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幌延深地層研究計画における地下水，河川水および降水の水質データ（2001 ～ 2010 年度）

Data of Groundwater from Boreholes, River Water and Precipitation for the Horonobe Underground Research Laboratory Project (2001-2010)

天野 由記　山本 陽一　南條 功　村上 裕晃
横田 秀晴　山崎 雅則　國丸 貴紀　大山 隆弘
岩月 輝希

Yuki AMANO, Yoichi YAMAMOTO, Isao NANJYO, Hiroaki MURAKAMI
Hideharu YOKOTA, Masanori YAMAZAKI, Takanori KUNIMARU, Takahiro OYAMA
and Teruki IWATSUKI

地層処分研究開発部門
幌延深地層研究ユニット

Horonobe Underground Research Unit
Geological Isolation Research and Development Directorate

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独立行政法人日本原子力研究開発機構　研究技術情報部　研究技術情報課
〒319-1195　茨城県那珂郡東海村白方白根 2 番地 4
電話 029-282-6387, Fax 029-282-5920, E-mail:ird-support@jaea.go.jp

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日本原子力研究開発機構
地層処分研究開発部門　幌延深地層研究ユニット
天野　由記，山本　陽一[※1]，南條 功[※1]，村上　裕晃，横田　秀晴，山崎　雅則[※1]，國丸　貴紀[+1]，
大山　隆弘[*1]，岩月　輝希

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日本原子力研究開発機構幌延深地層研究センターでは，地質環境特性調査および環境モニタリングとして平成 13 年度よりボーリング孔の地下水, 河川水および降水などの水質分析を実施してきた。本報告は，平成 13 年度から平成 22 年度までの水質分析データを取りまとめたものである。

幌延深地層研究センター（駐在）：〒098-3224　北海道天塩郡幌延町北進 432-2
+1 地層処分研究開発部門 東濃地科学研究ユニット，※1 技術開発協力員，　*1 電力中央研究所

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Horonobe Underground Research Unit
Geological Isolation Research and Development Directorate
Japan Atomic Energy Agency
Horonobe-cho, Teshio-gun, Hokkaido

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In the Horonobe Underground Research Laboratory (URL) Project, groundwater from boreholes, river water and precipitation have been analyzed for the environmental monitoring since the fiscal year 2001.

This report shows the data set of water chemistry since the fiscal year 2001 to the fiscal year 2010.

Keywords: Horonobe Underground Research Laboratory, Analytical Method, Environmental Monitoring, Groundwater

+1 Tono Geoscientific Research Unit, Geological Isolation Research and Development Directorate
※1 Collaborating Engineer
*1 Central Research Institute of Electric Power Industry

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1. はじめに

日本原子力研究開発機構 幌延深地層研究センターでは，幌延深地層研究計画に基づきボーリング孔の掘削を伴う地上からの調査研究（第 1 段階）の一環として，平成 13 年度から表層水，地下水などの水質分析を行ってきた。分析の対象は，ボーリング孔から採取した地下水，掘削水，掘削リターン水，岩石コアからの抽出水，河川水および雨水などである。また，平成 18 年度から幌延深地層研究計画における地下施設建設時の調査研究（第 2 段階）が進められており，立坑内の集水リング，立坑壁面湧水やボーリング孔などから地下水を採取し，水質分析を実施している。

本報告書では，國丸ほか（2007）[1)]によるデータ集に，地下施設を利用した採水調査を含む平成 18 年度から平成 22 年度までの水質分析データを加えた。また，財団法人 電力中央研究所，独立行政法人 産業技術総合研究所，独立行政法人 原子力安全基盤機構と共同で実施している調査結果についても加えており，幌延地域の地下水，表層水，天水の地球化学特性データについてこれまでの成果を取りまとめたものである。これらの水質分析データは，季節変動の把握のほか，地下水の水理モデルや地球化学モデルの構築や，地下施設の建設が地下水環境に与える影響評価などの様々な研究に利用できる。本報告書では，様々な目的の解析を行う過程でデータの品質を再確認できるように，データ毎に引用元，試料採取地点，試料採取日，分析期間，採取方法および分析方法についても示した。

2. 水質分析方法

2.1 試料採取場所および時期

Fig. 2.1.1 に水質分析試料を採取したボーリング孔(HDB-1,2,3,4,5,6,7,8,9,10,11 孔, PB-V01 孔)，河川水位自動観測点（P-1,P-2,P-3,P-4,P-5)，気象観測点（北進気象観測所：HMS，北進蒸発散量観測タワー：HET)，ズリ置き場の位置を示す。Fig. 2.1.2 に研究所用地周辺のボーリング孔位置，Fig. 2.1.3 に掘削土（ズリ）置場のボーリング孔位置，Fig. 2.1.4 に坑道内集水リングおよびボーリング孔位置，Fig. 2.1.5 に河川水および湧水の採取位置を示す。Fig. 2.1.6 には，研究所用地周辺，幌延町沿岸地域および上幌延地域において，財団法人 電力中央研究所（CRIEPI)，独立行政法人 産業技術総合研究所（AIST)，独立行政法人 原子力安全基盤機構（JNES）との共同研究により実施した調査ボーリング孔の位置を示す。また，平成 15 年 7 月～平成 23 年 3 月までに分析した各試料の採取場所および採取時期を Table 2.1.1～Table 2.1.8 に示す。

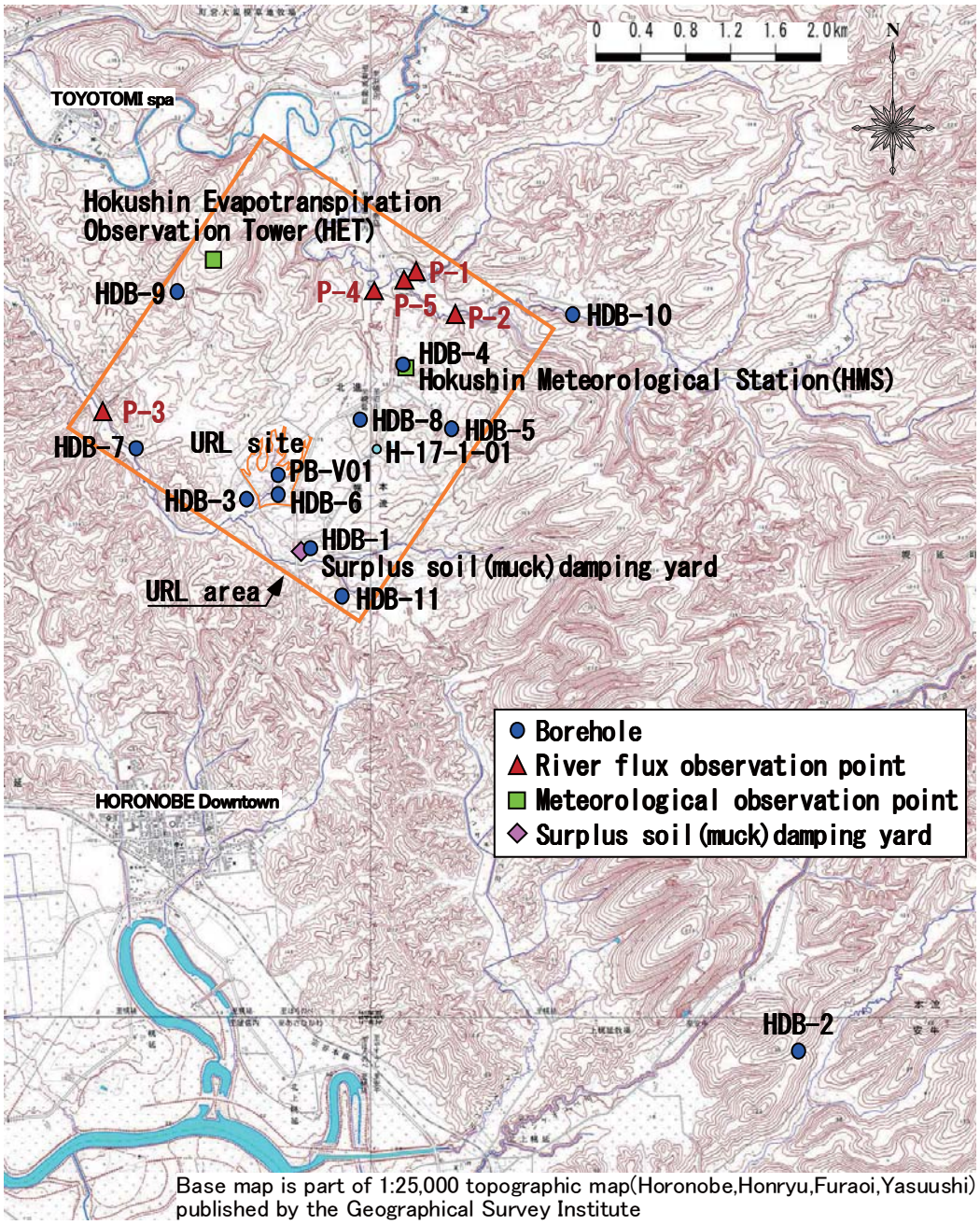

Fig. 2.1.1 Location map of sampling points

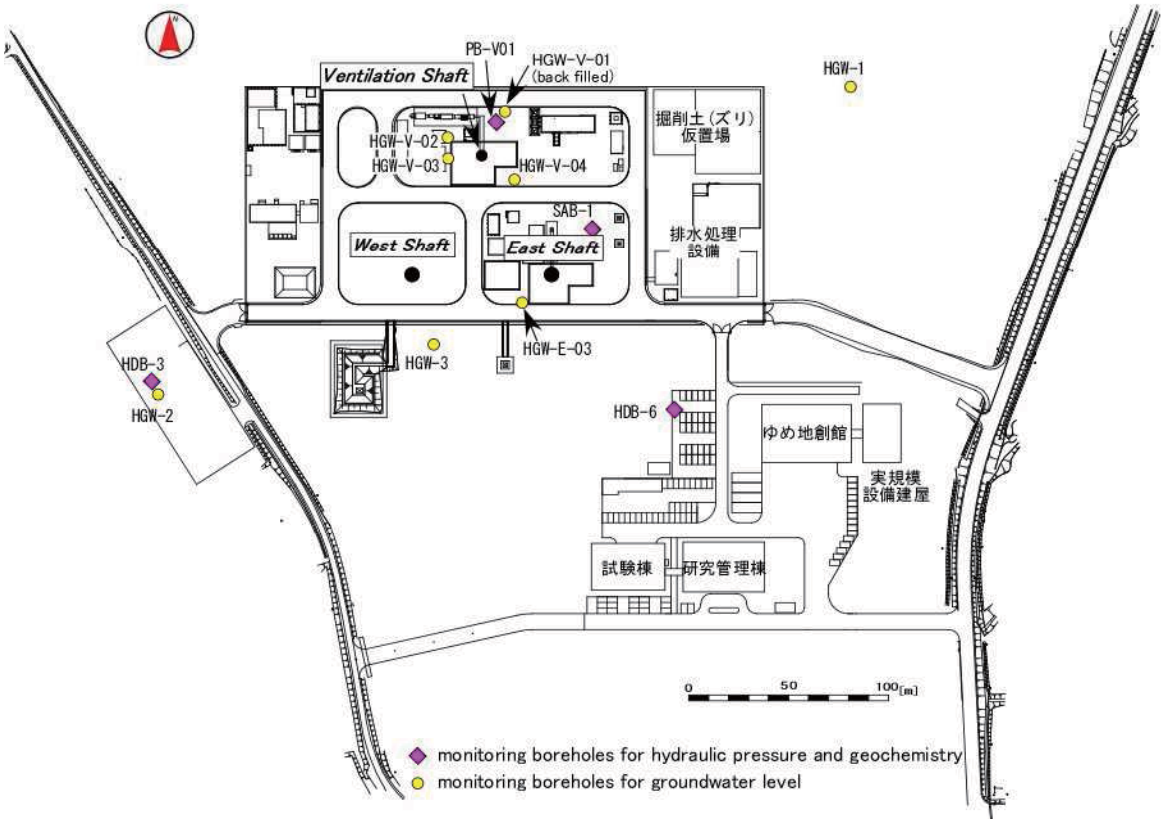

Fig. 2.1.2 Location map of sampling points around the Horonobe URL

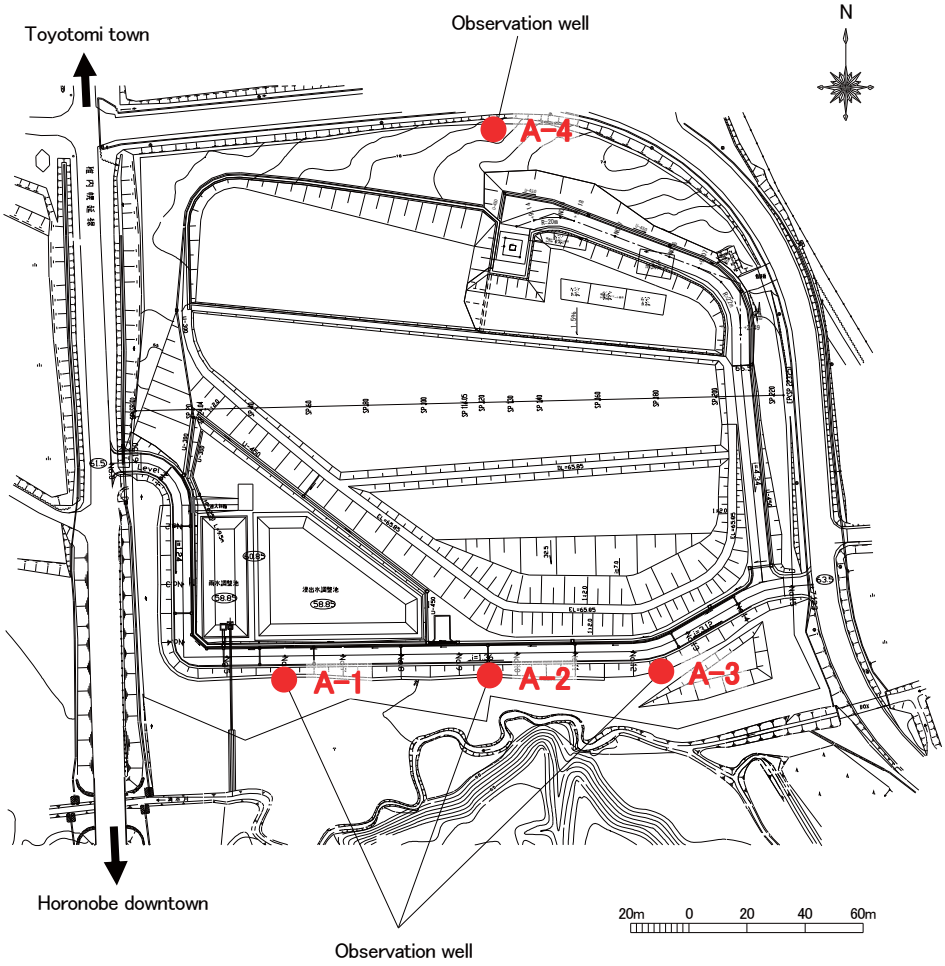

Fig. 2.1.3 Location map of sampling points at the surplus soil (muck) damping yard

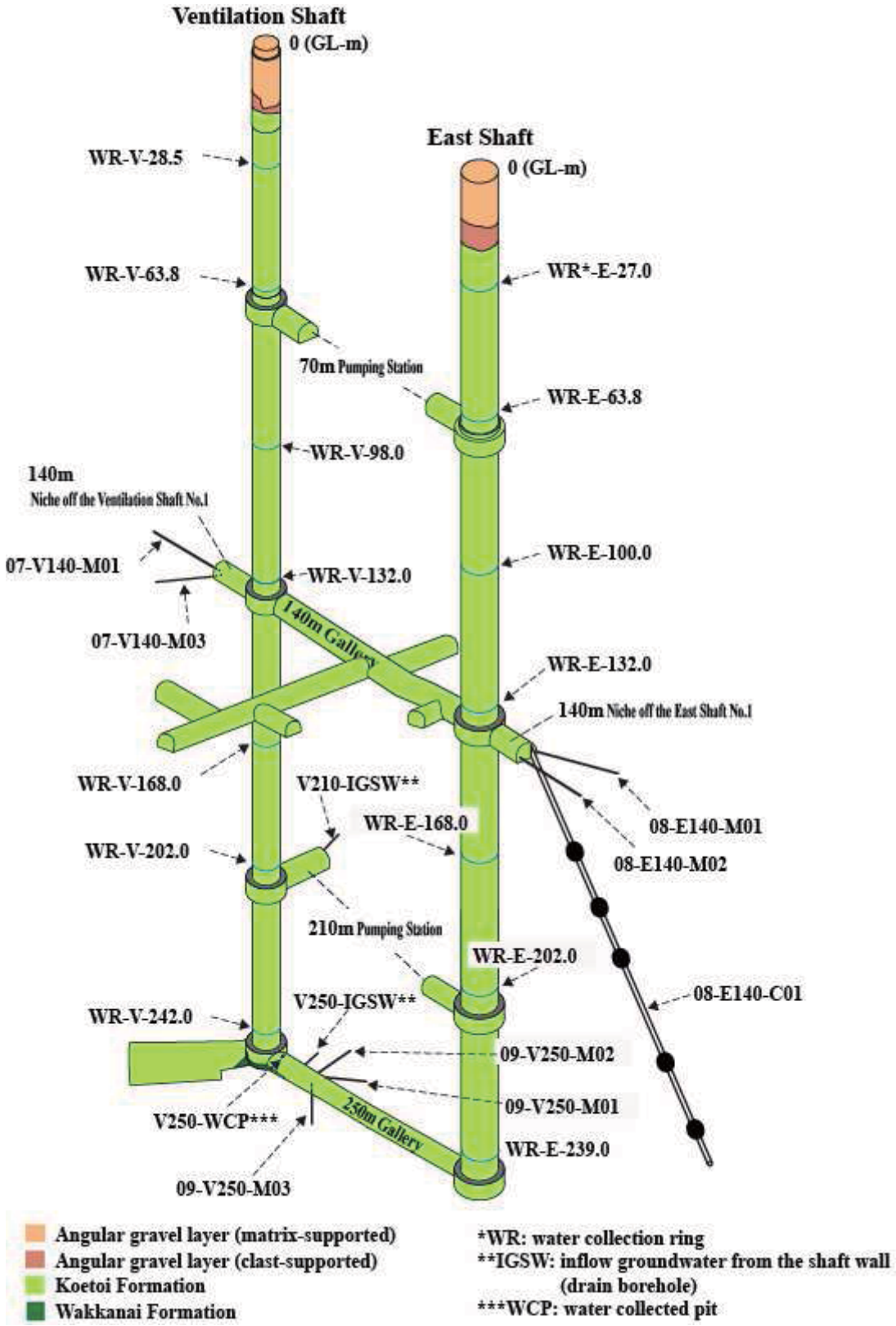

Fig. 2.1.4 Location map of sampling points in the Horonobe URL

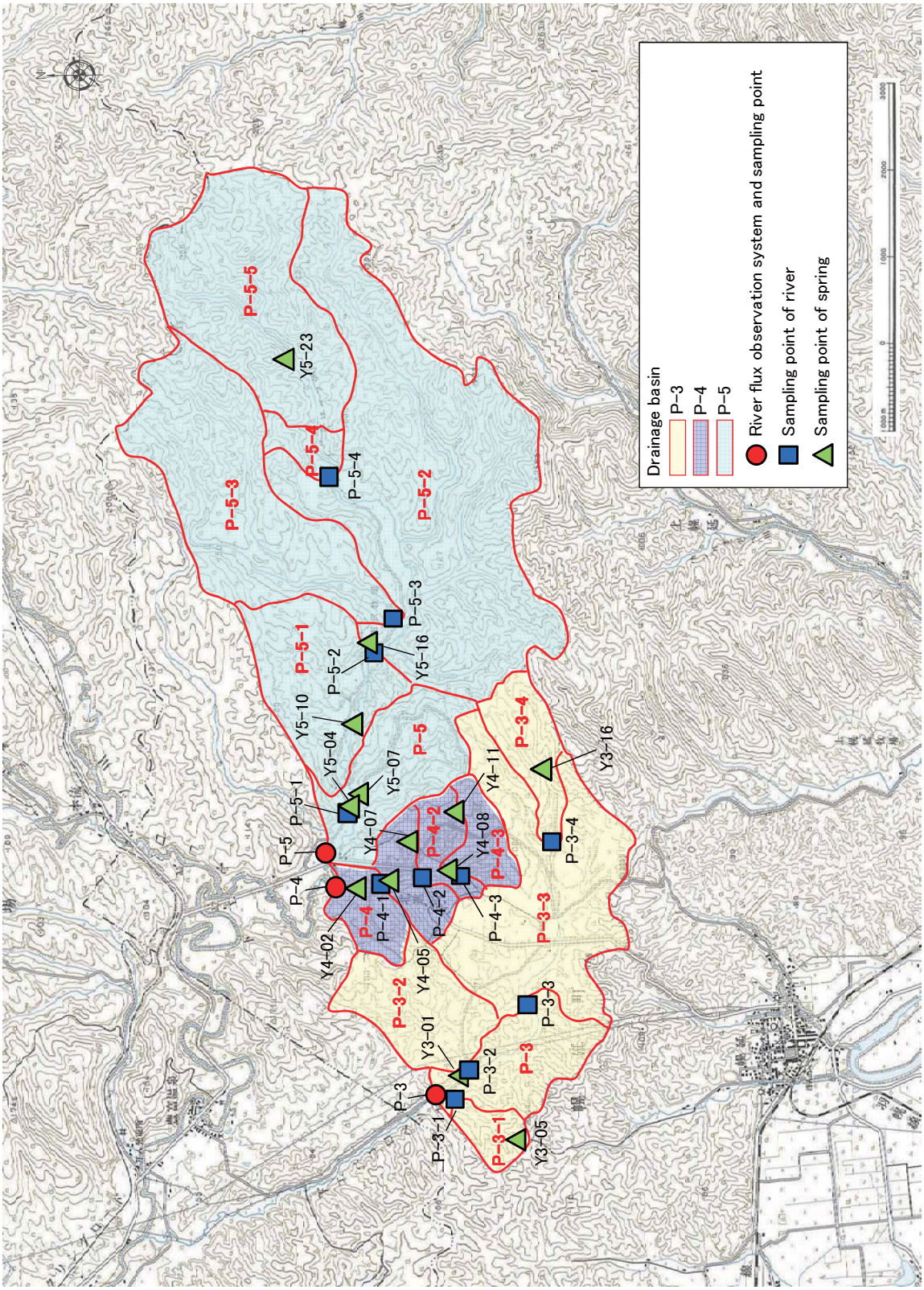

Fig. 2.1.5 Location map of sampling points of the river and the spring

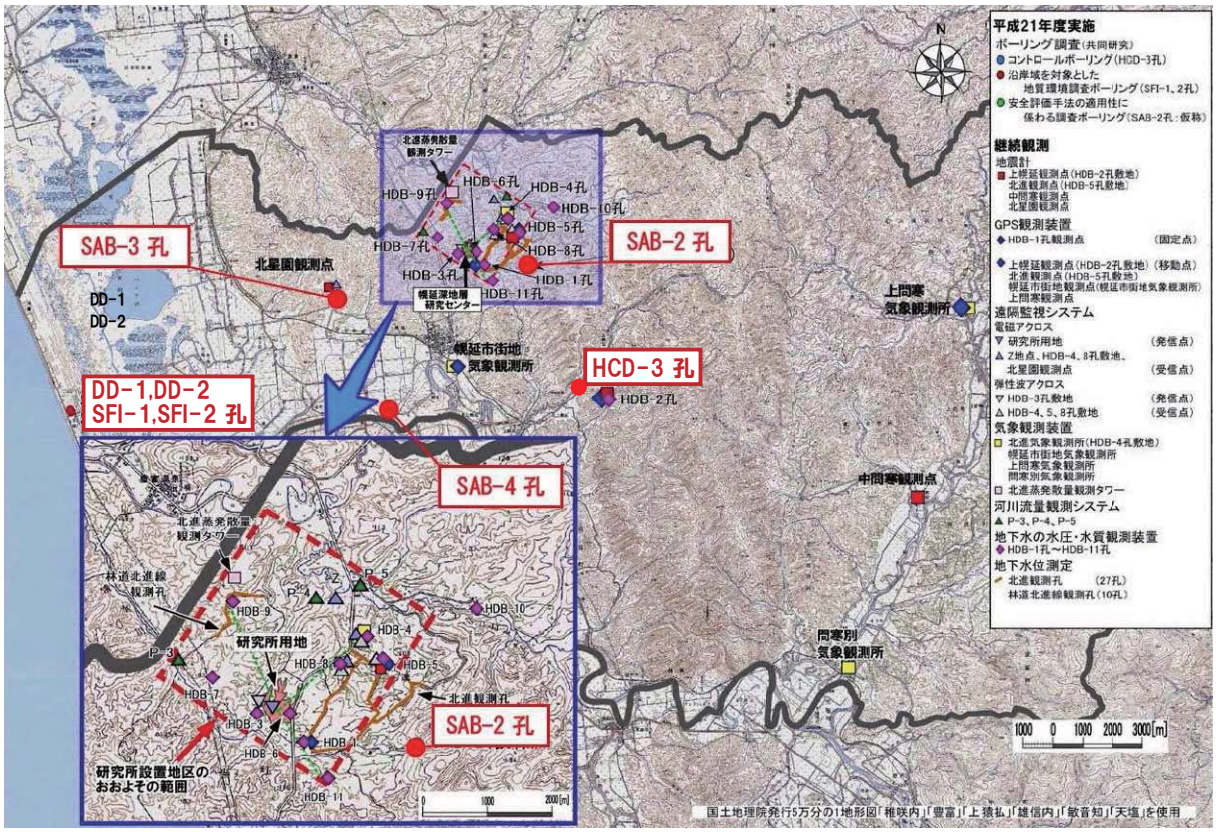

Fig. 2.1.6 Location map of sampling points (SAB-2,3,4, SFI-1,2, DD-1,2, HCD-3) at Horonobe Town (*from JAEA, 2011* [18]) *with some modification*)

Table 2.1.1 Sampling points and date in 2001-2010 after drilling boreholes on the ground surface

Sampling point	Depth [GL-m]	2003	2004	2005				2006		2007	2008	2009	2010
HDB-4	223.93-233.78		2/4-2/5	2/22	6/30	8/29	10/25	6/27	10/10			11/7	
	281.05-290.76			2/24	6/30	8/29	10/26	6/27	10/10			11/5	
	474.79-484.61		2/17-2/19		6/30							11/6	
HDB-5	368.6-376.0									11/8			
HDB-6	280.95 - 312.00	10/13											
	363.95-409.00	12/17											
	288.66-302.9			1/15				11/1					7/29
	362.39-385.7			1/17				11/6					7/28
	386.6-396.41							11/8		9/20			7/26
HDB-7	218.59-228.45		12/19										
HDB-9	216.90-257.50		11/27										
HDB-10	445.84-469.89		12/20										
	495.89-550.0			6/27	11/9			9/15		10/29	10/3		
HDB-11	224.96-236.30							12/22				10/26	
	395.61-404.45							12/22				10/29	
	606-644.15			3/29								10/26	
HGW-V-01	20-23							4/30					
	25-26							5/28					
HGW-V-03	9-12							10/10					
	38-40							10/15					
PB-V01	233.86-247.91										1/14		
	263.30-277.41										1/8		
	355.8-370.85										2/27, 3/8		

Table 2.1.2 Sampling points and date for river water in 2003 – 2010.

Sampling point	Date						
P-1	2003/7/28	2003/8/19	2003/9/19	2003/10/20	2003/11/20	2003/12/22	2004/1/20
	2004/2/19	2004/3/19	2004/4/22	2004/5/20	2004/6/22	2004/7/20	2004/7/26
	2004/8/20	2004/9/14	2004/9/17	2004/10/13	2004/10/14	2004/11/9	2004/11/12
	2004/11/19	2004/12/7	2004/12/22	2005/1/20	2005/2/18	2005/3/18	
P-2	2003/7/28	2003/8/19	2003/9/19	2003/10/20	2003/11/20	2003/12/22	2004/1/20
	2004/2/19	2004/3/19	2004/4/22	2004/5/20	2004/6/22	2004/7/20	2004/7/26
	2004/8/20	2004/9/14	2004/9/17	2004/10/13	2004/10/14	2004/11/9	2004/11/12
	2004/11/19	2004/12/7	2004/12/22	2005/1/20	2005/2/18	2005/3/18	
P-3	2003/7/28	2003/8/19	2003/9/19	2003/10/20	2003/11/20	2003/12/22	2004/1/20
	2004/3/19	2004/4/22	2004/5/20	2004/6/22	2004/7/20	2004/7/26	2004/8/20
	2004/9/14	2004/9/17	2004/10/13	2004/10/14	2004/11/9	2004/11/12	2004/11/19
	2004/12/7	2004/12/22	2005/1/20	2005/2/18	2005/3/18	2005/4/19	2005/5/19
	2005/5/20	2005/6/20	2005/7/21	2005/8/19	2005/9/20	2005/10/20	2005/11/21
	2005/12/20	2006/1/23	2006/2/20	2006/3/20	2006/4/19	2006/5/22	2006/6/22
	2006/7/21	2006/8/21	2006/9/20	2006/10/17	2006/11/21	2006/12/19	2007/1/16
	2007/2/16	2007/3/28	2007/4/17	2007/5/22	2007/6/20	2007/7/23	2007/8/21
	2007/9/20	2007/10/18	2007/11/20	2007/12/17	2008/1/16	2008/2/14	2008/6/20
	2009/8/5	2009/8/5	2009/12/21	2010/10/20	2011/2/9		
P-4	2004/5/20	2004/6/22	2004/7/20	2004/7/26	2004/8/20	2004/9/14	2004/9/17
	2004/10/13	2004/10/14	2004/11/9	2004/11/12	2004/11/19	2004/12/7	2004/12/22
	2005/1/20	2005/2/18	2005/3/18	2005/4/19	2005/5/19	2005/5/20	2005/6/20
	2005/7/21	2005/8/19	2005/9/20	2005/10/20	2005/11/21	2005/12/20	2006/1/23
	2006/2/20	2006/3/20	2006/4/19	2006/5/22	2006/6/22	2006/7/21	2006/8/21
	2006/9/20	2006/10/17	2006/11/21	2006/12/19	2007/1/16	2007/2/16	2007/3/28
	2007/4/17	2007/5/22	2007/6/20	2007/7/23	2007/8/21	2007/9/20	2007/10/18
	2007/11/20	2007/12/17	2008/1/16	2008/2/14	2008/6/20	2008/12/25	2009/8/6
	2009/12/21	2010/10/20	2011/2/9				
P-5	2004/5/20	2004/6/22	2004/7/20	2004/7/26	2004/8/20	2004/9/14	2004/9/17
	2004/10/13	2004/10/14	2004/11/9	2004/11/12	2004/11/19	2004/12/7	2004/12/22
	2005/1/20	2005/2/18	2005/3/18	2005/4/19	2005/5/19	2005/5/20	2005/6/20
	2005/7/21	2005/8/19	2005/9/20	2005/10/20	2005/11/21	2005/12/20	2006/1/23
	2006/2/20	2006/3/20	2006/4/19	2006/5/22	2006/6/22	2006/7/21	2006/8/21
	2006/9/20	2006/10/17	2006/11/21	2006/12/19	2007/1/16	2007/2/16	2007/3/28
	2007/4/17	2007/5/22	2007/6/20	2007/7/23	2007/8/21	2007/9/20	2007/10/18
	2007/11/20	2007/12/17	2008/1/16	2008/2/14	2008/6/20	2008/12/25	2009/8/6
	2009/12/21	2010/10/20	2011/2/9				
P-3-1,2,3,4	2009/12/4						
P-4-1,2,3	2009/12/4						
P-5-1,2,3,4	2009/12/4						

Table 2.1.3 Sampling points and date for precipitation in 2003 – 2010.

Sampling point		Date						
Rain	HMS	2003/8/14	2003/10/8	2003/10/20	2003/11/20	2004/5/20	2004/6/22	2004/7/20
		2004/8/20	2004/9/17	2004/10/14	2004/11/19	2005/4/19	2005/5/20	2005/6/20
		2005/8/19	2005/9/20	2005/10/20	2006/5/22	2006/6/22	2006/7/21	2006/8/21
		2006/9/20	2006/10/17	2006/11/21	2007/5/22	2007/6/20	2007/7/23	2007/8/21
		2007/9/20	2007/10/18	2007/11/20	2008/6/20	2009/8/4	2010/9/6	
Snow	HMS	2003/12/10	2004/1/20	2004/2/19	2004/4/22	2005/1/20	2005/2/18	2005/3/18
		2005/12/20	2006/1/23	2006/2/17	2006/3/20	2006/4/19	2006/12/19	2007/1/16
		2007/2/16	2007/3/28	2007/4/17	2007/12/17	2008/6/20	2009/1/15	2011/2/9
Rain and Snow	P-3	2010/1/5						
	P-4	2010/1/5						
	P-5	2009/12/21						
	HET	2010/1/5						
	HDB-2	2010/1/5						
	HMS	2004/12/22	2005/11/21					

Table 2.1.4 Sampling points and date for groundwater at the surplus soil (muck) damping yard in 2006 – 2010.

Sampling point	Date						
A-1	2006/12/22	2007/3/2	2007/5/22	2007/8/4	2007/11/8	2008/2/5	2008/8/1
	2008/11/4	2009/2/2	2009/8/3	2009/11/2	2010/2/1		
A-2	2006/12/22	2007/3/2	2007/5/22	2007/8/4	2007/11/8	2008/2/5	2008/8/1
	2008/11/4	2009/2/2	2009/8/3	2009/11/2	2010/2/1		
A-3	2006/12/22	2007/3/2	2007/5/22	2007/8/4	2007/11/8	2008/2/5	2008/8/1
	2008/11/4	2009/2/2	2009/8/3	2009/11/2	2010/2/1		
A-4	2006/12/22	2007/3/2	2007/5/22	2007/8/4	2007/11/8	2008/2/5	2008/8/1
	2008/11/4	2009/2/2	2009/8/3	2009/11/2	2010/2/1		

Table 2.1.5 Sampling point and date for groundwater at the downtown well in 2007 – 2008.

Sampling point	Date					
Well	2007/6/4	2007/11/5	2007/12/3	2008/1/7	2008/2/8	2008/6/5

Table 2.1.6 Sampling points and date for turbidity in 2005-2007

	2005				2006				2007	
Sampling point	P-3		P-5		P-5		P-5		P-5	
Date	2005/9/7	11:05	2005/9/7	11:30	2006/8/18	11:00	2006/10/12	0:00	2007/9/7	15:40
	2005/9/7	22:00	2005/9/7	22:17	2006/8/21	13:30	2006/10/12	1:00	2007/9/7	21:40
	2005/9/8	1:59	2005/9/8	0:36	2006/8/21	16:30	2006/10/12	2:00	2007/9/8	0:40
	2005/9/8	3:00	2005/9/8	1:45	2006/8/21	19:30	2006/10/12	3:00	2007/9/8	2:40
	2005/9/8	4:00	2005/9/8	2:59	2006/8/21	21:30	2006/10/12	4:00	2007/9/8	4:40
	2005/9/8	5:00	2005/9/8	4:17	2006/8/22	23:30	2006/10/12	5:00	2007/9/8	6:40
	2005/9/8	5:58	2005/9/8	5:32	2006/8/22	1:30	2006/10/12	6:00	2007/9/8	8:40
	2005/9/8	6:58	2005/9/8	6:58	2006/8/22	2:30	2006/10/12	7:00	2007/9/8	10:40
	2005/9/8	12:22	2005/9/8	8:18	2006/8/22	3:30	2006/10/12	8:00	2007/9/8	12:40
	2005/9/8	18:10	2005/9/8	9:30	2006/8/22	4:30	2006/10/12	9:00	2007/9/8	14:40
	2005/9/9	16:20	2005/9/8	11:25	2006/8/22	5:30	2006/10/12	10:00	2007/9/8	16:40
			2005/9/8	12:37	2006/8/22	6:30	2006/10/12	11:00	2007/9/8	18:40
			2005/9/8	13:50	2006/8/22	7:30	2006/10/12	12:00	2007/9/8	20:40
			2005/9/8	15:05	2006/8/22	8:30	2006/10/12	14:00	2007/9/8	22:40
			2005/9/8	16:30	2006/8/22	9:30	2006/10/12	16:00	2007/9/9	0:40
			2005/9/9	16:35	2006/8/22	10:30	2006/10/12	19:00	2007/9/9	2:40
					2006/8/22	11:30	2006/10/12	22:00	2007/9/9	4:40
					2006/8/22	12:30	2006/10/13	1:00	2007/9/9	6:40
					2006/8/22	13:30	2006/11/10	1:00	2007/9/9	8:40
					2006/8/22	14:30	2006/11/10	4:00	2007/9/9	10:40
					2006/8/22	16:30	2006/11/10	7:00	2007/9/9	12:40
					2006/8/23	18:30	2006/11/10	9:00	2007/9/9	14:40
					2006/8/23	21:30	2006/11/10	11:00	2007/9/9	17:40
					2006/8/24	0:30	2006/11/10	12:00	2007/9/9	20:40
					2006/8/24	3:30	2006/11/10	13:00	2008/2/14	16:00
					2006/8/24	15:10	2006/11/10	15:00		
					2006/8/24	21:10	2006/11/10	17:00		
					2006/8/25	3:10	2006/11/10	19:00		
					2006/8/25	5:10	2006/11/10	21:00		
					2006/8/25	6:10	2006/11/11	23:00		
					2006/8/25	7:10	2006/11/11	1:00		
					2006/8/25	8:10	2006/11/11	5:00		
					2006/8/25	9:10	2006/11/11	14:00		
					2006/10/11	13:00				
					2006/10/11	16:00				
					2006/10/11	19:00				
					2006/10/11	21:00				
					2006/10/11	23:00				

Table 2.1.7 Sampling points and date from the water collection rings in 2006-2010.

Sampling point		Date					
Ventilation shaft	V-28.5	2006/11/27	2007/1/9	2007/2/8	2007/3/16	2007/5/25	2007/7/3
		2007/7/13	2007/9/17	2007/11/12	2007/12/14	2008/1/10	2008/6/11
		2008/9/12	2008/11/11	2009/3/10	2010/10/27	2010/11/24	2010/12/22
	V-63.8	2007/9/17	2007/11/12	2007/11/23	2007/12/4	2007/12/14	2007/12/20
		2008/1/10	2008/2/7	2010/10/27	2010/11/24	2011/12/22	
	V-98.0	2007/11/8	2007/11/23	2007/11/27	2007/12/4	2007/12/14	2007/12/20
		2008/1/10	2008/2/7	2009/7/27	2009/11/25	2010/11/18	2010/7/27
		2010/11/24	2010/12/22	2011/2/1			
	V-132.0	2008/6/17	2008/11/11	2009/7/27	2009/11/25	2010/1/18	2010/2/16
		2010/7/27	2010/10/27	2010/11/24	2010/12/22	2011/2/1	
	V-168.0	2008/6/17	2008/11/11	2009/7/27	2009/11/25	2010/1/18	2010/2/16
		2010/7/27	2010/10/27	2010/11/24	2010/12/22	2011/2/1	
	V-202.0	2008/9/12	2008/11/11	2009/7/27	2009/11/25	2010/1/18	2010/2/16
		2010/10/27	2010/11/24	2010/12/22	2011/2/1		
	V-242.0	2008/11/11	2009/1/13	2009/7/27			
East shaft	E-27.0	2007/1/9	2007/2/8	2007/3/16	2007/5/26	2007/6/18	2007/9/13
		2007/11/23	2007/12/11	2008/1/10	2008/6/10	2009/4/27	2010/7/27
		2010/10/27	2010/11/24	2010/12/22			
	E-63.8	2007/11/23	2007/12/11	2007/12/25	2008/1/10	2008/2/7	2008/6/10
		2008/11/12	2009/2/10	2009/12/22	2010/1/18	2010/2/16	2010/7/27
		2010/10/27	2010/11/24	2010/12/22	2011/2/1		
	E-100.0	2008/6/10	2008/11/12	2009/7/27	2009/11/25	2010/1/18	2010/2/16
		2010/7/27	2010/10/27	2010/11/24	2010/12/22		
	E-132.0	2008/11/12	2009/7/27	2009/11/25	2010/1/18	2010/2/16	2010/7/27
		2010/10/27	2010/11/24	2010/12/22	2011/2/1		
	E-168.0	2009/11/25	2009/12/22	2010/1/12	2010/1/18	2010/1/26	2010/2/2
		2010/2/9	2010/2/16	2010/2/22	2010/3/2	2010/10/27	2010/11/24
		2010/12/22	2011/2/1				
	E-202.0	2009/12/22	2010/1/12	2010/1/18	2010/1/26	2010/2/2	2010/2/9
		2010/2/16	2010/2/22	2010/3/2	2010/7/27	2010/10/27	2010/11/24
		2010/12/22	2011/2/1				
	E-239.0	2010/5/18	2010/6/1	2010/6/23	2010/7/7	2010/7/21	

Table 2.1.8 Sampling points and date for inflow groundwater from the shaft and gallery wall in 2008-2010

Sampling point		Depth (GL-m)	Date				
Ventilation shaft	07-V140-M01		2008/2/8	2008/11/17	2008/12/19	2009/8/26	2009/12/22
			2010/1/18	2010/2/16	2010/1/15	2010/7/27	2010/10/27
			2010/11/19	2010/11/24	2010/12/22		
	07-V140-M03		2010/1/15	2010/10/28	2010/11/25		
	09-V250-M01		2009/12/15	2010/1/18	2010/6/7	2010/10/13	2011/1/20
	09-V250-M02		2009/11/17	2010/1/18	2010/6/7	2010/10/13	2011/1/20
		Zone 1	2011/2/15				
		Zone 2	2011/2/15				
	09-V250-M03		2009/12/15	2010/1/18	2010/6/7	2010/10/14	2011/1/20
East shaft	08-E140-M01		2010/2/4	2010/10/29			
	08-E140-M02	Zone 1	2010/1/15	2010/2/4	2010/7/20	2010/10/28	2011/2/15
		Zone 2	2010/1/15	2011/2/15			
	08-E140-C01		2009/3/9	2009/3/13			
		157.55-167.86	2009/4/16	2009/8/4	2009/9/17	2011/2/4	
		168.62-174.37	2009/4/16	2009/8/4	2009/9/17		
		175.13-194.20	2009/3/17	2009/4/16	2009/8/4	2009/9/17	2011/2/16
		195.0-208.87	2009/3/17	2009/4/16	2009/8/4	2009/9/17	2011/2/16
		219.69-218.7	2009/3/7	2009/4/16	2009/8/4	2009/9/17	2011/1/31
			2011/2/4				

2.2 分析試料の採取方法

2.2.1 化学成分分析試料の採取

化学成分分析用の試料はポリエチレンビンに採取した。採取前に容器内部を試料水で3回以上とも洗いし，満水状態となるまで採水した。

2.2.2 同位体分析試料の採取

トリチウム，酸素（$\delta^{18}O$）・水素（δD）安定同位体比，塩素同位体比分析用の試料はポリエチレンビンに採取した。採取前に容器内部を試料水で3回以上とも洗いし，満水状態で採水した。$\delta^{13}C$・$\Delta^{14}C$ 分析用試料は，あらかじめ硝酸洗浄を行ったガラス瓶（1 L；デュラン瓶）で可能な限り大気が混入しない状態で採取し，容器内の試料をオーバーフローさせた後，採取後直ちに5 N水酸化ナトリウム溶液（10 ml）および2 N塩化ストロンチウム溶液（10 ml）を添加して，試料中の炭素を固定処理した。

2.2.3 有機酸類分析試料の採取

有機酸類分析試料は，ポリエチレンビンに採取した。採取前に容器内部を試料水で3回以上とも洗いし，満水状態で採水した。

2.2.4 ガス分析試料の採取

ガス分析試料は，ガラス製の容器に採取し，ブチルゴムおよびアルミキャップで栓をした。表層からのボーリング調査による揚水試験中の試料については，揚水試験中，セパレータータンクにて分離された気相を採取した。このとき，容器内を容積の20倍程度のガスを通過させてから容器のコックを閉じた。揚水試験試料以外については，封圧採水あるいは採水時に生じた脱ガス試料を水上置換法により採取した。

2.2.5 微生物分析試料の採取

微生物分析試料の採水は絶対嫌気性細菌の死滅を防ぐため，地下水への空気（酸素）の接触，もしくは混入が無いよう，窒素ガスを充填したグローブバッグ内にて行った。試料は培養計数用試料についてはネジロガラスビン，全菌数計数用試料については滅菌済みポリプロピレンビンに採取した。なお雑菌の混入を防止するため，試料容器はあらかじめオートクレーブによる滅菌（121℃，15 分の高圧蒸気滅菌）を施し，グローブバッグはγ線照射による滅菌を施した新品を使用し，さらに試料容器はグローブバッグ挿入前にアルコール消毒を行った。採水時は試料水で容器内部を 3 回以上とも洗いして，満水状態で採水した。

全菌数計数用試料は，試料水内の微生物細胞を固定するために，採水後に試料水に中性ホルマリンを終濃度が4%になるように添加した。

2.3 分析項目および分析方法

主な水質分析項目および主な分析方法をTable 2.3.1 ～Table 2.3.6に示す。このうち，Table 2.3.4に分析方法の略称，Table 2.3.5およびTable 2.3.6に各試料の分析方法を示した。各分析方法を以下に記述する。

2.3.1 化学成分の分析方法

水試料は，0.45 μm メンブランフィルターを用いて吸引ろ過をした後に，分析に供した。ただし，pHおよび電気伝導度や全濃度を対象とした分析項目については，濾過処理を行わずに測定を行った。

化学成分分析の分析法を Table 2.3.1，および重炭酸イオン（HCO_3^-）および炭酸イオン（CO_3^{2-}）の計算方法をTable 2.3.2 に示す。TICの分析を行っていない試料のHCO_3^- およびCO_3^{2-} の濃度については，Table 2.3.3を元にアルカリ度から換算した。

Table 2.3.1 Methods of analysis

Analytical species	Analytical methods
pH	Glass electrode method (JIS K 0102-12.1)
ORP	Metallic Electrodes (Pt, Ag)
Electric conductivity (EC)	EC portable meter (JIS K 0102-13)
Na^+	Flame photometry (JIS K 0101-47.1), Ion chromatography, Inductively coupled plasma atomic emission spectrometry
K^+	Flame photometry (JIS K 0101-48.1) Ion chromatography, Inductively coupled plasma atomic emission spectrometry
NH_4^+	Absorptiometry (JIS K 0101-36.5)
Li^+	Inductively coupled plasma atomic emission spectrometry
Ca^{2+}	Inductively coupled plasma atomic emission spectrometry (JIS K 0101-49.3) Flame photometry, Ion chromatography,
Mg^{2+}	Inductively coupled plasma atomic emission spectrometry (JIS K 0101 50.3) Flame photometry, Ion chromatography,
Sr	Inductively coupled plasma atomic emission spectrometry
Se	Atomic absorption spectrometry (JIS K 0102 67.2)
P	Absorptiometry (JIS K 0102-46.3), Inductively coupled plasma atomic emission spectrometry
I^-	Ion chromatography (JIS K 0102-36.1), Ion selective electrode method
Mn(II)	Inductively coupled plasma atomic emission spectrometry (JIS K 0101-58.4), Absorptiometry
T-Mn	Inductively coupled plasma atomic emission spectrometry (JIS K 0101 58.4)
Fe^{3+}	Phenanthroline Absorptiometry (JIS K 0101 60.1) Inductively coupled plasma atomic emission spectrometry (JIS K 0101 60.4)
Fe^{2+}	Phenanthroline Absorptiometry (JIS K 0101 60.1)
Total Fe	Inductively coupled plasma atomic emission spectrometry (JIS K 0101-60.4), Absorptiometry
SiO_2	Gravimetric analysis (JIS K 0101-44.3)
Dissolved (and colloidal) Si	Inductively coupled plasma atomic emission spectrometry (JIS K 0101 44.2), Absorptiometry
Al^{3+}	Inductively coupled plasma atomic emission spectrometry (JIS K 0101 59.4)
F^-	Ion chromatography (環告第 59 号付表 6), Absorptiometry
Cl^-	Ion chromatography (JIS K 0101 32.5)
Br^-	Ion chromatography (JIS K 0101-34.2)
NO_3^-	Ion chromatography (JIS K 0101-37.2.5), Absorptiometry
NO_2^-	Ion chromatography (JIS K 0101-37.1.2)
SO_4^{2-}	Ion chromatography (JIS K 0101-42.4)
S^{2-}	Methylene blue Absorptiometry (JIS K 0101-40.1)
M-alkalinity (pH 4.8)	Neutralization titration (JIS K 0101-14.2)
P-alkalinity (pH 8.3)	Neutralization titration (JIS K 0101-14.2)
TOC	Combustion catalytic oxidation and nondispersive infrared detection (JIS K 0102-22.2)
TIC	Combustion catalytic oxidation and nondispersive infrared detection (JIS K 0102-22.2)
U	Inductively coupled plasma mass spectrometry
Tracer	High performance liquid chromatography, Fluorometry
δD, $\delta^{18}O$, $\delta^{13}C$, $\delta^{34}S$	Mass spectrometry
^3H	Mass spectrometry, Scintillation counter method

Table 2.3.2 Concentration distribution of total carbonate relate to pH (at 25℃)

pH	Concentration distribution		pH	Concentration distribution		pH	Concentration distribution	
	a (HCO_3^-)	b (CO_3^{2-})		a (HCO_3^-)	b (CO_3^{2-})		a (HCO_3^-)	b (CO_3^{2-})
2.0	0.00000	—	6.0	0.30120	0.00000	10.0	0.68010	0.31970
2.1	0.00002	—	6.1	0.35630	0.00002	10.1	0.62452	0.37532
2.2	0.00004	—	6.2	0.41140	0.00004	10.2	0.56894	0.43094
2.3	0.00006	—	6.3	0.46650	0.00006	10.3	0.51336	0.48656
2.4	0.00008	—	6.4	0.52160	0.00008	10.4	0.45778	0.54218
2.5	0.00010	—	6.5	0.57670	0.00010	10.5	0.40220	0.59780
2.6	0.00016	—	6.6	0.62362	0.00016	10.6	0.35684	0.64316
2.7	0.00022	—	6.7	0.67054	0.00022	10.7	0.31148	0.68852
2.8	0.00028	—	6.8	0.71746	0.00028	10.8	0.26612	0.73388
2.9	0.00034	—	6.9	0.76438	0.00034	10.9	0.22076	0.77024
3.0	0.00040	—	7.0	0.81130	0.00040	11.0	0.17540	0.82460
3.1	0.00060	—	7.1	0.83510	0.00060	11.1	0.15292	0.84708
3.2	0.00080	—	7.2	0.85890	0.00080	11.2	0.13044	0.86956
3.3	0.00100	—	7.3	0.88270	0.00100	11.3	0.10796	0.89204
3.4	0.00120	—	7.4	0.90650	0.00120	11.4	0.08548	0.91452
3.5	0.00140	—	7.5	0.93030	0.00140	11.5	0.06300	0.93700
3.6	0.00198	—	7.6	0.93880	0.00204	11.6	0.05456	0.94544
3.7	0.00256	—	7.7	0.94730	0.00268	11.7	0.04612	0.95388
3.8	0.00314	—	7.8	0.95580	0.00332	11.8	0.03768	0.96232
3.9	0.00372	—	7.9	0.96430	0.00396	11.9	0.02924	0.97076
4.0	0.00430	—	8.0	0.97280	0.00460	12.0	0.02080	0.97920
4.1	0.00612	—	8.1	0.97390	0.00658	12.1	0.01798	0.98202
4.2	0.00794	—	8.2	0.97500	0.00856	12.2	0.01516	0.98484
4.3	0.00976	—	8.3	0.97610	0.01054	12.3	0.01234	0.98766
4.4	0.01158	—	8.4	0.97720	0.01252	12.4	0.00952	0.99048
4.5	0.01340	—	8.5	0.97830	0.01450	12.5	0.00670	0.99330
4.6	0.01898	—	8.6	0.97324	0.02056	12.6	0.00578	0.99422
4.7	0.02456	—	8.7	0.96818	0.02662	12.7	0.00486	0.99514
4.8	0.03014	—	8.8	0.96312	0.03268	12.8	0.00394	0.99606
4.9	0.03572	—	8.9	0.95806	0.03874	12.9	0.00302	0.99698
5.0	0.04130	—	9.0	0.95300	0.04480	13.0	0.00210	0.99790
5.1	0.05704	—	9.1	0.93642	0.06170			
5.2	0.07278	—	9.2	0.91984	0.07860			
5.3	0.08852	—	9.3	0.90326	0.09550			
5.4	0.10426	—	9.4	0.88668	0.11240			
5.5	0.12000	—	9.5	0.87010	0.12930			
5.6	0.15624	—	9.6	0.83210	0.16738			
5.7	0.19248	—	9.7	0.79410	0.20546			
5.8	0.22872	—	9.8	0.75610	0.24354			
5.9	0.26496	—	9.9	0.71810	0.28162			

Notice:

1. Molecular weights for the calculation; H: 1.008, C: 12.01, O: 16.00
   Namely: CO_2 : 44.01, HCO_3^- : 61.018, CO_3^{2-} : 60.01
2. Calculation method as follows;

$$[HCO_3^-] = C \times a \times 61.018/44.01$$
$$[CO_3^{2-}] = C \times b \times 60.01/44.01$$

C : concentration of total carbonate (= TIC (mg/l) × 44.01/12.01) (mg CO_2/l)
a : molar ratio of bicarbonate
b : molar ratio of carbonate

Table 2.3.3 Conversion table of alkalinity

Condition	Calculation formula
P-Alkalinity＝0 M-Alkalinity＝HCO_3^-	M[meq/l]×61.018
2×P-Alkalinity < M-Alkalinity 2×P-Alkalinity＝CO_3^{2-} M-Alkalinity－2×P-Alkalinity＝HCO_3^-	2P[meq/l]×30.05 (M－2P) [meq/l]×61.018
2×P-Alkalinity＝M-Alkalinity 2×P-Alkalinity＝CO_3^{2-}	2P[meq/l]×30.05
P-Alkalinity < M-Alkalinity < 2×P-Alkalinity 2×P-Alkalinity－M-Alkalinity＝OH^- 2×(M-Alkalinity－P-Alkalinity)＝CO_3^{2-}	(2P－M) [meq/l]×17.008 2(M－P) [meq/l]×30.05
P-Alkalinity＝M-Alkalinity P-Alkalinity＝OH^-	P[meq/l]×17.008

Molecular weights for the calculation; H: 1.008, C: 12.01, O: 16.00

2.3.2　同位体の分析方法

(1) 酸素安定同位体比（$\delta^{18}O$）

水試料 250 µl をガラスバイアル（容量 1 ml）に採取し，グローブバッグ内で，ヘッドスペースに CO_2 ガスを満たした後，シリコンセプタム付キャップで蓋をした。この状態で 40℃のブロックバスにセットして 9 時間以上静置した。この操作で，H_2O－CO_2 間での酸素同位体交換反応により，CO_2 ガスは，水の酸素同位体比に応じた同位体比組成と平衡になる。この CO_2 ガスをオートサンプラーにより質量分析計に導入し（途中コールドトラップを用いて水分を除去する），同位体比を測定した。

$\delta^{18}O$ は次の関係から求めることができる。

$$\delta^{18}O\ (‰) = [(^{18}O/^{16}O)sample - (^{18}O/^{16}O)SMOW] / (^{18}O/^{16}O)SMOW \times 1000$$

ここで，SMOW: 標準海水，sample: 供試体

(2) 水素安定同位体比（δD）

水試料は，ファインピペットを用いて約 3 µL 採取し，反応容器（グリースレスストップコック付パイレックス反応管）内で約 1 g の金属亜鉛と真空下 410℃で 2～5 時間反応させ，H_2 ガスを発生させた。このガスを質量分析計に導入して同位体比を測定した。

δD は次の関係から求めることができる。

$$\delta D\ (‰) = [(D/H)_{sample} - (D/H)_{SMOW}] / (D/H)_{SMOW} \times 1000$$

ここで，D: 重水素，SMOW: 世界標準海水，sample: 供試体

(3) トリチウム（T）

ろ過・蒸留した試料（1～2 ）を過酸化ナトリウムとともに電解セルに入れて約 125 時間電解濃縮を行った。電解濃縮試料に乾燥した CO_2 ガスを約 15 分間通気し，再度蒸留を行った。このうち 10 ml をガラスバイアルに分取し，液体シンチレーター10 ml を加え，振り混ぜた後，冷暗所に一昼夜静置した。この試料を液体シンチレーションカウンターにより β 線測定を行った。

(4) 塩素同位体比（$^{36}Cl/Cl$）

試料水はイオン交換クロマトグラフィーにより塩化物イオンを分離し，硝酸銀添加及び遠心分離法により，加速器質量分析器（AMS）の供試体となる塩化銀（AgCl）を沈殿させた。通常はこの作業を 2 度繰り

返した。AMS による $^{36}Cl/Cl$ 分析においては，試料中に含まれる ^{36}S の影響を受けるため，上記の AgCl の精製を行った。精製では AgCl の沈殿物を蒸留水及びアンモニア溶液により洗浄し，遠心分離法により再沈殿させる作業を数回繰り返した。精製された AgCl 沈殿物をオーブンにて乾燥させ，AMS の供試体とした。分析に必要な AgCl 供試体は 5～25 mg である。

(5) 硫黄同位体比（$^{34}S/S$）

硫酸イオン濃度の低い（<約 50 mg/l）試料は加熱蒸発させることにより適宜濃縮した。試料は 0.45 μm メンブランフィルターを用いて吸引ろ過した後に分析に供した。試料を強酸酸性にして煮沸した後，塩化バリウム溶液を加え，硫酸イオンを硫酸バリウムとして沈殿させた。これをろ別し，乾燥した後，シリカ及び五酸化バナジウムと混合し，真空下で 900℃に過熱し，金属銅により還元して SO_2 ガスとし，精製後，質量分析計にて同位体比を測定した。

(6) ストロンチウム同位体比（$^{87}Sr/^{86}Sr$）

試料は 0.45 μm メンブランフィルターを用いて吸引ろ過した後に分析に供した。試料に塩素とフッ素を加えて分解し，陽イオン交換樹脂により Sr を分離精製した後，フィラメントに塗布して表面電離型質量分析計で同位体比を測定した。

(7) 炭素同位体比

①ガス試料

パージ＆トラップ型ガス抽出ラインにガスクロマトグラフと燃焼炉と同位体質量分析計をオンラインで接続した irmGC/CMS に直結した，連続フローガス型分析システムを使用した。アルカリの添加により CO_2 の選択除去を行うとともに，撹拌と高純度ヘリウムによるバブリングにより CH_4 を完全に抽出した。抽出した CH_4 は水分を選択除去した後，液体窒素温度（約-200℃）の吸着剤トラップに捕集し，90℃に加熱して CH_4 を捕集トラップから脱着した後，再び小体積の低温トラップへ再吸着して濃縮した。再加熱で濃縮トラップから脱着した CH_4 は，ガスクロマトグラフによる他の成分からの分離を経てから，焼却炉で CO_2 とした後，質量分析計に導入し $\delta^{13}C$ を測定した。

$\delta^{13}C$ は次の関係から求めることができる。

$$\delta^{13}C\ (‰) = [(^{13}C/^{12}C)_{sample} - (^{13}C/^{12}C)_{PDB}] / (^{13}C/^{12}C)_{PDB} \times 1000$$

ここで，PDB: 標準炭素，sample: 供試体

②水試料

試料水 1 L に対して 5N の NaOH を 10 ml 加えた後，2N の $SrCl_2$ を 10 ml 加えて速やかに蓋をし，地下水中の無機炭素を $SrCO_3$ として沈殿回収した。実験室において，大気中の炭酸ガスを除去したグローブボックス内で $SrCO_3$ を反応管に移し，真空ラインに接続した後，$SrCO_3$ とリン酸を反応させて CO_2 を発生させ，グラファイト化した。$\delta^{13}C$ および ^{14}C 濃度はタンデム型加速器質量分析装置を用いて測定した。

2.3.3 有機酸類の分析方法

(1) フミン酸・フルボ酸

フミン酸およびフルボ酸の分析は以下の方法で行った。まず試料 500 ml に希塩酸を加えて pH を 1.5 とし，一夜間静置しフミン酸を沈殿させた。試料をメンブランフィルターでろ過し，残さはフミン酸の定量に，ろ液はフルボ酸の定量に用いた。残さを水で洗浄後，水酸化ナトリウム溶液 5 ml を加えて溶解し定容とした。これを，蛍光分光光度計を用いてフミン酸を測定した。なお励起波長は 330 nm，測定波長は 435 nm とした。また，ろ液は同じく蛍光分光光度計を用いてフルボ酸を定量した。なお，励起波長は 330 nm，測定波長は 435 nm とした。測定精度は両成分とも，測定値の±10%である。

(2) 酢酸・ギ酸

酢酸・ギ酸の測定はイオンクロマトグラフ法にて行った。定量下限は 0.5 mg/L，測定精度は測定値の±5 %である。

2.3.4 微生物の分析方法

(1) 全菌数

全菌数の計数はアクリジンオレンジあるいはDAPI (4',6-diamino-2-phenylindol) 染色法[2),3)]で行った。

(2) 生菌数

生菌数の計数は，CFU 法（寒天平板法 : Colony Forming Unit）[2)]あるいは MPN 法（最確数法 : Most Probable Number）による培養法を用いた。好気性あるいは嫌気性従属栄養性細菌の培養には CFU 法を，アンモニア酸化菌，亜硝酸酸化菌，鉄酸化細菌，硫黄酸化細菌，硝酸還元菌，脱窒菌，硫酸還元菌，メタン生成菌の培養には MPN 法を用いた。それぞれの菌の培養法および培地組成については，Appendix 2 に示す。

Table 2.3.4 Abbreviation of analytical methods

	Analytical methods
A	Absorptiometry
AA	Automated Analysis
AAS	Atomic absorption spectrometry
AMS	Accelerator mass spectrometry
CA	Colorimetric analysis
calc	Calculation
CFU	Plate method (Colony forming unit)
CS	Combustion oxidation infrared spectrometry
DC	Direct count method
FP	Flame photometry
FS	Fluorescence spectrophotometer
GA	Gravimetric analysis
GC	Gas chromatography
HPLC	High pressure liquid chromatography
IC	Ion chromatography
ICP	Inductively coupled plasma atomic emission spectrometry
ICP-MS	Inductively coupled plasma mass spectrometry
IR	Infrared absorption spectrometry
ISE	Ion selective electrode
LSC	Liquid scintillation counter
MS	Mass spectrometry
MPN	Most probable number method
NT	Neutralization titration
PM	Portable meter
SLM	Scattered light measurement
TIMS	Thermal ionization mass spectrometry
TC-IC	Total carbon - Inorganic carbon
TOC	TOC analyzer
Un	Unclear
(blank space)	Not analyzed

3. 水質分析結果

3.1 地上からのボーリング孔および地下施設内の地下水分析結果

地下水中の水質分析結果を Table3.1 に示す。

3.2 河川および雨水等の分析結果

河川，降水（雨水・雪），湧水および浅層地下水の水質分析結果を Table3.2 に示す。

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注1）これらの報告書は，独立行政法人原子力安全基盤機構からの委託事業の成果を取りまとめたものである。

Table 2.3.5 Analytical methods of groundwater

Deep boreholes from the surface area

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Table 2.3.5 Analytical methods of groundwater (1/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Physico-chemical parameter							Contamination indicator			Geochemistry																										
		Min.	Max.			EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temperature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}
		[m]	[m]			[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]		[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
Deep boreholes from the surface area																																										
1	HDB-1	54.00	56.00				PM									FP	FP	ICP	ICP														IC						IC			
2	HDB-1	54.00	56.00				PM																																			
3	HDB-1	54.00	56.00				PM																																			
4	HDB-1	109.30	111.60				PM									FP	FP	ICP	ICP														IC						IC			
5	HDB-1	109.30	111.60				PM																																			
6	HDB-1	109.30	111.60				PM																																			
7	HDB-1	130.00	131.00				PM									FP	FP	ICP	ICP														IC						IC			
8	HDB-1	164.03	165.92													FP	FP	ICP	ICP														IC						IC			
9	HDB-1	222.70	224.00													FP	FP	ICP	ICP														IC						IC			
10	HDB-1	222.70	224.00				PM																																			
11	HDB-1	222.70	224.00				PM																																			
12	HDB-1	222.70	224.00				PM																																			
13	HDB-1	222.70	224.00				PM																																			
14	HDB-1	271.23	273.93													FP	FP	ICP	ICP														IC						IC			
15	HDB-1	311.10	312.00				PM									FP	FP	ICP	ICP														IC						IC			
16	HDB-1	311.10	312.00				PM																																			
17	HDB-1	311.10	312.00				PM																																			
18	HDB-1	311.10	312.00				PM																																			
19	HDB-1	345.00	346.00													FP	FP	ICP	ICP														IC						IC			
20	HDB-1	380.00	381.00				PM									FP	FP	ICP	ICP														IC						IC			
21	HDB-1	400.05	401.00				PM									FP	FP	ICP	ICP														IC						IC			
22	HDB-1	443.00	444.00				PM									FP	FP	ICP	ICP														IC						IC			
23	HDB-1	455.00	456.00													FP	FP	ICP	ICP														IC						IC			
24	HDB-1	493.00	494.00													FP	FP	ICP	ICP														IC						IC			
25	HDB-1	514.00	515.00				PM									FP	FP	ICP	ICP														IC						IC			
26	HDB-1	514.00	515.00				PM																																			
27	HDB-1	545.00	546.00													FP	FP	ICP	ICP														IC						IC			
28	HDB-1	556.05	556.80				PM									FP	FP	ICP	ICP														IC						IC			
29	HDB-1	556.05	556.80				PM																																			
30	HDB-1	597.35	598.00													FP	FP	ICP	ICP														IC						IC			
31	HDB-1	609.70	610.00				PM									FP	FP	ICP	ICP														IC						IC			
32	HDB-1	609.70	610.00				PM																																			
33	HDB-1	648.20	650.00													FP	FP	ICP	ICP														IC						IC			
34	HDB-1	704.15	705.00				PM									FP	FP	ICP	ICP														IC						IC			
35	HDB-1	548.00	568.18		2002/4/27		PM		PM					FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
36	HDB-1	548.00	568.18		2002/4/30		PM		PM					FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
37	HDB-1	548.00	568.18		2002/5/1		PM		PM					FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
38	HDB-1	548.00	568.18		2002/5/2		PM		PM					FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
39	HDB-1	548.00	568.18		2002/5/3	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A		ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	
40	HDB-1	548.00	568.18		2002/5/4		PM		PM							FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
41	HDB-1				2001/12/11	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
42	HDB-1				2002/1/17	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
43	HDB-1				2002/2/15	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
44	HDB-1				2002/3/16	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
45	HDB-1				2002/4/15	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
46	HDB-1				2001/12/17	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
47	HDB-1				2002/1/17	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
48	HDB-1				2002/2/16	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
49	HDB-1				2002/3/16	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC	A	calc	
50	HDB-1				2002/4/15	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
51	HDB-1				2002/1/27																																					
52	HDB-1				2002/3/12																																					
53	HDB-1				2002/3/20	PM		PM								FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC	A	calc	
54	HDB-1				2002/4/16																																					
55	HDB-1				2002/4/19																																					
56	HDB-1	9.00			2001/10/31	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC			calc
57	HDB-1	30.00			2001/11/5	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
58	HDB-1	55.90			2001/11/10	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC			calc
59	HDB-1	173.90			2001/12/1	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
60	HDB-1	199.68			2001/12/9	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
61	HDB-1	191.00			2001/12/27	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
62	HDB-1	220.33			2002/1/3	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
63	HDB-1	265.59			2002/1/7	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
64	HDB-1	282.45			2002/1/10	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
65	HDB-1	309.76			2002/1/14	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
66	HDB-1	330.55			2002/1/17	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
67	HDB-1	366.64			2002/1/21	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
68	HDB-1	392.65			2002/1/24	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
69	HDB-1	405.55			2002/1/25	PM		PM				PM		FS												AAS	A								IC							
70	HDB-1	415.02			2002/1/27	PM		PM				PM		FS																												
71	HDB-1	421.28			2002/3/4	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
72	HDB-1	436.62			2002/3/8	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
73	HDB-1	452.13			2002/3/11	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
74	HDB-1	479.96			2002/3/14	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
75	HDB-1	523.54			2002/3/19	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
76	HDB-1	554.61			2002/3/21	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
77	HDB-1	592.55			2002/3/25	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
78	HDB-1	618.11			2002/3/28	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
79	HDB-1	648.91			2002/4/1	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
80	HDB-1	677.78			2002/4/4	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
81	HDB-1	711.62			2002/4/8	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
82	HDB-1	720.00			2002/4/9	PM		PM				PM		FS																												
83	HDB-2	45.00	45.90				PM									FP	FP	ICP	ICP														IC						IC			
84	HDB-2	45.00	45.90				PM																																			
85	HDB-2	45.00	45.90				PM																																			
86	HDB-2	128.00	130.00				PM									FP	FP	ICP	ICP														IC						IC			
87	HDB-2	151.00	157.84													FP	FP	ICP	ICP														IC						IC			
88	HDB-2	204.00	205.90				PM									FP	FP	ICP	ICP														IC						IC			
89	HDB-2	254.00	255.00													FP	FP	ICP	ICP														IC						IC			
90	HDB-2	290.00	290.82				PM									FP	FP	ICP	ICP														IC						IC			
91	HDB-2	290.00	290.82				PM																																			
92	HDB-2	350.00	351.29													FP	FP	ICP	ICP														IC						IC			
93	HDB-2	400.90	401.75				PM									FP	FP	ICP	ICP														IC						IC			
94	HDB-2	400.90	401.75				PM																																			
95	HDB-2	403.15	403.95													FP	FP	ICP	ICP														IC						IC			
96	HDB-2	412.59	413.69				PM									FP	FP	ICP	ICP														IC						IC			
97	HDB-2	454.00	464.12													FP	FP																IC						IC			
98	HDB-2	499.00	499.80				PM									FP	FP	ICP	ICP														IC						IC			
99	HDB-2	499.00	499.80				PM																																			
100	HDB-2	534.75	543.99													FP	FP	ICP	ICP														IC						IC			
101	HDB-2	594.00	594.85				PM									FP	FP	ICP	ICP														IC						IC			

Table 2.3.5 Analytical methods of groundwater (2/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date											Gases																			Isotope											Organics			
		Min.	Max.			M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	CO	H_2S	H_2	^3H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (DIC)	^{14}C	^{36}Cl	$^{36}Cl/Cl$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$	Humic acid	Fuluvic acid	Acetate	Formate
		[m]	[m]			[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mol/Kg]	[%]	[mol/Kg]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
Deep boreholes from the surface area																																																	
1	HDB-1	54.00	56.00										calc	calc	calc																					MS	MS											
2	HDB-1	54.00	56.00																																	MS	MS											
3	HDB-1	54.00	56.00																																	MS	MS											
4	HDB-1	109.30	111.60										calc	calc	calc																					MS	MS											
5	HDB-1	109.30	111.60																																	MS	MS											
6	HDB-1	109.30	111.60																																	MS	MS											
7	HDB-1	130.00	131.00										calc	calc	calc																					MS	MS											
8	HDB-1	164.03	165.92										calc	calc	calc																																		
9	HDB-1	222.70	224.00										calc	calc	calc																					MS	MS											
10	HDB-1	222.70	224.00																																	MS	MS											
11	HDB-1	222.70	224.00																																	MS	MS											
12	HDB-1	222.70	224.00																																	MS	MS											
13	HDB-1	222.70	224.00																																	MS	MS											
14	HDB-1	271.23	273.93										calc	calc	calc																																		
15	HDB-1	311.10	312.00										calc	calc	calc																					MS	MS											
16	HDB-1	311.10	312.00																																	MS	MS											
17	HDB-1	311.10	312.00																																	MS	MS											
18	HDB-1	311.10	312.00																																	MS	MS											
19	HDB-1	345.00	346.00										calc	calc	calc																																		
20	HDB-1	380.00	381.00										calc	calc	calc																					MS	MS											
21	HDB-1	400.05	401.00										calc	calc	calc																					MS	MS											
22	HDB-1	443.00	444.00										calc	calc	calc																					MS	MS											
23	HDB-1	455.00	456.00										calc	calc	calc																																		
24	HDB-1	493.00	494.00										calc	calc	calc																																		
25	HDB-1	514.00	515.00										calc	calc	calc																					MS	MS											
26	HDB-1	514.00	515.00																																	MS	MS											
27	HDB-1	545.00	546.00										calc	calc	calc																																		
28	HDB-1	556.05	556.80										calc	calc	calc																					MS	MS											
29	HDB-1	556.05	556.80																																	MS	MS											
30	HDB-1	597.35	598.00										calc	calc	calc																																		
31	HDB-1	609.70	610.00										calc	calc	calc																					MS	MS											
32	HDB-1	609.70	610.00																																	MS	MS											
33	HDB-1	648.20	650.00										calc	calc	calc																																		
34	HDB-1	704.15	705.00										calc	calc	calc																					MS	MS											
35	HDB-1	548.00	568.18		2002/4/27	NT				CS	CS		calc	calc	calc																																		
36	HDB-1	548.00	568.18		2002/4/30	NT				CS	CS		calc	calc	calc																																		
37	HDB-1	548.00	568.18		2002/5/1	NT				CS	CS		calc	calc	calc																																		
38	HDB-1	548.00	568.18		2002/5/2	NT				CS	CS		calc	calc	calc																																		
39	HDB-1	548.00	568.18		2002/5/3	NT				CS	CS		calc	calc	calc																				LSC	MS	MS						AMS			FS	FS	IC	IC
40	HDB-1	548.00	568.18		2002/5/4	NT				CS	CS		calc	calc	calc																																		
41	HDB-1				2001/12/11	NT				CS	CS		calc	calc	calc																																		
42	HDB-1				2002/1/17	NT		NT		CS	CS		calc	calc	calc																																		
43	HDB-1				2002/2/15	NT				CS	CS		calc	calc	calc																																		
44	HDB-1				2002/3/16	NT				CS	CS		calc	calc	calc																																		
45	HDB-1				2002/4/15	NT				CS	CS		calc	calc	calc																																		
46	HDB-1				2001/12/17	NT				CS	CS		calc	calc	calc																																		
47	HDB-1				2002/1/17	NT				CS	CS		calc	calc	calc																																		
48	HDB-1				2002/2/16	NT				CS	CS		calc	calc	calc																																		
49	HDB-1				2002/3/16	NT				CS	CS		calc	calc	calc																																		
50	HDB-1				2002/4/15	NT				CS	CS		calc	calc	calc																																		
51	HDB-1				2002/1/27																																										FS	FS	IC	IC
52	HDB-1				2002/3/12																																												
53	HDB-1				2002/3/20	NT				CS	CS		calc	calc	calc																																		
54	HDB-1				2002/4/16																																										FS	FS	IC	IC
55	HDB-1				2002/4/19																																												
56	HDB-1	9.00			2001/10/31	NT		NT		CS	CS		calc	calc	calc																																		
57	HDB-1	30.00			2001/11/5	NT				CS	CS		calc	calc	calc																																		
58	HDB-1	55.90			2001/11/10	NT		NT		CS	CS		calc	calc	calc																																		
59	HDB-1	173.90			2001/12/1	NT		NT		CS	CS		calc	calc	calc																																		
60	HDB-1	199.68			2001/12/9	NT		NT		CS	CS		calc	calc	calc																																		
61	HDB-1	191.00			2001/12/27	NT		NT		CS	CS		calc	calc	calc																																		
62	HDB-1	220.33			2002/1/3	NT		NT		CS	CS		calc	calc	calc																																		
63	HDB-1	265.59			2002/1/7	NT		NT		CS	CS		calc	calc	calc																																		
64	HDB-1	282.45			2002/1/10	NT		NT		CS	CS		calc	calc	calc																																		
65	HDB-1	309.76			2002/1/14	NT		NT		CS	CS		calc	calc	calc																																		
66	HDB-1	330.55			2002/1/17	NT		NT		CS	CS		calc	calc	calc																																		
67	HDB-1	366.64			2002/1/21	NT		NT		CS	CS		calc	calc	calc																																		
68	HDB-1	392.65			2002/1/24	NT		NT		CS	CS		calc	calc	calc																																		
69	HDB-1	405.55			2002/1/25																																												
70	HDB-1	415.02			2002/1/27																																												
71	HDB-1	421.28			2002/3/4	NT		NT		CS	CS		calc	calc	calc																																		
72	HDB-1	436.62			2002/3/8	NT		NT		CS	CS		calc	calc	calc																																		
73	HDB-1	452.13			2002/3/11	NT		NT		CS	CS		calc	calc	calc																																		
74	HDB-1	479.96			2002/3/14	NT		NT		CS	CS		calc	calc	calc																																		
75	HDB-1	523.54			2002/3/19	NT				CS	CS		calc	calc	calc																																		
76	HDB-1	554.61			2002/3/21	NT		NT		CS	CS		calc	calc	calc																																		
77	HDB-1	592.55			2002/3/25	NT		NT		CS	CS		calc	calc	calc																																		
78	HDB-1	618.11			2002/3/28	NT		NT		CS	CS		calc	calc	calc																																		
79	HDB-1	648.91			2002/4/1	NT		NT		CS	CS		calc	calc	calc																																		
80	HDB-1	677.78			2002/4/4	NT		NT		CS	CS		calc	calc	calc																																		
81	HDB-1	711.62			2002/4/8	NT		NT		CS	CS		calc	calc	calc																																		
82	HDB-1	720.00			2002/4/9																																												
83	HDB-2	45.00	45.90										calc	calc	calc																					MS	MS											
84	HDB-2	45.00	45.90																																	MS	MS											
85	HDB-2	45.00	45.90																																	MS	MS											
86	HDB-2	128.00	130.00										calc	calc	calc																					MS	MS											
87	HDB-2	151.00	157.84										calc	calc	calc																																		
88	HDB-2	204.00	205.90										calc	calc	calc																					MS	MS											
89	HDB-2	254.00	255.00										calc	calc	calc																																		
90	HDB-2	290.00	290.82										calc	calc	calc																					MS	MS											
91	HDB-2	290.00	290.82																																	MS	MS											
92	HDB-2	350.00	351.29										calc	calc	calc																																		
93	HDB-2	400.90	401.75										calc	calc	calc																					MS	MS											
94	HDB-2	400.90	401.75																																	MS	MS											
95	HDB-2	403.15	403.95										calc	calc	calc																																		
96	HDB-2	412.59	413.69										calc	calc	calc																					MS	MS											
97	HDB-2	454.00	464.12										calc	calc	calc																																		
98	HDB-2	499.00	499.80										calc	calc	calc																					MS	MS											
99	HDB-2	499.00	499.80																																	MS	MS											
100	HDB-2	534.75	543.99										calc	calc	calc																																		
101	HDB-2	594.00	594.85										calc	calc	calc																					MS	MS											

Table 2.3.5 Analytical methods of groundwater (3/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Microbiology																					
		Min.	Max.			Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]			[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
Deep boreholes from the surface area																											
1	HDB-1	54.00	56.00																								
2	HDB-1	54.00	56.00																								
3	HDB-1	54.00	56.00																								
4	HDB-1	109.30	111.60																								
5	HDB-1	109.30	111.60																								
6	HDB-1	109.30	111.60																								
7	HDB-1	130.00	131.00																								
8	HDB-1	164.03	165.92																								
9	HDB-1	222.70	224.00																								
10	HDB-1	222.70	224.00																								
11	HDB-1	222.70	224.00																								
12	HDB-1	222.70	224.00																								
13	HDB-1	222.70	224.00																								
14	HDB-1	271.23	273.93																								
15	HDB-1	311.10	312.00																								
16	HDB-1	311.10	312.00																								
17	HDB-1	311.10	312.00																								
18	HDB-1	311.10	312.00																								
19	HDB-1	345.00	346.00																								
20	HDB-1	380.00	381.00																								
21	HDB-1	400.05	401.00																								
22	HDB-1	443.00	444.00																								
23	HDB-1	455.00	456.00																								
24	HDB-1	493.00	494.00																								
25	HDB-1	514.00	515.00																								
26	HDB-1	514.00	515.00																								
27	HDB-1	545.00	546.00																								
28	HDB-1	556.05	556.80																								
29	HDB-1	556.05	556.80																								
30	HDB-1	597.35	598.00																								
31	HDB-1	609.70	610.00																								
32	HDB-1	609.70	610.00																								
33	HDB-1	648.20	650.00																								
34	HDB-1	704.15	705.00																								
35	HDB-1	548.00	568.18		2002/4/27																						
36	HDB-1	548.00	568.18		2002/4/30																						
37	HDB-1	548.00	568.18		2002/5/1																						
38	HDB-1	548.00	568.18		2002/5/2																						
39	HDB-1	548.00	568.18		2002/5/3	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
40	HDB-1	548.00	568.18		2002/5/4																						
41	HDB-1				2001/12/11																						
42	HDB-1				2002/1/17																						
43	HDB-1				2002/2/15																						
44	HDB-1				2002/3/16																						
45	HDB-1				2002/4/15																						
46	HDB-1				2001/12/17																						
47	HDB-1				2002/1/17																						
48	HDB-1				2002/2/16																						
49	HDB-1				2002/3/16																						
50	HDB-1				2002/4/15																						
51	HDB-1				2002/1/27																						
52	HDB-1				2002/3/12	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
53	HDB-1				2002/3/20																						
54	HDB-1				2002/4/16																						
55	HDB-1				2002/4/19	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
56	HDB-1	9.00			2001/10/31																						
57	HDB-1	30.00			2001/11/5																						
58	HDB-1	55.90			2001/11/10																						
59	HDB-1	173.90			2001/12/1																						
60	HDB-1	199.68			2001/12/9																						
61	HDB-1	191.00			2001/12/27																						
62	HDB-1	220.33			2002/1/3																						
63	HDB-1	265.59			2002/1/7																						
64	HDB-1	282.45			2002/1/10																						
65	HDB-1	309.76			2002/1/14																						
66	HDB-1	330.55			2002/1/17																						
67	HDB-1	366.64			2002/1/21																						
68	HDB-1	392.65			2002/1/24																						
69	HDB-1	405.55			2002/1/25																						
70	HDB-1	415.02			2002/1/27																						
71	HDB-1	421.28			2002/3/4																						
72	HDB-1	436.62			2002/3/8																						
73	HDB-1	452.13			2002/3/11																						
74	HDB-1	479.96			2002/3/14																						
75	HDB-1	523.54			2002/3/19																						
76	HDB-1	554.61			2002/3/21																						
77	HDB-1	592.55			2002/3/25																						
78	HDB-1	618.11			2002/3/28																						
79	HDB-1	648.91			2002/4/1																						
80	HDB-1	677.78			2002/4/4																						
81	HDB-1	711.62			2002/4/8																						
82	HDB-1	720.00			2002/4/9																						
83	HDB-2	45.00	45.90																								
84	HDB-2	45.00	45.90																								
85	HDB-2	45.00	45.90																								
86	HDB-2	128.00	130.00																								
87	HDB-2	151.00	157.84																								
88	HDB-2	204.00	205.90																								
89	HDB-2	254.00	255.00																								
90	HDB-2	290.00	290.82																								
91	HDB-2	290.00	290.82																								
92	HDB-2	350.00	351.29																								
93	HDB-2	400.90	401.75																								
94	HDB-2	400.90	401.75																								
95	HDB-2	403.15	403.95																								
96	HDB-2	412.59	413.69																								
97	HDB-2	454.00	464.12																								
98	HDB-2	499.00	499.80																								
99	HDB-2	499.00	499.80																								
100	HDB-2	534.75	543.99																								
101	HDB-2	594.00	594.85																								

Table 2.3.5 Analytical methods of groundwater (4/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Physico-chemical parameter							Contamination indicator			Geochemistry																											
		Min.	Max.			EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temperature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}
		[m]	[m]			[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]		[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
102	HDB-2	623.00	624.00				PM									FP	FP	ICP	ICP														IC						IC			
103	HDB-2	652.69	654.80													FP	FP	ICP	ICP														IC						IC			
104	HDB-2	675.00	676.00				PM									FP	FP	ICP	ICP														IC						IC			
105	HDB-2	688.00	689.00													FP	FP	ICP	ICP														IC						IC			
106	HDB-2	695.00	696.00				PM									FP	FP	ICP	ICP														IC						IC			
107	HDB-2	695.00	696.00				PM																																			
108	HDB-2	718.50	719.85													FP	FP	ICP	ICP														IC						IC			
109	HDB-2	344.90	404.90		2002/2/10		PM		PM							FP	FP	ICP	ICP	ICP		ICP	GA		ICP					A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
110	HDB-2	344.90	404.90		2002/2/17	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A			A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	
111	HDB-2	666.50	682.50		2002/5/6																										ICP											
112	HDB-2				2001/12/11	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
113	HDB-2				2002/1/18	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
114	HDB-2				2002/2/15	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
115	HDB-2				2002/3/16	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
116	HDB-2				2002/4/15	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
117	HDB-2				2001/12/17	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
118	HDB-2				2002/1/18	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
119	HDB-2				2002/2/15	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
120	HDB-2				2002/3/16	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
121	HDB-2				2002/4/15	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	
122	HDB-2				2002/1/27																																					
123	HDB-2				2002/3/12																																					
124	HDB-2				2002/3/20	PM		PM								FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC	A	calc	
125	HDB-2				2002/4/16																																					
126	HDB-2				2002/4/19																																					
127	HDB-2	72.00			2001/12/7	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
128	HDB-2	100.00			2001/12/9	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC			calc
129	HDB-2	106.40			2001/12/11	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
130	HDB-2	122.30			2001/12/14	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
131	HDB-2	133.80			2001/12/21	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
132	HDB-2	150.00			2001/12/23	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
133	HDB-2	161.35			2001/12/24	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
134	HDB-2	186.20			2001/12/27	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
135	HDB-2	218.34			2001/12/31	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
136	HDB-2	244.80			2002/1/3	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
137	HDB-2	275.75			2002/1/7	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
138	HDB-2	304.09			2002/1/10	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
139	HDB-2	345.34			2002/1/14	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
140	HDB-2	371.15			2002/1/17	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
141	HDB-2	400.00			2002/1/20	PM	PM	PM	PM			PM		FS												AAS	A								IC							
142	HDB-2	413.84			2002/3/14	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC			calc
143	HDB-2	454.87			2002/3/18	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
144	HDB-2	483.10			2002/3/21	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
145	HDB-2	520.15			2002/3/25	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
146	HDB-2	548.72			2002/3/28	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
147	HDB-2	589.63			2002/4/1	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
148	HDB-2	610.79			2002/4/4	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
149	HDB-2	652.32			2002/4/8	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
150	HDB-2	674.66			2002/4/11	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
151	HDB-2	715.18			2002/4/15	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP				ICP	A	ICP	IC	IC	IC		IC	IC	A	IC		calc	calc
152	HDB-2	720.00			2002/4/16	PM	PM	PM	PM			PM		FS												AAS	A								IC							
153	HDB-3	22.12	23.00													FP	FP	ICP	ICP														IC						IC		calc	
154	HDB-3	104.09	106.00													FP	FP	ICP	ICP														IC						IC		calc	
155	HDB-3	124.00	124.30																																							
156	HDB-3	155.20	155.99													FP	FP	ICP	ICP														IC						IC		calc	
157	HDB-3	156.20	156.90													FP	FP	ICP	ICP														IC						IC		calc	
158	HDB-3	202.40	202.70																																							
159	HDB-3	229.30	229.92													FP	FP	ICP	ICP														IC						IC		calc	
160	HDB-3	274.30	274.90													FP	FP	ICP	ICP														IC						IC		calc	
161	HDB-3	293.00	293.30																																							
162	HDB-3	326.00	327.00													FP	FP	ICP	ICP														IC						IC		calc	
163	HDB-3	373.00	373.70													FP	FP	ICP	ICP														IC						IC		calc	
164	HDB-3	394.73	395.00																																							
165	HDB-3	425.20	426.00													FP	FP	ICP	ICP														IC						IC		calc	
166	HDB-3	494.00	494.27																																							
167	HDB-3	500.10	501.00													FP	FP	ICP	ICP														IC						IC		calc	
168	HDB-3	160.50	200.45		2002/11/26	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
169	HDB-3	160.50	200.45		2002/11/27	PM	PM	PM	PM					FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
170	HDB-3	160.50	200.45		2002/11/27	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
171	HDB-3	160.50	200.45		2002/11/28	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
172	HDB-3	454.50	520.00		2003/1/11																																					
173	HDB-3				2002/9/29	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
174	HDB-3				2002/10/24	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
175	HDB-3				2002/11/24	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
176	HDB-3				2002/12/24	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
177	HDB-3				2003/1/1	PM		PM				PM																														
178	HDB-3				2003/1/23	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
179	HDB-3				2003/2/19	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
180	HDB-3				2002/9/29	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
181	HDB-3				2002/10/24	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
182	HDB-3				2002/11/24	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
183	HDB-3				2002/12/24	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
184	HDB-3				2003/1/23	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
185	HDB-3				2003/2/19	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
186	HDB-3				2002/10/12											FP	FP	ICP	ICP	ICP			GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
187	HDB-3				2003/1/13											FP	FP	ICP	ICP	ICP			GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
188	HDB-3	52.44			2002/10/16	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
189	HDB-3	49.84			2002/10/18	PM		PM				PM				FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
190	HDB-3	62.61			2002/10/25	PM		PM				PM				FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
191	HDB-3	155.18			2002/11/1	PM		PM				PM				FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
192	HDB-3	234.91			2002/11/8	PM		PM				PM				FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
193	HDB-3	309.46			2002/11/13	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
194	HDB-3	111.46			2002/12/6	PM		PM				PM				FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
195	HDB-3	317.82			2002/12/13	PM		PM				PM				FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
196	HDB-3	385.77			2002/12/20	PM		PM				PM				FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
197	HDB-3	464.46			2002/12/27	PM		PM				PM				FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
198	HDB-3	517.21			2003/1/1	PM		PM				PM				FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
199	HDB-4	28.93	30.65													FP	FP	ICP	ICP														IC						IC		calc	
200	HDB-4	96.73	97.55													FP	FP	ICP	ICP														IC						IC		calc	
201	HDB-4	100.75	101.05																																							
202	HDB-4	159.40	160.20													FP	FP	ICP	ICP														IC						IC		calc	

Table 2.3.5 Analytical methods of groundwater (5/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date											Gases																			Isotope											Organics			
		Min.	Max.			M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	CO	H_2S	H_2	^3H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (DIC)	^{14}C	^{36}Cl	$^{36}Cl/Cl$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$	Humic acid	Fuluvic acid	Acetate	Formate
		[m]	[m]			[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mol/Kg]	[%]	[mol/Kg]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
102	HDB-2	623.00	624.00										calc	calc	calc																						MS	MS												
103	HDB-2	652.69	654.80										calc	calc	calc																																			
104	HDB-2	675.00	676.00										calc	calc	calc																						MS	MS												
105	HDB-2	688.00	689.00										calc	calc	calc																																			
106	HDB-2	695.00	696.00										calc	calc	calc																						MS	MS												
107	HDB-2	695.00	696.00																																		MS	MS												
108	HDB-2	718.50	719.85										calc	calc	calc																																			
109	HDB-2	344.90	404.90		2002/2/10	NT				CS	CS		calc	calc	calc																																			
110	HDB-2	344.90	404.90		2002/2/17	NT				CS	CS		calc	calc	calc																						MS	MS										FS	FS	IC	IC
111	HDB-2	666.50	682.50		2002/5/6												GC		GC	GC		GC		GC		GC		GC	GC			GC	GC																	
112	HDB-2				2001/12/11	NT				CS	CS		calc	calc	calc																																				
113	HDB-2				2002/1/18	NT				CS	CS		calc	calc	calc																																				
114	HDB-2				2002/2/15	NT				CS	CS		calc	calc	calc																																				
115	HDB-2				2002/3/16	NT				CS	CS		calc	calc	calc																																				
116	HDB-2				2002/4/15	NT				CS	CS		calc	calc	calc																																				
117	HDB-2				2001/12/17	NT				CS	CS		calc	calc	calc																																				
118	HDB-2				2002/1/18	NT				CS	CS		calc	calc	calc																																				
119	HDB-2				2002/2/15	NT				CS	CS		calc	calc	calc																																				
120	HDB-2				2002/3/16	NT				CS	CS		calc	calc	calc																																				
121	HDB-2				2002/4/15	NT				CS	CS		calc	calc	calc																																				
122	HDB-2				2002/1/27																																											FS	FS	IC	IC
123	HDB-2				2002/3/12																																														
124	HDB-2				2002/3/20	NT				CS	CS		calc	calc	calc																																				
125	HDB-2				2002/4/16																																											FS	FS	IC	IC
126	HDB-2				2002/4/19																																														
127	HDB-2	72.00			2001/12/7	NT		NT		CS	CS		calc	calc	calc																																				
128	HDB-2	100.00			2001/12/9	NT		NT		CS	CS		calc	calc	calc																																				
129	HDB-2	106.40			2001/12/11	NT		NT		CS	CS		calc	calc	calc																																				
130	HDB-2	122.30			2001/12/14	NT		NT		CS	CS		calc	calc	calc																																				
131	HDB-2	133.80			2001/12/21	NT		NT		CS	CS		calc	calc	calc																																				
132	HDB-2	150.00			2001/12/23	NT		NT		CS	CS		calc	calc	calc																																				
133	HDB-2	161.35			2001/12/24	NT		NT		CS	CS		calc	calc	calc																																				
134	HDB-2	186.20			2001/12/27	NT		NT		CS	CS		calc	calc	calc																																				
135	HDB-2	218.34			2001/12/31	NT		NT		CS	CS		calc	calc	calc																																				
136	HDB-2	244.80			2002/1/3	NT		NT		CS	CS		calc	calc	calc																																				
137	HDB-2	275.75			2002/1/7	NT		NT		CS	CS		calc	calc	calc																																				
138	HDB-2	304.09			2002/1/10	NT		NT		CS	CS		calc	calc	calc																																				
139	HDB-2	345.34			2002/1/14	NT		NT		CS	CS		calc	calc	calc																																				
140	HDB-2	371.15			2002/1/17	NT		NT		CS	CS		calc	calc	calc																																				
141	HDB-2	400.00			2002/1/20																															LSC	MS	MS									FS	FS	IC	IC
142	HDB-2	413.84			2002/3/14	NT		NT		CS	CS		calc	calc	calc																																				
143	HDB-2	454.87			2002/3/18	NT		NT		CS	CS		calc	calc	calc																																				
144	HDB-2	483.10			2002/3/21	NT		NT		CS	CS		calc	calc	calc																																				
145	HDB-2	520.15			2002/3/25	NT		NT		CS	CS		calc	calc	calc																																				
146	HDB-2	548.72			2002/3/28	NT		NT		CS	CS		calc	calc	calc																																				
147	HDB-2	589.63			2002/4/1	NT		NT		CS	CS		calc	calc	calc																																				
148	HDB-2	610.79			2002/4/4	NT		NT		CS	CS		calc	calc	calc																																				
149	HDB-2	652.32			2002/4/8	NT		NT		CS	CS		calc	calc	calc																																				
150	HDB-2	674.66			2002/4/11	NT		NT		CS	CS		calc	calc	calc																																				
151	HDB-2	715.18			2002/4/15	NT		NT		CS	CS		calc	calc	calc																																				
152	HDB-2	720.00			2002/4/16																															LSC	MS	MS									FS	FS	IC	IC
153	HDB-3	22.12	23.00										calc	calc	calc																						MS	MS												
154	HDB-3	104.09	106.00										calc	calc	calc																						MS	MS												
155	HDB-3	124.00	124.30														GC		GC	GC		GC		GC		GC		GC	GC									MS	MS												
156	HDB-3	155.20	155.99										calc	calc	calc																						MS	MS												
157	HDB-3	156.20	156.90										calc	calc	calc																						MS	MS												
158	HDB-3	202.40	202.70														GC		GC	GC		GC		GC		GC		GC	GC									MS	MS												
159	HDB-3	229.30	229.92										calc	calc	calc																						MS	MS												
160	HDB-3	274.30	274.90										calc	calc	calc																						MS	MS												
161	HDB-3	293.00	293.30														GC		GC	GC		GC		GC		GC		GC	GC									MS	MS												
162	HDB-3	326.00	327.00										calc	calc	calc																						MS	MS												
163	HDB-3	373.00	373.70										calc	calc	calc																						MS	MS												
164	HDB-3	394.73	395.00														GC		GC	GC		GC		GC		GC		GC	GC									MS	MS												
165	HDB-3	425.20	426.00										calc	calc	calc																						MS	MS												
166	HDB-3	494.00	494.27														GC		GC	GC		GC		GC		GC		GC	GC									MS	MS												
167	HDB-3	500.10	501.00										calc	calc	calc																						MS	MS												
168	HDB-3	160.50	200.45		2002/11/26	NT		NT					calc	calc	calc																																				
169	HDB-3	160.50	200.45		2002/11/27	NT		NT					calc	calc	calc																																				
170	HDB-3	160.50	200.45		2002/11/27	NT		NT					calc	calc	calc																																				
171	HDB-3	160.50	200.45		2002/11/28	NT		NT		CS	CS		calc	calc	calc		GC		GC	GC		GC		GC		GC		GC	GC							LSC	MS	MS	MS	MS				AMS			FS	FS	IC	IC
172	HDB-3	454.50	520.00		2003/1/11												GC		GC	GC		GC		GC		GC		GC	GC										MS	MS												
173	HDB-3				2002/9/29	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS							
174	HDB-3				2002/10/24	NT		NT		CS	CS		calc	calc	calc																																				
175	HDB-3				2002/11/24	NT		NT		CS	CS		calc	calc	calc																																				
176	HDB-3				2002/12/24	NT		NT		CS	CS		calc	calc	calc																																				
177	HDB-3				2003/1/1																															LSC	MS	MS						AMS							
178	HDB-3				2003/1/23	NT		NT		CS	CS		calc	calc	calc																																				
179	HDB-3				2003/2/19	NT		NT		CS	CS		calc	calc	calc																																				
180	HDB-3				2002/9/29	NT		NT		CS	CS		calc	calc	calc																																				
181	HDB-3				2002/10/24	NT		NT		CS	CS		calc	calc	calc																																				
182	HDB-3				2002/11/24	NT		NT		CS	CS		calc	calc	calc																																				
183	HDB-3				2002/12/24	NT		NT		CS	CS		calc	calc	calc																																				
184	HDB-3				2003/1/23	NT		NT		CS	CS		calc	calc	calc																																				
185	HDB-3				2003/2/19	NT		NT		CS	CS		calc	calc	calc																																				
186	HDB-3				2002/10/12	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
187	HDB-3				2003/1/13	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
188	HDB-3	52.44			2002/10/16	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
189	HDB-3	49.84			2002/10/18	NT		NT					calc	calc	calc																																				
190	HDB-3	62.61			2002/10/25	NT		NT					calc	calc	calc																																				
191	HDB-3	155.18			2002/11/1	NT		NT					calc	calc	calc																																				
192	HDB-3	234.91			2002/11/8	NT		NT					calc	calc	calc																																				
193	HDB-3	309.46			2002/11/13	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
194	HDB-3	111.46			2002/12/6	NT		NT					calc	calc	calc																																				
195	HDB-3	317.82			2002/12/13	NT		NT					calc	calc	calc																																				
196	HDB-3	385.77			2002/12/20	NT		NT					calc	calc	calc																																				
197	HDB-3	464.46			2002/12/27	NT		NT					calc	calc	calc																																				
198	HDB-3	517.21			2003/1/1	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
199	HDB-4	28.93	30.65										calc	calc	calc																						MS	MS												
200	HDB-4	96.73	97.55										calc	calc	calc																						MS	MS												
201	HDB-4	100.75	101.05														GC		GC	GC		GC		GC		GC		GC	GC									MS	MS												
202	HDB-4	159.40	160.20										calc	calc	calc																						MS	MS												

Table 2.3.5 Analytical methods of groundwater (6/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Microbiology																					
		Min.	Max.			Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]			[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
102	HDB-2	623.00	624.00																								
103	HDB-2	652.69	654.80																								
104	HDB-2	675.00	676.00																								
105	HDB-2	688.00	689.00																								
106	HDB-2	695.00	696.00																								
107	HDB-2	695.00	696.00																								
108	HDB-2	718.50	719.85																								
109	HDB-2	344.90	404.90		2002/2/10																						
110	HDB-2	344.90	404.90		2002/2/17	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
111	HDB-2	666.50	682.50		2002/5/6																						
112	HDB-2				2001/12/11																						
113	HDB-2				2002/1/18																						
114	HDB-2				2002/2/15																						
115	HDB-2				2002/3/16																						
116	HDB-2				2002/4/15																						
117	HDB-2				2001/12/17																						
118	HDB-2				2002/1/18																						
119	HDB-2				2002/2/15																						
120	HDB-2				2002/3/16																						
121	HDB-2				2002/4/15																						
122	HDB-2				2002/1/27																						
123	HDB-2				2002/3/12	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
124	HDB-2				2002/3/20																						
125	HDB-2				2002/4/16																						
126	HDB-2				2002/4/19	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
127	HDB-2	72.00			2001/12/7																						
128	HDB-2	100.00			2001/12/9																						
129	HDB-2	106.40			2001/12/11																						
130	HDB-2	122.30			2001/12/14																						
131	HDB-2	133.80			2001/12/21																						
132	HDB-2	150.00			2001/12/23																						
133	HDB-2	161.35			2001/12/24																						
134	HDB-2	186.20			2001/12/27																						
135	HDB-2	218.34			2001/12/31																						
136	HDB-2	244.80			2002/1/3																						
137	HDB-2	275.75			2002/1/7																						
138	HDB-2	304.09			2002/1/10																						
139	HDB-2	345.34			2002/1/14																						
140	HDB-2	371.15			2002/1/17																						
141	HDB-2	400.00			2002/1/20																						
142	HDB-2	413.84			2002/3/14																						
143	HDB-2	454.87			2002/3/18																						
144	HDB-2	483.10			2002/3/21																						
145	HDB-2	520.15			2002/3/25																						
146	HDB-2	548.72			2002/3/28																						
147	HDB-2	589.63			2002/4/1																						
148	HDB-2	610.79			2002/4/4																						
149	HDB-2	652.32			2002/4/8																						
150	HDB-2	674.66			2002/4/11																						
151	HDB-2	715.18			2002/4/15																						
152	HDB-2	720.00			2002/4/16																						
153	HDB-3	22.12	23.00																								
154	HDB-3	104.09	106.00																								
155	HDB-3	124.00	124.30																								
156	HDB-3	155.20	155.99																								
157	HDB-3	156.20	156.90																								
158	HDB-3	202.40	202.70																								
159	HDB-3	229.30	229.92																								
160	HDB-3	274.30	274.90																								
161	HDB-3	293.00	293.30																								
162	HDB-3	326.00	327.00																								
163	HDB-3	373.00	373.70																								
164	HDB-3	394.73	395.00																								
165	HDB-3	425.20	426.00																								
166	HDB-3	494.00	494.27																								
167	HDB-3	500.10	501.00																								
168	HDB-3	160.50	200.45		2002/11/26																						
169	HDB-3	160.50	200.45		2002/11/27																						
170	HDB-3	160.50	200.45		2002/11/27																						
171	HDB-3	160.50	200.45		2002/11/28	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN				MPN		MPN			
172	HDB-3	454.50	520.00		2003/1/11																						
173	HDB-3				2002/9/29																						
174	HDB-3				2002/10/24																						
175	HDB-3				2002/11/24																						
176	HDB-3				2002/12/24																						
177	HDB-3				2003/1/1																						
178	HDB-3				2003/1/23																						
179	HDB-3				2003/2/19																						
180	HDB-3				2002/9/29																						
181	HDB-3				2002/10/24																						
182	HDB-3				2002/11/24																						
183	HDB-3				2002/12/24																						
184	HDB-3				2003/1/23																						
185	HDB-3				2003/2/19																						
186	HDB-3				2002/10/12	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN				MPN		MPN			
187	HDB-3				2003/1/13	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN				MPN		MPN			
188	HDB-3	52.44			2002/10/16	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN				MPN		MPN			
189	HDB-3	49.84			2002/10/18																						
190	HDB-3	62.61			2002/10/25																						
191	HDB-3	155.18			2002/11/1																						
192	HDB-3	234.91			2002/11/8																						
193	HDB-3	309.46			2002/11/13	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN				MPN		MPN			
194	HDB-3	111.46			2002/12/6																						
195	HDB-3	317.82			2002/12/13																						
196	HDB-3	385.77			2002/12/20																						
197	HDB-3	464.46			2002/12/27																						
198	HDB-3	517.21			2003/1/1	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN				MPN		MPN			
199	HDB-4	28.93	30.65																								
200	HDB-4	96.73	97.55																								
201	HDB-4	100.75	101.05																								
202	HDB-4	159.40	160.20																								

Table 2.3.5 Analytical methods of groundwater (7/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Physico-chemical parameter							Contamination indicator			Geochemistry																												
		Min.	Max.			EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temperature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}
		[m]	[m]			[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]		[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
203	HDB-4	166.78	168.00													FP	FP	ICP	ICP														IC						IC		calc	
204	HDB-4	198.36	198.60																																								
205	HDB-4	224.00	224.75													FP	FP	ICP	ICP														IC						IC		calc	
206	HDB-4	274.25	275.00													FP	FP	ICP	ICP														IC						IC		calc	
207	HDB-4	297.00	297.30																																								
208	HDB-4	324.00	325.00													FP	FP	ICP	ICP														IC						IC		calc	
209	HDB-4	377.00	377.90													FP	FP	ICP	ICP														IC						IC		calc	
210	HDB-4	388.72	389.00																																								
211	HDB-4	426.00	426.75													FP	FP	ICP	ICP														IC						IC		calc	
212	HDB-4	474.00	474.90													FP	FP	ICP	ICP														IC						IC		calc	
213	HDB-4	501.00	501.28																																								
214	HDB-4	218.45	236.53		2002/11/23	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
215	HDB-4	218.45	236.53		2002/11/23	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
216	HDB-4	218.45	236.53			PM		PM		PM	calc		HPLC			FP	FP	ICP	ICP			ICP								A			IC						IC	A	calc	calc
217	HDB-4	281.45	299.53		2002/11/24	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
218	HDB-4	281.45	299.53		2002/11/24	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
219	HDB-4	281.45	299.53		2002/11/25	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
220	HDB-4	281.45	299.53		2002/11/25		PM		PM					FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
221	HDB-4	371.90	406.50		2002/12/31		PM		PM					FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
222	HDB-4	371.90	406.50		2003/1/1	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
223	HDB-4	371.90	406.50		2003/1/1	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
224	HDB-4	407.90	520.00		2003/1/15	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
225	HDB-4	407.90	520.00		2003/1/16	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
226	HDB-4	407.90	520.00		2003/1/16	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
227	HDB-4				2002/9/29	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
228	HDB-4				2002/10/24	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
229	HDB-4				2002/11/24	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
230	HDB-4				2002/12/24	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
231	HDB-4				2002/12/25	PM		PM				PM		FS																													
232	HDB-4				2003/1/23	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
233	HDB-4				2003/2/19	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
234	HDB-4				2002/9/29	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
235	HDB-4				2002/10/24	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
236	HDB-4				2002/11/24	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
237	HDB-4				2002/12/24	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
238	HDB-4				2003/1/23	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
239	HDB-4				2003/2/19	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
240	HDB-4				2002/10/12																																						
241	HDB-4				2002/10/15											FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	
242	HDB-4				2003/1/13											FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	
243	HDB-4	46.98			2002/10/17	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	
244	HDB-4	9.69			2002/10/18	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	
245	HDB-4	55.50			2002/10/25	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
246	HDB-4	147.30			2002/11/1	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
247	HDB-4	206.62			2002/11/8	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
248	HDB-4	278.90			2002/11/15	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
249	HDB-4	297.00			2002/11/16	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
250	HDB-4	359.86			2002/12/13	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	
251	HDB-4	453.26			2002/12/20	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	
252	HDB-4	517.30			2002/12/24	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
253	HDB-4	223.93	233.78	4	2004/2/4～2/5		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
254	HDB-4	223.93	233.78	4	2005/2/22		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
255	HDB-4	223.93	233.78	4	2005/6/30		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
256	HDB-4	223.93	233.78	4	2005/8/29		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
257	HDB-4	223.93	233.78	4	2005/10/25		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
258	HDB-4	223.93	233.78	4	2006/6/27		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC		calc	calc
259	HDB-4	223.93	233.78	4	2006/10/10		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC		calc	calc
260	HDB-4	223.93	233.78	4	2009/11/7	PM	PM	PM	PM				HPLC	HPLC		IC	IC	IC	IC	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
261	HDB-4	281.05	290.76	6	2005/2/24		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
262	HDB-4	281.05	290.76	6	2005/6/30		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
263	HDB-4	281.05	290.76	6	2005/8/29		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
264	HDB-4	281.05	290.76	6	2005/10/26		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
265	HDB-4	281.05	290.76	6	2006/6/27		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC		calc	calc
266	HDB-4	281.05	290.76	6	2006/10/10		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC		calc	calc
267	HDB-4	281.05	290.76	6	2009/11/5	PM	PM	PM	PM				HPLC	HPLC		IC	IC	IC	IC	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
268	HDB-4	474.79	484.61	10	2004/2/17～2/19		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
269	HDB-4	474.79	484.61	10	2005/6/30		PM		PM							FP	FP	FP, ICP	FP, ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
270	HDB-4	474.79	484.61	10	2009/11/6	PM		PM	PM				HPLC	HPLC		ICP	ICP	ICP	ICP	ICP			ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC			IC	A		
271	HDB-5	27.51	28.00													FP	FP	ICP	ICP														IC						IC		calc	
272	HDB-5	60.19	61.34													FP	FP	ICP	ICP														IC						IC		calc	
273	HDB-5	97.70	97.28																																								
274	HDB-5	124.56	125.36													FP	FP	ICP	ICP														IC						IC		calc	
275	HDB-5	174.15	174.80													FP	FP	ICP	ICP														IC						IC		calc	
276	HDB-5	196.70	196.95																																								
277	HDB-5	225.00	225.80													FP	FP	ICP	ICP														IC						IC		calc	
278	HDB-5	278.20	279.00													FP	FP	ICP	ICP														IC						IC		calc	
279	HDB-5	294.68	295.00																																								
280	HDB-5	324.18	325.00													FP	FP	ICP	ICP														IC						IC		calc	
281	HDB-5	373.25	373.95													FP	FP	ICP	ICP														IC						IC		calc	
282	HDB-5	405.00	405.28																																								
283	HDB-5	426.00	426.90													FP	FP	ICP	ICP														IC						IC		calc	
284	HDB-5	473.10	474.00													FP	FP	ICP	ICP														IC						IC		calc	
285	HDB-5	494.74	495.00																																								
286	HDB-5	154.05	180.46		2002/12/5	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
287	HDB-5	154.05	180.46		2002/12/5	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
288	HDB-5	154.05	180.46		2002/12/5	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
289	HDB-5	154.05	180.46		2002/12/6	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
290	HDB-5	182.05	250.46		2002/12/10		PM		PM					FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
291	HDB-5	182.05	250.46		2002/12/10	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
292	HDB-5	182.05	250.46		2002/12/11	PM	PM	PM	PM			PM		FS																													
293	HDB-5	182.05	250.46		2002/12/11	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
294	HDB-5	420.01	annulus		2003/1/23		PM		PM					FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
295	HDB-5	331.22	402.23		2003/1/27		PM		PM					FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
296	HDB-5	331.22	402.23		2003/1/27	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
297	HDB-5	331.22	402.23		2003/1/28	PM	PM	PM	PM			PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
298	HDB-5	331.22	annulus		2003/1/26		PM		PM					FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
299	HDB-5	331.22	annulus		2003/1/27		PM		PM					FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
300	HDB-5	331.22	annulus		2003/1/29		PM		PM					FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
301	HDB-5				2002/9/29	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
302	HDB-5				2002/10/24	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
303	HDB-5				2002/11/24	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc

Table 2.3.5 Analytical methods of groundwater (8/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date											Gases																			Isotope											Organics			
		Min.	Max.			M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	CO	H_2S	H_2	^3H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (DIC)	^{14}C	^{36}Cl	$^{36}Cl/Cl$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$	Humic acid	Fuluvic acid	Acetate	Formate
		[m]	[m]			[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mol/Kg]	[%]	[mol/Kg]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
203	HDB-4	166.78	168.00										calc	calc	calc																						MS	MS												
204	HDB-4	198.36	198.60														GC		GC	GC		GC		GC		GC		GC	GC										MS	MS											
205	HDB-4	224.00	224.75										calc	calc	calc																						MS	MS												
206	HDB-4	274.25	275.00										calc	calc	calc																						MS	MS												
207	HDB-4	297.00	297.30														GC		GC	GC		GC		GC		GC		GC	GC										MS	MS											
208	HDB-4	324.00	325.00										calc	calc	calc																						MS	MS												
209	HDB-4	377.00	377.90										calc	calc	calc																						MS	MS												
210	HDB-4	388.72	389.00														GC		GC	GC		GC		GC		GC		GC	GC										MS	MS											
211	HDB-4	426.00	426.75										calc	calc	calc																						MS	MS												
212	HDB-4	474.00	474.90										calc	calc	calc																						MS	MS												
213	HDB-4	501.00	501.28														GC		GC	GC		GC		GC		GC		GC	GC										MS	MS											
214	HDB-4	218.45	236.53		2002/11/23	NT		NT					calc	calc	calc																																			
215	HDB-4	218.45	236.53		2002/11/23	NT		NT					calc	calc	calc																																			
216	HDB-4	218.45	236.53										calc	calc	calc																																			
217	HDB-4	281.45	299.53		2002/11/24	NT		NT					calc	calc	calc																																			
218	HDB-4	281.45	299.53		2002/11/24	NT		NT					calc	calc	calc																																			
219	HDB-4	281.45	299.53		2002/11/25	NT		NT					calc	calc	calc																																			
220	HDB-4	281.45	299.53		2002/11/25	NT		NT		CS	CS		calc	calc	calc		GC		GC	GC		GC		GC		GC		GC	GC		GC	GC	GC			LSC	MS	MS	MS	MS				AMS			FS	FS	IC	IC
221	HDB-4	371.90	406.50		2002/12/31	NT		NT					calc	calc	calc																																			
222	HDB-4	371.90	406.50		2003/1/1	NT		NT					calc	calc	calc																																			
223	HDB-4	371.90	406.50		2003/1/1	NT		NT					calc	calc	calc		GC		GC	GC		GC		GC		GC		GC	GC		GC	GC	GC						MS	MS											
224	HDB-4	407.90	520.00		2003/1/15	NT		NT					calc	calc	calc																																			
225	HDB-4	407.90	520.00		2003/1/16	NT		NT					calc	calc	calc																																			
226	HDB-4	407.90	520.00		2003/1/16	NT		NT		CS	CS		calc	calc	calc		GC		GC	GC		GC		GC		GC		GC	GC		GC	GC	GC			LSC	MS	MS	MS	MS				AMS			FS	FS	IC	IC
227	HDB-4				2002/9/29	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS						
228	HDB-4				2002/10/24	NT		NT		CS	CS		calc	calc	calc																																			
229	HDB-4				2002/11/24	NT		NT		CS	CS		calc	calc	calc																																			
230	HDB-4				2002/12/24	NT		NT		CS	CS		calc	calc	calc																																			
231	HDB-4				2002/12/25																															LSC	MS	MS						AMS						
232	HDB-4				2003/1/23	NT		NT		CS	CS		calc	calc	calc																																			
233	HDB-4				2003/2/19	NT		NT		CS	CS		calc	calc	calc																																			
234	HDB-4				2002/9/29	NT		NT		CS	CS		calc	calc	calc																																			
235	HDB-4				2002/10/24	NT		NT		CS	CS		calc	calc	calc																																			
236	HDB-4				2002/11/24	NT		NT		CS	CS		calc	calc	calc																																			
237	HDB-4				2002/12/24	NT		NT		CS	CS		calc	calc	calc																																			
238	HDB-4				2003/1/23	NT		NT		CS	CS		calc	calc	calc																																			
239	HDB-4				2003/2/19	NT		NT		CS	CS		calc	calc	calc																																			
240	HDB-4				2002/10/12																															LSC	MS	MS						AMS			FS	FS	IC	IC
241	HDB-4				2002/10/15	NT		NT		CS	CS		calc	calc	calc																																			
242	HDB-4				2003/1/13	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
243	HDB-4	46.98			2002/10/17	NT				CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
244	HDB-4	9.69			2002/10/18	NT							calc	calc	calc																																			
245	HDB-4	55.50			2002/10/25	NT		NT					calc	calc	calc																																			
246	HDB-4	147.30			2002/11/1	NT		NT					calc	calc	calc																																			
247	HDB-4	206.62			2002/11/8	NT		NT					calc	calc	calc																																			
248	HDB-4	278.90			2002/11/15	NT		NT					calc	calc	calc																																			
249	HDB-4	297.00			2002/11/16	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
250	HDB-4	359.86			2002/12/13	NT							calc	calc	calc																																			
251	HDB-4	453.26			2002/12/20	NT							calc	calc	calc																																			
252	HDB-4	517.30			2002/12/24	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
253	HDB-4	223.93	233.78	4	2004/2/4～2/5	NT				CS	CS		calc	calc	calc																																			
254	HDB-4	223.93	233.78	4	2005/2/22	NT				CS	CS		calc	calc	calc																																			
255	HDB-4	223.93	233.78	4	2005/6/30	NT				CS	CS		calc	calc	calc																																			
256	HDB-4	223.93	233.78	4	2005/8/29	NT				CS	CS		calc	calc	calc																																			
257	HDB-4	223.93	233.78	4	2005/10/25	NT				CS	CS		calc	calc	calc																																			
258	HDB-4	223.93	233.78	4	2006/6/27	NT		NT		CS		ICP-MS	calc	calc	calc																																			
259	HDB-4	223.93	233.78	4	2006/10/10	NT		NT		CS		ICP-MS	calc	calc	calc																																			
260	HDB-4	223.93	233.78	4	2009/11/7	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS												
261	HDB-4	281.05	290.76	6	2005/2/24	NT				CS	CS		calc	calc	calc																																			
262	HDB-4	281.05	290.76	6	2005/6/30	NT				CS	CS		calc	calc	calc																																			
263	HDB-4	281.05	290.76	6	2005/8/29	NT				CS	CS		calc	calc	calc																																			
264	HDB-4	281.05	290.76	6	2005/10/26	NT				CS	CS		calc	calc	calc																																			
265	HDB-4	281.05	290.76	6	2006/6/27	NT		NT		CS		ICP-MS	calc	calc	calc																																			
266	HDB-4	281.05	290.76	6	2006/10/10	NT		NT		CS		ICP-MS	calc	calc	calc																																			
267	HDB-4	281.05	290.76	6	2009/11/5	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS												
268	HDB-4	474.79	484.61	10	2004/2/17～2/19	NT				CS	CS		calc	calc	calc																																			
269	HDB-4	474.79	484.61	10	2005/6/30	NT				CS	CS		calc	calc	calc																																			
270	HDB-4	474.79	484.61	10	2009/11/6					CS	CS	ICP-MS	calc	calc	calc																																			
271	HDB-5	27.51	28.00										calc	calc	calc																						MS	MS												
272	HDB-5	60.19	61.34										calc	calc	calc																						MS	MS												
273	HDB-5	97.70	97.28														GC		GC	GC		GC		GC		GC		GC	GC										MS	MS											
274	HDB-5	124.56	125.36										calc	calc	calc																						MS	MS												
275	HDB-5	174.15	174.80										calc	calc	calc																						MS	MS												
276	HDB-5	196.70	196.95														GC		GC	GC		GC		GC		GC		GC	GC										MS	MS											
277	HDB-5	225.00	225.80										calc	calc	calc																						MS	MS												
278	HDB-5	278.20	279.00										calc	calc	calc																						MS	MS												
279	HDB-5	294.68	295.00														GC		GC	GC		GC		GC		GC		GC	GC										MS	MS											
280	HDB-5	324.18	325.00										calc	calc	calc																						MS	MS												
281	HDB-5	373.25	373.95										calc	calc	calc																						MS	MS												
282	HDB-5	405.00	405.28														GC		GC	GC		GC		GC		GC		GC	GC										MS	MS											
283	HDB-5	426.00	426.90										calc	calc	calc																						MS	MS												
284	HDB-5	473.10	474.00										calc	calc	calc																						MS	MS												
285	HDB-5	494.74	495.00														GC		GC	GC		GC		GC		GC		GC	GC										MS	MS											
286	HDB-5	154.05	180.46		2002/12/5	NT		NT					calc	calc	calc																																			
287	HDB-5	154.05	180.46		2002/12/5	NT		NT					calc	calc	calc																																			
288	HDB-5	154.05	180.46		2002/12/5	NT		NT					calc	calc	calc																																			
289	HDB-5	154.05	180.46		2002/12/6	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
290	HDB-5	182.05	250.46		2002/12/10	NT		NT					calc	calc	calc																																			
291	HDB-5	182.05	250.46		2002/12/10	NT		NT					calc	calc	calc																																			
292	HDB-5	182.05	250.46		2002/12/11																																														
293	HDB-5	182.05	250.46		2002/12/11	NT		NT		CS	CS		calc	calc	calc		GC		GC	GC		GC		GC		GC		GC	GC		GC	GC	GC			LSC	MS	MS						AMS			FS	FS	IC	IC
294	HDB-5	420.01	annulus		2003/1/23	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
295	HDB-5	331.22	402.23		2003/1/27	NT		NT					calc	calc	calc																																			
296	HDB-5	331.22	402.23		2003/1/27	NT		NT					calc	calc	calc																																			
297	HDB-5	331.22	402.23		2003/1/28	NT		NT		CS	CS		calc	calc	calc		GC		GC	GC		GC		GC		GC		GC	GC		GC	GC	GC			LSC	MS	MS	MS	MS				AMS			FS	FS	IC	IC
298	HDB-5	331.22	annulus		2003/1/26	NT		NT					calc	calc	calc																																			
299	HDB-5	331.22	annulus		2003/1/27	NT		NT					calc	calc	calc																																			
300	HDB-5	331.22	annulus		2003/1/29	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
301	HDB-5				2002/9/29	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS						
302	HDB-5				2002/10/24	NT		NT		CS	CS		calc	calc	calc																																			
303	HDB-5				2002/11/24	NT		NT		CS	CS		calc	calc	calc																																			

Table 2.3.5 Analytical methods of groundwater (9/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Microbiology																					
		Min.	Max.			Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]			[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
203	HDB-4	166.78	168.00																								
204	HDB-4	198.36	198.60																								
205	HDB-4	224.00	224.75																								
206	HDB-4	274.25	275.00																								
207	HDB-4	297.00	297.30																								
208	HDB-4	324.00	325.00																								
209	HDB-4	377.00	377.90																								
210	HDB-4	388.72	389.00																								
211	HDB-4	426.00	426.75																								
212	HDB-4	474.00	474.90																								
213	HDB-4	501.00	501.28																								
214	HDB-4	218.45	236.53		2002/11/23																						
215	HDB-4	218.45	236.53		2002/11/23																						
216	HDB-4	218.45	236.53																								
217	HDB-4	281.45	299.53		2002/11/24																						
218	HDB-4	281.45	299.53		2002/11/24																						
219	HDB-4	281.45	299.53		2002/11/25																						
220	HDB-4	281.45	299.53		2002/11/25	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
221	HDB-4	371.90	406.50		2002/12/31																						
222	HDB-4	371.90	406.50		2003/1/1																						
223	HDB-4	371.90	406.50		2003/1/1																						
224	HDB-4	407.90	520.00		2003/1/15																						
225	HDB-4	407.90	520.00		2003/1/16																						
226	HDB-4	407.90	520.00		2003/1/16	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
227	HDB-4				2002/9/29																						
228	HDB-4				2002/10/24																						
229	HDB-4				2002/11/24																						
230	HDB-4				2002/12/24																						
231	HDB-4				2002/12/25																						
232	HDB-4				2003/1/23																						
233	HDB-4				2003/2/19																						
234	HDB-4				2002/9/29																						
235	HDB-4				2002/10/24																						
236	HDB-4				2002/11/24																						
237	HDB-4				2002/12/24																						
238	HDB-4				2003/1/23																						
239	HDB-4				2003/2/19																						
240	HDB-4				2002/10/12	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
241	HDB-4				2002/10/15																						
242	HDB-4				2003/1/13	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
243	HDB-4	46.98			2002/10/17	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
244	HDB-4	9.69			2002/10/18																						
245	HDB-4	55.50			2002/10/25																						
246	HDB-4	147.30			2002/11/1																						
247	HDB-4	206.62			2002/11/8																						
248	HDB-4	278.90			2002/11/15																						
249	HDB-4	297.00			2002/11/16	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
250	HDB-4	359.86			2002/12/13																						
251	HDB-4	453.26			2002/12/20																						
252	HDB-4	517.30			2002/12/24	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
253	HDB-4	223.93	233.78	4	2004/2/4～2/5																						
254	HDB-4	223.93	233.78	4	2005/2/22																						
255	HDB-4	223.93	233.78	4	2005/6/30																						
256	HDB-4	223.93	233.78	4	2005/8/29																						
257	HDB-4	223.93	233.78	4	2005/10/25																						
258	HDB-4	223.93	233.78	4	2006/6/27																						
259	HDB-4	223.93	233.78	4	2006/10/10																						
260	HDB-4	223.93	233.78	4	2009/11/7																						
261	HDB-4	281.05	290.76	6	2005/2/24																						
262	HDB-4	281.05	290.76	6	2005/6/30																						
263	HDB-4	281.05	290.76	6	2005/8/29																						
264	HDB-4	281.05	290.76	6	2005/10/26																						
265	HDB-4	281.05	290.76	6	2006/6/27																						
266	HDB-4	281.05	290.76	6	2006/10/10																						
267	HDB-4	281.05	290.76	6	2009/11/5																						
268	HDB-4	474.79	484.61	10	2004/2/17～2/19																						
269	HDB-4	474.79	484.61	10	2005/6/30																						
270	HDB-4	474.79	484.61	10	2009/11/6																						
271	HDB-5	27.51	28.00																								
272	HDB-5	60.19	61.34																								
273	HDB-5	97.70	97.28																								
274	HDB-5	124.56	125.36																								
275	HDB-5	174.15	174.80																								
276	HDB-5	196.70	196.95																								
277	HDB-5	225.00	225.80																								
278	HDB-5	278.20	279.00																								
279	HDB-5	294.68	295.00																								
280	HDB-5	324.18	325.00																								
281	HDB-5	373.25	373.95																								
282	HDB-5	405.00	405.28																								
283	HDB-5	426.00	426.90																								
284	HDB-5	473.10	474.00																								
285	HDB-5	494.74	495.00																								
286	HDB-5	154.05	180.46		2002/12/5																						
287	HDB-5	154.05	180.46		2002/12/5																						
288	HDB-5	154.05	180.46		2002/12/5																						
289	HDB-5	154.05	180.46		2002/12/6	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
290	HDB-5	182.05	250.46		2002/12/10																						
291	HDB-5	182.05	250.46		2002/12/10																						
292	HDB-5	182.05	250.46		2002/12/11																						
293	HDB-5	182.05	250.46		2002/12/11																						
294	HDB-5	420.01	annulus		2003/1/23																						
295	HDB-5	331.22	402.23		2003/1/27																						
296	HDB-5	331.22	402.23		2003/1/27																						
297	HDB-5	331.22	402.23		2003/1/28	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
298	HDB-5	331.22	annulus		2003/1/26																						
299	HDB-5	331.22	annulus		2003/1/27																						
300	HDB-5	331.22	annulus		2003/1/29	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
301	HDB-5				2002/9/29																						
302	HDB-5				2002/10/24																						
303	HDB-5				2002/11/24																						

Table 2.3.5 Analytical methods of groundwater (10/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Physico-chemical parameter							Contamination indicator			Geochemistry																											
		Min.	Max.			EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temperature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}
		[m]	[m]			[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]		[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
304	HDB-5				2002/12/24	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
305	HDB-5				2003/1/13	PM		PM				PM		FS																													
306	HDB-5				2003/1/23	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
307	HDB-5				2003/2/19	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
308	HDB-5				2002/9/29	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
309	HDB-5				2002/10/24	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
310	HDB-5				2002/11/24	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
311	HDB-5				2002/12/24	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
312	HDB-5				2003/1/23	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
313	HDB-5				2003/2/19	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
314	HDB-5				2002/10/12																																						
315	HDB-5				2002/10/15											FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	
316	HDB-5				2003/1/13											FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	
317	HDB-5	46.83			2002/10/30	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	
318	HDB-5	4.00			2002/11/1	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	
319	HDB-5	63.86			2002/11/8	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
320	HDB-5	109.45			2002/11/15	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
321	HDB-5	182.01			2002/11/22	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	
322	HDB-5	259.46			2002/11/29	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	
323	HDB-5	272.24			2002/11/30	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	
324	HDB-5	196.26			2002/12/20	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	
325	HDB-5	275.05			2002/12/27	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
326	HDB-5	348.19			2003/1/3	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
327	HDB-5	443.39			2003/1/10	PM		PM				PM		FS		FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
328	HDB-5	511.44			2003/1/14	PM		PM				PM		FS		FP	FP	ICP	ICP	0.03		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC		calc	calc
329	HDB-5	368.60	377.40	8	2007/11/8		PM		PM					FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
330	HDB-6	78.00	78.38						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
331	HDB-6	115.60	115.90																																								
332	HDB-6	115.30	115.60																																								
333	HDB-6	135.00	135.30						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
334	HDB-6	217.40	217.70																																								
335	HDB-6	279.41	279.89						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
336	HDB-6	300.70	301.00																																								
337	HDB-6	300.30	300.60																																								
338	HDB-6	394.30	394.52						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
339	HDB-6	405.50	405.80																																								
340	HDB-6	405.10	405.40																																								
341	HDB-6	440.00	440.50						PM							FP	FP	ICP	ICP			ICP							ICP	A			IC						IC		calc	calc
342	HDB-6	492.28	492.50						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
343	HDB-6	498.40	498.70																																								
344	HDB-6	498.10	498.40																																								
345	HDB-6	547.00	547.48						PM							FP	FP	ICP	ICP			ICP							ICP	A			IC						IC		calc	calc
346	HDB-6	600.03	600.33						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
347	HDB-6	607.00	607.30																																								
348	HDB-6	610.70	611.00						PM							FP	FP	ICP	ICP			ICP							ICP	A			IC						IC		calc	calc
349	HDB-6	280.95	312.00		2003/10/12	PM		PM		PM		PM		FS		FP	FP	ICP	ICP					ICP					ICP	A		IC	IC	IC		IC			IC	A	calc	
350	HDB-6	280.95	312.00		2003/10/12	PM		PM		PM		PM		FS																A									IC	A	calc	
351	HDB-6	280.95	312.00		2003/10/12	PM		PM		PM		PM		FS		FP	FP	ICP	ICP					ICP					ICP	A		IC	IC	IC		IC			IC	A	calc	
352	HDB-6	280.95	312.00		2003/10/13	PM		PM		PM		PM		FS		FP	FP	ICP	ICP					ICP					ICP	A		IC	IC	IC		IC			IC	A	calc	
353	HDB-6	280.95	312.00		2003/10/13	PM		PM		PM		PM		FS																A									IC	A	calc	
354	HDB-6	280.95	312.00		2003/10/16	PM		PM		PM		PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		A	IC		calc	
355	HDB-6	363.95	409.00		2003/12/8	PM		PM				PM		FS		FP	FP	ICP	ICP					ICP					ICP	A		IC	IC	IC		IC			IC	A	calc	
356	HDB-6	363.95	409.00		2003/12/15	PM		PM		PM		PM		FS		FP	FP	ICP	ICP					ICP					ICP	A		IC	IC	IC		IC			IC	A	calc	
357	HDB-6	363.95	409.00		2003/12/15	PM		PM		PM		PM		FS																A									IC	A	calc	
358	HDB-6	363.95	409.00		2003/12/15	PM		PM		PM		PM		FS		FP	FP	ICP	ICP					ICP					ICP	A		IC	IC	IC		IC			IC	A	calc	
359	HDB-6	363.95	409.00		2003/12/15	PM		PM		PM		PM		FS																A									IC	A	calc	
360	HDB-6	363.95	409.00		2003/12/15	PM		PM		PM		PM		FS		FP	FP	ICP	ICP					ICP					ICP	A		IC	IC	IC		IC			IC	A	calc	
361	HDB-6	363.95	409.00		2003/12/17	PM		PM		PM		PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		A	IC		calc	
362	HDB-6				2003/8/18	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	
363	HDB-6				2003/9/16	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	
364	HDB-6				2003/10/17	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	
365	HDB-6				2003/11/13	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	
366	HDB-6				2003/11/28	PM		PM				PM		FS																											calc	
367	HDB-6				2003/12/7	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	
368	HDB-6				2003/1/20	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	
369	HDB-6				2003/2/18	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	
370	HDB-6				2003/8/18	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	
371	HDB-6				2003/9/16	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	
372	HDB-6				2003/10/17	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	
373	HDB-6				2003/11/13	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	
374	HDB-6				2003/12/7	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	
375	HDB-6				2004/1/20	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	
376	HDB-6				2004/2/18	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	
377	HDB-6				2003/8/18	PM		PM				PM		FS		FP	FP	ICP	ICP				GA				A		ICP	A	ICP	IC	IC	IC	IC	IC			IC	A		
378	HDB-6				2003/11/28																																						
379	HDB-6				2003/12/16																																						
380	HDB-6	100.69			2003/9/2	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC			IC	A	calc	calc
381	HDB-6	137.50			2003/9/4	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC			IC	A	calc	calc
382	HDB-6	200.00			2003/9/24	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC			IC	A	calc	calc
383	HDB-6	299.67			2003/10/1	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC			IC	A	calc	calc
384	HDB-6	367.00			2003/10/7	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC			IC	A	calc	calc
385	HDB-6	400.00			2003/11/8	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC			IC	A	calc	calc
386	HDB-6	500.28			2003/11/17	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC			IC	A	calc	calc
387	HDB-6	600.20			2003/11/26	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC			IC	A	calc	calc
388	HDB-6	620.00			2003/11/28	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC			IC	A	calc	calc
389	HDB-6	288.66	302.90	4	2005/1/15		PM		PM							FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
390	HDB-6	288.66	302.90	4	2006/11/1		PM		PM							FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC		calc	calc
391	HDB-6	288.66	302.90	4	2010/7/29		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
392	HDB-6	362.39	385.70	6	2005/1/17		PM		PM							FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
393	HDB-6	362.39	385.70	6	2006/11/6		PM		PM							FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC		calc	calc
394	HDB-6	362.39	385.70	6	2010/7/28		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	ICP		ICP		ICP		A	A	ICP	A	IC	IC	IC	IC		IC	IC	A	calc	calc
395	HDB-6	386.60	396.41	7	2006/11/8		PM		PM							FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC		calc	calc
396	HDB-6	386.60	396.41	7	2007/9/20		PM		PM					FS		FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
397	HDB-6	386.60	396.41	7	2010/7/26		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
398	HDB-7	41.50	41.72						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
399	HDB-7	131.00	131.26						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
400	HDB-7	320.36	320.67						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
401	HDB-7	343.29	343.55						PM							FP	FP	ICP	ICP			ICP							ICP	A			IC						IC		calc	calc

Table 2.3.5 Analytical methods of groundwater (11/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date												Gases																			Isotope											Organics			
		Min.	Max.			M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	CO	H_2S	H_2	^3H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (DIC)	^{14}C	^{36}Cl	$^{36}Cl/Cl$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$	Humic acid	Fuluvic acid	Acetate	Formate
		[m]	[m]			[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mol/Kg]	[%]	[mol/Kg]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
304	HDB-5				2002/12/24	NT		NT		CS	CS		calc	calc	calc																																				
305	HDB-5				2003/1/13																															LSC	MS	MS						AMS						
306	HDB-5				2003/1/23	NT		NT		CS	CS		calc	calc	calc																																				
307	HDB-5				2003/2/19	NT		NT		CS	CS		calc	calc	calc																																				
308	HDB-5				2002/9/29	NT		NT		CS	CS		calc	calc	calc																																				
309	HDB-5				2002/10/24	NT		NT		CS	CS		calc	calc	calc																																				
310	HDB-5				2002/11/24	NT		NT		CS	CS		calc	calc	calc																																				
311	HDB-5				2002/12/24	NT		NT		CS	CS		calc	calc	calc																																				
312	HDB-5				2003/1/23	NT		NT		CS	CS		calc	calc	calc																																				
313	HDB-5				2003/2/19	NT		NT		CS	CS		calc	calc	calc																																				
314	HDB-5				2002/10/12																															LSC	MS	MS						AMS			FS	FS	IC	IC
315	HDB-5				2002/10/15	NT		NT		CS	CS		calc	calc	calc																																				
316	HDB-5				2003/1/13	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
317	HDB-5	46.83			2002/10/30	NT				CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
318	HDB-5	4.00			2002/11/1	NT							calc	calc	calc																																				
319	HDB-5	63.86			2002/11/8	NT		NT					calc	calc	calc																																				
320	HDB-5	109.45			2002/11/15	NT		NT					calc	calc	calc																																				
321	HDB-5	182.01			2002/11/22	NT							calc	calc	calc																																				
322	HDB-5	259.46			2002/11/29	NT							calc	calc	calc																																				
323	HDB-5	272.24			2002/11/30	NT				CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
324	HDB-5	196.26			2002/12/20	NT		NT					calc	calc	calc																																				
325	HDB-5	275.05			2002/12/27	NT		NT					calc	calc	calc																																				
326	HDB-5	348.19			2003/1/3	NT		NT					calc	calc	calc																																				
327	HDB-5	443.39			2003/1/10	NT		NT					calc	calc	calc																																				
328	HDB-5	511.44			2003/1/14	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
329	HDB-5	368.60	377.40	8	2007/11/8	NT				CS	CS		calc	calc	calc																					LSC	MS	MS												
330	HDB-6	78.00	78.38							CS	CS		calc	calc	calc																						MS	MS						AMS						
331	HDB-6	115.60	115.90														GC		GC	GC		GC		GC		GC		GC	GC									MS												
332	HDB-6	115.30	115.60														GC		GC	GC		GC		GC		GC		GC	GC										MS												
333	HDB-6	135.00	135.30							CS	CS		calc	calc	calc																						MS	MS						AMS						
334	HDB-6	217.40	217.70														GC		GC	GC		GC		GC		GC		GC	GC										MS												
335	HDB-6	279.41	279.89							CS	CS		calc	calc	calc																						MS	MS						AMS						
336	HDB-6	300.70	301.00														GC		GC	GC		GC		GC		GC		GC	GC										MS	MS											
337	HDB-6	300.30	300.60														GC		GC	GC		GC		GC		GC		GC	GC											MS											
338	HDB-6	394.30	394.52							CS	CS		calc	calc	calc																						MS	MS						AMS						
339	HDB-6	405.50	405.80														GC		GC	GC		GC		GC		GC		GC	GC										MS	MS											
340	HDB-6	405.10	405.40														GC		GC	GC		GC		GC		GC		GC	GC											MS											
341	HDB-6	440.00	440.50							CS	CS		calc	calc	calc																						MS	MS						AMS						
342	HDB-6	492.28	492.50							CS	CS		calc	calc	calc																						MS	MS						AMS						
343	HDB-6	498.40	498.70														GC		GC	GC		GC		GC		GC		GC	GC										MS												
344	HDB-6	498.10	498.40														GC		GC	GC		GC		GC		GC		GC	GC											MS											
345	HDB-6	547.00	547.48							CS	CS		calc	calc	calc																						MS	MS						AMS						
346	HDB-6	600.03	600.33							CS	CS		calc	calc	calc																						MS	MS						AMS						
347	HDB-6	607.00	607.30														GC		GC	GC		GC		GC		GC		GC	GC										MS												
348	HDB-6	610.70	611.00							CS	CS		calc	calc	calc																						MS	MS						AMS						
349	HDB-6	280.95	312.00		2003/10/12		NT		NT	CS	CS		calc	calc	calc																																				
350	HDB-6	280.95	312.00		2003/10/12		NT		NT																																										
351	HDB-6	280.95	312.00		2003/10/12		NT		NT	CS	CS		calc	calc	calc																																				
352	HDB-6	280.95	312.00		2003/10/13		NT		NT	CS	CS		calc	calc	calc																																				
353	HDB-6	280.95	312.00		2003/10/13		NT		NT																																										
354	HDB-6	280.95	312.00		2003/10/16		NT		NT	CS	CS		calc	calc	calc		GC		GC	GC		GC		GC		GC		GC	GC		GC					LSC	MS	MS	MS	MS				AMS			FS	FS	IC	IC
355	HDB-6	363.95	409.00		2003/12/8		NT		NT	CS	CS		calc	calc	calc																																				
356	HDB-6	363.95	409.00		2003/12/15		NT		NT	CS	CS		calc	calc	calc																																				
357	HDB-6	363.95	409.00		2003/12/15		NT		NT																																										
358	HDB-6	363.95	409.00		2003/12/15		NT		NT	CS	CS		calc	calc	calc																																				
359	HDB-6	363.95	409.00		2003/12/15		NT		NT																																										
360	HDB-6	363.95	409.00		2003/12/15		NT		NT	CS	CS		calc	calc	calc																																				
361	HDB-6	363.95	409.00		2003/12/17		NT		NT	CS	CS		calc	calc	calc		GC		GC	GC		GC		GC		GC		GC	GC		GC					LSC	MS	MS	MS	MS							FS	FS	IC	IC
362	HDB-6				2003/8/18		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS						
363	HDB-6				2003/9/16		NT		NT	CS	CS		calc	calc	calc																																				
364	HDB-6				2003/10/17		NT		NT	CS	CS		calc	calc	calc																																				
365	HDB-6				2003/11/13		NT		NT	CS	CS		calc	calc	calc																																				
366	HDB-6				2003/11/28																															LSC	MS	MS						AMS						
367	HDB-6				2003/12/7		NT		NT	CS	CS		calc	calc	calc																																				
368	HDB-6				2003/1/20		NT			CS	CS		calc	calc	calc																																				
369	HDB-6				2003/2/18		NT			CS	CS		calc	calc	calc																																				
370	HDB-6				2003/8/18		NT		NT	CS	CS		calc	calc	calc																																				
371	HDB-6				2003/9/16		NT		NT	CS	CS		calc	calc	calc																																				
372	HDB-6				2003/10/17		NT		NT	CS	CS		calc	calc	calc																																				
373	HDB-6				2003/11/13		NT		NT	CS	CS		calc	calc	calc																																				
374	HDB-6				2003/12/7		NT		NT	CS	CS		calc	calc	calc																																				
375	HDB-6				2004/1/20		NT		NT	CS	CS		calc	calc	calc																																				
376	HDB-6				2004/2/18		NT		NT	CS	CS		calc	calc	calc																																				
377	HDB-6				2003/8/18		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS			FS	FS	IC	IC
378	HDB-6				2003/11/28																															LSC	MS	MS						AMS			FS	FS	IC	IC
379	HDB-6				2003/12/16																																														
380	HDB-6	100.69			2003/9/2		NT		NT	CS	CS		calc	calc	calc																																				
381	HDB-6	137.50			2003/9/4		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS						
382	HDB-6	200.00			2003/9/24		NT		NT	CS	CS		calc	calc	calc																																				
383	HDB-6	299.67			2003/10/1		NT		NT	CS	CS		calc	calc	calc																																				
384	HDB-6	367.00			2003/10/7		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS						
385	HDB-6	400.00			2003/11/8		NT		NT	CS	CS		calc	calc	calc																																				
386	HDB-6	500.28			2003/11/17		NT		NT	CS	CS		calc	calc	calc																																				
387	HDB-6	600.20			2003/11/26		NT		NT	CS	CS		calc	calc	calc																																				
388	HDB-6	620.00			2003/11/28		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS						
389	HDB-6	288.66	302.90	4	2005/1/15	NT				CS	CS		calc	calc	calc																																				
390	HDB-6	288.66	302.90	4	2006/11/1	NT		NT		CS			calc	calc	calc																																				
391	HDB-6	288.66	302.90	4	2010/7/29	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS												
392	HDB-6	362.39	385.70	6	2005/1/17	NT				CS	CS		calc	calc	calc																																				
393	HDB-6	362.39	385.70	6	2006/11/6	NT		NT		CS			calc	calc	calc																																				
394	HDB-6	362.39	385.70	6	2010/7/28	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS												
395	HDB-6	386.60	396.41	7	2006/11/8	NT		NT		CS			calc	calc	calc																																				
396	HDB-6	386.60	396.41	7	2007/9/20	NT				CS	CS		calc	calc	calc																					LSC	MS	MS												
397	HDB-6	386.60	396.41	7	2010/7/26	NT		NT		CS	CS		calc	calc	calc																					LSC	MS	MS												
398	HDB-7	41.50	41.72							CS	CS		calc	calc	calc																						MS	MS						AMS						
399	HDB-7	131.00	131.26							CS	CS		calc	calc	calc																						MS	MS						AMS						
400	HDB-7	320.36	320.67							CS	CS		calc	calc	calc																						MS	MS						AMS						
401	HDB-7	343.29	343.55							CS	CS		calc	calc	calc																						MS	MS						AMS						

Table 2.3.5 Analytical methods of groundwater (12/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Microbiology																					
		Min.	Max.			Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]			[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
304	HDB-5				2002/12/24																						
305	HDB-5				2003/1/13																						
306	HDB-5				2003/1/23																						
307	HDB-5				2003/2/19																						
308	HDB-5				2002/9/29																						
309	HDB-5				2002/10/24																						
310	HDB-5				2002/11/24																						
311	HDB-5				2002/12/24																						
312	HDB-5				2003/1/23																						
313	HDB-5				2003/2/19																						
314	HDB-5				2002/10/12	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
315	HDB-5				2002/10/15																						
316	HDB-5				2003/1/13	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
317	HDB-5	46.83			2002/10/30	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
318	HDB-5	4.00			2002/11/1																						
319	HDB-5	63.86			2002/11/8																						
320	HDB-5	109.45			2002/11/15																						
321	HDB-5	182.01			2002/11/22																						
322	HDB-5	259.46			2002/11/29																						
323	HDB-5	272.24			2002/11/30	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
324	HDB-5	196.26			2002/12/20																						
325	HDB-5	275.05			2002/12/27																						
326	HDB-5	348.19			2003/1/3																						
327	HDB-5	443.39			2003/1/10																						
328	HDB-5	511.44			2003/1/14	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
329	HDB-5	368.60	377.40	8	2007/11/8																						
330	HDB-6	78.00	78.38																								
331	HDB-6	115.60	115.90																								
332	HDB-6	115.30	115.60																								
333	HDB-6	135.00	135.30																								
334	HDB-6	217.40	217.70																								
335	HDB-6	279.41	279.89																								
336	HDB-6	300.70	301.00																								
337	HDB-6	300.30	300.60																								
338	HDB-6	394.30	394.52																								
339	HDB-6	405.50	405.80																								
340	HDB-6	405.10	405.40																								
341	HDB-6	440.00	440.50																								
342	HDB-6	492.28	492.50																								
343	HDB-6	498.40	498.70																								
344	HDB-6	498.10	498.40																								
345	HDB-6	547.00	547.48																								
346	HDB-6	600.03	600.33																								
347	HDB-6	607.00	607.30																								
348	HDB-6	610.70	611.00																								
349	HDB-6	280.95	312.00		2003/10/12																						
350	HDB-6	280.95	312.00		2003/10/12																						
351	HDB-6	280.95	312.00		2003/10/12																						
352	HDB-6	280.95	312.00		2003/10/13																						
353	HDB-6	280.95	312.00		2003/10/13																						
354	HDB-6	280.95	312.00		2003/10/16	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
355	HDB-6	363.95	409.00		2003/12/8																						
356	HDB-6	363.95	409.00		2003/12/15																						
357	HDB-6	363.95	409.00		2003/12/15																						
358	HDB-6	363.95	409.00		2003/12/15																						
359	HDB-6	363.95	409.00		2003/12/15																						
360	HDB-6	363.95	409.00		2003/12/15																						
361	HDB-6	363.95	409.00		2003/12/17	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
362	HDB-6				2003/8/18																						
363	HDB-6				2003/9/16																						
364	HDB-6				2003/10/17																						
365	HDB-6				2003/11/13																						
366	HDB-6				2003/11/28																						
367	HDB-6				2003/12/7																						
368	HDB-6				2003/1/20																						
369	HDB-6				2003/2/18																						
370	HDB-6				2003/8/18																						
371	HDB-6				2003/9/16																						
372	HDB-6				2003/10/17																						
373	HDB-6				2003/11/13																						
374	HDB-6				2003/12/7																						
375	HDB-6				2004/1/20																						
376	HDB-6				2004/2/18																						
377	HDB-6				2003/8/18	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
378	HDB-6				2003/11/28																						
379	HDB-6				2003/12/16	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
380	HDB-6	100.69			2003/9/2																						
381	HDB-6	137.50			2003/9/4																						
382	HDB-6	200.00			2003/9/24																						
383	HDB-6	299.67			2003/10/1																						
384	HDB-6	367.00			2003/10/7																						
385	HDB-6	400.00			2003/11/8																						
386	HDB-6	500.28			2003/11/17																						
387	HDB-6	600.20			2003/11/26																						
388	HDB-6	620.00			2003/11/28																						
389	HDB-6	288.66	302.90	4	2005/1/15	DC																					
390	HDB-6	288.66	302.90	4	2006/11/1																						
391	HDB-6	288.66	302.90	4	2010/7/29																						
392	HDB-6	362.39	385.70	6	2005/1/17	DC																					
393	HDB-6	362.39	385.70	6	2006/11/6																						
394	HDB-6	362.39	385.70	6	2010/7/28																						
395	HDB-6	386.60	396.41	7	2006/11/8																						
396	HDB-6	386.60	396.41	7	2007/9/20																						
397	HDB-6	386.60	396.41	7	2010/7/26																						
398	HDB-7	41.50	41.72																								
399	HDB-7	131.00	131.26																								
400	HDB-7	320.36	320.67																								
401	HDB-7	343.29	343.55																								

Table 2.3.5 Analytical methods of groundwater (13/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Physico-chemical parameter							Contamination indicator			Geochemistry																											
		Min.	Max.			EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temperature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}
		[m]	[m]			[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]		[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
402	HDB-7	398.80	399.00						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
403	HDB-7	442.10	442.30						PM							FP	FP	ICP	ICP			ICP							ICP	A			IC						IC		calc	calc
404	HDB-7	496.13	496.36						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
405	HDB-7	506.38	506.90						PM							FP	FP	ICP	ICP			ICP							ICP	A			IC						IC		calc	calc
406	HDB-7				2003/8/18	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
407	HDB-7				2003/9/16	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
408	HDB-7				2003/10/17	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
409	HDB-7				2003/11/7	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
410	HDB-7				2003/12/7	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
411	HDB-7				2004/1/20	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
412	HDB-7				2004/2/18	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
413	HDB-7				2003/8/18	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
414	HDB-7				2003/9/16	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
415	HDB-7				2003/10/17	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
416	HDB-7				2003/11/7	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
417	HDB-7				2003/12/7	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
418	HDB-7				2004/1/20	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
419	HDB-7				2004/2/18	PM		PM						FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
420	HDB-7	100.00			2003/8/27	PM		PM						FS		FP	FP	ICP	ICP				GA	ICP		AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
421	HDB-7	178.00			2003/9/2	PM		PM						FS		FP	FP	ICP	ICP				GA	ICP		AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
422	HDB-7	200.07			2003/9/23	PM		PM						FS		FP	FP	ICP	ICP				GA	ICP		AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
423	HDB-7	300.00			2003/10/1	PM		PM						FS		FP	FP	ICP	ICP				GA	ICP		AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
424	HDB-7	324.00			2003/10/3	PM		PM						FS		FP	FP	ICP	ICP				GA	ICP		AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
425	HDB-7	400.00			2003/11/1	PM		PM						FS		FP	FP	ICP	ICP				GA	ICP		AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
426	HDB-7	501.89			2003/11/6	PM		PM						FS		FP	FP	ICP	ICP				GA	ICP		AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
427	HDB-7	520.00			2003/11/7	PM		PM						FS		FP	FP	ICP	ICP				GA	ICP					ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
428	HDB-7	218.59	228.45		2004/12/19		PM		PM							FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	calc
429	HDB-8	63.00	63.30						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
430	HDB-8	101.73	102.00						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
431	HDB-8	283.64	284.00						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
432	HDB-8	344.20	344.70						PM							FP	FP	ICP	ICP			ICP							ICP	A			IC						IC		calc	calc
433	HDB-8	400.57	401.00						PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
434	HDB-8	449.04	449.24						PM							FP	FP	ICP	ICP			ICP							ICP	A			IC						IC		calc	calc
435	HDB-8	465.25	465.42						PM							FP	FP	ICP	ICP			ICP							ICP	A			IC						IC		calc	calc
436	HDB-8	57.50	89.05		2003/9/16	PM		PM		PM		PM		FS		FP	FP	ICP	ICP					ICP					ICP	A		IC	IC	IC		IC			IC	A	calc	
437	HDB-8	57.50	89.05		2003/9/18	PM		PM		PM		PM		FS		FP	FP	ICP	ICP					ICP					ICP	A		IC	IC	IC		IC			IC	A	calc	
438	HDB-8	57.50	89.05		2003/9/18	PM		PM		PM		PM		FS		FP	FP	ICP	ICP					ICP					ICP	A		IC	IC	IC		IC			IC	A	calc	
439	HDB-8	57.50	89.05		2003/9/18	PM		PM		PM		PM		FS																A									IC	A	calc	
440	HDB-8	57.50	89.05		2003/9/18	PM		PM		PM		PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
441	HDB-8	57.50	89.05		2003/10/17																																				calc	
442	HDB-8	168.01	184.06		2003/10/26	PM		PM		PM		PM		FS																A									IC	A	calc	
443	HDB-8	168.01	184.06		2003/10/26	PM		PM		PM		PM		FS		FP	FP	ICP	ICP					ICP					ICP	A		IC	IC	IC		IC			IC	A	calc	
444	HDB-8	168.01	184.06		2003/10/26	PM		PM		PM		PM		FS		FP	FP	ICP	ICP					ICP					ICP	A		IC	IC	IC		IC			IC	A	calc	
445	HDB-8	168.01	184.06		2003/10/27	PM		PM		PM		PM		FS		FP	FP	ICP	ICP					ICP					ICP	A		IC	IC	IC		IC			IC	A	calc	
446	HDB-8	168.01	184.06		2003/10/27	PM		PM		PM		PM		FS																A									IC	A	calc	
447	HDB-8	168.01	184.06		2003/10/29	PM		PM		PM		PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
448	HDB-8				2003/11/1																																						
449	HDB-8				2003/8/26	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
450	HDB-8				2003/9/16	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
451	HDB-8				2003/10/17	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
452	HDB-8				2003/11/13	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
453	HDB-8				2003/11/28	PM		PM				PM		FS																													
454	HDB-8				2003/12/7	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
455	HDB-8				2004/1/20	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
456	HDB-8				2004/2/18	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
457	HDB-8				2003/8/26	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
458	HDB-8				2003/9/16	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
459	HDB-8				2003/10/17	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
460	HDB-8				2003/11/13	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
461	HDB-8				2003/12/7	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
462	HDB-8				2004/1/20	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
463	HDB-8				2004/2/18	PM		PM				PM		FS		FP	FP	ICP	ICP	ICP		ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC	IC		A	IC		calc	
464	HDB-8				2003/8/18	PM		PM				PM		FS		FP	FP	ICP	ICP				GA				A		ICP	A	ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	
465	HDB-8				2003/11/28																																						
466	HDB-8				2003/12/16																																						
467	HDB-8	98.86			2003/9/3	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
468	HDB-8	112.98			2003/9/4	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
469	HDB-8	200.00			2003/10/4	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
470	HDB-8	300.40			2003/10/13	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
471	HDB-8	307.50			2003/10/13	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
472	HDB-8	399.77			2003/11/21	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
473	HDB-8	469.94			2003/11/27	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP		ICP	IC	IC	IC	IC	IC	IC			IC	A	calc	calc
474	HDB-9	36.22	36.45				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
475	HDB-9	54.95	55.23				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
476	HDB-9	78.00	78.50				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
477	HDB-9	151.10	151.42				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
478	HDB-9	200.00	200.40																																								
479	HDB-9	222.00	222.25																																								
480	HDB-9	251.70	252.00				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
481	HDB-9	347.68	348.00				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
482	HDB-9	397.78	397.98																																								
483	HDB-9	456.62	457.00				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
484	HDB-9	498.80	499.00																																								
485	HDB-9	516.67	517.00				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
486	HDB-9	198.75	199.00						PM							FP	FP	ICP	ICP			ICP							ICP				IC						IC		calc	calc
487	HDB-9	26.50	82.60		2004/10/21	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A		calc
488	HDB-9	26.50	82.60		2004/10/21	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
489	HDB-9	26.50	82.60		2004/10/21	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
490	HDB-9	26.50	82.60		2004/10/22	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
491	HDB-9	26.50	82.60		2004/10/22	PM		PM		PM		PM		FS																A									IC	A		
492	HDB-9	26.50	82.60		2004/10/23	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
493	HDB-9	26.50	82.60		2004/10/24	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
494	HDB-9	216.90	257.50		2004/11/26	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
495	HDB-9	216.90	257.50		2004/11/26	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
496	HDB-9	216.90	257.50		2004/11/26	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
497	HDB-9	216.90	257.50		2004/11/26	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
498	HDB-9	216.90	257.50		2004/11/27	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
499	HDB-9	216.90	257.50		2004/11/27	PM		PM		PM		PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
500	HDB-9				2004/8/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
501	HDB-9				2004/9/12	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc

Table 2.3.5 Analytical methods of groundwater (14/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date											Gases																			Isotope											Organics			
		Min.	Max.			M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	CO	H_2S	H_2	^3H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (DIC)	^{14}C	^{36}Cl	$^{36}Cl/Cl$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$	Humic acid	Fuluvic acid	Acetate	Formate
		[m]	[m]			[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mol/Kg]	[%]	[mol/Kg]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
402	HDB-7	398.80	399.00							CS	CS		calc	calc	calc																						MS	MS						AMS						
403	HDB-7	442.10	442.30							CS	CS		calc	calc	calc																						MS	MS						AMS						
404	HDB-7	496.13	496.36							CS	CS		calc	calc	calc																						MS	MS						AMS						
405	HDB-7	506.38	506.90							CS	CS		calc	calc	calc																						MS	MS						AMS						
406	HDB-7				2003/8/18		NT		NT	CS	CS		calc	calc	calc																				LSC	MS	MS						AMS						
407	HDB-7				2003/9/16		NT		NT	CS	CS		calc	calc	calc																																			
408	HDB-7				2003/10/17		NT		NT	CS	CS		calc	calc	calc																																			
409	HDB-7				2003/11/7		NT		NT	CS	CS		calc	calc	calc																				LSC	MS	MS						AMS						
410	HDB-7				2003/12/7		NT		NT	CS	CS		calc	calc	calc																																			
411	HDB-7				2004/1/20		NT		NT	CS	CS		calc	calc	calc																																			
412	HDB-7				2004/2/18		NT		NT	CS	CS		calc	calc	calc																																			
413	HDB-7				2003/8/18		NT		NT	CS	CS		calc	calc	calc																																			
414	HDB-7				2003/9/16		NT		NT	CS	CS		calc	calc	calc																																			
415	HDB-7				2003/10/17		NT		NT	CS	CS		calc	calc	calc																																			
416	HDB-7				2003/11/7		NT		NT	CS	CS		calc	calc	calc																																			
417	HDB-7				2003/12/7		NT		NT	CS	CS		calc	calc	calc																																			
418	HDB-7				2004/1/20		NT		NT	CS	CS		calc	calc	calc																																			
419	HDB-7				2004/2/18		NT		NT	CS	CS		calc	calc	calc																																			
420	HDB-7	100.00			2003/8/27		NT		NT	CS	CS		calc	calc	calc																																			
421	HDB-7	178.00			2003/9/2		NT		NT	CS	CS		calc	calc	calc																				LSC	MS	MS						AMS						
422	HDB-7	200.07			2003/9/23		NT		NT	CS	CS		calc	calc	calc																																			
423	HDB-7	300.00			2003/10/1		NT		NT	CS	CS		calc	calc	calc																																			
424	HDB-7	324.00			2003/10/3		NT		NT	CS	CS		calc	calc	calc																				LSC	MS	MS												
425	HDB-7	400.00			2003/11/1		NT		NT	CS	CS		calc	calc	calc																																			
426	HDB-7	501.89			2003/11/6		NT		NT	CS	CS		calc	calc	calc																																			
427	HDB-7	520.00			2003/11/7		NT		NT	CS	CS		calc	calc	calc																				LSC	MS	MS						AMS						
428	HDB-7	218.59	228.45		2004/12/19	NT				CS	CS		calc	calc	calc																																			
429	HDB-8	63.00	63.30							CS	CS		calc	calc	calc																						MS	MS						AMS						
430	HDB-8	101.73	102.00							CS	CS		calc	calc	calc																						MS	MS						AMS						
431	HDB-8	283.64	284.00							CS	CS		calc	calc	calc																						MS	MS						AMS						
432	HDB-8	344.20	344.70							CS	CS		calc	calc	calc																						MS	MS						AMS						
433	HDB-8	400.57	401.00							CS	CS		calc	calc	calc																						MS	MS						AMS						
434	HDB-8	449.04	449.24							CS	CS		calc	calc	calc																						MS	MS						AMS						
435	HDB-8	465.25	465.42							CS	CS		calc	calc	calc																						MS	MS						AMS						
436	HDB-8	57.50	89.05		2003/9/16		NT		NT	CS	CS		calc	calc	calc																																			
437	HDB-8	57.50	89.05		2003/9/18		NT		NT	CS	CS		calc	calc	calc																																			
438	HDB-8	57.50	89.05		2003/9/18		NT		NT	CS	CS		calc	calc	calc																																			
439	HDB-8	57.50	89.05		2003/9/18		NT		NT																																									
440	HDB-8	57.50	89.05		2003/9/18		NT		NT	CS	CS		calc	calc	calc																				LSC	MS	MS						AMS			FS	FS	IC	IC
441	HDB-8	57.50	89.05		2003/10/17												GC		GC	GC		GC		GC		GC		GC	GC																					
442	HDB-8	168.01	184.06		2003/10/26		NT		NT				calc	calc	calc																																			
443	HDB-8	168.01	184.06		2003/10/26		NT		NT	CS	CS		calc	calc	calc																																			
444	HDB-8	168.01	184.06		2003/10/26		NT		NT	CS	CS		calc	calc	calc																																			
445	HDB-8	168.01	184.06		2003/10/27		NT		NT	CS	CS		calc	calc	calc																																			
446	HDB-8	168.01	184.06		2003/10/27		NT		NT																																									
447	HDB-8	168.01	184.06		2003/10/29		NT		NT	CS	CS		calc	calc	calc																				LSC	MS	MS						AMS			FS	FS	IC	IC
448	HDB-8				2003/11/1												GC		GC	GC		GC		GC		GC		GC	GC																					
449	HDB-8				2003/8/26		NT		NT	CS	CS		calc	calc	calc																				LSC	MS	MS						AMS						
450	HDB-8				2003/9/16		NT		NT	CS	CS		calc	calc	calc																																			
451	HDB-8				2003/10/17		NT		NT	CS	CS		calc	calc	calc																																			
452	HDB-8				2003/11/13		NT		NT	CS	CS		calc	calc	calc																																			
453	HDB-8				2003/11/28								calc	calc	calc																				LSC	MS	MS						AMS						
454	HDB-8				2003/12/7		NT			CS	CS		calc	calc	calc																																			
455	HDB-8				2004/1/20		NT			CS	CS		calc	calc	calc																																			
456	HDB-8				2004/2/18		NT			CS	CS		calc	calc	calc																																			
457	HDB-8				2003/8/26		NT		NT	CS	CS		calc	calc	calc																																			
458	HDB-8				2003/9/16		NT		NT	CS	CS		calc	calc	calc																																			
459	HDB-8				2003/10/17		NT		NT	CS	CS		calc	calc	calc																																			
460	HDB-8				2003/11/13		NT		NT	CS	CS		calc	calc	calc																																			
461	HDB-8				2003/12/7		NT		NT	CS	CS		calc	calc	calc																																			
462	HDB-8				2004/1/20		NT		NT	CS	CS		calc	calc	calc																																			
463	HDB-8				2004/2/18		NT		NT	CS	CS		calc	calc	calc																																			
464	HDB-8				2003/8/18		NT		NT	CS	CS		calc	calc	calc																				LSC	MS	MS						AMS			FS	FS	IC	IC
465	HDB-8				2003/11/28																														LSC	MS	MS						AMS			FS	FS	IC	IC
466	HDB-8				2003/12/16																																													
467	HDB-8	98.86			2003/9/3		NT		NT	CS	CS		calc	calc	calc																																			
468	HDB-8	112.98			2003/9/4		NT		NT	CS	CS		calc	calc	calc																				LSC	MS	MS						AMS						
469	HDB-8	200.00			2003/10/4		NT		NT	CS	CS		calc	calc	calc																																			
470	HDB-8	300.40			2003/10/13		NT		NT	CS	CS		calc	calc	calc																																			
471	HDB-8	307.50			2003/10/13		NT		NT	CS	CS		calc	calc	calc																				LSC	MS	MS						AMS						
472	HDB-8	399.77			2003/11/21		NT		NT	CS	CS		calc	calc	calc																																			
473	HDB-8	469.94			2003/11/27		NT		NT	CS	CS		calc	calc	calc																				LSC	MS	MS						AMS						
474	HDB-9	36.22	36.45							CS	CS		calc	calc	calc																						MS	MS												
475	HDB-9	54.95	55.23							CS	CS		calc	calc	calc																						MS	MS												
476	HDB-9	78.00	78.50							CS	CS		calc	calc	calc																						MS	MS												
477	HDB-9	151.10	151.42							CS	CS		calc	calc	calc																						MS	MS												
478	HDB-9	200.00	200.40														GC		GC	GC		GC		GC		GC		GC										MS	MS											
479	HDB-9	222.00	222.25																																		MS	MS												
480	HDB-9	251.70	252.00							CS	CS		calc	calc	calc																						MS	MS												
481	HDB-9	347.68	348.00							CS	CS		calc	calc	calc																						MS	MS												
482	HDB-9	397.78	397.98														GC		GC	GC		GC		GC		GC		GC											MS	MS										
483	HDB-9	456.62	457.00							CS	CS		calc	calc	calc																						MS	MS												
484	HDB-9	498.80	499.00														GC		GC	GC		GC		GC		GC		GC											MS	MS											
485	HDB-9	516.67	517.00							CS	CS		calc	calc	calc																						MS	MS												
486	HDB-9	198.75	199.00							CS	CS		calc	calc	calc																						MS	MS												
487	HDB-9	26.50	82.60		2004/10/21		NT		NT	CS	CS		calc	calc	calc																																			
488	HDB-9	26.50	82.60		2004/10/21		NT		NT	CS	CS		calc	calc	calc																																			
489	HDB-9	26.50	82.60		2004/10/21		NT		NT	CS	CS		calc	calc	calc																																			
490	HDB-9	26.50	82.60		2004/10/22		NT		NT	CS	CS		calc	calc	calc																																			
491	HDB-9	26.50	82.60		2004/10/22		NT		NT				calc	calc	calc																																			
492	HDB-9	26.50	82.60		2004/10/23		NT		NT	CS	CS		calc	calc	calc																																			
493	HDB-9	26.50	82.60		2004/10/24		NT		NT	CS	CS		calc	calc	calc																				LSC	MS	MS						AMS	MS	TIMS	FS	FS	IC	IC
494	HDB-9	216.90	257.50		2004/11/26		NT		NT	CS	CS		calc	calc	calc																																			
495	HDB-9	216.90	257.50		2004/11/26		NT		NT	CS	CS		calc	calc	calc																																			
496	HDB-9	216.90	257.50		2004/11/26		NT		NT	CS	CS		calc	calc	calc																																			
497	HDB-9	216.90	257.50		2004/11/26		NT		NT	CS	CS		calc	calc	calc																																			
498	HDB-9	216.90	257.50		2004/11/27		NT		NT	CS	CS		calc	calc	calc																																			
499	HDB-9	216.90	257.50		2004/11/27		NT		NT	CS	CS		calc	calc	calc		GC		GC	GC		GC		GC		GC		GC	GC						LSC	MS	MS	MS	MS				AMS	MS	TIMS	FS	FS	IC	IC
500	HDB-9				2004/8/9		NT		NT	CS	CS		calc	calc	calc																																			
501	HDB-9				2004/9/12		NT		NT	CS	CS		calc	calc	calc																																			

Table 2.3.5 Analytical methods of groundwater (15/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Microbiology																					
		Min.	Max.			Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]			[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
402	HDB-7	398.80	399.00																								
403	HDB-7	442.10	442.30																								
404	HDB-7	496.13	496.36																								
405	HDB-7	506.38	506.90																								
406	HDB-7				2003/8/18																						
407	HDB-7				2003/9/16																						
408	HDB-7				2003/10/17																						
409	HDB-7				2003/11/7																						
410	HDB-7				2003/12/7																						
411	HDB-7				2004/1/20																						
412	HDB-7				2004/2/18																						
413	HDB-7				2003/8/18																						
414	HDB-7				2003/9/16																						
415	HDB-7				2003/10/17																						
416	HDB-7				2003/11/7																						
417	HDB-7				2003/12/7																						
418	HDB-7				2004/1/20																						
419	HDB-7				2004/2/18																						
420	HDB-7	100.00			2003/8/27																						
421	HDB-7	178.00			2003/9/2																						
422	HDB-7	200.07			2003/9/23																						
423	HDB-7	300.00			2003/10/1																						
424	HDB-7	324.00			2003/10/3																						
425	HDB-7	400.00			2003/11/1																						
426	HDB-7	501.89			2003/11/6																						
427	HDB-7	520.00			2003/11/7																						
428	HDB-7	218.59	228.45		2004/12/19																						
429	HDB-8	63.00	63.30																								
430	HDB-8	101.73	102.00																								
431	HDB-8	283.64	284.00																								
432	HDB-8	344.20	344.70																								
433	HDB-8	400.57	401.00																								
434	HDB-8	449.04	449.24																								
435	HDB-8	465.25	465.42																								
436	HDB-8	57.50	89.05		2003/9/16																						
437	HDB-8	57.50	89.05		2003/9/18																						
438	HDB-8	57.50	89.05		2003/9/18																						
439	HDB-8	57.50	89.05		2003/9/18																						
440	HDB-8	57.50	89.05		2003/9/18	DC	CFU		CFU	MPN	MPN	MPN				MPN		MPN			MPN			MPN			
441	HDB-8	57.50	89.05		2003/10/17																						
442	HDB-8	168.01	184.06		2003/10/26																						
443	HDB-8	168.01	184.06		2003/10/26																						
444	HDB-8	168.01	184.06		2003/10/26																						
445	HDB-8	168.01	184.06		2003/10/27																						
446	HDB-8	168.01	184.06		2003/10/27																						
447	HDB-8	168.01	184.06		2003/10/29	DC	CFU		CFU	MPN	MPN	MPN				MPN		MPN			MPN			MPN			
448	HDB-8				2003/11/1																						
449	HDB-8				2003/8/26																						
450	HDB-8				2003/9/16																						
451	HDB-8				2003/10/17																						
452	HDB-8				2003/11/13																						
453	HDB-8				2003/11/28																						
454	HDB-8				2003/12/7																						
455	HDB-8				2004/1/20																						
456	HDB-8				2004/2/18																						
457	HDB-8				2003/8/26																						
458	HDB-8				2003/9/16																						
459	HDB-8				2003/10/17																						
460	HDB-8				2003/11/13																						
461	HDB-8				2003/12/7																						
462	HDB-8				2004/1/20																						
463	HDB-8				2004/2/18																						
464	HDB-8				2003/8/18	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
465	HDB-8				2003/11/28																						
466	HDB-8				2003/12/16	DC	CFU	CFU		MPN	MPN	MPN				MPN		MPN			MPN			MPN			
467	HDB-8	98.86			2003/9/3																						
468	HDB-8	112.98			2003/9/4																						
469	HDB-8	200.00			2003/10/4																						
470	HDB-8	300.40			2003/10/13																						
471	HDB-8	307.50			2003/10/13																						
472	HDB-8	399.77			2003/11/21																						
473	HDB-8	469.94			2003/11/27																						
474	HDB-9	36.22	36.45																								
475	HDB-9	54.95	55.23																								
476	HDB-9	78.00	78.50																								
477	HDB-9	151.10	151.42																								
478	HDB-9	200.00	200.40																								
479	HDB-9	222.00	222.25																								
480	HDB-9	251.70	252.00																								
481	HDB-9	347.68	348.00																								
482	HDB-9	397.78	397.98																								
483	HDB-9	456.62	457.00																								
484	HDB-9	498.80	499.00																								
485	HDB-9	516.67	517.00																								
486	HDB-9	198.75	199.00																								
487	HDB-9	26.50	82.60		2004/10/21																						
488	HDB-9	26.50	82.60		2004/10/21																						
489	HDB-9	26.50	82.60		2004/10/21																						
490	HDB-9	26.50	82.60		2004/10/22																						
491	HDB-9	26.50	82.60		2004/10/22																						
492	HDB-9	26.50	82.60		2004/10/23																						
493	HDB-9	26.50	82.60		2004/10/24	DC	CFU	CFU	CFU	MPN	MPN	MPN	MPN	MPN	MPN	MPN	MPN	MPN				MPN	MPN	MPN			
494	HDB-9	216.90	257.50		2004/11/26																						
495	HDB-9	216.90	257.50		2004/11/26																						
496	HDB-9	216.90	257.50		2004/11/26																						
497	HDB-9	216.90	257.50		2004/11/26																						
498	HDB-9	216.90	257.50		2004/11/27																						
499	HDB-9	216.90	257.50		2004/11/27	DC	CFU	CFU	CFU	MPN	MPN	MPN	MPN	MPN	MPN	MPN	MPN	MPN				MPN	MPN	MPN			
500	HDB-9				2004/8/9																						
501	HDB-9				2004/9/12																						

Table 2.3.5 Analytical methods of groundwater (16/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Physico-chemical parameter							Contamination indicator			Geochemistry																												
		Min.	Max.			EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temperature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}
		[m]	[m]			[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]		[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
502	HDB-9				2004/10/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
503	HDB-9				2004/11/5	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
504	HDB-9				2004/12/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
505	HDB-9				2005/1/7	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
506	HDB-9				2005/2/3	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
507	HDB-9				2004/8/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
508	HDB-9				2004/9/12	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
509	HDB-9				2004/10/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
510	HDB-9				2004/11/5	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
511	HDB-9				2004/12/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
512	HDB-9				2005/1/7	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
513	HDB-9				2005/2/3	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
514	HDB-9				2004/9/16	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
515	HDB-9	100.24			2004/10/27	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
516	HDB-9	125.00			2004/10/28	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
517	HDB-9	201.00			2004/11/13	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
518	HDB-9	257.50			2004/11/17	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
519	HDB-9	299.22			2004/12/14	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
520	HDB-9	401.53			2005/12/20	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
521	HDB-9	500.04			2004/12/29	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
522	HDB-9	520.00			2004/12/30	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
523	HDB-9	216.90	257.50		2005/10/3		PM							FS		FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
524	HDB-10	32.76	33.00				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
525	HDB-10	43.70	44.00				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
526	HDB-10	59.10	59.30				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
527	HDB-10	148.65	149.00				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
528	HDB-10	195.85	196.25		2004/10/29																																					
529	HDB-10	249.68	250.00				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
530	HDB-10	301.00	301.34				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
531	HDB-10	355.00	355.20																																							
532	HDB-10	401.00	401.35																																							
533	HDB-10	447.00	447.35				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
534	HDB-10	466.46	466.71				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
535	HDB-10	485.60	486.00																																							
536	HDB-10	505.50	506.00				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
537	HDB-10	548.00	548.50				PM		PM							FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
538	HDB-10	195.65	195.85						PM							FP	FP	ICP	ICP			ICP							ICP				IC						IC		calc	calc
539	HDB-10	397.40	397.70						PM							FP	FP	ICP	ICP			ICP							ICP				IC						IC		calc	calc
540	HDB-10	484.80	485.00						PM							FP	FP	ICP	ICP			ICP							ICP				IC						IC		calc	calc
541	HDB-10	41.33	59.88		2004/10/13	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
542	HDB-10	41.33	59.88		2004/10/13	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
543	HDB-10	41.33	59.88		2004/10/13	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
544	HDB-10	41.33	59.88		2004/10/13	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
545	HDB-10	41.33	59.88		2004/10/13	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
546	HDB-10	41.33	59.88		2004/10/14	PM		PM		PM		PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
547	HDB-10	445.84	469.89		2004/12/19	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
548	HDB-10	445.84	469.89		2004/12/19	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
549	HDB-10	445.84	469.89		2004/12/19	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
550	HDB-10	445.84	469.89		2004/12/19	PM		PM		PM		PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
551	HDB-10	445.84	469.89		2004/12/19									FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
552	HDB-10	445.84	469.89		2004/12/20	PM		PM		PM		PM		FS																A									IC	A	calc	calc
553	HDB-10	445.84	469.89		2004/12/20	PM		PM		PM		PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
554	HDB-10	445.84	469.89		2004/12/22																																					
555	HDB-10				2004/8/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
556	HDB-10				2004/9/12	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
557	HDB-10				2004/10/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
558	HDB-10				2004/11/5	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
559	HDB-10				2004/12/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
560	HDB-10				2005/1/7	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
561	HDB-10				2005/2/3	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
562	HDB-10				2004/8/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
563	HDB-10				2004/9/12	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
564	HDB-10				2004/10/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
565	HDB-10				2004/11/5	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
566	HDB-10				2004/12/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
567	HDB-10				2005/1/7	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
568	HDB-10				2005/2/3	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
569	HDB-10				2004/9/16	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
570	HDB-10	100.03			2004/10/3	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
571	HDB-10	136.00			2004/10/5	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
572	HDB-10	200.13			2004/10/29	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
573	HDB-10	298.00			2004/11/4	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
574	HDB-10	400.02			2004/11/30	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
575	HDB-10	500.00			2004/12/8	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
576	HDB-10	550.00			2005/1/6	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
577	HDB-10	45.00			2005/6/22		PM		PM							FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
578	HDB-10	495.89	550.00		2005/6/27		PM		PM							FP	FP	FP, ICP	FP, ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
579	HDB-10	495.89	550.00		2005/11/9		PM		PM							FP	FP	FP, ICP	FP, ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC		calc	calc
580	HDB-10	495.89	550.00		2006/9/15	PM	PM	PM	PM	PM		PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC		calc	calc
581	HDB-10	495.89	550.00		2007/10/29	PM		PM		PM	calc	PM		HPLC		IC	IC	ICP	ICP		A		ICP	ICP			IC		A	A		IC	IC	IC		IC		A	IC	A	calc	calc
582	HDB-10	495.89	550.00		2008/10/3		PM		PM					HPLC		FP	FP	FP, ICP	FP, ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
583	HDB-10	495.89	550.00		2008/10/3	PM		PM	PM	PM	calc	PM		FS		IC	IC	ICP	ICP		A		ICP	ICP			IC		A	A		IC	IC	IC		IC	IC	A	IC	A	calc	calc
584	HDB-11	30.60	31.00			PM		PM								FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
585	HDB-11	49.64	49.87			PM		PM								FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
586	HDB-11	96.75	97.00													IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
587	HDB-11	99.00	99.40																																							
588	HDB-11	99.40	99.72			PM		PM								FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
589	HDB-11	114.09	114.30					PM								FP	FP	ICP	ICP			ICP							ICP				IC						IC		calc	calc
590	HDB-11	120.00	120.38													IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
591	HDB-11	134.20	134.45			PM		PM								FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
592	HDB-11	138.20	138.57													IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
593	HDB-11	169.53	169.83													IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
594	HDB-11	171.65	171.85			PM		PM								FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
595	HDB-11	199.00	199.55																																							
596	HDB-11	231.00	231.35													IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
597	HDB-11	251.10	251.45			PM		PM								FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
598	HDB-11	271.75	272.00					PM								FP	FP	ICP	ICP			ICP							ICP				IC						IC		calc	calc
599	HDB-11	298.60	299.00																																							
600	HDB-11	300.36	300.56			PM		PM								FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
601	HDB-11	332.50	332.70			PM		PM								FP	FP	ICP	ICP			ICP											IC						IC		calc	calc
602	HDB-11	335.47	335.72													IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			

Table 2.3.5 Analytical methods of groundwater (17/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date												Gases																			Isotope											Organics			
		Min.	Max.			M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	CO	H_2S	H_2	^3H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (DIC)	^{14}C	^{36}Cl	$^{36}Cl/Cl$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$	Humic acid	Fuluvic acid	Acetate	Formate
		[m]	[m]			[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mol/Kg]	[%]	[mol/Kg]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
502	HDB-9				2004/10/9		NT		NT	CS	CS		calc	calc	calc																																				
503	HDB-9				2004/11/5		NT		NT	CS	CS		calc	calc	calc																																				
504	HDB-9				2004/12/9		NT		NT	CS	CS		calc	calc	calc																																				
505	HDB-9				2005/1/7		NT		NT	CS	CS		calc	calc	calc																																				
506	HDB-9				2005/2/3		NT		NT	CS	CS		calc	calc	calc																																				
507	HDB-9				2004/8/9		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS	MS	TIMS				
508	HDB-9				2004/9/12		NT		NT	CS	CS		calc	calc	calc																																				
509	HDB-9				2004/10/9		NT		NT	CS	CS		calc	calc	calc																																				
510	HDB-9				2004/11/5		NT		NT	CS	CS		calc	calc	calc																																				
511	HDB-9				2004/12/9		NT		NT	CS	CS		calc	calc	calc																																				
512	HDB-9				2005/1/7		NT		NT	CS	CS		calc	calc	calc																																				
513	HDB-9				2005/2/3		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS	MS	TIMS				
514	HDB-9				2004/9/16		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS	MS	TIMS	FS	FS	IC	IC
515	HDB-9	100.24			2004/10/27		NT		NT	CS	CS		calc	calc	calc																																				
516	HDB-9	125.00			2004/10/28		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS	MS	TIMS	FS	FS	IC	IC
517	HDB-9	201.00			2004/11/13		NT		NT	CS	CS		calc	calc	calc																																				
518	HDB-9	257.50			2004/11/17		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS	MS	TIMS	FS	FS	IC	IC
519	HDB-9	299.22			2004/12/14		NT		NT	CS	CS		calc	calc	calc																																				
520	HDB-9	401.53			2005/12/20		NT		NT	CS	CS		calc	calc	calc																																				
521	HDB-9	500.04			2004/12/29		NT		NT	CS	CS		calc	calc	calc																																				
522	HDB-9	520.00			2004/12/30		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS	MS	TIMS	FS	FS	IC	IC
523	HDB-9	216.90	257.50		2005/10/3		NT			CS	CS		calc	calc	calc																																				
524	HDB-10	32.76	33.00							CS	CS		calc	calc	calc																						MS	MS													
525	HDB-10	43.70	44.00							CS	CS		calc	calc	calc																						MS	MS													
526	HDB-10	59.10	59.30							CS	CS		calc	calc	calc																						MS	MS													
527	HDB-10	148.65	149.00							CS	CS		calc	calc	calc																						MS	MS													
528	HDB-10	195.85	196.25		2004/10/29												GC		GC	GC		GC		GC		GC		GC	GC										MS	MS										
529	HDB-10	249.68	250.00							CS	CS		calc	calc	calc																						MS	MS													
530	HDB-10	301.00	301.34							CS	CS		calc	calc	calc																						MS	MS													
531	HDB-10	355.00	355.20																																		MS	MS													
532	HDB-10	401.00	401.35														GC		GC	GC		GC		GC		GC		GC	GC										MS	MS										
533	HDB-10	447.00	447.35							CS	CS		calc	calc	calc																						MS	MS													
534	HDB-10	466.46	466.71							CS	CS		calc	calc	calc																						MS	MS													
535	HDB-10	485.60	486.00														GC		GC	GC		GC		GC		GC		GC	GC										MS	MS										
536	HDB-10	505.50	506.00							CS	CS		calc	calc	calc																						MS	MS													
537	HDB-10	548.00	548.50							CS	CS		calc	calc	calc																						MS	MS													
538	HDB-10	195.65	195.85							CS	CS		calc	calc	calc																						MS	MS													
539	HDB-10	397.40	397.70							CS	CS		calc	calc	calc																																				
540	HDB-10	484.80	485.00							CS	CS		calc	calc	calc																																				
541	HDB-10	41.33	59.88		2004/10/13		NT		NT	CS	CS		calc	calc	calc																																				
542	HDB-10	41.33	59.88		2004/10/13		NT		NT	CS	CS		calc	calc	calc																																				
543	HDB-10	41.33	59.88		2004/10/13		NT		NT	CS	CS		calc	calc	calc																																				
544	HDB-10	41.33	59.88		2004/10/13		NT		NT	CS	CS		calc	calc	calc																																				
545	HDB-10	41.33	59.88		2004/10/13		NT		NT	CS	CS		calc	calc	calc																																				
546	HDB-10	41.33	59.88		2004/10/14		NT		NT	CS	CS		calc	calc	calc		GC		GC	GC		GC		GC		GC		GC	GC							LSC	MS	MS	MS	MS				AMS	MS	TIMS	FS	FS	IC	IC
547	HDB-10	445.84	469.89		2004/12/19		NT		NT	CS	CS		calc	calc	calc																																				
548	HDB-10	445.84	469.89		2004/12/19		NT		NT	CS	CS		calc	calc	calc																																				
549	HDB-10	445.84	469.89		2004/12/19		NT		NT	CS	CS		calc	calc	calc																																				
550	HDB-10	445.84	469.89		2004/12/19		NT		NT	CS	CS		calc	calc	calc																																				
551	HDB-10	445.84	469.89		2004/12/19		NT		NT	CS	CS		calc	calc	calc																																				
552	HDB-10	445.84	469.89		2004/12/20		NT		NT																																										
553	HDB-10	445.84	469.89		2004/12/20		NT		NT	CS	CS		calc	calc	calc		GC		GC	GC		GC		GC		GC		GC	GC							LSC	MS	MS	MS	MS				AMS	MS	TIMS	FS	FS	IC	IC
554	HDB-10	445.84	469.89		2004/12/22																																														
555	HDB-10				2004/8/9		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS	MS	TIMS				
556	HDB-10				2004/9/12		NT		NT	CS	CS		calc	calc	calc																																				
557	HDB-10				2004/10/9		NT		NT	CS	CS		calc	calc	calc																																				
558	HDB-10				2004/11/5		NT		NT	CS	CS		calc	calc	calc																																				
559	HDB-10				2004/12/9		NT		NT	CS	CS		calc	calc	calc																																				
560	HDB-10				2005/1/7		NT		NT	CS	CS		calc	calc	calc																																				
561	HDB-10				2005/2/3		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS	MS	TIMS				
562	HDB-10				2004/8/9		NT		NT	CS	CS		calc	calc	calc																																				
563	HDB-10				2004/9/12		NT		NT	CS	CS		calc	calc	calc																																				
564	HDB-10				2004/10/9		NT		NT	CS	CS		calc	calc	calc																																				
565	HDB-10				2004/11/5		NT		NT	CS	CS		calc	calc	calc																																				
566	HDB-10				2004/12/9		NT		NT	CS	CS		calc	calc	calc																																				
567	HDB-10				2005/1/7		NT		NT	CS	CS		calc	calc	calc																																				
568	HDB-10				2005/2/3		NT		NT	CS	CS		calc	calc	calc																																				
569	HDB-10				2004/9/16		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS	MS	TIMS	FS	FS	IC	IC
570	HDB-10	100.03			2004/10/3		NT		NT	CS	CS		calc	calc	calc																																				
571	HDB-10	136.00			2004/10/5		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS	MS	TIMS	FS	FS	IC	IC
572	HDB-10	200.13			2004/10/29		NT		NT	CS	CS		calc	calc	calc																																				
573	HDB-10	298.00			2004/11/4		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS	MS	TIMS	FS	FS	IC	IC
574	HDB-10	400.02			2004/11/30		NT		NT	CS	CS		calc	calc	calc																																				
575	HDB-10	500.00			2004/12/8		NT		NT	CS	CS		calc	calc	calc																					LSC	MS	MS						AMS	MS	TIMS	FS	FS	IC	IC
576	HDB-10	550.00			2005/1/6		NT		NT	CS	CS		calc	calc	calc																																				
577	HDB-10	45.00			2005/6/22		NT			CS	CS		calc	calc	calc																																				
578	HDB-10	495.89	550.00		2005/6/27	NT				CS	CS		calc	calc	calc																																				
579	HDB-10	495.89	550.00		2005/11/9	NT				CS	CS		calc	calc	calc																																				
580	HDB-10	495.89	550.00		2006/9/15	NT				CS	CS	ICP-MS	calc	calc	calc																																				
581	HDB-10	495.89	550.00		2007/10/29					CS	CS		calc	calc	calc																																				
582	HDB-10	495.89	550.00		2008/10/3	NT				CS	CS		calc	calc	calc																					LSC	MS	MS													
583	HDB-10	495.89	550.00		2008/10/3					CS	CS		calc	calc	calc	GC		GC			GC	GC	GC	GC	GC		GC								GC				MS	MS										
584	HDB-11	30.60	31.00							CS	CS		calc	calc	calc																						MS	MS													
585	HDB-11	49.64	49.87							CS	CS		calc	calc	calc																						MS	MS													
586	HDB-11	96.75	97.00																																		MS	MS													
587	HDB-11	99.00	99.40																					GC		GC		GC	GC		GC								MS	MS										
588	HDB-11	99.40	99.72							CS	CS		calc	calc	calc																						MS	MS													
589	HDB-11	114.09	114.30							CS	CS		calc	calc	calc																						MS	MS													
590	HDB-11	120.00	120.38																																		MS	MS													
591	HDB-11	134.20	134.45							CS	CS		calc	calc	calc																						MS	MS													
592	HDB-11	138.20	138.57																																		MS	MS													
593	HDB-11	169.53	169.83																																		MS	MS													
594	HDB-11	171.65	171.85							CS	CS		calc	calc	calc																						MS	MS													
595	HDB-11	199.00	199.55																					GC		GC		GC	GC		GC								MS	MS										
596	HDB-11	231.00	231.35																																		MS	MS													
597	HDB-11	251.10	251.45							CS	CS		calc	calc	calc																						MS	MS													
598	HDB-11	271.75	272.00							CS	CS		calc	calc	calc																						MS	MS													
599	HDB-11	298.60	299.00																					GC		GC		GC	GC		GC								MS	MS										
600	HDB-11	300.36	300.56							CS	CS		calc	calc	calc																						MS	MS													
601	HDB-11	332.50	332.70							CS	CS		calc	calc	calc																						MS	MS										FS	FS	IC	IC
602	HDB-11	335.47	335.72																																		MS	MS													

Table 2.3.5 Analytical methods of groundwater (18/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Microbiology																					
		Min.	Max.			Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]			[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
502	HDB-9				2004/10/9																						
503	HDB-9				2004/11/5																						
504	HDB-9				2004/12/9																						
505	HDB-9				2005/1/7																						
506	HDB-9				2005/2/3																						
507	HDB-9				2004/8/9																						
508	HDB-9				2004/9/12																						
509	HDB-9				2004/10/9																						
510	HDB-9				2004/11/5																						
511	HDB-9				2004/12/9																						
512	HDB-9				2005/1/7																						
513	HDB-9				2005/2/3																						
514	HDB-9				2004/9/16	DC	CFU	CFU	CFU	MPN	MPN	MPN	MPN	MPN	MPN	MPN	MPN	MPN				MPN	MPN	MPN			
515	HDB-9	100.24			2004/10/27																						
516	HDB-9	125.00			2004/10/28																						
517	HDB-9	201.00			2004/11/13																						
518	HDB-9	257.50			2004/11/17																						
519	HDB-9	299.22			2004/12/14																						
520	HDB-9	401.53			2005/12/20																						
521	HDB-9	500.04			2004/12/29																						
522	HDB-9	520.00			2004/12/30																						
523	HDB-9	216.90	257.50		2005/10/3																						
524	HDB-10	32.76	33.00																								
525	HDB-10	43.70	44.00																								
526	HDB-10	59.10	59.30																								
527	HDB-10	148.65	149.00																								
528	HDB-10	195.85	196.25		2004/10/29																						
529	HDB-10	249.68	250.00																								
530	HDB-10	301.00	301.34																								
531	HDB-10	355.00	355.20																								
532	HDB-10	401.00	401.35																								
533	HDB-10	447.00	447.35																								
534	HDB-10	466.46	466.71																								
535	HDB-10	485.60	486.00																								
536	HDB-10	505.50	506.00																								
537	HDB-10	548.00	548.50																								
538	HDB-10	195.65	195.85																								
539	HDB-10	397.40	397.70																								
540	HDB-10	484.80	485.00																								
541	HDB-10	41.33	59.88		2004/10/13																						
542	HDB-10	41.33	59.88		2004/10/13																						
543	HDB-10	41.33	59.88		2004/10/13																						
544	HDB-10	41.33	59.88		2004/10/13																						
545	HDB-10	41.33	59.88		2004/10/13																						
546	HDB-10	41.33	59.88		2004/10/14	DC	CFU	CFU	CFU	MPN	MPN	MPN	MPN	MPN	MPN	MPN	MPN	MPN				MPN	MPN	MPN			
547	HDB-10	445.84	469.89		2004/12/19																						
548	HDB-10	445.84	469.89		2004/12/19																						
549	HDB-10	445.84	469.89		2004/12/19																						
550	HDB-10	445.84	469.89		2004/12/19																						
551	HDB-10	445.84	469.89		2004/12/19																						
552	HDB-10	445.84	469.89		2004/12/20																						
553	HDB-10	445.84	469.89		2004/12/20	DC																					
554	HDB-10	445.84	469.89		2004/12/22	DC	CFU	CFU	CFU	MPN	MPN	MPN	MPN	MPN	MPN	MPN	MPN	MPN				MPN	MPN	MPN			
555	HDB-10				2004/8/9																						
556	HDB-10				2004/9/12																						
557	HDB-10				2004/10/9																						
558	HDB-10				2004/11/5																						
559	HDB-10				2004/12/9																						
560	HDB-10				2005/1/7																						
561	HDB-10				2005/2/3																						
562	HDB-10				2004/8/9																						
563	HDB-10				2004/9/12																						
564	HDB-10				2004/10/9																						
565	HDB-10				2004/11/5																						
566	HDB-10				2004/12/9																						
567	HDB-10				2005/1/7																						
568	HDB-10				2005/2/3	DC																					
569	HDB-10				2004/9/16	DC	CFU	CFU	CFU	MPN	MPN	MPN	MPN	MPN	MPN	MPN	MPN	MPN				MPN	MPN	MPN			
570	HDB-10	100.03			2004/10/3																						
571	HDB-10	136.00			2004/10/5																						
572	HDB-10	200.13			2004/10/29																						
573	HDB-10	298.00			2004/11/4																						
574	HDB-10	400.02			2004/11/30																						
575	HDB-10	500.00			2004/12/8																						
576	HDB-10	550.00			2005/1/6																						
577	HDB-10	45.00			2005/6/22																						
578	HDB-10	495.89	550.00		2005/6/27																						
579	HDB-10	495.89	550.00		2005/11/9																						
580	HDB-10	495.89	550.00		2006/9/15																						
581	HDB-10	495.89	550.00		2007/10/29																						
582	HDB-10	495.89	550.00		2008/10/3																						
583	HDB-10	495.89	550.00		2008/10/3		CFU								MPN		MPN		MPN	MPN		MPN		MPN	MPN	MPN	MPN
584	HDB-11	30.60	31.00																								
585	HDB-11	49.64	49.87																								
586	HDB-11	96.75	97.00																								
587	HDB-11	99.00	99.40																								
588	HDB-11	99.40	99.72																								
589	HDB-11	114.09	114.30																								
590	HDB-11	120.00	120.38																								
591	HDB-11	134.20	134.45																								
592	HDB-11	138.20	138.57																								
593	HDB-11	169.53	169.83																								
594	HDB-11	171.65	171.85																								
595	HDB-11	199.00	199.55																								
596	HDB-11	231.00	231.35																								
597	HDB-11	251.10	251.45																								
598	HDB-11	271.75	272.00																								
599	HDB-11	298.60	299.00																								
600	HDB-11	300.36	300.56																								
601	HDB-11	332.50	332.70																								
602	HDB-11	335.47	335.72																								

Table 2.3.5 Analytical methods of groundwater (19/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Physico-chemical parameter							Contamination indicator			Geochemistry																												
		Min.	Max.			EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temperature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}
		[m]	[m]			[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]		[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
603	HDB-11	383.85	384.00													IC	IC	ICP	ICP															IC	ICP-MS	ICP-MS				IC			
604	HDB-11	388.62	388.82			PM		PM								FP	FP	ICP	ICP			ICP												IC						IC		calc	calc
605	HDB-11	392.30	392.70																																								
606	HDB-11	396.00	396.22													IC	IC	ICP	ICP															IC	ICP-MS	ICP-MS				IC			
607	HDB-11	421.13	421.35					PM								FP	FP	ICP	ICP			ICP							ICP					IC						IC		calc	calc
608	HDB-11	439.64	440.00													IC	IC	ICP	ICP															IC	ICP-MS	ICP-MS				IC			
609	HDB-11	448.70	449.00			PM		PM								FP	FP	ICP	ICP			ICP												IC						IC		calc	calc
610	HDB-11	473.00	473.23													IC	IC	ICP	ICP															IC	ICP-MS	ICP-MS				IC			
611	HDB-11	496.55	496.75																																								
612	HDB-11	498.00	498.39			PM		PM								FP	FP	ICP	ICP			ICP												IC						IC		calc	calc
613	HDB-11	547.51	548.00			PM		PM								FP	FP	ICP	ICP			ICP												IC						IC		calc	calc
614	HDB-11	572.80	573.00					PM								FP	FP	ICP	ICP			ICP							ICP					IC						IC		calc	calc
615	HDB-11	595.40	595.80																																								
616	HDB-11	599.05	599.50			PM		PM								FP	FP	ICP	ICP			ICP												IC						IC		calc	calc
617	HDB-11	644.81	645.00			PM		PM								FP	FP	ICP	ICP			ICP												IC						IC		calc	calc
618	HDB-11	697.80	698.00																																								
619	HDB-11	703.50	704.00			PM		PM								FP	FP	ICP	ICP			ICP												IC						IC		calc	calc
620	HDB-11	722.00	722.39					PM								FP	FP	ICP	ICP			ICP							ICP					IC						IC		calc	calc
621	HDB-11	748.60	748.38			PM		PM								FP	FP	ICP	ICP			ICP												IC						IC		calc	calc
622	HDB-11	793.50	793.90																																								
623	HDB-11	800.73	801.00			PM		PM								FP	FP	ICP	ICP			ICP												IC						IC		calc	calc
624	HDB-11	852.80	853.00			PM		PM								FP	FP	ICP	ICP			ICP												IC						IC		calc	calc
625	HDB-11	871.00	871.60					PM								FP	FP	ICP	ICP			ICP							ICP					IC						IC		calc	calc
626	HDB-11	895.80	896.20																																								
627	HDB-11	901.30	901.70			PM		PM								FP	FP	ICP	ICP			ICP												IC						IC		calc	calc
628	HDB-11	950.00	950.20			PM		PM								FP	FP	ICP	ICP			ICP												IC						IC		calc	calc
629	HDB-11	994.00	994.35			PM		PM								FP	FP	ICP	ICP			ICP												IC						IC		calc	calc
630	HDB-11	995.90	996.30																																								
631	HDB-11	171.00	237.05		2004/12/7	PM		PM			calc	PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
632	HDB-11	171.00	237.05		2004/12/8	PM		PM			calc	PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
633	HDB-11	171.00	237.05		2004/12/10	PM		PM			calc	PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
634	HDB-11	171.00	237.05		2004/12/12	PM		PM			calc	PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
635	HDB-11	171.00	237.05		2004/12/12	PM		PM			calc	PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
636	HDB-11	606.00	644.15		2005/3/13	PM		PM			calc	PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
637	HDB-11	606.00	644.15		2005/3/17	PM		PM			calc	PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
638	HDB-11	606.00	644.15		2005/3/18	PM		PM			calc	PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
639	HDB-11	606.00	644.15		2005/3/25	PM		PM			calc	PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
640	HDB-11	606.00	644.15		2005/3/30	PM		PM			calc	PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA		ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
641	HDB-11	606.00	644.15		2005/3/30	PM		PM			calc	PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
642	HDB-11				2004/10/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
643	HDB-11				2004/11/5	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
644	HDB-11				2004/12/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
645	HDB-11				2005/1/7	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
646	HDB-11				2005/2/3	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
647	HDB-11				2005/3/13	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
648	HDB-11				2005/4/3	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
649	HDB-11				2005/5/6	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
650	HDB-11				2005/6/7	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
651	HDB-11				2005/7/5	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
652	HDB-11				2005/7/29	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
653	HDB-11				2004/9/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
654	HDB-11				2004/10/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
655	HDB-11				2004/11/5	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
656	HDB-11				2004/12/9	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
657	HDB-11				2005/1/7	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
658	HDB-11				2005/2/3	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
659	HDB-11				2005/3/13	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
660	HDB-11				2005/4/3	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
661	HDB-11				2005/5/6	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
662	HDB-11				2005/6/7	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
663	HDB-11				2005/7/5	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
664	HDB-11				2005/7/29	PM		PM				PM		FS		FP	FP	ICP	ICP		ICP	ICP	GA	ICP	ICP	AAS	A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC	IC	A	IC	A	calc	calc
665	HDB-11	70.00			2004/9/16																																						
666	HDB-11				2005/7/7	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
667	HDB-11		100.66		2004/10/29	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
668	HDB-11		153.00		2004/10/30	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
669	HDB-11		200.18		2004/11/17	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
670	HDB-11		299.55		2004/11/21	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
671	HDB-11		400.70		2004/11/25	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
672	HDB-11		453.00		2004/11/27	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
673	HDB-11		500.00		2005/1/7	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
674	HDB-11		600.61		2005/1/12	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
675	HDB-11		699.72		2005/1/19	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
676	HDB-11		803.00		2005/1/26	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
677	HDB-11		900.00		2005/5/12	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
678	HDB-11		1000.00		2005/5/24	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
679	HDB-11		1020.00		2005/5/26	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
680	HDB-11				2005/7/19	PM		PM				PM		FS		FP	FP	ICP	ICP				GA	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
681	HDB-11	224.96	236.30	3	2006/12/22		PM		PM							FP	FP	FP, ICP	FP, ICP			ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC		calc	calc
682	HDB-11	395.61	404.45	5	2006/12/22		PM		PM							FP	FP	FP, ICP	FP, ICP			ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC		calc	calc
683	HDB-11	224.96	236.30	3	2009/10/26	PM	PM	PM	PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
684	HDB-11	395.61	404.45	5	2009/10/28	PM	PM	PM	PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
685	HDB-11	621.13	631.99	9	2009/10/26	PM	PM	PM	PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
686	H-17-1-01	35.00	38.00		2007/10/18				PM							FP	FP	FP, ICP	FP, ICP		ICP		A	ICP			A		ICP			IC	IC	IC		IC	IC	A	IC	A	calc	calc
687	HGW-V-01	20.00	23.00		2006/4/30		PM		PM							FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
688	HGW-V-01	25.00	26.00		2006/5/28		PM		PM							FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
689	HGW-V-3	9.00	12.00		2006/10/10		PM		PM					FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
690	HGW-V-3	38.00	40.00		2006/10/15		PM		PM					FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
691	PB-V01	182.30	182.89		2007/12/12		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
692	PB-V01	206.45	206.75		2007/12/14		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
693	PB-V01	218.27	218.57		2007/12/14		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
694	PB-V01	247.38	247.68		2007/12/16		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
695	PB-V01	264.0					PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
696	PB-V01	276.26	276.56		2007/12/18		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
697	PB-V01	280					PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
698	PB-V01	289.5					PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
699	PB-V01	297.3					PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
700	PB-V01	304.86	305.16		2007/12/20		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
701	PB-V01	335.60	335.90		2007/12/22		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
702	PB-V01	342.48	342.78		2007/12/23		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			

Table 2.3.5 Analytical methods of groundwater (20/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date											Gases																			Isotope												Organics			
		Min.	Max.			M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	CO	H_2S	H_2	^3H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (DIC)	^{14}C	^{36}Cl	$^{36}Cl/Cl$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$	Humic acid	Fuluvic acid	Acetate	Formate
		[m]	[m]			[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mol/Kg]	[%]	[mol/Kg]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
603	HDB-11	383.85	384.00																																		MS	MS													
604	HDB-11	388.62	388.82							CS	CS		calc	calc	calc																						MS	MS													
605	HDB-11	392.30	392.70																					GC		GC		GC	GC		GC								MS	MS											
606	HDB-11	396.00	396.22																																		MS	MS													
607	HDB-11	421.13	421.35							CS	CS		calc	calc	calc																																				
608	HDB-11	439.64	440.00																																		MS	MS													
609	HDB-11	448.70	449.00							CS	CS		calc	calc	calc																						MS	MS													
610	HDB-11	473.00	473.23																																		MS	MS													
611	HDB-11	496.55	496.75																					GC		GC		GC	GC		GC								MS	MS											
612	HDB-11	498.00	498.39							CS	CS		calc	calc	calc																						MS	MS													
613	HDB-11	547.51	548.00							CS	CS		calc	calc	calc																						MS	MS													
614	HDB-11	572.80	573.00							CS	CS		calc	calc	calc																																				
615	HDB-11	595.40	595.80																					GC		GC		GC	GC		GC								MS	MS											
616	HDB-11	599.05	599.50							CS	CS		calc	calc	calc																						MS	MS										FS	FS	IC	IC
617	HDB-11	644.81	645.00							CS	CS		calc	calc	calc																						MS	MS													
618	HDB-11	697.80	698.00																					GC		GC		GC	GC		GC								MS	MS											
619	HDB-11	703.50	704.00							CS	CS		calc	calc	calc																						MS	MS													
620	HDB-11	722.00	722.39							CS	CS		calc	calc	calc																																				
621	HDB-11	748.60	748.38							CS	CS		calc	calc	calc																						MS	MS													
622	HDB-11	793.50	793.90																					GC		GC		GC	GC		GC								MS	MS											
623	HDB-11	800.73	801.00							CS	CS		calc	calc	calc																						MS	MS													
624	HDB-11	852.80	853.00							CS	CS		calc	calc	calc																						MS	MS													
625	HDB-11	871.00	871.60							CS	CS		calc	calc	calc																																				
626	HDB-11	895.80	896.20																					GC		GC		GC	GC		GC								MS	MS											
627	HDB-11	901.30	901.70							CS	CS		calc	calc	calc																						MS	MS													
628	HDB-11	950.00	950.20							CS	CS		calc	calc	calc																						MS	MS													
629	HDB-11	994.00	994.35							CS	CS		calc	calc	calc																						MS	MS													
630	HDB-11	995.90	996.30																					GC		GC		GC	GC		GC								MS	MS											
631	HDB-11	171.00	237.05		2004/12/7		NT		NT	CS	CS		calc	calc	calc																																				
632	HDB-11	171.00	237.05		2004/12/8		NT		NT	CS	CS		calc	calc	calc																																				
633	HDB-11	171.00	237.05		2004/12/10		NT		NT	CS	CS		calc	calc	calc																																				
634	HDB-11	171.00	237.05		2004/12/12		NT		NT	CS	CS		calc	calc	calc																																				
635	HDB-11	171.00	237.05		2004/12/12		NT		NT	CS	CS		calc	calc	calc		GC		GC	GC		GC		GC		GC										LSC	MS	MS	MS	MS				AMS	MS	TIMS				
636	HDB-11	606.00	644.15		2005/3/13		NT		NT	CS	CS		calc	calc	calc																																				
637	HDB-11	606.00	644.15		2005/3/17		NT		NT	CS	CS		calc	calc	calc																																				
638	HDB-11	606.00	644.15		2005/3/18		NT		NT	CS	CS		calc	calc	calc																																				
639	HDB-11	606.00	644.15		2005/3/25		NT		NT	CS	CS		calc	calc	calc																																				
640	HDB-11	606.00	644.15		2005/3/30		NT		NT	CS	CS		calc	calc	calc		GC		GC	GC		GC		GC		GC										LSC	MS	MS	MS	MS				AMS	MS	TIMS				
641	HDB-11	606.00	644.15		2005/3/30		NT		NT	CS	CS		calc	calc	calc																						LSC	MS	MS						AMS	MS	TIMS				
642	HDB-11				2004/10/9		NT		NT	CS	CS		calc	calc	calc																																				
643	HDB-11				2004/11/5		NT		NT	CS	CS		calc	calc	calc																																				
644	HDB-11				2004/12/9		NT		NT	CS	CS		calc	calc	calc																																				
645	HDB-11				2005/1/7		NT		NT	CS	CS		calc	calc	calc																																				
646	HDB-11				2005/2/3		NT		NT	CS	CS		calc	calc	calc																																				
647	HDB-11				2005/3/13		NT		NT	CS	CS		calc	calc	calc																																				
648	HDB-11				2005/4/3		NT		NT	CS	CS		calc	calc	calc																																				
649	HDB-11				2005/5/6		NT		NT	CS	CS		calc	calc	calc																																				
650	HDB-11				2005/6/7		NT		NT	CS	CS		calc	calc	calc																																				
651	HDB-11				2005/7/5		NT		NT	CS	CS		calc	calc	calc																																				
652	HDB-11				2005/7/29		NT		NT	CS	CS		calc	calc	calc																																				
653	HDB-11				2004/9/9		NT		NT	CS	CS		calc	calc	calc																						LSC	MS	MS						AMS	MS	TIMS				
654	HDB-11				2004/10/9		NT		NT	CS	CS		calc	calc	calc																																				
655	HDB-11				2004/11/5		NT		NT	CS	CS		calc	calc	calc																																				
656	HDB-11				2004/12/9		NT		NT	CS	CS		calc	calc	calc																																				
657	HDB-11				2005/1/7		NT		NT	CS	CS		calc	calc	calc																																				
658	HDB-11				2005/2/3		NT		NT	CS	CS		calc	calc	calc																																				
659	HDB-11				2005/3/13		NT		NT	CS	CS		calc	calc	calc																																				
660	HDB-11				2005/4/3		NT		NT	CS	CS		calc	calc	calc																																				
661	HDB-11				2005/5/6		NT		NT	CS	CS		calc	calc	calc																																				
662	HDB-11				2005/6/7		NT		NT	CS	CS		calc	calc	calc																																				
663	HDB-11				2005/7/5		NT		NT	CS	CS		calc	calc	calc																																				
664	HDB-11				2005/7/29		NT		NT	CS	CS		calc	calc	calc																						LSC	MS	MS							MS	TIMS				
665	HDB-11	70.00			2004/9/16																																														
666	HDB-11				2005/7/7		NT			CS	CS		calc	calc	calc																						LSC	MS	MS							MS	TIMS	FS	FS	IC	IC
667	HDB-11		100.66		2004/10/29		NT		NT	CS	CS		calc	calc	calc																																				
668	HDB-11		153.00		2004/10/30		NT		NT	CS	CS		calc	calc	calc																						LSC	MS	MS						AMS	MS	TIMS				
669	HDB-11		200.18		2004/11/17		NT		NT	CS	CS		calc	calc	calc																																				
670	HDB-11		299.55		2004/11/21		NT		NT	CS	CS		calc	calc	calc																																				
671	HDB-11		400.70		2004/11/25		NT		NT	CS	CS		calc	calc	calc																																				
672	HDB-11		453.00		2004/11/27		NT		NT	CS	CS		calc	calc	calc																						LSC	MS	MS						AMS	MS	TIMS	FS	FS	IC	IC
673	HDB-11		500.00		2005/1/7		NT		NT	CS	CS		calc	calc	calc																																				
674	HDB-11		600.61		2005/1/12		NT		NT	CS	CS		calc	calc	calc																																	FS	FS	IC	IC
675	HDB-11		699.72		2005/1/19		NT		NT	CS	CS		calc	calc	calc																																				
676	HDB-11		803.00		2005/1/26		NT		NT	CS	CS		calc	calc	calc																						LSC	MS	MS						AMS	MS	TIMS	FS	FS	IC	IC
677	HDB-11		900.00		2005/5/12		NT		NT	CS	CS		calc	calc	calc																																				
678	HDB-11		1000.00		2005/5/24		NT		NT	CS	CS		calc	calc	calc																																				
679	HDB-11		1020.00		2005/5/26		NT		NT	CS	CS		calc	calc	calc																						LSC	MS	MS							MS	TIMS				
680	HDB-11				2005/7/19		NT		NT	CS	CS		calc	calc	calc																																				
681	HDB-11	224.96	236.30	3	2006/12/22	NT				CS	CS		calc	calc	calc																																				
682	HDB-11	395.61	404.45	5	2006/12/22	NT				CS	CS		calc	calc	calc																																				
683	HDB-11	224.96	236.30	3	2009/10/26	NT		NT		CS	CS		calc	calc	calc																						LSC	MS	MS												
684	HDB-11	395.61	404.45	5	2009/10/28	NT		NT		CS	CS		calc	calc	calc																						LSC	MS	MS												
685	HDB-11	621.13	631.99	9	2009/10/26	NT		NT		CS	CS		calc	calc	calc																							MS	MS													
686	H-17-1-01	35.00	38.00		2007/10/18					CS	CS		calc	calc	calc																																				
687	HGW-V-01	20.00	23.00		2006/4/30	NT				CS	CS		calc	calc	calc																																				
688	HGW-V-01	25.00	26.00		2006/5/28	NT				CS	CS		calc	calc	calc																																				
689	HGW-V-3	9.00	12.00		2006/10/10	NT				CS	CS		calc	calc	calc																							MS	MS													
690	HGW-V-3	38.00	40.00		2006/10/15	NT				CS	CS		calc	calc	calc																							MS	MS													
691	PB-V01	182.30	182.89		2007/12/12																																MS	MS							AMS						
692	PB-V01	206.45	206.75		2007/12/14																																MS	MS													
693	PB-V01	218.27	218.57		2007/12/14																																MS	MS							AMS						
694	PB-V01	247.38	247.68		2007/12/16																																MS	MS							AMS						
695	PB-V01	264.0																																			MS	MS													
696	PB-V01	276.26	276.56		2007/12/18																																MS	MS													
697	PB-V01	280																																			MS	MS													
698	PB-V01	289.5																																			MS	MS													
699	PB-V01	297.3																																			MS	MS							AMS						
700	PB-V01	304.86	305.16		2007/12/20																																MS	MS													
701	PB-V01	335.60	335.90		2007/12/22																																MS	MS													
702	PB-V01	342.48	342.78		2007/12/23																																MS	MS							AMS						

Table 2.3.5 Analytical methods of groundwater (21/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Microbiology																					
		Min.	Max.			Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]			[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
603	HDB-11	383.85	384.00																								
604	HDB-11	388.62	388.82																								
605	HDB-11	392.30	392.70																								
606	HDB-11	396.00	396.22																								
607	HDB-11	421.13	421.35																								
608	HDB-11	439.64	440.00																								
609	HDB-11	448.70	449.00																								
610	HDB-11	473.00	473.23																								
611	HDB-11	496.55	496.75																								
612	HDB-11	498.00	498.39																								
613	HDB-11	547.51	548.00																								
614	HDB-11	572.80	573.00																								
615	HDB-11	595.40	595.80																								
616	HDB-11	599.05	599.50																								
617	HDB-11	644.81	645.00																								
618	HDB-11	697.80	698.00																								
619	HDB-11	703.50	704.00																								
620	HDB-11	722.00	722.39																								
621	HDB-11	748.60	748.38																								
622	HDB-11	793.50	793.90																								
623	HDB-11	800.73	801.00																								
624	HDB-11	852.80	853.00																								
625	HDB-11	871.00	871.60																								
626	HDB-11	895.80	896.20																								
627	HDB-11	901.30	901.70																								
628	HDB-11	950.00	950.20																								
629	HDB-11	994.00	994.35																								
630	HDB-11	995.90	996.30																								
631	HDB-11	171.00	237.05		2004/12/7																						
632	HDB-11	171.00	237.05		2004/12/8																						
633	HDB-11	171.00	237.05		2004/12/10																						
634	HDB-11	171.00	237.05		2004/12/12																						
635	HDB-11	171.00	237.05		2004/12/12	DC	CFU		CFU	MPN	MPN	MPN			MPN		MPN					MPN		MPN			
636	HDB-11	606.00	644.15		2005/3/13																						
637	HDB-11	606.00	644.15		2005/3/17																						
638	HDB-11	606.00	644.15		2005/3/18																						
639	HDB-11	606.00	644.15		2005/3/25																						
640	HDB-11	606.00	644.15		2005/3/30	DC	CFU		CFU	MPN	MPN	MPN			MPN		MPN					MPN		MPN			
641	HDB-11	606.00	644.15		2005/3/30	DC																					
642	HDB-11				2004/10/9																						
643	HDB-11				2004/11/5																						
644	HDB-11				2004/12/9																						
645	HDB-11				2005/1/7																						
646	HDB-11				2005/2/3																						
647	HDB-11				2005/3/13																						
648	HDB-11				2005/4/3																						
649	HDB-11				2005/5/6																						
650	HDB-11				2005/6/7																						
651	HDB-11				2005/7/5																						
652	HDB-11				2005/7/29																						
653	HDB-11				2004/9/9																						
654	HDB-11				2004/10/9																						
655	HDB-11				2004/11/5																						
656	HDB-11				2004/12/9																						
657	HDB-11				2005/1/7																						
658	HDB-11				2005/2/3																						
659	HDB-11				2005/3/13																						
660	HDB-11				2005/4/3																						
661	HDB-11				2005/5/6																						
662	HDB-11				2005/6/7																						
663	HDB-11				2005/7/5																						
664	HDB-11				2005/7/29																						
665	HDB-11	70.00			2004/9/16	DC	CFU		CFU	MPN	MPN	MPN			MPN		MPN					MPN		MPN			
666	HDB-11				2005/7/7	DC	CFU		CFU	MPN	MPN	MPN			MPN		MPN					MPN		MPN			
667	HDB-11		100.66		2004/10/29																						
668	HDB-11		153.00		2004/10/30																						
669	HDB-11		200.18		2004/11/17																						
670	HDB-11		299.55		2004/11/21																						
671	HDB-11		400.70		2004/11/25																						
672	HDB-11		453.00		2004/11/27																						
673	HDB-11		500.00		2005/1/7																						
674	HDB-11		600.61		2005/1/12																						
675	HDB-11		699.72		2005/1/19																						
676	HDB-11		803.00		2005/1/26																						
677	HDB-11		900.00		2005/5/12																						
678	HDB-11		1000.00		2005/5/24																						
679	HDB-11		1020.00		2005/5/26																						
680	HDB-11				2005/7/19																						
681	HDB-11	224.96	236.30	3	2006/12/22																						
682	HDB-11	395.61	404.45	5	2006/12/22																						
683	HDB-11	224.96	236.30	3	2009/10/26																						
684	HDB-11	395.61	404.45	5	2009/10/28																						
685	HDB-11	621.13	631.99	9	2009/10/26																						
686	H-17-1-01	35.00	38.00		2007/10/18																						
687	HGW-V-01	20.00	23.00		2006/4/30																						
688	HGW-V-01	25.00	26.00		2006/5/28																						
689	HGW-V-3	9.00	12.00		2006/10/10																						
690	HGW-V-3	38.00	40.00		2006/10/15																						
691	PB-V01	182.30	182.89		2007/12/12																						
692	PB-V01	206.45	206.75		2007/12/14																						
693	PB-V01	218.27	218.57		2007/12/14																						
694	PB-V01	247.38	247.68		2007/12/16																						
695	PB-V01	264.0																									
696	PB-V01	276.26	276.56		2007/12/18																						
697	PB-V01	280																									
698	PB-V01	289.5																									
699	PB-V01	297.3																									
700	PB-V01	304.86	305.16		2007/12/20																						
701	PB-V01	335.60	335.90		2007/12/22																						
702	PB-V01	342.48	342.78		2007/12/23																						

Table 2.3.5 Analytical methods of groundwater (22/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Physico-chemical parameter							Contamination indicator			Geochemistry																											
		Min.	Max.			EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temperature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}
		[m]	[m]			[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]		[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
703	PB-V01	375.17	375.47		2008/1/19		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
704	PB-V01	403.00	403.30		2008/1/21		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
705	PB-V01	419.00	419.25		2008/1/23		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
706	PB-V01	448.70	449.00		2008/1/25		PM									IC	IC	ICP	ICP														IC	ICP-MS					IC			
707	PB-V01	472.10	472.40		2008/1/27		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
708	PB-V01	489.49	489.79		2008/1/29		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
709	PB-V01	505.70	506.00		2008/1/30		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
710	PB-V01	516.00	516.30		2008/1/31		PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
711	PB-V01	233.86	247.91		2008/1/12 19:30:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
712	PB-V01	233.86	247.91		2008/1/12 22:30:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
713	PB-V01	233.86	247.91		2008/1/12 23:30:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
714	PB-V01	233.86	247.91		2008/1/13 0:30:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
715	PB-V01	233.86	247.91		2008/1/14 9:10:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
716	PB-V01	233.86	247.91		2008/1/14 8:30:00	PM	PM	PM	PM	PM	calc		FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
717	PB-V01	263.30	277.41		2008/1/6 14:30:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
718	PB-V01	263.30	277.41		2008/1/6 20:00:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
719	PB-V01	263.30	277.41		2008/1/6 20:30:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
720	PB-V01	263.30	277.41		2008/1/6 21:30:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
721	PB-V01	263.30	277.41		2008/1/8 12:30:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
722	PB-V01	263.30	277.41		2008/1/8 12:30:00	PM	PM	PM	PM	PM	calc		FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
723	PB-V01	355.80	370.85		2008/2/26 1:00:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
724	PB-V01	355.80	370.85		2008/2/26 12:00:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
725	PB-V01	355.80	370.85		2008/2/26 13:00:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
726	PB-V01	355.80	370.85		2008/2/26 16:00:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
727	PB-V01	355.80	370.85		2008/2/27 13:05:00	PM	PM	PM	PM	PM	calc		FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
728	PB-V01	355.80	370.85		2008/3/3 1:00:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
729	PB-V01	355.80	370.85		2008/3/3 19:00:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
730	PB-V01	355.80	370.85		2008/3/3 21:00:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
731	PB-V01	355.80	370.85		2008/3/3 23:30:00		PM		PM				FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
732	PB-V01	355.80	370.85		2008/3/8 17:30:00	PM	PM	PM	PM	PM	calc		FS	FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
733	SAB-1	266.5	286.55		2008/12/1			PM			calc																			A			IC	IC	IC	IC, AA	AA	IC	IC	A		
734	SAB-1	270.0	289.0	2	2009/12/15			PM			calc																			A			IC	IC	IC	IC, AA	AA	IC	IC	A		
735	SAB-1	270.0	289.0	2	2009/12/15																																						
736	SAB-1	270.0	289.0	2	2010			PM								IC	IC	IC	IC					IC			AA					AA	IC	IC	IC	IC, AA	AA	IC	IC			
737	SAB-1	270.0	289.0	2	2010																																						
738	SAB-1	270.0	289.0	2	2010																																						
739	SAB-1	319.3	328		2008/12/12			PM			calc																			A			IC	IC	IC	IC, AA	AA	IC	IC	A	calc	
740	SAB-1	319.3	328		2008/12/12																						AA					AA	IC	IC	IC	IC, AA			IC		calc	
741	SAB-1	310.0	339.0	4	2009/12/9			PM			calc					IC	IC	IC	IC		ICP	ICP		IC	ICP		AA		ICP	A		AA	IC	IC	IC	IC, AA	AA	IC	IC	A	calc	
742	SAB-1	310.0	339.0	4	2009/12/9											IC	IC	IC	IC																								
743	SAB-1	310.0	339.0	4	2010			PM			calc					IC	IC	IC	IC					IC			AA			A		AA	IC	IC	IC	IC, AA	AA	IC	IC	A		
744	SAB-1	310.0	339.0	4	2010																																						
745	SAB-1	310.0	339.0	4	2010																																						
746	SAB-1	470.3	512.8		2009/1/31			PM																								AA	IC	IC	IC	IC, AA	AA	IC	IC		calc	
747	SAB-1	470.3	512.8		2009/1/31																											AA	IC	IC	IC	IC, AA	AA		IC		calc	
748	SAB-1	470.3	512.8		2009/1/31																												IC	IC	IC	IC, AA	AA		IC		calc	
749	SAB-1	465.0	512.0	6	2009/12/4			PM			calc					IC	IC	IC	IC		0.21	ICP		IC	ICP		AA		ICP	A		AA	IC	IC	IC	IC, AA	AA	IC	IC	A	calc	
750	SAB-1	465.0	512.0	6	2010			PM			calc					IC	IC	IC	IC					IC			AA			A		AA	IC	IC	IC	IC, AA	AA	IC	IC	A		
751	SAB-1	465.0	512.0	6	2010																																						
752	SAB-2	100.75	100.95													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
753	SAB-2	151.00	151.35													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
754	SAB-2	197.00	197.30													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
755	SAB-2	249.30	249.60													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
756	SAB-2	299.11	299.40													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
757	SAB-2	346.00	346.35													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
758	SAB-2	399.00	399.33													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
759	SAB-2	451.00	451.35													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
760	SAB-2	481.40	481.70													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
761	SAB-2	501.00	501.30													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
762	SAB-2	550.72	551.00													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
763	SAB-2	584.05	584.35													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
764	SAB-2	598.40	598.70													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
765	SAB-2	650.70	651.00													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
766	SAB-2	671.40	671.70													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
767	SAB-2	702.40	702.70													FP	FP	ICP	ICP										ICP				IC	IC	IC				IC		calc	calc
768	SAB-2	242.00	297.05		2010/3/27	PM		PM	PM		calc			FS		FP	FP	ICP	ICP				ICP	ICP			A		ICP	A	ICP	IC	IC	IC	IC				IC	A	calc	calc
769	SAB-3	27.00	27.29						PM							IC	IC	IC	IC										ICP				IC	IC	A				IC		calc	calc
770	SAB-3	70.30	70.50						PM							IC	IC	IC	IC										ICP				IC	IC	A				IC		calc	calc
771	SAB-3	108.22	108.41						PM							IC	IC	IC	IC										ICP				IC	IC	A				IC		calc	calc
772	SAB-3	154.00	154.25						PM							IC	IC	IC	IC										ICP				IC	IC	A				IC		calc	calc
773	SAB-4	30.22	30.45						PM							IC	IC	IC	IC										ICP				IC	IC	A				IC		calc	calc
774	SAB-4	68.00	68.37						PM							IC	IC	IC	IC										ICP				IC	IC	A				IC		calc	calc
775	SAB-4	111.50	111.77						PM							IC	IC	IC	IC										ICP				IC	IC	A				IC		calc	calc
776	SAB-4	148.18	148.50						PM							IC	IC	IC	IC										ICP				IC	IC	A				IC		calc	calc
777	SFI-1	20.35	20.50				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
778	SFI-1	20.35	20.50				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
779	SFI-1	37.85	39.63				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
780	SFI-1	37.85	39.63				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
781	SFI-1	49.00	49.60				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
782	SFI-1	49.00	49.60				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
783	SFI-1	60.25	61.90				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
784	SFI-1	60.25	61.90				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
785	SFI-1	72.50	72.85				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
786	SFI-1	72.50	72.85				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
787	SFI-1	107.40	110.00				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			

Table 2.3.5 Analytical methods of groundwater (23/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date											Gases																			Isotope											Organics			
		Min.	Max.			M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	CO	H_2S	H_2	^3H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (DIC)	^{14}C	^{36}Cl	$^{36}Cl/Cl$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$	Humic acid	Fuluvic acid	Acetate	Formate
		[m]	[m]			[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mol/Kg]	[%]	[mol/Kg]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
703	PB-V01	375.17	375.47		2008/1/19																																MS	MS												
704	PB-V01	403.00	403.30		2008/1/21																																MS	MS						AMS						
705	PB-V01	419.00	419.25		2008/1/23																																MS	MS												
706	PB-V01	448.70	449.00		2008/1/25																																MS	MS												
707	PB-V01	472.10	472.40		2008/1/27																																MS	MS						AMS						
708	PB-V01	489.49	489.79		2008/1/29																																MS	MS												
709	PB-V01	505.70	506.00		2008/1/30																																MS	MS						AMS						
710	PB-V01	516.00	516.30		2008/1/31																																MS	MS												
711	PB-V01	233.86	247.91		2008/1/12 19:30:00	NT				CS	CS		calc	calc	calc																																			
712	PB-V01	233.86	247.91		2008/1/12 22:30:00	NT				CS	CS		calc	calc	calc																																			
713	PB-V01	233.86	247.91		2008/1/12 23:30:00	NT				CS	CS		calc	calc	calc																																			
714	PB-V01	233.86	247.91		2008/1/13 0:30:00	NT				CS	CS		calc	calc	calc																																			
715	PB-V01	233.86	247.91		2008/1/14 9:10:00	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
716	PB-V01	233.86	247.91		2008/1/14 8:30:00	NT				CS	CS		calc	calc	calc																																			
717	PB-V01	263.30	277.41		2008/1/6 14:30:00	NT				CS	CS		calc	calc	calc																																			
718	PB-V01	263.30	277.41		2008/1/6 20:00:00	NT				CS	CS		calc	calc	calc																																			
719	PB-V01	263.30	277.41		2008/1/6 20:30:00	NT				CS	CS		calc	calc	calc																																			
720	PB-V01	263.30	277.41		2008/1/6 21:30:00	NT				CS	CS		calc	calc	calc																																			
721	PB-V01	263.30	277.41		2008/1/8 12:30:00	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
722	PB-V01	263.30	277.41		2008/1/8 12:30:00	NT				CS	CS		calc	calc	calc																																			
723	PB-V01	355.80	370.85		2008/2/26 1:00:00	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
724	PB-V01	355.80	370.85		2008/2/26 12:00:00	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
725	PB-V01	355.80	370.85		2008/2/26 13:00:00	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
726	PB-V01	355.80	370.85		2008/2/26 16:00:00	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
727	PB-V01	355.80	370.85		2008/2/27 13:05:00	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
728	PB-V01	355.80	370.85		2008/3/3 1:00:00	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
729	PB-V01	355.80	370.85		2008/3/3 19:00:00	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
730	PB-V01	355.80	370.85		2008/3/3 21:00:00	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
731	PB-V01	355.80	370.85		2008/3/3 23:30:00	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
732	PB-V01	355.80	370.85		2008/3/8 17:30:00	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
733	SAB-1	266.5	286.55		2008/12/1	NT				CS				calc																						MS	MS												
734	SAB-1	270.0	289.0	2	2009/12/15	NT				CS			calc	calc	calc																					MS	MS												
735	SAB-1	270.0	289.0	2	2009/12/15																																												
736	SAB-1	270.0	289.0	2	2010	NT				CS			calc	calc	calc																																			
737	SAB-1	270.0	289.0	2	2010																																												
738	SAB-1	270.0	289.0	2	2010																																												
739	SAB-1	319.3	328		2008/12/12	NT				CS				calc																						MS	MS												
740	SAB-1	319.3	328		2008/12/12									calc																						MS	MS												
741	SAB-1	310.0	339.0	4	2009/12/9	NT				CS			calc	calc	calc																					MS	MS												
742	SAB-1	310.0	339.0	4	2009/12/9																																												
743	SAB-1	310.0	339.0	4	2010	NT				CS			calc	calc	calc																																			
744	SAB-1	310.0	339.0	4	2010																																												
745	SAB-1	310.0	339.0	4	2010																																												
746	SAB-1	470.3	512.8		2009/1/31					CS				calc																						MS	MS												
747	SAB-1	470.3	512.8		2009/1/31									calc																						MS	MS												
748	SAB-1	470.3	512.8		2009/1/31									calc																						MS	MS												
749	SAB-1	465.0	512.0	6	2009/12/4	NT				CS			calc	calc	calc																					MS	MS												
750	SAB-1	465.0	512.0	6	2010	NT				CS			calc	calc	calc																																			
751	SAB-1	465.0	512.0	6	2010																																												
752	SAB-2	100.75	100.95										calc	calc	calc																					MS	MS						AMS						
753	SAB-2	151.00	151.35										calc	calc	calc																					MS	MS						AMS						
754	SAB-2	197.00	197.30										calc	calc	calc																					MS	MS						AMS						
755	SAB-2	249.30	249.60										calc	calc	calc																					MS	MS						AMS						
756	SAB-2	299.11	299.40										calc	calc	calc																					MS	MS						AMS						
757	SAB-2	346.00	346.35										calc	calc	calc																					MS	MS						AMS						
758	SAB-2	399.00	399.33										calc	calc	calc																					MS	MS						AMS						
759	SAB-2	451.00	451.35										calc	calc	calc																					MS	MS						AMS						
760	SAB-2	481.40	481.70										calc	calc	calc																					MS	MS						AMS						
761	SAB-2	501.00	501.30										calc	calc	calc																					MS	MS						AMS						
762	SAB-2	550.72	551.00										calc	calc	calc																					MS	MS						AMS						
763	SAB-2	584.05	584.35										calc	calc	calc																					MS	MS						AMS						
764	SAB-2	598.40	598.70										calc	calc	calc																					MS	MS						AMS						
765	SAB-2	650.70	651.00										calc	calc	calc																					MS	MS						AMS						
766	SAB-2	671.40	671.70										calc	calc	calc																					MS	MS						AMS						
767	SAB-2	702.40	702.70										calc	calc	calc																					MS	MS						AMS						
768	SAB-2	242.00	297.05		2010/3/27	NT				CS	CS		calc	calc	calc																				MS	MS	MS						AMS		TIMS				
769	SAB-3	27.00	27.29										calc	calc	calc																					MS	MS												
770	SAB-3	70.30	70.50										calc	calc	calc																					MS	MS												
771	SAB-3	108.22	108.41										calc	calc	calc																					MS	MS												
772	SAB-3	154.00	154.25										calc	calc	calc																					MS	MS												
773	SAB-4	30.22	30.45										calc	calc	calc																					MS	MS												
774	SAB-4	68.00	68.37										calc	calc	calc																					MS	MS												
775	SAB-4	111.50	111.77										calc	calc	calc																					MS	MS												
776	SAB-4	148.18	148.50										calc	calc	calc																					MS	MS												
777	SFI-1	20.35	20.50																																														
778	SFI-1	20.35	20.50																																														
779	SFI-1	37.85	39.63																																														
780	SFI-1	37.85	39.63																																														
781	SFI-1	49.00	49.60																																	MS	MS						AMS						
782	SFI-1	49.00	49.60																																	MS	MS												
783	SFI-1	60.25	61.90																																	MS	MS												
784	SFI-1	60.25	61.90																																	MS	MS												
785	SFI-1	72.50	72.85																																	MS	MS						AMS						
786	SFI-1	72.50	72.85																																	MS	MS												
787	SFI-1	107.40	110.00																																	MS	MS												

Table 2.3.5 Analytical methods of groundwater (24/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Microbiology																					
		Min.	Max.			Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]			[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
703	PB-V01	375.17	375.47		2008/1/19																						
704	PB-V01	403.00	403.30		2008/1/21																						
705	PB-V01	419.00	419.25		2008/1/23																						
706	PB-V01	448.70	449.00		2008/1/25																						
707	PB-V01	472.10	472.40		2008/1/27																						
708	PB-V01	489.49	489.79		2008/1/29																						
709	PB-V01	505.70	506.00		2008/1/30																						
710	PB-V01	516.00	516.30		2008/1/31																						
711	PB-V01	233.86	247.91		2008/1/12 19:30:00																						
712	PB-V01	233.86	247.91		2008/1/12 22:30:00																						
713	PB-V01	233.86	247.91		2008/1/12 23:30:00																						
714	PB-V01	233.86	247.91		2008/1/13 0:30:00																						
715	PB-V01	233.86	247.91		2008/1/14 9:10:00																						
716	PB-V01	233.86	247.91		2008/1/14 8:30:00																						
717	PB-V01	263.30	277.41		2008/1/6 14:30:00																						
718	PB-V01	263.30	277.41		2008/1/6 20:00:00																						
719	PB-V01	263.30	277.41		2008/1/6 20:30:00																						
720	PB-V01	263.30	277.41		2008/1/6 21:30:00																						
721	PB-V01	263.30	277.41		2008/1/8 12:30:00																						
722	PB-V01	263.30	277.41		2008/1/8 12:30:00																						
723	PB-V01	355.80	370.85		2008/2/26 1:00:00																						
724	PB-V01	355.80	370.85		2008/2/26 12:00:00																						
725	PB-V01	355.80	370.85		2008/2/26 13:00:00																						
726	PB-V01	355.80	370.85		2008/2/26 16:00:00																						
727	PB-V01	355.80	370.85		2008/2/27 13:05:00																						
728	PB-V01	355.80	370.85		2008/3/3 1:00:00																						
729	PB-V01	355.80	370.85		2008/3/3 19:00:00																						
730	PB-V01	355.80	370.85		2008/3/3 21:00:00																						
731	PB-V01	355.80	370.85		2008/3/3 23:30:00																						
732	PB-V01	355.80	370.85		2008/3/8 17:30:00																						
733	SAB-1	266.5	286.55		2008/12/1	DC																					
734	SAB-1	270.0	289.0	2	2009/12/15	DC																					
735	SAB-1	270.0	289.0	2	2009/12/15																						
736	SAB-1	270.0	289.0	2	2010	DC																					
737	SAB-1	270.0	289.0	2	2010																						
738	SAB-1	270.0	289.0	2	2010																						
739	SAB-1	319.3	328		2008/12/12																						
740	SAB-1	319.3	328		2008/12/12																						
741	SAB-1	310.0	339.0	4	2009/12/9	DC																					
742	SAB-1	310.0	339.0	4	2009/12/9																						
743	SAB-1	310.0	339.0	4	2010	DC																					
744	SAB-1	310.0	339.0	4	2010																						
745	SAB-1	310.0	339.0	4	2010																						
746	SAB-1	470.3	512.8		2009/1/31																						
747	SAB-1	470.3	512.8		2009/1/31																						
748	SAB-1	470.3	512.8		2009/1/31																						
749	SAB-1	465.0	512.0	6	2009/12/4	DC																					
750	SAB-1	465.0	512.0	6	2010	DC																					
751	SAB-1	465.0	512.0	6	2010																						
752	SAB-2	100.75	100.95																								
753	SAB-2	151.00	151.35																								
754	SAB-2	197.00	197.30																								
755	SAB-2	249.30	249.60																								
756	SAB-2	299.11	299.40																								
757	SAB-2	346.00	346.35																								
758	SAB-2	399.00	399.33																								
759	SAB-2	451.00	451.35																								
760	SAB-2	481.40	481.70																								
761	SAB-2	501.00	501.30																								
762	SAB-2	550.72	551.00																								
763	SAB-2	584.05	584.35																								
764	SAB-2	598.40	598.70																								
765	SAB-2	650.70	651.00																								
766	SAB-2	671.40	671.70																								
767	SAB-2	702.40	702.70																								
768	SAB-2	242.00	297.05		2010/3/27																						
769	SAB-3	27.00	27.29																								
770	SAB-3	70.30	70.50																								
771	SAB-3	108.22	108.41																								
772	SAB-3	154.00	154.25																								
773	SAB-4	30.22	30.45																								
774	SAB-4	68.00	68.37																								
775	SAB-4	111.50	111.77																								
776	SAB-4	148.18	148.50																								
777	SFI-1	20.35	20.50																								
778	SFI-1	20.35	20.50																								
779	SFI-1	37.85	39.63																								
780	SFI-1	37.85	39.63																								
781	SFI-1	49.00	49.60																								
782	SFI-1	49.00	49.60																								
783	SFI-1	60.25	61.90																								
784	SFI-1	60.25	61.90																								
785	SFI-1	72.50	72.85																								
786	SFI-1	72.50	72.85																								
787	SFI-1	107.40	110.00																								

Table 2.3.5 Analytical methods of groundwater (25/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Physico-chemical parameter							Contamination indicator			Geochemistry																									
		Min.	Max.			EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temperature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}
		[m]	[m]			[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]		[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
788	SFI-1	107.40	110.00				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
789	SFI-1	120.10	123.90				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
790	SFI-1	120.10	123.90				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
791	SFI-1	130.00	130.50				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
792	SFI-1	130.00	130.50				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
793	SFI-1	142.40	144.00				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
794	SFI-1	142.40	144.00				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
795	SFI-1	154.30	154.80				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
796	SFI-1	154.30	154.80				PM									IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
797	DD-1	183.02	183.32				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
798	DD-1	183.02	183.32				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
799	DD-1	204.94	205.19				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
800	DD-1	204.94	205.19				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
801	DD-1	220.70	221.00				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
802	DD-1	220.70	221.00				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
803	DD-1	239.85	240.10				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
804	DD-1	239.85	240.10				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
805	DD-1	257.60	257.90				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
806	DD-1	257.60	257.90				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
807	DD-1	279.60	279.86				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
808	DD-1	279.60	279.86				PM									IC	IC	ICP	ICP														IC						IC			
809	DD-1	308.10	308.25				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
810	DD-1	308.10	308.25				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
811	DD-1	324.35	324.55				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
812	DD-1	324.35	324.55				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
813	DD-1	342.00	342.25				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
814	DD-1	342.00	342.25				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
815	DD-1	356.70	357.00				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
816	DD-1	356.70	357.00				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
817	DD-1	374.70	375.00				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
818	DD-1	374.70	375.00				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
819	DD-1	394.70	395.00				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
820	DD-1	394.70	395.00				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
821	DD-1	422.75	423.05				PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
822	DD-1	422.75	423.05				PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
823	DD-1	447.90	448.20				PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
824	DD-1	472.43	472.73				PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
825	DD-1	472.43	472.73				PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
826	DD-1	495.55	495.85				PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
827	DD-1	522.63	522.96				PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
828	DD-1	522.63	522.96				PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
829	DD-1	541.52	541.82				PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
830	DD-1	541.52	541.82				PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
831	DD-1	570.07	570.37				PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
832	DD-1	570.07	570.37				PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
833	DD-1	593.97	594.27				PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
834	DD-1	593.97	594.27				PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
835	DD-1	626.95	627.32		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
836	DD-1	626.95	627.32		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
837	DD-1	647.80	648.10		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
838	DD-1	647.80	648.10		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
839	DD-1	672.00	672.25		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
840	DD-1	672.00	672.25		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
841	DD-1	692.60	692.90		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
842	DD-1	720.60	720.90		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
843	DD-1	720.60	720.90		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
844	DD-1	752.15	752.40		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
845	DD-1	774.55	774.85		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
846	DD-1	774.55	774.85		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
847	DD-1	800.57	800.85		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
848	DD-1	800.57	800.85		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
849	DD-1	824.05	824.35		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
850	DD-1	824.05	824.35		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
851	DD-1	842.85	843.10		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
852	DD-1	842.85	843.10		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
853	DD-1	869.17	869.42		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
854	DD-1	869.17	869.42		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
855	DD-1	890.67	890.99		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
856	DD-1	921.45	921.67		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
857	DD-1	921.45	921.67		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
858	DD-1	950.50	950.80		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
859	DD-1	950.50	950.80		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
860	DD-1	975.85	976.11		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
861	DD-1	994.00	994.25		2010		PM								A	IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
862	DD-2	32.70	33.00				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
863	DD-2	32.70	33.00				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
864	DD-2	44.15	44.45				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
865	DD-2	44.15	44.45				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
866	DD-2	62.15	62.50				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
867	DD-2	62.15	62.50				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
868	DD-2	88.00	88.30				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
869	DD-2	88.00	88.30				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
870	DD-2	99.30	99.55				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
871	DD-2	99.30	99.55				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
872	HCD-3	168.74	168.92		2006											IC	IC	ICP	ICP														IC						IC			
873	HCD-3	168.74	168.92		2006													ICP	ICP														IC						IC			
874	HCD-3	176.14	176.23		2006													ICP	ICP														IC						IC			
875	HCD-3	184.39	184.48		2006													ICP	ICP														IC						IC			
876	HCD-3	193.38	193.47		2006													ICP	ICP														IC						IC			
877	HCD-3	200.86	201.03		2006													ICP	ICP														IC						IC			
878	HCD-3	209.08	209.16		2006											IC	IC	ICP	ICP														IC						IC			
879	HCD-3	218.49	218.65		2006													ICP	ICP														IC						IC			
880	HCD-3	228.97	229.05		2006													ICP	ICP														IC						IC			
881	HCD-3	234.66	234.74		2006													ICP	ICP														IC						IC			
882	HCD-3	240.61	240.69		2006													ICP	ICP														IC						IC			
883	HCD-3	251.34	251.49		2006											IC	IC	ICP	ICP														IC						IC			
884	HCD-3	257.19	257.27		2006													ICP	ICP														IC						IC			
885	HCD-3	264.63	264.78		2006													ICP	ICP														IC						IC			
886	HCD-3	272.12	272.19		2006													ICP	ICP														IC						IC			
887	HCD-3	279.50	279.64		2006													ICP	ICP														IC						IC			
888	HCD-3	288.58	288.72		2006											IC	IC	ICP	ICP														IC						IC			
889	HCD-3	291.92	292.05		2006											IC	IC	ICP	ICP														IC						IC			
890	HCD-3	300.57	300.63		2006													ICP	ICP														IC						IC			
891	HCD-3	306.72	306.85		2006													ICP	ICP														IC						IC			
892	HCD-3	315.62	315.68		2006													ICP	ICP														IC						IC			
893	HCD-3	322.08	322.21		2007													ICP	ICP														IC						IC			
894	HCD-3	322.08	322.34		2007											IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			

Table 2.3.5 Analytical methods of groundwater (26/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date											Gases																				Isotope												Organics			
		Min.	Max.			M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	CO	H_2S	H_2	^3H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (DIC)	^{14}C	^{36}Cl	$^{36}Cl/Cl$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$	Humic acid	Fuluvic acid	Acetate	Formate
		[m]	[m]			[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mol/Kg]	[%]	[mol/Kg]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]	[‰]		[mg/l]	[mg/l]	[mg/l]	[mg/l]
788	SFI-1	107.40	110.00																																																
789	SFI-1	120.10	123.90																																	MS	MS						AMS							
790	SFI-1	120.10	123.90																																																
791	SFI-1	130.00	130.50																																								AMS							
792	SFI-1	130.00	130.50																																																
793	SFI-1	142.40	144.00																																	MS	MS													
794	SFI-1	142.40	144.00																																																
795	SFI-1	154.30	154.80																																	MS	MS						AMS							
796	SFI-1	154.30	154.80																																	MS	MS													
797	DD-1	183.02	183.32																																	MS	MS													
798	DD-1	183.02	183.32																																	MS	MS													
799	DD-1	204.94	205.19																																	MS	MS													
800	DD-1	204.94	205.19																																	MS	MS													
801	DD-1	220.70	221.00																																	MS	MS													
802	DD-1	220.70	221.00																																	MS	MS													
803	DD-1	239.85	240.10																																	MS	MS													
804	DD-1	239.85	240.10																																	MS	MS													
805	DD-1	257.60	257.90																																	MS	MS													
806	DD-1	257.60	257.90																																	MS	MS													
807	DD-1	279.60	279.86																																	MS	MS						AMS							
808	DD-1	279.60	279.86																																	MS	MS													
809	DD-1	308.10	308.25																																	MS	MS													
810	DD-1	308.10	308.25																																	MS	MS													
811	DD-1	324.35	324.55																																	MS	MS													
812	DD-1	324.35	324.55																																	MS	MS													
813	DD-1	342.00	342.25																																	MS	MS													
814	DD-1	342.00	342.25																																	MS	MS													
815	DD-1	356.70	357.00																																	MS	MS						AMS							
816	DD-1	356.70	357.00																																	MS	MS													
817	DD-1	374.70	375.00																																	MS	MS						AMS							
818	DD-1	374.70	375.00																																	MS	MS													
819	DD-1	394.70	395.00																																	MS	MS						AMS							
820	DD-1	394.70	395.00																																	MS	MS													
821	DD-1	422.75	423.05																																	MS	MS													
822	DD-1	422.75	423.05																																	MS	MS													
823	DD-1	447.90	448.20																																	MS	MS													
824	DD-1	472.43	472.73																																	MS	MS						AMS							
825	DD-1	472.43	472.73																																	MS	MS													
826	DD-1	495.55	495.85																																	MS	MS													
827	DD-1	522.63	522.96																																	MS	MS						AMS							
828	DD-1	522.63	522.96																																	MS	MS													
829	DD-1	541.52	541.82																																	MS	MS													
830	DD-1	541.52	541.82																																	MS	MS													
831	DD-1	570.07	570.37																																	MS	MS													
832	DD-1	570.07	570.37																																	MS	MS													
833	DD-1	593.97	594.27																																	MS	MS						AMS							
834	DD-1	593.97	594.27																																	MS	MS													
835	DD-1	626.95	627.32		2010																															MS	MS													
836	DD-1	626.95	627.32		2010																															MS	MS													
837	DD-1	647.80	648.10		2010																															MS	MS						AMS							
838	DD-1	647.80	648.10		2010																															MS	MS													
839	DD-1	672.00	672.25		2010																															MS	MS													
840	DD-1	672.00	672.25		2010																															MS	MS													
841	DD-1	692.60	692.90		2010																															MS	MS						AMS							
842	DD-1	720.60	720.90		2010																															MS	MS													
843	DD-1	720.60	720.90		2010																															MS	MS													
844	DD-1	752.15	752.40		2010																															MS	MS						AMS							
845	DD-1	774.55	774.85		2010																															MS	MS													
846	DD-1	774.55	774.85		2010																															MS	MS													
847	DD-1	800.57	800.85		2010																															MS	MS						AMS							
848	DD-1	800.57	800.85		2010																															MS	MS													
849	DD-1	824.05	824.35		2010																															MS	MS													
850	DD-1	824.05	824.35		2010																															MS	MS													
851	DD-1	842.85	843.10		2010																															MS	MS						AMS							
852	DD-1	842.85	843.10		2010																															MS	MS													
853	DD-1	869.17	869.42		2010																															MS	MS													
854	DD-1	869.17	869.42		2010																															MS	MS													
855	DD-1	890.67	890.99		2010																															MS	MS						AMS							
856	DD-1	921.45	921.67		2010																															MS	MS													
857	DD-1	921.45	921.67		2010																															MS	MS													
858	DD-1	950.50	950.80		2010																															MS	MS						AMS							
859	DD-1	950.50	950.80		2010																															MS	MS													
860	DD-1	975.85	976.11		2010																															MS	MS													
861	DD-1	994.00	994.25		2010																															MS	MS						AMS							
862	DD-2	32.70	33.00																																	MS	MS													
863	DD-2	32.70	33.00																																	MS	MS													
864	DD-2	44.15	44.45																																	MS	MS													
865	DD-2	44.15	44.45																																	MS	MS													
866	DD-2	62.15	62.50																																	MS	MS													
867	DD-2	62.15	62.50																																	MS	MS													
868	DD-2	88.00	88.30																																	MS	MS													
869	DD-2	88.00	88.30																																	MS	MS													
870	DD-2	99.30	99.55																																	MS	MS													
871	DD-2	99.30	99.55																																	MS	MS													
872	HCD-3	168.74	168.92		2006																															MS	MS													
873	HCD-3	168.74	168.92		2006																															MS	MS													
874	HCD-3	176.14	176.23		2006																																															
875	HCD-3	184.39	184.48		2006																																															
876	HCD-3	193.38	193.47		2006																																															
877	HCD-3	200.86	201.03		2006																																															
878	HCD-3	209.08	209.16		2006																															MS	MS													
879	HCD-3	218.49	218.65		2006																																															
880	HCD-3	228.97	229.05		2006																																															
881	HCD-3	234.66	234.74		2006																																															
882	HCD-3	240.61	240.69		2006																																															
883	HCD-3	251.34	251.49		2006																															MS	MS													
884	HCD-3	257.19	257.27		2006																																															
885	HCD-3	264.63	264.78		2006																																															
886	HCD-3	272.12	272.19		2006																																															
887	HCD-3	279.50	279.64		2006																																															
888	HCD-3	288.58	288.72		2006																															MS	MS													
889	HCD-3	291.92	292.05		2006																															MS	MS													
890	HCD-3	300.57	300.63		2006																																															
891	HCD-3	306.72	306.85		2006																																															
892	HCD-3	315.62	315.68		2006																																															
893	HCD-3	322.08	322.21		2007																																															
894	HCD-3	322.08	322.34		2007																															MS	MS													

Table 2.3.5 Analytical methods of groundwater (27/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Microbiology																					
		Min.	Max.			Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]			[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
788	SFI-1	107.40	110.00																								
789	SFI-1	120.10	123.90																								
790	SFI-1	120.10	123.90																								
791	SFI-1	130.00	130.50																								
792	SFI-1	130.00	130.50																								
793	SFI-1	142.40	144.00																								
794	SFI-1	142.40	144.00																								
795	SFI-1	154.30	154.80																								
796	SFI-1	154.30	154.80																								
797	DD-1	183.02	183.32																								
798	DD-1	183.02	183.32																								
799	DD-1	204.94	205.19																								
800	DD-1	204.94	205.19																								
801	DD-1	220.70	221.00																								
802	DD-1	220.70	221.00																								
803	DD-1	239.85	240.10																								
804	DD-1	239.85	240.10																								
805	DD-1	257.60	257.90																								
806	DD-1	257.60	257.90																								
807	DD-1	279.60	279.86																								
808	DD-1	279.60	279.86																								
809	DD-1	308.10	308.25																								
810	DD-1	308.10	308.25																								
811	DD-1	324.35	324.55																								
812	DD-1	324.35	324.55																								
813	DD-1	342.00	342.25																								
814	DD-1	342.00	342.25																								
815	DD-1	356.70	357.00																								
816	DD-1	356.70	357.00																								
817	DD-1	374.70	375.00																								
818	DD-1	374.70	375.00																								
819	DD-1	394.70	395.00																								
820	DD-1	394.70	395.00																								
821	DD-1	422.75	423.05																								
822	DD-1	422.75	423.05																								
823	DD-1	447.90	448.20																								
824	DD-1	472.43	472.73																								
825	DD-1	472.43	472.73																								
826	DD-1	495.55	495.85																								
827	DD-1	522.63	522.96																								
828	DD-1	522.63	522.96																								
829	DD-1	541.52	541.82																								
830	DD-1	541.52	541.82																								
831	DD-1	570.07	570.37																								
832	DD-1	570.07	570.37																								
833	DD-1	593.97	594.27																								
834	DD-1	593.97	594.27																								
835	DD-1	626.95	627.32		2010																						
836	DD-1	626.95	627.32		2010																						
837	DD-1	647.80	648.10		2010																						
838	DD-1	647.80	648.10		2010																						
839	DD-1	672.00	672.25		2010																						
840	DD-1	672.00	672.25		2010																						
841	DD-1	692.60	692.90		2010																						
842	DD-1	720.60	720.90		2010																						
843	DD-1	720.60	720.90		2010																						
844	DD-1	752.15	752.40		2010																						
845	DD-1	774.55	774.85		2010																						
846	DD-1	774.55	774.85		2010																						
847	DD-1	800.57	800.85		2010																						
848	DD-1	800.57	800.85		2010																						
849	DD-1	824.05	824.35		2010																						
850	DD-1	824.05	824.35		2010																						
851	DD-1	842.85	843.10		2010																						
852	DD-1	842.85	843.10		2010																						
853	DD-1	869.17	869.42		2010																						
854	DD-1	869.17	869.42		2010																						
855	DD-1	890.67	890.99		2010																						
856	DD-1	921.45	921.67		2010																						
857	DD-1	921.45	921.67		2010																						
858	DD-1	950.50	950.80		2010																						
859	DD-1	950.50	950.80		2010																						
860	DD-1	975.85	976.11		2010																						
861	DD-1	994.00	994.25		2010																						
862	DD-2	32.70	33.00																								
863	DD-2	32.70	33.00																								
864	DD-2	44.15	44.45																								
865	DD-2	44.15	44.45																								
866	DD-2	62.15	62.50																								
867	DD-2	62.15	62.50																								
868	DD-2	88.00	88.30																								
869	DD-2	88.00	88.30																								
870	DD-2	99.30	99.55																								
871	DD-2	99.30	99.55																								
872	HCD-3	168.74	168.92		2006																						
873	HCD-3	168.74	168.92		2006																						
874	HCD-3	176.14	176.23		2006																						
875	HCD-3	184.39	184.48		2006																						
876	HCD-3	193.38	193.47		2006																						
877	HCD-3	200.86	201.03		2006																						
878	HCD-3	209.08	209.16		2006																						
879	HCD-3	218.49	218.65		2006																						
880	HCD-3	228.97	229.05		2006																						
881	HCD-3	234.66	234.74		2006																						
882	HCD-3	240.61	240.69		2006																						
883	HCD-3	251.34	251.49		2006																						
884	HCD-3	257.19	257.27		2006																						
885	HCD-3	264.63	264.78		2006																						
886	HCD-3	272.12	272.19		2006																						
887	HCD-3	279.50	279.64		2006																						
888	HCD-3	288.58	288.72		2006																						
889	HCD-3	291.92	292.05		2006																						
890	HCD-3	300.57	300.63		2006																						
891	HCD-3	306.72	306.85		2006																						
892	HCD-3	315.62	315.68		2006																						
893	HCD-3	322.08	322.21		2007																						
894	HCD-3	322.08	322.34		2007																						

Table 2.3.5 Analytical methods of groundwater (28/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Physico-chemical parameter							Contamination indicator			Geochemistry																										
		Min.	Max.			EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temperature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}
		[m]	[m]			[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]		[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
895	HCD-3	327.31	327.37		2007													ICP	ICP														IC						IC			
896	HCD-3	332.43	332.49		2007													ICP	ICP														IC						IC			
897	HCD-3	339.52	339.64		2007													ICP	ICP														IC						IC			
898	HCD-3	344.41	34.47		2007													ICP	ICP														IC						IC			
899	HCD-3	350.84	351.07		2007											IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
900	HCD-3	352.85	352.91		2007													ICP	ICP														IC						IC			
901	HCD-3	355.80	355.86		2007													ICP	ICP														IC						IC			
902	HCD-3	362.18	362.23		2007													ICP	ICP														IC						IC			
903	HCD-3	370.00	370.05		2007													ICP	ICP														IC						IC			
904	HCD-3	373.65	373.70		2007													ICP	ICP														IC						IC			
905	HCD-3	377.71	377.76		2007													ICP	ICP														IC						IC			
906	HCD-3	378.27	378.42		2007											IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
907	HCD-3	383.64	383.68		2007													ICP	ICP														IC						IC			
908	HCD-3	388.61	388.65		2007													ICP	ICP														IC						IC			
909	HCD-3	393.22	393.26		2007													ICP	ICP														IC						IC			
910	HCD-3	396.83	396.87		2007													ICP	ICP														IC						IC			
911	HCD-3	401.01	401.09		2007													ICP	ICP														IC						IC			
912	HCD-3	401.70	401.82		2007											IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
913	HCD-3	405.42	405.46		2007													ICP	ICP														IC						IC			
914	HCD-3	409.35	409.39		2007													ICP	ICP														IC						IC			
915	HCD-3	413.42	413.46		2007													ICP	ICP														IC						IC			
916	HCD-3	416.42	416.45		2007													ICP	ICP														IC						IC			
917	HCD-3	418.98	419.04		2007											IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
918	HCD-3	419.86	419.89		2007													ICP	ICP														IC						IC			
919	HCD-3	421.56	421.59		2007													ICP	ICP														IC						IC			
920	HCD-3	424.24	424.27		2007													ICP	ICP														IC						IC			
921	HCD-3	426.65	426.68		2007													ICP	ICP														IC						IC			
922	HCD-3	428.80	428.82		2007													ICP	ICP														IC						IC			
923	HCD-3	430.72	430.77		2007											IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
924	HCD-3	430.79	430.81		2007													ICP	ICP														IC						IC			
925	HCD-3	432.17	432.19		2007													ICP	ICP														IC						IC			
926	HCD-3	433.56	433.58		2007													ICP	ICP														IC						IC			
927	HCD-3	434.76	434.77		2007													ICP	ICP														IC						IC			
928	HCD-3	435.52	435.53		2007													ICP	ICP														IC						IC			
929	HCD-3	436.24	436.25		2008													ICP	ICP														IC						IC			
930	HCD-3	436.72	436.72				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
931	HCD-3	436.73	436.73		2010													ICP	ICP														IC						IC			
932	HCD-3	436.75	436.75		2010													ICP	ICP														IC						IC			
933	HCD-3	436.78	436.73		2010													ICP	ICP														IC						IC			
934	HCD-3	436.81	436.83													IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
935	HCD-3	436.83	436.83		2008													ICP	ICP														IC						IC			
936	HCD-3	436.85	436.86				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC		calc	
937	HCD-3	436.98	436.97		2010													ICP	ICP														IC						IC			
938	HCD-3	437.32	437.33		2008													ICP	ICP														IC						IC			
939	HCD-3	437.49	437.48		2010													ICP	ICP														IC						IC			
940	HCD-3	437.60	437.60		2008													ICP	ICP														IC						IC			
941	HCD-3	437.65	437.65		2008													ICP	ICP														IC						IC			
942	HCD-3	437.69	437.69		2008													ICP	ICP														IC						IC			
943	HCD-3	437.72	437.72													IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
944	HCD-3	437.72	437.72		2008													ICP	ICP														IC						IC			
945	HCD-3	437.77	437.77		2008													ICP	ICP														IC						IC			
946	HCD-3	437.89	437.89		2008													ICP	ICP														IC						IC			
947	HCD-3	437.93	437.92		2010													ICP	ICP														IC						IC			
948	HCD-3	438.00	437.98				PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
949	HCD-3	438.06	438.06		2008													ICP	ICP														IC						IC			
950	HCD-3	438.28	438.29		2008													ICP	ICP														IC						IC			
951	HCD-3	438.39	438.39		2008													ICP	ICP														IC						IC			
952	HCD-3	438.18	438.17		2009													ICP	ICP														IC						IC			
953	HCD-3	438.40	438.41		2009											IC	IC	ICP	ICP														IC	ICP-MS	ICP-MS				IC			
954	HCD-3	438.48	438.48		2009													ICP	ICP														IC						IC			
955	HCD-3	438.60	438.60		2009													ICP	ICP														IC						IC			
956	HCD-3	438.67	438.66		2009													ICP	ICP														IC						IC			
957	HCD-3	438.69	438.68		2009		PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
958	HCD-3	438.70	438.70		2009													ICP	ICP														IC						IC			
959	HCD-3	438.70	438.69		2009		PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
960	HCD-3	438.71	438.71		2009													ICP	ICP														IC						IC			
961	HCD-3	438.72	438.72		2009													ICP	ICP														IC						IC			
962	HCD-3	438.72	438.72		2009													ICP	ICP														IC						IC			
963	HCD-3	438.72	438.72		2009													ICP	ICP														IC						IC			
964	HCD-3	438.73	438.74		2009		PM									IC	IC	ICP	ICP				ICP-MS	ICP-MS									IC	ICP-MS	ICP-MS				IC			
965	HCD-3	438.74	438.74		2009													ICP	ICP														IC						IC			

Table 2.3.5 Analytical methods of groundwater (29/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Gases																												Isotope											Organics			
		Min.	Max.			M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	CO	H_2S	H_2	^3H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (DIC)	^{14}C	^{35}Cl	$^{36}Cl/Cl$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$	Humic acid	Fuluvic acid	Acetate	Formate
		[m]	[m]			[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mol/Kg]	[%]	[mol/Kg]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
895	HCD-3	327.31	327.37		2007																																														
896	HCD-3	332.43	332.49		2007																																														
897	HCD-3	339.52	339.64		2007																																														
898	HCD-3	344.41	34.47		2007																																														
899	HCD-3	350.84	351.07		2007																															MS	MS														
900	HCD-3	352.85	352.91		2007																																														
901	HCD-3	355.80	355.86		2007																																														
902	HCD-3	362.18	362.23		2007																																														
903	HCD-3	370.00	370.05		2007																																														
904	HCD-3	373.65	373.70		2007																																														
905	HCD-3	377.71	377.76		2007																																														
906	HCD-3	378.27	378.42		2007																															MS	MS														
907	HCD-3	383.64	383.68		2007																																														
908	HCD-3	388.61	388.65		2007																																														
909	HCD-3	393.22	393.26		2007																																														
910	HCD-3	396.83	396.87		2007																																														
911	HCD-3	401.01	401.09		2007																																														
912	HCD-3	401.70	401.82		2007																															MS	MS														
913	HCD-3	405.42	405.46		2007																																														
914	HCD-3	409.35	409.39		2007																																														
915	HCD-3	413.42	413.46		2007																																														
916	HCD-3	416.42	416.45		2007																																														
917	HCD-3	418.98	419.04		2007																															MS	MS														
918	HCD-3	419.86	419.89		2007																																														
919	HCD-3	421.56	421.59		2007																																														
920	HCD-3	424.24	424.27		2007																																														
921	HCD-3	426.65	426.68		2007																																														
922	HCD-3	428.80	428.82		2007																																														
923	HCD-3	430.72	430.77		2007																															MS	MS														
924	HCD-3	430.79	430.81		2007																																														
925	HCD-3	432.17	432.19		2007																																														
926	HCD-3	433.56	433.58		2007																																														
927	HCD-3	434.76	434.77		2007																																														
928	HCD-3	435.52	435.53		2007																																														
929	HCD-3	436.24	436.25		2008																																														
930	HCD-3	436.72	436.72																																	MS	MS							AMS							
931	HCD-3	436.73	436.73		2010																																														
932	HCD-3	436.75	436.75		2010																																														
933	HCD-3	436.78	436.73		2010																																														
934	HCD-3	436.81	436.83																																	MS	MS							AMS							
935	HCD-3	436.83	436.83		2008																																														
936	HCD-3	436.85	436.86																																	MS	MS							AMS							
937	HCD-3	436.98	436.97		2010																																														
938	HCD-3	437.32	437.33		2008																																														
939	HCD-3	437.49	437.48		2010																																														
940	HCD-3	437.60	437.60		2008																																														
941	HCD-3	437.65	437.65		2008																																														
942	HCD-3	437.69	437.69		2008																																														
943	HCD-3	437.72	437.72																																	MS	MS							AMS							
944	HCD-3	437.72	437.72		2008																																														
945	HCD-3	437.77	437.77		2008																																														
946	HCD-3	437.89	437.89		2008																																														
947	HCD-3	437.93	437.92		2010																																														
948	HCD-3	438.00	437.98																																	MS	MS							AMS							
949	HCD-3	438.06	438.06		2008																																														
950	HCD-3	438.28	438.29		2008																																														
951	HCD-3	438.39	438.39		2008																																														
952	HCD-3	438.18	438.17		2009																																														
953	HCD-3	438.40	438.41		2009																															MS	MS							AMS							
954	HCD-3	438.48	438.48		2009																																														
955	HCD-3	438.60	438.60		2009																																														
956	HCD-3	438.67	438.66		2009																																														
957	HCD-3	438.69	438.68		2009																															MS	MS							AMS							
958	HCD-3	438.70	438.70		2009																																														
959	HCD-3	438.70	438.69		2009																															MS	MS							AMS							
960	HCD-3	438.71	438.71		2009																																														
961	HCD-3	438.72	438.72		2009																																														
962	HCD-3	438.72	438.72		2009																																														
963	HCD-3	438.72	438.72		2009																																														
964	HCD-3	438.73	438.74		2009																															MS	MS							AMS							
965	HCD-3	438.74	438.74		2009																																														

Table 2.3.5 Analytical methods of groundwater (30/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Microbiology																					
		Min.	Max.			Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]			[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
895	HCD-3	327.31	327.37		2007																						
896	HCD-3	332.43	332.49		2007																						
897	HCD-3	339.52	339.64		2007																						
898	HCD-3	344.41	34.47		2007																						
899	HCD-3	350.84	351.07		2007																						
900	HCD-3	352.85	352.91		2007																						
901	HCD-3	355.80	355.86		2007																						
902	HCD-3	362.18	362.23		2007																						
903	HCD-3	370.00	370.05		2007																						
904	HCD-3	373.65	373.70		2007																						
905	HCD-3	377.71	377.76		2007																						
906	HCD-3	378.27	378.42		2007																						
907	HCD-3	383.64	383.68		2007																						
908	HCD-3	388.61	388.65		2007																						
909	HCD-3	393.22	393.26		2007																						
910	HCD-3	396.83	396.87		2007																						
911	HCD-3	401.01	401.09		2007																						
912	HCD-3	401.70	401.82		2007																						
913	HCD-3	405.42	405.46		2007																						
914	HCD-3	409.35	409.39		2007																						
915	HCD-3	413.42	413.46		2007																						
916	HCD-3	416.42	416.45		2007																						
917	HCD-3	418.98	419.04		2007																						
918	HCD-3	419.86	419.89		2007																						
919	HCD-3	421.56	421.59		2007																						
920	HCD-3	424.24	424.27		2007																						
921	HCD-3	426.65	426.68		2007																						
922	HCD-3	428.80	428.82		2007																						
923	HCD-3	430.72	430.77		2007																						
924	HCD-3	430.79	430.81		2007																						
925	HCD-3	432.17	432.19		2007																						
926	HCD-3	433.56	433.58		2007																						
927	HCD-3	434.76	434.77		2007																						
928	HCD-3	435.52	435.53		2007																						
929	HCD-3	436.24	436.25		2008																						
930	HCD-3	436.72	436.72																								
931	HCD-3	436.73	436.73		2010																						
932	HCD-3	436.75	436.75		2010																						
933	HCD-3	436.78	436.73		2010																						
934	HCD-3	436.81	436.83																								
935	HCD-3	436.83	436.83		2008																						
936	HCD-3	436.85	436.86																								
937	HCD-3	436.98	436.97		2010																						
938	HCD-3	437.32	437.33		2008																						
939	HCD-3	437.49	437.48		2010																						
940	HCD-3	437.60	437.60		2008																						
941	HCD-3	437.65	437.65		2008																						
942	HCD-3	437.69	437.69		2008																						
943	HCD-3	437.72	437.72																								
944	HCD-3	437.72	437.72		2008																						
945	HCD-3	437.77	437.77		2008																						
946	HCD-3	437.89	437.89		2008																						
947	HCD-3	437.93	437.92		2010																						
948	HCD-3	438.00	437.98																								
949	HCD-3	438.06	438.06		2008																						
950	HCD-3	438.28	438.29		2008																						
951	HCD-3	438.39	438.39		2008																						
952	HCD-3	438.18	438.17		2009																						
953	HCD-3	438.40	438.41		2009																						
954	HCD-3	438.48	438.48		2009																						
955	HCD-3	438.60	438.60		2009																						
956	HCD-3	438.67	438.66		2009																						
957	HCD-3	438.69	438.68		2009																						
958	HCD-3	438.70	438.70		2009																						
959	HCD-3	438.70	438.69		2009																						
960	HCD-3	438.71	438.71		2009																						
961	HCD-3	438.72	438.72		2009																						
962	HCD-3	438.72	438.72		2009																						
963	HCD-3	438.72	438.72		2009																						
964	HCD-3	438.73	438.74		2009																						
965	HCD-3	438.74	438.74		2009																						

Table 2.3.5 Analytical methods of groundwater

Boreholes and inflow from the shaft wall

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Table 2.3.5 Analytical methods of groundwater (31/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Physico-chemical parameter							Contamination indicator			Geochemistry																												
		Min.	Max.			EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temperature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}
		[m]	[m]			[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]		[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
Boreholes in the Gallery of the Horonobe URL																																												
966	07-V140-M01	138.68	138.68		2008/2/8		PM		PM					FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
967	07-V140-M01	138.68	138.68		2008/11/17		PM		PM							FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
968	07-V140-M01	138.68	138.68		2008/12/19	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
969	07-V140-M01	138.68	138.68		2009/8/26			PM		PM	calc	PM				IC	IC	FP	FP		A		FP	FP			IC		A	A		IC	IC	IC		IC		A	IC	A	calc	calc
970	07-V140-M01	138.68	138.68		2009/12/22		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
971	07-V140-M01	138.68	138.68		2010/1/15		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
972	07-V140-M01	138.68	138.68		2010/1/18		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
973	07-V140-M01	138.68	138.68		2010/2/16											ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC			IC			
974	07-V140-M01	138.68	138.68		2010/7/27		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
975	07-V140-M01	138.68	138.68		2010/10/27		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
976	07-V140-M01	138.68	138.68		2010/11/19		PM		PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
977	07-V140-M01	138.68	138.68		2010/11/24		PM		PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
978	07-V140-M01	138.68	138.68		2010/12/22		PM		PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
979	07-V140-M01	138.68	138.68		2011/2/1		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
980	07-V140-M03		138.67	1	2010/1/15	PM	PM	PM	PM	PM	calc	PM	HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
981	07-V140-M03			1	2010/10/28		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
982	07-V140-M03			1	2010/11/25		PM		PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
983	07-V140-M03			2	2009/10/7																																						
984	08-E140-C01				2009/3/9		PM		PM					FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC		calc	calc
985	08-E140-C01				2009/3/13		PM		PM					FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC		calc	calc
986	08-E140-C01	157.55	167.86	5	2009/4/16		PM		PM				HPLC			IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
987	08-E140-C01	157.55	167.86	5	2009/8/4		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
988	08-E140-C01	157.55	167.86	5	2009/9/17		PM	PM	PM	PM	calc		HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
989	08-E140-C01	157.55	167.86	5	2011/2/4		PM	PM	PM	PM	calc		HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
990	08-E140-C01	168.62	174.37	4	2009/4/16		PM	PM	PM	PM	calc		HPLC			IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
991	08-E140-C01	168.62	174.37	4	2009/8/4		PM	PM	PM	PM	calc		HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
992	08-E140-C01	168.62	174.37	4	2009/9/17		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
993	08-E140-C01	175.13	194.20	3	2009/3/17		PM		PM					FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
994	08-E140-C01	175.13	194.20	3	2009/4/16		PM		PM				HPLC			IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
995	08-E140-C01	175.13	194.20	3	2009/8/4		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
996	08-E140-C01	175.13	194.20	3	2009/9/17		PM	PM	PM	PM	calc		HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
997	08-E140-C01	175.13	194.20	3	2011/2/16		PM	PM	PM	PM	calc		HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
998	08-E140-C01	195.00	208.87	2	2009/3/17		PM		PM					FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
999	08-E140-C01	195.00	208.87	2	2009/4/16		PM		PM				HPLC			IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1000	08-E140-C01	195.00	208.87	2	2009/8/4		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1001	08-E140-C01	195.00	208.87	2	2009/9/17		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1002	08-E140-C01	195.00	208.87	2	2011/2/16		PM	PM	PM	PM	calc		HPLC	HPLC		IC	IC	IC	IC			ICP	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1003	08-E140-C01	209.69	218.70	1	2009/3/17		PM		PM					FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1004	08-E140-C01	209.69	218.70	1	2009/4/16		PM		PM				HPLC			IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1005	08-E140-C01	209.69	218.70	1	2009/8/4		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1006	08-E140-C01	209.69	218.70	1	2009/9/17		PM	PM	PM	PM	calc		HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP	A	ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1007	08-E140-C01	209.69	218.70	1	2011/1/31		PM	PM	PM	PM	calc		HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1008	08-E140-M01	139.13	218.70		2010/2/4		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP			ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1009	08-E140-M01	139.13	218.70		2010/10/29		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1010	08-E140-M01	139.18		1	2010/1/15		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP			ICP	A	IC	IC	IC	IC		A	IC		calc	calc
1011	08-E140-M02	139.18		1	2010/2/4		PM		PM							IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC		calc	calc
1012	08-E140-M02	139.18		1	2010/7/20		PM	PM	PM	PM	calc		HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1013	08-E140-M02	139.18		1	2010/10/28		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1014	08-E140-M02	139.18		1	2011/2/15		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1015	08-E140-M02	139.18		2	2010/1/15		PM		PM							IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC		calc	calc
1016	08-E140-M02	139.18		2	2011/2/15		PM		PM				HPLC	HPLC		IC	IC	IC	IC			IC	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1017	09-V250-M01	249.15			2009/12/15		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1018	09-V250-M01	249.15			2010/1/18		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1019	09-V250-M01	249.15			2010/6/7		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1020	09-V250-M01	249.15			2010/10/13		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1021	09-V250-M01	249.15			2011/1/20		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1022	09-V250-M02	249.15			2009/11/17		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1023	09-V250-M02	249.15			2010/1/18		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1024	09-V250-M02	249.15			2010/6/7		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1025	09-V250-M02	249.15			2010/10/13		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1026	09-V250-M02	249.15			2011/1/20		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1027	09-V250-M02	249.15		1	2011/2/15		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1028	09-V250-M02	249.15		2	2011/2/15		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1029	09-V250-M03	250.15	270.15		2009/12/15		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1030	09-V250-M03	250.15	270.15		2010/1/18		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1031	09-V250-M03	250.15	270.15		2010/6/7		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1032	09-V250-M03	250.15	270.15		2010/10/14		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		A	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1033	09-V250-M03	250.15	270.15		2011/1/20		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP		ICP		ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
Sedimentary rocks from the shaft wall																																												
1034	East shaft	5.1	5.1				PM		PM							ICP	ICP	ICP	ICP		ICP		ICP						ICP		ICP	IC	IC	IC	IC	IC			IC			
1035	East shaft	5.5	5.5				PM		PM							ICP	ICP	ICP	ICP		ICP		ICP						ICP		ICP	IC	IC	IC	IC	IC			IC			
1036	East shaft	6.5	6.5				PM		PM							ICP	ICP	ICP	ICP		ICP		ICP						ICP		ICP	IC	IC	IC	IC	IC			IC			
1037	East shaft	7.6	7.6																																								
1038	East shaft	9.5	9.5				PM		PM							ICP	ICP	ICP	ICP		ICP		ICP						ICP		ICP	IC	IC	IC	IC	IC			IC			
1039	East shaft	11.6	11.6				PM		PM							ICP	ICP	ICP	ICP		ICP		ICP						ICP		ICP	IC	IC	IC	IC	IC			IC			
1040	East shaft	13.6	13.6																																								
1041	East shaft	15.6	15.6																																								
1042	East shaft	17.6	17.6				PM		PM							ICP	ICP	ICP	ICP		ICP		ICP						ICP		ICP	IC	IC	IC	IC	IC			IC			
1043	East shaft	19.6	19.6				PM		PM							ICP	ICP	ICP	ICP		ICP		ICP						ICP		ICP	IC	IC	IC	IC	IC			IC			
1044	East shaft	24.1	24.1				PM		PM							ICP	ICP	ICP	ICP		ICP		ICP						ICP		ICP	IC	IC	IC	IC	IC			IC			
1045	East shaft	29.0	29.0																																								
1046	East shaft	33.0	33.0				PM		PM							ICP	ICP	ICP	ICP		ICP		ICP						ICP		ICP	IC	IC	IC	IC	IC			IC			
1047	East shaft	37.1	37.1																																								
1048	East shaft	40.1	40.1				PM		PM							ICP	ICP	ICP	ICP		ICP		ICP						ICP		ICP	IC	IC	IC	IC	IC			IC			
1049	East shaft	52.7	52.7				PM		PM							ICP	ICP	ICP	ICP													IC	IC	IC		IC			IC			
1050	East shaft	60.0	60.0				PM		PM							ICP	ICP	ICP	ICP													IC	IC	IC		IC			IC			
1051	East shaft	69.8	69.8				PM		PM							ICP	ICP	ICP	ICP													IC	IC	IC		IC			IC			
1052	East shaft	80.1	80.1				PM		PM							ICP	ICP	ICP	ICP													IC	IC	IC		IC			IC			
1053	East shaft	90.1	90.1				PM		PM							ICP	ICP	ICP	ICP													IC	IC	IC		IC			IC			
1054	East shaft	100.2	100.2				PM		PM							ICP	ICP	ICP	ICP													IC	IC	IC		IC			IC			
1055	East shaft	110.2	110.2				PM		PM							ICP	ICP	ICP	ICP		ICP		ICP						ICP		ICP	IC	IC	IC	IC	IC			IC			
1056	East shaft	118.2	118.2				PM		PM							ICP	ICP	ICP	ICP		ICP		ICP						ICP		ICP	IC	IC	IC	IC	IC			IC			
1057	East shaft	130.2	130.2				PM		PM							ICP	ICP	ICP	ICP		ICP		ICP						ICP		ICP	IC	IC	IC	IC	IC			IC			
1058	East shaft	139.8	139.8				PM		PM							ICP	ICP	ICP	ICP		ICP		ICP						ICP		ICP	IC	IC	IC	IC	IC			IC			
Inflow from the shaft wall																																											
1059	WR-V-28.5	5.0	28.5		2006/11/27	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1060	WR-V-28.5	5.0	28.5		2007/1/9	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1061	WR-V-28.5	5.0	28.5		2007/2/8	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1062	WR-V-28.5	5.0	28.5		2007/3/16	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1063	WR-V-28.5	5.0	28.5		2007/5/25	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1064	WR-V-28.5	5.0	28.5		2007/7/3	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1065	WR-V-28.5	5.0	28.5		2007/7/13	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1066	WR-V-28.5	5.0	28.5		2007/9/17	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc

Table 2.3.5 Analytical methods of groundwater (32/39)

Index	Sample point	Sampling depth (GL) Min.	Sampling depth (GL) Max.	sampling zone No.	sampling date	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Gases N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	CO	H_2S	H_2	Isotope ^3H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (DIC)	^{14}C	^{36}Cl	$^{36}Cl/Cl$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$	Organics Humic acid	Fuluvic acid	Acetate	Formate
		[m]	[m]			[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mol/Kg]	[%]	[mol/Kg]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
Boreholes in the Gallery of the Horonobe URL																																																			
966	07-V140-M01	138.68	138.68		2008/2/8	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
967	07-V140-M01	138.68	138.68		2008/11/17	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
968	07-V140-M01	138.68	138.68		2008/12/19	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
969	07-V140-M01	138.68	138.68		2009/8/26					CS	CS		calc	calc	calc							GC		GC																										
970	07-V140-M01	138.68	138.68		2009/12/22	NT				CS	CS		calc	calc	calc																																			
971	07-V140-M01	138.68	138.68		2010/1/15	NT				CS	CS		calc	calc	calc																				MS	MS	MS			AMS	AMS									
972	07-V140-M01	138.68	138.68		2010/1/18	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
973	07-V140-M01	138.68	138.68		2010/2/16					CS	CS	ICP-MS	calc	calc	calc																																			
974	07-V140-M01	138.68	138.68		2010/7/27	NT		NT		CS	CS		calc	calc	calc																				LSC	MS	MS													
975	07-V140-M01	138.68	138.68		2010/10/27	NT		NT		CS	CS		calc	calc	calc																					MS	MS													
976	07-V140-M01	138.68	138.68		2010/11/19	NT		NT		CS	CS		calc	calc	calc																																			
977	07-V140-M01	138.68	138.68		2010/11/24	NT		NT		CS	CS		calc	calc	calc																																			
978	07-V140-M01	138.68	138.68		2010/12/22	NT		NT		CS	CS		calc	calc	calc																																			
979	07-V140-M01	138.68	138.68		2011/2/1	NT		NT		CS	CS		calc	calc	calc																					MS	MS													
980	07-V140-M03		138.67	1	2010/1/15	NT				CS	CS		calc	calc	calc							GC		GC												MS	MS	MS			AMS	AMS									
981	07-V140-M03			1	2010/10/28	NT		NT		CS	CS		calc	calc	calc																				LSC	MS	MS													
982	07-V140-M03			1	2010/11/25	NT		NT		CS	CS		calc	calc	calc																																			
983	07-V140-M03			2	2009/10/7																	GC		GC																										
984	08-E140-C01				2009/3/9	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
985	08-E140-C01				2009/3/13	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
986	08-E140-C01	157.55	167.86	5	2009/4/16	NT				CS	CS		calc	calc	calc																					MS	MS													
987	08-E140-C01	157.55	167.86	5	2009/8/4	NT				CS	CS		calc	calc	calc																				MS	MS	MS			AMS	AMS									
988	08-E140-C01	157.55	167.86	5	2009/9/17	NT				CS	CS		calc	calc	calc																				MS	MS	MS			AMS	AMS									
989	08-E140-C01	157.55	167.86	5	2011/2/4	NT		NT		CS	CS		calc	calc	calc																				LSC	MS	MS													
990	08-E140-C01	168.62	174.37	4	2009/4/16	NT				CS	CS		calc	calc	calc																					MS	MS													
991	08-E140-C01	168.62	174.37	4	2009/8/4	NT		NT		CS	CS		calc	calc	calc																				MS	MS	MS													
992	08-E140-C01	168.62	174.37	4	2009/9/17	NT				CS	CS		calc	calc	calc																				MS	MS	MS			AMS	AMS									
993	08-E140-C01	175.13	194.20	3	2009/3/17	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
994	08-E140-C01	175.13	194.20	3	2009/4/16	NT				CS	CS		calc	calc	calc																					MS	MS													
995	08-E140-C01	175.13	194.20	3	2009/8/4	NT				CS	CS		calc	calc	calc																				MS	MS	MS			AMS	AMS									
996	08-E140-C01	175.13	194.20	3	2009/9/17	NT				CS	CS		calc	calc	calc																				MS	MS	MS			AMS	AMS									
997	08-E140-C01	175.13	194.20	3	2011/2/16	NT		NT		CS	CS		calc	calc	calc																				LSC	MS	MS													
998	08-E140-C01	195.00	208.87	2	2009/3/17	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
999	08-E140-C01	195.00	208.87	2	2009/4/16	NT				CS	CS		calc	calc	calc																					MS	MS													
1000	08-E140-C01	195.00	208.87	2	2009/8/4	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
1001	08-E140-C01	195.00	208.87	2	2009/9/17	NT				CS	CS		calc	calc	calc																				MS	MS	MS			AMS	AMS									
1002	08-E140-C01	195.00	208.87	2	2011/2/16	NT		NT		CS	CS		calc	calc	calc																				LSC	MS	MS			AMS	AMS									
1003	08-E140-C01	209.69	218.70	1	2009/3/17	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
1004	08-E140-C01	209.69	218.70	1	2009/4/16	NT				CS	CS		calc	calc	calc																					MS	MS													
1005	08-E140-C01	209.69	218.70	1	2009/8/4	NT				CS	CS		calc	calc	calc																				MS	MS	MS			AMS	AMS									
1006	08-E140-C01	209.69	218.70	1	2009/9/17	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
1007	08-E140-C01	209.69	218.70	1	2011/1/31	NT		NT		CS	CS		calc	calc	calc																				LSC	MS	MS													
1008	08-E140-M01	139.13	218.70		2010/2/4	NT				CS	CS		calc	calc	calc																																			
1009	08-E140-M01	139.13	218.70		2010/10/29	NT		NT		CS	CS		calc	calc	calc																				LSC	MS	MS													
1010	08-E140-M01	139.18		1	2010/1/15	NT				CS	CS		calc	calc	calc																									AMS	AMS									
1011	08-E140-M02	139.18		1	2010/2/4	NT				CS	CS		calc	calc	calc																																			
1012	08-E140-M02	139.18		1	2010/7/20	NT		NT		CS	CS		calc	calc	calc																				LSC	MS	MS													
1013	08-E140-M02	139.18		1	2010/10/28	NT		NT		CS	CS		calc	calc	calc																					MS	MS													
1014	08-E140-M02	139.18		1	2011/2/15	NT		NT		CS	CS		calc	calc	calc																					MS	MS													
1015	08-E140-M02	139.18		2	2010/1/15	NT		NT		CS	CS		calc	calc	calc																																			
1016	08-E140-M02	139.18		2	2011/2/15	NT		NT		CS	CS		calc	calc	calc																				LSC	MS	MS													
1017	09-V250-M01	249.15			2009/12/15	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
1018	09-V250-M01	249.15			2010/1/18	NT				CS	CS		calc	calc	calc																				MS	MS	MS			AMS	AMS									
1019	09-V250-M01	249.15			2010/6/7	NT				CS	CS		calc	calc	calc																				LSC	MS	MS													
1020	09-V250-M01	249.15			2010/10/13	NT		NT		CS	CS		calc	calc	calc																				LSC	MS	MS													
1021	09-V250-M01	249.15			2011/1/20	NT		NT		CS	CS		calc	calc	calc																				LSC	MS	MS													
1022	09-V250-M02	249.15			2009/11/17	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
1023	09-V250-M02	249.15			2010/1/18	NT				CS	CS		calc	calc	calc																				MS	MS	MS			AMS	AMS									
1024	09-V250-M02	249.15			2010/6/7	NT				CS	CS		calc	calc	calc																				LSC	MS	MS													
1025	09-V250-M02	249.15			2010/10/13	NT				CS	CS		calc	calc	calc																				LSC	MS	MS													
1026	09-V250-M02	249.15			2011/1/20	NT		NT		CS	CS		calc	calc	calc																				LSC	MS	MS													
1027	09-V250-M02	249.15		1	2011/2/15	NT				CS	CS		calc	calc	calc																				LSC	MS	MS													
1028	09-V250-M02	249.15		2	2011/2/15	NT		NT		CS	CS		calc	calc	calc																				LSC	MS	MS													
1029	09-V250-M03	250.15	270.15		2009/12/15	NT				CS	CS		calc	calc	calc																				MS	MS	MS													
1030	09-V250-M03	250.15	270.15		2010/1/18	NT				CS	CS		calc	calc	calc																				MS	MS	MS			AMS	AMS									
1031	09-V250-M03	250.15	270.15		2010/6/7	NT				CS	CS		calc	calc	calc																				LSC	MS	MS													
1032	09-V250-M03	250.15	270.15		2010/10/14	NT				CS	CS		calc	calc	calc																				LSC	MS	MS													
1033	09-V250-M03	250.15	270.15		2011/1/20	NT		NT		CS	CS		calc	calc	calc																				LSC	MS	MS													
Sedimentary rocks from the shaft wall																																																			
1034	East shaft	5.1	5.1				NT																													MS	MS													
1035	East shaft	5.5	5.5				NT																													MS	MS													
1036	East shaft	6.5	6.5				NT																													MS	MS													
1037	East shaft	7.6	7.6																																																
1038	East shaft	9.5	9.5				NT																													MS	MS													
1039	East shaft	11.6	11.6				NT																													MS	MS													
1040	East shaft	13.6	13.6																																																
1041	East shaft	15.6	15.6																																																
1042	East shaft	17.6	17.6				NT																													MS	MS													
1043	East shaft	19.6	19.6				NT																													MS	MS													
1044	East shaft	24.1	24.1				NT																													MS	MS													
1045	East shaft	29.0	29.0																																																
1046	East shaft	33.0	33.0				NT																													MS	MS													
1047	East shaft	37.1	37.1																																																
1048	East shaft	40.1	40.1				NT																													MS	MS													
1049	East shaft	52.7	52.7				NT																													MS	MS													
1050	East shaft	60.0	60.0				NT																													MS	MS													
1051	East shaft	69.8	69.8				NT																													MS	MS													
1052	East shaft	80.1	80.1				NT																													MS	MS													
1053	East shaft	90.1	90.1				NT																													MS	MS													
1054	East shaft	100.2	100.2				NT																													MS	MS													
1055	East shaft	110.2	110.2				NT																													MS	MS													
1056	East shaft	118.2	118.2				NT																													MS	MS													
1057	East shaft	130.2	130.2				NT																													MS	MS													
1058	East shaft	139.8	139.8				NT																													MS	MS													
Inflow from the shaft wall																																																			
1059	WR-V-28.5	5.0	28.5		2006/11/27	NT				CS	CS		calc	calc	calc																																			
1060	WR-V-28.5	5.0	28.5		2007/1/9	NT				CS	CS		calc	calc	calc																																			
1061	WR-V-28.5	5.0	28.5		2007/2/8	NT				CS	CS		calc	calc	calc																																			
1062	WR-V-28.5	5.0	28.5		2007/3/16	NT				CS	CS		calc	calc	calc																																			
1063	WR-V-28.5	5.0	28.5		2007/5/25	NT				CS	CS		calc	calc	calc																																			
1064	WR-V-28.5	5.0	28.5		2007/7/3	NT				CS	CS		calc	calc	calc																																			
1065	WR-V-28.5	5.0	28.5		2007/7/13	NT				CS	CS		calc	calc	calc																																			
1066	WR-V-28.5	5.0	28.5		2007/9/17	NT				CS	CS		calc	calc	calc																																			

Table 2.3.5 Analytical methods of groundwater (33/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Microbiology																					
		Min.	Max.			Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]			[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
Boreholes in the Gallery of the Horonobe URL																											
966	07-V140-M01	138.68	138.68		2008/2/8																						
967	07-V140-M01	138.68	138.68		2008/11/17																						
968	07-V140-M01	138.68	138.68		2008/12/19																						
969	07-V140-M01	138.68	138.68		2009/8/26																						
970	07-V140-M01	138.68	138.68		2009/12/22																						
971	07-V140-M01	138.68	138.68		2010/1/15																						
972	07-V140-M01	138.68	138.68		2010/1/18																						
973	07-V140-M01	138.68	138.68		2010/2/16																						
974	07-V140-M01	138.68	138.68		2010/7/27																						
975	07-V140-M01	138.68	138.68		2010/10/27																						
976	07-V140-M01	138.68	138.68		2010/11/19																						
977	07-V140-M01	138.68	138.68		2010/11/24																						
978	07-V140-M01	138.68	138.68		2010/12/22																						
979	07-V140-M01	138.68	138.68		2011/2/1																						
980	07-V140-M03		138.67	1	2010/1/15																						
981	07-V140-M03			1	2010/10/28																						
982	07-V140-M03			1	2010/11/25																						
983	07-V140-M03			2	2009/10/7																						
984	08-E140-C01				2009/3/9																						
985	08-E140-C01				2009/3/13																						
986	08-E140-C01	157.55	167.86	5	2009/4/16																						
987	08-E140-C01	157.55	167.86	5	2009/8/4																						
988	08-E140-C01	157.55	167.86	5	2009/9/17																						
989	08-E140-C01	157.55	167.86	5	2011/2/4	DC																					
990	08-E140-C01	168.62	174.37	4	2009/4/16																						
991	08-E140-C01	168.62	174.37	4	2009/8/4																						
992	08-E140-C01	168.62	174.37	4	2009/9/17																						
993	08-E140-C01	175.13	194.20	3	2009/3/17																						
994	08-E140-C01	175.13	194.20	3	2009/4/16																						
995	08-E140-C01	175.13	194.20	3	2009/8/4																						
996	08-E140-C01	175.13	194.20	3	2009/9/17																						
997	08-E140-C01	175.13	194.20	3	2011/2/16	DC																					
998	08-E140-C01	195.00	208.87	2	2009/3/17																						
999	08-E140-C01	195.00	208.87	2	2009/4/16																						
1000	08-E140-C01	195.00	208.87	2	2009/8/4																						
1001	08-E140-C01	195.00	208.87	2	2009/9/17																						
1002	08-E140-C01	195.00	208.87	2	2011/2/16																						
1003	08-E140-C01	209.69	218.70	1	2009/3/17																						
1004	08-E140-C01	209.69	218.70	1	2009/4/16																						
1005	08-E140-C01	209.69	218.70	1	2009/8/4																						
1006	08-E140-C01	209.69	218.70	1	2009/9/17																						
1007	08-E140-C01	209.69	218.70	1	2011/1/31	DC																					
1008	08-E140-M01	139.13	218.70		2010/2/4																						
1009	08-E140-M01	139.13	218.70		2010/10/29																						
1010	08-E140-M01	139.18		1	2010/1/15																						
1011	08-E140-M02	139.18		1	2010/2/4																						
1012	08-E140-M02	139.18		1	2010/7/20																						
1013	08-E140-M02	139.18		1	2010/10/28																						
1014	08-E140-M02	139.18		1	2011/2/15	DC																					
1015	08-E140-M02	139.18		2	2010/1/15																						
1016	08-E140-M02	139.18		2	2011/2/15																						
1017	09-V250-M01	249.15			2009/12/15																						
1018	09-V250-M01	249.15			2010/1/18																						
1019	09-V250-M01	249.15			2010/6/7																						
1020	09-V250-M01	249.15			2010/10/13																						
1021	09-V250-M01	249.15			2011/1/20																						
1022	09-V250-M02	249.15			2009/11/17																						
1023	09-V250-M02	249.15			2010/1/18																						
1024	09-V250-M02	249.15			2010/6/7																						
1025	09-V250-M02	249.15			2010/10/13																						
1026	09-V250-M02	249.15			2011/1/20																						
1027	09-V250-M02	249.15		1	2011/2/15																						
1028	09-V250-M02	249.15		2	2011/2/15																						
1029	09-V250-M03	250.15	270.15		2009/12/15																						
1030	09-V250-M03	250.15	270.15		2010/1/18																						
1031	09-V250-M03	250.15	270.15		2010/6/7																						
1032	09-V250-M03	250.15	270.15		2010/10/14																						
1033	09-V250-M03	250.15	270.15		2011/1/20																						
Sedimentary rocks from the shaft wall																											
1034	East shaft	5.1	5.1																								
1035	East shaft	5.5	5.5																								
1036	East shaft	6.5	6.5																								
1037	East shaft	7.6	7.6																								
1038	East shaft	9.5	9.5																								
1039	East shaft	11.6	11.6																								
1040	East shaft	13.6	13.6																								
1041	East shaft	15.6	15.6																								
1042	East shaft	17.6	17.6																								
1043	East shaft	19.6	19.6																								
1044	East shaft	24.1	24.1																								
1045	East shaft	29.0	29.0																								
1046	East shaft	33.0	33.0																								
1047	East shaft	37.1	37.1																								
1048	East shaft	40.1	40.1																								
1049	East shaft	52.7	52.7																								
1050	East shaft	60.0	60.0																								
1051	East shaft	69.8	69.8																								
1052	East shaft	80.1	80.1																								
1053	East shaft	90.1	90.1																								
1054	East shaft	100.2	100.2																								
1055	East shaft	110.2	110.2																								
1056	East shaft	118.2	118.2																								
1057	East shaft	130.2	130.2																								
1058	East shaft	139.8	139.8																								
Inflow from the shaft wall																											
1059	WR-V-28.5	5.0	28.5		2006/11/27																						
1060	WR-V-28.5	5.0	28.5		2007/1/9																						
1061	WR-V-28.5	5.0	28.5		2007/2/8																						
1062	WR-V-28.5	5.0	28.5		2007/3/16																						
1063	WR-V-28.5	5.0	28.5		2007/5/25																						
1064	WR-V-28.5	5.0	28.5		2007/7/3																						
1065	WR-V-28.5	5.0	28.5		2007/7/13																						
1066	WR-V-28.5	5.0	28.5		2007/9/17																						

Table 2.3.5 Analytical methods of groundwater (34/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Physico-chemical parameter							Contamination indicator			Geochemistry																														
		Min.	Max.			EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temperature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}
		[m]	[m]			[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]		[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
1067	WR-V-28.5	5.0	28.5		2007/11/12	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1068	WR-V-28.5	5.0	28.5		2007/12/14	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1069	WR-V-28.5	5.0	28.5		2008/1/10	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1070	WR-V-28.5	5.0	28.5		2008/6/11	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1071	WR-V-28.5	5.0	28.5		2008/9/12	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1072	WR-V-28.5	5.0	28.5		2008/11/11	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1073	WR-V-28.5	5.0	28.5		2009/3/10	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1074	WR-V-28.5	5.0	28.5		2010/10/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1075	WR-V-28.5	5.0	28.5		2010/11/24	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1076	WR-V-28.5	5.0	28.5		2010/12/22	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		A	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1077	WR-V-63.8	28.5	63.8		2007/9/17	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1078	WR-V-63.8	28.5	63.8		2007/11/12	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1079	WR-V-63.8	28.5	63.8		2007/11/23	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1080	WR-V-63.8	28.5	63.8		2007/12/4	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1081	WR-V-63.8	28.5	63.8		2007/12/14	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1082	WR-V-63.8	28.5	63.8		2007/12/20	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1083	WR-V-63.8	28.5	63.8		2008/1/10	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1084	WR-V-63.8	28.5	63.8		2008/2/7	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1085	WR-V-63.8	28.5	63.8		2010/10/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1086	WR-V-63.8	28.5	63.8		2010/11/24	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1087	WR-V-63.8	28.5	63.8		2010/12/22	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1088	WR-V-98.0	63.8	98.0		2007/11/8		PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1089	WR-V-98.0	63.8	98.0		2007/11/23		PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1090	WR-V-98.0	63.8	98.0		2007/11/27	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1091	WR-V-98.0	63.8	98.0		2007/12/4		PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1092	WR-V-98.0	63.8	98.0		2007/12/14		PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1093	WR-V-98.0	63.8	98.0		2007/12/20		PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1094	WR-V-98.0	63.8	98.0		2008/1/10		PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1095	WR-V-98.0	63.8	98.0		2008/2/7		PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1096	WR-V-98.0	63.8	98.0		2009/7/27	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1097	WR-V-98.0	63.8	98.0		2009/11/25	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1098	WR-V-98.0	63.8	98.0		2010/1/18	PM	PM	PM	PM			PM	HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1099	WR-V-98.0	63.8	98.0		2010/7/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1100	WR-V-98.0	63.8	98.0		2010/11/24	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1101	WR-V-98.0	63.8	98.0		2010/12/22	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1102	WR-V-98.0	63.8	98.0		2011/2/1	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1103	WR-V-132.0	98.0	133.8		2008/6/17	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC			IC	A	calc	calc
1104	WR-V-132.0	98.0	133.8		2008/11/11	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC			IC	A	calc	calc
1105	WR-V-132.0	98.0	133.8		2009/7/27	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC			IC	A	calc	calc
1106	WR-V-132.0	98.0	133.8		2009/11/25	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC			IC	A	calc	calc
1107	WR-V-132.0	98.0	133.8		2010/1/18	PM	PM	PM	PM			PM	HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC			IC	A	calc	calc
1108	WR-V-132.0	98.0	133.8		2010/2/16	PM	PM	PM	PM			PM				ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC			IC			
1109	WR-V-132.0	98.0	133.8		2010/7/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1110	WR-V-132.0	98.0	133.8		2010/10/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1111	WR-V-132.0	98.0	133.8		2010/11/24	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1112	WR-V-132.0	98.0	133.8		2010/12/22	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1113	WR-V-132.0	98.0	133.8		2011/2/1	PM	PM	PM	PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1114	WR-V-168.0	133.8	168.0		2008/6/17	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1115	WR-V-168.0	133.8	168.0		2008/11/11	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1116	WR-V-168.0	133.8	168.0		2009/7/27	PM	PM	PM	PM			PM				FP	FP	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1117	WR-V-168.0	133.8	168.0		2009/11/25	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1118	WR-V-168.0	133.8	168.0		2010/1/18	PM		PM				PM	HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1119	WR-V-168.0	133.8	168.0		2010/2/16	PM		PM				PM				ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC			IC			
1120	WR-V-168.0	133.8	168.0		2010/7/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		A	IC	A	calc	calc
1121	WR-V-168.0	133.8	168.0		2010/10/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		A	IC	A	calc	calc
1122	WR-V-168.0	133.8	168.0		2010/11/24	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		A	IC	A	calc	calc
1123	WR-V-168.0	133.8	168.0		2010/12/22	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		A	IC	A	calc	calc
1124	WR-V-168.0	133.8	168.0		2011/2/1	PM	PM	PM	PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		A	IC	A	calc	calc
1125	WR-V-202.0	168.0	202.0		2008/9/12		PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1126	WR-V-202.0	168.0	202.0		2008/11/11	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1127	WR-V-202.0	168.0	202.0		2009/7/27	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1128	WR-V-202.0	168.0	202.0		2009/11/25	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1129	WR-V-202.0	168.0	202.0		2010/1/18	PM	PM	PM	PM			PM	HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1130	WR-V-202.0	168.0	202.0		2010/2/16	PM		PM				PM				ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC	IC		IC			
1131	WR-V-202.0	168.0	202.0		2010/10/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1132	WR-V-202.0	168.0	202.0		2010/11/24	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1133	WR-V-202.0	168.0	202.0		2010/12/22	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1134	WR-V-202.0	168.0	202.0		2011/2/1	PM	PM	PM	PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1135	V210-IGSW		210.0		2008/9/2		PM		PM							FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1136	V210-IGSW		210.0		2009/12/22	PM	PM	PM	PM			PM	HPLC	HPLC		FP	FP	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1137	V210-IGSW		210.0		2010/1/18	PM	PM	PM	PM			PM	HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1138	V210-IGSW		210.0		2010/2/16											ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC			IC			
1139	V210-IGSW		210.0		2010/10/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1140	V210-IGSW		210.0		2010/11/24	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1141	V210-IGSW		210.0		2010/12/22	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1142	V210-IGSW		210.0		2011/2/1	PM	PM	PM	PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1143	WR-V-242.0	133.8	168.0		2008/11/11	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1144	WR-V-242.0	133.8	168.0		2009/1/13	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1145	WR-V-242.0	133.8	168.0		2009/7/27	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1146	V250-WCP		250.0		2009/8/26		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1147	V250-WCP		250.0		2009/10/26		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1148	V250-WCP		250.0		2009/11/25		PM		PM							IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1149	V250-WCP		250.0		2009/12/22		PM		PM							IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1150	V250-WCP		250.0		2010/1/18		PM		PM							IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1151	V250-WCP		250.0		2010/2/16											ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC	IC		IC			
1152	V250-WCP		250.0		2010/7/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1153	V250-WCP		250.0		2010/10/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1154	V250-WCP		250.0		2010/11/24	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1155	V250-WCP		250.0		2010/12/22	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1156	V250-IGSW		248.0		2010/1/18		PM		PM				HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1157	WR-E-27.0	5.0	27.0		2007/1/9	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1158	WR-E-27.0	5.0	27.0		2007/2/8	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1159	WR-E-27.0	5.0	27.0		2007/3/16	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1160	WR-E-27.0	5.0	27.0		2007/5/26	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1161	WR-E-27.0	5.0	27.0		2007/6/18	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1162	WR-E-27.0	5.0	27.0		2007/9/13	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1163	WR-E-27.0	5.0	27.0		2007/11/23	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1164	WR-E-27.0	5.0	27.0		2007/12/11	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1165	WR-E-27.0	5.0	27.0		2008/1/10	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1166	WR-E-27.0	5.0	27.0		2008/6/10	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1167	WR-E-27.0	5.0	27.0		2009/4/27	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1168	WR-E-27.0	5.0	27.0		2010/7/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1169	WR-E-27.0	5.0	27.0		2010/10/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc

Table 2.3.5 Analytical methods of groundwater (35/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date												Gases																				Isotope											Organics			
		Min.	Max.			M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	CO	H_2S	H_2	^3H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (DIC)	^{14}C	^{36}Cl	$^{36}Cl/Cl$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$	Humic acid	Fuluvic acid	Acetate	Formate
		[m]	[m]			[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mol/Kg]	[%]	[mol/Kg]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
1067	WR-V-28.5	5.0	28.5		2007/11/12	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1068	WR-V-28.5	5.0	28.5		2007/12/14	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1069	WR-V-28.5	5.0	28.5		2008/1/10	NT				CS	CS		calc	calc	calc																																				
1070	WR-V-28.5	5.0	28.5		2008/6/11	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1071	WR-V-28.5	5.0	28.5		2008/9/12	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1072	WR-V-28.5	5.0	28.5		2008/11/11	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1073	WR-V-28.5	5.0	28.5		2009/3/10	NT				CS	CS		calc	calc	calc																																				
1074	WR-V-28.5	5.0	28.5		2010/10/27	NT				CS	CS		calc	calc	calc																					LSC	MS	MS												
1075	WR-V-28.5	5.0	28.5		2010/11/24	NT				CS	CS		calc	calc	calc																																				
1076	WR-V-28.5	5.0	28.5		2010/12/22	NT				CS	CS		calc	calc	calc																																				
1077	WR-V-63.8	28.5	63.8		2007/9/17	NT				CS	CS		calc	calc	calc																																				
1078	WR-V-63.8	28.5	63.8		2007/11/12	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1079	WR-V-63.8	28.5	63.8		2007/11/23	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1080	WR-V-63.8	28.5	63.8		2007/12/4	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1081	WR-V-63.8	28.5	63.8		2007/12/14	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1082	WR-V-63.8	28.5	63.8		2007/12/20	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1083	WR-V-63.8	28.5	63.8		2008/1/10	NT				CS	CS		calc	calc	calc																																				
1084	WR-V-63.8	28.5	63.8		2008/2/7	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1085	WR-V-63.8	28.5	63.8		2010/10/27	NT				CS	CS		calc	calc	calc																					LSC	MS	MS												
1086	WR-V-63.8	28.5	63.8		2010/11/24	NT				CS	CS		calc	calc	calc																																				
1087	WR-V-63.8	28.5	63.8		2010/12/22	NT				CS	CS		calc	calc	calc																																				
1088	WR-V-98.0	63.8	98.0		2007/11/8	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1089	WR-V-98.0	63.8	98.0		2007/11/23	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1090	WR-V-98.0	63.8	98.0		2007/11/27	NT				CS	CS		calc	calc	calc																																				
1091	WR-V-98.0	63.8	98.0		2007/12/4	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1092	WR-V-98.0	63.8	98.0		2007/12/14	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1093	WR-V-98.0	63.8	98.0		2007/12/20	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1094	WR-V-98.0	63.8	98.0		2008/1/10	NT				CS	CS		calc	calc	calc																																				
1095	WR-V-98.0	63.8	98.0		2008/2/7	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1096	WR-V-98.0	63.8	98.0		2009/7/27	NT		NT		CS	CS		calc	calc	calc																																				
1097	WR-V-98.0	63.8	98.0		2009/11/25	NT				CS	CS		calc	calc	calc																																				
1098	WR-V-98.0	63.8	98.0		2010/1/18	NT		NT		CS	CS		calc	calc	calc																					MS	MS	MS												
1099	WR-V-98.0	63.8	98.0		2010/7/27	NT				CS	CS		calc	calc	calc																					LSC	MS	MS												
1100	WR-V-98.0	63.8	98.0		2010/11/24	NT				CS	CS		calc	calc	calc																																				
1101	WR-V-98.0	63.8	98.0		2010/12/22	NT				CS	CS		calc	calc	calc																																				
1102	WR-V-98.0	63.8	98.0		2011/2/1	NT				CS	CS		calc	calc	calc																						MS	MS													
1103	WR-V-132.0	98.0	133.8		2008/6/17	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1104	WR-V-132.0	98.0	133.8		2008/11/11	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1105	WR-V-132.0	98.0	133.8		2009/7/27	NT				CS	CS		calc	calc	calc																																				
1106	WR-V-132.0	98.0	133.8		2009/11/25	NT				CS	CS		calc	calc	calc																																				
1107	WR-V-132.0	98.0	133.8		2010/1/18	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1108	WR-V-132.0	98.0	133.8		2010/2/16					CS	CS	ICP-MS	calc	calc	calc																																				
1109	WR-V-132.0	98.0	133.8		2010/7/27	NT				CS	CS		calc	calc	calc																					LSC	MS	MS												
1110	WR-V-132.0	98.0	133.8		2010/10/27	NT				CS	CS		calc	calc	calc																						MS	MS													
1111	WR-V-132.0	98.0	133.8		2010/11/24	NT				CS	CS		calc	calc	calc																																				
1112	WR-V-132.0	98.0	133.8		2010/12/22	NT				CS	CS		calc	calc	calc																						MS	MS													
1113	WR-V-132.0	98.0	133.8		2011/2/1	NT				CS	CS		calc	calc	calc																					LSC	MS	MS												
1114	WR-V-168.0	133.8	168.0		2008/6/17	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1115	WR-V-168.0	133.8	168.0		2008/11/11	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1116	WR-V-168.0	133.8	168.0		2009/7/27	NT		NT		CS	CS		calc	calc	calc																																				
1117	WR-V-168.0	133.8	168.0		2009/11/25	NT				CS	CS		calc	calc	calc																																				
1118	WR-V-168.0	133.8	168.0		2010/1/18	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1119	WR-V-168.0	133.8	168.0		2010/2/16					CS	CS	ICP-MS	calc	calc	calc																																				
1120	WR-V-168.0	133.8	168.0		2010/7/27	NT				CS	CS		calc	calc	calc																					LSC	MS	MS												
1121	WR-V-168.0	133.8	168.0		2010/10/27	NT				CS	CS		calc	calc	calc																						MS	MS													
1122	WR-V-168.0	133.8	168.0		2010/11/24	NT				CS	CS		calc	calc	calc																																				
1123	WR-V-168.0	133.8	168.0		2010/12/22	NT				CS	CS		calc	calc	calc																						MS	MS													
1124	WR-V-168.0	133.8	168.0		2011/2/1	NT				CS	CS		calc	calc	calc																						MS	MS													
1125	WR-V-202.0	168.0	202.0		2008/9/12	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1126	WR-V-202.0	168.0	202.0		2008/11/11	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1127	WR-V-202.0	168.0	202.0		2009/7/27	NT		NT		CS	CS		calc	calc	calc																																				
1128	WR-V-202.0	168.0	202.0		2009/11/25	NT		NT		CS	CS		calc	calc	calc																																				
1129	WR-V-202.0	168.0	202.0		2010/1/18	NT		NT		CS	CS		calc	calc	calc																					MS	MS	MS												
1130	WR-V-202.0	168.0	202.0		2010/2/16					CS	CS	ICP-MS	calc	calc	calc																																				
1131	WR-V-202.0	168.0	202.0		2010/10/27	NT				CS	CS		calc	calc	calc																					LSC	MS	MS												
1132	WR-V-202.0	168.0	202.0		2010/11/24	NT				CS	CS		calc	calc	calc																																				
1133	WR-V-202.0	168.0	202.0		2010/12/22	NT				CS	CS		calc	calc	calc																						MS	MS													
1134	WR-V-202.0	168.0	202.0		2011/2/1	NT				CS	CS		calc	calc	calc																						MS	MS													
1135	V210-IGSW		210.0		2008/9/2	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1136	V210-IGSW		210.0		2009/12/22	NT		NT		CS	CS		calc	calc	calc																																				
1137	V210-IGSW		210.0		2010/1/18	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1138	V210-IGSW		210.0		2010/2/16					CS	CS	ICP-MS	calc	calc	calc																																				
1139	V210-IGSW		210.0		2010/10/27	NT				CS	CS		calc	calc	calc																					LSC	MS	MS												
1140	V210-IGSW		210.0		2010/11/24	NT				CS	CS		calc	calc	calc																																				
1141	V210-IGSW		210.0		2010/12/22	NT				CS	CS		calc	calc	calc																																				
1142	V210-IGSW		210.0		2011/2/1	NT				CS	CS		calc	calc	calc																						MS	MS													
1143	WR-V-242.0	133.8	168.0		2008/11/11	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1144	WR-V-242.0	133.8	168.0		2009/1/13	NT		NT		CS	CS		calc	calc	calc																					MS	MS	MS												
1145	WR-V-242.0	133.8	168.0		2009/7/27	NT				CS	CS		calc	calc	calc																																				
1146	V250-WCP		250.0		2009/8/26	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1147	V250-WCP		250.0		2009/10/26	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1148	V250-WCP		250.0		2009/11/25	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1149	V250-WCP		250.0		2009/12/22	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1150	V250-WCP		250.0		2010/1/18	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1151	V250-WCP		250.0		2010/2/16					CS	CS	ICP-MS	calc	calc	calc																																				
1152	V250-WCP		250.0		2010/7/27	NT				CS	CS		calc	calc	calc																					LSC	MS	MS												
1153	V250-WCP		250.0		2010/10/27	NT				CS	CS		calc	calc	calc																						MS	MS													
1154	V250-WCP		250.0		2010/11/24	NT				CS	CS		calc	calc	calc																																				
1155	V250-WCP		250.0		2010/12/22	NT				CS	CS		calc	calc	calc																																				
1156	V250-IGSW		248.0		2010/1/18	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1157	WR-E-27.0	5.0	27.0		2007/1/9	NT				CS	CS		calc	calc	calc																																				
1158	WR-E-27.0	5.0	27.0		2007/2/8	NT				CS	CS		calc	calc	calc																																				
1159	WR-E-27.0	5.0	27.0		2007/3/16	NT				CS	CS		calc	calc	calc																																				
1160	WR-E-27.0	5.0	27.0		2007/5/26	NT				CS	CS		calc	calc	calc																																				
1161	WR-E-27.0	5.0	27.0		2007/6/18	NT				CS	CS		calc	calc	calc																																				
1162	WR-E-27.0	5.0	27.0		2007/9/13	NT				CS	CS		calc	calc	calc																																				
1163	WR-E-27.0	5.0	27.0		2007/11/23	NT				CS	CS		calc	calc	calc																																				
1164	WR-E-27.0	5.0	27.0		2007/12/11	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1165	WR-E-27.0	5.0	27.0		2008/1/10	NT				CS	CS		calc	calc	calc																																				
1166	WR-E-27.0	5.0	27.0		2008/6/10	NT				CS	CS		calc	calc	calc																					MS	MS	MS												
1167	WR-E-27.0	5.0	27.0		2009/4/27	NT				CS	CS		calc	calc	calc																																				
1168	WR-E-27.0	5.0	27.0		2010/7/27	NT				CS	CS		calc	calc	calc																					LSC	MS	MS												
1169	WR-E-27.0	5.0	27.0		2010/10/27	NT				CS	CS		calc	calc	calc																						MS	MS													

Table 2.3.5 Analytical methods of groundwater (36/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Microbiology																					
		Min.	Max.			Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]			[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
1067	WR-V-28.5	5.0	28.5		2007/11/12																						
1068	WR-V-28.5	5.0	28.5		2007/12/14																						
1069	WR-V-28.5	5.0	28.5		2008/1/10																						
1070	WR-V-28.5	5.0	28.5		2008/6/11																						
1071	WR-V-28.5	5.0	28.5		2008/9/12																						
1072	WR-V-28.5	5.0	28.5		2008/11/11																						
1073	WR-V-28.5	5.0	28.5		2009/3/10																						
1074	WR-V-28.5	5.0	28.5		2010/10/27																						
1075	WR-V-28.5	5.0	28.5		2010/11/24																						
1076	WR-V-28.5	5.0	28.5		2010/12/22																						
1077	WR-V-63.8	28.5	63.8		2007/9/17																						
1078	WR-V-63.8	28.5	63.8		2007/11/12																						
1079	WR-V-63.8	28.5	63.8		2007/11/23																						
1080	WR-V-63.8	28.5	63.8		2007/12/4																						
1081	WR-V-63.8	28.5	63.8		2007/12/14																						
1082	WR-V-63.8	28.5	63.8		2007/12/20																						
1083	WR-V-63.8	28.5	63.8		2008/1/10																						
1084	WR-V-63.8	28.5	63.8		2008/2/7																						
1085	WR-V-63.8	28.5	63.8		2010/10/27																						
1086	WR-V-63.8	28.5	63.8		2010/11/24																						
1087	WR-V-63.8	28.5	63.8		2010/12/22																						
1088	WR-V-98.0	63.8	98.0		2007/11/8																						
1089	WR-V-98.0	63.8	98.0		2007/11/23																						
1090	WR-V-98.0	63.8	98.0		2007/11/27																						
1091	WR-V-98.0	63.8	98.0		2007/12/4																						
1092	WR-V-98.0	63.8	98.0		2007/12/14																						
1093	WR-V-98.0	63.8	98.0		2007/12/20																						
1094	WR-V-98.0	63.8	98.0		2008/1/10																						
1095	WR-V-98.0	63.8	98.0		2008/2/7																						
1096	WR-V-98.0	63.8	98.0		2009/7/27																						
1097	WR-V-98.0	63.8	98.0		2009/11/25																						
1098	WR-V-98.0	63.8	98.0		2010/1/18																						
1099	WR-V-98.0	63.8	98.0		2010/7/27																						
1100	WR-V-98.0	63.8	98.0		2010/11/24																						
1101	WR-V-98.0	63.8	98.0		2010/12/22																						
1102	WR-V-98.0	63.8	98.0		2011/2/1																						
1103	WR-V-132.0	98.0	133.8		2008/6/17																						
1104	WR-V-132.0	98.0	133.8		2008/11/11																						
1105	WR-V-132.0	98.0	133.8		2009/7/27																						
1106	WR-V-132.0	98.0	133.8		2009/11/25																						
1107	WR-V-132.0	98.0	133.8		2010/1/18																						
1108	WR-V-132.0	98.0	133.8		2010/2/16																						
1109	WR-V-132.0	98.0	133.8		2010/7/27																						
1110	WR-V-132.0	98.0	133.8		2010/10/27																						
1111	WR-V-132.0	98.0	133.8		2010/11/24																						
1112	WR-V-132.0	98.0	133.8		2010/12/22																						
1113	WR-V-132.0	98.0	133.8		2011/2/1																						
1114	WR-V-168.0	133.8	168.0		2008/6/17																						
1115	WR-V-168.0	133.8	168.0		2008/11/11																						
1116	WR-V-168.0	133.8	168.0		2009/7/27																						
1117	WR-V-168.0	133.8	168.0		2009/11/25																						
1118	WR-V-168.0	133.8	168.0		2010/1/18																						
1119	WR-V-168.0	133.8	168.0		2010/2/16																						
1120	WR-V-168.0	133.8	168.0		2010/7/27																						
1121	WR-V-168.0	133.8	168.0		2010/10/27																						
1122	WR-V-168.0	133.8	168.0		2010/11/24																						
1123	WR-V-168.0	133.8	168.0		2010/12/22																						
1124	WR-V-168.0	133.8	168.0		2011/2/1																						
1125	WR-V-202.0	168.0	202.0		2008/9/12																						
1126	WR-V-202.0	168.0	202.0		2008/11/11																						
1127	WR-V-202.0	168.0	202.0		2009/7/27																						
1128	WR-V-202.0	168.0	202.0		2009/11/25																						
1129	WR-V-202.0	168.0	202.0		2010/1/18																						
1130	WR-V-202.0	168.0	202.0		2010/2/16																						
1131	WR-V-202.0	168.0	202.0		2010/10/27																						
1132	WR-V-202.0	168.0	202.0		2010/11/24																						
1133	WR-V-202.0	168.0	202.0		2010/12/22																						
1134	WR-V-202.0	168.0	202.0		2011/2/1																						
1135	V210-IGSW		210.0		2008/9/2																						
1136	V210-IGSW		210.0		2009/12/22																						
1137	V210-IGSW		210.0		2010/1/18																						
1138	V210-IGSW		210.0		2010/2/16																						
1139	V210-IGSW		210.0		2010/10/27																						
1140	V210-IGSW		210.0		2010/11/24																						
1141	V210-IGSW		210.0		2010/12/22																						
1142	V210-IGSW		210.0		2011/2/1																						
1143	WR-V-242.0	133.8	168.0		2008/11/11																						
1144	WR-V-242.0	133.8	168.0		2009/1/13																						
1145	WR-V-242.0	133.8	168.0		2009/7/27																						
1146	V250-WCP		250.0		2009/8/26																						
1147	V250-WCP		250.0		2009/10/26																						
1148	V250-WCP		250.0		2009/11/25																						
1149	V250-WCP		250.0		2009/12/22																						
1150	V250-WCP		250.0		2010/1/18																						
1151	V250-WCP		250.0		2010/2/16																						
1152	V250-WCP		250.0		2010/7/27																						
1153	V250-WCP		250.0		2010/10/27																						
1154	V250-WCP		250.0		2010/11/24																						
1155	V250-WCP		250.0		2010/12/22																						
1156	V250-IGSW		248.0		2010/1/18																						
1157	WR-E-27.0	5.0	27.0		2007/1/9																						
1158	WR-E-27.0	5.0	27.0		2007/2/8																						
1159	WR-E-27.0	5.0	27.0		2007/3/16																						
1160	WR-E-27.0	5.0	27.0		2007/5/26																						
1161	WR-E-27.0	5.0	27.0		2007/6/18																						
1162	WR-E-27.0	5.0	27.0		2007/9/13																						
1163	WR-E-27.0	5.0	27.0		2007/11/23																						
1164	WR-E-27.0	5.0	27.0		2007/12/11																						
1165	WR-E-27.0	5.0	27.0		2008/1/10																						
1166	WR-E-27.0	5.0	27.0		2008/6/10																						
1167	WR-E-27.0	5.0	27.0		2009/4/27																						
1168	WR-E-27.0	5.0	27.0		2010/7/27																						
1169	WR-E-27.0	5.0	27.0		2010/10/27																						

Table 2.3.5 Analytical methods of groundwater (37/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Physico-chemical parameter							Contamination indicator			Geochemistry																												
		Min.	Max.			EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temperature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}
		[m]	[m]			[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]		[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
1170	WR-E-27.0	5.0	27.0		2010/11/24	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1171	WR-E-27.0	5.0	27.0		2010/12/22	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1172	WR-E-63.8	27.0	63.9		2007/11/23	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1173	WR-E-63.8	27.0	63.9		2007/12/11	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1174	WR-E-63.8	27.0	63.9		2007/12/25	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1175	WR-E-63.8	27.0	63.9		2008/1/10	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1176	WR-E-63.8	27.0	63.9		2008/2/7	PM	PM	PM	PM			PM				FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1177	WR-E-63.8	27.0	63.9		2008/6/10	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1178	WR-E-63.8	27.0	63.9		2008/11/12	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1179	WR-E-63.8	27.0	63.9		2009/2/10	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1180	WR-E-63.8	27.0	63.9		2009/12/22	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1181	WR-E-63.8	27.0	63.9		2010/1/18	PM	PM	PM	PM			PM	HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1182	WR-E-63.8	27.0	63.9		2010/2/16	PM		PM				PM				ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC	IC		IC			
1183	WR-E-63.8	27.0	63.9		2010/7/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1184	WR-E-63.8	27.0	63.9		2010/10/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1185	WR-E-63.8	27.0	63.9		2010/11/24	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1186	WR-E-63.8	27.0	63.9		2010/12/22	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1187	WR-E-63.8	27.0	63.9		2011/2/1	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1188	WR-E-100.0	63.9	100.0		2008/6/10	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1189	WR-E-100.0	63.9	100.0		2008/11/12	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1190	WR-E-100.0	63.9	100.0		2009/7/27	PM	PM	PM	PM			PM				FP	FP	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC	A	calc	calc
1191	WR-E-100.0	63.9	100.0		2009/11/25	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1192	WR-E-100.0	63.9	100.0		2010/1/18	PM	PM	PM	PM			PM	HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1193	WR-E-100.0	63.9	100.0		2010/2/16	PM		PM				PM				ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC	IC		IC			
1194	WR-E-100.0	63.9	100.0		2010/7/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1195	WR-E-100.0	63.9	100.0		2010/10/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1196	WR-E-100.0	63.9	100.0		2010/11/24	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1197	WR-E-100.0	63.9	100.0		2010/12/22	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1198	WR-E-132.0	100.0	132.0		2008/11/12	PM	PM	PM	PM			PM		FS		FP	FP	FP, ICP	FP, ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE	IC		A	IC	A	calc	calc
1199	WR-E-132.0	100.0	132.0		2009/7/27	PM	PM	PM	PM			PM				FP	FP	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC	IC		A	IC	A	calc	calc
1200	WR-E-132.0	100.0	132.0		2009/11/25	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1201	WR-E-132.0	100.0	132.0		2010/1/18	PM	PM	PM	PM			PM	HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1202	WR-E-132.0	100.0	132.0		2010/2/16	PM		PM				PM				ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC	IC		IC			
1203	WR-E-132.0	100.0	132.0		2010/7/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1204	WR-E-132.0	100.0	132.0		2010/10/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1205	WR-E-132.0	100.0	132.0		2010/11/24	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1206	WR-E-132.0	100.0	132.0		2010/12/22	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1207	WR-E-132.0	100.0	132.0		2011/2/1	PM	PM	PM	PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1208	WR-E-168.0	132.0	169.0		2009/11/25	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1209	WR-E-168.0	132.0	169.0		2009/12/22	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1210	WR-E-168.0	132.0	169.0		2010/1/12	PM	PM	PM	PM			PM	HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1211	WR-E-168.0	132.0	169.0		2010/1/18	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1212	WR-E-168.0	132.0	169.0		2010/1/26	PM	PM	PM	PM			PM	HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1213	WR-E-168.0	132.0	169.0		2010/2/2	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1214	WR-E-168.0	132.0	169.0		2010/2/9	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1215	WR-E-168.0	132.0	169.0		2010/2/16	PM		PM				PM				ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC	IC		IC			
1216	WR-E-168.0	132.0	169.0		2010/2/22	PM		PM				PM				ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC	IC		IC			
1217	WR-E-168.0	132.0	169.0		2010/3/2	PM		PM				PM				ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC	IC		IC			
1218	WR-E-168.0	132.0	169.0		2010/10/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1219	WR-E-168.0	132.0	169.0		2010/11/24	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1220	WR-E-168.0	132.0	169.0		2010/12/22	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1221	WR-E-168.0	132.0	169.0		2011/2/1	PM	PM	PM	PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1222	WR-E-202.0	169.0	202.0		2009/12/22	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC		IC		A	IC	A	calc	calc
1223	WR-E-202.0	169.0	202.0		2010/1/12	PM	PM	PM	PM			PM	HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1224	WR-E-202.0	169.0	202.0		2010/1/18	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1225	WR-E-202.0	169.0	202.0		2010/1/26	PM	PM	PM	PM			PM	HPLC	HPLC		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1226	WR-E-202.0	169.0	202.0		2010/2/2	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1227	WR-E-202.0	169.0	202.0		2010/2/9	PM	PM	PM	PM			PM				IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC	IC		A	IC	A	calc	calc
1228	WR-E-202.0	169.0	202.0		2010/2/16	PM		PM				PM				ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC	IC		IC			
1229	WR-E-202.0	169.0	202.0		2010/2/22	PM		PM				PM				ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC	IC		IC			
1230	WR-E-202.0	169.0	202.0		2010/3/2	PM		PM				PM				ICP	ICP	ICP	ICP		ICP		ICP	ICP	ICP				ICP		ICP	IC	IC	IC		IC	IC		IC			
1231	WR-E-202.0	169.0	202.0		2010/7/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1232	WR-E-202.0	169.0	202.0		2010/10/27	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1233	WR-E-202.0	169.0	202.0		2010/11/24	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1234	WR-E-202.0	169.0	202.0		2010/12/22	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1235	WR-E-202.0	169.0	202.0		2011/2/1	PM	PM	PM	PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1236	WR-E-239.0	202.0	239.0		2010/5/18	PM	PM	PM	PM				HPLC	HPLC		IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1237	WR-E-239.0	202.0	239.0		2010/6/1	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1238	WR-E-239.0	202.0	239.0		2010/6/23	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1239	WR-E-239.0	202.0	239.0		2010/7/7	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc
1240	WR-E-239.0	202.0	239.0		2010/7/21	PM	PM	PM	PM							IC	IC	IC	IC		ICP	IC	ICP		ICP		ICP	ICP	ICP	A	ICP	IC	IC	IC	IC	IC		IC	IC	A	calc	calc

Table 2.3.5 Analytical methods of groundwater (38/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date											Gases																			Isotope											Organics			
		Min.	Max.			M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	CO	H_2S	H_2	^3H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (DIC)	^{14}C	^{36}Cl	$^{36}Cl/Cl$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$	Humic acid	Fuluvic acid	Acetate	Formate
		[m]	[m]			[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mol/Kg]	[%]	[mol/Kg]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
1170	WR-E-27.0	5.0	27.0		2010/11/24	NT				CS	CS		calc	calc	calc																																				
1171	WR-E-27.0	5.0	27.0		2010/12/22	NT				CS	CS		calc	calc	calc																																				
1172	WR-E-63.8	27.0	63.9		2007/11/23	NT				CS	CS		calc	calc	calc																																				
1173	WR-E-63.8	27.0	63.9		2007/12/11	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1174	WR-E-63.8	27.0	63.9		2007/12/25	NT				CS	CS		calc	calc	calc																																				
1175	WR-E-63.8	27.0	63.9		2008/1/10	NT				CS	CS		calc	calc	calc																																				
1176	WR-E-63.8	27.0	63.9		2008/2/7	NT				CS	CS		calc	calc	calc																																				
1177	WR-E-63.8	27.0	63.9		2008/6/10	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1178	WR-E-63.8	27.0	63.9		2008/11/12	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1179	WR-E-63.8	27.0	63.9		2009/2/10	NT				CS	CS		calc	calc	calc																																				
1180	WR-E-63.8	27.0	63.9		2009/12/22	NT				CS	CS		calc	calc	calc																																				
1181	WR-E-63.8	27.0	63.9		2010/1/18	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1182	WR-E-63.8	27.0	63.9		2010/2/16					CS	CS	ICP-MS	calc	calc	calc																																				
1183	WR-E-63.8	27.0	63.9		2010/7/27	NT				CS	CS		calc	calc	calc																				LSC	MS	MS												
1184	WR-E-63.8	27.0	63.9		2010/10/27	NT				CS	CS		calc	calc	calc																					MS	MS												
1185	WR-E-63.8	27.0	63.9		2010/11/24	NT				CS	CS		calc	calc	calc																																				
1186	WR-E-63.8	27.0	63.9		2010/12/22	NT				CS	CS		calc	calc	calc																					MS	MS												
1187	WR-E-63.8	27.0	63.9		2011/2/1	NT				CS	CS		calc	calc	calc																					MS	MS												
1188	WR-E-100.0	63.9	100.0		2008/6/10	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1189	WR-E-100.0	63.9	100.0		2008/11/12	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1190	WR-E-100.0	63.9	100.0		2009/7/27	NT				CS	CS		calc	calc	calc																																				
1191	WR-E-100.0	63.9	100.0		2009/11/25	NT				CS	CS		calc	calc	calc																																				
1192	WR-E-100.0	63.9	100.0		2010/1/18	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1193	WR-E-100.0	63.9	100.0		2010/2/16					CS	CS	ICP-MS	calc	calc	calc																																				
1194	WR-E-100.0	63.9	100.0		2010/7/27	NT				CS	CS		calc	calc	calc																				LSC	MS	MS												
1195	WR-E-100.0	63.9	100.0		2010/10/27	NT				CS	CS		calc	calc	calc																					MS	MS												
1196	WR-E-100.0	63.9	100.0		2010/11/24	NT				CS	CS		calc	calc	calc																																				
1197	WR-E-100.0	63.9	100.0		2010/12/22	NT				CS	CS		calc	calc	calc																					MS	MS												
1198	WR-E-132.0	100.0	132.0		2008/11/12	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1199	WR-E-132.0	100.0	132.0		2009/7/27	NT				CS	CS		calc	calc	calc																																				
1200	WR-E-132.0	100.0	132.0		2009/11/25	NT				CS	CS		calc	calc	calc																																				
1201	WR-E-132.0	100.0	132.0		2010/1/18	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1202	WR-E-132.0	100.0	132.0		2010/2/16					CS	CS	ICP-MS	calc	calc	calc																																				
1203	WR-E-132.0	100.0	132.0		2010/7/27	NT				CS	CS		calc	calc	calc																				LSC	MS	MS												
1204	WR-E-132.0	100.0	132.0		2010/10/27	NT				CS	CS		calc	calc	calc																					MS	MS												
1205	WR-E-132.0	100.0	132.0		2010/11/24	NT				CS	CS		calc	calc	calc																																				
1206	WR-E-132.0	100.0	132.0		2010/12/22	NT				CS	CS		calc	calc	calc																					MS	MS												
1207	WR-E-132.0	100.0	132.0		2011/2/1	NT				CS	CS		calc	calc	calc																					MS	MS												
1208	WR-E-168.0	132.0	169.0		2009/11/25	NT				CS	CS		calc	calc	calc																																				
1209	WR-E-168.0	132.0	169.0		2009/12/22	NT		NT		CS	CS		calc	calc	calc																																				
1210	WR-E-168.0	132.0	169.0		2010/1/12	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1211	WR-E-168.0	132.0	169.0		2010/1/18	NT		NT		CS	CS		calc	calc	calc																				MS	MS	MS												
1212	WR-E-168.0	132.0	169.0		2010/1/26	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1213	WR-E-168.0	132.0	169.0		2010/2/2	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1214	WR-E-168.0	132.0	169.0		2010/2/9	NT				CS	CS		calc	calc	calc																																				
1215	WR-E-168.0	132.0	169.0		2010/2/16					CS	CS	ICP-MS	calc	calc	calc																																				
1216	WR-E-168.0	132.0	169.0		2010/2/22					CS	CS	ICP-MS	calc	calc	calc																																				
1217	WR-E-168.0	132.0	169.0		2010/3/2					CS	CS	ICP-MS	calc	calc	calc																																				
1218	WR-E-168.0	132.0	169.0		2010/10/27	NT				CS	CS		calc	calc	calc																				LSC	MS	MS												
1219	WR-E-168.0	132.0	169.0		2010/11/24	NT				CS	CS		calc	calc	calc																																				
1220	WR-E-168.0	132.0	169.0		2010/12/22	NT				CS	CS		calc	calc	calc																					MS	MS												
1221	WR-E-168.0	132.0	169.0		2011/2/1	NT				CS	CS		calc	calc	calc																					MS	MS												
1222	WR-E-202.0	169.0	202.0		2009/12/22	NT		NT		CS	CS		calc	calc	calc																																				
1223	WR-E-202.0	169.0	202.0		2010/1/12	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1224	WR-E-202.0	169.0	202.0		2010/1/18	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1225	WR-E-202.0	169.0	202.0		2010/1/26	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1226	WR-E-202.0	169.0	202.0		2010/2/2	NT				CS	CS		calc	calc	calc																				MS	MS	MS												
1227	WR-E-202.0	169.0	202.0		2010/2/9	NT				CS	CS		calc	calc	calc																																				
1228	WR-E-202.0	169.0	202.0		2010/2/16					CS	CS	ICP-MS	calc	calc	calc																																				
1229	WR-E-202.0	169.0	202.0		2010/2/22					CS	CS	ICP-MS	calc	calc	calc																																				
1230	WR-E-202.0	169.0	202.0		2010/3/2					CS	CS	ICP-MS	calc	calc	calc																																				
1231	WR-E-202.0	169.0	202.0		2010/7/27	NT				CS	CS		calc	calc	calc																				LSC	MS	MS												
1232	WR-E-202.0	169.0	202.0		2010/10/27	NT				CS	CS		calc	calc	calc																					MS	MS												
1233	WR-E-202.0	169.0	202.0		2010/11/24	NT				CS	CS		calc	calc	calc																																				
1234	WR-E-202.0	169.0	202.0		2010/12/22	NT				CS	CS		calc	calc	calc																					MS	MS												
1235	WR-E-202.0	169.0	202.0		2011/2/1	NT				CS	CS		calc	calc	calc																					MS	MS												
1236	WR-E-239.0	202.0	239.0		2010/5/18	NT				CS	CS		calc	calc	calc																				LSC	MS	MS												
1237	WR-E-239.0	202.0	239.0		2010/6/1	NT				CS	CS		calc	calc	calc																																				
1238	WR-E-239.0	202.0	239.0		2010/6/23	NT				CS	CS		calc	calc	calc																																				
1239	WR-E-239.0	202.0	239.0		2010/7/7	NT				CS	CS		calc	calc	calc																																				
1240	WR-E-239.0	202.0	239.0		2010/7/21	NT				CS	CS		calc	calc	calc																																				

Table 2.3.5 Analytical methods of groundwater (39/39)

Index	Sample point	Sampling depth (GL)		sampling zone No.	sampling date	Microbiology																					
		Min.	Max.			Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]			[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
1170	WR-E-27.0	5.0	27.0		2010/11/24																						
1171	WR-E-27.0	5.0	27.0		2010/12/22																						
1172	WR-E-63.8	27.0	63.9		2007/11/23																						
1173	WR-E-63.8	27.0	63.9		2007/12/11																						
1174	WR-E-63.8	27.0	63.9		2007/12/25																						
1175	WR-E-63.8	27.0	63.9		2008/1/10																						
1176	WR-E-63.8	27.0	63.9		2008/2/7																						
1177	WR-E-63.8	27.0	63.9		2008/6/10																						
1178	WR-E-63.8	27.0	63.9		2008/11/12																						
1179	WR-E-63.8	27.0	63.9		2009/2/10																						
1180	WR-E-63.8	27.0	63.9		2009/12/22																						
1181	WR-E-63.8	27.0	63.9		2010/1/18																						
1182	WR-E-63.8	27.0	63.9		2010/2/16																						
1183	WR-E-63.8	27.0	63.9		2010/7/27																						
1184	WR-E-63.8	27.0	63.9		2010/10/27																						
1185	WR-E-63.8	27.0	63.9		2010/11/24																						
1186	WR-E-63.8	27.0	63.9		2010/12/22																						
1187	WR-E-63.8	27.0	63.9		2011/2/1																						
1188	WR-E-100.0	63.9	100.0		2008/6/10																						
1189	WR-E-100.0	63.9	100.0		2008/11/12																						
1190	WR-E-100.0	63.9	100.0		2009/7/27																						
1191	WR-E-100.0	63.9	100.0		2009/11/25																						
1192	WR-E-100.0	63.9	100.0		2010/1/18																						
1193	WR-E-100.0	63.9	100.0		2010/2/16																						
1194	WR-E-100.0	63.9	100.0		2010/7/27																						
1195	WR-E-100.0	63.9	100.0		2010/10/27																						
1196	WR-E-100.0	63.9	100.0		2010/11/24																						
1197	WR-E-100.0	63.9	100.0		2010/12/22																						
1198	WR-E-132.0	100.0	132.0		2008/11/12																						
1199	WR-E-132.0	100.0	132.0		2009/7/27																						
1200	WR-E-132.0	100.0	132.0		2009/11/25																						
1201	WR-E-132.0	100.0	132.0		2010/1/18																						
1202	WR-E-132.0	100.0	132.0		2010/2/16																						
1203	WR-E-132.0	100.0	132.0		2010/7/27																						
1204	WR-E-132.0	100.0	132.0		2010/10/27																						
1205	WR-E-132.0	100.0	132.0		2010/11/24																						
1206	WR-E-132.0	100.0	132.0		2010/12/22																						
1207	WR-E-132.0	100.0	132.0		2011/2/1																						
1208	WR-E-168.0	132.0	169.0		2009/11/25																						
1209	WR-E-168.0	132.0	169.0		2009/12/22																						
1210	WR-E-168.0	132.0	169.0		2010/1/12																						
1211	WR-E-168.0	132.0	169.0		2010/1/18																						
1212	WR-E-168.0	132.0	169.0		2010/1/26																						
1213	WR-E-168.0	132.0	169.0		2010/2/2																						
1214	WR-E-168.0	132.0	169.0		2010/2/9																						
1215	WR-E-168.0	132.0	169.0		2010/2/16																						
1216	WR-E-168.0	132.0	169.0		2010/2/22																						
1217	WR-E-168.0	132.0	169.0		2010/3/2																						
1218	WR-E-168.0	132.0	169.0		2010/10/27																						
1219	WR-E-168.0	132.0	169.0		2010/11/24																						
1220	WR-E-168.0	132.0	169.0		2010/12/22																						
1221	WR-E-168.0	132.0	169.0		2011/2/1																						
1222	WR-E-202.0	169.0	202.0		2009/12/22																						
1223	WR-E-202.0	169.0	202.0		2010/1/12																						
1224	WR-E-202.0	169.0	202.0		2010/1/18																						
1225	WR-E-202.0	169.0	202.0		2010/1/26																						
1226	WR-E-202.0	169.0	202.0		2010/2/2																						
1227	WR-E-202.0	169.0	202.0		2010/2/9																						
1228	WR-E-202.0	169.0	202.0		2010/2/16																						
1229	WR-E-202.0	169.0	202.0		2010/2/22																						
1230	WR-E-202.0	169.0	202.0		2010/3/2																						
1231	WR-E-202.0	169.0	202.0		2010/7/27																						
1232	WR-E-202.0	169.0	202.0		2010/10/27																						
1233	WR-E-202.0	169.0	202.0		2010/11/24																						
1234	WR-E-202.0	169.0	202.0		2010/12/22																						
1235	WR-E-202.0	169.0	202.0		2011/2/1																						
1236	WR-E-239.0	202.0	239.0		2010/5/18																						
1237	WR-E-239.0	202.0	239.0		2010/6/1																						
1238	WR-E-239.0	202.0	239.0		2010/6/23																						
1239	WR-E-239.0	202.0	239.0		2010/7/7																						
1240	WR-E-239.0	202.0	239.0		2010/7/21																						

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Table 2.3.6 Analytical methods of river and precipitation

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Table 2.3.6 Analytical methods for river, precipitation, spring, and groundwater from the shallow boreholes (1/14)

Index	Sampling point		Sampling date	Physico-chemical parameter					Geochemistry																			
				EC at site	EC at lab	pH at site	pH at lab	Temperature at site	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T.Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-
				[mS/m]	[mS/m]			[℃]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
1	River	P-1	2003/7/28	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
2	River	P-1	2003/8/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
3	River	P-1	2003/9/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
4	River	P-1	2003/10/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
5	River	P-1	2003/11/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
6	River	P-1	2003/12/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
7	River	P-1	2004/1/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
8	River	P-1	2004/2/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
9	River	P-1	2004/3/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
10	River	P-1	2004/4/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
11	River	P-1	2004/5/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
12	River	P-1	2004/6/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
13	River	P-1	2004/7/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
14	River	P-1	2004/7/26	PM	PM	PM	PM	PM																				
15	River	P-1	2004/8/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
16	River	P-1	2004/9/14	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
17	River	P-1	2004/9/17	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
18	River	P-1	2004/10/13	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
19	River	P-1	2004/10/14	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
20	River	P-1	2004/11/9	PM	PM	PM	PM	PM																				
21	River	P-1	2004/11/12	PM	PM	PM	PM	PM																				
22	River	P-1	2004/11/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
23	River	P-1	2004/12/7		PM		PM																					
24	River	P-1	2004/12/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
25	River	P-1	2005/1/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
26	River	P-1	2005/2/18		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
27	River	P-1	2005/3/18	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
28	River	P-2	2003/7/28	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
29	River	P-2	2003/8/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
30	River	P-2	2003/9/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
31	River	P-2	2003/10/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
32	River	P-2	2003/11/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
33	River	P-2	2003/12/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
34	River	P-2	2004/1/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
35	River	P-2	2004/2/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
36	River	P-2	2004/3/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
37	River	P-2	2004/4/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
38	River	P-2	2004/5/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
39	River	P-2	2004/6/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
40	River	P-2	2004/7/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
41	River	P-2	2004/7/26	PM	PM	PM	PM	PM																				
42	River	P-2	2004/8/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
43	River	P-2	2004/9/14	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
44	River	P-2	2004/9/17	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
45	River	P-2	2004/10/13	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
46	River	P-2	2004/10/14	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
47	River	P-2	2004/11/9	PM	PM	PM	PM	PM																				
48	River	P-2	2004/11/12	PM	PM	PM	PM	PM																				
49	River	P-2	2004/11/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
50	River	P-2	2004/12/7		PM		PM																					
51	River	P-2	2004/12/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
52	River	P-2	2005/1/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
53	River	P-2	2005/2/18		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
54	River	P-2	2005/3/18	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
55	River	P-3	2003/7/28	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
56	River	P-3	2003/8/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
57	River	P-3	2003/9/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
58	River	P-3	2003/10/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
59	River	P-3	2003/11/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
60	River	P-3	2003/12/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
61	River	P-3	2004/1/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
62	River	P-3	2004/3/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
63	River	P-3	2004/4/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
64	River	P-3	2004/5/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
65	River	P-3	2004/6/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
66	River	P-3	2004/7/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
67	River	P-3	2004/7/26	PM	PM	PM	PM	PM																				
68	River	P-3	2004/8/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
69	River	P-3	2004/9/14	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
70	River	P-3	2004/9/17	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
71	River	P-3	2004/10/13	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
72	River	P-3	2004/10/14	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
73	River	P-3	2004/11/9	PM	PM	PM	PM	PM																				
74	River	P-3	2004/11/12	PM	PM	PM	PM	PM																				
75	River	P-3	2004/11/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
76	River	P-3	2004/12/7		PM		PM																					
77	River	P-3	2004/12/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
78	River	P-3	2005/1/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
79	River	P-3	2005/2/18	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
80	River	P-3	2005/3/18	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
81	River	P-3	2005/4/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
82	River	P-3	2005/5/19		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
83	River	P-3	2005/5/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC

Table 2.3.6 Analytical methods for river, precipitation, spring, and groundwater from the shallow boreholes (2/14)

Index	Sampling point		Sampling date	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M Alkalinity	M Alkalinity	P Alkalinity	P Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Tracer (uranine)	Tracer (Na-naphtio-nate)	Isotope			Chromaticity					
																							^3H	δD	$δ^{18}O$	Suspen-ded solids	Total solids	Ignition loss	Spectral values y	Chromaticity coordinates x,y	Turbidity
				[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]		[meq/l]	[meq/l]	[%]	[mg/l]	[mg/l]	[T.U]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]			[NTU]
1	River	P-1	2003/7/28	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
2	River	P-1	2003/8/19	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
3	River	P-1	2003/9/19	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
4	River	P-1	2003/10/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
5	River	P-1	2003/11/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
6	River	P-1	2003/12/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
7	River	P-1	2004/1/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
8	River	P-1	2004/2/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
9	River	P-1	2004/3/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
10	River	P-1	2004/4/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
11	River	P-1	2004/5/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
12	River	P-1	2004/6/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
13	River	P-1	2004/7/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
14	River	P-1	2004/7/26																							Un	Un	Un	Un	Un	Un
15	River	P-1	2004/8/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
16	River	P-1	2004/9/14	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
17	River	P-1	2004/9/17	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
18	River	P-1	2004/10/13	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
19	River	P-1	2004/10/14	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
20	River	P-1	2004/11/9																							Un	Un	Un	Un	Un	Un
21	River	P-1	2004/11/12																							Un	Un	Un	Un	Un	Un
22	River	P-1	2004/11/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
23	River	P-1	2004/12/7																							Un	Un	Un	Un	Un	Un
24	River	P-1	2004/12/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
25	River	P-1	2005/1/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
26	River	P-1	2005/2/18	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
27	River	P-1	2005/3/18	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
28	River	P-2	2003/7/28	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
29	River	P-2	2003/8/19	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
30	River	P-2	2003/9/19	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
31	River	P-2	2003/10/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
32	River	P-2	2003/11/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
33	River	P-2	2003/12/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
34	River	P-2	2004/1/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
35	River	P-2	2004/2/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
36	River	P-2	2004/3/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
37	River	P-2	2004/4/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
38	River	P-2	2004/5/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
39	River	P-2	2004/6/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
40	River	P-2	2004/7/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
41	River	P-2	2004/7/26																							Un	Un	Un	Un	Un	Un
42	River	P-2	2004/8/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
43	River	P-2	2004/9/14	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
44	River	P-2	2004/9/17	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
45	River	P-2	2004/10/13	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
46	River	P-2	2004/10/14	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
47	River	P-2	2004/11/9																							Un	Un	Un	Un	Un	Un
48	River	P-2	2004/11/12																							Un	Un	Un	Un	Un	Un
49	River	P-2	2004/11/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
50	River	P-2	2004/12/7																							Un	Un	Un	Un	Un	Un
51	River	P-2	2004/12/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
52	River	P-2	2005/1/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
53	River	P-2	2005/2/18	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
54	River	P-2	2005/3/18	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
55	River	P-3	2003/7/28	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
56	River	P-3	2003/8/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
57	River	P-3	2003/9/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
58	River	P-3	2003/10/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
59	River	P-3	2003/11/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
60	River	P-3	2003/12/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
61	River	P-3	2004/1/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
62	River	P-3	2004/3/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
63	River	P-3	2004/4/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
64	River	P-3	2004/5/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
65	River	P-3	2004/6/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
66	River	P-3	2004/7/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
67	River	P-3	2004/7/26																							Un	Un	Un	Un	Un	Un
68	River	P-3	2004/8/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
69	River	P-3	2004/9/14	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
70	River	P-3	2004/9/17	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
71	River	P-3	2004/10/13	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
72	River	P-3	2004/10/14	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
73	River	P-3	2004/11/9																							Un	Un	Un	Un	Un	Un
74	River	P-3	2004/11/12																							Un	Un	Un	Un	Un	Un
75	River	P-3	2004/11/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
76	River	P-3	2004/12/7																							Un	Un	Un	Un	Un	Un
77	River	P-3	2004/12/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
78	River	P-3	2005/1/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
79	River	P-3	2005/2/18	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
80	River	P-3	2005/3/18	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
81	River	P-3	2005/4/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
82	River	P-3	2005/5/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
83	River	P-3	2005/5/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											

Table 2.3.6 Analytical methods for river, precipitation, spring, and groundwater from the shallow boreholes (3/14)

Index	Sampling point		Sampling date	Physico-chemical parameter					Geochemistry																			
				EC at site	EC at lab	pH at site	pH at lab	Temperature at site	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T.Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-
				[mS/m]	[mS/m]			[℃]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
84	River	P-3	2005/6/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
85	River	P-3	2005/7/21	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
86	River	P-3	2005/8/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
87	River	P-3	2005/9/7 11:05		PM		PM																					
88	River	P-3	2005/9/7 22:00		PM		PM																					
89	River	P-3	2005/9/8 1:59		PM		PM																					
90	River	P-3	2005/9/8 3:00		PM		PM																					
91	River	P-3	2005/9/8 4:00		PM		PM																					
92	River	P-3	2005/9/8 5:00		PM		PM																					
93	River	P-3	2005/9/8 5:58		PM		PM																					
94	River	P-3	2005/9/8 6:58		PM		PM																					
95	River	P-3	2005/9/8 12:22		PM		PM																					
96	River	P-3	2005/9/8 18:10		PM		PM																					
97	River	P-3	2005/9/9 16:20		PM		PM																					
98	River	P-3	2005/9/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
99	River	P-3	2005/10/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
100	River	P-3	2005/11/21	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
101	River	P-3	2005/12/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
102	River	P-3	2006/1/23	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
103	River	P-3	2006/2/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
104	River	P-3	2006/3/20	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
105	River	P-3	2006/4/19	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
106	River	P-3	2006/5/22	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
107	River	P-3	2006/6/22	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
108	River	P-3	2006/7/21	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
109	River	P-3	2006/8/21	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
110	River	P-3	2006/9/20	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
111	River	P-3	2006/10/17	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
112	River	P-3	2006/11/21	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
113	River	P-3	2006/12/19	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
114	River	P-3	2007/1/16	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
115	River	P-3	2007/2/16	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
116	River	P-3	2007/3/28		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
117	River	P-3	2007/4/17		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
118	River	P-3	2007/5/22		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
119	River	P-3	2007/6/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
120	River	P-3	2007/7/23		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
121	River	P-3	2007/8/21		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
122	River	P-3	2007/9/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
123	River	P-3	2007/10/18		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
124	River	P-3	2007/11/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
125	River	P-3	2007/12/17		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
126	River	P-3	2008/1/16		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
127	River	P-3	2008/2/14		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
128	River	P-3	2008/6/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
129	River	P-3	2008/12/25		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
130	River	P-3	2009/8/5		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
131	River	P-3	2009/12/21		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
132	River	P-3-1	2009/12/4	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
133	River	P-3-2	2009/12/4	PM	PM	PM	PM	PM	IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
134	River	P-3-3	2009/12/4	PM	PM	PM	PM	PM	IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
135	River	P-3-4	2009/12/4	PM	PM	PM	PM	PM	IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
136	River	P-3	2010/10/20		PM		PM	PM	IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	ICP	ICP	ICP		ICP	A	IC	IC	IC
137	River	P-3	2011/2/9		PM		PM	PM	IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	ICP	ICP	ICP		ICP	A	IC	IC	IC
138	River	P-4	2004/5/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
139	River	P-4	2004/6/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
140	River	P-4	2004/7/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
141	River	P-4	2004/7/26	PM	PM	PM	PM	PM																				
142	River	P-4	2004/8/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
143	River	P-4	2004/9/14	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
144	River	P-4	2004/9/17	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
145	River	P-4	2004/10/13	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
146	River	P-4	2004/10/14	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
147	River	P-4	2004/11/9	PM	PM	PM	PM	PM																				
148	River	P-4	2004/11/12	PM	PM	PM	PM	PM																				
149	River	P-4	2004/11/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
150	River	P-4	2004/12/7	PM	PM	PM	PM	PM																				
151	River	P-4	2004/12/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
152	River	P-4	2005/1/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
153	River	P-4	2005/2/18	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
154	River	P-4	2005/3/18	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
155	River	P-4	2005/4/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
156	River	P-4	2005/5/19		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
157	River	P-4	2005/5/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
158	River	P-4	2005/6/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
159	River	P-4	2005/7/21	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
160	River	P-4	2005/8/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
161	River	P-4	2005/9/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
162	River	P-4	2005/10/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
163	River	P-4	2005/11/21	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
164	River	P-4	2005/12/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
165	River	P-4	2006/1/23	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
166	River	P-4	2006/2/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC

Table 2.3.6 Analytical methods for river, precipitation, spring, and groundwater from the shallow boreholes (4/14)

Index	Sampling point		Sampling date	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M Alkalinity	M Alkalinity	P Alkalinity	P Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Tracer (uranine)	Tracer (Na-naphtio-nate)	Isotope ^3H	Isotope δD	Isotope $\delta^{18}O$	Chromaticity Suspen-ded solids	Chromaticity Total solids	Chromaticity Ignition loss	Chromaticity Spectral values y	Chromaticity Chromaticity coordinates x,y	Chromaticity Turbidity
				[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]		[meq/l]	[meq/l]	[%]	[mg/l]	[mg/l]	[T.U]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]			[NTU]
84	River	P-3	2005/6/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
85	River	P-3	2005/7/21	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
86	River	P-3	2005/8/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
87	River	P-3	2005/9/7 11:05																							Un	Un	Un	Un	Un	Un
88	River	P-3	2005/9/7 22:00																							Un	Un	Un	Un	Un	Un
89	River	P-3	2005/9/8 1:59																							Un	Un	Un	Un	Un	Un
90	River	P-3	2005/9/8 3:00																							Un	Un	Un	Un	Un	Un
91	River	P-3	2005/9/8 4:00																							Un	Un	Un	Un	Un	Un
92	River	P-3	2005/9/8 5:00																							Un	Un	Un	Un	Un	Un
93	River	P-3	2005/9/8 5:58																							Un	Un	Un	Un	Un	Un
94	River	P-3	2005/9/8 6:58																							Un	Un	Un	Un	Un	Un
95	River	P-3	2005/9/8 12:22																							Un	Un	Un	Un	Un	Un
96	River	P-3	2005/9/8 18:10																							Un	Un	Un	Un	Un	Un
97	River	P-3	2005/9/9 16:20																							Un	Un	Un	Un	Un	Un
98	River	P-3	2005/9/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
99	River	P-3	2005/10/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
100	River	P-3	2005/11/21	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
101	River	P-3	2005/12/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
102	River	P-3	2006/1/23	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
103	River	P-3	2006/2/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
104	River	P-3	2006/3/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
105	River	P-3	2006/4/19	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
106	River	P-3	2006/5/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
107	River	P-3	2006/6/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
108	River	P-3	2006/7/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
109	River	P-3	2006/8/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
110	River	P-3	2006/9/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
111	River	P-3	2006/10/17	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc				MS	MS						
112	River	P-3	2006/11/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
113	River	P-3	2006/12/19	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
114	River	P-3	2007/1/16	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS									
115	River	P-3	2007/2/16	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
116	River	P-3	2007/3/28	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
117	River	P-3	2007/4/17	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
118	River	P-3	2007/5/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
119	River	P-3	2007/6/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
120	River	P-3	2007/7/23	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
121	River	P-3	2007/8/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
122	River	P-3	2007/9/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
123	River	P-3	2007/10/18	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
124	River	P-3	2007/11/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
125	River	P-3	2007/12/17	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
126	River	P-3	2008/1/16	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
127	River	P-3	2008/2/14	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
128	River	P-3	2008/6/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
129	River	P-3	2008/12/25	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS	LS	MS	MS						
130	River	P-3	2009/8/5	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
131	River	P-3	2009/12/21	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
132	River	P-3-1	2009/12/4	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
133	River	P-3-2	2009/12/4	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
134	River	P-3-3	2009/12/4	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
135	River	P-3-4	2009/12/4	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
136	River	P-3	2010/10/20	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc			LS	MS	MS						
137	River	P-3	2011/2/9	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc			LS	MS	MS						
138	River	P-4	2004/5/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
139	River	P-4	2004/6/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
140	River	P-4	2004/7/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
141	River	P-4	2004/7/26																							Un	Un	Un	Un	Un	Un
142	River	P-4	2004/8/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
143	River	P-4	2004/9/14	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
144	River	P-4	2004/9/17	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
145	River	P-4	2004/10/13	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
146	River	P-4	2004/10/14	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
147	River	P-4	2004/11/9																							Un	Un	Un	Un	Un	Un
148	River	P-4	2004/11/12																							Un	Un	Un	Un	Un	Un
149	River	P-4	2004/11/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
150	River	P-4	2004/12/7																							Un	Un	Un	Un	Un	Un
151	River	P-4	2004/12/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
152	River	P-4	2005/1/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
153	River	P-4	2005/2/18	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
154	River	P-4	2005/3/18	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
155	River	P-4	2005/4/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
156	River	P-4	2005/5/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
157	River	P-4	2005/5/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
158	River	P-4	2005/6/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
159	River	P-4	2005/7/21	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
160	River	P-4	2005/8/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
161	River	P-4	2005/9/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
162	River	P-4	2005/10/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
163	River	P-4	2005/11/21	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
164	River	P-4	2005/12/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
165	River	P-4	2006/1/23	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
166	River	P-4	2006/2/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											

Table 2.3.6 Analytical methods for river, precipitation, spring, and groundwater from the shallow boreholes (5/14)

Index	Sampling point		Sampling date	Physico-chemical parameter					Geochemistry																				
				EC at site	EC at lab	pH at site	pH at lab	Temperature at site	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T.Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-
				[mS/m]	[mS/m]			[℃]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
167	River	P-4	2006/3/20	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
168	River	P-4	2006/4/19	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
169	River	P-4	2006/5/22	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
170	River	P-4	2006/6/22	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
171	River	P-4	2006/7/21	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
172	River	P-4	2006/8/21	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
173	River	P-4	2006/9/20	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
174	River	P-4	2006/10/17	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
175	River	P-4	2006/11/21	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
176	River	P-4	2006/12/19	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
177	River	P-4	2007/1/16	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
178	River	P-4	2007/2/16	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
179	River	P-4	2007/3/28		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
180	River	P-4	2007/4/17		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
181	River	P-4	2007/5/22		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
182	River	P-4	2007/6/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
183	River	P-4	2007/7/23		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
184	River	P-4	2007/8/21		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
185	River	P-4	2007/9/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
186	River	P-4	2007/10/18		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
187	River	P-4	2007/11/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
188	River	P-4	2007/12/17		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
189	River	P-4	2008/1/16		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
190	River	P-4	2008/2/14		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
191	River	P-4	2008/6/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
192	River	P-4	2008/12/25		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
193	River	P-4	2009/8/6		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
194	River	P-4	2009/12/21		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
195	River	P-4-1	2009/12/4	PM	PM	PM	PM	PM	IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
196	River	P-4-2	2009/12/4	PM	PM	PM	PM	PM	IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
197	River	P-4-3	2009/12/4	PM	PM	PM	PM	PM	IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
198	River	P-4	2010/10/20		PM		PM	PM	IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	ICP	ICP	ICP		ICP	A	IC	IC	IC
199	River	P-4	2011/2/9		PM		PM	PM	IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	ICP	ICP	ICP		ICP	A	IC	IC	IC
200	River	P-5	2004/5/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
201	River	P-5	2004/6/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
202	River	P-5	2004/7/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
203	River	P-5	2004/7/26	PM	PM	PM	PM	PM																				
204	River	P-5	2004/8/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
205	River	P-5	2004/9/14	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
206	River	P-5	2004/9/17	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
207	River	P-5	2004/10/13	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
208	River	P-5	2004/10/14	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
209	River	P-5	2004/11/9	PM	PM	PM	PM	PM																				
210	River	P-5	2004/11/12	PM	PM	PM	PM	PM																				
211	River	P-5	2004/11/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
212	River	P-5	2004/12/7	PM	PM	PM	PM	PM																				
213	River	P-5	2004/12/22	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
214	River	P-5	2005/1/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
215	River	P-5	2005/2/18	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
216	River	P-5	2005/3/18	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
217	River	P-5	2005/4/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
218	River	P-5	2005/5/19		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
219	River	P-5	2005/5/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
220	River	P-5	2005/6/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
221	River	P-5	2005/7/21	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
222	River	P-5	2005/8/19	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
223	River	P-5	2005/9/7 11:30		PM		PM																					
224	River	P-5	2005/9/7 22:17		PM		PM																					
225	River	P-5	2005/9/8 0:36		PM		PM																					
226	River	P-5	2005/9/8 1:45		PM		PM																					
227	River	P-5	2005/9/8 2:59		PM		PM																					
228	River	P-5	2005/9/8 4:17		PM		PM																					
229	River	P-5	2005/9/8 5:32		PM		PM																					
230	River	P-5	2005/9/8 6:58		PM		PM																					
231	River	P-5	2005/9/8 8:18		PM		PM																					
232	River	P-5	2005/9/8 9:30		PM		PM																					
233	River	P-5	2005/9/8 11:25		PM		PM																					
234	River	P-5	2005/9/8 12:37		PM		PM																					
235	River	P-5	2005/9/8 13:50		PM		PM																					
236	River	P-5	2005/9/8 15:05		PM		PM																					
237	River	P-5	2005/9/8 16:30		PM		PM																					
238	River	P-5	2005/9/9 16:35		PM		PM																					
239	River	P-5	2005/9/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
240	River	P-5	2005/10/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
241	River	P-5	2005/11/21	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
242	River	P-5	2005/12/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
243	River	P-5	2006/1/23	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
244	River	P-5	2006/2/20	PM	PM	PM	PM	PM	FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
245	River	P-5	2006/3/20	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
246	River	P-5	2006/4/19	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
247	River	P-5	2006/5/22	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
248	River	P-5	2006/6/22	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
249	River	P-5	2006/7/21	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE

Table 2.3.6 Analytical methods for river, precipitation, spring, and groundwater from the shallow boreholes (6/14)

Index	Sampling point		Sampling date	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M Alkalinity	M Alkalinity	P Alkalinity	P Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Tracer (uranine)	Tracer (Na-naphtio-nate)	Isotope ^3H	Isotope δD	Isotope $\delta^{18}O$	Chromaticity Suspen-ded solids	Chromaticity Total solids	Chromaticity Ignition loss	Chromaticity Spectral values y	Chromaticity Chromaticity coordinates x,y	Chromaticity Turbidity
				[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]		[meq/l]	[meq/l]	[%]	[mg/l]	[mg/l]	[T.U]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]			[NTU]
167	River	P-4	2006/3/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
168	River	P-4	2006/4/19	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
169	River	P-4	2006/5/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
170	River	P-4	2006/6/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
171	River	P-4	2006/7/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
172	River	P-4	2006/8/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
173	River	P-4	2006/9/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
174	River	P-4	2006/10/17	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc				MS	MS						
175	River	P-4	2006/11/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
176	River	P-4	2006/12/19	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
177	River	P-4	2007/1/16	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS									
178	River	P-4	2007/2/16	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
179	River	P-4	2007/3/28	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
180	River	P-4	2007/4/17	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
181	River	P-4	2007/5/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
182	River	P-4	2007/6/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
183	River	P-4	2007/7/23	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
184	River	P-4	2007/8/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
185	River	P-4	2007/9/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
186	River	P-4	2007/10/18	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
187	River	P-4	2007/11/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
188	River	P-4	2007/12/17	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
189	River	P-4	2008/1/16	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
190	River	P-4	2008/2/14	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
191	River	P-4	2008/6/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
192	River	P-4	2008/12/25	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS	LS	MS	MS						
193	River	P-4	2009/8/6	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
194	River	P-4	2009/12/21	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
195	River	P-4-1	2009/12/4	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
196	River	P-4-2	2009/12/4	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
197	River	P-4-3	2009/12/4	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
198	River	P-4	2010/10/20	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc			LS	MS	MS						
199	River	P-4	2011/2/9	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc			LS	MS	MS						
200	River	P-5	2004/5/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
201	River	P-5	2004/6/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
202	River	P-5	2004/7/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
203	River	P-5	2004/7/26																							Un	Un	Un	Un	Un	Un
204	River	P-5	2004/8/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
205	River	P-5	2004/9/14	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
206	River	P-5	2004/9/17	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
207	River	P-5	2004/10/13	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
208	River	P-5	2004/10/14	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
209	River	P-5	2004/11/9																							Un	Un	Un	Un	Un	Un
210	River	P-5	2004/11/12																							Un	Un	Un	Un	Un	Un
211	River	P-5	2004/11/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
212	River	P-5	2004/12/7																							Un	Un	Un	Un	Un	Un
213	River	P-5	2004/12/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
214	River	P-5	2005/1/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
215	River	P-5	2005/2/18	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
216	River	P-5	2005/3/18	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
217	River	P-5	2005/4/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
218	River	P-5	2005/5/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc						Un	Un	Un	Un	Un	Un
219	River	P-5	2005/5/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
220	River	P-5	2005/6/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
221	River	P-5	2005/7/21	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
222	River	P-5	2005/8/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
223	River	P-5	2005/9/7 11:30																							Un	Un	Un	Un	Un	Un
224	River	P-5	2005/9/7 22:17																							Un	Un	Un	Un	Un	Un
225	River	P-5	2005/9/8 0:36																							Un	Un	Un	Un	Un	Un
226	River	P-5	2005/9/8 1:45																							Un	Un	Un	Un	Un	Un
227	River	P-5	2005/9/8 2:59																							Un	Un	Un	Un	Un	Un
228	River	P-5	2005/9/8 4:17																							Un	Un	Un	Un	Un	Un
229	River	P-5	2005/9/8 5:32																							Un	Un	Un	Un	Un	Un
230	River	P-5	2005/9/8 6:58																							Un	Un	Un	Un	Un	Un
231	River	P-5	2005/9/8 8:18																							Un	Un	Un	Un	Un	Un
232	River	P-5	2005/9/8 9:30																							Un	Un	Un	Un	Un	Un
233	River	P-5	2005/9/8 11:25																							Un	Un	Un	Un	Un	Un
234	River	P-5	2005/9/8 12:37																							Un	Un	Un	Un	Un	Un
235	River	P-5	2005/9/8 13:50																							Un	Un	Un	Un	Un	Un
236	River	P-5	2005/9/8 15:05																							Un	Un	Un	Un	Un	Un
237	River	P-5	2005/9/8 16:30																							Un	Un	Un	Un	Un	Un
238	River	P-5	2005/9/9 16:35																							Un	Un	Un	Un	Un	Un
239	River	P-5	2005/9/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
240	River	P-5	2005/10/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
241	River	P-5	2005/11/21	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
242	River	P-5	2005/12/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
243	River	P-5	2006/1/23	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
244	River	P-5	2006/2/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
245	River	P-5	2006/3/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
246	River	P-5	2006/4/19	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
247	River	P-5	2006/5/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
248	River	P-5	2006/6/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
249	River	P-5	2006/7/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											

Table 2.3.6 Analytical methods for river, precipitation, spring, and groundwater from the shallow boreholes (7/14)

Index	Sampling point		Sampling date	Physico-chemical parameter					Geochemistry																			
				EC at site	EC at lab	pH at site	pH at lab	Temperature at site	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T.Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-
				[mS/m]	[mS/m]			[℃]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
250	River	P-5	2006/8/18 11:00		PM		PM																					
251	River	P-5	2006/8/21	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
252	River	P-5	2006/8/21 13:30		PM		PM																					
253	River	P-5	2006/8/21 16:30		PM		PM																					
254	River	P-5	2006/8/21 19:30		PM		PM																					
255	River	P-5	2006/8/21 21:30		PM		PM																					
256	River	P-5	2006/8/21 23:30		PM		PM																					
257	River	P-5	2006/8/22 1:30		PM		PM																					
258	River	P-5	2006/8/22 2:30		PM		PM																					
259	River	P-5	2006/8/22 3:30		PM		PM																					
260	River	P-5	2006/8/22 4:30		PM		PM																					
261	River	P-5	2006/8/22 5:30		PM		PM																					
262	River	P-5	2006/8/22 6:30		PM		PM																					
263	River	P-5	2006/8/22 7:30		PM		PM																					
264	River	P-5	2006/8/22 8:30		PM		PM																					
265	River	P-5	2006/8/22 9:30		PM		PM																					
266	River	P-5	2006/8/22 10:30		PM		PM																					
267	River	P-5	2006/8/22 11:30		PM		PM																					
268	River	P-5	2006/8/22 12:30		PM		PM																					
269	River	P-5	2006/8/22 13:30		PM		PM																					
270	River	P-5	2006/8/22 14:30		PM		PM																					
271	River	P-5	2006/8/22 16:30		PM		PM																					
272	River	P-5	2006/8/22 18:30		PM		PM																					
273	River	P-5	2006/8/22 21:30		PM		PM																					
274	River	P-5	2006/8/23 0:30		PM		PM																					
275	River	P-5	2006/8/23 3:30		PM		PM																					
276	River	P-5	2006/8/24 15:10		PM		PM																					
277	River	P-5	2006/8/24 21:10		PM		PM																					
278	River	P-5	2006/8/25 3:10		PM		PM																					
279	River	P-5	2006/8/25 5:10		PM		PM																					
280	River	P-5	2006/8/25 6:10		PM		PM																					
281	River	P-5	2006/8/25 7:10		PM		PM																					
282	River	P-5	2006/8/25 8:10		PM		PM																					
283	River	P-5	2006/8/25 9:10		PM		PM																					
284	River	P-5	2006/9/20	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
285	River	P-5	2006/10/11 13:00		PM		PM																					
286	River	P-5	2006/10/11 16:00		PM		PM																					
287	River	P-5	2006/10/11 19:00		PM		PM																					
288	River	P-5	2006/10/11 21:00		PM		PM																					
289	River	P-5	2006/10/11 23:00		PM		PM																					
290	River	P-5	2006/10/12 0:00		PM		PM																					
291	River	P-5	2006/10/12 1:00		PM		PM																					
292	River	P-5	2006/10/12 2:00		PM		PM																					
293	River	P-5	2006/10/12 3:00		PM		PM																					
294	River	P-5	2006/10/12 4:00		PM		PM																					
295	River	P-5	2006/10/12 5:00		PM		PM																					
296	River	P-5	2006/10/12 6:00		PM		PM																					
297	River	P-5	2006/10/12 7:00		PM		PM																					
298	River	P-5	2006/10/12 8:00		PM		PM																					
299	River	P-5	2006/10/12 9:00		PM		PM																					
300	River	P-5	2006/10/12 10:00		PM		PM																					
301	River	P-5	2006/10/12 11:00		PM		PM																					
302	River	P-5	2006/10/12 12:00		PM		PM																					
303	River	P-5	2006/10/12 14:00		PM		PM																					
304	River	P-5	2006/10/12 16:00		PM		PM																					
305	River	P-5	2006/10/12 19:00		PM		PM																					
306	River	P-5	2006/10/12 22:00		PM		PM																					
307	River	P-5	2006/10/13 1:00		PM		PM																					
308	River	P-5	2006/10/17		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
309	River	P-5	2006/11/10 1:00		PM		PM																					
310	River	P-5	2006/11/10 4:00		PM		PM																					
311	River	P-5	2006/11/10 7:00		PM		PM																					
312	River	P-5	2006/11/10 9:00		PM		PM																					
313	River	P-5	2006/11/10 11:00		PM		PM																					
314	River	P-5	2006/11/10 12:00		PM		PM																					
315	River	P-5	2006/11/10 13:00		PM		PM																					
316	River	P-5	2006/11/10 15:00		PM		PM																					
317	River	P-5	2006/11/10 17:00		PM		PM																					
318	River	P-5	2006/11/10 19:00		PM		PM																					
319	River	P-5	2006/11/10 21:00		PM		PM																					
320	River	P-5	2006/11/10 23:00		PM		PM																					
321	River	P-5	2006/11/11 1:00		PM		PM																					
322	River	P-5	2006/11/11 5:00		PM		PM																					
323	River	P-5	2006/11/11 14:00		PM		PM																					
324	River	P-5	2006/11/21		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
325	River	P-5	2006/12/19	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
326	River	P-5	2007/1/16	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
327	River	P-5	2007/2/16	PM	PM	PM	PM	PM	FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
328	River	P-5	2007/3/28		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
329	River	P-5	2007/4/17		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
330	River	P-5	2007/5/22		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
331	River	P-5	2007/6/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
332	River	P-5	2007/7/23		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE

Table 2.3.6 Analytical methods for river, precipitation, spring, and groundwater from the shallow boreholes (8/14)

Index	Sampling point		Sampling date	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M Alkalinity	M Alkalinity	P Alkalinity	P Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Tracer (uranine)	Tracer (Na-naphtio-nate)	Isotope ^3H	Isotope δD	Isotope $\delta^{18}O$	Chromaticity Suspen-ded solids	Chromaticity Total solids	Chromaticity Ignition loss	Chromaticity Spectral values y	Chromaticity Chromaticity coordinates x,y	Chromaticity Turbidity
				[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]		[meq/l]	[meq/l]	[%]	[mg/l]	[mg/l]	[T.U]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]			[NTU]
250	River	P-5	2006/8/18 11:00																							Un	Un	Un	Un	Un	Un
251	River	P-5	2006/8/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
252	River	P-5	2006/8/21 13:30																							Un	Un	Un	Un	Un	Un
253	River	P-5	2006/8/21 16:30																							Un	Un	Un	Un	Un	Un
254	River	P-5	2006/8/21 19:30																							Un	Un	Un	Un	Un	Un
255	River	P-5	2006/8/21 21:30																							Un	Un	Un	Un	Un	Un
256	River	P-5	2006/8/21 23:30																							Un	Un	Un	Un	Un	Un
257	River	P-5	2006/8/22 1:30																							Un	Un	Un	Un	Un	Un
258	River	P-5	2006/8/22 2:30																							Un	Un	Un	Un	Un	Un
259	River	P-5	2006/8/22 3:30																							Un	Un	Un	Un	Un	Un
260	River	P-5	2006/8/22 4:30																							Un	Un	Un	Un	Un	Un
261	River	P-5	2006/8/22 5:30																							Un	Un	Un	Un	Un	Un
262	River	P-5	2006/8/22 6:30																							Un	Un	Un	Un	Un	Un
263	River	P-5	2006/8/22 7:30																							Un	Un	Un	Un	Un	Un
264	River	P-5	2006/8/22 8:30																							Un	Un	Un	Un	Un	Un
265	River	P-5	2006/8/22 9:30																							Un	Un	Un	Un	Un	Un
266	River	P-5	2006/8/22 10:30																							Un	Un	Un	Un	Un	Un
267	River	P-5	2006/8/22 11:30																							Un	Un	Un	Un	Un	Un
268	River	P-5	2006/8/22 12:30																							Un	Un	Un	Un	Un	Un
269	River	P-5	2006/8/22 13:30																							Un	Un	Un	Un	Un	Un
270	River	P-5	2006/8/22 14:30																							Un	Un	Un	Un	Un	Un
271	River	P-5	2006/8/22 16:30																							Un	Un	Un	Un	Un	Un
272	River	P-5	2006/8/22 18:30																							Un	Un	Un	Un	Un	Un
273	River	P-5	2006/8/22 21:30																							Un	Un	Un	Un	Un	Un
274	River	P-5	2006/8/23 0:30																							Un	Un	Un	Un	Un	Un
275	River	P-5	2006/8/23 3:30																							Un	Un	Un	Un	Un	Un
276	River	P-5	2006/8/24 15:10																							Un	Un	Un	Un	Un	Un
277	River	P-5	2006/8/24 21:10																							Un	Un	Un	Un	Un	Un
278	River	P-5	2006/8/25 3:10																							Un	Un	Un	Un	Un	Un
279	River	P-5	2006/8/25 5:10																							Un	Un	Un	Un	Un	Un
280	River	P-5	2006/8/25 6:10																							Un	Un	Un	Un	Un	Un
281	River	P-5	2006/8/25 7:10																							Un	Un	Un	Un	Un	Un
282	River	P-5	2006/8/25 8:10																							Un	Un	Un	Un	Un	Un
283	River	P-5	2006/8/25 9:10																							Un	Un	Un	Un	Un	Un
284	River	P-5	2006/9/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
285	River	P-5	2006/10/11 13:00																							Un	Un	Un	Un	Un	Un
286	River	P-5	2006/10/11 16:00																							Un	Un	Un	Un	Un	Un
287	River	P-5	2006/10/11 19:00																							Un	Un	Un	Un	Un	Un
288	River	P-5	2006/10/11 21:00																							Un	Un	Un	Un	Un	Un
289	River	P-5	2006/10/11 23:00																							Un	Un	Un	Un	Un	Un
290	River	P-5	2006/10/12 0:00																							Un	Un	Un	Un	Un	Un
291	River	P-5	2006/10/12 1:00																							Un	Un	Un	Un	Un	Un
292	River	P-5	2006/10/12 2:00																							Un	Un	Un	Un	Un	Un
293	River	P-5	2006/10/12 3:00																							Un	Un	Un	Un	Un	Un
294	River	P-5	2006/10/12 4:00																							Un	Un	Un	Un	Un	Un
295	River	P-5	2006/10/12 5:00																							Un	Un	Un	Un	Un	Un
296	River	P-5	2006/10/12 6:00																							Un	Un	Un	Un	Un	Un
297	River	P-5	2006/10/12 7:00																							Un	Un	Un	Un	Un	Un
298	River	P-5	2006/10/12 8:00																							Un	Un	Un	Un	Un	Un
299	River	P-5	2006/10/12 9:00																							Un	Un	Un	Un	Un	Un
300	River	P-5	2006/10/12 10:00																							Un	Un	Un	Un	Un	Un
301	River	P-5	2006/10/12 11:00																							Un	Un	Un	Un	Un	Un
302	River	P-5	2006/10/12 12:00																							Un	Un	Un	Un	Un	Un
303	River	P-5	2006/10/12 14:00																							Un	Un	Un	Un	Un	Un
304	River	P-5	2006/10/12 16:00																							Un	Un	Un	Un	Un	Un
305	River	P-5	2006/10/12 19:00																							Un	Un	Un	Un	Un	Un
306	River	P-5	2006/10/12 22:00																							Un	Un	Un	Un	Un	Un
307	River	P-5	2006/10/13 1:00																							Un	Un	Un	Un	Un	Un
308	River	P-5	2006/10/17	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc				MS	MS						
309	River	P-5	2006/11/10 1:00																							Un	Un	Un	Un	Un	Un
310	River	P-5	2006/11/10 4:00																							Un	Un	Un	Un	Un	Un
311	River	P-5	2006/11/10 7:00																							Un	Un	Un	Un	Un	Un
312	River	P-5	2006/11/10 9:00																							Un	Un	Un	Un	Un	Un
313	River	P-5	2006/11/10 11:00																							Un	Un	Un	Un	Un	Un
314	River	P-5	2006/11/10 12:00																							Un	Un	Un	Un	Un	Un
315	River	P-5	2006/11/10 13:00																							Un	Un	Un	Un	Un	Un
316	River	P-5	2006/11/10 15:00																							Un	Un	Un	Un	Un	Un
317	River	P-5	2006/11/10 17:00																							Un	Un	Un	Un	Un	Un
318	River	P-5	2006/11/10 19:00																							Un	Un	Un	Un	Un	Un
319	River	P-5	2006/11/10 21:00																							Un	Un	Un	Un	Un	Un
320	River	P-5	2006/11/10 23:00																							Un	Un	Un	Un	Un	Un
321	River	P-5	2006/11/11 1:00																							Un	Un	Un	Un	Un	Un
322	River	P-5	2006/11/11 5:00																							Un	Un	Un	Un	Un	Un
323	River	P-5	2006/11/11 14:00																							Un	Un	Un	Un	Un	Un
324	River	P-5	2006/11/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
325	River	P-5	2006/12/19	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
326	River	P-5	2007/1/16	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS									
327	River	P-5	2007/2/16	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
328	River	P-5	2007/3/28	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
329	River	P-5	2007/4/17	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
330	River	P-5	2007/5/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
331	River	P-5	2007/6/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
332	River	P-5	2007/7/23	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											

Table 2.3.6 Analytical methods for river, precipitation, spring, and groundwater from the shallow boreholes (9/14)

Index	Sampling point		Sampling date	Physico-chemical parameter					Geochemistry																			
				EC at site	EC at lab	pH at site	pH at lab	Temperature at site	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T.Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-
				[mS/m]	[mS/m]			[℃]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
333	River	P-5	2007/8/21		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
334	River	P-5	2007/9/7 15:40		PM		PM																					
335	River	P-5	2007/9/7 21:40		PM		PM																					
336	River	P-5	2007/9/8 0:40		PM		PM																					
337	River	P-5	2007/9/8 2:40		PM		PM																					
338	River	P-5	2007/9/8 4:40		PM		PM																					
339	River	P-5	2007/9/8 6:40		PM		PM																					
340	River	P-5	2007/9/8 8:40		PM		PM																					
341	River	P-5	2007/9/8 10:40		PM		PM																					
342	River	P-5	2007/9/8 12:40		PM		PM																					
343	River	P-5	2007/9/8 14:40		PM		PM																					
344	River	P-5	2007/9/8 16:40		PM		PM																					
345	River	P-5	2007/9/8 18:40		PM		PM																					
346	River	P-5	2007/9/8 20:40		PM		PM																					
347	River	P-5	2007/9/8 22:40		PM		PM																					
348	River	P-5	2007/9/9 0:40		PM		PM																					
349	River	P-5	2007/9/9 2:40		PM		PM																					
350	River	P-5	2007/9/9 4:40		PM		PM																					
351	River	P-5	2007/9/9 6:40		PM		PM																					
352	River	P-5	2007/9/9 8:40		PM		PM																					
353	River	P-5	2007/9/9 10:40		PM		PM																					
354	River	P-5	2007/9/9 12:40		PM		PM																					
355	River	P-5	2007/9/9 14:40		PM		PM																					
356	River	P-5	2007/9/9 17:40		PM		PM																					
357	River	P-5	2007/9/9 20:40		PM		PM																					
358	River	P-5	2007/9/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
359	River	P-5	2007/10/18		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
360	River	P-5	2007/11/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
361	River	P-5	2007/12/17		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
362	River	P-5	2008/1/16		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
363	River	P-5	2008/2/14		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
364	River	P-5	2008/2/14 16:00		PM		PM																					
365	River	P-5	2008/6/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
366	River	P-5	2008/12/25		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
367	River	P-5	2009/8/6		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
368	River	P-5	2009/12/21		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
369	River	P-5-1	2009/12/4	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
370	River	P-5-2	2009/12/4	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
371	River	P-5-3	2009/12/4	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
372	River	P-5-4	2009/12/4	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
373	River	P-5	2010/10/20		PM		PM	PM	IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	ICP	ICP	ICP		ICP	A	IC	IC	IC
374	River	P-5	2011/2/9		PM		PM	PM	IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	ICP	ICP	ICP		ICP	A	IC	IC	IC
375	Rain	HMS	2003/8/14		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
376	Rain	HMS	2003/10/8		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
377	Rain	HMS	2003/10/20		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
378	Rain	HMS	2003/11/20		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
379	Rain	HMS	2004/5/20		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
380	Rain	HMS	2004/6/22		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
381	Rain	HMS	2004/7/20		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
382	Rain	HMS	2004/8/20		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
383	Rain	HMS	2004/9/17		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
384	Rain	HMS	2004/10/14		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
385	Rain	HMS	2004/11/19		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
386	Rain	HMS	2005/4/19		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
387	Rain	HMS	2005/5/20		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
388	Rain	HMS	2005/6/20		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
389	Rain	HMS	2005/8/19		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
390	Rain	HMS	2005/9/20		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
391	Rain	HMS	2005/10/20		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
392	Rain	HMS	2006/5/22		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
393	Rain	HMS	2006/6/22		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
394	Rain	HMS	2006/7/21		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
395	Rain	HMS	2006/8/21		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
396	Rain	HMS	2006/9/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
397	Rain	HMS	2006/10/17		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
398	Rain	HMS	2006/11/21		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
399	Rain	HMS	2007/5/22		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
400	Rain	HMS	2007/6/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
401	Rain	HMS	2007/7/23		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
402	Rain	HMS	2007/8/21		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
403	Rain	HMS	2007/9/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
404	Rain	HMS	2007/10/18		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
405	Rain	HMS	2007/11/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
406	Rain	HMS	2008/6/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
407	Rain	HMS	2009/8/4		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
408	Rain	HMS	2010/9/6		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	ICP	ICP	ICP		ICP	A	IC	IC	IC
409	Rain&Snow	HMS	2004/12/22		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
410	Rain&Snow	HMS	2005/11/21		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
411	Snow	HMS	2003/12/10		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
412	Snow	HMS	2004/1/6		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
413	Snow	HMS	2004/2/19		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
414	Snow	HMS	2004/4/22		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
415	Snow	HMS	2005/1/20		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC

Table 2.3.6 Analytical methods for river, precipitation, spring, and groundwater from the shallow boreholes (10/14)

Index	Sampling point		Sampling date	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M Alkalinity	M Alkalinity	P Alkalinity	P Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Tracer (uranine)	Tracer (Na-naphtio-nate)	Isotope ^3H	Isotope δD	Isotope $\delta^{18}O$	Chromaticity Suspen-ded solids	Chromaticity Total solids	Chromaticity Ignition loss	Chromaticity Spectral values y	Chromaticity Chromaticity coordinates x,y	Chromaticity Turbidity
				[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]		[meq/l]	[meq/l]	[%]	[mg/l]	[mg/l]	[T.U]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]			[NTU]
333	River	P-5	2007/8/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
334	River	P-5	2007/9/7 15:40																							Un	Un	Un	Un	Un	Un
335	River	P-5	2007/9/7 21:40																							Un	Un	Un	Un	Un	Un
336	River	P-5	2007/9/8 0:40																							Un	Un	Un	Un	Un	Un
337	River	P-5	2007/9/8 2:40																							Un	Un	Un	Un	Un	Un
338	River	P-5	2007/9/8 4:40																							Un	Un	Un	Un	Un	Un
339	River	P-5	2007/9/8 6:40																							Un	Un	Un	Un	Un	Un
340	River	P-5	2007/9/8 8:40																							Un	Un	Un	Un	Un	Un
341	River	P-5	2007/9/8 10:40																							Un	Un	Un	Un	Un	Un
342	River	P-5	2007/9/8 12:40																							Un	Un	Un	Un	Un	Un
343	River	P-5	2007/9/8 14:40																							Un	Un	Un	Un	Un	Un
344	River	P-5	2007/9/8 16:40																							Un	Un	Un	Un	Un	Un
345	River	P-5	2007/9/8 18:40																							Un	Un	Un	Un	Un	Un
346	River	P-5	2007/9/8 20:40																							Un	Un	Un	Un	Un	Un
347	River	P-5	2007/9/8 22:40																							Un	Un	Un	Un	Un	Un
348	River	P-5	2007/9/9 0:40																							Un	Un	Un	Un	Un	Un
349	River	P-5	2007/9/9 2:40																							Un	Un	Un	Un	Un	Un
350	River	P-5	2007/9/9 4:40																							Un	Un	Un	Un	Un	Un
351	River	P-5	2007/9/9 6:40																							Un	Un	Un	Un	Un	Un
352	River	P-5	2007/9/9 8:40																							Un	Un	Un	Un	Un	Un
353	River	P-5	2007/9/9 10:40																							Un	Un	Un	Un	Un	Un
354	River	P-5	2007/9/9 12:40																							Un	Un	Un	Un	Un	Un
355	River	P-5	2007/9/9 14:40																							Un	Un	Un	Un	Un	Un
356	River	P-5	2007/9/9 17:40																							Un	Un	Un	Un	Un	Un
357	River	P-5	2007/9/9 20:40																							Un	Un	Un	Un	Un	Un
358	River	P-5	2007/9/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
359	River	P-5	2007/10/18	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
360	River	P-5	2007/11/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
361	River	P-5	2007/12/17	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
362	River	P-5	2008/1/16	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
363	River	P-5	2008/2/14	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
364	River	P-5	2008/2/14 16:00																							Un	Un	Un	Un	Un	Un
365	River	P-5	2008/6/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
366	River	P-5	2008/12/25	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS	LS	MS	MS						
367	River	P-5	2009/8/6	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
368	River	P-5	2009/12/21	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
369	River	P-5-1	2009/12/4	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
370	River	P-5-2	2009/12/4	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
371	River	P-5-3	2009/12/4	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
372	River	P-5-4	2009/12/4	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
373	River	P-5	2010/10/20	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc			LS	MS	MS						
374	River	P-5	2011/2/9	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc			LS	MS	MS						
375	Rain	HMS	2003/8/14	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
376	Rain	HMS	2003/10/8	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
377	Rain	HMS	2003/10/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
378	Rain	HMS	2003/11/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
379	Rain	HMS	2004/5/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
380	Rain	HMS	2004/6/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
381	Rain	HMS	2004/7/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
382	Rain	HMS	2004/8/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
383	Rain	HMS	2004/9/17	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
384	Rain	HMS	2004/10/14	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
385	Rain	HMS	2004/11/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
386	Rain	HMS	2005/4/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
387	Rain	HMS	2005/5/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
388	Rain	HMS	2005/6/20	IC		A	IC		calc	calc	NT	calc			CS	CS		calc	calc	calc											
389	Rain	HMS	2005/8/19	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
390	Rain	HMS	2005/9/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
391	Rain	HMS	2005/10/20	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
392	Rain	HMS	2006/5/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
393	Rain	HMS	2006/6/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
394	Rain	HMS	2006/7/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
395	Rain	HMS	2006/8/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
396	Rain	HMS	2006/9/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
397	Rain	HMS	2006/10/17	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc				MS	MS						
398	Rain	HMS	2006/11/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
399	Rain	HMS	2007/5/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
400	Rain	HMS	2007/6/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
401	Rain	HMS	2007/7/23	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
402	Rain	HMS	2007/8/21	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
403	Rain	HMS	2007/9/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
404	Rain	HMS	2007/10/18	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
405	Rain	HMS	2007/11/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
406	Rain	HMS	2008/6/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS	LS	MS	MS						
407	Rain	HMS	2009/8/4	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
408	Rain	HMS	2010/9/6	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc			LS	MS	MS						
409	Rain&Snow	HMS	2004/12/22	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
410	Rain&Snow	HMS	2005/11/21	IC		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
411	Snow	HMS	2003/12/10	IC		A	IC	A	calc	calc	calc	calc			CS	CS		calc	calc	calc											
412	Snow	HMS	2004/1/6	IC		A	IC	A	calc	calc	calc	calc			CS	CS		calc	calc	calc											
413	Snow	HMS	2004/2/19	IC		A	IC	A	calc	calc	calc	calc			CS	CS		calc	calc	calc											
414	Snow	HMS	2004/4/22	IC		A	IC	A	calc	calc	calc	calc			CS	CS		calc	calc	calc											
415	Snow	HMS	2005/1/20	IC		A	IC	A	calc	calc	calc	calc			CS	CS		calc	calc	calc											

Table 2.3.6 Analytical methods for river, precipitation, spring, and groundwater from the shallow boreholes (11/14)

Index	Sampling point		Sampling date	Physico-chemical parameter					Geochemistry																			
				EC at site	EC at lab	pH at site	pH at lab	Temperature at site	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T.Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-
				[mS/m]	[mS/m]			[℃]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
416	Snow	HMS	2005/2/18		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
417	Snow	HMS	2005/3/18		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
418	Snow	HMS	2005/12/20		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
419	Snow	HMS	2006/1/23		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
420	Snow	HMS	2006/2/17		PM		PM		FP	FP	ICP	ICP		ICP	ICP	ICP		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	IC
421	Snow	HMS	2006/3/20		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
422	Snow	HMS	2006/4/19		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
423	Snow	HMS	2006/12/19		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
424	Snow	HMS	2007/1/16		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
425	Snow	HMS	2007/2/16		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
426	Snow	HMS	2007/3/28		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
427	Snow	HMS	2007/4/17		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
428	Snow	HMS	2007/12/17		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
429	Snow	HMS	2008/1/16		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
430	Snow	HMS	2008/2/15		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
431	Snow	HMS	2009/1/15		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
432	Snow	HMS	2011/2/9		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	ICP	ICP	ICP		ICP	A	IC	IC	IC
433	Snow	HDB-2	2010/1/5		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
434	Snow	HET	2010/1/5		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
435	Snow	P-3	2010/1/5		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
436	Snow	P-4	2010/1/5		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
437	Snow	P-5	2009/12/21		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
438	Spring	Y3-01	2009/12/9	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
439	Spring	Y3-05	2009/12/7	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
440	Spring	Y3-16	2009/12/9	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
441	Spring	Y4-02	2009/12/7	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
442	Spring	Y4-05	2009/12/7	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
443	Spring	Y4-07	2009/12/7	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
444	Spring	Y4-08	2009/12/7	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
445	Spring	Y4-11	2009/12/7	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
446	Spring	Y5-04	2009/12/7	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
447	Spring	Y5-07	2009/12/7	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
448	Spring	Y5-10	2009/12/7	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
449	Spring	Y5-16	2009/12/7	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
450	Spring	Y5-23	2009/12/8	PM		PM		PM	FP	FP	ICP	ICP		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	IC	IC	IC	ISE
451	Shallow Groundwater	A-1	2006/12/22		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
452	Shallow Groundwater	A-1	2007/3/2		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
453	Shallow Groundwater	A-1	2007/5/22		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
454	Shallow Groundwater	A-1	2007/8/4		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
455	Shallow Groundwater	A-1	2007/11/8		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
456	Shallow Groundwater	A-1	2008/2/5		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
457	Shallow Groundwater	A-1	2008/8/1		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
458	Shallow Groundwater	A-1	2008/11/4		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
459	Shallow Groundwater	A-1	2009/2/2		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
460	Shallow Groundwater	A-1	2009/8/3		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
461	Shallow Groundwater	A-1	2009/11/2		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
462	Shallow Groundwater	A-1	2010/2/1		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
463	Shallow Groundwater	A-2	2006/12/22		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
464	Shallow Groundwater	A-2	2007/3/2		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
465	Shallow Groundwater	A-2	2007/5/22		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
466	Shallow Groundwater	A-2	2007/8/4		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
467	Shallow Groundwater	A-2	2007/11/8		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
468	Shallow Groundwater	A-2	2008/2/5		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
469	Shallow Groundwater	A-2	2008/8/1		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
470	Shallow Groundwater	A-2	2008/11/4		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
471	Shallow Groundwater	A-2	2009/2/2		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
472	Shallow Groundwater	A-2	2009/8/3		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
473	Shallow Groundwater	A-2	2009/11/2		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
474	Shallow Groundwater	A-2	2010/2/1		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC

Table 2.3.6 Analytical methods for river, precipitation, spring, and groundwater from the shallow boreholes (12/14)

Index	Sampling point		Sampling date	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M Alkalinity	M Alkalinity	P Alkalinity	P Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Tracer (uranine)	Tracer (Na-naphtio-nate)	Isotope ^3H	Isotope δD	Isotope $\delta^{18}O$	Chromaticity Suspen-ded solids	Chromaticity Total solids	Chromaticity Ignition loss	Chromaticity Spectral values y	Chromaticity Chromaticity coordinates x,y	Chromaticity Turbidity
				[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]		[meq/l]	[meq/l]	[%]	[mg/l]	[mg/l]	[T.U]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]			[NTU]
416	Snow	HMS	2005/2/18	IC		A	IC	A	calc	calc	calc	calc			CS	CS		calc	calc	calc											
417	Snow	HMS	2005/3/18	IC		A	IC	A	calc	calc	calc	calc			CS	CS		calc	calc	calc											
418	Snow	HMS	2005/12/20	IC		A	IC	A	calc	calc	calc	calc			CS	CS		calc	calc	calc											
419	Snow	HMS	2006/1/23	IC		A	IC	A	calc	calc	calc	calc			CS	CS		calc	calc	calc											
420	Snow	HMS	2006/2/17	IC		A	IC	A	calc	calc	calc	calc			CS	CS		calc	calc	calc											
421	Snow	HMS	2006/3/20	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
422	Snow	HMS	2006/4/19	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
423	Snow	HMS	2006/12/19	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
424	Snow	HMS	2007/1/16	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
425	Snow	HMS	2007/2/16	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
426	Snow	HMS	2007/3/28	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
427	Snow	HMS	2007/4/17	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
428	Snow	HMS	2007/12/17	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
429	Snow	HMS	2008/1/16	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
430	Snow	HMS	2008/2/15	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
431	Snow	HMS	2009/1/15	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
432	Snow	HMS	2011/2/9	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc			LS	MS	MS						
433	Snow	HDB-2	2010/1/5	IC		A	IC	A	calc	calc					CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
434	Snow	HET	2010/1/5	IC		A	IC	A	calc	calc					CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
435	Snow	P-3	2010/1/5	IC		A	IC	A	calc	calc					CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
436	Snow	P-4	2010/1/5	IC		A	IC	A	calc	calc					CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
437	Snow	P-5	2009/12/21	IC		A	IC	A	calc	calc					CS	CS		calc	calc	calc	HPLC	HPLC	MS	MS	MS						
438	Spring	Y3-01	2009/12/9	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
439	Spring	Y3-05	2009/12/7	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
440	Spring	Y3-16	2009/12/9	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
441	Spring	Y4-02	2009/12/7	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
442	Spring	Y4-05	2009/12/7	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
443	Spring	Y4-07	2009/12/7	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
444	Spring	Y4-08	2009/12/7	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
445	Spring	Y4-11	2009/12/7	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
446	Spring	Y5-04	2009/12/7	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
447	Spring	Y5-07	2009/12/7	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
448	Spring	Y5-10	2009/12/7	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
449	Spring	Y5-16	2009/12/7	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
450	Spring	Y5-23	2009/12/8	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc			LS	MS	MS						
451	Shallow Groundwater	A-1	2006/12/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS		MS	MS						
452	Shallow Groundwater	A-1	2007/3/2	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
453	Shallow Groundwater	A-1	2007/5/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
454	Shallow Groundwater	A-1	2007/8/4	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
455	Shallow Groundwater	A-1	2007/11/8	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
456	Shallow Groundwater	A-1	2008/2/5	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
457	Shallow Groundwater	A-1	2008/8/1	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
458	Shallow Groundwater	A-1	2008/11/4	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS	LS	MS	MS						
459	Shallow Groundwater	A-1	2009/2/2	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
460	Shallow Groundwater	A-1	2009/8/3	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
461	Shallow Groundwater	A-1	2009/11/2	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
462	Shallow Groundwater	A-1	2010/2/1	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
463	Shallow Groundwater	A-2	2006/12/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS									
464	Shallow Groundwater	A-2	2007/3/2	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
465	Shallow Groundwater	A-2	2007/5/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
466	Shallow Groundwater	A-2	2007/8/4	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
467	Shallow Groundwater	A-2	2007/11/8	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
468	Shallow Groundwater	A-2	2008/2/5	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
469	Shallow Groundwater	A-2	2008/8/1	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
470	Shallow Groundwater	A-2	2008/11/4	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS	LS	MS	MS						
471	Shallow Groundwater	A-2	2009/2/2	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
472	Shallow Groundwater	A-2	2009/8/3	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
473	Shallow Groundwater	A-2	2009/11/2	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
474	Shallow Groundwater	A-2	2010/2/1	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											

Table 2.3.6 Analytical methods for river, precipitation, spring, and groundwater from the shallow boreholes (13/14)

Index	Sampling point		Sampling date	Physico-chemical parameter					Geochemistry																			
				EC at site	EC at lab	pH at site	pH at lab	Temperature at site	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T.Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-
				[mS/m]	[mS/m]			[℃]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
475	Shallow Groundwater	A-3	2006/12/22		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
476	Shallow Groundwater	A-3	2007/3/2		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
477	Shallow Groundwater	A-3	2007/5/22		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
478	Shallow Groundwater	A-3	2007/8/4		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
479	Shallow Groundwater	A-3	2007/11/8		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
480	Shallow Groundwater	A-3	2008/2/5		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
481	Shallow Groundwater	A-3	2008/8/1		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
482	Shallow Groundwater	A-3	2008/11/4		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
483	Shallow Groundwater	A-3	2009/2/2		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
484	Shallow Groundwater	A-3	2009/8/3		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
485	Shallow Groundwater	A-3	2009/11/2		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
486	Shallow Groundwater	A-3	2010/2/1		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
487	Shallow Groundwater	A-4	2006/12/22		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
488	Shallow Groundwater	A-4	2007/3/2		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
489	Shallow Groundwater	A-4	2007/5/22		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
490	Shallow Groundwater	A-4	2007/8/4		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
491	Shallow Groundwater	A-4	2007/11/8		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
492	Shallow Groundwater	A-4	2008/2/5		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
493	Shallow Groundwater	A-4	2008/8/1		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
494	Shallow Groundwater	A-4	2008/11/4		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
495	Shallow Groundwater	A-4	2009/2/2		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
496	Shallow Groundwater	A-4	2009/8/3		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
497	Shallow Groundwater	A-4	2009/11/2		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
498	Shallow Groundwater	A-4	2010/2/1		PM		PM		IC	IC	IC	IC		ICP	ICP	A		ICP	AAS	A	ICP	ICP		ICP	A	IC	IC	IC
499	Shallow Groundwater	well	2007/6/4		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
500	Shallow Groundwater	well	2007/11/5		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
501	Shallow Groundwater	well	2007/12/3		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
502	Shallow Groundwater	well	2008/1/7		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
503	Shallow Groundwater	well	2008/2/8		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE
504	Shallow Groundwater	well	2008/6/5		PM		PM		FP	FP	FP, ICP	FP, ICP		FP, AAS,ICP	FP, ICP	A		FP, ICP	AAS	A	ICP	FP, AAS,ICP		AAS,ICP	IC	IC	IC	ISE

Table 2.3.6 Analytical methods for river, precipitation, spring, and groundwater from the shallow boreholes (14/14)

Index	Sampling point		Sampling date	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M Alkalinity	M Alkalinity	P Alkalinity	P Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Tracer (uranine)	Tracer (Na-naphtio-nate)	Isotope ^3H	Isotope δD	Isotope $\delta^{18}O$	Chromaticity Suspen-ded solids	Chromaticity Total solids	Chromaticity Ignition loss	Chromaticity Spectral values y	Chromaticity Chromaticity coordinates x,y	Chromaticity Turbidity
				[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]		[meq/l]	[meq/l]	[%]	[mg/l]	[mg/l]	[T.U]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]			[NTU]
475	Shallow Groundwater	A-3	2006/12/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS		MS	MS						
476	Shallow Groundwater	A-3	2007/3/2	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
477	Shallow Groundwater	A-3	2007/5/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
478	Shallow Groundwater	A-3	2007/8/4	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
479	Shallow Groundwater	A-3	2007/11/8	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
480	Shallow Groundwater	A-3	2008/2/5	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
481	Shallow Groundwater	A-3	2008/8/1	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
482	Shallow Groundwater	A-3	2008/11/4	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS	LS	MS	MS						
483	Shallow Groundwater	A-3	2009/2/2	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
484	Shallow Groundwater	A-3	2009/8/3	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
485	Shallow Groundwater	A-3	2009/11/2	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
486	Shallow Groundwater	A-3	2010/2/1	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
487	Shallow Groundwater	A-4	2006/12/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS		MS	MS						
488	Shallow Groundwater	A-4	2007/3/2	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
489	Shallow Groundwater	A-4	2007/5/22	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
490	Shallow Groundwater	A-4	2007/8/4	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
491	Shallow Groundwater	A-4	2007/11/8	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
492	Shallow Groundwater	A-4	2008/2/5	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
493	Shallow Groundwater	A-4	2008/8/1	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
494	Shallow Groundwater	A-4	2008/11/4	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS	LS	MS	MS						
495	Shallow Groundwater	A-4	2009/2/2	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
496	Shallow Groundwater	A-4	2009/8/3	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
497	Shallow Groundwater	A-4	2009/11/2	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
498	Shallow Groundwater	A-4	2010/2/1	IC		A	IC	A	calc	calc	NT				CS	CS		calc	calc	calc											
499	Shallow Groundwater	well	2007/6/4	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc											
500	Shallow Groundwater	well	2007/11/5	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS	LS	MS	MS						
501	Shallow Groundwater	well	2007/12/3	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS	LS	MS	MS						
502	Shallow Groundwater	well	2008/1/7	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS	LS	MS	MS						
503	Shallow Groundwater	well	2008/2/8	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS	LS	MS	MS						
504	Shallow Groundwater	well	2008/6/5	A		A	IC	A	calc	calc	NT	calc			CS	CS		calc	calc	calc		FS	LS	MS	MS						

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater

Deep boreholes from the surface area

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Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (1/64)

Index	Sample point	sampling zone (GL) Min. [m]	sampling zone (GL) Max. [m]	sampling zone (EL) Min. [m]	sampling zone (EL) Max. [m]	sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII) X	Y	Z (middle depth)	location (WGS84, UTM, Zone54) East	North	Z (middle depth)	Physico-chemical parameter EC at site [mS/m]	EC at lab [mS/m]	pH at site	pH at lab	ORP Observ. [mV]	ORP SHE [mV]	Temper-ature at site [℃]	Contamination indicator Tracer (uranine) [mg/l]	Tracer (Na-naphtionate) [mg/l]	Tracer (amino G acid) [mg/l]	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	Comments
Deep boreholes from the surface area																													
1	HDB-1	54	56	15.102	13.102				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	14.102	568102.257803	4987758.417428	14.102		202.7										pore water extraction: centrifugation
2	HDB-1	54	56	15.102	13.102				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	14.102	568102.257803	4987758.417428	14.102		227.3										pore water extraction: squeeze (4MPa)
3	HDB-1	54	56	15.102	13.102				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	14.102	568102.257803	4987758.417428	14.102		264.5										pore water extraction: squeeze (5MPa)
4	HDB-1	109.3	111.6	-40.198	-42.498				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-41.348	568102.257803	4987758.417428	-41.348		378.2										pore water extraction: centrifugation
5	HDB-1	109.3	111.6	-40.198	-42.498				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-41.348	568102.257803	4987758.417428	-41.348		429.8										pore water extraction: squeeze (4MPa)
6	HDB-1	109.3	111.6	-40.198	-42.498				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-41.348	568102.257803	4987758.417428	-41.348		429.8										pore water extraction: squeeze (6MPa)
7	HDB-1	130	131	-60.898	-61.898				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-61.398	568102.257803	4987758.417428	-61.398		507.1										
8	HDB-1	164.03	165.92	-94.928	-96.818				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-95.873	568102.257803	4987758.417428	-95.873												
9	HDB-1	222.7	224	-153.598	-154.898				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-154.248	568102.257803	4987758.417428	-154.248												pore water extraction: centrifugation
10	HDB-1	222.7	224	-153.598	-154.898				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-154.248	568102.257803	4987758.417428	-154.248		780.6										pore water extraction: squeeze (4MPa)
11	HDB-1	222.7	224	-153.598	-154.898				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-154.248	568102.257803	4987758.417428	-154.248		894										pore water extraction: squeeze (8MPa)
12	HDB-1	222.7	224	-153.598	-154.898				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-154.248	568102.257803	4987758.417428	-154.248		879.7										pore water extraction: squeeze (14MPa)
13	HDB-1	222.7	224	-153.598	-154.898				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-154.248	568102.257803	4987758.417428	-154.248		865.4										pore water extraction: squeeze (22MPa)
14	HDB-1	271.23	273.93	-202.128	-204.828				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-203.478	568102.257803	4987758.417428	-203.478												
15	HDB-1	311.1	312	-241.998	-242.898				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-242.448	568102.257803	4987758.417428	-242.448		1083.7										pore water extraction: squeeze (6MPa)
16	HDB-1	311.1	312	-241.998	-242.898				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-242.448	568102.257803	4987758.417428	-242.448		1098.6										pore water extraction: squeeze (10MPa)
17	HDB-1	311.1	312	-241.998	-242.898				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-242.448	568102.257803	4987758.417428	-242.448		1098.6										pore water extraction: squeeze (18MPa)
18	HDB-1	311.1	312	-241.998	-242.898				core	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-242.448	568102.257803	4987758.417428	-242.448		1068.9										pore water extraction: squeeze (26MPa)
19	HDB-1	345	346	-275.898	-276.898				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	115628.843076	-30357.385516	-276.398	568102.257803	4987758.417428	-276.398												
20	HDB-1	380	381	-310.898	-311.898				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	115628.843076	-30357.385516	-311.398	568102.257803	4987758.417428	-311.398		1211.7										
21	HDB-1	400.05	401	-330.948	-331.898				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	115628.843076	-30357.385516	-331.423	568102.257803	4987758.417428	-331.423		1234.3										
22	HDB-1	443	444	-373.898	-374.898				core	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-374.398	568102.257803	4987758.417428	-374.398		1454										
23	HDB-1	455	456	-385.898	-386.898				core	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-386.398	568102.257803	4987758.417428	-386.398												
24	HDB-1	493	494	-423.898	-424.898				core	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-424.398	568102.257803	4987758.417428	-424.398												
25	HDB-1	514	515	-444.898	-445.898				core	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-445.398	568102.257803	4987758.417428	-445.398		1759.4										pore water extraction: squeeze (35MPa)
26	HDB-1	514	515	-444.898	-445.898				core	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-445.398	568102.257803	4987758.417428	-445.398		2256.9										pore water extraction: squeeze (70MPa)
27	HDB-1	545	546	-475.898	-476.898				core	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-476.398	568102.257803	4987758.417428	-476.398												
28	HDB-1	556.05	556.8	-486.948	-487.698				core	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-487.323	568102.257803	4987758.417428	-487.323		1435.9										pore water extraction: squeeze (40MPa)
29	HDB-1	556.05	556.8	-486.948	-487.698				core	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-487.323	568102.257803	4987758.417428	-487.323		1467.6										pore water extraction: squeeze (70MPa)
30	HDB-1	597.35	598	-528.248	-528.898				core	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-528.573	568102.257803	4987758.417428	-528.573												
31	HDB-1	609.7	610	-540.598	-540.898				core	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-540.748	568102.257803	4987758.417428	-540.748		5923.4										pore water extraction: squeeze (50MPa)
32	HDB-1	609.7	610	-540.598	-540.898				core	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-540.748	568102.257803	4987758.417428	-540.748		5486.1										pore water extraction: squeeze (70MPa)
33	HDB-1	648.2	650	-579.098	-580.898				core	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-579.998	568102.257803	4987758.417428	-579.998												
34	HDB-1	704.15	705	-635.048	-635.898				core	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-635.473	568102.257803	4987758.417428	-635.473		5486.1										
35	HDB-1	548	568.18	-478.898	-499.078		2002/4/27		pump	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-488.988	568102.257803	4987758.417428	-488.988		22.1		8.1				11.9		A		
36	HDB-1	548	568.18	-478.898	-499.078		2002/4/30		pump	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-488.988	568102.257803	4987758.417428	-488.988		1420		7.7				3.0		A		
37	HDB-1	548	568.18	-478.898	-499.078		2002/5/1		pump	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-488.988	568102.257803	4987758.417428	-488.988	1052	2120	6.9	7.7	-76	130		2.5		A		
38	HDB-1	548	568.18	-478.898	-499.078		2002/5/2		pump	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-488.988	568102.257803	4987758.417428	-488.988		2450		7.7				2.1		A		
39	HDB-1	548	568.18	-478.898	-499.078		2002/5/3		pump	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-488.988	568102.257803	4987758.417428	-488.988	1254	2560	6.9	7.9			12.4	1.1		A		
40	HDB-1	548	568.18	-478.898	-499.078		2002/5/4		pump	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-488.988	568102.257803	4987758.417428	-488.988		2850		7.7								
41	HDB-1						2001/12/11		river (up the stream)									9.4	9.93	7.4	6.76			20.2	<0.1		A		
42	HDB-1						2002/1/17		river (up the stream)									13	10.99	8.4	6.76			19.1	<0.1		A		
43	HDB-1						2002/2/15		river (up the stream)									11.1		7.2				19.4	<0.1		A		
44	HDB-1						2002/3/16		river (up the stream)									8.47	10	6.4	6.67			19	<0.1		A		
45	HDB-1						2002/4/15		river (up the stream)									6.28		6.6				22	<0.1		A		
46	HDB-1						2001/12/17		river (down the stream)									13.9	14.33	6.8	6.42			20.2	<0.1		A		
47	HDB-1						2002/1/17		river (down the stream)									16.7	17.59	7.4	6.48			18.9	<0.1		A		
48	HDB-1						2002/2/16		river (down the stream)									17.4		7.1				19.3	<0.1		A		
49	HDB-1						2002/3/16		river (down the stream)									13.3	15.48	5.2	5.48			18.8	<0.1		A		
50	HDB-1						2002/4/15		river (down the stream)									6.71		6.8				22.2	<0.1		A		
51	HDB-1						2002/1/27		well																				
52	HDB-1						2002/3/12		well																				
53	HDB-1						2002/3/20		well									14.2		7.3									
54	HDB-1						2002/4/16		well																				
55	HDB-1						2002/4/19		well																				
56	HDB-1	9		60.102			2001/10/31		return	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	60.102	568102.257803	4987758.417428	60.102	719	653	12.8	12.5			12.3	5.67		A		
57	HDB-1	30	reaming	39.102			2001/11/5		return	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	39.102	568102.257803	4987758.417428	39.102	32.6	31.9	8.2	8.2			11.8	6.85		A		
58	HDB-1	55.9		13.202			2001/11/10		return	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	13.202	568102.257803	4987758.417428	13.202	35	25.8	11.2	10.5			10.7	12.51		A		
59	HDB-1	173.9		-104.798			2001/12/1		return	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-104.798	568102.257803	4987758.417428	-104.798	63.2	70	10.4	9.9			7.9	10.25		A		
60	HDB-1	199.68		-130.578			2001/12/9		return	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-130.576	568102.257803	4987758.417428	-130.576	60.7	69	9.1	9.6			9.4	8.41		A		
61	HDB-1	191	reaming	-121.898			2001/12/27		return	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-121.898	568102.257803	4987758.417428	-121.898	125	138.4	9.1	8.8			11	8.01		A		
62	HDB-1	220.33		-151.228			2002/1/3		return	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-151.228	568102.257803	4987758.417428	-151.228	143.5	31.5	12.3	9.6			12.1	8.47		A		
63	HDB-1	265.59		-196.488			2002/1/7		return	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-196.488	568102.257803	4987758.417428	-196.488	94.2	103	12.6	8.5			12.6	9.77		A		
64	HDB-1	282.45		-213.348			2002/1/10		return	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-213.348	568102.257803	4987758.417428	-213.348	155	157	9.5	9			10.7	9.29		A		
65	HDB-1	309.76		-240.658			2002/1/14		return	Koetoi Fm.	diatomaceous mudstone	115628.843076	-30357.385516	-240.658	568102.257803	4987758.417428	-240.658	187.3	186	8.5	8.8			13.8	6.31		A		
66	HDB-1	330.55		-261.448			2002/1/17		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	115628.843076	-30357.385516	-261.448	568102.257803	4987758.417428	-261.448	195.7	226	8.5	8.4			12	5.27		A		
67	HDB-1	366.64		-297.538			2002/1/21		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	115628.843076	-30357.385516	-297.538	568102.257803	4987758.417428	-297.538	198.6	265	8.4	8.7			14.3	5.53		A		
68	HDB-1	392.65		-323.548			2002/1/24		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	115628.843076	-30357.385516	-323.548	568102.257803	4987758.417428	-323.548	209	259	8.3	8.8			15.4	3.70		A		
69	HDB-1	405.55		-336.448			2002/1/25		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	115628.843076	-30357.385516	-336.448	568102.257803	4987758.417428	-336.448	208		8.3				15.8	2.73		A		
70	HDB-1	415.02		-345.918			2002/1/27		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	115628.843076	-30357.385516	-345.918	568102.257803	4987758.417428	-345.918	214		8.3				13	2.79		A		
71	HDB-1	421.28		-352.178			2002/3/4		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	115628.843076	-30357.385516	-352.178	568102.257803	4987758.417428	-352.178	202	115	11.6	9.8			16.3	10.67		A		
72	HDB-1	436.62		-367.518			2002/3/8		return	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-367.518	568102.257803	4987758.417428	-367.518	170.7	77.3	10.3	9.2			16.8	8.24		A		
73	HDB-1	452.13		-383.028			2002/3/11		return	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-383.028	568102.257803	4987758.417428	-383.028	306	408	8.4	8.6			17	5.38		A		
74	HDB-1	479.96		-410.858			2002/3/14		return	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-410.858	568102.257803	4987758.417428	-410.858	403	470	8.0	8.5			21.2	8.51		A		
75	HDB-1	523.54		-454.438			2002/3/19		return	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-454.438	568102.257803	4987758.417428	-454.438	392	588	7.9	8.2			18.7	8.12		A		
76	HDB-1	554.61		-485.508			2002/3/21		return	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-485.508	568102.257803	4987758.417428	-485.508	409	442	8.9	8.6			21.1	8.03		A		
77	HDB-1	592.55		-523.448			2002/3/25		return	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-523.448	568102.257803	4987758.417428	-523.448	436	448	7.8	8.8			22	12.01		A		
78	HDB-1	618.11		-549.008			2002/3/28		return	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-549.008	568102.257803	4987758.417428	-549.008	446	271	9.5	8.8			24.8	8.23		A		
79	HDB-1	648.91		-579.808			2002/4/1		return	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-579.808	568102.257803	4987758.417428	-579.808	504	585	8.7	9.1			23.9	7.70		A		
80	HDB-1	677.78		-608.678			2002/4/4		return	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-608.678	568102.257803	4987758.417428	-608.678	494	501	8.2	8.6			23.5	8.42		A		
81	HDB-1	711.62		-642.518			2002/4/8		return	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-642.518	568102.257803	4987758.417428	-642.518	381	283	8.1	8.6			23	8.58		A		
82	HDB-1	720		-650.898			2002/4/9		return	Wakkanai Fm.	siliceous mudstone	115628.843076	-30357.385516	-650.898	568102.257803	4987758.417428	-650.898	398		8.1				24.7	8.70		A		
83	HDB-2	45	45.9	-2.471	-3.371				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-2.921	572478.747392	4983002.942185	-2.921		252										pore water extraction: squeeze (20MPa)
84	HDB-2	45	45.9	-2.471	-3.371				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-2.921	572478.747392	4983002.942185	-2.921		264.5										pore water extraction: squeeze (24MPa)
85	HDB-2	45	45.9	-2.471	-3.371				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-2.921	572478.747392	4983002.942185	-2.921		227.3										pore water extraction: squeeze (30MPa)
86	HDB-2	128	130	-85.471	-87.471				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-86.471	572478.747392	4983002.942185	-86.471		752.6										
87	HDB-2	151	157.84	-108.471	-115.311				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-111.891	572478.747392	4983002.942185	-111.891												
88	HDB-2	204	205.9	-161.471	-163.371				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-162.421	572478.747392	4983002.942185	-162.421		1859.6										
89	HDB-2	254	255	-211.471	-212.471				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-211.971	572478.747392	4983002.942185	-211.971												
90	HDB-2	290	290.82	-247.471	-248.291				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-247.881	572478.747392	4983002.942185	-247.881		2047										pore water extraction: squeeze (40MPa)
91	HDB-2	290	290.82	-247.471	-248.291				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-247.881	572478.747392	4983002.942185	-247.881		1826										pore water extraction: squeeze (<70MPa)

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (2/64)

Index	Sample point	sampling zone (GL) Min.	sampling zone (GL) Max.	sampling zone (EL) Min.	sampling zone (EL) Max.	sampling zone No.	sampling date	Geochemistry Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
Deep boreholes from the surface area																																												
1	HDB-1	54	56	15.102	13.102			690	97	220	98													100						2200											51.5	48.6	3.0
2	HDB-1	54	56	15.102	13.102																																							
3	HDB-1	54	56	15.102	13.102																																							
4	HDB-1	109.3	111.6	-40.198	-42.498			1500	130	110	52													300						3100											78.3	72.9	3.6
5	HDB-1	109.3	111.6	-40.198	-42.498																																							
6	HDB-1	109.3	111.6	-40.198	-42.498																																							
7	HDB-1	130	131	-60.898	-61.898			1700	140	97	36													600						3200											85.3	83.4	1.1
8	HDB-1	164.03	165.92	-94.928	-96.818			2000	110	59	35													2000						2200											95.6	102.1	-3.3
9	HDB-1	222.7	224	-153.598	-154.898			3700	190	380	180													2000						7200											199.5	206.0	-1.6
10	HDB-1	222.7	224	-153.598	-154.898																																							
11	HDB-1	222.7	224	-153.598	-154.898																																							
12	HDB-1	222.7	224	-153.598	-154.898																																							
13	HDB-1	222.7	224	-153.598	-154.898																																							
14	HDB-1	271.23	273.93	-202.128	-204.828			2700	150	72	54													3400						2200											129.3	141.5	-4.5
15	HDB-1	311.1	312	-241.998	-242.898			4400	200	150	100													5000						3400											212.1	211.5	0.1
16	HDB-1	311.1	312	-241.998	-242.898																																							
17	HDB-1	311.1	312	-241.998	-242.898																																							
18	HDB-1	311.1	312	-241.998	-242.898																																							
19	HDB-1	345	346	-275.898	-276.898			3000	120	68	56													4100						1900											141.5	155.0	-4.5
20	HDB-1	380	381	-310.898	-311.898			5100	150	280	150													5300						5300											251.9	259.5	-1.5
21	HDB-1	400.05	401	-330.948	-331.898			5400	180	290	200													5300						6000											270.3	274.0	-0.7
22	HDB-1	443	444	-373.898	-374.898			5800	190	230	180													6900						4000											283.3	277.5	1.0
23	HDB-1	455	456	-385.898	-386.898			5000	160	140	110													8100						800											237.5	244.8	-1.5
24	HDB-1	493	494	-423.898	-424.898			6600	340	316	190													9700						3200											327.1	339.8	-1.9
25	HDB-1	514	515	-444.898	-445.898			6200	120	140	150													9500						1200											292.0	292.6	-0.1
26	HDB-1	514	515	-444.898	-445.898																																							
27	HDB-1	545	546	-475.898	-476.898			6100	170	61	84													10000						900											279.5	300.4	-3.6
28	HDB-1	556.05	556.8	-486.948	-487.698			5900	120	180	140													8700						1700											280.1	280.4	-0.1
29	HDB-1	556.05	556.8	-486.948	-487.698																																							
30	HDB-1	597.35	598	-528.248	-528.898			7700	330	430	260													9700						4800											386.1	373.0	1.7
31	HDB-1	609.7	610	-540.598	-540.898			9900	180	560	890													9400						13100											536.2	537.1	-0.1
32	HDB-1	609.7	610	-540.598	-540.898																																							
33	HDB-1	648.2	650	-579.098	-580.898			6300	170	210	140													10400						300											300.3	299.2	0.2
34	HDB-1	704.15	705	-635.048	-635.898			11000	190	510	1000													9700						14500											590.9	574.7	1.4
35	HDB-1	548	568.18	-478.898	-499.078		2002/4/27	26	2	16.6	2.2	<0.01		0.02	33		0.11				0.04	0.01	0.1	0.25	25.7	0.1		0.93	0.43	0.1	11.8		79.5		64.2				17	14		2.2	2.3	-0.1
36	HDB-1	548	568.18	-478.898	-499.078		2002/4/30	2920	110	91.9	53.5	0.46		5.4	48		1.4				0.34	0.01	0.1	0.1	4120	0.1		0.1	0.16	76	140		1301		1050				15	260		143.0	140.3	0.9
37	HDB-1	548	568.18	-478.898	-499.078		2002/5/1	4360	160	150	94	0.5		7.8	49		2.4				0.02	0.01	0.1	0.1	6640	0.1		0.1	0.18	110	110		1809		1460				22	340		215.0	219.0	-0.9
38	HDB-1	548	568.18	-478.898	-499.078		2002/5/2	5010	174	180	111	0.45		9.1	47		2.8				0.02	0.01	0.1	0.1	7330	0.1		0.1	0.22	120	97.6		2056		1660				13	360		247.1	242.2	1.0
39	HDB-1	548	568.18	-478.898	-499.078		2002/5/3	5140	170	180	120	0.41		9.5	49		2.97	0.001	0.05		2.9	0.01	0.1	0.1	7500	0.1	16	0.1	0.18	130	96.7		2155		1740				10	390		253.9	248.6	1.1
40	HDB-1	548	568.18	-478.898	-499.078		2002/5/4	5850	181	200	140	0.25		14	50		3.42				0.04	0.01	0.1	0.1	8920	0.1		0.1	0.16	130	62.2		2366		1910				11	380		287.7	291.4	-0.6
41	HDB-1						2001/12/11	12	1.5	3.5	1.7	<0.01		0.01	32		0.04				0.07	0.03	0.1	0.1	15	0.1		1.5	0.1	4.6	8.6		19		13				3	4		1.1	0.9	0.2
42	HDB-1						2002/1/17	13	1.8	4	1.9	<0.01		0.01	30		0.04				0.21	0.02	0.1	0.1	13	0.1		0.1	1.6	0.1	9.1		40		32.5		1		3	4		1.0	1.2	-0.3
43	HDB-1						2002/2/15	13	1.4	4.6	2.2	<0.01		0.01	31		0.04				0.15	0.01	0.1	0.1	15	0.2		1.8	0.1	0.1	11		22		18.4				3	5		1.0	1.1	0.0
44	HDB-1						2002/3/16	10	1.5	3.5	1.7	0.02		0.01	22		0.03				0.07	0.01	0.1	0.1	18	0.1		3.3	0.1	0.12	7.6		7.4		6.04				3	2		0.8	0.8	-0.1
45	HDB-1						2002/4/15	9	2.1	1.6	0.67	<0.01		0.01	35		0.02				0.03	0.01	0.1	0.1	12	0.1		1.5	0.2	0.1	6.8		4.6		3.78				2	1		0.6	0.6	0.0
46	HDB-1						2001/12/17	15	1.7	5.5	3	0.08		0.02	33		0.04				0.03	0.01	0.1	0.1	16	0.1		1.3	0.1	0.4	24		12		10				3	3		1.2	1.2	0.1
47	HDB-1						2002/1/17	18	2.2	3.6	2.3	<0.01		0.01	32		0.02				0.16	0.01	0.1	0.1	16	0.1		1	0.1	0.3	12		17		14.1				3	4		1.2	1.0	0.2
48	HDB-1						2002/2/16	18	1.8	7.9	4	0.11		0.03	30		0.06				0.09	0.01	0.1	0.1	19	0.2		1.5	0.1	0.3	34		16		13.1				3	3		1.6	1.5	0.0
49	HDB-1						2002/3/16	12	1.5	6.4	3.3	0.1		0.01	22		0.05				0.14	0.01	0.2	0.1	18	0.1		2.7	0.1	0.13	32	1.8	1.8		1.51				1	1		1.2	1.3	-0.1
50	HDB-1						2002/4/15	8.8	2	1.9	0.92	<0.01		0.01	32		0.02				0.05	0.01	0.1	0.1	12	0.1		1.1	0.3	0.1	8.7		4.6		3.78				2	1		0.6	0.6	0.0
51	HDB-1						2002/1/27																																					
52	HDB-1						2002/3/12																																					
53	HDB-1						2002/3/20	14	1.5	6.1	3.7	<0.01		<0.01	29		0.04				0.05	<0.01	<0.1	0.2	18	0.4		0.4	<0.1	<0.1	4.4	<0.1	42		35				<1	9		1.3	1.3	0.0
54	HDB-1						2002/4/16																																					
55	HDB-1						2002/4/19																																					
56	HDB-1	9		60.102			2001/10/31	53	31	649	<0.1	<0.01		0.1	5		6.9				0.05	0.01	1	0.1	512	0.1		0.8	0.2	1.6	4			72	1200		1140		15	4		35.7	36.8	-1.5
57	HDB-1	30	reaming	39.102			2001/11/5	17	4.8	24	7.1	0.04		0.06	32		0.12				0.07	0.01	0.2	0.4	31	0.1		0.5	0.3	2.73	37		85		69.6				17	18		2.8	3.1	-0.3
58	HDB-1	55.9		13.202			2001/11/10	12	19	31	0.14	<0.01		0.02	48		0.15				0.06	0.01	0.1	0.4	19	0.1		0.6	0.1	5.5	20			12	75.6		56.3		9	6		2.9	2.7	0.2
59	HDB-1	173.9		-104.798			2001/12/1	137	18	11	0.63	0.02		0.23	101		0.04				4.2	0.13	7.9	0.1	57	0.1		0.1	0.1	26	35		5	143	242		119		51	44		9.4	7.5	11.1
60	HDB-1	199.68		-130.578			2001/12/9	130	19	5.4	0.54	<0.01		0.83	192		0.02				0.83	0.07	1.8	0.3	79	0.1		0.5	0.5	12	50		71	39	189		65.3		41	35		7.3	5.9	11.2
61	HDB-1	191	reaming	-121.898			2001/12/27	181	23	8.9	1.8	0.02		0.24	57		0.06				1.6	0.28	1.1	0.42	151	1		1.2	0.2	19	63		382	45	389		37.7		54	95		10.3	13.5	-13.6
62	HDB-1	220.33		-151.228			2002/1/3	51	6.1	13	<0.1	<0.01		0.06	32		0.2				0.01	0.01	0.4	0.3	36	0.2		0.3	0.6	7.4	26		34	21	62.9		17.6		7	15		3.5	2.9	0.6
63	HDB-1	265.59		-196.488			2002/1/7	189	10	6	0.3	<0.01		0.31	58		0.03				0.35	0.28	0.2	0.4	128	0.9		0.2	1.3	20	62		233	5	199		3.8		11	8		10.0	9.0	5.4
64	HDB-1	282.45		-213.348			2002/1/10	322	10	3.7	0.6	0.01		0.38	43		0.04				0.67	0.36	0.5	0.6	258	1.8		0.1	0.24	5.8	121		268	30	270		25.2		73	70		14.9	15.3	-1.2
65	HDB-1	309.76		-240.658			2002/1/14	392	13	7.4	1.5	0.03		0.49	38		0.07				1.1	0.03	0.8	0.5	289	1.8		0.3	0.8	7.8	147		341	30	330		25.2		61	89		18.5	17.9	1.5
66	HDB-1	330.55		-261.448			2002/1/17	466	17	6.1	1.4	<0.01		0.74	22		0.11				0.45	0.07	0.4	0.5	411	0.1		2.5	0.1	15	234		405	36	393		30.2		39	95		22.1	24.4	-5.0
67	HDB-1	366.64		-297.538			2002/1/21	423	17	8.2	2	0.02		0.77	42		0.13				0.33	0.03	0.17	0.5	397	2.5		0.2	0.2	16	276		499	16	473		13.8		95	120		20.4	25.7	-11.5
68	HDB-1	392.65		-323.548			2002/1/24	542	24	11	2.5	0.02		0.53	34		0.11				0.99	0.07	0.6	0.5	310	2		0.9	0.3	11	265		383	60.4	415		50.3		53	100		25.7	22.7	6.1
69	HDB-1	405.55		-336.448			2002/1/25											0.01	0.05								1																	
70	HDB-1	415.02		-345.918			2002/1/27																																					
71	HDB-1	421.28		-352.178			2002/3/4	353	4.7	7.7	0.41	<0.01		0.03	233		0.05				0.45	0.08	1.4	0.7	112	1		0.1	3.5	17	149		13	256	439		214		38	54		17.0	15.7	3.9
72	HDB-1	436.62		-367.518			2002/3/8	360	8.3	5.4	0.63	<0.01		0.04	115		0.04				0.8	0.08	1.3	0.2	191	12		0.1	0.8	8.3	193		257	29	259		23.9		72	65		16.8	14.8	6.3
73	HDB-1	452.13		-383.028			2002/3/11	839	24	13	3.3	<0.01		0.89	31		0.21				0.2	0.01	0.2	0.2	980	0.1		0.3	0.2	16	310		403	30	381		25.2		48	87		39.1	41.7	-3.3
74	HDB-1	479.96		-410.858			2002/3/14	1000	27	20	3.9	0.03		1.1	35		0.23				0.16	0.01	0.1	0.2	1190	0.1		0.3	0.2	19	357		484	15	422		12.6		43	75		46.7	49.4	-2.8
75	HDB-1	523.54		-454.438			2002/3/19	1140	38	35	9.6	0.21		1.6	28		0.39				0.13	0.01	0.1	0.1	1323	0.1		0.3	0.1	14	362		533		437		-		30	110		54.1	53.5	0.5
76	HDB-1	554.61		-485.508			2002/3/21	810	22	9.2	2.2	<0.01		1.9	44		0.1				0.26	0.09	0.2	0.3	869	0.1		0.6	0.4	13	477	<0.1	376	15.1	334		12.6		63	90		37.4	41.1	-4.7
77	HDB-1	592.55		-523.448			2002/3/25	1060	27	12	3.2	0.03		1.9	57		0.14				0.68	0.11	0.3	0.3	731	0.1		0.4	0.3	9.1	1103		360	30.2	346		25.2		90	81		48.5	50.5	-2.1
78	HDB-1	618.11		-549.008			2002/3/28	1240	26	13	1.4	0.02		1.1	49		0.13				1.9	0.1	0.5	1.1	742	0.1		0.4	0.1	12	1020		560	45.3	535		37.8		84	110		56.3	53.0	3.0
79	HDB-1	648.91		-579.808			2002/4/1	1460	25	18	2.4	0.04		0.12	56		0.1				3.3	0.17	0.73	0.1	427	0.1		2.1	28	4.4	1360		1120	151	1170		126		95	170		65.6	64.7	0.7
80	HDB-1	677.78		-608.678			2002/4/4	1150	30	15	4.8	0.08		2.7	51		0.15				0.42	0.04	0.1	0.8	760	0.1		1	0.1	15	980		391	15.1	346		12.6		100	73		53.2	48.8	4.3
81	HDB-1	711.62		-642.518			2002/4/8	910	22	16	4.3	0.06		0.93	31		0.14				0.56	0.2	0.5	0.1	770	0.1		1.9	0.1	8.8	880		333	15.1	298		12.6		92	93		42.0	46.0	-4.6
82	HDB-1	720		-650.898			2002/4/9																																					
83	HDB-2	45	45.9	-2.471	-3.371			500	21	28	24													610						520											25.6	28.0	-4.4
84	HDB-2	45	45.9	-2.471	-3.371																																							
85	HDB-2	45	45.9	-2.471	-3.371																																							
86	HDB-2	128	130	-85.471	-87.471			1700	46	85	39													740						2700											82.5	77.0	3.5
87	HDB-2	151	157.84	-108.471	-115.311			1600	80	87	30													1900						1100											78.4	76.4	1.3
88	HDB-2	204	205.9	-161.471	-163.371			5500	96	450	250													3300						9000											284.6	280.1	0.8
89	HDB-2	254	255	-211.471	-212.471			4300	50	280	96													4400						4700											210.1	221.7	-2.7
90	HDB-2	290	290.82	-247.471	-248.291			6300	120	400	310													3500						10300											322.4	312.7	1.5
91	HDB-2	290	290.82	-247.471	-248.291																																							

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (3/64)

Index	Sample point	sampling zone (GL) Min.	sampling zone (GL) Max.	sampling zone (EL) Min.	sampling zone (EL) Max.	sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases: Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	Isotopes: ^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{36}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_w]	[cc_{STP}/g_w]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
Deep boreholes from the surface area																																													
1	HDB-1	54	56	15.102	13.102																												-66	-9.7											
2	HDB-1	54	56	15.102	13.102																												-67	-9.8											
3	HDB-1	54	56	15.102	13.102																												-65	-9.5											
4	HDB-1	109.3	111.6	-40.198	-42.498																												-68	-9.1											
5	HDB-1	109.3	111.6	-40.198	-42.498																												-69	-9.1											
6	HDB-1	109.3	111.6	-40.198	-42.498																												-69	-9.1											
7	HDB-1	130	131	-60.898	-61.898																												-66	-8.3											
8	HDB-1	164.03	165.92	-94.928	-96.818																																								
9	HDB-1	222.7	224	-153.598	-154.898																												-52	-5.0											
10	HDB-1	222.7	224	-153.598	-154.898																												-53	-5.0											
11	HDB-1	222.7	224	-153.598	-154.898																												-53	-5.2											
12	HDB-1	222.7	224	-153.598	-154.898																												-53	-5.2											
13	HDB-1	222.7	224	-153.598	-154.898																												-53	-5.0											
14	HDB-1	271.23	273.93	-202.128	-204.828																																								
15	HDB-1	311.1	312	-241.998	-242.898																												-38	-1.4											
16	HDB-1	311.1	312	-241.998	-242.898																												-39	-1.6											
17	HDB-1	311.1	312	-241.998	-242.898																												-39	-1.7											
18	HDB-1	311.1	312	-241.998	-242.898																												-39	-1.7											
19	HDB-1	345	346	-275.898	-276.898																																								
20	HDB-1	380	381	-310.898	-311.898																												-32	0.2											
21	HDB-1	400.05	401	-330.948	-331.898																												-30	0.6											
22	HDB-1	443	444	-373.898	-374.898																												-27	1.4											
23	HDB-1	455	456	-385.898	-386.898																																								
24	HDB-1	493	494	-423.898	-424.898																																								
25	HDB-1	514	515	-444.898	-445.898																												-20	2.8											
26	HDB-1	514	515	-444.898	-445.898																												-21	2.7											
27	HDB-1	545	546	-475.898	-476.898																																								
28	HDB-1	556.05	556.8	-486.948	-487.698																												-27	0.8											
29	HDB-1	556.05	556.8	-486.948	-487.698																												-26	1.0											
30	HDB-1	597.35	598	-528.248	-528.898																																								
31	HDB-1	609.7	610	-540.598	-540.898																												-19	2.8											
32	HDB-1	609.7	610	-540.598	-540.898																												-21	2.5											
33	HDB-1	648.2	650	-579.098	-580.898																																								
34	HDB-1	704.15	705	-635.048	-635.898																												-19	3.6											
35	HDB-1	548	568.18	-478.898	-499.078		2002/4/27	×																																					
36	HDB-1	548	568.18	-478.898	-499.078		2002/4/30	×																																					
37	HDB-1	548	568.18	-478.898	-499.078		2002/5/1	×																																					
38	HDB-1	548	568.18	-478.898	-499.078		2002/5/2	×																																					
39	HDB-1	548	568.18	-478.898	-499.078		2002/5/3	×																								1.4 ±0.1	-20	1.2						3.30					
40	HDB-1	548	568.18	-478.898	-499.078		2002/5/4	×																																					
41	HDB-1						2001/12/11	×																																					
42	HDB-1						2002/1/17	×																																					
43	HDB-1						2002/2/15	×																																					
44	HDB-1						2002/3/16	×																																					
45	HDB-1						2002/4/15	×																																					
46	HDB-1						2001/12/17	×																																					
47	HDB-1						2002/1/17	×																																					
48	HDB-1						2002/2/16	×																																					
49	HDB-1						2002/3/16	×																																					
50	HDB-1						2002/4/15	×																																					
51	HDB-1						2002/1/27																																						
52	HDB-1						2002/3/12																																						
53	HDB-1						2002/3/20	×																																					
54	HDB-1						2002/4/16																																						
55	HDB-1						2002/4/19																																						
56	HDB-1	9		60.102			2001/10/31	×																																					
57	HDB-1	30	reaming	39.102			2001/11/5	×																																					
58	HDB-1	55.9		13.202			2001/11/10	×																																					
59	HDB-1	173.9		-104.798			2001/12/1	×																																					
60	HDB-1	199.68		-130.578			2001/12/9	×																																					
61	HDB-1	191	reaming	-121.898			2001/12/27	×																																					
62	HDB-1	220.33		-151.228			2002/1/3	×																																					
63	HDB-1	265.59		-196.488			2002/1/7	×																																					
64	HDB-1	282.45		-213.348			2002/1/10	×																																					
65	HDB-1	309.76		-240.658			2002/1/14	×																																					
66	HDB-1	330.55		-261.448			2002/1/17	×																																					
67	HDB-1	366.64		-297.538			2002/1/21	×																																					
68	HDB-1	392.65		-323.548			2002/1/24	×																																					
69	HDB-1	405.55		-336.448			2002/1/25																																						
70	HDB-1	415.02		-345.918			2002/1/27																																						
71	HDB-1	421.28		-352.178			2002/3/4	×																																					
72	HDB-1	436.62		-367.518			2002/3/8	×																																					
73	HDB-1	452.13		-383.028			2002/3/11	×																																					
74	HDB-1	479.96		-410.858			2002/3/14	×																																					
75	HDB-1	523.54		-454.438			2002/3/19	×																																					
76	HDB-1	554.61		-485.508			2002/3/21	×																																					
77	HDB-1	592.55		-523.448			2002/3/25	×																																					
78	HDB-1	618.11		-549.008			2002/3/28	×																																					
79	HDB-1	648.91		-579.808			2002/4/1	×																																					
80	HDB-1	677.78		-608.678			2002/4/4	×																																					
81	HDB-1	711.62		-642.518			2002/4/8	×																																					
82	HDB-1	720		-650.898			2002/4/9	×																																					
83	HDB-2	45	45.9	-2.471	-3.371																												-70	-10.3											
84	HDB-2	45	45.9	-2.471	-3.371																												-72	-10.4											
85	HDB-2	45	45.9	-2.471	-3.371																												-74	-10.5											
86	HDB-2	128	130	-85.471	-87.471																												-57	-6.6											
87	HDB-2	151	157.84	-108.471	-115.311																																								
88	HDB-2	204	205.9	-161.471	-163.371																												-18	0.9											
89	HDB-2	254	255	-211.471	-212.471																																								
90	HDB-2	290	290.82	-247.471	-248.291																												-20	1.7											
91	HDB-2	290	290.82	-247.471	-248.291																												-20	1.5											

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (4/64)

Index	Sample point	sampling zone (GL) Min.	sampling zone (GL) Max.	sampling zone (EL) Min.	sampling zone (EL) Max.	sampling zone No.	sampling date	Organics: Humic acid	Organics: Fuluvic acid	Organics: Acetate	Organics: Formate	Microbiology: Total cell number	Microbiology: Aerobic heterotrophs	Microbiology: Anaerobic heterotrophs (nutrient agar/B2A)	Microbiology: Anaerobic heterotrophs (GAM)	Microbiology: Ammonia-oxidizer	Microbiology: Nitrifying bacteria	Microbiology: Iron-oxidizer	Microbiology: Sulfur-oxidizer (silverman 9k)	Microbiology: Sulfur-oxidizer (starkey)	Microbiology: Nitrate-reducer (PYN)	Microbiology: Nitrate-reducer (Giltay)	Microbiology: Denitrifying bacteria (PYN)	Microbiology: Denitrifying bacteria (Giltay)	Microbiology: Mn-reducer	Microbiology: Iron-reducer	Microbiology: Sulfate-reducer (A)	Microbiology: Sulfate-reducer (E)	Microbiology: Sulfate-reducer (F)	Microbiology: Methanogen (H_2)	Microbiology: Methanogen (acetate)	Microbiology: Methanogen (formate)	Microbiology: Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
Deep boreholes from the surface area																																	
1	HDB-1	54	56	15.102	13.102																												
2	HDB-1	54	56	15.102	13.102																												
3	HDB-1	54	56	15.102	13.102																												
4	HDB-1	109.3	111.6	-40.198	-42.498																												
5	HDB-1	109.3	111.6	-40.198	-42.498																												
6	HDB-1	109.3	111.6	-40.198	-42.498																												
7	HDB-1	130	131	-60.898	-61.898																												
8	HDB-1	164.03	165.92	-94.928	-96.818																												
9	HDB-1	222.7	224	-153.598	-154.898																												
10	HDB-1	222.7	224	-153.598	-154.898																												
11	HDB-1	222.7	224	-153.598	-154.898																												
12	HDB-1	222.7	224	-153.598	-154.898																												
13	HDB-1	222.7	224	-153.598	-154.898																												
14	HDB-1	271.23	273.93	-202.128	-204.828																												
15	HDB-1	311.1	312	-241.998	-242.898																												
16	HDB-1	311.1	312	-241.998	-242.898																												
17	HDB-1	311.1	312	-241.998	-242.898																												
18	HDB-1	311.1	312	-241.998	-242.898																												
19	HDB-1	345	346	-275.898	-276.898																												
20	HDB-1	380	381	-310.898	-311.898																												
21	HDB-1	400.05	401	-330.948	-331.898																												
22	HDB-1	443	444	-373.898	-374.898																												
23	HDB-1	455	456	-385.898	-386.898																												
24	HDB-1	493	494	-423.898	-424.898																												
25	HDB-1	514	515	-444.898	-445.898																												
26	HDB-1	514	515	-444.898	-445.898																												
27	HDB-1	545	546	-475.898	-476.898																												
28	HDB-1	556.05	556.8	-486.948	-487.698																												
29	HDB-1	556.05	556.8	-486.948	-487.698																												
30	HDB-1	597.35	598	-528.248	-528.898																												
31	HDB-1	609.7	610	-540.598	-540.898																												
32	HDB-1	609.7	610	-540.598	-540.898																												
33	HDB-1	648.2	650	-579.098	-580.898																												
34	HDB-1	704.15	705	-635.048	-635.898																												
35	HDB-1	548	568.18	-478.898	-499.078		2002/4/27																										
36	HDB-1	548	568.18	-478.898	-499.078		2002/4/30																										
37	HDB-1	548	568.18	-478.898	-499.078		2002/5/1																										
38	HDB-1	548	568.18	-478.898	-499.078		2002/5/2																										
39	HDB-1	548	568.18	-478.898	-499.078		2002/5/3	0.94	680.00	<0.5	<0.5	1.3.E+04	2.1.E+02	1.5.E+01		N.D.	N.D.	N.D.				4.9.E+01		1.3.E+00			N.D.			N.D.			
40	HDB-1	548	568.18	-478.898	-499.078		2002/5/4																										
41	HDB-1						2001/12/11																										
42	HDB-1						2002/1/17																										
43	HDB-1						2002/2/15																										
44	HDB-1						2002/3/16																										
45	HDB-1						2002/4/15																										
46	HDB-1						2001/12/17																										
47	HDB-1						2002/1/17																										
48	HDB-1						2002/2/16																										
49	HDB-1						2002/3/16																										
50	HDB-1						2002/4/15																										
51	HDB-1						2002/1/27	1.60	0.64	<0.5	<0.5																						
52	HDB-1						2002/3/12					7.9.E+03	1.6.E+01	1.0.E+01		N.D.	N.D.	N.D.				N.D.		N.D.			N.D.			N.D.			
53	HDB-1						2002/3/20																										
54	HDB-1						2002/4/16	<0.1	0.20	<0.5	<0.5																						
55	HDB-1						2002/4/19					2.1.E+02	5.1.E+00	N.D.		N.D.	N.D.	N.D.				N.D.		N.D.			N.D.			N.D.			
56	HDB-1	9		60.102			2001/10/31																										
57	HDB-1	30	reaming	39.102			2001/11/5																										
58	HDB-1	55.9		13.202			2001/11/10																										
59	HDB-1	173.9		-104.798			2001/12/1																										
60	HDB-1	199.68		-130.578			2001/12/9																										
61	HDB-1	191	reaming	-121.898			2001/12/27																										
62	HDB-1	220.33		-151.228			2002/1/3																										
63	HDB-1	265.59		-196.488			2002/1/7																										
64	HDB-1	282.45		-213.348			2002/1/10																										
65	HDB-1	309.76		-240.658			2002/1/14																										
66	HDB-1	330.55		-261.448			2002/1/17																										
67	HDB-1	366.64		-297.538			2002/1/21																										
68	HDB-1	392.65		-323.548			2002/1/24																										
69	HDB-1	405.55		-336.448			2002/1/25																										
70	HDB-1	415.02		-345.918			2002/1/27																										
71	HDB-1	421.28		-352.178			2002/3/4																										
72	HDB-1	436.62		-367.518			2002/3/8																										
73	HDB-1	452.13		-383.028			2002/3/11																										
74	HDB-1	479.96		-410.858			2002/3/14																										
75	HDB-1	523.54		-454.438			2002/3/19																										
76	HDB-1	554.61		-485.508			2002/3/21																										
77	HDB-1	592.55		-523.448			2002/3/25																										
78	HDB-1	618.11		-549.008			2002/3/28																										
79	HDB-1	648.91		-579.808			2002/4/1																										
80	HDB-1	677.78		-608.678			2002/4/4																										
81	HDB-1	711.62		-642.518			2002/4/8																										
82	HDB-1	720		-650.898			2002/4/9																										
83	HDB-2	45	45.9	-2.471	-3.371																												
84	HDB-2	45	45.9	-2.471	-3.371																												
85	HDB-2	45	45.9	-2.471	-3.371																												
86	HDB-2	128	130	-85.471	-87.471																												
87	HDB-2	151	157.84	-108.471	-115.311																												
88	HDB-2	204	205.9	-161.471	-163.371																												
89	HDB-2	254	255	-211.471	-212.471																												
90	HDB-2	290	290.82	-247.471	-248.291																												
91	HDB-2	290	290.82	-247.471	-248.291																												

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (5/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII)			location (WGS84, UTM, Zone54)			Physico-chemical parameter							Contamination indicator				Comments
		Min.	Max.	Min.	Max.							X	Y	Z (middle depth)	East	North	Z (middle depth)	EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temper-ature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	
		[m]	[m]	[m]	[m]													[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]	[mg/l]		
92	HDB-2	350	351.29	-307.471	-308.761				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-308.116	572478.747392	4983002.942185	-308.116												
93	HDB-2	400.9	401.75	-358.371	-359.221				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-358.796	572478.747392	4983002.942185	-358.796		1809.3										pore water extraction: squeeze (55MPa)
94	HDB-2	400.9	401.75	-358.371	-359.221				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-358.796	572478.747392	4983002.942185	-358.796		1660.7										pore water extraction: squeeze (<70MPa)
95	HDB-2	403.15	403.95	-360.621	-361.421				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-361.021	572478.747392	4983002.942185	-361.021												
96	HDB-2	412.59	413.69	-370.061	-371.161				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-370.611	572478.747392	4983002.942185	-370.611		1533.8										
97	HDB-2	454	464.12	-411.471	-421.591				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-416.531	572478.747392	4983002.942185	-416.531												
98	HDB-2	499	499.8	-456.471	-457.271				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-456.871	572478.747392	4983002.942185	-456.871		1054.1										pore water extraction: squeeze (30MPa)
99	HDB-2	499	499.8	-456.471	-457.271				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-456.871	572478.747392	4983002.942185	-456.871		851.2										pore water extraction: squeeze (65MPa)
100	HDB-2	534.75	543.99	-492.221	-501.461				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-496.841	572478.747392	4983002.942185	-496.841												
101	HDB-2	594	594.85	-551.471	-552.321				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-551.896	572478.747392	4983002.942185	-551.896		2098.9										
102	HDB-2	623	624	-580.471	-581.471				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-580.971	572478.747392	4983002.942185	-580.971		2066.2										
103	HDB-2	652.69	654.8	-610.161	-612.271				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-611.216	572478.747392	4983002.942185	-611.216												
104	HDB-2	675	676	-632.471	-633.471				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-632.971	572478.747392	4983002.942185	-632.971		1935.3										
105	HDB-2	688	689	-645.471	-646.471				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-645.971	572478.747392	4983002.942185	-645.971												
106	HDB-2	695	696	-652.471	-653.471				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-652.971	572478.747392	4983002.942185	-652.971		2239.2										pore water extraction: squeeze (35MPa)
107	HDB-2	695	696	-652.471	-653.471				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-652.971	572478.747392	4983002.942185	-652.971		2012.5										pore water extraction: squeeze (<70MPa)
108	HDB-2	718.5	719.85	-675.971	-677.321				core	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-676.646	572478.747392	4983002.942185	-676.646												
109	HDB-2	334.9	404.9	-292.371	-362.371		2002/2/10		pump	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-327.371	572478.747392	4983002.942185	-327.371		10.2		8.2								
110	HDB-2	334.9	404.9	-292.371	-362.371		2002/2/17		pump	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-327.371	572478.747392	4983002.942185	-327.371	1256	1490	7.45	7.9	-132	74	22.3		0.9		A	
111	HDB-2	666.5	682.5	-623.971	-639.971		2002/5/6		pump	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-631.971	572478.747392	4983002.942185	-631.971												
112	HDB-2						2001/12/11		river (up the stream)									11	11.38	7	6.68			20.3		<0.1		A	
113	HDB-2						2002/1/18		river (up the stream)									11.9	12.56	7.5	6.65			18.9		<0.1		A	
114	HDB-2						2002/2/15		river (up the stream)									11.9	113	7.2	7.3			19.1		<0.1		A	
115	HDB-2						2002/3/16		river (up the stream)									8.57	10.38	6.6	8.12			19		<0.1		A	
116	HDB-2						2002/4/15		river (up the stream)									6.73	7	6.8	7.16			22.6		<0.1		A	
117	HDB-2						2001/12/17		river (down the stream)									10.8	11.54	7.4	6.72			20.2		<0.1		A	
118	HDB-2						2002/1/18		river (down the stream)									11.5	11.93	7.5	6.68			18.8		<0.1		A	
119	HDB-2						2002/2/15		river (down the stream)									11.3	-	7.3	-			18.9		<0.1		A	
120	HDB-2						2002/3/16		river (down the stream)									8.45	10.12	6.7	7.57			18.9		<0.1		A	
121	HDB-2						2002/4/15		river (down the stream)									6.83	7.21	6.8	6.75			22.6		<0.1		A	
122	HDB-2						2002/1/27		well																				
123	HDB-2						2002/3/12		well																				
124	HDB-2						2002/3/20		well									14.2		7.3									
125	HDB-2						2002/4/16		well																				
126	HDB-2						2002/4/19		well																				
127	HDB-2	72		-29.471			2001/12/7		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-29.471	572478.747392	4983002.942185	-29.471	234	234	12.5	12.5			12.7		8.29		A	
128	HDB-2	100		-57.471			2001/12/9		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-57.471	572478.747392	4983002.942185	-57.471	95.7	95.7	12	12			13.9		9.04		A	
129	HDB-2	106.4		-63.871			2001/12/11		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-63.871	572478.747392	4983002.942185	-63.871	94.5	94.5	11.86	11.86			12.8		8.56		A	
130	HDB-2	122.3		-79.771			2001/12/14		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-79.771	572478.747392	4983002.942185	-79.771	81.5	81.5	11.56	11.56			13.4		9.83		A	
131	HDB-2	133.8		-91.271			2001/12/21		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-91.271	572478.747392	4983002.942185	-91.271	53.1	53.1	10.48	10.48			11.3		9		A	
132	HDB-2	150		-107.471			2001/12/23		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-107.471	572478.747392	4983002.942185	-107.471	60.3	60.3	9.98	9.98			11.7		8.38		A	
133	HDB-2	161.35		-118.821			2001/12/24		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-118.821	572478.747392	4983002.942185	-118.821	66.6	66.6	9	9			13.5		8.93		A	
134	HDB-2	186.2		-143.671			2001/12/27		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-143.671	572478.747392	4983002.942185	-143.671	73.7	73.7	8.74	8.74			12.2		8.43		A	
135	HDB-2	218.34		-175.811			2001/12/31		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-175.811	572478.747392	4983002.942185	-175.811	79	79	8.62	8.62			14.3		8.43		A	
136	HDB-2	244.8		-202.271			2002/1/3		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-202.271	572478.747392	4983002.942185	-202.271	85.8	85.8	8.43	8.43			14.5		9.83		A	
137	HDB-2	275.75		-233.221			2002/1/7		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	110805.196981	-26053.729311	-233.221	572478.747392	4983002.942185	-233.221	93.4	93.4	9.27	9.27			16.7		8.53		A	
138	HDB-2	304.09		-261.561			2002/1/10		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-261.561	572478.747392	4983002.942185	-261.561	101.4	101.4	9.72	9.72			18.2		8.76		A	
139	HDB-2	345.34		-302.811			2002/1/14		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-302.811	572478.747392	4983002.942185	-302.811	107.1	107.1	10.26	10.26			18.7		8.11		A	
140	HDB-2	371.15		-328.621			2002/1/17		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-328.621	572478.747392	4983002.942185	-328.621	113.1	113.1	10.22	10.22			20		8.8		A	
141	HDB-2	400		-357.471			2002/1/20		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-357.471	572478.747392	4983002.942185	-357.471	112.3	112.3	10.18	10.18			15		9.36		A	
142	HDB-2	413.84		-371.311			2002/3/14		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-371.311	572478.747392	4983002.942185	-371.311	838	838	11.99	11.99			16.3		9.37		A	
143	HDB-2	454.87		-412.341			2002/3/18		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-412.341	572478.747392	4983002.942185	-412.341	635	635	11.06	11.06			14.8		10.04		A	
144	HDB-2	483.1		-440.571			2002/3/21		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-440.571	572478.747392	4983002.942185	-440.571	764	764	10.4	10.4			15.6		10.21		A	
145	HDB-2	520.15		-477.621			2002/3/25		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-477.621	572478.747392	4983002.942185	-477.621	583	583	9.8	9.8			15.4		11.46		A	
146	HDB-2	548.72		-506.191			2002/3/28		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-506.191	572478.747392	4983002.942185	-506.191	548	548	9.52	9.52			16.5		9.95		A	
147	HDB-2	589.63		-547.101			2002/4/1		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-547.101	572478.747392	4983002.942185	-547.101	647	647	8.83	8.83			20.3		11.06		A	
148	HDB-2	610.79		-568.261			2002/4/4		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-568.261	572478.747392	4983002.942185	-568.261	635	635	8.89	8.89			20.1		8.57		A	
149	HDB-2	652.32		-609.791			2002/4/8		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-609.791	572478.747392	4983002.942185	-609.791	604	604	8.83	8.83			20		6.87		A	
150	HDB-2	674.66		-632.131			2002/4/11		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-632.131	572478.747392	4983002.942185	-632.131	695	695	8.68	8.68			22		8.28		A	
151	HDB-2	715.18		-672.651			2002/4/15		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-672.651	572478.747392	4983002.942185	-672.651	713	713	8.52	8.52			21.5		12.16		A	
152	HDB-2	720		-677.471			2002/4/16		return	Wakkanai Fm.	siliceous mudstone	110805.196981	-26053.729311	-677.471	572478.747392	4983002.942185	-677.471	717	717	8.53	8.53			21.6		9.88		A	
153	HDB-3	22.12	23	36.072	35.192				core	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	35.632	567524.237654	4988229.854210	35.632												pore water extraction: squeeze (<70MPa)
154	HDB-3	104.09	106	-45.898	-47.808				core	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-46.853	567524.237654	4988229.854210	-46.853												pore water extraction: squeeze (<70MPa)
155	HDB-3	124	124.3	-65.808	-66.108				core	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-65.958	567524.237654	4988229.854210	-65.958												
156	HDB-3	155.2	155.99	-97.008	-97.798				core	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-97.403	567524.237654	4988229.854210	-97.403												pore water extraction: squeeze (<70MPa)
157	HDB-3	156.2	156.9	-98.008	-98.708				core	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-98.358	567524.237654	4988229.854210	-98.358												pore water extraction: squeeze (<70MPa)
158	HDB-3	202.4	202.7	-144.208	-144.508				core	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-144.358	567524.237654	4988229.854210	-144.358												
159	HDB-3	229.3	229.92	-171.108	-171.728				core	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-171.418	567524.237654	4988229.854210	-171.418												pore water extraction: squeeze (<70MPa)
160	HDB-3	274.3	274.9	-216.108	-216.708				core	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-216.408	567524.237654	4988229.854210	-216.408												pore water extraction: squeeze (<70MPa)
161	HDB-3	293	293.3	-234.808	-235.108				core	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-234.958	567524.237654	4988229.854210	-234.958												
162	HDB-3	326	327	-267.808	-268.808				core	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-268.308	567524.237654	4988229.854210	-268.308												pore water extraction: squeeze (<70MPa)
163	HDB-3	373	373.7	-314.808	-315.508				core	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-315.158	567524.237654	4988229.854210	-315.158												pore water extraction: squeeze (<70MPa)
164	HDB-3	394.73	395	-336.538	-336.808				core	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-336.673	567524.237654	4988229.854210	-336.673												
165	HDB-3	425.2	426	-367.008	-367.808				core	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-367.408	567524.237654	4988229.854210	-367.408												pore water extraction: squeeze (<70MPa)
166	HDB-3	494	494.27	-435.808	-436.078				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116109.269584	-30928.204381	-435.943	567524.237654	4988229.854210	-435.943												
167	HDB-3	500.1	501	-441.908	-442.808				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116109.269584	-30928.204381	-442.358	567524.237654	4988229.854210	-442.358												pore water extraction: squeeze (<70MPa)
168	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/26		pump	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-122.283	567524.237654	4988229.854210	-122.283	53.52	1314	8.20	7.07			13.34		8.52		A	
169	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/27		pump	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-122.283	567524.237654	4988229.854210	-122.283	2400	3260	6.58	6.7					3.01		A	
170	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/27		pump	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-122.283	567524.237654	4988229.854210	-122.283	3348	3470	6.57	6.76			12.95		2.02		A	
171	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/28		pump	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-122.283	567524.237654	4988229.854210	-122.283	3170	3490	6.56	6.7			14.74		2.08		A	
172	HDB-3	454.5	520	-396.308	-461.808		2003/1/11		pump	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116109.269584	-30928.204381	-429.058	567524.237654	4988229.854210	-429.058												
173	HDB-3						2002/9/29		river (up the stream)									7.02		5.04				13.4					
174	HDB-3						2002/10/24		river (up the stream)									5.66		5.13				9.3					
175	HDB-3						2002/11/24		river (up the stream)									5.81		5.55				5.2					
176	HDB-3						2002/12/24		river (up the stream)									8.43		5.67				0.9					
177	HDB-3						2003/1/1		river (up the stream)									7.42		5.76				0.1					
178	HDB-3						2003/1/23		river (up the stream)									8.73		6.74				0					
179	HDB-3						2003/2/19		river (up the stream)									5.59		6.54				0					

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (6/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Geochemistry																																						
		Min.	Max.	Min.	Max.			Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
92	HDB-2	350	351.29	-307.471	-308.761			3300	120	13	47														4100							2100											151.1	159.2	-2.6
93	HDB-2	400.9	401.75	-358.371	-359.221			5500	98	440	200														3000							9700											280.0	286.2	-1.1
94	HDB-2	400.9	401.75	-358.371	-359.221																																									
95	HDB-2	403.15	403.95	-360.621	-361.421			4000	130	71	39														5800							1800											184.0	200.8	-4.4
96	HDB-2	412.59	413.69	-370.061	-371.161			5200	80	440	170														3000							9100											264.1	273.7	-1.8
97	HDB-2	454	464.12	-411.471	-421.591			6100	130																8300							1800											268.5	271.2	-0.5
98	HDB-2	499	499.8	-456.471	-457.271			2400	27	39	13														2700							1200											108.1	101.0	3.4
99	HDB-2	499	499.8	-456.471	-457.271																																									
100	HDB-2	534.75	543.99	-492.221	-501.461			2600	40	50	17														3400							1100											118.0	118.6	-0.3
101	HDB-2	594	594.85	-551.471	-552.321			6000	12	500	180														3100							10100											300.9	297.3	0.6
102	HDB-2	623	624	-580.471	-581.471			6600	22	490	220														2900							11600											330.1	322.9	1.1
103	HDB-2	652.69	654.8	-610.161	-612.271			3100	100	100	27														3600							2300											144.5	149.2	-1.6
104	HDB-2	675	676	-632.471	-633.471			7300	77	440	250														2500							14000											361.9	361.5	0.1
105	HDB-2	688	689	-645.471	-646.471			2800	30	54	13														3500							960											126.3	118.5	3.2
106	HDB-2	695	696	-652.471	-653.471			7400	140	410	260														2400							15000											367.2	379.5	-1.6
107	HDB-2	695	696	-652.471	-653.471																																									
108	HDB-2	718.5	719.85	-675.971	-677.321			2700	40	63	16														3400							990											122.9	116.4	2.7
109	HDB-2	334.9	404.9	-292.371	-362.371		2002/2/10	2040	44	81	27	0.88		1.8	34		0.76					<0.01	<0.1	<0.1	2730	10		<0.1	<0.1	44	8.7		1430		1170				45	290		98.8	100.7	-0.9
110	HDB-2	334.9	404.9	-292.371	-362.371		2002/2/17	3120	51	24	36	0.51		2.7	45		1.2	<0.001	0.01			0.03	<0.1	<0.1	4180	19	12	<0.1	<0.1	53	2.4		2120		1740				44	400		144.5	152.8	-2.8
111	HDB-2	666.5	682.5	-623.971	-639.971		2002/5/6																																							
112	HDB-2						2001/12/11	15	1.3	3.4	2.1	0.01		0.01	22		0.02				0.09	0.03	<0.1	<0.1	16	<0.1		1.1	<0.1	0.2	12		17		14				3	4		1.1	1.0	0.0
113	HDB-2						2002/1/18	16	1.5	7.2	3.5	0.11		0.03	18		0.06				0.05	0.02	<0.1	0.1	19	0.2		1.4	0.1	0.2	31		18		15				2	3		1.4	1.5	-0.1
114	HDB-2						2002/2/15	16	1.3	4.0	2.3	<0.01		0.01	19		0.02				0.11	<0.01	<0.1	<0.1	18	<0.1		1.0	<0.1	0.09	12		17		14.3				3	4		1.1	1.1	0.1
115	HDB-2						2002/3/16	12	1.2	2.6	1.6	0.01		<0.01	18		0.02				0.08	<0.01	<0.1	<0.1	18	<0.1		1.8	<0.1	<0.1	7.3		5.8		4.78				3	2		0.8	0.8	0.0
116	HDB-2						2002/4/15	8.5	1.3	2.1	1.3	<0.01		<0.01	20		0.01				0.32	<0.01	<0.1	<0.1	13	<0.1		1.2	<0.1	<0.1	8.2		6.5		5.29				3	1		0.6	0.7	0.0
117	HDB-2						2001/12/17	15	1.4	3.3	2.0	0.02		0.01	30		0.02				0.16	0.02	<0.1	<0.1	16	<0.1		1.0	0.1	2.2	11		17		14				3	4		1.2	1.0	0.2
118	HDB-2						2002/1/18	16	1.6	3.5	2.1	0.1		<0.01	26		0.02				0.31	0.03	<0.1	0.1	17	<0.1		1.0	<0.1	0.1	11		19		16				2	3		1.1	1.0	0.1
119	HDB-2						2002/2/15	15	1.2	3.8	2.2	0.02		<0.01	24		0.02				0.16	<0.01	<0.1	<0.1	17	<0.1		0.9	<0.1	0.1	11		18		14.9				3	4		1.1	1.0	0.0
120	HDB-2						2002/3/16	12	1.2	2.5	1.6	0.02		<0.01	16		0.02				0.09	<0.01	<0.1	<0.1	17	<0.1		1.6	<0.1	<0.1	7.2		6.4		5.29				3	2		0.8	0.8	0.1
121	HDB-2						2002/4/15	8.8	1.4	1.8	1.3	<0.01		<0.01	24		0.01				0.24	<0.01	<0.1	<0.1	12	<0.1		1.1	<0.1	<0.1	7.6		7.1		5.79				3	1		0.6	0.6	0.0
122	HDB-2						2002/1/27																																							
123	HDB-2						2002/3/13																																							
124	HDB-2						2002/3/20	14	1.5	6.1	3.7	<0.01		<0.01	29		0.04				0.05	<0.01	<0.1	0.2	18	0.4		0.4	<0.1	<0.1	4.4	<0.1	42		35				<1	9		1.3	1.3	0.0
125	HDB-2						2002/4/16																																							
126	HDB-2						2002/4/19																																							
127	HDB-2	72		-29.471			2001/12/7	101	4.2	160	<0.1	<0.01		0.51	12		1.3				0.01	0.01	0.6	0.5	37	<0.1		0.7	0.6	16	65		614	69.54	620		58.2		14	6		13.5	15.0	-5.2
128	HDB-2	100		-57.471			2001/12/9	135	10	15	0.48	<0.01		0.52	83		0.07				0.92	0.37	0.9	0.2	24	<0.1		0.9	0.8	13	40			121	281		180		32	34		7.8	5.9	14.3
129	HDB-2	106.4		-63.871			2001/12/11	166	12	9.8	3.5	0.03		0.13	226		0.04				4	0.03	9.7	0.6	24	<0.1		<0.1	0.3	11	83		1.00	161	269		134		41	39		10.1	8.2	10.2
130	HDB-2	122.3		-79.771			2001/12/14	160	10	7.7	1.1	0.02		0.13	124		0.03				2.4	0.14	4.7	0.7	22	<0.1		<0.1	1.3	13	84		7.00	161	274		134		30	44		9.0	8.3	4.0
131	HDB-2	133.8		-91.271			2001/12/21	104	10	5.2	0.77	0.02		<0.01	80		0.02				0.96	0.28	0.8	0.5	24	0.2		0.3	1.1	4.4	74		167	<1	138		<1		28	31		5.5	5.0	3.9
132	HDB-2	150		-107.471			2001/12/23	132	10	3.3	0.78	0.01		0.28	66		0.02				0.77	0.22	0.7	0.7	31	0.2		0.3	0.9	5.1	90		175	15	169		12.6		26	38		6.6	6.2	3.3
133	HDB-2	161.35		-118.821			2001/12/24	156	27	4.9	1.5	0.06		0.54	164		0.03				3	0.08	2.2	0.9	44	0.2		0.3	0.9	5.9	115		246	2	206		1.88		40	44		8.5	7.8	4.5
134	HDB-2	186.2		-143.671			2001/12/27	281	27	7.0	3.1	0.05		0.17	368		0.05				14	0.32	5.4	0.9	59	0.3		0.7	0.3	6.2	95		154	53	214		44		65	53		14.7	8.1	28.9
135	HDB-2	218.34		-175.811			2001/12/31	202	25	5.4	2.7	0.22		0.30	480		0.04				14	0.22	5.5	1.0	85	0.3		0.2	0.3	6.9	101		266	8	232		6.9		72	53		11.2	9.2	9.8
136	HDB-2	244.8		-202.271			2002/1/3	223	15	5.9	2.9	0.22		0.40	403		0.04				5.3	0.69	5.2	1.2	148	0.4		0.3	0.3	7.0	116		279	9	244		7.5		70	60		11.7	11.6	0.8
137	HDB-2	275.75		-233.221			2002/1/7	231	29	7.7	4.9	0.37		0.32	551		0.07				27	0.23	10	1.3	129	0.6		0.3	0.18	6.8	106		285	15	259		12.6		59	66		13.6	11.1	10.0
138	HDB-2	304.09		-261.561			2002/1/10	258	13	4.6	1.4	0.03		0.34	106		0.03				0.86	0.13	1.1	0.9	203	0.7		0.2	0.1	6.4	123		285	18	264		15.1		28	68		12.4	13.7	-4.7
139	HDB-2	345.34		-302.811			2002/1/14	272	14	4.5	1.4	0.07		0.35	70		0.03				2	0.03	0.8	0.9	242	0.7		0.3	0.1	2.6	181		262	15	240		12.6		32	63		12.8	15.5	-9.3
140	HDB-2	371.15		-328.621			2002/1/17	341	22	6.1	2	0.07		0.44	133		0.05				0.36	0.08	0.6	0.9	287	1		0.2	0.2	11	259	<0.1	265	11	235		8.81		35	64		16.6	18.3	-4.8
141	HDB-2	400		-357.471			2002/1/20											0.007	0.04								1																		
142	HDB-2	413.84		-371.311			2002/3/14	2700	36	16	0.63	<0.01		0.02	1080		0.1				0.55	0.02	0.2	<0.1	518	9.7		170	40	9.9	780			1770	3570		2090		470	490		119.7	97.8	10.1
143	HDB-2	454.87		-412.341			2002/3/18	2070	27	14	0.93	<0.01		<0.01	318		0.12				2.2	0.06	0.4	1.5	854	<0.1		4.0	127	8.9	786		1010	815	2190		680		470	280		92.0	89.0	1.7
144	HDB-2	483.1		-440.571			2002/3/21	1410	21	19	1.2	0.03		0.02	198		0.12				1.8	0.07	0.4	1.0	865	<0.1		3.8	57	6.6	807		356	694	1450		579		140	100		63.3	73.1	-7.2
145	HDB-2	520.15		-477.621			2002/3/25	1400	23	20	1.2	0.03		0.05	118		0.13				3.2	0.35	0.6	0.9	778	4.2		1.7	58	5.6	733		941	316	1300		264		250	240		63.0	65.3	-1.8
146	HDB-2	548.72		-506.191			2002/3/28	1140	25	14	3.4	0.11		2.00	18		0.16				0.15	0.05	0.11	0.3	905	<0.1		0.2	0.2	13	840		380	22.7	350		18.9		71	100		52.2	50.0	2.1
147	HDB-2	589.63		-547.101			2002/4/1	1800	33	14	3.4	0.04		0.48	60		0.08				2.2	0.06	0.5	0.7	470	<0.1		0.3	<0.1	8.2	1630		1640	272	1800		227		56	180		80.7	83.8	-1.9
148	HDB-2	610.79		-568.261			2002/4/4	1730	29	13	3.5	0.03		0.29	38		0.08				1.3	0.17	0.7	0.7	510	<0.1		<0.1	<0.1	8.8	1390		2160	197	2100		164		69	470		77.5	85.8	-5.0
149	HDB-2	652.32		-609.791			2002/4/8	1430	29	14	4.4	0.02		0.27	23		0.09				0.31	0.04	0.2	0.8	560	<0.1		1.3	<0.1	5.7	1460		1330	106	1270		88.1		42	360		64.4	71.8	-5.5
150	HDB-2	674.66		-632.131			2002/4/11	1900	24	43	4.2	0.04		0.28	24		0.07				0.66	0.07	0.5	<0.1	410	<0.1		1.6	<0.1	7.8	1750		2010	197	1980		164		150	420		86.3	88.0	-1.0
151	HDB-2	715.18		-672.651			2002/4/15	2340	34	13	5.6	0.04		0.17	37		0.09				1.5	0.26	0.3	0.7	410	<0.1		<0.1	<0.1	6.2	3480		1630	145	1580		121		160	310		104.1	115.8	-5.3
152	HDB-2	720		-677.471			2002/4/16											<0.001	0.04								<1																		
153	HDB-3	22.12	23	36.072	35.192			850	68	57	36														1100							420		200									44.5	43.0	1.7
154	HDB-3	104.09	106	-45.898	-47.808			6000	370	150	150														9900							880		50									290.2	298.0	-1.3
155	HDB-3	124	124.3	-65.808	-66.108																																									
156	HDB-3	155.2	155.99	-97.008	-97.798			6500	360	170	180														11000							290		10									315.1	316.1	-0.1
157	HDB-3	156.2	156.9	-98.008	-98.708			7600	480	200	190														13000							800		10									368.3	383.0	-2.0
158	HDB-3	202.4	202.7	-144.208	-144.508																																									
159	HDB-3	229.3	229.92	-171.108	-171.728			6200	350	75	160														10000							500		50									295.4	292.9	0.4
160	HDB-3	274.3	274.9	-216.108	-216.708			6600	340	250	190														11000							1100		10									323.8	332.9	-1.4
161	HDB-3	293	293.3	-234.808	-235.108																																									
162	HDB-3	326	327	-267.808	-268.808			7100	430	520	290														12000							1800		50									369.5	376.3	-0.9
163	HDB-3	373	373.7	-314.808	-315.508			6800	310	280	230														11000							1700		10									336.5	345.4	-1.3
164	HDB-3	394.73	395	-336.538	-336.808																																									
165	HDB-3	425.2	426	-367.008	-367.808			6500	220	230	260														11000							1100		10									321.1	332.9	-1.8
166	HDB-3	494	494.27	-435.808	-436.078																																									
167	HDB-3	500.1	501	-441.908	-442.808			6600	280	260	220														11000							1300		10.0									325.2	337.1	-1.8
168	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/26	2200	100	120	72			8.3											3480							23		1000	<1	820		0 (N.D)				111.3	114.9	-1.6
169	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/27	6300	290	320	200			24											9160							46		2341	<1	1920		0 (N.D)				317.2	297.4	3.2
170	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/27	6700	320	350	210			24											10000							37		2865	<1	2350		0 (N.D)				337.7	329.5	1.2
171	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/28	6900	320	220	210	0.01		22	27		5.7	0 (N.D)	0.07	0 (N.D)	0.19	0	0 (N.D)	0 (N.D)	11600	99	41	0.4	0 (N.D)	380	38		2463	<1	2020		0 (N.D)		52	530		360.7	369.2	-1.2
172	HDB-3	454.5	520	-396.308	-461.808		2003/1/11																																							
173	HDB-3						2002/9/29	6.4	1.4	1.8	1.5	0.07		0 (N.D)	26		0.02	0 (N.D)	0.19	0.03	7.0	0.23	3.0	0 (N.D)	9.7	0 (N.D)	0 (N.D)	0.3	0.1	0 (N.D)	2.9		5.7	<1	4.7		0 (N.D)		10	3		1.0	0.5	0.52
174	HDB-3						2002/10/24	5.5	0.8	0.93	0.89	0.01		0 (N.D)	13		0.01	0 (N.D)	0 (N.D)	0 (N.D)	0.52	0.02	0.4	0 (N.D)	8.7	0 (N.D)	0 (N.D)	0.3	0 (N.D)	0 (N.D)	3.1		4.5	<1	3.7		0 (N.D)		5	2		0.4	0.4	0.01
175	HDB-3						2002/11/24	5.9	0.59	1.2	0.9	0.02		0 (N.D)	18		0.01	0 (N.D)	0 (N.D)	0 (N.D)	2.7	0.04	0.3	0 (N.D)	9.2	0 (N.D)	0 (N.D)	<0.1	0 (N.D)	0 (N.D)	3.8		4.6	<1	3.8		0 (N.D)		4	0 (N.D)		0.5	0.5	0.04
176	HDB-3						2002/12/24	6.4	0.65	1.1	0.84	0.02		0 (N.D)	18		0.01	0 (N.D)	0.08	0.02	3.1	0 (N.D)	1.0	0 (N.D)	8.8	0 (N.D)	0 (N.D)	0.2	0 (N.D)	0 (N.D)	4.1		3.7	<1	3.0		0 (N.D)		5	1		0.6	0.4	0.15
177	HDB-3						2003/1/1																																							
178	HDB-3						2003/1/23	9.6	0.58	1.0	1.2	<0.01		0 (N.D)	1.0		0.01	0 (N.D)	0 (N.D)	0 (N.D)	0.44	0.01	0.2	<0.1	16	0 (N.D)	0 (N.D)	1.5	0.1	0.32	4.3		1.4	<1	1.2		0 (N.D)		1	0 (N.D)		0.6	0.6	0.00
179	HDB-3						2003/2/19	4.7	0.62	0.88	0.57	<0.01		0 (N.D)	0.46		0 (N.D)	0 (N.D)	0 (N.D)	0 (N.D)	0.24	0.02	0.2	<0.1	9.5	0 (N.D)	0 (N.D)	0.8	0.2	0.31	2.0		1.2	<1	0.96		0 (N.D)		1	0 (N.D)		0.4	0.4	-0.03

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (7/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases																							Isotopes												
		Min.	Max.	Min.	Max.				Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{36}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_w]	[cc_{STP}/g_w]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
92	HDB-2	350	351.29	-307.471	-308.761																																						
93	HDB-2	400.9	401.75	-358.371	-359.221																												-23	0.7									
94	HDB-2	400.9	401.75	-358.371	-359.221																												-23	0.7									
95	HDB-2	403.15	403.95	-360.621	-361.421																																						
96	HDB-2	412.59	413.69	-370.061	-371.161																												-23	0.5									
97	HDB-2	454	464.12	-411.471	-421.591																																						
98	HDB-2	499	499.8	-456.471	-457.271																												-25	0.2									
99	HDB-2	499	499.8	-456.471	-457.271																												-24	0.1									
100	HDB-2	534.75	543.99	-492.221	-501.461																																						
101	HDB-2	594	594.85	-551.471	-552.321																												-22	0.9									
102	HDB-2	623	624	-580.471	-581.471																												-22	0.7									
103	HDB-2	652.69	654.8	-610.161	-612.271																																						
104	HDB-2	675	676	-632.471	-633.471																												-25	0.2									
105	HDB-2	688	689	-645.471	-646.471																																						
106	HDB-2	695	696	-652.471	-653.471																												-28	-0.5									
107	HDB-2	695	696	-652.471	-653.471																												-26	-0.3									
108	HDB-2	718.5	719.85	-675.971	-677.321																																						
109	HDB-2	334.9	404.9	-292.371	-362.371		2002/2/10	×																																			
110	HDB-2	334.9	404.9	-292.371	-362.371		2002/2/17	×																									-29	0.4									
111	HDB-2	666.5	682.5	-623.971	-639.971		2002/5/6				5.26		1.43	0.718		0.058		91.3		0.138		0.024	0.01			0.0044			0.01															
112	HDB-2						2001/12/11	×																																			
113	HDB-2						2002/1/18	×																																			
114	HDB-2						2002/2/15	×																																			
115	HDB-2						2002/3/16	×																																			
116	HDB-2						2002/4/15	×																																			
117	HDB-2						2001/12/17	×																																			
118	HDB-2						2002/1/18	×																																			
119	HDB-2						2002/2/15	×																																			
120	HDB-2						2002/3/16	×																																			
121	HDB-2						2002/4/15	×																																			
122	HDB-2						2002/1/27																																				
123	HDB-2						2002/3/12																																				
124	HDB-2						2002/3/20	×																																			
125	HDB-2						2002/4/16																																				
126	HDB-2						2002/4/19																																				
127	HDB-2	72		-29.471			2001/12/7	×																																			
128	HDB-2	100		-57.471			2001/12/9	×																																			
129	HDB-2	106.4		-63.871			2001/12/11	×																																			
130	HDB-2	122.3		-79.771			2001/12/14	×																																			
131	HDB-2	133.8		-91.271			2001/12/21	×																																			
132	HDB-2	150		-107.471			2001/12/23	×																																			
133	HDB-2	161.35		-118.821			2001/12/24	×																																			
134	HDB-2	186.2		-143.671			2001/12/27	×																																			
135	HDB-2	218.34		-175.811			2001/12/31	×																																			
136	HDB-2	244.8		-202.271			2002/1/3	×																																			
137	HDB-2	275.75		-233.221			2002/1/7	×																																			
138	HDB-2	304.09		-261.561			2002/1/10	×																																			
139	HDB-2	345.34		-302.811			2002/1/14	×																																			
140	HDB-2	371.15		-328.621			2002/1/17	×																																			
141	HDB-2	400		-357.471			2002/1/20	×																							5.8	-52	-6.5										
142	HDB-2	413.84		-371.311			2002/3/14	×																																			
143	HDB-2	454.87		-412.341			2002/3/18	×																																			
144	HDB-2	483.1		-440.571			2002/3/21	×																																			
145	HDB-2	520.15		-477.621			2002/3/25	×																																			
146	HDB-2	548.72		-506.191			2002/3/28	×																																			
147	HDB-2	589.63		-547.101			2002/4/1	×																																			
148	HDB-2	610.79		-568.261			2002/4/4	×																																			
149	HDB-2	652.32		-609.791			2002/4/8	×																																			
150	HDB-2	674.66		-632.131			2002/4/11	×																																			
151	HDB-2	715.18		-672.651			2002/4/15	×																																			
152	HDB-2	720		-677.471			2002/4/16																								3.7±0.1	-40	-5.5										
153	HDB-3	22.12	23	36.072	35.192																												-64	-8.9									
154	HDB-3	104.09	106	-45.898	-47.808																												-32	0.5									
155	HDB-3	124	124.3	-65.808	-66.108						19.78		5.02	0.33		5.15		11.8		N.D.		N.D.	N.D.	N.D.					N.D.						-72.2	0.49							
156	HDB-3	155.2	155.99	-97.008	-97.798																												-27	1.3									
157	HDB-3	156.2	156.9	-98.008	-98.708																												-25	2.6									
158	HDB-3	202.4	202.7	-144.208	-144.508						8.26		1.65	0.08		6.96		18.9		0.0022		N.D.	N.D.	N.D.					N.D.						-74.2	3.11							
159	HDB-3	229.3	229.92	-171.108	-171.728																												-26	1.7									
160	HDB-3	274.3	274.9	-216.108	-216.708																												-26	1.9									
161	HDB-3	293	293.3	-234.808	-235.108						24.31		4.77	0.54		4.80		17.51		0.0002		N.D.	N.D.	N.D.					N.D.						-64.1	1.56							
162	HDB-3	326	327	-267.808	-268.808																												-23	2.3									
163	HDB-3	373	373.7	-314.808	-315.508																												-23	2.6									
164	HDB-3	394.73	395	-336.538	-336.808						9.00		2.44	0.16		4.49		33.65		0.0079		N.D.	N.D.	N.D.					N.D.						-62.7	1.79							
165	HDB-3	425.2	426	-367.008	-367.808																												-21	2.2									
166	HDB-3	494	494.27	-435.808	-436.078						5.90		2.07	0.1		4.86		32.67		0.014		0.0082	N.D.	0.0016					N.D.						-64.0	1.39							
167	HDB-3	500.1	501	-441.908	-442.808																												-23	2.6									
168	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/26																																				
169	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/27																																				
170	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/27																																				
171	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/28	×	1464.33/ 1986.09		1.69		0.258	0.032		32.6		65		<0.01		<0.01	N.D.	N.D.		N.D.			<0.01	<0.01	1.2±0.2	-27	1.5	-62.1	4.9				0.9				
172	HDB-3	454.5	520	-396.308	-461.808		2003/1/11				1.65		0.586	0.07		12		84.5		0..012		<0.01	N.D.	N.D.		N.D.			<0.01	<0.01				-59.2	3.5							
173	HDB-3						2002/9/29	×																							7.4±0.2	-66	-10.0						33.8				
174	HDB-3						2002/10/24	×																																			
175	HDB-3						2002/11/24	×																																			
176	HDB-3						2002/12/24	×																																			
177	HDB-3						2003/1/1																								7.7±0.3	-66	-10.2						30.3				
178	HDB-3						2003/1/23	×																																			
179	HDB-3						2003/2/19	×																																			

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (8/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Organics				Microbiology																					
		Min.	Max.	Min.	Max.			Humic acid	Fuluvic acid	Acetate	Formate	Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
92	HDB-2	350	351.29	-307.471	-308.761																												
93	HDB-2	400.9	401.75	-358.371	-359.221																												
94	HDB-2	400.9	401.75	-358.371	-359.221																												
95	HDB-2	403.15	403.95	-360.621	-361.421																												
96	HDB-2	412.59	413.69	-370.061	-371.161																												
97	HDB-2	454	464.12	-411.471	-421.591																												
98	HDB-2	499	499.8	-456.471	-457.271																												
99	HDB-2	499	499.8	-456.471	-457.271																												
100	HDB-2	534.75	543.99	-492.221	-501.461																												
101	HDB-2	594	594.85	-551.471	-552.321																												
102	HDB-2	623	624	-580.471	-581.471																												
103	HDB-2	652.69	654.8	-610.161	-612.271																												
104	HDB-2	675	676	-632.471	-633.471																												
105	HDB-2	688	689	-645.471	-646.471																												
106	HDB-2	695	696	-652.471	-653.471																												
107	HDB-2	695	696	-652.471	-653.471																												
108	HDB-2	718.5	719.85	-675.971	-677.321																												
109	HDB-2	334.9	404.9	-292.371	-362.371		2002/2/10																										
110	HDB-2	334.9	404.9	-292.371	-362.371		2002/2/17	0.34	380	<0.5	<0.5	3.4.E+07	3.2.E+03	5.8.E+04		N.D.	N.D.	N.D.				2.2.E+03		7.9.E+03			2.2.E+01			2.2.E+01			
111	HDB-2	666.5	682.5	-623.971	-639.971		2002/5/6																										
112	HDB-2						2001/12/11																										
113	HDB-2						2002/1/18																										
114	HDB-2						2002/2/15																										
115	HDB-2						2002/3/16																										
116	HDB-2						2002/4/15																										
117	HDB-2						2001/12/17																										
118	HDB-2						2002/1/18																										
119	HDB-2						2002/2/15																										
120	HDB-2						2002/3/16																										
121	HDB-2						2002/4/15																										
122	HDB-2						2002/1/27	1.60	0.64	<0.5	<0.5																						
123	HDB-2						2002/3/12					7.9.E+03	1.6.E+01	1.0.E+01		N.D.	N.D.	N.D.				N.D.		N.D.			N.D.			N.D.			
124	HDB-2						2002/3/20																										
125	HDB-2						2002/4/16	<0.1	0.20	<0.5	<0.5																						
126	HDB-2						2002/4/19					2.1.E+02	5.1.E+00	N.D.		N.D.	N.D.	N.D.				N.D.		N.D.			N.D.			N.D.			
127	HDB-2	72		-29.471			2001/12/7																										
128	HDB-2	100		-57.471			2001/12/9																										
129	HDB-2	106.4		-63.871			2001/12/11																										
130	HDB-2	122.3		-79.771			2001/12/14																										
131	HDB-2	133.8		-91.271			2001/12/21																										
132	HDB-2	150		-107.471			2001/12/23																										
133	HDB-2	161.35		-118.821			2001/12/24																										
134	HDB-2	186.2		-143.671			2001/12/27																										
135	HDB-2	218.34		-175.811			2001/12/31																										
136	HDB-2	244.8		-202.271			2002/1/3																										
137	HDB-2	275.75		-233.221			2002/1/7																										
138	HDB-2	304.09		-261.561			2002/1/10																										
139	HDB-2	345.34		-302.811			2002/1/14																										
140	HDB-2	371.15		-328.621			2002/1/17																										
141	HDB-2	400		-357.471			2002/1/20	17	4200	0.5	0.5																						
142	HDB-2	413.84		-371.311			2002/3/14																										
143	HDB-2	454.87		-412.341			2002/3/18																										
144	HDB-2	483.1		-440.571			2002/3/21																										
145	HDB-2	520.15		-477.621			2002/3/25																										
146	HDB-2	548.72		-506.191			2002/3/28																										
147	HDB-2	589.63		-547.101			2002/4/1																										
148	HDB-2	610.79		-568.261			2002/4/4																										
149	HDB-2	652.32		-609.791			2002/4/8																										
150	HDB-2	674.66		-632.131			2002/4/11																										
151	HDB-2	715.18		-672.651			2002/4/15																										
152	HDB-2	720		-677.471			2002/4/16	160	4100	<0.5	<0.5																						
153	HDB-3	22.12	23	36.072	35.192																												
154	HDB-3	104.09	106	-45.898	-47.808																												
155	HDB-3	124	124.3	-65.808	-66.108																												
156	HDB-3	155.2	155.99	-97.008	-97.798																												
157	HDB-3	156.2	156.9	-98.008	-98.708																												
158	HDB-3	202.4	202.7	-144.208	-144.508																												
159	HDB-3	229.3	229.92	-171.108	-171.728																												
160	HDB-3	274.3	274.9	-216.108	-216.708																												
161	HDB-3	293	293.3	-234.808	-235.108																												
162	HDB-3	326	327	-267.808	-268.808																												
163	HDB-3	373	373.7	-314.808	-315.508																												
164	HDB-3	394.73	395	-336.538	-336.808																												
165	HDB-3	425.2	426	-367.008	-367.808																												
166	HDB-3	494	494.27	-435.808	-436.078																												
167	HDB-3	500.1	501	-441.908	-442.808																												
168	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/26																										
169	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/27																										
170	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/27																										
171	HDB-3	160.5	200.45	-102.308	-142.258		2002/11/28	3.1	231	0 (N.D)	0 (N.D)	1.4E+05	3.1E+03		2.6E+02	0 (N.D)	0 (N.D)	0 (N.D)				2.2E+02		1.1E+01				2.2E+01		0 (N.D)			
172	HDB-3	454.5	520	-396.308	-461.808		2003/1/11																										
173	HDB-3						2002/9/29																										
174	HDB-3						2002/10/24																										
175	HDB-3						2002/11/24																										
176	HDB-3						2002/12/24																										
177	HDB-3						2003/1/1																										
178	HDB-3						2003/1/23																										
179	HDB-3						2003/2/19																										

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (9/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII)			location (WGS84, UTM, Zone54)			Physico-chemical parameter							Contamination indicator				Comments
		Min.	Max.	Min.	Max.							X	Y	Z (middle depth)	East	North	Z (middle depth)	EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temper-ature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	
		[m]	[m]	[m]	[m]													[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]	[mg/l]		
180	HDB-3						2002/9/29		river (down the stream)									6.11		4.81				17.8					
181	HDB-3						2002/10/24		river (down the stream)									6.01		5.24				9.7					
182	HDB-3						2002/11/24		river (down the stream)									7.6		5.71				4.3					
183	HDB-3						2002/12/24		river (down the stream)									12.8		5.92				0					
184	HDB-3						2003/1/23		river (down the stream)									10.6		6.77				0					
185	HDB-3						2003/2/19		river (down the stream)									5.58		6.56				0					
186	HDB-3						2002/10/12		well																				
187	HDB-3						2003/1/13		well																				
188	HDB-3	52.44		5.752			2002/10/16		return	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	5.752	567524.237654	4988229.854210	5.752	72.1		8.61				12.5					
189	HDB-3	49.84		8.352			2002/10/18		return	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	8.352	567524.237654	4988229.854210	8.352	118.7		8.02				13.4					
190	HDB-3	62.61		-4.418			2002/10/25		return	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-4.418	567524.237654	4988229.854210	-4.418	120.3		9.89				9.6					
191	HDB-3	155.18		-96.988			2002/11/1		return	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-96.988	567524.237654	4988229.854210	-96.988	422		8.4				10.1					
192	HDB-3	234.91		-176.718			2002/11/8		return	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-176.718	567524.237654	4988229.854210	-176.718	362		7.86				12					
193	HDB-3	309.46		-251.268			2002/11/13		return	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-251.268	567524.237654	4988229.854210	-251.268	394		8.02				13.3					
194	HDB-3	111.46		-53.268			2002/12/6		return	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-53.268	567524.237654	4988229.854210	-53.268	642		7.83				10.6					
195	HDB-3	317.82		-259.628			2002/12/13		return	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-259.628	567524.237654	4988229.854210	-259.628	563		12.37				11.9					
196	HDB-3	385.77		-327.578			2002/12/20		return	Koetoi Fm.	diatomaceous mudstone	116109.269584	-30928.204381	-327.578	567524.237654	4988229.854210	-327.578	395		10.15				15					
197	HDB-3	464.46		-406.268			2002/12/27		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116109.269584	-30928.204381	-406.268	567524.237654	4988229.854210	-406.268	211		9.53				11.4					
198	HDB-3	517.21		-459.018			2003/1/1		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116109.269584	-30928.204381	-459.018	567524.237654	4988229.854210	-459.018	527		7.58				15.7					
199	HDB-4	28.93	30.65	34.68	32.96				core	Koetoi Fm.	diatomaceous mudstone	117240.044610	-29530.240236	33.82	568904.225546	4989381.786038	33.82												pore water extraction: squeeze (<70MPa)
200	HDB-4	96.73	97.55	-33.12	-33.94				core	Koetoi Fm.	diatomaceous mudstone	117240.044610	-29530.240236	-33.53	568904.225546	4989381.786038	-33.53												
201	HDB-4	100.75	101.05	-37.14	-37.44				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	117240.044610	-29530.240236	-37.29	568904.225546	4989381.786038	-37.29												
202	HDB-4	159.4	160.2	-95.79	-96.59				core	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-96.19	568904.225546	4989381.786038	-96.19												
203	HDB-4	166.78	168	-103.17	-104.39				core	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-103.78	568904.225546	4989381.786038	-103.78												
204	HDB-4	198.36	198.6	-134.75	-134.99				core	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-134.87	568904.225546	4989381.786038	-134.87												
205	HDB-4	224	224.75	-160.39	-161.14				core	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-160.765	568904.225546	4989381.786038	-160.77												
206	HDB-4	274.25	275	-210.64	-211.39				core	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-211.015	568904.225546	4989381.786038	-211.02												
207	HDB-4	297	297.3	-233.39	-233.69				core	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-233.54	568904.225546	4989381.786038	-233.54												
208	HDB-4	324	325	-260.39	-261.39				core	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-260.89	568904.225546	4989381.786038	-260.89												
209	HDB-4	377	377.9	-313.39	-314.29				core	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-313.84	568904.225546	4989381.786038	-313.84												
210	HDB-4	388.72	389	-325.11	-325.39				core	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-325.25	568904.225546	4989381.786038	-325.25												
211	HDB-4	426	426.75	-362.39	-363.14				core	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-362.765	568904.225546	4989381.786038	-362.77												
212	HDB-4	474	474.9	-410.39	-411.29				core	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-410.84	568904.225546	4989381.786038	-410.84												
213	HDB-4	501	501.28	-437.39	-437.67				core	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-437.53	568904.225546	4989381.786038	-437.53												
214	HDB-4	218.45	236.53	-154.84	-172.92		2002/11/23		pump	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-163.88	568904.225546	4989381.786038	-163.88	14.778	14.72	7.29	7.27			11.33		8.39		A	
215	HDB-4	218.45	236.53	-154.84	-172.92		2002/11/23		pump	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-163.88	568904.225546	4989381.786038	-163.88	312.6	313	7.53	7.53			15.03		1.14		A	
216	HDB-4	218.45	236.53	-154.84	-172.92				pump	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-163.88	568904.225546	4989381.786038	-163.88	313		7.5		-39	167			1.1		A	
217	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/24		pump	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-226.8775	568904.225546	4989381.786038	-226.88	39.28	16.13	7.39	7.27			15.64		9.353		A	
218	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/24		pump	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-226.8775	568904.225546	4989381.786038	-226.88	304.8	431	7.27	7.71			13.33		0.469		A	
219	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/25		pump	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-226.8775	568904.225546	4989381.786038	-226.88	366.2	441	7.23	7.80			13.64		0.34		A	
220	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/25		pump	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-226.8775	568904.225546	4989381.786038	-226.88		430		7.84					0.43		A	
221	HDB-4	371.9	406.5	-308.29	-342.89		2002/12/31		pump	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-325.59	568904.225546	4989381.786038	-325.59		15.85		6.82					3.14		A	
222	HDB-4	371.9	406.5	-308.29	-342.89		2003/1/1		pump	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-325.59	568904.225546	4989381.786038	-325.59	1607.2	1607	7.03	7.03			11.73		0.57		A	
223	HDB-4	371.9	406.5	-308.29	-342.89		2003/1/1		pump	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-325.59	568904.225546	4989381.786038	-325.59	1583.6	1582	7.02	7.02			9.83		0.55		A	
224	HDB-4	407.9	520	-344.29	-456.39		2003/1/15		pump	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-400.34	568904.225546	4989381.786038	-400.34	0.0012	16.36	8.67	6.97			10.94		3.64		A	
225	HDB-4	407.9	520	-344.29	-456.39		2003/1/16		pump	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-400.34	568904.225546	4989381.786038	-400.34	1641.4	1645	6.98	6.97			12.7		0.69		A	
226	HDB-4	407.9	520	-344.29	-456.39		2003/1/16		pump	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-400.34	568904.225546	4989381.786038	-400.34	1667.2	1681	6.98	6.98			12.84		0.70		A	
227	HDB-4						2002/9/29		river (up the stream)									8.77		5.83				11.9		0.03		A	
228	HDB-4						2002/10/24		river (up the stream)									8.84		6.21				8.1		0.055		A	
229	HDB-4						2002/11/24		river (up the stream)									8.26		6.8				4.8		0.014		A	
230	HDB-4						2002/12/24		river (up the stream)									8.43		7.17				1.6		0.027		A	
231	HDB-4						2002/12/25		river (up the stream)									8.53		6.35				1		0.025		A	
232	HDB-4						2003/1/23		river (up the stream)									10.2		6.74				2.9		0.03		A	
233	HDB-4						2003/2/19		river (up the stream)									8.36		6.57				1		0.03		A	
234	HDB-4						2002/9/29		river (down the stream)									9.93		6.16				12.2		0.05		A	
235	HDB-4						2002/10/24		river (down the stream)									9.48		6.02				8.4		0.058		A	
236	HDB-4						2002/11/24		river (down the stream)									8.75		6.56				5.2		0.015		A	
237	HDB-4						2002/12/24		river (down the stream)									9.7		7.17				2.3		0.026		A	
238	HDB-4						2003/1/23		river (down the stream)									10.13		6.77				3.1		0.03		A	
239	HDB-4						2003/2/19		river (down the stream)									10.7		6.85				1.3		0.03		A	
240	HDB-4						2002/10/12		well																				
241	HDB-4						2002/10/15		well																				
242	HDB-4						2003/1/13		well																				
243	HDB-4	46.98		16.63			2002/10/17		return	Koetoi Fm.	diatomaceous mudstone	117240.044610	-29530.240236	16.63	568904.225546	4989381.786038	16.63	23.6		9.87				10.6		10		A	
244	HDB-4	9.69		53.92			2002/10/18		return	Koetoi Fm.	diatomaceous mudstone	117240.044610	-29530.240236	53.92	568904.225546	4989381.786038	53.92	16.97		7.11				8.8		9.87		A	
245	HDB-4	55.50		8.11			2002/10/25		return	Koetoi Fm.	diatomaceous mudstone	117240.044610	-29530.240236	8.11	568904.225546	4989381.786038	8.11	49.4		11.21				11.5		8.6475		A	
246	HDB-4	147.30		-83.69			2002/11/1		return	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-83.69	568904.225546	4989381.786038	-83.69	40.2		9.55				11.6		9.635		A	
247	HDB-4	206.62		-143.01			2002/11/8		return	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-143.01	568904.225546	4989381.786038	-143.01	76.3		9.89				11.2		10.668		A	
248	HDB-4	278.90		-215.29			2002/11/15		return	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-215.29	568904.225546	4989381.786038	-215.29	66.2		10.25				8.4		8.69		A	
249	HDB-4	297.00		-233.39			2002/11/16		return	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-233.39	568904.225546	4989381.786038	-233.39	123.4		9.45				10.8		8.38		A	
250	HDB-4	359.86		-296.25			2002/12/13		return	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-296.25	568904.225546	4989381.786038	-296.25	202		9.48				14.6		9.8283		A	
251	HDB-4	453.26		-389.65			2002/12/20		return	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-389.65	568904.225546	4989381.786038	-389.65	290		8.34				17		8.186		A	
252	HDB-4	517.30		-453.69			2002/12/24		return	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-453.69	568904.225546	4989381.786038	-453.69	464		7.69				18.9		8.26		A	
253	HDB-4	223.93	233.78	-160.32	-170.17	4	2004/2/4 ~ 2/5		bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-165.25	568904.225546	4989381.786038	-165.25		280		8.6								
254	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/2/22		bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-165.25	568904.225546	4989381.786038	-165.25		440		10								
255	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/6/30	2005/7/23-8/19	bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-165.25	568904.225546	4989381.786038	-165.25		430		10								
256	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/8/29	2005/9/22-10/5	bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-165.25	568904.225546	4989381.786038	-165.25		430		9.9								
257	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/10/25	2005/10/31-11/10	bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-165.25	568904.225546	4989381.786038	-165.25		420		10								
258	HDB-4	223.93	233.78	-160.32	-170.17	4	2006/6/27	2006/8/22-9/29	bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-165.25	568904.225546	4989381.786038	-165.25		390		10								
259	HDB-4	223.93	233.78	-160.32	-170.17	4	2006/10/10	2006/11/16-12/6	bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-165.25	568904.225546	4989381.786038	-165.25		380		10.1								
260	HDB-4	223.93	233.78	-160.32	-170.17	4	2009/11/7	2009/11/12-	bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-165.25	568904.225546	4989381.786038	-165.25	267	320	10.5	10.3				<0.002	0.140		B	
261	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/2/24		bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-222.30	568904.225546	4989381.786038	-222.30		390		9.2								
262	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/6/30	2005/7/23-8/19	bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-222.30	568904.225546	4989381.786038	-222.30		370		10								
263	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/8/29	2005/9/22-10/5	bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-222.30	568904.225546	4989381.786038	-222.30		400		9.8								
264	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/10/26	2005/10/31-11/10	bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-222.30	568904.225546	4989381.786038	-222.30		420		9.7								
265	HDB-4	281.05	290.76	-217.44	-227.15	6	2006/6/27	2006/8/22-9/29	bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-222.30	568904.225546	4989381.786038	-222.30		370		9.9								
266	HDB-4	281.05	290.76	-217.44	-227.15	6	2006/10/10	2006/11/16-12/6	bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-222.30	568904.225546	4989381.786038	-222.30		380		9.9								
267	HDB-4	281.05	290.76	-217.44	-227.15	6	2009/11/5	2009/11/10-	bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-222.30	568904.225546	4989381.786038	-222.30	355	360	10.3	9.9				<0.002	0.079		B	
268	HDB-4	474.79	484.61	-411.18	-421	10	2004/2/17 ~ 2/19		bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-416.09	568904.225546	4989381.786038	-416.09		580		8.2								
269	HDB-4	474.79	484.61	-411.18	-421	10	2005/6/30	2005/7/23-8/19	bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-416.09	568904.225546	4989381.786038	-416.09		1700		9.4								
270	HDB-4	474.79	484.61	-411.18	-421	10	2009/11/6	2009/12/22-1/13	bottle	Wakkanai Fm.	siliceous mudstone	117240.044610	-29530.240236	-416.09	568904.225546	4989381.786038	-416.09	702		9.7	9.3				<0.002	0.095		B	analyzed at Tono Geoscience center
271	HDB-5	27.51	28	51.258	50.768				core	Koetoi Fm.	diatomaceous mudstone	116664.215800	-29165.160200	51.013	569278.058950	4988811.806517	51.013												pore water extraction: squeeze (<70MPa)
272	HDB-5	60.19	61.34	18.578	17.428				core	Koetoi Fm.	diatomaceous mudstone	116664.215800	-29165.160200	18.003	569278.058950	4988811.806517	18.003												

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (10/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Geochemistry																																				
		Min.	Max.	Min.	Max.			Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
180	HDB-3						2002/9/29	6.9	2.0	1.3	1.4	0.04		0 (N.D)	30		0.01	0 (N.D)	0.11	0.04	5.4	0.11	3.0	<0.1	9.6	0 (N.D)	0 (N.D)	0.1	0.1	0 (N.D)	3.3		4.5	<1	3.7		0 (N.D)		11	1		1.0	0.5	0.50
181	HDB-3						2002/10/24	6.4	1.2	1.5	1.8	0.04		0 (N.D)	13		0.02	0 (N.D)	0.1	0 (N.D)	4.2	0.02	0.4	0.2	10	0 (N.D)	0 (N.D)	0.3	<0.1	0 (N.D)	5.4		5.9	<1	4.8		0 (N.D)		6	1		0.7	0.5	0.11
182	HDB-3						2002/11/24	7.3	0.94	1.6	1.3	0.04		0 (N.D)	17		0.02	0 (N.D)	0 (N.D)	0 (N.D)	5.1	0.05	0.3	<0.1	11	0.2	0 (N.D)	0.1	<0.1	0 (N.D)	4.5		10	<1	8.2		0 (N.D)		8	3		0.7	0.6	0.04
183	HDB-3						2002/12/24	15	1.5	5.2	2.8	0.09		0 (N.D)	17		0.03	0 (N.D)	0.18	0 (N.D)	15	0.01	1.0	<0.1	21	0.2	0 (N.D)	<0.1	<0.1	0 (N.D)	5.3		28	<1	23		0 (N.D)		7	8		1.6	1.2	0.35
184	HDB-3						2003/1/23	8.3	0.42	1.9	1.0	<0.01		0 (N.D)	0.6		0.01	0 (N.D)	0 (N.D)	0 (N.D)	0.32	<0.01	0.3	<0.1	14	0 (N.D)	0 (N.D)	1.4	0.2	0.27	3.7		3.5	<1	2.9		0 (N.D)		1	1		0.6	0.6	0.01
185	HDB-3						2003/2/19	4.8	0.66	0.73	0.57	<0.01		0 (N.D)	0.34		0 (N.D)	0 (N.D)	0 (N.D)	0 (N.D)	0.16	0.02	0.1	<0.1	9.6	0 (N.D)	0 (N.D)	0.9	<0.1	0.29	2.4		0.95	<1	0.78		0 (N.D)		2	0 (N.D)		0.3	0.4	-0.05
186	HDB-3						2002/10/12	17	1.7	5.9	3.5	<0.01			3		0.04	N.D.	0.23	N.D.	0.01	<0.01	<0.01	0.2	19	0 (N.D)	N.D.	0.4	<0.1	<0.1	4.4	N.D.	43	<1	35		N.D.		N.D.	9		1.4	1.4	-0.01
187	HDB-3						2003/1/13	17	1.5	5.1	3.5	<0.01			34		0.04	N.D.	0.22	N.D.	0.03	<0.01	<0.01	0.3	23	0 (N.D)	N.D.	<0.1	<0.1	0.2	5.7	N.D.	43	<1	35		N.D.		N.D.	10		1.3	1.5	-0.19
188	HDB-3	52.44		5.752			2002/10/16	130	16	9.4	2.3	0.02		0.38	19		0.05	0.003	0.15	0.01	0.77	<0.01	1.6	0.2	120	0 (N.D)	0 (N.D)	0.5	0.2	2.6	24		183	<1	150		0 (N.D)		15	36		7.1	6.9	1.2
189	HDB-3	49.84		8.352			2002/10/18	440	38	11	4.2			1.6											550						26		402	<1	330		0 (N.D)					21.2	22.7	-3.3
190	HDB-3	62.61		-4.418			2002/10/25	260	17	12	1.3			0.67											320						48		154	8.03	140		6.7					12.5	12.8	-1.1
191	HDB-3	155.18		-96.988			2002/11/1	840	63	21	8.6			2.4											1070						74		461	7.19	390		6					40.2	39.5	0.9
192	HDB-3	234.91		-176.718			2002/11/8	1150	64	28	9.7			2.7											1570						300		500	<1	410		0 (N.D)					54.2	58.7	-4.0
193	HDB-3	309.46		-251.268			2002/11/13	930	60	27	9.8	0.3		2.3	9.4		0.34	0 (N.D)	0 (N.D)	0 (N.D)	0.49	0.02	0.4	0.1	1140	11	3.0	0.4	<0.1	51	370		317	<1	260		0 (N.D)		38	61		47.3	45.2	2.3
194	HDB-3	111.46		-53.268			2002/12/6	1100	65	86	21			3.3											1700						200		390	<1	320		0 (N.D)					56.0	58.5	-2.2
195	HDB-3	317.82		-259.628			2002/12/13	580	13	43	0.03			0.45											510						130		<1	63.0	640		590					27.8	19.3	17.9
196	HDB-3	385.77		-327.578			2002/12/20	840	26	41	0.38			0.07											1000						390		<1	69.0	180		120					39.3	38.8	0.7
197	HDB-3	464.46		-406.268			2002/12/27	320	13	6.9	0.78			0.33											280						210		190	<1	160		0 (N.D)					14.7	15.4	-2.3
198	HDB-3	517.21		-459.018			2003/1/1	1200	45	35	11	0.53		2.9	16		0.44	0 (N.D)	0 (N.D)	0 (N.D)	0.22	0	0.1	0.4	1660	16	<1	<0.1	<0.1	2.6	350		410	7.60	350		6.3		24	82		56.6	61.3	-4.0
199	HDB-4	28.93	30.65	34.68	32.96			39	13	7	5														35						90		0									2.8	2.9	-1.2
200	HDB-4	96.73	97.55	-33.12	-33.94			500	38	15	11														140						980		20									24.4	24.6	-0.6
201	HDB-4	100.75	101.05	-37.14	-37.44																																							
202	HDB-4	159.4	160.2	-95.79	-96.59			1200	45	95	56														160						2800		10									62.7	62.9	-0.2
203	HDB-4	166.78	168	-103.17	-104.39			1900	73	300	190														120						5400		10									115.1	115.8	-0.3
204	HDB-4	198.36	198.6	-134.75	-134.99																																							
205	HDB-4	224	224.75	-160.39	-161.14			770	31	12	10														600						810		40									35.7	34.4	1.8
206	HDB-4	274.25	275	-210.64	-211.39			1200	30	51	34														530						2000		20									58.3	56.8	1.3
207	HDB-4	297	297.3	-233.39	-233.69																																							
208	HDB-4	324	325	-260.39	-261.39			1700	27	51	15														1600						1500		10									78.4	76.4	1.3
209	HDB-4	377	377.9	-313.39	-314.29			2800	39	98	78														3300						1900		10									134.0	132.6	0.5
210	HDB-4	388.72	389	-325.11	-325.39																																							
211	HDB-4	426	426.75	-362.39	-363.14			3500	49	40	66														4400						1600		10									160.9	157.4	1.1
212	HDB-4	474	474.9	-410.39	-411.29			3300	51	18	53														4700						600		10									150.0	145.0	1.7
213	HDB-4	501	501.28	-437.39	-437.67																																							
214	HDB-4	218.45	236.53	-154.84	-172.92		2002/11/23	19	1.9	7.4	3.6			0.01											27						5.4		49	<1	40		0 (N.D)					1.5	1.7	-0.2
215	HDB-4	218.45	236.53	-154.84	-172.92		2002/11/23	730	17	14	5.4			0.70											630						4.6		1123	<1	920		0 (N.D)					33.4	36.3	-4.1
216	HDB-4	218.45	236.53	-154.84	-172.92			730	17	14	5.4											0.05			630						4.6	0.00006	1123							220.918033		33.3	36.3	-4.2
217	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/24	19	1.6	8.1	3.8			0.01											22						5.2		51	<1	42		0 (N.D)					1.6	1.6	0.0
218	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/24	860	21	23	10			0.61											780						0.2		1269	<1	1040		0 (N.D)					40.0	42.8	-3.4
219	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/25	870	21	23	10			0.63											780						0.2		1342	<1	1100		0 (N.D)					40.4	44.0	-4.3
220	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/25	880	21	23	9.9	0.01		0.59	20		0.23	0 (N.D)	0.12	0 (N.D)	0.05	0.02	<0.01	0.2	820	2.9	<1	<0.1	0.9	2.6	0.3		1184	60.0	1070		50		16	250		41.0	44.7	-4.4
221	HDB-4	371.9	406.5	-308.29	-342.89		2002/12/31	18	1.5	6.9	3.6			<0.01											22						5.6		46.0	<1	38		0 (N.D)					1.5	1.5	-0.1
222	HDB-4	371.9	406.5	-308.29	-342.89		2003/1/1	3600	55	91	55			0.19											4400						2.1		2600	<1	2200		0 (N.D)					167.0	166.6	0.1
223	HDB-4	371.9	406.5	-308.29	-342.89		2003/1/1	3500	54	94	53			1.9											4300						1.7		2600	<1	2100		0 (N.D)					162.9	163.8	-0.3
224	HDB-4	407.9	520	-344.29	-456.39		2003/1/15	20	1.5	6.6	3.6			<0.01											27						4.7		47	<1	39		0 (N.D)					1.5	1.7	-0.1
225	HDB-4	407.9	520	-344.29	-456.39		2003/1/16	3700	57	98	61			3.2											4600						4.8		2600	<1	2100		0 (N.D)					172.7	172.3	0.1
226	HDB-4	407.9	520	-344.29	-456.39		2003/1/16	3700	59	95	56	0.03		3.5	23		1.3	0 (N.D)	0.1	0 (N.D)	0.11	0.06	0.02	0.4	4600	19	16	0.2	<0.1	86	7.0		2610	<1	2140		0 (N.D)		42	570		177.0	172.8	1.2
227	HDB-4						2002/9/29	9.7	3.1	1.9	1.6	0.02		<0.01	28		0.02	0 (N.D)	0.08	0 (N.D)	1.1	0.04	<0.01	<0.1	13	<0.1	<1	2.8	0.1	<0.1	6.5		8.9	<1	7.3		0 (N.D)		4	2		0.8	0.7	0.0
228	HDB-4						2002/10/24	8.9	4.3	1.7	1.7	0.03		<0.01	18		0.02	0 (N.D)	0.17	0 (N.D)	3.6	0.02	0.2	0.1	14	<0.1	<1	2.9	0.2	<0.1	5.9		7.9	<1	6.5		0 (N.D)		8	2		0.8	0.7	0.1
229	HDB-4						2002/11/24	8.8	2.3	1.6	1.4	<0.01		<0.01	24		0.02	0 (N.D)	0 (N.D)	0 (N.D)	0.4	0.01	<0.01	<0.1	12	0.2	<1	5.3	<0.1	<0.1	6.9		6.0	<1	4.9		0 (N.D)		8	3		0.7	0.7	-0.1
230	HDB-4						2002/12/24	11	2.2	1.6	1.4	0.01		<0.01	25		0.02	0 (N.D)	0.06	0 (N.D)	1.1	0 (N.D)	0.2	<0.1	11	<0.1	<1	4.3	<0.1	<0.1	6.7		6.0	<1	4.9		0 (N.D)		2	2		0.8	0.7	0.1
231	HDB-4						2002/12/25																																					
232	HDB-4						2003/1/23	12	1.8	2.1	1.6	0.03		<0.01	24		0.02	0 (N.D)	0.07	0 (N.D)	1	0 (N.D)	0.2	0.1	12	<0.1	<1	2.8	0.1	0.03	7.7		18	<1	15		0 (N.D)		2	5		0.8	0.9	0.0
233	HDB-4						2003/2/19	9.5	2.0	1.5	1.4	0.08		<0.01	24		0.02	0 (N.D)	0.36	0.03	6.1	0.02	1.1	<0.1	12	<0.1	<1	3.0	0.2	0.04	6.0		8.6	<1	7.1		0 (N.D)		2	2		0.9	0.7	0.2
234	HDB-4						2002/9/29	12	2.8	2.2	1.8	0.03		<0.01	28		0.03	0 (N.D)	0.12	0 (N.D)	1.1	0.02	<0.01	<0.1	12	<0.1	<1	2.4	0.1	<0.1	7.8		18	<1	15		0 (N.D)		3	4		0.9	0.9	0.0
235	HDB-4						2002/10/24	9.5	2.8	2.9	2.0	0.21		<0.01	17		0.03	0 (N.D)	0.28	0 (N.D)	4.1	0.02	0.7	<0.1	14	<0.1	<1	1.6	<0.1	<0.1	8.5		11	<1	9.4		0 (N.D)		6	2		1.0	0.8	0.1
236	HDB-4						2002/11/24	9.9	1.9	2.0	1.6	0.02		<0.01	24		0.01	0 (N.D)	0.06	0 (N.D)	1.2	0.01	0.1	<0.1	11	0.2	<1	4.0	0.1	<0.1	8.1		12	<1	9.8		0 (N.D)		3	2		0.8	0.8	0.0
237	HDB-4						2002/12/24	11	1.8	1.9	1.6	0.01		0.01	26		0.03	0 (N.D)	0 (N.D)	0 (N.D)	0.36	0.01	<0.01	<0.1	12	<0.1	<1	3.0	<0.1	<0.1	7.9		14	<1	11		0 (N.D)		3	3		0.8	0.8	-0.1
238	HDB-4						2003/1/23	12	1.9	2.1	1.7	0.01		0.01	25		0.03	0 (N.D)	0 (N.D)	0 (N.D)	0.51	0 (N.D)	<0.01	<0.1	11	<0.1	<1	2.9	<0.1	0.04	7.8		18	<1	15		0 (N.D)		2	5		0.8	0.9	0.0
239	HDB-4						2003/2/19	13	1.8	2.1	1.7	0.04		0.01	25		0.02	0 (N.D)	0.01	0 (N.D)	1.5	0.03	0.2	<0.1	11	<0.1	<1	3.5	0.2	0.04	7.4		20	<1	17		0 (N.D)		2	4		0.9	0.9	0.0
240	HDB-4						2002/10/12																																					
241	HDB-4						2002/10/15	17	1.7	5.9	3.5	<0.01		0.01	16		0.04	<0.001	0.23	<0.01	0.01	<0.01	<0.01	<0.1	19	<0.1	<1	0.4	<0.1	<0.1	4.4	<0.1	43		35		<0.1		<1	9		1.4	1.3	0.0
242	HDB-4						2003/1/13	17	1.5	5.1	3.5	<0.01		<0.01	17		0.04	<0.001	0.22	<0.01	0.03	<0.01	<0.01	<0.1	23	<0.1	<1	<0.1	<0.1	0.2	5.7	<0.1	43		35		<0.1		<1	10		1.3	1.5	-0.1
243	HDB-4	46.98		16.63			2002/10/17	17	2.3	14	3.3	<0.01		0.01	16		0.05	0 (N.D)	0.21	0 (N.D)	0.01	0 (N.D)	<0.01	0.2	20	<0.1	<1	<0.1	<0.1	<0.1	5.3		67		53				2	13		1.8	1.8	-0.01
244	HDB-4	9.69		53.92			2002/10/18	18	3.1	11	3.4			0.01											20						7.0		59		48							1.7	1.7	0.0
245	HDB-4	55.50		8.11			2002/10/25	28	3.3	54	<0.05			0.01											22						25		24	72	140		60					4.0	4.1	-1.4
246	HDB-4	147.30		-83.69			2002/11/1	87	17	5.9	5.9			0.12											23						35		164	16	160		13					5.0	4.6	4.2
247	HDB-4	206.62		-143.01			2002/11/8	140	2.6	2.3	1.0			0.02											26						60		238	9.0	210		7.6					6.4	6.2	1.2
248	HDB-4	278.90		-215.29			2002/11/15	150	2.2	2.6	0.80			0 (N.D)											26						68		171	24	180		20					6.8	5.8	7.7
249	HDB-4	297.00		-233.39			2002/11/16	240	3.0	1.7	0.54	<0.01		0.04	18		0.02	0.001	0 (N.D)	0 (N.D)	0.55	0.02	0.9	0.5	110	0.5	<1	0.5	0.3	1.4	48		374	7.8	320		6.3		12	79		10.8	10.6	1.3
250	HDB-4	359.86		-296.25			2002/12/13	270	4.7	3.7	2.1			0.03											160						140		360		300							12.2	13.3	-4.3
251	HDB-4	453.26		-389.65			2002/12/20	450	9.4	6.8	2.0			0.13											410						160		440		360							20.3	22.1	-4.2
252	HDB-4	517.30		-453.69			2002/12/24	760	22	6.8	5.0	0.05		0.36	12		0.14	0 (N.D)	0 (N.D)	0.21	0.31	0 (N.D)	0.3	0.6	810	3.2	2	0.2	0.1	12	250		490	18	430		15		34	110		35.1	36.8	-2.3
253	HDB-4	223.93	233.78	-160.32	-170.17	4	2004/2/4～2/5	760	16	16	8	0.03		1	21		0.21	N.D.	0.41	0.08	<0.01		<0.01	0.3	900	1.8	<1	<0.1		3.7	37		650	14	720				4.7	180		35.3	37.3	-2.8
254	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/2/22	950	22	1.7	0.25	<0.01		0.54	14		0.07	N.D.	0.6	<0.01	0.02		0.02	0.18	1000	3.6	22	<0.1		48	0.3		380	180	870				7.8	110		44.7	40.9	4.5
255	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/6/30	930	22	1.6	0.24	<0.01		0.47	12		0.08	N.D.	0.6	<0.01	0.01		0.01	0.44	960	2.9	3.7	0.03		49	0.9		370	170	860				6.8	110		43.9	39.3	5.6
256	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/8/29	910	20	1.9	0.34	<0.01		0.46	10		0.09	N.D.	0.7	<0.01	0.01		<0.01	0.2	930	3.4	2.9	0.02		51	1.2		390	150	850				7.1	110		43.1	38.0	6.3
257	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/10/25	880	20	2.8	1.1	<0.01		0.48	11		0.08	N.D.	0.6	<0.01	0.01		0.01	0.32	900	3.2	4.9	<0.1		53	0.8		330	150	840				7.6	97		42.0	36.2	7.4
258	HDB-4	223.93	233.78	-160.32	-170.17	4	2006/6/27	830	19	1.7	0.16	<0.01		0.49	6.4		0.05	N.D.	0.7	<0.01	<0.01		0.01	0.37	830	3.1	2.5	0.01		55	2.2		320	150	980		7.1		92		<0.2	39.8	34.1	7.7
259	HDB-4	223.93	233.78	-160.32	-170.17	4	2006/10/10	800	18	1.6	0.16	<0.01		0.45	5.6		0.09	N.D.	0.7	<0.01	<0.01		<0.01	0.34	810	3.1	3.9	<0.1		62	2.5		290	170	790		7.9		91		<0.2	38.8	33.8	7.0
260	HDB-4	223.93	233.78	-160.32	-170.17	4	2009/11/7	720	13	0.4	<0.1	<0.01		0.6	2.5		0.08	<0.01	0.4	<0.01	0.06	0.04	<0.1	0.4	680	2.7	2.0	<0.1		73	8.9	0.007	170	150	740		430		10	64		35.8	27.5	13.1
261	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/2/24	840	45	2.7	2.4	<0.01		0.4			0.07	N.D.	0.9	<0.01	0.02		0.01		730		0.5			31	1.1		870	73	960				5.5	190		39.8	37.5	3.0
262	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/6/30	750	95	1.3	0.11	<0.01		0.28	15		0.06	N.D.	2	<0.01	0.02		0.01	0.41	660	2	2.5	0.02		39	0.9		450	210	940				6.8	130		37.3	33.5	5.3
263	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/8/29	800	140	2	0.5	<0.01		0.33	15		0.1	N.D.	2	<0.01	0.02		<0.01	0.53	690	2.4	2.6	0.02		37	1.1		590	190	1100				7.6	150		40.6	36.0	6.0
264	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/10/26	850	150	1.7	0.25	<0.01		0.42	21		0.13	N.D.	1.6	<0.01	0.04		<0.01	0.37	700	2.4	2.5	0.02		34	0.3		720	180	1100				8.4	180		42.8	38.0	6.0
265	HDB-4	281.05	290.76	-217.44	-227.15	6	2006/6/27	750	130	1.6	0.17	<0.01		0.37	13		0.06	N.D.	1.8	<0.01	0.01		0.01	0.44	650	2.3	1.9	0.03		40	1.4		500	190	810		7.2		140		<0.2	38.3	33.4	6.9
266	HDB-4	281.05	290.76	-217.44	-227.15	6	2006/10/10	760	140	1.6	0.31	<0.01		0.37	15		0.11	N.D.	1.8	<0.01	0.01		<0.01	0.39	650	2.3	2.4	<0.1		42	1.1		520	200	1000		7.9		140		<0.2	39.1	34.1	6.9
267	HDB-4	281.05	290.76	-217.44	-227.15	6	2009/11/5	790	160	1.6	0.6	<0.01		0.7	3.7		0.10	<0.01	0.7	<0.01	0.04	0.03	<0.1	0.4	650	2.4	4.0	<0.1		41	1	0.017	390	170	1200		450		7	110		41.0	30.8	14.1
268	HDB-4	474.79	484.61	-411.18	-421	10	2004/2/17～2/19	3400	51	39	78	0.03		4.6	23		0.9	0.005	0.18	0.17	0.02		<0.01	<0.1	5000	8.2	28	<0.1		70	6.3		1800	17	1800				11	99		162.0	171.2	-2.7
269	HDB-4	474.79	484.61	-411.18	-421	10	2005/6/30	4200	69	1.5	15	<0.01		2.8			0.62	N.D.	0.5	<0.01	0.08		<0.01	0.03	4800	18	13	0.03		130	1.1		2300	290	3000				13	520		193.3	183.5	2.6
270	HDB-4	474.79	484.61	-411.18	-421	10	2009/11/6	3930	53	6.37	11.6	<0.02			10	68.0	0.4				0.03		<0.05	<0.05	4910	19.2		<0.05			4.7	0.025							14.3	375	0.13	173.5	169.9	1.0
271	HDB-5	27.51	28	51.258	50.768			100	28	220	90														77						960		30									23.4	22.6	1.8
272	HDB-5	60.19	61.34	18.578	17.428			92	15	150	56														66						650		30									16.5	15.9	1.9

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (11/64)

Index	Sample point	sampling zone (GL) Min.	sampling zone (GL) Max.	sampling zone (EL) Min.	sampling zone (EL) Max.	sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases: Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	Isotopes: ^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{36}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_w]	[cc_{STP}/g_w]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
180	HDB-3						2002/9/29	×																																					
181	HDB-3						2002/10/24	×																																					
182	HDB-3						2002/11/24	×																																					
183	HDB-3						2002/12/24	×																																					
184	HDB-3						2003/1/23	×																																					
185	HDB-3						2003/2/19	×																																					
186	HDB-3						2002/10/12	×																								4.5±0.2	-68.8	-10.6						39.9±0.3				
187	HDB-3						2003/1/13	×																								4.4±0.2	-67.2	-10.4						38.4±2.5				
188	HDB-3	52.44		5.752			2002/10/16	×																								4.3±0.2	-66	-9.8						11				
189	HDB-3	49.84		8.352			2002/10/18																																						
190	HDB-3	62.61		-4.418			2002/10/25																																						
191	HDB-3	155.18		-96.988			2002/11/1																																						
192	HDB-3	234.91		-176.718			2002/11/8																																						
193	HDB-3	309.46		-251.268			2002/11/13	×																								3.4±0.2	-55	-7.4						3.6				
194	HDB-3	111.46		-53.268			2002/12/6																																						
195	HDB-3	317.82		-259.628			2002/12/13																																						
196	HDB-3	385.77		-327.578			2002/12/20																																						
197	HDB-3	464.46		-406.268			2002/12/27																																						
198	HDB-3	517.21		-459.018			2003/1/1	×																								2.5±0.2	-54	-7.3						0.8				
199	HDB-4	28.93	30.65	34.68	32.96																												-67	-10.3										
200	HDB-4	96.73	97.55	-33.12	-33.94																												-68	-9.7										
201	HDB-4	100.75	101.05	-37.14	-37.44						37.21		10.51	0.55		0.1		7.58		N.D.		N.D.	N.D.	N.D.						N.D.						-57.5	-14.32								
202	HDB-4	159.4	160.2	-95.79	-96.59																												-64	-8.9										
203	HDB-4	166.78	168	-103.17	-104.39																												-66	-9.6										
204	HDB-4	198.36	198.6	-134.75	-134.99						15.15		3.52	0.88		0.47		5.33		N.D.		N.D.	N.D.	N.D.						N.D.						-57.6	-8.48								
205	HDB-4	224	224.75	-160.39	-161.14																												-67	-8.9										
206	HDB-4	274.25	275	-210.64	-211.39																												-65	-8.0										
207	HDB-4	297	297.3	-233.39	-233.69						7.93		1.42	0.38		0.97		33.02		N.D.		N.D.	N.D.	N.D.						N.D.						-47.7	7.61								
208	HDB-4	324	325	-260.39	-261.39																												-60	-7.0										
209	HDB-4	377	377.9	-313.39	-314.29																												-36	-1.1										
210	HDB-4	388.72	389	-325.11	-325.39						5.67		1.38	0.09		3.42		43.55		0.0061		N.D.	N.D.	N.D.						N.D.						-46	14.29								
211	HDB-4	426	426.75	-362.39	-363.14																												-28	0.5										
212	HDB-4	474	474.9	-410.39	-411.29																												-25	1.8										
213	HDB-4	501	501.28	-437.39	-437.67						4.58		1.01	0.06		3.81		29.27		0.0053		N.D.	N.D.	N.D.						N.D.						-51.7	10.81								
214	HDB-4	218.45	236.53	-154.84	-172.92		2002/11/23		3902.51/ 14275.29																																				
215	HDB-4	218.45	236.53	-154.84	-172.92		2002/11/23																																						
216	HDB-4	218.45	236.53	-154.84	-172.92			×																																					
217	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/24																																						
218	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/24																																						
219	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/25																																						
220	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/25	×	1454.11/ 11811.61		3.6		0.346	0.068		3.58		93		<0.01		<0.01	N.D.		N.D.	<0.001			<0.01			0 (N.D)	-66	-9.0	-43.3	13.6				7.8				
221	HDB-4	371.9	406.5	-308.29	-342.89		2002/12/31																																						
222	HDB-4	371.9	406.5	-308.29	-342.89		2003/1/1																																						
223	HDB-4	371.9	406.5	-308.29	-342.89		2003/1/1		2084.51/ 3191.98		2.66		0.862	0.03		11.7		83.2		<0.01		<0.01	N.D.		N.D.	<0.001			<0.01						-32.6	23.1								
224	HDB-4	407.9	520	-344.29	-456.39		2003/1/15																																						
225	HDB-4	407.9	520	-344.29	-456.39		2003/1/16																																						
226	HDB-4	407.9	520	-344.29	-456.39		2003/1/16	×	4696.26/ 6792.49		1.43		0.368	0.015		14.4		82.4		0.01		N.D.	N.D.		N.D.	<0.001			<0.01			0 (N.D)	-21	0.5	-45.8	+19.6				1.7				
227	HDB-4						2002/9/29	×																								7.8±0.2	-68	-10.4						58.1				
228	HDB-4						2002/10/24	×																																					
229	HDB-4						2002/11/24	×																																					
230	HDB-4						2002/12/24	×																																					
231	HDB-4						2002/12/25																									10.8±0.3	-67	-10.4						85.6				
232	HDB-4						2003/1/23	×																																					
233	HDB-4						2003/2/19	×																																					
234	HDB-4						2002/9/29	×																																					
235	HDB-4						2002/10/24	×																																					
236	HDB-4						2002/11/24	×																																					
237	HDB-4						2002/12/24	×																																					
238	HDB-4						2003/1/23	×																																					
239	HDB-4						2003/2/19	×																																					
240	HDB-4						2002/10/12	×																								4.5±0.2	-68.8	-10.6						39.9±3.7				
241	HDB-4						2002/10/15	×																																					
242	HDB-4						2003/1/13	×																								4.4±0.2	-67.2	-10.4						38.4±2.5				
243	HDB-4	46.98		16.63			2002/10/17	×																								4.3±0.2	-65	-10.2						47±7				
244	HDB-4	9.69		53.92			2002/10/18																																						
245	HDB-4	55.50		8.11			2002/10/25																																						
246	HDB-4	147.30		-83.69			2002/11/1																																						
247	HDB-4	206.62		-143.01			2002/11/8																																						
248	HDB-4	278.90		-215.29			2002/11/15																																						
249	HDB-4	297.00		-233.39			2002/11/16	×																								4.2±0.2	-63	-9.4						18.4±2.7				
250	HDB-4	359.86		-296.25			2002/12/13	×																																					
251	HDB-4	453.26		-389.65			2002/12/20	×																																					
252	HDB-4	517.30		-453.69			2002/12/24	×																								2.5±0.2	-53	-7.0						5.1±1.7				
253	HDB-4	223.93	233.78	-160.32	-170.17	4	2004/2/4～2/5	×																																					
254	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/2/22	×																																					
255	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/6/30	×																																					
256	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/8/29	×																																					
257	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/10/25	×																																					
258	HDB-4	223.93	233.78	-160.32	-170.17	4	2006/6/27	×																																					
259	HDB-4	223.93	233.78	-160.32	-170.17	4	2006/10/10	×																																					
260	HDB-4	223.93	233.78	-160.32	-170.17	4	2009/11/7	○																								≦0.21	-71.2	-9.7										
261	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/2/24	×																																					
262	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/6/30	×																																					
263	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/8/29	×																																					
264	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/10/26	×																																					
265	HDB-4	281.05	290.76	-217.44	-227.15	6	2006/6/27	×																																					
266	HDB-4	281.05	290.76	-217.44	-227.15	6	2008/10/10	×																																					
267	HDB-4	281.05	290.76	-217.44	-227.15	6	2009/11/5	○																								≦0.20	-70	-9.4										
268	HDB-4	474.79	484.61	-411.18	-421	10	2004/2/17～2/19	×																																					
269	HDB-4	474.79	484.61	-411.18	-421	10	2005/6/30	×																																					
270	HDB-4	474.79	484.61	-411.18	-421	10	2009/11/6	×																																					
271	HDB-5	27.51	28	51.258	50.768																												-66	-9.8										
272	HDB-5	60.19	61.34	18.578	17.428																												-67	-10.0										

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (12/64)

Index	Sample point	sampling zone (GL) Min.	sampling zone (GL) Max.	sampling zone (EL) Min.	sampling zone (EL) Max.	sampling zone No.	sampling date	Organics: Humic acid	Organics: Fuluvic acid	Organics: Acetate	Organics: Formate	Microbiology: Total cell number	Microbiology: Aerobic heterotrophs	Microbiology: Anaerobic heterotrophs (nutrient agar/B2A)	Microbiology: Anaerobic heterotrophs (GAM)	Microbiology: Ammonia-oxidizer	Microbiology: Nitrifying bacteria	Microbiology: Iron-oxidizer	Microbiology: Sulfur-oxidizer (silverman 9k)	Microbiology: Sulfur-oxidizer (starkey)	Microbiology: Nitrate-reducer (PYN)	Microbiology: Nitrate-reducer (Giltay)	Microbiology: Denitrifying bacteria (PYN)	Microbiology: Denitrifying bacteria (Giltay)	Microbiology: Mn-reducer	Microbiology: Iron-reducer	Microbiology: Sulfate-reducer (A)	Microbiology: Sulfate-reducer (E)	Microbiology: Sulfate-reducer (F)	Microbiology: Methanogen (H_2)	Microbiology: Methanogen (acetate)	Microbiology: Methanogen (formate)	Microbiology: Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
180	HDB-3						2002/9/29																										
181	HDB-3						2002/10/24																										
182	HDB-3						2002/11/24																										
183	HDB-3						2002/12/24																										
184	HDB-3						2003/1/23																										
185	HDB-3						2003/2/19																										
186	HDB-3						2002/10/12	N.D.	0.06	<0.5	<0.5	1.2E+04	5.6E+02		1.3E+00	0 (N.D)	0 (N.D)	0 (N.D)				1.1E+02		8.0E+01				N.D.		0 (N.D)			
187	HDB-3						2003/1/13	N.D.	0.01	<0.5	<0.5	1.3E+04	3.0E+02		N.D.	0 (N.D)	0 (N.D)	0 (N.D)				2.2E+02		1.1E+01				N.D.		0 (N.D)			
188	HDB-3	52.44		5.752			2002/10/18	41	70	0 (N.D)	0 (N.D)	1.8E+07	7.3E+05		4.3E+05	2.1E+02	1.3E+02	1.1E+01				2.2E+05		4.3E+04				3.3E+03		1.1E+02			
189	HDB-3	49.84		8.352			2002/10/18																										
190	HDB-3	62.61		-4.418			2002/10/25																										
191	HDB-3	155.18		-96.988			2002/11/1																										
192	HDB-3	234.91		-176.718			2002/11/8																										
193	HDB-3	309.46		-251.268			2002/11/13	233	112	0 (N.D)	0 (N.D)	6.8E+07	6.8E+05		4.9E+04	1.1E+01	1.1E+02	0 (N.D)				4.9E+05		2.3E+04				7.9E+03		2.2E+02			
194	HDB-3	111.46		-53.268			2002/12/6																										
195	HDB-3	317.82		-259.628			2002/12/13																										
196	HDB-3	385.77		-327.578			2002/12/20																										
197	HDB-3	464.46		-406.268			2002/12/27																										
198	HDB-3	517.21		-459.018			2003/1/1	45	390	0 (N.D)	0 (N.D)	1.1E+08	3.5E+06		8.9E+04	1.7E+01	1.1E+01	0 (N.D)				2.4E+05		1.4E+04				2.2E+03		1.1E+01			
199	HDB-4	28.93	30.65	34.68	32.96																												
200	HDB-4	96.73	97.55	-33.12	-33.94																												
201	HDB-4	100.75	101.05	-37.14	-37.44																												
202	HDB-4	159.4	160.2	-95.79	-96.59																												
203	HDB-4	166.78	168	-103.17	-104.39																												
204	HDB-4	198.36	198.6	-134.75	-134.99																												
205	HDB-4	224	224.75	-160.39	-161.14																												
206	HDB-4	274.25	275	-210.64	-211.39																												
207	HDB-4	297	297.3	-233.39	-233.69																												
208	HDB-4	324	325	-260.39	-261.39																												
209	HDB-4	377	377.9	-313.39	-314.29																												
210	HDB-4	388.72	389	-325.11	-325.39																												
211	HDB-4	426	426.75	-362.39	-363.14																												
212	HDB-4	474	474.9	-410.39	-411.29																												
213	HDB-4	501	501.28	-437.39	-437.67																												
214	HDB-4	218.45	236.53	-154.84	-172.92		2002/11/23																										
215	HDB-4	218.45	236.53	-154.84	-172.92		2002/11/23																										
216	HDB-4	218.45	236.53	-154.84	-172.92																												
217	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/24																										
218	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/24																										
219	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/25																										
220	HDB-4	281.45	299.525	-217.84	-235.915		2002/11/25	1.7	47	0 (N.D)	0 (N.D)	1.1E+04	1.6E+02	2.0E+00		<0.2	<0.2	<0.2				2.2E+01		<0.2			<0.2			<0.2			
221	HDB-4	371.9	406.5	-308.29	-342.89		2002/12/31																										
222	HDB-4	371.9	406.5	-308.29	-342.89		2003/1/1																										
223	HDB-4	371.9	406.5	-308.29	-342.89		2003/1/1																										
224	HDB-4	407.9	520	-344.29	-456.39		2003/1/15																										
225	HDB-4	407.9	520	-344.29	-456.39		2003/1/16																										
226	HDB-4	407.9	520	-344.29	-456.39		2003/1/16	5.5	92	0 (N.D)	0 (N.D)	6.4E+04	5.3E+01	1.5E+00		<0.2	<0.2	<0.2				<0.2		<0.2			<0.2			<0.2			
227	HDB-4						2002/9/29																										
228	HDB-4						2002/10/24																										
229	HDB-4						2002/11/24																										
230	HDB-4						2002/12/24																										
231	HDB-4						2002/12/25																										
232	HDB-4						2003/1/23																										
233	HDB-4						2003/2/19																										
234	HDB-4						2002/9/29																										
235	HDB-4						2002/10/24																										
236	HDB-4						2002/11/24																										
237	HDB-4						2002/12/24																										
238	HDB-4						2003/1/23																										
239	HDB-4						2003/2/19																										
240	HDB-4						2002/10/12	N.D.	0.06	<0.5	<0.5	1.2.E+04	5.6.E+02	1.3.E+00		<0.2	<0.2	<0.2				1.1.E+02		8.0.E+01			<0.2			<0.2			
241	HDB-4						2002/10/15																										
242	HDB-4						2003/1/13	N.D.	0.06	<0.5	<0.5	1.3.E+04	3.0.E+02	N.D.		<0.2	<0.2	<0.2				2.2.E+02		1.1.E+01			<0.2			<0.2			
243	HDB-4	46.98		16.63			2002/10/17	3.2	7.1	0 (N.D)	0 (N.D)	2.1E+06	6.4E+04	3.9E+04		1.4E+00	1.1E+01	1.1E+01				1.7E+05		1.4E+04			3.3E+04			7.9E+02			
244	HDB-4	9.69		53.92			2002/10/18																										
245	HDB-4	55.50		8.11			2002/10/25																										
246	HDB-4	147.30		-83.69			2002/11/1																										
247	HDB-4	206.62		-143.01			2002/11/8																										
248	HDB-4	278.90		-215.29			2002/11/15																										
249	HDB-4	297.00		-233.39			2002/11/16	103	45	0 (N.D)	0 (N.D)	2.1E+07	8.8E+05	4.6E+04		0 (N.D)	0 (N.D)	0 (N.D)				3.3E+05		2.2E+04			4.9E+04			1.2E+02			
250	HDB-4	359.86		-296.25			2002/12/13																										
251	HDB-4	453.26		-389.65			2002/12/20																										
252	HDB-4	517.30		-453.69			2002/12/24	41	229	0 (N.D)	0 (N.D)	1.5E+08	1.3E+05	6.3E+03		7.0E+01	1.7E+01	0 (N.D)				3.3E+03		2.2E+01			4.9E+01			2.7E+02			
253	HDB-4	223.93	233.78	-160.32	-170.17	4	2004/2/4～2/5																										
254	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/2/22																										
255	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/6/30																										
256	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/8/29																										
257	HDB-4	223.93	233.78	-160.32	-170.17	4	2005/10/25																										
258	HDB-4	223.93	233.78	-160.32	-170.17	4	2006/6/27																										
259	HDB-4	223.93	233.78	-160.32	-170.17	4	2006/10/10																										
260	HDB-4	223.93	233.78	-160.32	-170.17	4	2009/11/7																										
261	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/2/24																										
262	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/6/30																										
263	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/8/29																										
264	HDB-4	281.05	290.76	-217.44	-227.15	6	2005/10/26																										
265	HDB-4	281.05	290.76	-217.44	-227.15	6	2006/6/27																										
266	HDB-4	281.05	290.76	-217.44	-227.15	6	2006/10/10																										
267	HDB-4	281.05	290.76	-217.44	-227.15	6	2009/11/5																										
268	HDB-4	474.79	484.61	-411.18	-421	10	2004/2/17～2/19																										
269	HDB-4	474.79	484.61	-411.18	-421	10	2005/6/30																										
270	HDB-4	474.79	484.61	-411.18	-421	10	2009/11/6																										
271	HDB-5	27.51	28	51.258	50.768																												
272	HDB-5	60.19	61.34	18.578	17.428																												

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (13/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII)			location (WGS84, UTM, Zone54)			Physico-chemical parameter							Contamination indicator				Comments
		Min.	Max.	Min.	Max.							X	Y	Z (middle depth)	East	North	Z (middle depth)	EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temper-ature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	
		[m]	[m]	[m]	[m]													[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]	[mg/l]		
273	HDB-5	97.7	97.28	-18.932	-18.512				core	Koetoi Fm.	diatomaceous mudstone, siliceous mudstone	116664.215800	-29165.160200	-18.722	569278.058950	4988811.806517	-18.722												
274	HDB-5	124.56	125.36	-45.792	-46.592				core	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-46.192	569278.058950	4988811.806517	-46.192												
275	HDB-5	174.15	174.8	-95.382	-96.032				core	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-95.707	569278.058950	4988811.806517	-95.707												
276	HDB-5	196.7	196.95	-117.932	-118.182				core	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-118.057	569278.058950	4988811.806517	-118.057												
277	HDB-5	225	225.8	-146.232	-147.032				core	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-146.632	569278.058950	4988811.806517	-146.632												
278	HDB-5	278.2	279	-199.432	-200.232				core	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-199.832	569278.058950	4988811.806517	-199.832												
279	HDB-5	294.68	295	-215.912	-216.232				core	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-216.072	569278.058950	4988811.806517	-216.072												
280	HDB-5	324.18	325	-245.412	-246.232				core	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-245.822	569278.058950	4988811.806517	-245.822												
281	HDB-5	373.25	373.95	-294.482	-295.182				core	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-294.832	569278.058950	4988811.806517	-294.832												
282	HDB-5	405	405.28	-326.232	-326.512				core	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-326.372	569278.058950	4988811.806517	-326.372												
283	HDB-5	426	426.9	-347.232	-348.132				core	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-347.682	569278.058950	4988811.806517	-347.682												
284	HDB-5	473.1	474	-394.332	-395.232				core	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-394.782	569278.058950	4988811.806517	-394.782												
285	HDB-5	494.74	495	-415.972	-416.232				core	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-416.102	569278.058950	4988811.806517	-416.102												
286	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/5		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-88.487	569278.058950	4988811.806517	-88.487	87.88	73.7	8.43	8.5			11.93		11.32		A	
287	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/5		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-88.487	569278.058950	4988811.806517	-88.487	36.72	36.7	9.07	9.06			11.54		4.82		A	
288	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/5		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-88.487	569278.058950	4988811.806517	-88.487	42.52	42.5	8.81	8.8			11.15		0.28		A	
289	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/6		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-88.487	569278.058950	4988811.806517	-88.487	42.34	39.5	8.82	8.53			11.45		0.15		A	
290	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/10		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-137.485	569278.058950	4988811.806517	-137.485		24.4		8.2					9.76		A	
291	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/10		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-137.485	569278.058950	4988811.806517	-137.485	78.76	78.6	8.80	8.79			8.66		1.59		A	
292	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/11		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-137.485	569278.058950	4988811.806517	-137.485	85.16	85	8.59	8.59			9.05		0.36		A	
293	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/11		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-137.485	569278.058950	4988811.806517	-137.485	84.32	84.5	8.58	8.25			9.45		0.3		A	
294	HDB-5	420.01	annulus	-341.242			2003/1/23		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-341.242	569278.058950	4988811.806517	-341.242		866		7.11					0.58		A	
295	HDB-5	331.22	402.23	-252.452	-323.462		2003/1/27		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-287.957	569278.058950	4988811.806517	-287.957		20.1		8.63					9.79		A	
296	HDB-5	331.22	402.23	-252.452	-323.462		2003/1/27		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-287.957	569278.058950	4988811.806517	-287.957	1300.8	1299	7.01	6.99			13.58		0.57		A	
297	HDB-5	331.22	402.23	-252.452	-323.462		2003/1/28		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-287.957	569278.058950	4988811.806517	-287.957	1302.6	1301	7.01	7.02			13.97		0.51		A	
298	HDB-5	331.22	annulus	-252.452			2003/1/26		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-252.452	569278.058950	4988811.806517	-252.452		999		7.15					0.54		A	
299	HDB-5	331.22	annulus	-252.452			2003/1/27		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-252.452	569278.058950	4988811.806517	-252.452		1039		7.17					0.52		A	
300	HDB-5	331.22	annulus	-252.452			2003/1/29		pump	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-252.452	569278.058950	4988811.806517	-252.452		546		7.44					0.42		A	
301	HDB-5						2002/9/29		river (up the stream)									12.47		6.49				12.4		0.05		A	
302	HDB-5						2002/10/24		river (up the stream)									10.67		6.48				8.3		0.049		A	
303	HDB-5						2002/11/24		river (up the stream)									10.65		6.78				5		0.015		A	
304	HDB-5						2002/12/24		river (up the stream)									11.37		7.07				1.6		0.038		A	
305	HDB-5						2003/1/13		river (up the stream)									12.25		6.73				1.3		0.052		A	
306	HDB-5						2003/1/23		river (up the stream)									11.65		6.45				1.1		0.051		A	
307	HDB-5						2003/2/19		river (up the stream)									5.57		6.48				0		0.01		A	
308	HDB-5						2002/9/29		river (down the stream)									13.81		6.82				12.8		0.05		A	
309	HDB-5						2002/10/24		river (down the stream)									11.09		6.43				8.1		0.056		A	
310	HDB-5						2002/11/24		river (down the stream)									11.11		7.18				4.7		0.016		A	
311	HDB-5						2002/12/24		river (down the stream)									11.76		7.13				0.8		0.046		A	
312	HDB-5						2003/1/23		river (down the stream)									14.89		6.67				1.7		0.059		A	
313	HDB-5						2003/2/19		river (down the stream)									14.15		6.88				0.8		0.05		A	
314	HDB-5						2002/10/12		well																				
315	HDB-5						2002/10/15		well																				
316	HDB-5						2003/1/13		well																				
317	HDB-5	46.83		31.938			2002/10/30		return	Koetoi Fm.	diatomaceous mudstone	116664.215800	-29165.160200	31.938	569278.058950	4988811.806517	31.938	17.33		7.92				8.3		10.359		A	
318	HDB-5	4		74.768			2002/11/1		return	Koetoi Fm.	diatomaceous mudstone	116664.215800	-29165.160200	74.768	569278.058950	4988811.806517	74.768	19.07		8.18				8.9		10.75		A	
319	HDB-5	63.86		14.908			2002/11/8		return	Koetoi Fm.	diatomaceous mudstone	116664.215800	-29165.160200	14.908	569278.058950	4988811.806517	14.908	149.5		11.91				11.6		10.683		A	
320	HDB-5	109.45		-30.682			2002/11/15		return	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-30.682	569278.058950	4988811.806517	-30.682	73.3		9.94				6.9		11.2		A	
321	HDB-5	182.01		-103.242			2002/11/22		return	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-103.242	569278.058950	4988811.806517	-103.242	90.5		9.15				15.7		8.1		A	
322	HDB-5	259.46		-180.692			2002/11/29		return	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-180.692	569278.058950	4988811.806517	-180.692	84.6		7.37				19.3		10.57		A	
323	HDB-5	272.24		-193.472			2002/11/30		return	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-193.472	569278.058950	4988811.806517	-193.472	194.4		9.18				16.8		8.87		A	
324	HDB-5	196.26		-117.492			2002/12/20		return	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-117.492	569278.058950	4988811.806517	-117.492	198.7		9.65				18.2		9.44		A	
325	HDB-5	275.05		-196.282			2002/12/27		return	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-196.282	569278.058950	4988811.806517	-196.282	131.1		10.55				12		10.4		A	
326	HDB-5	348.19		-269.422			2003/1/3		return	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-269.422	569278.058950	4988811.806517	-269.422	193.5		8.8				16.1		9.94		A	
327	HDB-5	443.39		-364.622			2003/1/10		return	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-364.622	569278.058950	4988811.806517	-364.622	221		8.37				18.9		8.49		A	
328	HDB-5	511.44		-432.672			2003/1/14		return	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-432.672	569278.058950	4988811.806517	-432.672	229		8.37				9.2		8.66		A	
329	HDB-5	368.6	377.4	-289.832	-298.632	8	2007/11/8	2007/11/9-11/26	bottle	Wakkanai Fm.	siliceous mudstone	116664.215800	-29165.160200	-294.232	569278.058950	4988811.806517	-294.232		1200		7.6					0.68		A	
330	HDB-6	78.00	78.38	-17.79	-18.17				core	Koetoi Fm.	diatomaceous mudstone	116095.346017	-30665.705917	-17.98	567786.852703	4988219.987383	-17.98				8.1									pore water extraction: squeeze (<70MPa)
331	HDB-6	115.60	115.90	-55.39	-55.69				core	Koetoi Fm.	diatomaceous mudstone	116095.346017	-30665.705917	-55.54	567786.852703	4988219.987383	-55.54													gas: He/groundwater (well) purge
332	HDB-6	115.30	115.60	-55.09	-55.39				core	Koetoi Fm.	diatomaceous mudstone	116095.346017	-30665.705917	-55.24	567786.852703	4988219.987383	-55.24													gas: He/pH3.5 water purge
333	HDB-6	135.00	135.30	-74.79	-75.09				core	Koetoi Fm.	diatomaceous mudstone	116095.346017	-30665.705917	-74.94	567786.852703	4988219.987383	-74.94				8.2									
334	HDB-6	217.40	217.70	-157.19	-157.49				core	Koetoi Fm.	diatomaceous mudstone	116095.346017	-30665.705917	-157.34	567786.852703	4988219.987383	-157.34													gas: He/groundwater (well) purge
335	HDB-6	279.41	279.89	-219.20	-219.68				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116095.346017	-30665.705917	-219.44	567786.852703	4988219.987383	-219.44				8.3									
336	HDB-6	300.70	301.00	-240.49	-240.79				core	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-240.64	567786.852703	4988219.987383	-240.64													gas: He/groundwater (well) purge
337	HDB-6	300.30	300.60	-240.09	-240.39				core	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-240.24	567786.852703	4988219.987383	-240.24													gas: He/pH3.5 water purge
338	HDB-6	394.30	394.52	-334.09	-334.31				core	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-334.20	567786.852703	4988219.987383	-334.20				8.3									
339	HDB-6	405.50	405.80	-345.29	-345.59				core	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-345.44	567786.852703	4988219.987383	-345.44													gas: He/groundwater (well) purge
340	HDB-6	405.10	405.40	-344.89	-345.19				core	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-345.04	567786.852703	4988219.987383	-345.04													gas: He/pH3.5 water purge
341	HDB-6	440.00	440.50	-379.79	-380.29				core	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-380.04	567786.852703	4988219.987383	-380.04				8.5									
342	HDB-6	492.28	492.50	-432.07	-432.29				core	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-432.18	567786.852703	4988219.987383	-432.18				8									
343	HDB-6	498.40	498.70	-438.19	-438.49				core	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-438.34	567786.852703	4988219.987383	-438.34													gas: He/groundwater (well) purge
344	HDB-6	498.10	498.40	-437.89	-438.19				core	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-438.04	567786.852703	4988219.987383	-438.04													gas: He/pH3.5 water purge
345	HDB-6	547.00	547.48	-486.79	-487.27				core	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-487.03	567786.852703	4988219.987383	-487.03				8.29									
346	HDB-6	600.03	600.33	-539.82	-540.12				core	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-539.97	567786.852703	4988219.987383	-539.97				8.3									
347	HDB-6	607.00	607.30	-546.79	-547.09				core	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-546.94	567786.852703	4988219.987383	-546.94													gas: He/groundwater (well) purge
348	HDB-6	610.70	611.00	-550.49	-550.79				core	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-550.64	567786.852703	4988219.987383	-550.64				8.09									
349	HDB-6	280.95	312	-220.74	-251.79		2003/10/12		pump	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-236.26	567786.852703	4988219.987383	-236.26	19.2		7.2		162.8		10.0		8.40		A	
350	HDB-6	280.95	312	-220.74	-251.79		2003/10/12		pump	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-236.26	567786.852703	4988219.987383	-236.26	17.8		7.6		211.0		11.9		8.95		A	
351	HDB-6	280.95	312	-220.74	-251.79		2003/10/12		pump	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-236.26	567786.852703	4988219.987383	-236.26	255.0		7.0		86.5		13.2		5.14		A	
352	HDB-6	280.95	312	-220.74	-251.79		2003/10/13		pump	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-236.26	567786.852703	4988219.987383	-236.26	1023.0		7.1		-25.6		13.5		3.26		A	
353	HDB-6	280.95	312	-220.74	-251.79		2003/10/13		pump	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-236.26	567786.852703	4988219.987383	-236.26	1236.0		7.1		-52.0		13.8		1.37		A	
354	HDB-6	280.95	312	-220.74	-251.79		2003/10/16		pump	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-236.26	567786.852703	4988219.987383	-236.26	1199		7.3		-200.6		17.7		0.81		A	
355	HDB-6	363.95	409	-303.74	-348.79		2003/12/8		pump	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-326.26	567786.852703	4988219.987383	-326.26	2090		7.2				20.6		0.68		A	
356	HDB-6	363.95	409	-303.74	-348.79		2003/12/15		pump	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-326.26	567786.852703	4988219.987383	-326.26	63.4		7.3		112.5		7.9		10.02		A	
357	HDB-6	363.95	409	-303.74	-348.79		2003/12/15		pump	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-326.26	567786.852703	4988219.987383	-326.26	980		6.9		40.3		9.8		6.42		A	
358	HDB-6	363.95	409	-303.74	-348.79		2003/12/15		pump	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-326.26	567786.852703	4988219.987383	-326.26	1406		6.9		30.3		10.8		3.95		A	
359	HDB-6	363.95	409	-303.74	-348.79		2003/12/15		pump	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-326.26	567786.852703	4988219.987383	-326.26	1796		6.9		17.0		11.6		2.06		A	
360	HDB-6	363.95	409	-303.74	-348.79		2003/12/15		pump	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-326.26	567786.852703	4988219.987383	-326.26	1879		6.9		-5.6		11.7		1.05		A	
361	HDB-6	363.95	409	-303.74	-348.79		2003/12/17		pump	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-326.26	567786.852703	4988219.987383	-326.26	1966		6.9		-262.2		20.5		0.62		A	
362	HDB-6						2003/8/18		river (up the stream)									34.9		6.5				16.3		0.34		A	
363	HDB-6						2003/9/16		river (up the stream)									45.9		6.8				13.2		0.45		A	
364	HDB-6						2003/10/17		river (up the stream)									10.99		6.8				9.7		0.29		A	
365	HDB-6						2003/11/13		river (up the stream)									30.2		6.9				3.5		0.51		A	
366	HDB-6						2003/11/28		river (up the stream)									27		6.8				2.4		0.16		A	

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (14/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Geochemistry																																							
		Min.	Max.	Min.	Max.			Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
273	HDB-5	97.7	97.28	-18.932	-18.512																																										
274	HDB-5	124.56	125.36	-45.792	-46.592			200	14	360	150														72							1800		10									39.4	39.6	-0.3
275	HDB-5	174.15	174.8	-95.382	-96.032			520	24	27	24														68							1100		50									26.5	25.6	1.8
276	HDB-5	196.7	196.95	-117.932	-118.182																																										
277	HDB-5	225	225.8	-146.232	-147.032			630	19	26	13														130							1200		50									30.2	29.4	1.4
278	HDB-5	278.2	279	-199.432	-200.232			1600	53	100	53														1100							2300		30									80.3	79.3	0.6
279	HDB-5	294.68	295	-215.912	-216.232																																										
280	HDB-5	324.18	325	-245.412	-246.232			1800	43	27	35														1900							1300		20									83.6	80.9	1.6
281	HDB-5	373.25	373.95	-294.482	-295.182			2400	36	32	64														3700							190		30									112.1	108.7	1.6
282	HDB-5	405	405.28	-326.232	-326.512																																										
283	HDB-5	426	426.9	-347.232	-348.132			3900	72	73	95														4400							2600		20									182.9	178.3	1.3
284	HDB-5	473.1	474	-394.332	-395.232			3400	66	19	60														4800							780		20									155.4	151.8	1.2
285	HDB-5	494.74	495	-415.972	-416.232																																										
286	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/5	19	1.6	8.2	3.5		0 (N.D)												22							5.6		53	<1	43		0 (N.D)					1.6	1.6	-0.1
287	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/5	90	3.4	1.5	0.66		0.06												19							4.5		230	<1	190		0 (N.D)					4.1	4.4	-3.5
288	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/5	89	4.1	0.94	0.46		0.06												14							0.9		230	<1	190		0 (N.D)					4.1	4.2	-1.8
289	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/6	86	4.0	0.91	0.45	0.01	0.07	20		0.01	0 (N.D)	0.07	0 (N.D)	0.11	0 (N.D)	0 (N.D)	0.4	16	0.1	0 (N.D)	0 (N.D)	0 (N.D)	5.4	0.5		240	<1	200		0 (N.D)		3	50		4.2	4.5	-2.5
290	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/10	19	4.3	7.6	3.4		0.01												20							6.5		56	<1	46		0 (N.D)					1.6	1.7	-0.1
291	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/10	170	4.9	3.0	1.1		0.09												67							1.4		370	<1	300		0 (N.D)					7.8	8.0	-1.6
292	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/11																																								
293	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/11	180	5.4	2.2	0.96	0.01	0.12	19		0.02	0 (N.D)	0.09	0 (N.D)	0.13	0 (N.D)	0.1	0.4	67	0.2	0 (N.D)	0 (N.D)	0 (N.D)	6.7	2.2		410	<1	340		0 (N.D)		5	86		8.6	8.7	-0.9
294	HDB-5	420.01	annulus	-341.242			2003/1/23	1800	35	47	26	0.43	1.1	15		0.56	0 (N.D)	0.05	0 (N.D)	7.2	0.09	0 (N.D)	0.2	1800	5.2	7.9	0 (N.D)	0 (N.D)	41	8.1		1970	<1	1610		0 (N.D)		26	420		86.2	83.3	1.7
295	HDB-5	331.22	402.23	-252.452	-323.462		2003/1/27	2100	18	70	35		1.2												2500							6.0		2100	<1	1700		0 (N.D)					98.3	105.0	-3.3
296	HDB-5	331.22	402.23	-252.452	-323.462		2003/1/27	2900	48	100	50		1.7												3400							6.1		2600	<1	2100		0 (N.D)					136.7	138.6	-0.7
297	HDB-5	331.22	402.23	-252.452	-323.462		2003/1/28	2900	46	99	46	0.03	1.9	20		1.1	0 (N.D)	0.32	0 (N.D)	2.5	0.02	0.4	0.2	3250	10	13	0.6	0.1	64	6.8		2640	<1	2170		0 (N.D)		30	580		139.9	135.2	1.7
298	HDB-5	331.22	annulus	-252.452			2003/1/26	2000	18	71	35		0.12												2300							6.0		2100	<1	1700		0 (N.D)					93.9	99.4	-2.9
299	HDB-5	331.22	annulus	-252.452			2003/1/27	24	1.8	8.3	3.0		0.01												25							7.6		64	<1	52		0 (N.D)					1.8	1.9	-0.2
300	HDB-5	331.22	annulus	-252.452			2003/1/29	1200	24	29	13	0.21	0.73	18		0.19	0 (N.D)	6.2	0 (N.D)	29	0 (N.D)	0 (N.D)	0 (N.D)	960	4.3	3	0.2	0.2	0.28	7.3		1540	<1	1260		0 (N.D)		16	350		55.9	52.5	3.1
301	HDB-5						2002/9/29	11	2.9	6.5	2.9	0.06	0 (N.D)	25		0.06	0 (N.D)	0.17	0 (N.D)	1.7	0.01	0.3	0.1	15	0 (N.D)	0 (N.D)	3.5	0.1	0 (N.D)	5.4		30	<1	25		0 (N.D)		4	7		1.2	1.1	0.0
302	HDB-5						2002/10/24	10	2.4	4.9	2.2	0.04	0 (N.D)	20		0.04	0 (N.D)	0.11	0 (N.D)	1.1	0.01	0.3	0 (N.D)	14	0 (N.D)	0 (N.D)	3.5	0 (N.D)	0 (N.D)	5.4		21	<1	17		0 (N.D)		4	4		1.0	0.9	0.0
303	HDB-5						2002/11/24	11	1.8	3.8	1.9	0.01	0 (N.D)	23		0.04	0 (N.D)	0 (N.D)	0 (N.D)	0.61	0.01	0 (N.D)	0 (N.D)	14	0 (N.D)	0 (N.D)	7.4	0.1	0 (N.D)	6.8		16	<1	13		0 (N.D)		3	3		0.9	1.0	-0.1
304	HDB-5						2002/12/24	11	1.6	5.1	2.5	<0.01	0 (N.D)	22		0.04	0 (N.D)	0 (N.D)	0 (N.D)	0.19	0 (N.D)	0 (N.D)	0 (N.D)	16	0 (N.D)	0 (N.D)	5.0	0 (N.D)	0 (N.D)	5.8		21	<1	17		0 (N.D)		2	5		1.0	1.0	0.0
305	HDB-5						2003/1/13																																								
306	HDB-5						2003/1/23	11	1.7	6.5	2.9	0.8	0.02	20		0.09	0 (N.D)	6.8	0.36	42	0 (N.D)	14	0.2	14	0 (N.D)	0 (N.D)	3.8	0.2	0.18	4.9		32	<1	26		0 (N.D)		2	8		3.4	1.1	2.3
307	HDB-5						2003/2/19	5	0.61	0.71	0.56	<0.01	0 (N.D)	0.52		0 (N.D)	0 (N.D)	0 (N.D)	0 (N.D)	0.27	0.01	0.2	0 (N.D)	9.2	0 (N.D)	0 (N.D)	1.0	0 (N.D)	0.36	2.3		1	<1	0.91		0 (N.D)		1	0 (N.D)		0.4	0.4	0.0
308	HDB-5						2002/9/29	12	3.3	6.3	3.1	0.01	0 (N.D)	25		0.06	0 (N.D)	0.13	0 (N.D)	0.89	0.01	0 (N.D)	0 (N.D)	15	0 (N.D)	0 (N.D)	3.3	0.2	0 (N.D)	4.9		34	<1	28		0 (N.D)		5	7		1.2	1.2	0.0
309	HDB-5						2002/10/24	10	2.7	4.3	2.2	0.03	0 (N.D)	19		0.04	0 (N.D)	0.08	0 (N.D)	0.87	0 (N.D)	0.2	0.1	14	0 (N.D)	0 (N.D)	3.2	0 (N.D)	0 (N.D)	5.7		21	<1	17		0 (N.D)		4	4		0.9	0.9	0.0
310	HDB-5						2002/11/24	11	1.9	3.8	2	0.02	0 (N.D)	23		0.04	0 (N.D)	0.07	0 (N.D)	1.2	0.01	0.2	0 (N.D)	14	0 (N.D)	0 (N.D)	6.4	0.1	0 (N.D)	6.3		18	<1	15		0 (N.D)		3	3		0.9	1.0	0.0
311	HDB-5						2002/12/24	11	1.8	5.1	2.5	<0.01	0 (N.D)	22		0.04	0 (N.D)	0 (N.D)	0 (N.D)	0.21	0 (N.D)	0 (N.D)	0 (N.D)	13	0 (N.D)	0 (N.D)	4.9	0 (N.D)	0 (N.D)	5.4		24	<1	20		0 (N.D)		2	6		1.0	1.0	0.0
312	HDB-5						2003/1/23	15	2.0	6.3	3.1	0.13	0.01	20		0.06	0 (N.D)	0.51	0.06	6.6	0.02	0.2	0.2	17	0 (N.D)	0 (N.D)	5.0	0.2	0.04	4.4		39	<1	32		0 (N.D)		3	9		1.4	1.3	0.1
313	HDB-5						2003/2/19	11	1.8	7.6	3.5	0.03	0.01	20		0.06	0 (N.D)	0.12	0.02	1.8	0.03	0.6	0.2	13	0 (N.D)	0 (N.D)	5.8	0 (N.D)	0.05	3.9		41	<1	34		0 (N.D)		3	9		1.3	1.3	0.0
314	HDB-5						2002/10/12																																								
315	HDB-5						2002/10/15	17	1.7	5.9	3.5	<0.01	0.01	16		0.04	<0.001	0.23	<0.01	0.01	<0.01	<0.01	0 (N.D)	19	<0.1	<1	0.4	<0.1	<0.1	4.4	<0.1	43.0		35		<0.1		<1	9		1.4	1.4	0.0
316	HDB-5						2003/1/13	17	1.5	5.1	3.5	<0.01	<0.01	17		0.04	<0.001	0.22	<0.01	0.03	<0.01	<0.01	0 (N.D)	23	<0.1	<1	<0.1	<0.1	0.2	5.7	<0.1	43.0		35		<0.1		<1	10		1.3	1.5	-0.2
317	HDB-5	46.83		31.938			2002/10/30	18	4.6	7.8	3.5	0.02	0.01	13		0.05	0 (N.D)	0 (N.D)	0 (N.D)	0.31	0 (N.D)	0.4	0.2	19	0 (N.D)	0 (N.D)	0.6	0.2	1.7	8.6		59		48				12	12		1.7	1.7	0.0
318	HDB-5	4		74.768			2002/11/1	18	4.0	12	4.0		0.01											19						8.4		69		57								1.8	1.8	0.0
319	HDB-5	63.86		14.908			2002/11/8	130	3.6	38	0.19		0 (N.D)											26						38		0	83.93	310	240							7.7	4.5	25.8
320	HDB-5	109.45		-30.682			2002/11/15	150	1.8	1.9	0.7		0 (N.D)											23						66		226	8.75	200	7.3							6.7	6.0	5.3
321	HDB-5	182.01		-103.242			2002/11/22	170	4.1	2.8	1.3		0.02											22						68		329		270								7.7	7.4	2.1
322	HDB-5	259.46		-180.692			2002/11/29	240	3.0	4.4	1.8		0.04											24						120		451		370								10.9	10.6	1.5
323	HDB-5	272.24		-193.472			2002/11/30	220	3.3	4.6	1.3	0.01	0.02	23		0.05	0 (N.D)	0.1	0.03	1.4	0 (N.D)	1.9	0.9	25	0.1	0 (N.D)	0.6	0.2	1.7	130		390		320				71	85		10.3	9.9	2.3
324	HDB-5	196.26		-117.492			2002/12/20	220	3.3	5.2	1.1		0.02											33						260		210		180	1.3							10.0	9.8	1.1
325	HDB-5	275.05		-196.282			2002/12/27	200	3.0	2.5	0.64		0.02											63						120		250	11	230	9.5							9.0	8.8	1.1
326	HDB-5	348.19		-269.422			2003/1/3	360	7.9	4.4	1.9		0.07											90						310		500	23	440	19							16.2	18.0	-5.1
327	HDB-5	443.39		-364.622			2003/1/10	460	9.9	4.7	1.2		0.12											190						390		480	38	460	32							20.6	22.7	-4.8
328	HDB-5	511.44		-432.672			2003/1/14	470	10	5.3	1.7	0.03	0.13	19		0.07	0 (N.D)	0 (N.D)	0.02	0.91	0.01	1.0	1.1	230	0.9	0 (N.D)	0.1	0.1	1.5	410		450	7.6	380	6.3			12	96		21.3	22.7	-3.2
329	HDB-5	368.6	377.4	-289.832	-298.632	8	2007/11/8	2900	37	79	50	0.04	1.3	42		1.0	<0.01	<0.01	<0.01	0.03		<0.01	0.1	3400	12	10	0.04		71.0	6.1	<0.1	1900	4.1	1600				6.8	400		139.2	127.4	4.5
330	HDB-6	78.00	78.38	-17.79	-18.17			3400	160	81	57		14											4600						830		1600	<500				<100	400		162.7	173.1	-3.1
331	HDB-6	115.60	115.90	-55.39	-55.69																																										
332	HDB-6	115.30	115.60	-55.09	-55.39																																										
333	HDB-6	135.00	135.30	-74.79	-75.09			2500	120	53	33		13											2500						800		2100	<500				<100	400		119.0	121.5	-1.0
334	HDB-6	217.40	217.70	-157.19	-157.49																																										
335	HDB-6	279.41	279.89	-219.20	-219.68			1800	59	43	27		7.4											1800						710		1500	<500				<100	300		85.2	90.1	-2.8
336	HDB-6	300.70	301.00	-240.49	-240.79																																										
337	HDB-6	300.30	300.60	-240.09	-240.39																																										
338	HDB-6	394.30	394.52	-334.09	-334.31			4100	74	160	120		10											5900						1200		1200	<500				<100	300		199.5	210.8	-2.8
339	HDB-6	405.50	405.80	-345.29	-345.59																																										
340	HDB-6	405.10	405.40	-344.89	-345.19																																										
341	HDB-6	440.00	440.50	-379.79	-380.29			5244	81	144	111		12							<1	0 (N.D)			7717						32		1039	220				56	262		248.1	242.9	1.1
342	HDB-6	492.28	492.50	-432.07	-432.29			5200	48	120	170		13											8300						610		900	<500				200	300		249.2	261.2	-2.4
343	HDB-6	498.40	498.70	-438.19	-438.49																																										
344	HDB-6	498.10	498.40	-437.89	-438.19																																										
345	HDB-6	547.00	547.48	-486.79	-487.27			8205	135	123	216		15							<1	0 (N.D)			11808						1546		363	120				0 (N.D)	0 (N.D)		386.3	375.0	1.5
346	HDB-6	600.03	600.33	-539.82	-540.12			6400	67	84	190		11											9700						79		1100	<500				<100	300		301.4	310.8	-1.5
347	HDB-6	607.00	607.30	-546.79	-547.09																																										
348	HDB-6	610.70	611.00	-550.49	-550.79			8591	127	329	240		13							<1	0 (N.D)			12035						1934		667	<88				63	119		414.8	393.3	2.7
349	HDB-6	280.95	312	-220.74	-251.79		2003/10/12	21.2	1.5	9.9	3.5				0.11					0.01	0.05		0.2	23	<1		2.4			6.9	<0.1	48	0		0.94	0	2	11		1.7	1.6	0.1
350	HDB-6	280.95	312	-220.74	-251.79		2003/10/12														0.08									5.6	<0.1				0.88	0								
351	HDB-6	280.95	312	-220.74	-251.79		2003/10/12	408	13	20	6.9				9.4					0.02	0.10		<0.1	520	3.8		0.2			5.9	<0.1	342	0		6.20	0	7	83		19.6	20.4	-2.0
352	HDB-6	280.95	312	-220.74	-251.79		2003/10/13	1950	62	60	34				0.11					0.03	0.11		<0.1	2470	10		0.4			1.4	<0.1	1571	1		30.55	0	14	370		92.2	95.5	-1.8
353	HDB-6	280.95	312	-220.74	-251.79		2003/10/13														0.13									0.5	<0.1				39.66	0								
354	HDB-6	280.95	312	-220.74	-251.79		2003/10/16	2460	77	69	43	0.03	0.07	26	60	1	<0.01	0.57	<0.002	0.03	0.03	0.02	<0.1	3050	11	9	0.1		94	5.9		1751	2		38.96	0	130	390		121.1	115.0	2.6
355	HDB-6	363.95	409	-303.74	-348.79		2003/12/8	4330	110	150	120				98					0.02	<0.05		0.4	6300	43		0.2			<0.2	<0.1	1966	2		43.40	0	56	450		208.4	210.3	-0.5
356	HDB-6	363.95	409	-303.74	-348.79		2003/12/15	1720	43	64	46				38					0.01	<0.05		0.2	1900	18		2.9			4.4	<0.1	853	1		3.77	0	30	190		82.9	67.9	9.9
357	HDB-6	363.95	409	-303.74	-348.79		2003/12/15														<0.05									<0.2	<0.1				29.0	0								
358	HDB-6	363.95	409	-303.74	-348.79		2003/12/15	3180	81	100	82				70					0.01	<0.05		0.2	4900	37		2.0			<0.2	<0.1	1477	1		35.4	0	52	380		152.1	162.8	-3.4
359	HDB-6	363.95	409	-303.74	-348.79		2003/12/15														<0.05									<0.2	<0.1				41.1	0								
360	HDB-6	363.95	409	-303.74	-348.79		2003/12/15	4080	100	62	100				94					0.03	<0.05		0.2	6000	47		1.3			<0.2	<0.1	1710	1		42.8	0	59	440		191.3	197.7	-1.7
361	HDB-6	363.95	409	-303.74	-348.79		2003/12/17	4220	110	140	110	0.02	9.9	24	97	2.6	<0.01	0.10	<0.002	0.04	0.04	<0.01	0.2	6300	45	17	0.1		140	0.2		2000	1		46.2	0	63	510		211.5	210.9	0.2
362	HDB-6						2003/8/18	22	17	12	5.2	0.20	0.06	15		0.07	<0.01	2.3	0.10	14		4.7	<0.1	36	<1	<1	2.7		9.2	11		99			1.6	0	31	22		3.7	2.9	0.8
363	HDB-6						2003/9/16	20	42	18	7.5	0.19	0.01	15		0.08	<0.01	3.3	0.11	15		5.1	<0.1	35	<1	<1	0.1		14	18		156			2.6	0	23	32		5.1	3.9	1.1
364	HDB-6						2003/10/17	12.2	17	15	5.1	0.12	<0.01	15		0.06	<0.01	0.99	0.03	3.4		1.2	<0.1	20	<1	<1	<0.1		5.1	33		56			0.9	0	23	17		2.6	2.2	0.4
365	HDB-6						2003/11/13	14	18	16	6.8	0.14	<0.01	19		0.07	<0.01	2.8	0.03	9.3		1.1	<0.1	22	<1	<1	<0.1		7.3	4.7		102			1.7	0	27	17		3.1	2.4	0.7
366	HDB-6						2003/11/28																																								

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (15/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases																							Isotopes												
		Min.	Max.	Min.	Max.				Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{36}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_{H_2O}]	[cc_{STP}/g_{H_2O}]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
273	HDB-5	97.7	97.28	-18.932	-18.512						63.38		16.58	0.49		0.17		0.34		N.D.		N.D.	N.D.	N.D.						N.D.					-49.3	-15.08								
274	HDB-5	124.56	125.36	-45.792	-46.592																												-67	-9.9										
275	HDB-5	174.15	174.8	-95.382	-96.032																												-65	-9.6										
276	HDB-5	196.7	196.95	-117.932	-118.182						13.5		2.02	0.50		0.25		1.22		N.D.		N.D.	N.D.	N.D.						N.D.					-56.0	-12.2								
277	HDB-5	225	225.8	-146.232	-147.032																												-69	-9.9										
278	HDB-5	278.2	279	-199.432	-200.232																												-58	-6.3										
279	HDB-5	294.68	295	-215.912	-216.232						20.93		1.77	0.10		1.73		18.49		N.D.		N.D.	N.D.	N.D.						N.D.					-49.6	5.91								
280	HDB-5	324.18	325	-245.412	-246.232																												-48	-4.6										
281	HDB-5	373.25	373.95	-294.482	-295.182																												-31	-0.4										
282	HDB-5	405	405.28	-326.232	-326.512						3.82		1.07	0.06		4.98		38.65		0.0039		N.D.	N.D.	N.D.						N.D.					-48.5	16.87								
283	HDB-5	426	426.9	-347.232	-348.132																												-20	1.6										
284	HDB-5	473.1	474	-394.332	-395.232																												-19	1.9										
285	HDB-5	494.74	495	-415.972	-416.232						5.28		1.42	0.06		2.09		13.79		N.D.		N.D.	N.D.	N.D.						N.D.					-50.2	11.79								
286	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/5																																					
287	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/5																																					
288	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/5																																					
289	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/6	×	104.95/ 12717.62																							0 (N.D)	-70	-10.7						8				
290	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/10																																					
291	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/10																																					
292	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/11																																					
293	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/11	×	157.47/ 18299.80		35.8		3.44	0.578		0.13		60.4		<0.01		<0.01	N.D.		N.D.	N.D.			<0.01			0 (N.D)	-71	-10.8						7				
294	HDB-5	420.01	annulus	-341.242			2003/1/23	×																								0 (N.D)	-51	-5.1						5.7				
295	HDB-5	331.22	402.23	-252.452	-323.462		2003/1/27																																					
296	HDB-5	331.22	402.23	-252.452	-323.462		2003/1/27				1.66		0.698	0.023		14.6		79.6		<0.01		<0.01	N.D.		N.D.	N.D.			<0.01						-42.7	22.5								
297	HDB-5	331.22	402.23	-252.452	-323.462		2003/1/28	×	1464.33/ 6720.63		2.36		0.915	0.022		11.3		80.5		<0.01		<0.01	N.D.		N.D.	N.D.			<0.01			0 (N.D)	-35.5	-1.3	-43.3	20.6				5.4				
298	HDB-5	331.22	annulus	-252.452			2003/1/26																																					
299	HDB-5	331.22	annulus	-252.452			2003/1/27																																					
300	HDB-5	331.22	annulus	-252.452			2003/1/29	×																								0 (N.D)	-62	-7.6						4.4				
301	HDB-5						2002/9/29	×																								6.2±0.2	-68	-10.6						42.8				
302	HDB-5						2002/10/24	×																																				
303	HDB-5						2002/11/24	×																																				
304	HDB-5						2002/12/24	×																																				
305	HDB-5						2003/1/13																									6.5±0.2	-69	-10.7						61				
306	HDB-5						2003/1/23	×																																				
307	HDB-5						2003/2/19	×																																				
308	HDB-5						2002/9/29	×																																				
309	HDB-5						2002/10/24	×																																				
310	HDB-5						2002/11/24	×																																				
311	HDB-5						2002/12/24	×																																				
312	HDB-5						2003/1/23	×																																				
313	HDB-5						2003/2/19	×																																				
314	HDB-5						2002/10/12	×																								4.5±0.2	-68.8	-10.6						39.9±3.7				
315	HDB-5						2002/10/15	×																																				
316	HDB-5						2003/1/13	×																								4.4±0.2	-67.2	-10.4						38.4±2.5				
317	HDB-5	46.83		31.938			2002/10/30	×																								4.0±0.2	-66	-10.1						39				
318	HDB-5	4		74.768			2002/11/1																																					
319	HDB-5	63.86		14.908			2002/11/8																																					
320	HDB-5	109.45		-30.682			2002/11/15																																					
321	HDB-5	182.01		-103.242			2002/11/22																																					
322	HDB-5	259.46		-180.692			2002/11/29																																					
323	HDB-5	272.24		-193.472			2002/11/30	×																								0 (N.D)	-63	-9.5						18.4				
324	HDB-5	196.26		-117.492			2002/12/20																																					
325	HDB-5	275.05		-196.282			2002/12/27																																					
326	HDB-5	348.19		-269.422			2003/1/3																																					
327	HDB-5	443.39		-364.622			2003/1/10																																					
328	HDB-5	511.44		-432.672			2003/1/14	×																								2.6±0.2	-61	-8.7						6.7				
329	HDB-5	368.6	377.4	-289.832	-298.632	8	2007/11/8	×																								0.5 ±0.1	-34.7	-1.9										
330	HDB-6	78.00	78.38	-17.79	-18.17																												-36	-1.4						2.7				
331	HDB-6	115.60	115.90	-55.39	-55.69						26.89		7.43	0.86		0.98		6.76		N.D.		N.D.	N.D.	N.D.						N.D.					-64.5									
332	HDB-6	115.30	115.60	-55.09	-55.39						24.29		6.65	0.81		1.12		11.01		N.D.		N.D.	N.D.	N.D.						N.D.						11								
333	HDB-6	135.00	135.30	-74.79	-75.09																												-44	-2.4						3.2				
334	HDB-6	217.40	217.70	-157.19	-157.49						27.01		7.31	0.86		0.15		0.88		N.D.		N.D.	N.D.	N.D.						N.D.					-64									
335	HDB-6	279.41	279.89	-219.20	-219.68																												-55	-6.1						1.8				
336	HDB-6	300.70	301.00	-240.49	-240.79						4.58		1.23	0.23		2.72		24.98		N.D.		N.D.	N.D.	N.D.						N.D.					-51	11								
337	HDB-6	300.30	300.60	-240.09	-240.39						8.47		2.57	0.33		3.93		30.87		N.D.		N.D.	N.D.	N.D.						N.D.						11.9								
338	HDB-6	394.30	394.52	-334.09	-334.31																												-36	-0.4						1.1				
339	HDB-6	405.50	405.80	-345.29	-345.59						6.06		2.42	0.2		4.15		35.37		N.D.		N.D.	N.D.	N.D.						N.D.					-46.2	8.7								
340	HDB-6	405.10	405.40	-344.89	-345.19						2.14		0.63	0.1		5.31		29.38		N.D.		N.D.	N.D.	N.D.						N.D.						12								
341	HDB-6	440.00	440.50	-379.79	-380.29			×																									-27	1.0						2.8				
342	HDB-6	492.28	492.50	-432.07	-432.29																												-24	2.2						0.2				
343	HDB-6	498.40	498.70	-438.19	-438.49						11.33		5.29	0.27		3.13		53.29		0.017		0.0059	0.0037	0.0050						N.D.					-49.2								
344	HDB-6	498.10	498.40	-437.89	-438.19						16.89		6.61	0.34		2.58		47.27		0.015		0.0057	0.0037	0.0049						N.D.						5.7								
345	HDB-6	547.00	547.48	-486.79	-487.27			×																									0 (N.D)	0 (N.D)						5 (N.D)				
346	HDB-6	600.03	600.33	-539.82	-540.12																												-20	3.4						4.4				
347	HDB-6	607.00	607.30	-546.79	-547.09						53.55		15.42	0.76		0.36		18.23		0.021		0.027	0.012	0.019						N.D.					-54.5								
348	HDB-6	610.70	611.00	-550.49	-550.79			○																									0 (N.D)	0 (N.D)						6 (N.D)				
349	HDB-6	280.95	312	-220.74	-251.79		2003/10/12	○																																				
350	HDB-6	280.95	312	-220.74	-251.79		2003/10/12	○																																				
351	HDB-6	280.95	312	-220.74	-251.79		2003/10/12	○																																				
352	HDB-6	280.95	312	-220.74	-251.79		2003/10/13	○																																				
353	HDB-6	280.95	312	-220.74	-251.79		2003/10/13	○																																				
354	HDB-6	280.95	312	-220.74	-251.79		2003/10/16	○	3863.41/ 15639.22		0.47		N.D.	0.4		12.14		92.49		N.D.		N.D.	N.D.	N.D.	N.D.							<0.4	-56	-5.2	-64.80	6.20				2.20				
355	HDB-6	363.95	409	-303.74	-348.79		2003/12/8	○																																				
356	HDB-6	363.95	409	-303.74	-348.79		2003/12/15	○																																				
357	HDB-6	363.95	409	-303.74	-348.79		2003/12/15	○																																				
358	HDB-6	363.95	409	-303.74	-348.79		2003/12/15	○																																				
359	HDB-6	363.95	409	-303.74	-348.79		2003/12/15	○																																				
360	HDB-6	363.95	409	-303.74	-348.79		2003/12/15	○																																				
361	HDB-6	363.95	409	-303.74	-348.79		2003/12/17	○	1621.13/ 53260.64		0.68		N.D.	0.88		21.82		77.61		N.D.		N.D.	N.D.	N.D.	N.D.							<0.3	-37	-0.6	-67.50	11.20								
362	HDB-6						2003/8/18	○																								5.3±0.2	-65	-9.8						23				
363	HDB-6						2003/9/16	○																																				
364	HDB-6						2003/10/17	○																																				
365	HDB-6						2003/11/13	○																																				
366	HDB-6						2003/11/28	○																								5.4±0.2	-62	-9.8						26.5				

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (16/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Organics				Microbiology																					
		Min.	Max.	Min.	Max.			Humic acid	Fuluvic acid	Acetate	Formate	Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
273	HDB-5	97.7	97.28	-18.932	-18.512																												
274	HDB-5	124.56	125.36	-45.792	-46.592																												
275	HDB-5	174.15	174.8	-95.382	-96.032																												
276	HDB-5	196.7	196.95	-117.932	-118.182																												
277	HDB-5	225	225.8	-146.232	-147.032																												
278	HDB-5	278.2	279	-199.432	-200.232																												
279	HDB-5	294.68	295	-215.912	-216.232																												
280	HDB-5	324.18	325	-245.412	-246.232																												
281	HDB-5	373.25	373.95	-294.482	-295.182																												
282	HDB-5	405	405.28	-326.232	-326.512																												
283	HDB-5	426	426.9	-347.232	-348.132																												
284	HDB-5	473.1	474	-394.332	-395.232																												
285	HDB-5	494.74	495	-415.972	-416.232																												
286	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/5																										
287	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/5																										
288	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/5																										
289	HDB-5	154.05	180.46	-75.282	-101.692		2002/12/6	1.5	11	<0.5	<0.5	4.3E+04	5.6E+02	4.1E+02		<0.2	<0.2	<0.2				1.4		<0.2			<0.2			<0.2			
290	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/10																										
291	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/10																										
292	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/11																										
293	HDB-5	182.05	250.455	-103.282	-171.687		2002/12/11	3.7	19	<0.5	<0.5																						
294	HDB-5	420.01	annulus	-341.242			2003/1/23	3.9	39	<0.5	<0.5																						
295	HDB-5	331.22	402.23	-252.452	-323.462		2003/1/27																										
296	HDB-5	331.22	402.23	-252.452	-323.462		2003/1/27																										
297	HDB-5	331.22	402.23	-252.452	-323.462		2003/1/28	4.2	56	<0.5	<0.5	4.9E+04	1.5E+02	2.3E+00		<0.2	<0.2	<0.2				<0.2		<0.2			<0.2			<0.2			
298	HDB-5	331.22	annulus	-252.452			2003/1/26																										
299	HDB-5	331.22	annulus	-252.452			2003/1/27																										
300	HDB-5	331.22	annulus	-252.452			2003/1/29	2.4	37	<0.5	<0.5	8.8E+05	7.5E+02	4.1E+01		<0.2	<0.2	<0.2				1.3		5.0E-01			<0.2			<0.2			
301	HDB-5						2002/9/29																										
302	HDB-5						2002/10/24																										
303	HDB-5						2002/11/24																										
304	HDB-5						2002/12/24																										
305	HDB-5						2003/1/13																										
306	HDB-5						2003/1/23																										
307	HDB-5						2003/2/19																										
308	HDB-5						2002/9/29																										
309	HDB-5						2002/10/24																										
310	HDB-5						2002/11/24																										
311	HDB-5						2002/12/24																										
312	HDB-5						2003/1/23																										
313	HDB-5						2003/2/19																										
314	HDB-5						2002/10/12	N.D.	0.06	<0.5	<0.5	1.2.E+04	5.6.E+02	1.3.E+00		<0.2	<0.2	<0.2				1.1.E+02		8.0.E+01			<0.2			<0.2			
315	HDB-5						2002/10/15																										
316	HDB-5						2003/1/13	N.D.	0.06	<0.5	<0.5	1.3.E+04	3.0.E+02	N.D.		<0.2	<0.2	<0.2				2.2.E+02		1.1.E+01			<0.2			<0.2			
317	HDB-5	46.83		31.938			2002/10/30	50	65	<0.5	<0.5	1.1E+07	3.2E+03	5.8E+04		1.1E+02	1.3E+02	<0.2				3.3E+03		1.1E+02			4.9E+02			2.2E+02			
318	HDB-5	4		74.768			2002/11/1																										
319	HDB-5	63.86		14.908			2002/11/8																										
320	HDB-5	109.45		-30.682			2002/11/15																										
321	HDB-5	182.01		-103.242			2002/11/22																										
322	HDB-5	259.46		-180.692			2002/11/29																										
323	HDB-5	272.24		-193.472			2002/11/30	70	30	<0.5	<0.5	4.0E+07	1.2E+06	6.5E+04		1.1E+01	<0.2	<0.2				2.2E+03		1.4E+02			1.3E+03			1.7E+02			
324	HDB-5	196.26		-117.492			2002/12/20																										
325	HDB-5	275.05		-196.282			2002/12/27																										
326	HDB-5	348.19		-269.422			2003/1/3																										
327	HDB-5	443.39		-364.622			2003/1/10																										
328	HDB-5	511.44		-432.672			2003/1/14	28	210	<0.5	<0.5	1.3E+08	6.9E+05	3.0E+03		4.0E+01	1.1E+02	<0.2				1.7E+02		1.1E+01			4.9E+01			4.9E+02			
329	HDB-5	368.6	377.4	-289.832	-298.632	8	2007/11/8																										
330	HDB-6	78.00	78.38	-17.79	-18.17																												
331	HDB-6	115.60	115.90	-55.39	-55.69																												
332	HDB-6	115.30	115.60	-55.09	-55.39																												
333	HDB-6	135.00	135.30	-74.79	-75.09																												
334	HDB-6	217.40	217.70	-157.19	-157.49																												
335	HDB-6	279.41	279.89	-219.20	-219.68																												
336	HDB-6	300.70	301.00	-240.49	-240.79																												
337	HDB-6	300.30	300.60	-240.09	-240.39																												
338	HDB-6	394.30	394.52	-334.09	-334.31																												
339	HDB-6	405.50	405.80	-345.29	-345.59																												
340	HDB-6	405.10	405.40	-344.89	-345.19																												
341	HDB-6	440.00	440.50	-379.79	-380.29																												
342	HDB-6	492.28	492.50	-432.07	-432.29																												
343	HDB-6	498.40	498.70	-438.19	-438.49																												
344	HDB-6	498.10	498.40	-437.89	-438.19																												
345	HDB-6	547.00	547.48	-486.79	-487.27																												
346	HDB-6	600.03	600.33	-539.82	-540.12																												
347	HDB-6	607.00	607.30	-546.79	-547.09																												
348	HDB-6	610.70	611.00	-550.49	-550.79																												
349	HDB-6	280.95	312	-220.74	-251.79		2003/10/12																										
350	HDB-6	280.95	312	-220.74	-251.79		2003/10/12																										
351	HDB-6	280.95	312	-220.74	-251.79		2003/10/12																										
352	HDB-6	280.95	312	-220.74	-251.79		2003/10/13																										
353	HDB-6	280.95	312	-220.74	-251.79		2003/10/13																										
354	HDB-6	280.95	312	-220.74	-251.79		2003/10/16	3.7	129	<1	<1	3.2E+05	4.9E+04	<0.2		4.9E+03	3.1E+03	<0.2				1.3E+03		2.4E+03			1.3E+01			0 (N.D)			
355	HDB-6	363.95	409	-303.74	-348.79		2003/12/8																										
356	HDB-6	363.95	409	-303.74	-348.79		2003/12/15																										
357	HDB-6	363.95	409	-303.74	-348.79		2003/12/15																										
358	HDB-6	363.95	409	-303.74	-348.79		2003/12/15																										
359	HDB-6	363.95	409	-303.74	-348.79		2003/12/15																										
360	HDB-6	363.95	409	-303.74	-348.79		2003/12/15																										
361	HDB-6	363.95	409	-303.74	-348.79		2003/12/17	2.9	134	<1	<1	1.8E+04	1.2E+04	<0.2		>2.4E+04	>2.4E+04	<0.2				5.4E+04		5.4E+04			9.0E-01			0 (N.D)			
362	HDB-6						2003/8/18																										
363	HDB-6						2003/9/16																										
364	HDB-6						2003/10/17																										
365	HDB-6						2003/11/13																										
366	HDB-6						2003/11/28																										

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (17/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII)			location (WGS84, UTM, Zone54)			Physico-chemical parameter							Contamination indicator				Comments
		Min.	Max.	Min.	Max.							X	Y	Z (middle depth)	East	North	Z (middle depth)	EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temper-ature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	
		[m]	[m]	[m]	[m]													[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]	[mg/l]		
367	HDB-6						2003/12/7		river (up the stream)									17.96		6.5				3.6		0.23		A	
368	HDB-6						2003/1/20		river (up the stream; snow)									2.15		5.2						0.05		A	
369	HDB-6						2003/2/18		river (up the stream; snow)									3.8		4.5						4.72		A	
370	HDB-6						2003/8/18		river (down the stream)									29.1		6.3				17.4		0.49		A	
371	HDB-6						2003/9/16		river (down the stream)									28.3		6.2				15.2		0.16		A	
372	HDB-6						2003/10/17		river (down the stream)									13.1		6.4				10.1		0.15		A	
373	HDB-6						2003/11/13		river (down the stream)									13.6		6.2				4.2		0.12		A	
374	HDB-6						2003/12/7		river (down the stream)									19.4		6.6				3.2		0.18		A	
375	HDB-6						2004/1/20		river (down the stream)									30.7		6.8				0.4		0.09		A	
376	HDB-6						2004/2/18		river (down the stream)									40.5		7.0				1.0		<0.01		A	
377	HDB-6						2003/8/18		well									13.9		6.3				9.3		<0.05		A	
378	HDB-6						2003/11/28		well																				
379	HDB-6						2003/12/16		well																				
380	HDB-6	100.69		-40.48			2003/9/2		return	Koetoi Fm.	diatomaceous mudstone	116095.346017	-30665.705917	-40.48	567786.852703	4988219.987383	-40.48	301		10.65				19.0		11.06		A	
381	HDB-6	137.50		-77.29			2003/9/4		return	Koetoi Fm.	diatomaceous mudstone	116095.346017	-30665.705917	-77.29	567786.852703	4988219.987383	-77.29	259		10.14				17.6		9.44		A	
382	HDB-6	200.00		-139.79			2003/9/24		return	Koetoi Fm.	diatomaceous mudstone	116095.346017	-30665.705917	-139.79	567786.852703	4988219.987383	-139.79	260		9.78				12.8		9.90		A	
383	HDB-6	299.67		-239.46			2003/10/1		return	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-239.46	567786.852703	4988219.987383	-239.46	235		9.84				15.2		8.55		A	
384	HDB-6	367.00		-306.79			2003/10/7		return	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-306.79	567786.852703	4988219.987383	-306.79	221		9.28				14.3		10.35		A	
385	HDB-6	400.00		-339.79			2003/11/8		return	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-339.79	567786.852703	4988219.987383	-339.79	320		9.30				15.3		10.92		A	
386	HDB-6	500.28		-440.07			2003/11/17		return	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-440.07	567786.852703	4988219.987383	-440.07	434		8.88				14.0		9.79		A	
387	HDB-6	600.20		-539.99			2003/11/26		return	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-539.99	567786.852703	4988219.987383	-539.99	462		8.43				16.1		9.58		A	
388	HDB-6	620.00		-559.79			2003/11/28		return	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-559.79	567786.852703	4988219.987383	-559.79	469		8.39				15.6		10.12		A	
389	HDB-6	288.66	302.9	-228.45	-242.69	4	2005/1/15		bottle	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-235.6	567786.852703	4988219.987383	-235.6		860		8.3								Microbiology: reffered from Shimizu et al., 2006 [6]
390	HDB-6	288.66	302.9	-228.45	-242.69	4	2006/11/1		bottle	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-235.6	567786.852703	4988219.987383	-235.6		1000		8.8								
391	HDB-6	288.66	302.9	-228.45	-242.69	4	2010/7/29	2010/8/20-10/14	bottle	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-235.6	567786.852703	4988219.987383	-235.6		1300		7.5				<0.002	0.021		B	
392	HDB-6	362.39	385.7	-302.18	-325.49	6	2005/1/17		bottle	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-313.8	567786.852703	4988219.987383	-313.8		1500		8								Microbiology: reffered from Shimizu et al., 2006 [6]
393	HDB-6	362.39	385.7	-302.18	-325.49	6	2006/11/6		bottle	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-313.8	567786.852703	4988219.987383	-313.8		1700		8.9								
394	HDB-6	362.39	385.7	-302.18	-325.49	6	2010/7/28	2010/8/20-10/14	bottle	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-313.8	567786.852703	4988219.987383	-313.8		1700		8.8				<0.002	0.870		B	
395	HDB-6	386.60	396.41	-326.39	-336.20	7	2006/11/8		bottle	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-331.3	567786.852703	4988219.987383	-331.3		1200		9.1								
396	HDB-6	386.60	396.41	-326.39	-336.20	7	2007/9/20	2007/9/21-10/17	bottle	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-331.3	567786.852703	4988219.987383	-331.3		1400		9.0					2.3		A	
397	HDB-6	386.60	396.41	-326.39	-336.20	7	2010/7/26	2010/8/20-10/14	bottle	Wakkanai Fm.	siliceous mudstone	116095.346017	-30665.705917	-331.3	567786.852703	4988219.987383	-331.3		1500		9.2				<0.002	1.3		B	
398	HDB-7	41.50	41.72	2.25	2.03				core	Yuchi Fm.	sandy mudstone	116478.607320	-31961.902260	2.14	566485.227891	4988583.098013	2.14				8.7								pore water extraction: squeeze (<70MPa)
399	HDB-7	131.00	131.26	-87.25	-87.51				core	Yuchi Fm.	sandy mudstone	116478.607320	-31961.902260	-87.38	566485.227891	4988583.098013	-87.38				8.5								
400	HDB-7	320.36	320.67	-276.61	-276.92				core	Yuchi Fm.	sandy mudstone	116478.607320	-31961.902260	-276.76	566485.227891	4988583.098013	-276.76				8.5								
401	HDB-7	343.29	343.55	-299.54	-299.80				core	Yuchi Fm.	sandy mudstone	116478.607320	-31961.902260	-299.67	566485.227891	4988583.098013	-299.67				8.42								
402	HDB-7	398.80	399.00	-355.05	-355.25				core	Koetoi Fm.	diatomaceous mudstone	116478.607320	-31961.902260	-355.15	566485.227891	4988583.098013	-355.15				8.3								
403	HDB-7	442.10	442.30	-398.35	-398.55				core	Koetoi Fm.	diatomaceous mudstone	116478.607320	-31961.902260	-398.45	566485.227891	4988583.098013	-398.45				8.15								
404	HDB-7	496.13	496.36	-452.38	-452.61				core	Koetoi Fm.	diatomaceous mudstone	116478.607320	-31961.902260	-452.49	566485.227891	4988583.098013	-452.49				8.3								
405	HDB-7	506.38	506.90	-462.63	-463.15				core	Koetoi Fm.	diatomaceous mudstone	116478.607320	-31961.902260	-462.89	566485.227891	4988583.098013	-462.89				8.06								
406	HDB-7						2003/8/18		river (up the stream)	Yuchi Fm.								18.2		6.74						0.14		A	
407	HDB-7						2003/9/16		river (up the stream)	Yuchi Fm.								11.3		6.64						0.10		A	
408	HDB-7						2003/10/17		river (up the stream)	Yuchi Fm.								8.90		6.70						0.17		A	
409	HDB-7						2003/11/7		river (up the stream)	Yuchi Fm.								8.56		6.73						0.05		A	
410	HDB-7						2003/12/7		river (up the stream)	Yuchi Fm.								8.90		6.76						0.09		A	
411	HDB-7						2004/1/20		river (up the stream)	Yuchi Fm.								18.6		7.32						0.08		A	
412	HDB-7						2004/2/18		river (up the stream)	Yuchi Fm.								17.6		7.00						<0.01		A	
413	HDB-7						2003/8/18		river (down the stream)	Yuchi Fm.								18.6		6.58						0.09		A	
414	HDB-7						2003/9/16		river (down the stream)	Yuchi Fm.								17.7		6.36						0.11		A	
415	HDB-7						2003/10/17		river (down the stream)	Yuchi Fm.								15.61		6.55						0.13		A	
416	HDB-7						2003/11/7		river (down the stream)	Yuchi Fm.								12.65		6.83						0.08		A	
417	HDB-7						2003/12/7		river (down the stream)	Yuchi Fm.								11.92		6.66						0.08		A	
418	HDB-7						2004/1/20		river (down the stream)	Yuchi Fm.								21.0		7.38						0.06		A	
419	HDB-7						2004/2/18		river (down the stream)	Yuchi Fm.								20.9		7.13						<0.01		A	
420	HDB-7	100.00		-56.25			2003/8/27		return	Yuchi Fm.	sandy mudstone	116478.607320	-31961.902260	-56.25	566485.227891	4988583.098013	-56.25	264		7.58						10.91		A	
421	HDB-7	178.00		-134.25			2003/9/2		return	Yuchi Fm.	sandy mudstone	116478.607320	-31961.902260	-134.25	566485.227891	4988583.098013	-134.25	296		7.32						9.21		A	
422	HDB-7	200.07		-156.32			2003/9/23		return	Yuchi Fm.	sandy mudstone	116478.607320	-31961.902260	-156.32	566485.227891	4988583.098013	-156.32	222		10.54						10.13		A	
423	HDB-7	300.00		-256.25			2003/10/1		return	Yuchi Fm.	sandy mudstone	116478.607320	-31961.902260	-256.25	566485.227891	4988583.098013	-256.25	384		8.38						9.08		A	
424	HDB-7	324.00		-280.25			2003/10/3		return	Yuchi Fm.	sandy mudstone	116478.607320	-31961.902260	-280.25	566485.227891	4988583.098013	-280.25	398		8.23						8.86		A	
425	HDB-7	400.00		-356.25			2003/11/1		return	Koetoi Fm.	diatomaceous mudstone	116478.607320	-31961.902260	-356.25	566485.227891	4988583.098013	-356.25	354		11.20						10.75		A	
426	HDB-7	501.89		-458.14			2003/11/6		return	Koetoi Fm.	diatomaceous mudstone	116478.607320	-31961.902260	-458.14	566485.227891	4988583.098013	-458.14	477		11.08						10.62		A	
427	HDB-7	520.00		-476.25			2003/11/7		return	Koetoi Fm.	diatomaceous mudstone	116478.607320	-31961.902260	-476.25	566485.227891	4988583.098013	-476.25	521		11.07						10.06		A	
428	HDB-7	218.59	228.45	-174.84	-184.70		2004/12/19			Yuchi Fm.	sandy mudstone	116478.607320	-31961.902260	-179.77	566485.227891	4988583.098013	-179.77		3300		8.9								
429	HDB-8	63	63.3	7.05	6.75				core	Koetoi Fm.	diatomaceous mudstone	116738.892776	-29991.538088	6.90	568450.835463	4988873.699775	6.90				8.3								pore water extraction: squeeze (<70MPa)
430	HDB-8	101.73	102	-31.68	-31.95				core	Koetoi Fm.	diatomaceous mudstone	116738.892776	-29991.538088	-31.81	568450.835463	4988873.699775	-31.81				8.2								
431	HDB-8	283.64	284	-213.59	-213.95				core	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-213.77	568450.835463	4988873.699775	-213.77				8.5								
432	HDB-8	344.2	344.7	-274.15	-274.65				core	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-274.40	568450.835463	4988873.699775	-274.40				8.3								
433	HDB-8	400.57	401	-330.52	-330.95				core	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-330.73	568450.835463	4988873.699775	-330.73				8.3								
434	HDB-8	449.04	449.24	-378.99	-379.19				core	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-379.09	568450.835463	4988873.699775	-379.09				8.6								
435	HDB-8	465.25	465.42	-395.20	-395.37				core	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-395.28	568450.835463	4988873.699775	-395.28				7.94								
436	HDB-8	57.5	89.05	12.55	-19.00		2003/9/16		pump	Koetoi Fm.	diatomaceous mudstone	116738.892776	-29991.538088	-3.22	568450.835463	4988873.699775	-3.22	16.8		7.3		225.2		15.9		10.61		A	
437	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18		pump	Koetoi Fm.	diatomaceous mudstone	116738.892776	-29991.538088	-3.22	568450.835463	4988873.699775	-3.22	14.9		7.9		-157.7		146.6		8.33		A	
438	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18		pump	Koetoi Fm.	diatomaceous mudstone	116738.892776	-29991.538088	-3.22	568450.835463	4988873.699775	-3.22	13.2		7.91		-117		183.4		6.06		A	
439	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18		pump	Koetoi Fm.	diatomaceous mudstone	116738.892776	-29991.538088	-3.22	568450.835463	4988873.699775	-3.22	19.8		10.3		228.2		18.9		4.25		A	
440	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18		pump	Koetoi Fm.	diatomaceous mudstone	116738.892776	-29991.538088	-3.22	568450.835463	4988873.699775	-3.22	209		7.98		-616.1		17.3		3.74		A	
441	HDB-8	57.5	89.05	12.55	-19.00		2003/10/17		pump	Koetoi Fm.	diatomaceous mudstone	116738.892776	-29991.538088	-3.22	568450.835463	4988873.699775	-3.22												
442	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/26		pump	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-105.98	568450.835463	4988873.699775	-105.98	17.8		7.94		133.2		10.4		9.06		A	
443	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/26		pump	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-105.98	568450.835463	4988873.699775	-105.98	357		7.52		-75.2		11.2		3.72		A	
444	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/26		pump	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-105.98	568450.835463	4988873.699775	-105.98	347		7.57		-103.9		11.5		3.36		A	
445	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/27		pump	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-105.98	568450.835463	4988873.699775	-105.98	353		7.6		-126.2		13.6		2.42		A	
446	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/27		pump	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-105.98	568450.835463	4988873.699775	-105.98	351		7.65		-283.6		13.1		1.91		A	
447	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/29		pump	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-105.98	568450.835463	4988873.699775	-105.98	370		7.59		-222.9		14.2		1.47		A	
448	HDB-8						2003/11/1																						
449	HDB-8						2003/8/26		river (up the stream)									10.7		6.22				12.9		<0.05		A	
450	HDB-8						2003/9/16		river (up the stream)									10.51		6.51				12		<0.05		A	
451	HDB-8						2003/10/17		river (up the stream)									10.29		6.24				8.2		0.111		A	
452	HDB-8						2003/11/13		river (up the stream)									10.41		6.07				5.8		0.05		A	
453	HDB-8						2003/11/28		river (up the stream)									10.49		6.41				5.4		0.03		A	

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (18/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Geochemistry																																									
		Min.	Max.	Min.	Max.			Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
367	HDB-6						2003/12/7	10.8	7.6	9.2	3.6	0.06		0.01	15		0.04	<0.01	0.37	0.01	1.1		0.38	<0.1	17	<1	<1	2.2		1.0	20		26			0.4	0		9	7		1.5	1.4	0.2
368	HDB-6						2003/1/20	0.75	0.10	0.18	0.11	<0.01		<0.01	0.20		<0.01	<0.01	<0.05	<0.01	0.02		<0.1	<0.1	1.2	<1	<1	0.4		0.13	0.5		<0.1			<0.002			<1	<1		0.1	0.1	0.0
369	HDB-6						2003/2/18	3.1	0.20	1.1	0.45	<0.01		<0.01	0.33		<0.01	<0.01	<0.05	<0.01	0.18		0.11	<0.1	6.0	<1	<1	1.6		0.22	2.4		<0.1			<0.002			<1	<1		0.3	0.3	0.0
370	HDB-6						2003/8/18	21	12	13	5.3	0.45		0.02	13		0.06	<0.01	2.1	0.11	18		6.0	<0.1	27	<1	<1	2.3		4.5	2.7		77			1.26	0		32	18		3.5	2.1	1.4
371	HDB-6						2003/9/16	16.4	4.6	21	8.4	0.48		0.02	15		0.10	<0.01	0.17	0.02	3.3		0.90	<0.1	19	<1	<1	<0.1		0.6	71		34			0.56	0		5	9		2.8	2.6	0.2
372	HDB-6						2003/10/17	8.78	1.0	7.0	3.3	0.17		<0.01	17		0.04	<0.01	0.08	0.01	1.9		0.70	<0.1	11	<1	<1	0.2		<0.1	24		9.2			0.15	0		6	6		1.1	1.0	0.2
373	HDB-6						2003/11/13	10.8	1.1	8.0	3.9	0.23		0.02	19		0.05	<0.01	0.09	0.01	2.1		0.33	<0.1	13	<1	<1	0.2		<0.1	18		20			0.32	0		6	4		1.3	1.1	0.2
374	HDB-6						2003/12/7	10.7	8.9	9.1	3.6	0.05		<0.01	14		0.04	<0.01	0.33	<0.01	1.1		0.27	<0.1	17	<1	<1	3.1		<0.1	18		28			0.46	0		11	7		1.5	1.4	0.1
375	HDB-6						2004/1/20	28.9	2.8	14	7.4	0.35		0.07	16		0.08	<0.01	0.23	<0.01	2.9		0.54	<0.1	36	<1	<1	0.5		0.96	50		24			0.39	0		5	4		2.8	2.5	0.3
376	HDB-6						2004/2/18	29	22	16	8.1	0.32		0.06	16		0.09	<0.01	1.4	<0.01	10		0.23	<0.1	38	<1	<1	<0.1		12	31		110			1.81	0		30	15		4.2	3.5	0.6
377	HDB-6						2003/8/18	17	1.5	6.0	3.6				17				0.22		<0.01	<0.05	<0.01	<0.3	21	<1	<1	0.6			4.7	<0.1	41.5			0.68		0	<1	9		1.4	1.4	0.0
378	HDB-6						2003/11/28																																									
379	HDB-6						2003/12/16																																									
380	HDB-6	100.69		-40.48			2003/9/2	454	15	9.2	1.6				20	2.2			0.27		0.52		0.7	0.8	350	<1	<1	<0.1			270	<0.1	348	60		7.7		1	38	91		20.8	23.4	-5.8
381	HDB-6	137.50		-77.29			2003/9/4	502	20	10	1.9				16	9.3			0.14		0.36		0.5	0.6	310	<1	<1	1.1			240	<0.1	367	42		7.41		0.7	91	97		23.1	21.3	4.0
382	HDB-6	200.00		-139.79			2003/9/24	547	8.4	17	1.3				48	20			0.33		1.4		0.4	0.7	470	3	<1	0.2			290	<0.1	110	147		6.69		2.44	450	69		25.0	26.4	-2.7
383	HDB-6	299.67		-239.46			2003/10/1	433	15	8.3	1.6				28	10			0.52		0.62		0.5	0.8	270	2	<1	<0.1			310	<0.1	298	19		5.52		0.32	69	48		19.8	19.7	0.3
384	HDB-6	367.00		-306.79			2003/10/7	362	7.0	4.1	1.3				20	4.3			0.17		0.38		0.8	0.9	180	<1	<1	1.3			300	<0.1	422	3.0		7.02		0.05	20	76		16.3	18.4	-6.0
385	HDB-6	400.00		-339.79			2003/11/8	572	9.4	8.6	0.44				43	9.8			0.17		0.10		0.3	0.7	540	4	1	1.2			210	<0.1	256	104		7.66		1.73	37	49		25.6	27.6	-3.7
386	HDB-6	500.28		-440.07			2003/11/17	977	28	18	5.1				12	17			0.07		0.04		0.07	0.8	1100	7	3	0.9			330	<0.1	417	3.0		6.94		0.05	96	81		44.5	44.9	-0.5
387	HDB-6	600.20		-539.99			2003/11/26	1200	45	31	11				16	17			<0.05		0.36		0.77	0.5	1500	11	4	0.6			410	<0.1	431	3.0		7.16		0.05	15	82		55.9	58.1	-2.0
388	HDB-6	620.00		-559.79			2003/11/28	1160	43	30	11				13	17			0.06		0.16		0.25	0.5	1500	10	4	1.6			430	<0.1	395	3.0		6.57		0.05	14	74		54.0	57.9	-3.6
389	HDB-6	288.66	302.9	-228.45	-242.69	4	2005/1/15	1700	44	20	10		0.01	2.7	31		0.42	N.D.	0.6	N.D.	0.4		<0.01	0.35	2500	15	7.5	<0.1		74	140		810	8.6	720				17	160		81.4	87.1	-3.4
390	HDB-6	288.66	302.9	-228.45	-242.69	4	2006/11/1	2200	63	3.7	17		<0.01	4.7	33		0.39	N.D.	0.6	N.D.	0.14		<0.01	0.15	2500	18	7.9	<0.1		95	0.6		2000	66	1900		16		400			104.8	105.8	-0.5
391	HDB-6	288.66	302.9	-228.45	-242.69	4	2010/7/29	2800	67	79	45		0.09	6.9	24		1.1		0.8		10	1.81	<0.01	0.2	3700	23	9.1	<0.1		100	0.5	0.005	2400	3.6	2100				15	510		137.8	144.0	-2.2
392	HDB-6	362.39	385.7	-302.18	-325.49	6	2005/1/17	3200	80	43	53		<0.01	5.6	44		1.4	N.D.	0.4	N.D.	0.03		0.01	0.11	4600	32	15	<0.1		120	6.9		2200	10	1900				15	440		155.2	166.6	-3.5
393	HDB-6	362.39	385.7	-302.18	-325.49	6	2006/11/6	4000	99	2.2	36		<0.01	8.1	30		0.5	N.D.	0.8	N.D.	0.08		<0.01	0.05	4900	35	15	<0.1		140	0.8		2400	95	2500		18		490			188.5	181.2	2.0
394	HDB-6	362.39	385.7	-302.18	-325.49	6	2010/7/28	4000	97	5.2	15		0.0006	8.9	15		0.88		0.7		0.08	0.05	0.02	0.099	5500	35	14	<0.1		130	2.1	0.022	2200	72	2000		200		19	440		186.4	194.1	-2.0
395	HDB-6	386.60	396.41	-326.39	-336.20	7	2006/11/8	2600	75	3.3	10		<0.01	4.9	17		0.37	N.D.	0.7	N.D.	0.04		<0.01	0.13	3500	26	11	<0.1		100	2.7		1100	73	1300		16		240			122.2	119.6	1.1
396	HDB-6	386.60	396.41	-326.39	-336.20	7	2007/9/20	3200	86	6.2	8.6		<0.01	6.4	24		0.78	<0.01	1.1	<0.01	0.07		<0.01	0.15	3900	30	10	0.04		120	7.2	<0.1	1400	66	1600				20	300		149.9	135.7	5.0
397	HDB-6	386.60	396.41	-326.39	-336.20	7	2010/7/26	3300	80	2.7	2.5		0.002	6.6	13		0.64		1.1		0.16	0.05	0.002	0.2	4200	31	12	<0.1		130	5.4	0.013	1400	120	1600		430		23	300		154.0	146.1	2.7
398	HDB-7	41.50	41.72	2.25	2.03			880	42	8.9	7.0			0.25											130						430		2100	<500					<100	500		40.4	47.0	-7.6
399	HDB-7	131.00	131.26	-87.25	-87.51			2600	170	25	33			5.5											1200						3000		1900	<500					<100	400		122.1	127.3	-2.1
400	HDB-7	320.36	320.67	-276.61	-276.92			9300	420	57	190			18											15000						140		2800	<500					<100	600		436.2	471.3	-3.9
401	HDB-7	343.29	343.55	-299.54	-299.80			10613	518	84	168			17								<0.5	0 (N.D)		16037						417		2644	366					119	606		495.2	516.8	-2.1
402	HDB-7	398.80	399.00	-355.05	-355.25			9100	470	120	170			20											14000						490		3200	<500					<100	700		430.5	474.9	-4.9
403	HDB-7	442.10	442.30	-398.35	-398.55			10508	474	149	193			21								<0.5	0 (N.D)		15577						20		3096	293					123	661		495.3	500.4	-0.5
404	HDB-7	496.13	496.36	-452.38	-452.61			9000	480	100	160			23											14000						1200		2400	<500					<100	500		425.1	458.7	-3.8
405	HDB-7	506.38	506.90	-462.63	-463.15			10002	439	163	175			20								<0.5	0 (N.D)		14171						33		3231	235					120	661		471.5	461.2	1.1
406	HDB-7						2003/8/18	31	2.6	2.7	2.4	0.02		0.07	20		0.02	<0.01	0.20	<0.01	2.3		0.21	<0.1	33	<1	<1	2.1		0.1	4.7		35			0.58		0	7	7		1.8	1.7	0.2
407	HDB-7						2003/9/16	16.9	1.8	1.7	1.5	0.01		0.03	18		0.02	<0.01	0.12	<0.01	1.4		0.30	<0.1	19	<1	<1	1.0		0.1	4.2		17			0.28		0	3	7		1.1	0.9	0.1
408	HDB-7						2003/10/17	11.9	1.2	1.4	1.3	0.01		0.02	18		0.02	<0.01	0.06	<0.01	0.68		0.20	<0.1	15	<1	<1	0.7		<0.1	4.7		9.8			0.16		0	3	3		0.8	0.7	0.1
409	HDB-7						2003/11/7	11	1.1	1.8	1.5	0.01		0.02	19		0.02	<0.01	0.06	<0.01	0.61		0.17	<0.1	15	<1	<1	0.6		<0.1	4.4		9.8			0.16		0	4	2		0.8	0.7	0.1
410	HDB-7						2003/12/7	10.9	1.1	1.3	1.3	<0.01		0.02	18		0.02	<0.01	<0.05	<0.01	0.42		0.14	<0.1	14	<1	<1	0.8		<0.1	5.0		8.5			0.14		0	3	2		0.7	0.7	0.0
411	HDB-7						2004/1/20	26.8	2.1	2.5	2.3	<0.01		0.10	18		0.03	<0.01	0.07	<0.01	1.1		<0.1	<0.1	27	<1	<1	2.4		0.24	4.2		29			0.48		0	4	6		1.6	1.4	0.2
412	HDB-7						2004/2/18	27	1.9	2.9	2.4	0.01		0.09	18		0.03	<0.01	0.06	<0.01	1.0		0.10	<0.1	29	<1	<1	2.1		<0.1	4.1		31			0.51		0	5	4		1.6	1.5	0.1
413	HDB-7						2003/8/18	23	3.3	7.5	4.4	0.02		0.03	17		0.05	<0.01	0.13	<0.01	1.6		0.12	<0.1	27	<1	<1	1.7		0.1	16		38			0.62		0	5	7		1.9	1.8	0.1
414	HDB-7						2003/9/16	17.2	3.6	7.6	3.9	0.02		0.02	16		0.05	<0.01	0.11	<0.01	1.4		0.20	<0.1	22	<1	<1	1.8		<0.1	17		27			0.44		0	3	8		1.6	1.5	0.1
415	HDB-7						2003/10/17	13.4	2.4	5.8	3.1	0.04		0.02	16		0.04	<0.01	0.07	<0.01	0.82		0.20	<0.1	17	<1	<1	1.4		<0.1	16		18			0.3		0	4	5		1.2	1.2	0.1
416	HDB-7						2003/11/7	12	2.0	5.2	3.0	0.04		0.02	17		0.04	<0.01	0.08	<0.01	0.80		0.25	<0.1	16	<1	<1	1.2		<0.1	13		15			0.25		0	5	3		1.1	1.0	0.1
417	HDB-7						2003/12/7	11.5	1.7	4.2	2.4	0.04		0.02	16		0.03	<0.01	<0.05	<0.01	0.48		0.15	<0.1	15	<1	<1	1.3		0.1	12		13			0.22		0	3	3		1.0	0.9	0.1
418	HDB-7						2004/1/20	23.3	3.5	7.1	4.5	0.01		0.06	14		0.05	<0.01	0.08	<0.01	0.97		<0.1	<0.1	26	<1	<1	3.1		0.24	16		33			0.54		0	5	6		1.9	1.7	0.2
419	HDB-7						2004/2/18	23	3.6	7.5	4.6	0.02		0.06	14		0.05	<0.01	0.10	<0.01	1.2		0.07	<0.1	28	<1	<1	3.1		0.17	15		34			0.55		0	6	5		1.9	1.7	0.2
420	HDB-7	100.00		-56.25			2003/8/27	440	17	16	3.1				9.3	0.09		<0.01	0.05	<0.01	0.35		0.66	0.7	36	<1	<1	0.4			420	<0.1	492	42		9.47		0.7	490	140		20.7	19.4	3.3
421	HDB-7	178.00		-134.25			2003/9/2	527	30	15	4.3				12	0.18		<0.01	0.08	<0.01	0.71		0.8	0.5	93	<1	<1	1.6			460	<0.1	294	36		6.02		0.6	230	100		24.9	18.4	15.1
422	HDB-7	200.07		-156.32			2003/9/23	429	8.3	29	1.6				27	2.2		<0.01	1.1	<0.01	1.3		0.4	1.0	76	<1	<1	0.2			320	<0.1	379	137		10.77		2.28	450	69		20.5	20.0	1.3
423	HDB-7	300.00		-256.25			2003/10/1	867	45	30	6.9				7.7	2.5		<0.01	0.14	<0.01	0.28		0.2	0.5	460	5	2	0.2			600	<0.1	294	36		6.02		0.6	430	110		40.9	31.6	12.8
424	HDB-7	324.00		-280.25			2003/10/3	923	51	32	5.5				6.7	2.6		<0.01	0.27	<0.01	0.10		<0.1	0.4	520	5	2	1.1			670	<0.1	603	10		10.2		0.16	360	130		43.5	38.9	5.6
425	HDB-7	400.00		-356.25			2003/11/1	642	20	19	0.61				27	1.9		<0.01	0.66	<0.01	0.52		0.39	1.1	700	3	3	0.3			340	<0.1	194	117		7.06		1.94	170	46		29.5	34.2	-7.5
426	HDB-7	501.89		-458.14			2003/11/6	912	41	30	3.4				16	2.1		<0.01	0.57	<0.01	0.36		0.1	0.1	840	12	5	2.7			570	<0.1	285	62		6.73		1.03	110	53		42.5	42.6	-0.1
427	HDB-7	520.00		-476.25			2003/11/7	1260	56	45	4.20				24	2.7			0.52		0.69		0.93	0.2	1200	15	<1	1.7			720	<0.1	342	34		6.73		0.56	100	67		58.9	55.8	2.7
428	HDB-7	218.59	228.45	-174.84	-184.70		2004/12/19	7900	390	9.9	71		0.02	7.1	3.8		1.2	N.D.	7	N.D.	0.24		0.01	0.08	12000	130	60	0.01		420	32		3100	120	3600				79	640		384.2	395.4	-1.4
429	HDB-8	63	63.3	7.05	6.75			660	40	22	13			2.4											330						490		900	<500					<100	200		32.2	34.2	-3.0
430	HDB-8	101.73	102	-31.68	-31.95			860	38	29	17			3.5											260						1200		1000	<500					<100	200		41.7	48.7	-7.7
431	HDB-8	283.64	284	-213.59	-213.95			3600	60	52	87			14											4600						770		1300	<500					<100	400		169.8	164.8	-4.2
432	HDB-8	344.2	344.7	-274.15	-274.65			4232	72	109	76			12								<0.5	0 (N.D)		5573						17		1755	134					64	363		199.3	190.9	2.1
433	HDB-8	400.57	401	-330.52	-330.95			4000	46	68	100			11											5500						500		900	<500					<100	300		188.3	197.9	-2.5
434	HDB-8	449.04	449.24	-378.99	-379.19			4645	<1	128	82			9.1								<1	0 (N.D)		6815						10		877	214					77	217		216.4	214.2	0.5
435	HDB-8	465.25	465.42	-395.20	-395.37			5170	68	212	130			9.6								3.75	0 (N.D)		6567						2125		640	<88					59	116		249.2	242.8	1.3
436	HDB-8	57.5	89.05	12.55	-19.00		2003/9/16	20.2	1.9	11	3.5					0.09						0.11	<0.05	0.2	20	<1		0.1			4.6	<0.1	58	0		1.08		<0.1	5	13		1.8	1.6	0.1
437	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18	280	14	6.3	2.7					2.9						0.14	0.08	0.2	130	<1		<0.1			32	<0.1	539	2		9.11		<0.1	16	110		13.1	13.3	-0.8
438	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18	358	17	10	4.2					3.8						0.12	<0.05	0.2	180	1.0		0.1			21	<0.1	638	3		12		<0.1	23	130		16.8	16.1	2.3
439	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18																<0.05								13	<0.1				15.3		<0.1						
440	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18	367	18	12	5.7	0		0.1	20	3.8	0.11	<0.01	0.54	0.002	0.04	<0.01	0.06	0.1	200	<1	<1	0.5		20	23		841	4		12.7		<0.1	25	170		18.6	20.1	-3.7
441	HDB-8	57.5	89.05	12.55	-19.00		2003/10/17																																									
442	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/26																<0.05								5.6	<0.1				0.93		<0.1				0.0	0.1	-0.1
443	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/26	759	30	12	7.1					28						0.04	0.05	<0.1	530	2.0		0.4			3.7	<0.1	1135	2		20.8		<0.1	13	240		35.0	33.7	1.8
444	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/26	716	29	12	6.8					29						0.03	0.07	<0.1	450	1.0		0.4			2.4	<0.1	1288	3		24.3		<0.1	15	270		33.0	34.0	-1.4
445	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/27	736	30	12	7.2					31						0.06	<0.05	0.1	390	1.0		0.5			1.2	<0.1	1480	3		27.3		<0.1	16	310		34.0	35.4	-2.1
446	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/27																0.09								0.7	<0.1				28.6		<0.1						
447	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/29	787	31	12	7.8	0.01		3.9	20	33	20	<0.01	2.9	<0.002	0.05	0.04	0.02	<0.1	390	1.0	<1	0.5		35	1.1		1432	3		29.2		<0.1	13	300		38.8	40.2	-1.9
448	HDB-8						2003/11/1																																									
449	HDB-8						2003/8/26	15	2.1	2.8	2.0	0.02		0.02	28		0.02	<0.01	0.08	<0.01	1.1		0.26	0.3	14	<1	<1	2.6		0.2	9.4		17			0.28		<0.1	2	6		1.1	0.9	0.1
450	HDB-8						2003/9/16	13.3	2.3	3.9	1.8	0.02		0.01	26		0.02	<0.01	0.08	<0.01	1.0		0.2	<0.1	13	<1	<1	2.3		<0.1	9.9		17			0.28		<0.1	3	4		1.0	0.9	0.1
451	HDB-8						2003/10/17	12	1.9	2.2	1.7	0.02		<0.01	26		0.02	<0.01	0.08	<0.01	0.52		0.2	<0.1	13	<1	<1	3.2		<0.1	9.0		11			0.18		<0.1	3	6		0.9	0.8	0.1
452	HDB-8						2003/11/13	12.4	1.9	2.4	1.9	0.01		0.02	28		0.02	<0.01	0.05	<0.01	0.26		0.8	<0.1	13	<1	<1	3.3		<0.1	8.3		12			0.19		<0.1	3	3		1.0	0.8	0.2
453	HDB-8						2003/11/28																																									

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (19/64)

Index	Sample point	sampling zone (GL) Min.	sampling zone (GL) Max.	sampling zone (EL) Min.	sampling zone (EL) Max.	sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases: Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	Isotopes: ^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{36}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_w]	[cc_{STP}/g_w]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
367	HDB-6						2003/12/7	○																																					
368	HDB-6						2003/1/20	○																																					
369	HDB-6						2003/2/18	○																																					
370	HDB-6						2003/8/18	○																																					
371	HDB-6						2003/9/16	○																																					
372	HDB-6						2003/10/17	○																																					
373	HDB-6						2003/11/13	○																																					
374	HDB-6						2003/12/7	○																																					
375	HDB-6						2004/1/20	○																																					
376	HDB-6						2004/2/18	○																																					
377	HDB-6						2003/8/18	○																								4.0±0.2	-68.0	-10.52						46±2.8					
378	HDB-6						2003/11/28																									2.4±0.2	-66.3	-10.55						36.1±2.2					
379	HDB-6						2003/12/16																																						
380	HDB-6	100.69		-40.48			2003/9/2	○																																					
381	HDB-6	137.50		-77.29			2003/9/4	○																								2.8±0.2	-54	-7.6						3.7					
382	HDB-6	200.00		-139.79			2003/9/24	○																																					
383	HDB-6	299.67		-239.46			2003/10/1	○																																					
384	HDB-6	367.00		-306.79			2003/10/7	○																								2.7±0.2	-60	-8.7						n/s					
385	HDB-6	400.00		-339.79			2003/11/8	○																																					
386	HDB-6	500.28		-440.07			2003/11/17	○																																					
387	HDB-6	600.20		-539.99			2003/11/26	○																																					
388	HDB-6	620.00		-559.79			2003/11/28	○																								2.1±0.2	-53	-6.8						n/s					
389	HDB-6	288.66	302.9	-228.45	-242.69	4	2005/1/15	×																																					
390	HDB-6	288.66	302.9	-228.45	-242.69	4	2006/11/1	×																																					
391	HDB-6	288.66	302.9	-228.45	-242.69	4	2010/7/29	○																								< 0.3	-52	-4.8											
392	HDB-6	362.39	385.7	-302.18	-325.49	6	2005/1/17	×																																					
393	HDB-6	362.39	385.7	-302.18	-325.49	6	2006/11/6																																						
394	HDB-6	362.39	385.7	-302.18	-325.49	6	2010/7/28	○																								< 0.3	-40	-1.2											
395	HDB-6	386.60	396.41	-326.39	-336.20	7	2006/11/8																																						
396	HDB-6	386.60	396.41	-326.39	-336.20	7	2007/9/20	×																								0.5 ±0.1	-41.4	-2.2											
397	HDB-6	386.60	396.41	-326.39	-336.20	7	2010/7/26	○																								< 0.3	-38	-1.2											
398	HDB-7	41.50	41.72	2.25	2.03																												-63	-9.8						16					
399	HDB-7	131.00	131.26	-87.25	-87.51																												-60	-7.5						5					
400	HDB-7	320.36	320.67	-276.61	-276.92																												-19	2.7						5					
401	HDB-7	343.29	343.55	-299.54	-299.80			○																									-20	2.9						2					
402	HDB-7	398.80	399.00	-355.05	-355.25																												-18	2.8						3.9					
403	HDB-7	442.10	442.30	-398.35	-398.55			○																									-14	3.9						5.3					
404	HDB-7	496.13	496.36	-452.38	-452.61																												-17	2.8						3.4					
405	HDB-7	506.38	506.90	-462.63	-463.15			○																									-15	3.8						3.6					
406	HDB-7						2003/8/18	○																								6.3±0.2	-67	-10.4						24.1					
407	HDB-7						2003/9/16	○																																					
408	HDB-7						2003/10/17	○																																					
409	HDB-7						2003/11/7	○																								5.6±0.2	-65	-10.1						27.6					
410	HDB-7						2003/12/7	○																																					
411	HDB-7						2004/1/20	○																																					
412	HDB-7						2004/2/18	○																																					
413	HDB-7						2003/8/18	○																																					
414	HDB-7						2003/9/16	○																																					
415	HDB-7						2003/10/17	○																																					
416	HDB-7						2003/11/7	○																																					
417	HDB-7						2003/12/7	○																																					
418	HDB-7						2004/1/20	○																																					
419	HDB-7						2004/2/18	○																																					
420	HDB-7	100.00		-56.25			2003/8/27	○																																					
421	HDB-7	178.00		-134.25			2003/9/2	○																								3.1±0.2	-57	-8.2						21					
422	HDB-7	200.07		-156.32			2003/9/23	○																																					
423	HDB-7	300.00		-256.25			2003/10/1	○																																					
424	HDB-7	324.00		-280.25			2003/10/3	○																								3.1±0.2	-57	-8.2											
425	HDB-7	400.00		-356.25			2003/11/1	○																																					
426	HDB-7	501.89		-458.14			2003/11/6	○																																					
427	HDB-7	520.00		-476.25			2003/11/7	○																								2.7±0.2	-49	-6.5						4.40					
428	HDB-7	218.59	228.45	-174.84	-184.70		2004/12/19																																						
429	HDB-8	63	63.3	7.05	6.75																												-71	-10.1						4					
430	HDB-8	101.73	102	-31.68	-31.95																												-70	-9.2						0					
431	HDB-8	283.64	284	-213.59	-213.95																												-31	0.3						2.8					
432	HDB-8	344.2	344.7	-274.15	-274.65			×																									0 (N.D)	0 (N.D)						3 (N.D)					
433	HDB-8	400.57	401	-330.52	-330.95																												-18	2.2						5.2					
434	HDB-8	449.04	449.24	-378.99	-379.19			×																									-25	0.4						4.7					
435	HDB-8	465.25	465.42	-395.20	-395.37			×																									0 (N.D)	0 (N.D)						5 (N.D)					
436	HDB-8	57.5	89.05	12.55	-19.00		2003/9/16	○																																					
437	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18	○																																					
438	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18	○																																					
439	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18	○																																					
440	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18	○																								1.6±0.1	-72	-10.4						5.6					
441	HDB-8	57.5	89.05	12.55	-19.00		2003/10/17		23.71/ 1191.24		60.15		15.58	4.08		0.0071		11.2		N.D.		N.D.	N.D.	N.D.						N.D.					-68.9	-13.3									
442	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/26	○																																					
443	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/26	○																																					
444	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/26	○																																					
445	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/27	○																																					
446	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/27	○																																					
447	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/29	○																								<0.4	-70	-8.8						1.2					
448	HDB-8						2003/11/1		43539.11/ 44924.00		12.76		2.32	1.94		2.44		83.9		N.D.		N.D.	N.D.	N.D.						N.D.					-60.9	5.7									
449	HDB-8						2003/8/26	○																								7.6±0.2	-68	-10.7						70					
450	HDB-8						2003/9/16	○																																					
451	HDB-8						2003/10/17	○																																					
452	HDB-8						2003/11/13	○																																					
453	HDB-8						2003/11/28																									7.7±0.2	-68	-10.6						67					

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (20/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Organics				Microbiology																					
		Min.	Max.	Min.	Max.			Humic acid	Fuluvic acid	Acetate	Formate	Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
367	HDB-6						2003/12/7																										
368	HDB-6						2003/1/20																										
369	HDB-6						2003/2/18																										
370	HDB-6						2003/8/18																										
371	HDB-6						2003/9/16																										
372	HDB-6						2003/10/17																										
373	HDB-6						2003/11/13																										
374	HDB-6						2003/12/7																										
375	HDB-6						2004/1/20																										
376	HDB-6						2004/2/18																										
377	HDB-6						2003/8/18	0.02	<0.1	<1	<1	1.6E+04	5.4E+04	<0.2		>2.4E+04	9.2.E+03	<0.2				5.4.E+03		2.2E+03			1.3E+00			<0.2			
378	HDB-6						2003/11/28	0.02	<0.1	<1	<1																						
379	HDB-6						2003/12/16					1.1E+04	9.4E+02	3.3E+01		3.4.E+02	2.1.E+02	<0.2				8.0.E-01		1.7E+00			2.0E-01			<0.2			
380	HDB-6	100.69		-40.48			2003/9/2																										
381	HDB-6	137.50		-77.29			2003/9/4																										
382	HDB-6	200.00		-139.79			2003/9/24																										
383	HDB-6	299.67		-239.46			2003/10/1																										
384	HDB-6	387.00		-306.79			2003/10/7																										
385	HDB-6	400.00		-339.79			2003/11/8																										
386	HDB-6	500.28		-440.07			2003/11/17																										
387	HDB-6	600.20		-539.99			2003/11/26																										
388	HDB-6	620.00		-559.79			2003/11/28																										
389	HDB-6	288.66	302.9	-228.45	-242.69	4	2005/1/15					8.3 ± 0.6 (x10^6)																					
390	HDB-6	288.66	302.9	-228.45	-242.69	4	2006/11/1																										
391	HDB-6	288.66	302.9	-228.45	-242.69	4	2010/7/29																										
392	HDB-6	362.39	385.7	-302.18	-325.49	6	2005/1/17																										
393	HDB-6	362.39	385.7	-302.18	-325.49	6	2006/11/6																										
394	HDB-6	362.39	385.7	-302.18	-325.49	6	2010/7/28																										
395	HDB-6	386.60	396.41	-326.39	-336.20	7	2006/11/8																										
396	HDB-6	386.60	396.41	-326.39	-336.20	7	2007/9/20																										
397	HDB-6	386.60	396.41	-326.39	-336.20	7	2010/7/26																										
398	HDB-7	41.50	41.72	2.25	2.03																												
399	HDB-7	131.00	131.26	-87.25	-87.51																												
400	HDB-7	320.36	320.67	-276.61	-276.92																												
401	HDB-7	343.29	343.55	-299.54	-299.80																												
402	HDB-7	398.80	399.00	-355.05	-355.25																												
403	HDB-7	442.10	442.30	-398.35	-398.55																												
404	HDB-7	496.13	496.36	-452.38	-452.61																												
405	HDB-7	506.38	506.90	-462.63	-463.15																												
406	HDB-7						2003/8/18																										
407	HDB-7						2003/9/16																										
408	HDB-7						2003/10/17																										
409	HDB-7						2003/11/7																										
410	HDB-7						2003/12/7																										
411	HDB-7						2004/1/20																										
412	HDB-7						2004/2/18																										
413	HDB-7						2003/8/18																										
414	HDB-7						2003/9/16																										
415	HDB-7						2003/10/17																										
416	HDB-7						2003/11/7																										
417	HDB-7						2003/12/7																										
418	HDB-7						2004/1/20																										
419	HDB-7						2004/2/18																										
420	HDB-7	100.00		-56.25			2003/8/27																										
421	HDB-7	178.00		-134.25			2003/9/2																										
422	HDB-7	200.07		-156.32			2003/9/23																										
423	HDB-7	300.00		-256.25			2003/10/1																										
424	HDB-7	324.00		-280.25			2003/10/3																										
425	HDB-7	400.00		-356.25			2003/11/1																										
426	HDB-7	501.89		-458.14			2003/11/6																										
427	HDB-7	520.00		-476.25			2003/11/7																										
428	HDB-7	218.59	228.45	-174.84	-184.70		2004/12/19																										
429	HDB-8	63	63.3	7.05	6.75																												
430	HDB-8	101.73	102	-31.68	-31.95																												
431	HDB-8	283.64	284	-213.59	-213.95																												
432	HDB-8	344.2	344.7	-274.15	-274.65																												
433	HDB-8	400.57	401	-330.52	-330.95																												
434	HDB-8	449.04	449.24	-378.99	-379.19																												
435	HDB-8	465.25	465.42	-395.20	-395.37																												
436	HDB-8	57.5	89.05	12.55	-19.00		2003/9/16																										
437	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18																										
438	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18																										
439	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18																										
440	HDB-8	57.5	89.05	12.55	-19.00		2003/9/18	2.7	59	<1	<1	1.5E+07	3.5E+06		<0.2	>2.4E+04	>2.4E+04	<0.2				9.2E+05		9.2E+05			3.5E+01			<0.2			
441	HDB-8	57.5	89.05	12.55	-19.00		2003/10/17																										
442	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/26																										
443	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/26																										
444	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/26																										
445	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/27																										
446	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/27																										
447	HDB-8	168.01	184.06	-97.96	-114.01		2003/10/29	15	200	<1	<1	1.2E+04	1.9E+06		2.5E+02	>2.4E+04	>2.4E+04	1.3E+00				>2.4E+04		4.7E+02			7.9E+00			<0.2			
448	HDB-8						2003/11/1																										
449	HDB-8						2003/8/26																										
450	HDB-8						2003/9/16																										
451	HDB-8						2003/10/17																										
452	HDB-8						2003/11/13																										
453	HDB-8						2003/11/28																										

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (21/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII)			location (WGS84, UTM, Zone54)			Physico-chemical parameter							Contamination indicator				Comments
		Min.	Max.	Min.	Max.							X	Y	Z (middle depth)	East	North	Z (middle depth)	EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temper-ature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	
		[m]	[m]	[m]	[m]													[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]	[mg/l]		
454	HDB-8						2003/12/7		river (up the stream)									10.16		6.27				5.2		0.13		A	
455	HDB-8						2004/1/20		river (up the stream)									10.4		7.18				0.2		0.05		A	
456	HDB-8						2004/2/18		river (up the stream)									12		6.8				4.3		<0.01		A	
457	HDB-8						2003/8/26		river (down the stream)									11.2		6.74				14.7		0.05		A	
458	HDB-8						2003/9/16		river (down the stream)									10.9		6.76				12.5		0.06		A	
459	HDB-8						2003/10/17		river (down the stream)									10.58		6.45				7.9		0.05		A	
460	HDB-8						2003/11/13		river (down the stream)									10.4		6.52				5.5		0.07		A	
461	HDB-8						2003/12/7		river (down the stream)									10.12		6.76				4.9		0.08		A	
462	HDB-8						2004/1/20		river (down the stream)									11.6		7.12				0.5		0.05		A	
463	HDB-8						2004/2/18		river (down the stream)									11.5		6.75				3.4		<0.01		A	
464	HDB-8						2003/8/18		well									13.9		6.33				9.3		<0.05		A	
465	HDB-8						2003/11/28		well																				
466	HDB-8						2003/12/16		well																				
467	HDB-8	98.86		-28.81			2003/9/3		return	Koetoi Fm.	diatomaceous mudstone	116738.892776	-29991.538088	-28.81	568450.835463	4988873.699775	-28.81	172.2		8.28				21.7		10.06		A	
468	HDB-8	112.98		-42.93			2003/9/4		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116738.892776	-29991.538088	-42.93	568450.584205	4988872.284241	-42.93	178.3		8.23				21.4		10.82		A	
469	HDB-8	200		-129.95			2003/10/4		return	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-129.95	568450.584205	4988872.284241	-129.95	202		9.23				17		9.62		A	
470	HDB-8	300.4		-230.35			2003/10/13		return	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-230.35	568450.584205	4988872.284241	-230.35	257		8.45				18.9		9.4		A	
471	HDB-8	307.5		-237.45			2003/10/13		return	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-237.45	568450.584205	4988872.284241	-237.45	266		8.43				18.6		10.53		A	
472	HDB-8	399.77		-329.72			2003/11/21		return	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-329.72	568450.584205	4988872.284241	-329.72	275		10.18				18.4		9.68		A	
473	HDB-8	469.94		-399.89			2003/11/27		return	Wakkanai Fm.	siliceous mudstone	116738.892776	-29991.538088	-399.89	568450.584205	4988872.284241	-399.89	292		9.74				16.3		10.28		A	
474	HDB-9	36.22	36.45	60.97	60.74				core	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	60.85	566932.892781	4989973.228962	60.85		45		7.5								pore water extraction: squeeze (<70MPa)
475	HDB-9	54.95	55.23	42.24	41.96				core	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	42.10	566932.892781	4989973.228962	42.10		220		7.8								
476	HDB-9	78	78.5	19.19	18.69				core	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	18.94	566932.892781	4989973.228962	18.94		510		7.5								
477	HDB-9	151.1	151.42	-53.91	-54.23				core	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-54.07	566932.892781	4989973.228962	-54.07		1100		8.2								
478	HDB-9	200	200.4	-102.81	-103.21				core	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-103.01	566932.892781	4989973.228962	-103.01												
479	HDB-9	222	222.25	-124.81	-125.06				core	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-124.94	566932.892781	4989973.228962	-124.94												
480	HDB-9	251.7	252	-154.51	-154.81				core	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-154.66	566932.892781	4989973.228962	-154.66		2100		8.5								
481	HDB-9	347.68	348	-250.49	-250.81				core	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-250.65	566932.892781	4989973.228962	-250.65		2900		8.8								
482	HDB-9	397.78	397.98	-300.59	-300.79				core	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-300.69	566932.892781	4989973.228962	-300.69												
483	HDB-9	456.62	457	-359.43	-359.81				core	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-359.62	566932.892781	4989973.228962	-359.62		2600		8.4								
484	HDB-9	498.8	499	-401.61	-401.81				core	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-401.71	566932.892781	4989973.228962	-401.71												
485	HDB-9	516.67	517	-419.48	-419.81				core	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-419.65	566932.892781	4989973.228962	-419.65		2500		8.8								
486	HDB-9	198.75	199	-101.56	-101.81				core under Atmosphere Control	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-101.69	566932.892781	4989973.228962	-101.69				8.1								
487	HDB-9	26.5	82.6	70.69	14.59		2004/10/21		pump	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	42.64	566932.892781	4989973.228962	42.64	65.2		10.32		33.3		10.5		10.3		A	
488	HDB-9	26.5	82.6	70.69	14.59		2004/10/21		pump	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	42.64	566932.892781	4989973.228962	42.64	71.4		9.84		-12.4		11.9		8.07		A	
489	HDB-9	26.5	82.6	70.69	14.59		2004/10/21		pump	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	42.64	566932.892781	4989973.228962	42.64	63.7		9.64		9		13.5		6.01		A	
490	HDB-9	26.5	82.6	70.69	14.59		2004/10/22		pump	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	42.64	566932.892781	4989973.228962	42.64	45.9		9.23		-63.9		16.9		3.49		A	
491	HDB-9	26.5	82.6	70.69	14.59		2004/10/22		pump	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	42.64	566932.892781	4989973.228962	42.64	35.3		8.29		-176.8		16.8		1.97		A	
492	HDB-9	26.5	82.6	70.69	14.59		2004/10/23		pump	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	42.64	566932.892781	4989973.228962	42.64	23.8		6.62		-52.9		15.5		1.02		A	
493	HDB-9	26.5	82.6	70.69	14.59		2004/10/24		pump(last)	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	42.64	566932.892781	4989973.228962	42.64	15.8		6.12				16.6		0.3		A	
494	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26		pump	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-140.01	566932.892781	4989973.228962	-140.01	13.4		7.41		108		8.8		10.31		A	
495	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26		pump	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-140.01	566932.892781	4989973.228962	-140.01	674		6.97		24.7		10.9		6.63		A	
496	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26		pump	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-140.01	566932.892781	4989973.228962	-140.01	908		6.96		1.9		11.2		4.71		A	
497	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26		pump	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-140.01	566932.892781	4989973.228962	-140.01	1018		6.96		-10		11.3		3.75		A	
498	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/27		pump	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-140.01	566932.892781	4989973.228962	-140.01	1202		6.89		-59.1		12.3		2.08		A	
499	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/27		pump(last)	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-140.01	566932.892781	4989973.228962	-140.01	1239		6.92		-94.6		13		1.61		A	
500	HDB-9						2004/8/9		river (up the stream)									6.5		5.22				9.4		<0.05		A	
501	HDB-9						2004/9/12		river (up the stream)									7.2		5.02				9.7		<0.05		A	
502	HDB-9						2004/10/9		river (up the stream)									7.1		4.66				9.2		<0.05		A	
503	HDB-9						2004/11/5		river (up the stream)									7.9		4.69				8.4		<0.05		A	
504	HDB-9						2004/12/9		river (up the stream)									7.1		4.44				10.8		<0.05		A	
505	HDB-9						2005/1/7		river (up the stream)									13.7		4.83				5		<0.05		A	
506	HDB-9						2005/2/3		river (up the stream)									8.1		5.31				4.9		0.05		A	
507	HDB-9						2004/8/9		river (down the stream)									6.8		6.18				15.2		<0.05		A	
508	HDB-9						2004/9/12		river (down the stream)									7.1		6.22				12.2		<0.05		A	
509	HDB-9						2004/10/9		river (down the stream)									11.1		6				10.5		<0.05		A	
510	HDB-9						2004/11/5		river (down the stream)									7.8		6.08				8.2		0.05		A	
511	HDB-9						2004/12/9		river (down the stream)									7		6.53				4.5		<0.05		A	
512	HDB-9						2005/1/7		river (down the stream)									7.7		6.14				1.3		<0.05		A	
513	HDB-9						2005/2/3		river (down the stream)									8.6		6.3				1.1		<0.05		A	
514	HDB-9						2004/9/16		well									14.35		6.6				10.6		<0.05		A	The same sample with the well of HDB-10
515	HDB-9	100.24		-3.052			2004/10/27		return	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-3.052	566932.892781	4989973.228962	-3.052	130		9.3				12.1		9.29		A	
516	HDB-9	125		-27.812			2004/10/28		return	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-27.812	566932.892781	4989973.228962	-27.812	128		9.01				14.4		9.15		A	
517	HDB-9	201		-103.812			2004/11/13		return	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-103.812	566932.892781	4989973.228962	-103.812	188		8.86				15		9.96		A	
518	HDB-9	257.5		-160.312			2004/11/17		return	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-160.312	566932.892781	4989973.228962	-160.312	117		9.56				10.8		9.48		A	
519	HDB-9	299.22		-202.032			2004/12/14		return	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-202.032	566932.892781	4989973.228962	-202.032	343		10.51				16.1		10.3		A	
520	HDB-9	401.53		-304.342			2005/12/20		return	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-304.342	566932.892781	4989973.228962	-304.342	321		8.6				17.3		9.05		A	
521	HDB-9	500.04		-402.852			2004/12/29		return	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-402.852	566932.892781	4989973.228962	-402.852	308		8.07				16.7		10.7		A	
522	HDB-9	520		-422.812			2004/12/30		return	Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-422.812	566932.892781	4989973.228962	-422.812	297		8.03				18.1		10.4		A	
523	HDB-9	216.9	257.5	-119.712	-160.312		2005/10/3	2005/10/31-11/10		Wakkanai Fm.	siliceous mudstone	117862.016632	-31492.704863	-140.012	566932.892781	4989973.228962	-140.012		53		9.0						28.5		A	
524	HDB-10	32.76	33	18.07	17.83				core	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	17.95	570382.397230	4989878.518521	17.95		800		8.3								pore water extraction: squeeze (<70MPa)
525	HDB-10	43.7	44	7.13	6.83				core	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	6.98	570382.397230	4989878.518521	6.98		1100		8.4								
526	HDB-10	59.1	59.3	-8.27	-8.47				core	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	-8.37	570382.397230	4989878.518521	-8.37		1100		7.7								
527	HDB-10	148.65	149	-97.82	-98.17				core	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	-98.00	570382.397230	4989878.518521	-98.00		1300		8.4								
528	HDB-10	195.85	196.25	-145.021	-145.421		2004/10/29		core	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	-145.22	570382.397230	4989878.518521	-145.22												
529	HDB-10	249.68	250	-198.85	-199.17				core	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	-199.01	570382.397230	4989878.518521	-199.01		1700		8.2								
530	HDB-10	301	301.34	-250.17	-250.51				core	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-250.34	570382.397230	4989878.518521	-250.34		1500		8.4								
531	HDB-10	355	355.2	-304.17	-304.37				core	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-304.27	570382.397230	4989878.518521	-304.27												
532	HDB-10	401	401.35	-350.171	-350.521				core	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-350.35	570382.397230	4989878.518521	-350.35												
533	HDB-10	447	447.35	-396.17	-396.52				core	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-396.35	570382.397230	4989878.518521	-396.35		2600		8.2								
534	HDB-10	466.46	466.71	-415.63	-415.88				core	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-415.76	570382.397230	4989878.518521	-415.76		2200		7.8								
535	HDB-10	485.6	486	-434.771	-435.171				core	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-434.97	570382.397230	4989878.518521	-434.97												
536	HDB-10	505.5	506	-454.67	-455.17				core	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-454.92	570382.397230	4989878.518521	-454.92		1800		8.5								

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (22/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Geochemistry																																								
		Min.	Max.	Min.	Max.			Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
454	HDB-8						2003/12/7	11.4	1.9	2.2	1.6	0.01		0.01	26		0.02	<0.01	<0.05	<0.01	0.55		0.1	<0.1	13	<1	<1	4.1		<0.1	8.3		10			0.17			1	3		0.8	0.8	0.0
455	HDB-8						2004/1/20	13.2	3.7	3.0	2.1	<0.01		0.02	25		0.02	<0.01	<0.05	<0.01	0.18		<0.1	<0.1	12	<1	<1	3.5		0.14	8.4		19			0.31			3	4		1.0	0.9	0.1
456	HDB-8						2004/2/18	13	1.9	2.8	2.0	<0.01		0.02	26		0.02	<0.01	<0.05	<0.01	0.25		0.05	<0.1	13	<1	<1	2.8		<0.1	9.1		14			0.23			2	2		0.9	0.8	0.1
457	HDB-8						2003/8/26	14	2.2	2.9	2.1	0.01		0.02	27		0.03	<0.01	0.09	<0.01	1.1		0.17	<0.1	14	<1	<1	2.5		0.2	8.9		18			0.3		<0.1	2	5		1.0	0.9	0.1
458	HDB-8						2003/9/16	13.4	2.4	2.8	2.0	0.02		0.01	25		0.03	<0.01	0.1	<0.01	1		0.2	<0.1	13	<1	<1	1.9		<0.1	9.3		19			0.31		<0.1	3	4		1.0	0.9	0.1
459	HDB-8						2003/10/17	11.6	2.1	2.6	1.8	0.02		<0.01	25		0.02	<0.01	0.1	<0.01	0.66		0.2	<0.1	13	<1	<1	3.5		<0.1	9.2		12			0.2		<0.1	3	2		0.9	0.8	0.0
460	HDB-8						2003/11/13	12.3	1.9	2.7	2.1	0.01		0.01	28		0.03	<0.01	0.06	<0.01	0.36		0.08	<0.1	13	<1	<1	3.6		<0.1	8.5		13			0.22		<0.1	2	2		0.9	0.8	0.1
461	HDB-8						2003/12/7	11.3	2.1	2.4	1.8	0.01		0.01	25		0.03	<0.01	0.07	<0.01	0.3		0.06	<0.1	13	<1	<1	4.2		0.1	8.6		10			0.17		<0.1	2	3		0.8	0.8	0.0
462	HDB-8						2004/1/20	12.5	2.1	2.1	1.8	<0.01		0.02	26		0.02	<0.01	0.07	<0.01	0.22		<0.1	<0.1	12	<1	<1	3.2		0.4	9.3		13			0.21		<0.1	2	3		0.9	0.8	0.1
463	HDB-8						2004/2/18	14	3.8	3.1	2.1	0.01		0.02	25		0.03	<0.01	0.07	<0.01	0.32		0.04	<0.1	14	<1	<1	3.0		0.51	8.4		20			0.33		<0.1	4	3		1.1	1.0	0.1
464	HDB-8						2003/8/18	17	1.5	6.0	3.6				17				0.22		<0.01	<0.05	<0.01	<0.3	21	<1	<1	0.6			4.7	<0.1	41			0.68		<0.1	<1	9		1.4	1.4	0.0
465	HDB-8						2003/11/28																																								
466	HDB-8						2003/12/16																																								
467	HDB-8	98.86		-28.81			2003/9/3	230	9.0	5.5	1.2				21	1.2			0.11		0.35		0.6	0.7	36	<1	<1	0.2			280	<0.1	342	27.0		6.51		0.45	16	78		10.7	13.5	-11.6
468	HDB-8	112.98		-42.93			2003/9/4	301	17	6.9	1.8				21	2.0			0.07		0.24		0.5	0.5	34	<1	<1	0.3			370	<0.1	294	36.1		6.02		0.6	22	92		14.1	14.8	-2.5
469	HDB-8	200		-129.95			2003/10/4	338	12	6.7	1.1				20	3.5			0.11		0.26		0.4	0.9	51	<1	<1	2.9			470	<0.1	398	6.0		6.73		0.1	24	73		15.5	18.1	-7.7
470	HDB-8	300.4		-230.35			2003/10/13	348	9.9	6.0	1.0				19	4.2			0.06		0.28		0.79	0.7	100	<1	<1	1.3			370	<0.1	320	13.8		5.71		0.23	25	75		15.9	16.3	-1.5
471	HDB-8	307.5		-237.45			2003/10/13	583	24	20	4.6				16	8.2			0.06		0.03		0.1	0.6	220	1.0	<1	1.6			600	<0.1	390	12.0		6.79		0.2	16	87		27.3	25.6	3.4
472	HDB-8	399.77		-329.72			2003/11/21	542	13	7.3	1.8				15	7.7			0.09		0.05		0.1	1.1	370	2.0	1.0	0.5			350	<0.1	398	6.0		6.73		0.1	18	67		24.4	24.5	-0.2
473	HDB-8	469.94		-399.89			2003/11/27	574	19	13	2.4				13	7.3			<0.05		0.03		0.06	0.8	420	2.0	1.0	1.4			490	<0.1	320	13.8		5.71		0.23	16	67		26.3	27.9	-2.9
474	HDB-9	36.22	36.45	60.97	60.74			55	5.8	11	11			0.1											28						100		47	0.1					6.3	10		4.0	3.6	4.8
475	HDB-9	54.95	55.23	42.24	41.96			290	18	36	29			0.6											180						370		290	0.9					20	59		17.3	17.5	-0.6
476	HDB-9	78	78.5	19.19	18.69			1100	21	52	34			1.9											180						1900		530	0.8					42	110		54.0	53.3	0.7
477	HDB-9	151.1	151.42	-53.91	-54.23			2300	22	34	23			2.1											2100						360		1600	11					64	330		104.5	93.3	5.7
478	HDB-9	200	200.4	-102.81	-103.21																																										
479	HDB-9	222	222.26	-124.81	-125.06																																										
480	HDB-9	251.7	252	-154.51	-154.81			4600	38	59	64			2.6											5700						120		2000	29					60	400		209.6	196.9	3.1
481	HDB-9	347.68	348	-250.49	-250.81			6300	23	58	89			2.9											8600						1400		1000	12					20	210		285.1	288.2	-0.5
482	HDB-9	397.78	397.98	-300.59	-300.79																																										
483	HDB-9	456.62	457	-359.43	-359.81			5400	38	62	58			1.6											7100						430		1800	22					32	360		243.9	239.2	1.0
484	HDB-9	498.8	499	-401.61	-401.81																																										
485	HDB-9	516.67	517	-419.48	-419.81			5400	12	23	72			1.3											7000						2000		1000	12					20	200		242.3	255.6	-2.7
486	HDB-9	198.75	199	-101.56	-101.81			4134	50.8	86.9	45.9			2.63							<0.2				5421						5.45		2801	150					<24	597		189.5	204.1	-3.7
487	HDB-9	26.5	82.6	70.69	14.59		2004/10/21	130	1.4	1.3	0.43				23	0.19			0.1		0.27	0.14	0.77	0.5	19	<1	<1				51	<0.1	230	126		4.27		2.17	11	50		5.9	9.9	-25.5
488	HDB-9	26.5	82.6	70.69	14.59		2004/10/21	120	1.3	1.1	0.25				13	0.12			0.15		0.17	0.1	0.4	0.5	17	<1	<1				40	<0.1	220	40		3.37		0.66	8	45		5.4	6.4	-8.5
489	HDB-9	26.5	82.6	70.69	14.59		2004/10/21	120	1.6	1.7	0.51				21	0.18			0.11		1	0.08	2.5	0.6	17	<1	<1				44	<0.1	230	36		3.75		0.6	11	47		5.7	6.5	-6.7
490	HDB-9	26.5	82.6	70.69	14.59		2004/10/22	94	1.2	1	0.27				15	0.09			0.08		0.18	0.36	0.42	0.2	15	<1	<1				29	<0.1	180	26		3.26		0.44	3	38		4.2	4.9	-0.7
491	HDB-9	26.5	82.6	70.69	14.59		2004/10/22															0.15									20	<0.1	180			2.42		<0.1				0.0	3.4	-3.4
492	HDB-9	26.5	82.6	70.69	14.59		2004/10/23	48	1.6	1.5	0.37				19	0.09			<0.05		0.18	0.2	0.31	0.1	15	<1	<1				15	<0.1	91	0		1.56		<0.1	7	20		2.3	2.2	0.0
493	HDB-9	26.5	82.6	70.69	14.59		2004/10/24	22	1.8	3.9	1.1		0.16	0.01	21	0.05	0.03	<0.001	<0.05	<0.002	0.02	3.9	0.01	<0.1	14	<1	<1	<0.1	<0.1	0.51	10	<0.1	47	0		0.8		<0.1	2	9		1.3	1.4	-0.1
494	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26	17	1.6	7.8	3.3				18	<0.01			0.2		0.09	<0.05	0.01	0.1	18	<1	<1				4.4	<0.1	46	0		0.8		<0.1	5	8		1.4	1.4	0.1
495	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26	1800	27	41	20				16	35			0.07		0.02	<0.05	0.02	0.1	2300	15	7				3.4	<0.1	1500	0		23.73		<0.1	11	270		82.6	89.6	-4.1
496	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26	2700	39	66	33				24	53			0.07		0.02	<0.05	0.02	0.1	3500	23	9				2.7	<0.1	2200	0		37.62		<0.1	13	400		124.4	135.0	-4.1
497	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26	3100	44	52	41				18	61			0.06		0.02	<0.05	0.01	<0.1	4000	26	11				2	<0.1	2400	0		42.55		<0.1	12	460		141.9	152.4	-3.6
498	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/27	3900	55	64	56				18	78			0.18		0.02	<0.05	0.01	0.2	5100	33	14				0.5	<0.1	3000	0		52.31		<0.1	10	580		178.8	193.3	-3.9
499	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/27	4200	59	84	59		0.07	2.7	22	83	1.4	<0.001	0.91	<0.002	0.04	0.14	<0.01	0.2	5400	34	15	3.9	<0.01	87	6.9	<0.1	3200	0		54.93		<0.1	9	630		198.4	205.2	-1.7
500	HDB-9						2004/8/9	8.7	1	1	0.99		0.02	<0.01	18	0.03	0.01	<0.01	<0.05	0.03	1	<0.05	1.4	<0.1	13	<1	<1	1	<0.1	<0.1	7.4	<0.1	1.8	0		0.03		<0.1	3	<1		0.7	0.6	0.1
501	HDB-9						2004/9/12	8.5	1	1.2	1.0		0.01	<0.01	20	0.01	0.01	<0.01	<0.05	0.01	0.54	<0.05	0.72	<0.1	12	<1	<1	1.6	<0.1	<0.1	5.4	<0.1	1.8	0		0.03		<0.1	4	<4		0.6	0.5	0.1
502	HDB-9						2004/10/9	8.8	1.1	0.94	1.0		0.01	<0.01	19	0.16	0.01	<0.001	<0.05	0.02	0.47	0.08	0.63	<0.1	11	<1	<1	0.6	<0.1	<0.1	4.9	<0.1	3.1	0		0.05		<0.1	3	2		0.6	0.5	0.1
503	HDB-9						2004/11/5	9.2	1	0.87	1.0		0.02	<0.01	18	0.02	0.01	<0.001	0.06	0.05	1.6	0.08	2.3	<0.1	13	<1	<1	0.5	<0.1	<0.1	4.9	<0.1	0	0		0		<0.1	3	2		0.8	0.5	0.3
504	HDB-9						2004/12/9	8.7	0.9	1.2	1.2		0.01	<0.01	17	<0.02	0.01	<0.001	<0.05	<0.01	0.24	<0.05	0.23	<0.1	12	<1	<1	1.8	<0.1	<0.1	5.4	<0.1	0	0		0		<0.1	2	<1		0.6	0.5	0.1
505	HDB-9						2005/1/7	8.9	1	0.92	0.96		0.03	<0.01	17	0.02	0.02	<0.001	0.07	0.04	2.7	0.05	2.7	<0.1	14	<1	<1	0.7	<0.1	<0.1	4.8	<0.1	0	0		0		<0.1	4	<1		0.9	0.5	0.4
506	HDB-9						2005/2/3	8.9	1	1.4	1.1		0.07	<0.01	16	<0.02	0.03	0.001	0.58	0.11	14	0.05	9.5	<0.1	13	<1	<1	0.3	<0.1	0.1	4.7	<0.1	1.8	0		0.03		<0.1	3	1		1.9	0.5	1.4
507	HDB-9						2004/8/9	8.5	1.2	1.1	1		0.01	<0.01	19	0.05	0.01	<0.01	<0.05	<0.01	0.55	<0.05	0.32	<0.1	11	<1	<1	0.9	<0.1	<0.1	5.8	<0.1	3.7	0		0.06		<0.1	3	<1		0.6	0.5	0.1
508	HDB-9						2004/9/12	8	1	1.1	0.96		<0.01	<0.01	18	0.02	0.01	<0.01	<0.05	<0.01	0.35	<0.05	0.17	<0.1	10	<1	<1	1.6	<0.1	<0.1	6.1	<0.1	3.7	0		0.06		<0.1	4	<1		0.5	0.5	0.0
509	HDB-9						2004/10/9	8.8	1.2	1.1	1.2		0.02	<0.01	19	0.15	0.02	<0.001	<0.05	<0.01	0.39	0.07	0.036	<0.1	9.3	<1	<1	0.8	<0.1	<0.1	6	<0.1	6.1	0		0.1		<0.1	3	2		0.6	0.5	0.1
510	HDB-9						2004/11/5	9.1	1.2	1.1	1.3		<0.01	<0.01	18	0.02	0.01	<0.001	<0.05	<0.01	0.44	0.11	0.14	<0.1	11	<1	<1	1	<0.1	0.1	5.9	<0.1	0	0		0		<0.1	3	2		0.6	0.5	0.2
511	HDB-9						2004/12/9	8.4	0.9	1.6	1.3		<0.01	<0.01	18	<0.02	0.01	<0.001	<0.05	<0.01	0.15	0.08	0.09	<0.1	11	<1	<1	1.7	<0.1	<0.1	6.4	<0.1	4.9	0		0.08		<0.1	2	1		0.6	0.6	0.0
512	HDB-9						2005/1/7	8.9	1	1.2	1.3		<0.01	<0.01	16	0.02	0.01	<0.001	<0.05	<0.01	0.51	0.13	0.1	<0.1	16	<1	<1	1.6	<0.1	<0.1	6.3	<0.1	4.9	0		0.08		<0.1	3	1		0.6	0.7	-0.1
513	HDB-9						2005/2/3	9.2	1	1.9	1.6		0.03	<0.01	16	<0.02	0.02	<0.001	0.08	0.01	3.2	0.11	0.56	<0.1	11	<1	<1	1.7	<0.1	0.2	6.2	<0.1	7.9	0		0.13		<0.1	3	2		0.8	0.6	0.2
514	HDB-9						2004/9/16	16	1.5	5.5	3.4				18	<0.01			0.23		<0.01	<0.01	<0.01	0.1	17	<1	<1				4.4	<0.1	43	0		0.7		<0.1	4	7		1.3	1.3	0.0
515	HDB-9	100.24		-3.052			2004/10/27	240	2.7	1	0.22				15	0.6			0.17		0.06	0.15	0.1	1	25	<1	<1				137	<0.1	311	34		6.22		0.56	8	72		10.6	9.9	3.2
516	HDB-9	125		-27.812			2004/10/28	200	2.7	1.5	0.48				20	0.88			0.11		0.07	<0.05	0.2	0.9	27	<1	<1				127	<0.1	304	30		5.98		0.5	8	66		8.9	9.5	-3.3
517	HDB-9	201		-103.812			2004/11/13	370	10	7.1	0.42				22	5.7			0.12		0.14	0.23	0.1	0.9	130	<1	<1				397	<0.1	264	4.8		4.48		0.08	21	49		16.7	16.5	0.8
518	HDB-9	257.5		-160.312			2004/11/17	180	1.9	1	0.18				13	0.89			0.06		0.08	0.11	0.12	0.8	35	<1	<1				127	<0.1	178	67		5.13		1.11	11	57		8.0	9.0	-6.0
519	HDB-9	299.22		-202.032			2004/12/14	690	7.1	7.8	0.13				71	12			0.09		0.04	0.12	0.04	0.7	750	4.7	2				177	<0.1	15	209		7.19		3.47	20	26		30.6	32.6	-3.2
520	HDB-9	401.53		-304.342			2005/12/20	650	9.8	7	1.5				12	8.9			0.05		0.08	0.12	0.18	0.9	610	4.1	2				268	<0.1	414	18		7.39		0.3	15	78		29.0	30.3	-2.2
521	HDB-9	500.04		-402.852			2004/12/29	620	12	13	2.7				11	7.3			<0.05		0.09	0.17	0.1	0.6	500	3.3	1				461	<0.1	442	0		7.25		<0.1	14	78		28.1	31.0	-4.8
522	HDB-9	520		-422.812			2004/12/30	620	13	12	2.6				11	7.2			<0.05		0.07	0.19	0.08	0.64	480	3.1	1				529	<0.1	337	0		5.53		<0.1	15	64		28.1	30.1	-3.5
523	HDB-9	216.9	257.5	-119.712	-160.312		2005/10/3	96	7.6	8.4	2.6		<0.01	0.1	4		0.15	<0.001	<0.05	<0.01	<0.01		<0.01	0.19	71	0.4	0.22	<0.1		4.2	1.9		160	7.2		150			4.3	32		5.3	4.9	3.1
524	HDB-10	32.76	33	18.07	17.83			1800	88	48	34			4.7											1700						380		1800	18					53	370		86.4	85.9	0.3
525	HDB-10	43.7	44	7.13	6.83			2700	116	63	50			2.6											2900						320		2200	27					56	450		128.0	125.4	1.0
526	HDB-10	59.1	59.3	-8.27	-8.47			2400	130	59	45			7.6											2000						2800		380	0.4					51	79		115.4	120.8	-2.3
527	HDB-10	148.65	149	-97.82	-98.17			2900	138	41	29			3.6											3000						490		2200	26					59	440		134.6	131.7	1.1
528	HDB-10	195.85	196.25	-145.021	-145.421		2004/10/29																																								
529	HDB-10	249.68	250	-198.85	-199.17			3600	154	66	41			13											4500						170		2000	14					45	410		169.0	163.6	1.6
530	HDB-10	301	301.34	-250.17	-250.51			3100	140	82	46			12											4200						1300		580	19					23	120		148.0	155.5	-2.5
531	HDB-10	355	355.2	-304.17	-304.37																																										
532	HDB-10	401	401.35	-350.171	-350.521																																										
533	HDB-10	447	447.35	-396.17	-396.52			5100	98	84	140			17											7400						110		980	6.9					83	200		242.4	227.0	3.3
534	HDB-10	466.46	466.71	-415.63	-415.88			4300	58	160	110			18											6300						1700		240	0.7					39	50		208.1	216.8	-2.0
535	HDB-10	485.6	486	-434.771	-435.171																																										
536	HDB-10	505.5	506	-454.67	-455.17			4000	38	41	86			17											5500						870		560	8.2					27	110		186.5	182.5	1.1

Table 3.1 Chemical and isotopic composition of groundwater (23/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases																									Isotopes											
		Min.	Max.	Min.	Max.				Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{36}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_{sw}]	[cc_{STP}/g_{sw}]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
454	HDB-8						2003/12/7	○																																				
455	HDB-8						2004/1/20	○																																				
456	HDB-8						2004/2/18	○																																				
457	HDB-8						2003/8/26	○																																				
458	HDB-8						2003/9/16	○																																				
459	HDB-8						2003/10/17	○																																				
460	HDB-8						2003/11/13	○																																				
461	HDB-8						2003/12/7	○																																				
462	HDB-8						2004/1/20	○																																				
463	HDB-8						2004/2/18	○																																				
464	HDB-8						2003/8/18	○																							4.0±0.2	-68.0	-10.52						46±2.8					
465	HDB-8						2003/11/28																								2.4±0.2	-66.3	-10.55						36.1±2.2					
466	HDB-8						2003/12/16																																					
467	HDB-8	98.86		-28.81			2003/9/3	○																																				
468	HDB-8	112.98		-42.93			2003/9/4	○																							2.9±0.2	-60	-9.0						42					
469	HDB-8	200		-129.95			2003/10/4	○																																				
470	HDB-8	300.4		-230.35			2003/10/13	○																																				
471	HDB-8	307.5		-237.45			2003/10/13	○																							2.6±0.2	-57	-8.4						9					
472	HDB-8	399.77		-329.72			2003/11/21	○																																				
473	HDB-8	469.94		-399.89			2003/11/27	○																							3.0±0.2	-56	-8.1						4.7					
474	HDB-9	36.22	36.45	60.97	60.74																											-65	-9.5											
475	HDB-9	54.95	55.23	42.24	41.96																											-67.1	-9.83											
476	HDB-9	78	78.5	19.19	18.69																											-68.8	-9.5											
477	HDB-9	151.1	151.42	-53.91	-54.23																											-56.1	-5.84											
478	HDB-9	200	200.4	-102.81	-103.21						48.3		11.2	0.884		0.53		38.7		0.002		<0.001	N.D.	N.D.						<0.5					-51.9	-1.4								
479	HDB-9	222	222.25	-124.81	-125.06																											-29.9	1.6											
480	HDB-9	251.7	252	-154.51	-154.81																											-27.6	0.99											
481	HDB-9	347.68	348	-250.49	-250.81																											-19.1	4.4											
482	HDB-9	397.78	397.98	-300.59	-300.79						20.0		3.83	0.397		1.59		72.9		0.01		<0.001	N.D.	N.D.						<0.5					-48.1	-13.7								
483	HDB-9	456.62	457	-359.43	-359.81																											-20.4	1.96											
484	HDB-9	498.8	499	-401.61	-401.81						38.6		7.01	0.558		1.89		52.6		0.006		<0.001	N.D.	N.D.						<0.5					-48.6	-12.9								
485	HDB-9	516.67	517	-419.48	-419.81																											-23.3	2.8											
486	HDB-9	198.75	199	-101.56	-101.81																											-32.4	-0.33											
487	HDB-9	26.5	82.6	70.69	14.59		2004/10/21	○																																				
488	HDB-9	26.5	82.6	70.69	14.59		2004/10/21	○																																				
489	HDB-9	26.5	82.6	70.69	14.59		2004/10/21	○																																				
490	HDB-9	26.5	82.6	70.69	14.59		2004/10/22	○																																				
491	HDB-9	26.5	82.6	70.69	14.59		2004/10/22	○																																				
492	HDB-9	26.5	82.6	70.69	14.59		2004/10/23	○																																				
493	HDB-9	26.5	82.6	70.69	14.59		2004/10/24	○																							2.7±0.2	-71.1	-11						172±28				-1.8	0.705568±0.000011
494	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26	○																																				
495	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26	○																																				
496	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26	○																																				
497	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26	○																																				
498	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/27	○																																				
499	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/27	○	12825 /20900		0.69		0.088	0.035		16.8		80.5		0.006		<0.001	N.D.	N.D.						<0.5	<0.4	-35	0.1	-49.6	0.5				3.1±2.7				1.5	0.708214±0.000011
500	HDB-9						2004/8/9	○																																				
501	HDB-9						2004/9/12	○																																				
502	HDB-9						2004/10/9	○																																				
503	HDB-9						2004/11/5	○																																				
504	HDB-9						2004/12/9	○																																				
505	HDB-9						2005/1/7	○																																				
506	HDB-9						2005/2/3	○																																				
507	HDB-9						2004/8/9	○																							3.8±0.2	-68.7	-10.6						40±3				7.8	0.708146±0.000011
508	HDB-9						2004/9/12	○																																				
509	HDB-9						2004/10/9	○																																				
510	HDB-9						2004/11/5	○																																				
511	HDB-9						2004/12/9	○																																				
512	HDB-9						2005/1/7	○																																				
513	HDB-9						2005/2/3	○																							3.9±0.2	-70.1	-10.8						44±5				-10.8	0.708105±0.000020
514	HDB-9						2004/9/16	○																							1.1±0.2	-68.4	-10.6						37±6				14.6	0.710718±0.000018
515	HDB-9	100.24		-3.052			2004/10/27	○																																				
516	HDB-9	125		-27.812			2004/10/28	○																							1.6±0.2	-67.6	-10.2						1190±40				-1.4	0.705593±0.000011
517	HDB-9	201		-103.812			2004/11/13	○																																				
518	HDB-9	257.5		-160.312			2004/11/17	○																							1.3±0.2	-67.7	-10.5						29±5				-2.1	0.707199±0.000033
519	HDB-9	299.22		-202.032			2004/12/14	○																																				
520	HDB-9	401.53		-304.342			2005/12/20	○																																				
521	HDB-9	500.04		-402.852			2004/12/29	○																																				
522	HDB-9	520		-422.812			2004/12/30	○																							1.6±0.2	-61.1	-8.6						7.9±2.9				-6.4	0.707614±0.000011
523	HDB-9	216.9	257.5	-119.712	-160.312		2005/10/3	×																																				
524	HDB-10	32.76	33	18.07	17.83																											-62	-7.0											
525	HDB-10	43.7	44	7.13	6.83																											-55.3	-5.8											
526	HDB-10	59.1	59.3	-8.27	-8.47																											-60.1	-6.2											
527	HDB-10	148.65	149	-97.82	-98.17																											-49.8	-4.53											
528	HDB-10	195.85	196.25	-145.021	-145.421		2004/10/29				49.1		11.1	0.748		1.06		20.8		0.002		<0.001	N.D.	N.D.						<0.5					-65.0	-13.7								
529	HDB-10	249.68	250	-198.85	-199.17																											-47.17	-3.79											
530	HDB-10	301	301.34	-250.17	-250.51																											-57.9	-5.8											
531	HDB-10	355	355.2	-304.17	-304.37																											-63.4	-7.3											
532	HDB-10	401	401.35	-350.171	-350.521						33.7		3.77	1.34		1.53		45.6		0.005		<0.001	N.D.	N.D.						<0.5					-59.7	-13.1								
533	HDB-10	447	447.35	-396.17	-396.52																											-37.2	-2.36											
534	HDB-10	466.46	466.71	-415.63	-415.88																											-42.6	-2.1											
535	HDB-10	485.6	486	-434.771	-435.171						39.7		8.97	1.19		1.58		47.2		0.004		<0.001	N.D.	N.D.						<0.5					-57.2	-14.3								
536	HDB-10	505.5	506	-454.67	-455.17																											-43.8	-2.1											

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (24/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Organics				Microbiology																					
		Min.	Max.	Min.	Max.			Humic acid	Fuluvic acid	Acetate	Formate	Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
454	HDB-8						2003/12/7																										
455	HDB-8						2004/1/20																										
456	HDB-8						2004/2/18																										
457	HDB-8						2003/8/26																										
458	HDB-8						2003/9/16																										
459	HDB-8						2003/10/17																										
460	HDB-8						2003/11/13																										
461	HDB-8						2003/12/7																										
462	HDB-8						2004/1/20																										
463	HDB-8						2004/2/18																										
464	HDB-8						2003/8/18	0.02	<0.1	<1	<1	1.6E+04	5.4E+04	<0.2		>2.4E+04	9.2.E+03	<0.2				5.4.E+03		2.2E+03			1.3E+00			<0.2			
465	HDB-8						2003/11/28	0.02	<0.1	<1	<1																						
466	HDB-8						2003/12/16					1.1E+04	9.4E+02	3.3E+01		3.4.E+02	2.1.E+02	<0.2				8.0.E-01		1.7E+00			2.0E-01			<0.2			
467	HDB-8	98.86		-28.81			2003/9/3																										
468	HDB-8	112.98		-42.93			2003/9/4																										
469	HDB-8	200		-129.95			2003/10/4																										
470	HDB-8	300.4		-230.35			2003/10/13																										
471	HDB-8	307.5		-237.45			2003/10/13																										
472	HDB-8	399.77		-329.72			2003/11/21																										
473	HDB-8	469.94		-399.89			2003/11/27																										
474	HDB-9	36.22	36.45	60.97	60.74																												
475	HDB-9	54.95	55.23	42.24	41.96																												
476	HDB-9	78	78.5	19.19	18.69																												
477	HDB-9	151.1	151.42	-53.91	-54.23																												
478	HDB-9	200	200.4	-102.81	-103.21																												
479	HDB-9	222	222.25	-124.81	-125.06																												
480	HDB-9	251.7	252	-154.51	-154.81																												
481	HDB-9	347.68	348	-250.49	-250.81																												
482	HDB-9	397.78	397.98	-300.59	-300.79																												
483	HDB-9	456.62	457	-359.43	-359.81																												
484	HDB-9	498.8	499	-401.61	-401.81																												
485	HDB-9	516.67	517	-419.48	-419.81																												
486	HDB-9	198.75	199	-101.56	-101.81																												
487	HDB-9	26.5	82.6	70.69	14.59		2004/10/21																										
488	HDB-9	26.5	82.6	70.69	14.59		2004/10/21																										
489	HDB-9	26.5	82.6	70.69	14.59		2004/10/21																										
490	HDB-9	26.5	82.6	70.69	14.59		2004/10/22																										
491	HDB-9	26.5	82.6	70.69	14.59		2004/10/22																										
492	HDB-9	26.5	82.6	70.69	14.59		2004/10/23																										
493	HDB-9	26.5	82.6	70.69	14.59		2004/10/24	1.6	10	<1	<1	4.4.E+04	6.9.E+02	8.0.E+00	1.5.E+01	<0.18	<0.18	<0.18	<0.18	<0.18	1.4.E+04	1.3.E+03	1.4.E+04	4.5.E+02				<0.18	3.3.E+00	<0.18			
494	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26																										
495	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26																										
496	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26																										
497	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/26																										
498	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/27																										
499	HDB-9	216.9	257.5	-119.71	-160.31		2004/11/27	5.6	127.0	<1	<1	1.7.E+05	2.6.E+03	1.4.E+02	1.3.E+02	<0.18	<0.18	<0.18	1.3.E+01	1.1.E+01	3.3.E+00	6.2.E+01	4.5.E+01	6.2.E+01				1.3.E+00	2.3.E+02	<0.18			
500	HDB-9						2004/8/9																										
501	HDB-9						2004/9/12																										
502	HDB-9						2004/10/9																										
503	HDB-9						2004/11/5																										
504	HDB-9						2004/12/9																										
505	HDB-9						2005/1/7																										
506	HDB-9						2005/2/3																										
507	HDB-9						2004/8/9																										
508	HDB-9						2004/9/12																										
509	HDB-9						2004/10/9																										
510	HDB-9						2004/11/5																										
511	HDB-9						2004/12/9																										
512	HDB-9						2005/1/7																										
513	HDB-9						2005/2/3																										
514	HDB-9						2004/9/16	0.03	0.1	<1	<1	2.30.E+04	4.2.E+03	<1	7.20.E+03	<0.18	<0.18	<0.18	<0.18	<0.18	2.3.E+00	2.2.E+04	2.3.E+00	2.2.E+04				<0.18	<0.18	<0.18			
515	HDB-9	100.24		-3.052			2004/10/27																										
516	HDB-9	125		-27.812			2004/10/28	67	140	<1	<1																						
517	HDB-9	201		-103.812			2004/11/13																										
518	HDB-9	257.5		-160.312			2004/11/17	4.9	18	<1	<1																						
519	HDB-9	299.22		-202.032			2004/12/14																										
520	HDB-9	401.53		-304.342			2005/12/20																										
521	HDB-9	500.04		-402.852			2004/12/29																										
522	HDB-9	520		-422.812			2004/12/30	37	240	<1	<1																						
523	HDB-9	216.9	257.5	-119.712	-160.312		2005/10/3																										
524	HDB-10	32.76	33	18.07	17.83																												
525	HDB-10	43.7	44	7.13	6.83																												
526	HDB-10	59.1	59.3	-8.27	-8.47																												
527	HDB-10	148.65	149	-97.82	-98.17																												
528	HDB-10	195.85	196.25	-145.021	-145.421		2004/10/29																										
529	HDB-10	249.68	250	-198.85	-199.17																												
530	HDB-10	301	301.34	-250.17	-250.51																												
531	HDB-10	355	355.2	-304.17	-304.37																												
532	HDB-10	401	401.35	-350.171	-350.521																												
533	HDB-10	447	447.35	-396.17	-396.52																												
534	HDB-10	466.46	466.71	-415.63	-415.88																												
535	HDB-10	485.6	486	-434.771	-435.171																												
536	HDB-10	505.5	506	-454.67	-455.17																												

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (25/64)

Index	Sample point	sampling zone (GL) Min. [m]	sampling zone (GL) Max. [m]	sampling zone (EL) Min. [m]	sampling zone (EL) Max. [m]	sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII) X	location (WGS 84, XII) Y	location (WGS 84, XII) Z (middle depth)	location (WGS84, UTM, Zone54) East	location (WGS84, UTM, Zone54) North	location (WGS84, UTM, Zone54) Z (middle depth)	Physico-chemical parameter EC at site [mS/m]	EC at lab [mS/m]	pH at site	pH at lab	ORP Observ. [mV]	ORP SHE [mV]	Temper-ature at site [℃]	Contamination indicator Tracer (uranine) [mg/l]	Tracer (Na-naphtionate) [mg/l]	Tracer (amino G acid) [mg/l]	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	Comments
537	HDB-10	548	548.5	-497.17	-497.67				core	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-497.42	570382.397230	4989878.518521	-497.42		2300		8.3								
538	HDB-10	195.65	195.85	-144.82	-145.02				core under Atmosphere Control	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-144.92	570382.397230	4989878.518521	-144.92				8.246								
539	HDB-10	397.4	397.7	-346.57	-346.87				core under Atmosphere Control	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-346.72	570382.397230	4989878.518521	-346.72				8.05								
540	HDB-10	484.8	485	-433.97	-434.17				core under Atmosphere Control	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-434.07	570382.397230	4989878.518521	-434.07				8.27								
541	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13		pump	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	0.22	570382.397230	4989878.518521	0.22	273		7.38		15.2		12.3		9		A	
542	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13		pump	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	0.22	570382.397230	4989878.518521	0.22	618		7.27		-60.4		11.5		6.54		A	
543	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13		pump	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	0.22	570382.397230	4989878.518521	0.22	766		7.21		-89.8		11.4		5.78		A	
544	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13		pump	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	0.22	570382.397230	4989878.518521	0.22	967		7.15		-109		11.2		4.12		A	
545	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13		pump	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	0.22	570382.397230	4989878.518521	0.22	1096		7.16		-181		11		2.7		A	
546	HDB-10	41.33	59.88	9.50	-9.05		2004/10/14		pump(last)	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	0.22	570382.397230	4989878.518521	0.22	1067		7.16		-217		10.3		2.58		A	
547	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19		pump	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-407.04	570382.397230	4989878.518521	-407.04	35.3		7.45		68.6		18.3		10.14		A	
548	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19		pump	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-407.04	570382.397230	4989878.518521	-407.04	120.2		6.67		-68.5		11.2		8.34		A	
549	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19		pump	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-407.04	570382.397230	4989878.518521	-407.04	534		6.65		-86.3		11.1		5.41		A	
550	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19		pump	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-407.04	570382.397230	4989878.518521	-407.04	1517		6.72		-131		11.1		3.02		A	
551	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19		pump	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-407.04	570382.397230	4989878.518521	-407.04									2.25		A	
552	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/20		pump	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-407.04	570382.397230	4989878.518521	-407.04	2450		6.76		-152		11.7		0.94		A	
553	HDB-10	445.84	469.89	-395.011	-419.061		2004/12/20		pump(last)	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-407.04	570382.397230	4989878.518521	-407.04	2510		6.77		-234		30.5		0.75		A	Microbiology: reffered from Shimizu et al., 2006 [6]
554	HDB-10	445.84	469.89	-395.011	-419.061		2004/12/22		pump	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-407.04	570382.397230	4989878.518521	-407.04												
555	HDB-10						2004/8/9		river (up the stream)									9		6.77				19		<0.05		A	
556	HDB-10						2004/9/12		river (up the stream)									8.7		6.72				13.8		<0.05		A	
557	HDB-10						2004/10/9		river (up the stream)									12.8		6.23				12.4		<0.05		A	
558	HDB-10						2004/11/5		river (up the stream)									11		6.63				7.8		0.05		A	
559	HDB-10						2004/12/9		river (up the stream)									10.5		6.17				0.1		<0.05		A	
560	HDB-10						2005/1/7		river (up the stream)									12.3		6.7				0		<0.05		A	
561	HDB-10						2005/2/3		river (up the stream)									13.3		6.35				0		<0.05		A	
562	HDB-10						2004/8/9		river (down the stream)									9.1		6.79				18.6		<0.05		A	
563	HDB-10						2004/9/12		river (down the stream)									8.6		6.7				14		<0.05		A	
564	HDB-10						2004/10/9		river (down the stream)									12.8		6.2				12.3		<0.05		A	
565	HDB-10						2004/11/5		river (down the stream)									10.9		6.58				7.8		0.05		A	
566	HDB-10						2004/12/9		river (down the stream)									10.5		6.1				0.1		<0.05		A	
567	HDB-10						2005/1/7		river (down the stream)									12.5		6.72				0		<0.05		A	
568	HDB-10						2005/2/3		river (down the stream)									14.2		6.47				0		<0.05		A	
569	HDB-10						2004/9/16		well									14.35		6.6				10.6		<0.05		A	
570	HDB-10	100.03		-49.201			2004/10/3		return	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	-49.201	570382.397230	4989878.518521	-49.201	213		8.8				17.9		9.31		A	
571	HDB-10	136		-85.171			2004/10/5		return	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	-85.171	570382.397230	4989878.518521	-85.171	231		8.52				16.3		9.45		A	
572	HDB-10	200.13		-149.301			2004/10/29		return	Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	-149.301	570382.397230	4989878.518521	-149.301	259		8.39				16.1		9.11		A	
573	HDB-10	298		-247.171			2004/11/4		return	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-247.171	570382.397230	4989878.518521	-247.171	298		8.05				22.3		9.64		A	
574	HDB-10	400.02		-349.191			2004/11/30		return	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-349.191	570382.397230	4989878.518521	-349.191	340		8.22				16.6		9.43		A	
575	HDB-10	500		-449.171			2004/12/8		return	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-449.171	570382.397230	4989878.518521	-449.171	588		7.87				18.1		9.24		A	
576	HDB-10	550		-499.171			2005/1/6		return	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-499.171	570382.397230	4989878.518521	-499.171	294		8.66				19.7		9.24		A	
577	HDB-10	45.00		5.829			2005/6/22	2005/7/23-8/19		Koetoi Fm.	diatomaceous mudstone	117714.011009	-28044.201998	5.829	570382.397230	4989878.518521	5.829		130		7.7								
578	HDB-10	495.89	550.00	-445.061	-499.171		2005/6/27	2005/7/23-8/19		Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-472.116	570382.397230	4989878.518521	-472.116		2400		7.5								
579	HDB-10	495.89	550.00	-445.061	-499.171		2005/11/9	2005/12/27-2006/1/17		Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-472.116	570382.397230	4989878.518521	-472.116		2500		7.4								
580	HDB-10	495.89	550.00	-445.061	-499.171		2006/9/15		pump	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-472.116	570382.397230	4989878.518521	-472.116	2457	2400	6.2	7.4	-246		33.21		0.46		A	
581	HDB-10	495.89	550	-445.061	-499.171		2007/10/29		pump	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-472.116	570382.397230	4989878.518521	-472.116	2260		6.7		-239	-33	30.8		0.05		B	referred from JAEA, 2009 [5]
582	HDB-10	495.89	550	-445.061	-499.171		2008/10/3	2009/1/13-1/26	pump	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-472.116	570382.397230	4989878.518521	-472.116		2400		7.1					0.05		B	
583	HDB-10	495.89	550	-445.061	-499.171		2008/10/3		pump	Wakkanai Fm.	siliceous mudstone	117714.011009	-28044.201998	-472.116	570382.397230	4989878.518521	-472.116	2424		6.2	6.25	-235	-29	31.5		0.05		B	referred from JAEA, 2009 [5]
584	HDB-11	30.60	31.00	36.25	35.85				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	36.05	568463.268766	4987289.753180	36.05		640	8.4									pore water extraction: squeeze (<70MPa)
585	HDB-11	49.64	49.87	17.21	16.98				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	17.09	568463.268766	4987289.753180	17.09		820	8.2									
586	HDB-11	96.75	97.00	-29.90	-30.15				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369																pore water extraction: squeeze (100MPa), referred from CRIEPI, 2008a [9]
587	HDB-11	99.00	99.40	-32.15	-32.55				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-32.35	568463.268766	4987289.753180	-32.35												
588	HDB-11	99.40	99.72	-32.55	-32.87				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-32.71	568463.268766	4987289.753180	-32.71		1300	8.8									
589	HDB-11	114.09	114.30	-47.24	-47.45				core under Atmosphere Control	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-47.35	568463.268766	4987289.753180	-47.35			8.11									
590	HDB-11	120.00	120.38	-53.15	-53.53				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-53.34	568463.268766	4987289.753180	-53.34												pore water extraction: squeeze (100MPa), referred from CRIEPI, 2008a [9]
591	HDB-11	134.20	134.45	-67.35	-67.60				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-67.48	568463.268766	4987289.753180	-67.48		2220	8.2									
592	HDB-11	138.20	138.57	-71.35	-71.72				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-71.54	568463.268766	4987289.753180	-71.54												pore water extraction: squeeze (100MPa), referred from CRIEPI, 2008a [9]
593	HDB-11	169.53	169.83	-102.68	-102.98				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-102.83	568463.268766	4987289.753180	-102.83												pore water extraction: squeeze (100MPa), referred from CRIEPI, 2008a [9]
594	HDB-11	171.65	171.85	-104.80	-105.00				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-104.90	568463.268766	4987289.753180	-104.90		2500	7.9									
595	HDB-11	199.00	199.55	-132.15	-132.70				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-132.43	568463.268766	4987289.753180	-132.43												
596	HDB-11	231.00	231.35	-164.15	-164.50				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-164.33	568463.268766	4987289.753180	-164.33												pore water extraction: squeeze (100MPa), referred from CRIEPI, 2008a [9]
597	HDB-11	251.10	251.45	-184.25	-184.60				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-184.43	568463.268766	4987289.753180	-184.43		3320	8.2									
598	HDB-11	271.75	272.00	-204.90	-205.15				core under Atmosphere Control	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-205.03	568463.268766	4987289.753180	-205.03			7.93									
599	HDB-11	298.60	299.00	-231.75	-232.15				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-231.95	568463.268766	4987289.753180	-231.95												
600	HDB-11	300.36	300.56	-233.51	-233.71				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-233.61	568463.268766	4987289.753180	-233.61		2800	8.1									
601	HDB-11	332.50	332.70	-265.65	-265.85				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-265.75	568463.268766	4987289.753180	-265.75		2600	7.9									
602	HDB-11	335.47	335.72	-268.62	-268.87				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-268.75	568463.268766	4987289.753180	-268.75												pore water extraction: squeeze (100MPa), referred from CRIEPI, 2008a [9]
603	HDB-11	383.85	384.00	-317.00	-317.15				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-317.08	568463.268766	4987289.753180	-317.08												pore water extraction: squeeze (100MPa), referred from CRIEPI, 2008a [9]
604	HDB-11	388.62	388.82	-321.77	-321.97				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-321.87	568463.268766	4987289.753180	-321.87		2400	7.9									
605	HDB-11	392.30	392.70	-325.45	-325.85				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-325.65	568463.268766	4987289.753180	-325.65												
606	HDB-11	396.00	396.22	-329.15	-329.37				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-329.26	568463.268766	4987289.753180	-329.26												pore water extraction: squeeze (100MPa), referred from CRIEPI, 2008a [9]
607	HDB-11	421.13	421.35	-354.28	-354.50				core under Atmosphere Control	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-354.39	568463.268766	4987289.753180	-354.39			8.16									
608	HDB-11	439.64	440.00	-372.79	-373.15				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-372.97	568463.268766	4987289.753180	-372.97												pore water extraction: squeeze (100MPa), referred from CRIEPI, 2008a [9]
609	HDB-11	448.70	449.00	-381.85	-382.15				core	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-382.00	568463.268766	4987289.753180	-382.00		2660	8.5									
610	HDB-11	473.00	473.23	-406.15	-406.38				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	115154.541430	-30003.562369	-406.27	568463.268766	4987289.753180	-406.27												pore water extraction: squeeze (100MPa), referred from CRIEPI, 2008a [9]
611	HDB-11	496.55	496.75	-429.70	-429.90				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	115154.541430	-30003.562369	-429.80	568463.268766	4987289.753180	-429.80												
612	HDB-11	498.00	498.39	-431.15	-431.54				core	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	115154.541430	-30003.562369	-431.35	568463.268766	4987289.753180	-431.35		2800	8.4									
613	HDB-11	547.51	548.00	-480.66	-481.15				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-480.91	568463.268766	4987289.753180	-480.91		2900	8.4									
614	HDB-11	572.8	573	-505.95	-506.15				core under Atmosphere Control	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-506.05	568463.268766	4987289.753180	-506.05			8.16									
615	HDB-11	595.4	595.8	-528.55	-528.95				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-528.75	568463.268766	4987289.753180	-528.75												
616	HDB-11	599.05	599.5	-532.20	-532.65				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-532.43	568463.268766	4987289.753180	-532.43		2800	7.9									

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (26/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Geochemistry																																							
		Min.	Max.	Min.	Max.			Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
537	HDB-10	548	548.5	-497.17	-497.67			4600	50	93	120			22											6700						1500		320	3.2					42	64		219.0	225.3	-1.4
538	HDB-10	195.65	195.85	-144.82	-145.02			3484.2	193	66.16	37.84			18.72							<0.2				4223.8						104.36		3606	0					<24	723		165.5	180.3	-4.3
539	HDB-10	397.4	397.7	-346.57	-346.87			4301	118	213	113			20.7							<0.2				7064						11.9		1535	103					41	307		212.9	228.1	-3.4
540	HDB-10	484.8	485	-433.97	-434.17			3529	82	105	59.3			16							<0.2				5608						27.9		1275	112					25.9	251		168.0	183.5	-4.4
541	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13	530	28	18	8.4				18	8.6			0.54		0.02	0.06	0.07	0.1	490	5	2				6.7	<0.1	770	0		12.21		<0.1	11	150		25.4	26.6	-2.5
542	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13	1300	66	37	22				19	21			1.4		0.01	0.05	0.03	0.1	1200	12	6				3.8	<0.1	1800	0		29.8		<0.1	23	340		61.9	63.5	-1.3
543	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13	1600	82	47	30				21	28			2.3		0.01	0.07	0.05	0.1	1200	16	7				2.4	<0.1	2200	0		39.05		<0.1	27	430		76.5	70.1	4.3
544	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13	2100	100	57	42				23	37			4		0.02	0.06	0.03	0.1	2000	21	9				1	<0.1	2900	0		49.86		<0.1	23	580		100.2	104.2	-2.0
545	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13	2500	120	68	54				26	45			5.7		0.02	0.07	0.02	<0.1	2400	25	9				<0.2	<0.1	3500	0		58.7		<0.1	46	640		119.6	125.3	-2.3
546	HDB-10	41.33	59.88	9.50	-9.05		2004/10/14	2300	110	67	55		0.02	15	26	46	1.2	0.001	5.7	<0.002	0.67	0.12	0.06	0.3	2400	26	10	1	<0.1	140	1	<0.1	3600	0		58.7		<0.1	36	640		120.6	127.0	-2.6
547	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19	58	2.2	9.2	4.1				16	0.84			0.09		0.04	0.06	0.03	0.2	68	<1	<1				5.5	<0.1	74	0		1.46		<0.1	4	16		3.4	3.3	1.7
548	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19	260	14	19	4.5				14	4.3			<0.05		0.02	2.3	0.01	0.2	320	3.2	1				33	<0.1	240	0		3.57		<0.1	5	50		13.0	13.7	-2.6
549	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19	1200	48	68	29				16	21			0.06		0.03	4.7	<0.01	0.2	1700	20	8				37	<0.1	740	0		11.7		<0.1	7	130		59.2	61.0	-1.6
550	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19	3100	110	150	83				21	54			<0.05		0.04	3	<0.01	0.1	4900	50	20				25	<0.1	1400	0		25.5		<0.1	13	240		151.9	162.1	-3.3
551	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19	3800	130	180	110				23	67			<0.05		0.04	1.4	<0.01	0.1	6200	62	25				16	<0.1	1700	0		31.2		<0.1	16	260		186.6	203.6	-4.4
552	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/20															0.56									3.6	<0.1		0		37.9		<0.1						
553	HDB-10	445.84	469.89	-395.011	-419.061		2004/12/20	5000	160	97	140		<0.01	20	25	87	3.4	<0.001	0.05	<0.002	2.17	2.1	<0.01	<0.1	8100	83	33	0.5	<0.1	220	0.4	<0.1	1100	0		38.8		<0.1	20	320		253.0	247.3	1.1
554	HDB-10	445.84	469.89	-395.011	-419.061		2004/12/22																																						
555	HDB-10						2004/8/9	11	1.9	2.1	1.3		0.01	0.01	18	0.01	0.02	<0.01	<0.05	<0.01	0.47	<0.05	0.13	<0.1	14	<1	<1	0.8	<0.1	<0.1	8	<0.1	12	0		0.2		<0.1	4	2		0.8	0.8	0.0
556	HDB-10						2004/9/12	10	1.9	2	1.3		<0.01	<0.01	19	0.06	0.02	<0.01	<0.05	0.01	0.38	<0.05	0.18	<0.1	12	<1	<1	1	<0.1	<0.1	6.6	<0.1	11	0		0.18		<0.1	4	2		0.7	0.7	0.0
557	HDB-10						2004/10/9	13	2.2	2.5	1.8		<0.01	0.01	17	0.19	0.02	<0.001	<0.05	<0.01	0.37	0.07	0.15	<0.1	13	<1	<1	<0.1	<0.1	<0.1	8	<0.1	20	0		0.32		<0.1	3	4		0.9	0.9	0.1
558	HDB-10						2004/11/5	13	2.2	2.9	1.9		<0.01	0.01	15	0.14	0.02	<0.001	<0.05	<0.01	0.33	0.13	0.04	<0.1	15	<1	<1	<0.1	<0.1	<0.1	8	<0.1	18	0		0.3		<0.1	3	4		0.9	0.9	0.0
559	HDB-10						2004/12/9	12	1.6	3.2	2		0.01	<0.01	15	0.08	0.02	<0.001	<0.05	<0.01	0.25	0.09	0.08	<0.1	15	<1	<1	1.2	<0.1	<0.1	8	<0.1	13	0		0.22		<0.1	2	3		0.9	0.8	0.1
560	HDB-10						2005/1/7	14	1.9	3.2	2.1		<0.01	0.02	16	0.14	0.03	<0.001	<0.05	<0.01	0.18	0.09	0.27	<0.1	12	<1	<1	1.1	<0.1	0.1	9.2	<0.1	18	0		0.3		<0.1	2	4	<0.2	1.0	0.9	0.2
561	HDB-10						2005/2/3	15	1.9	3.8	2.4		0.01	0.03	15	0.15	0.02	<0.001	<0.05	<0.01	0.32	0.08	0.05	<0.1	17	<1	<1	1.3	<0.1	<0.1	9.6	<0.1	20	0		0.32		<0.1	2	4		1.1	1.0	0.1
562	HDB-10						2004/8/9	11	1.9	2	1.3		0.01	0.01	18	0.15	0.02	<0.01	<0.05	<0.01	0.47	<0.05	0.15	<0.1	14	<1	<1	0.8	<0.1	<0.1	8	<0.1	12	0		0.2		<0.1	4	2		0.8	0.8	0.0
563	HDB-10						2004/9/12	10	1.9	2	1.3		0.02	<0.01	16	0.1	0.02	<0.01	<0.05	<0.01	0.39	<0.05	0.16	<0.1	12	<1	<1	0.9	<0.1	<0.1	6.6	<0.1	11	0		0.18		<0.1	4	2		0.7	0.7	0.0
564	HDB-10						2004/10/9	13	2.2	2.5	1.8		0.01	0.01	17	0.18	0.02	<0.001	<0.05	<0.01	0.47	0.06	0.18	<0.1	12	<1	<1	<0.1	<0.1	<0.1	8	<0.1	19	0		0.31		<0.1	3	4		0.9	0.8	0.1
565	HDB-10						2004/11/5	13	2.1	2.7	1.9		<0.01	0.01	15	0.14	0.02	<0.001	<0.05	<0.01	0.34	0.12	0.04	<0.1	15	<1	<1	<0.1	<0.1	0.1	8	<0.1	18	0		0.3		<0.1	3	4		0.9	0.9	0.0
566	HDB-10						2004/12/9	12	1.6	3.2	2		0.01	<0.01	15	0.08	0.02	<0.001	<0.05	<0.01	0.25	0.09	0.11	<0.1	15	<1	<1	1.3	<0.1	<0.1	8.1	<0.1	13	0		0.22		<0.1	2	3		0.9	0.9	0.1
567	HDB-10						2005/1/7	14	1.8	3.3	2.1		<0.01	0.02	16	0.14	0.02	<0.001	<0.05	<0.01	0.17	0.1	0.02	<0.1	17	<1	<1	1.1	<0.1	0.1	9.2	<0.1	18	0		0.3		<0.1	2	4		1.0	1.0	0.0
568	HDB-10						2005/2/3	15	1.9	3.9	2.4		0.01	0.03	15	0.15	0.02	<0.001	<0.05	<0.01	0.4	0.09	0.06	<0.1	17	<1	<1	1.2	<0.1	0.1	9.6	<0.1	20	0		0.32		<0.1	2	4		1.1	1.0	0.1
569	HDB-10						2004/9/16	16	1.5	5.5	3.4				18	<0.01			0.23		<0.01	<0.01	<0.01	0.1	17	<1	<1				4.4	<0.1	43	0		0.7		<0.1	4	7		1.3	1.3	0.0
570	HDB-10	100.03		-49.201			2004/10/3	430	18	3.7	1.1				17	4.7			0.52		0.56	0.21	0.63	0.5	190	2	<1				315	<0.1	531	48		10.3		0.8	27	109		19.5	22.4	-6.8
571	HDB-10	136		-85.171			2004/10/5	540	27	5.8	1.8				13	5.3			0.21		0.24	0.18	0.14	0.5	280	3	1				363	<0.1	572	31		10.41		0.52	26	122		24.6	26.0	-2.7
572	HDB-10	200.13		-149.301			2004/10/29	510	18	8.2	1.5				13	4.2			<0.05		0.35	0.35	0.18	0.7	250	2	<1				547	<0.1	431	14		7.55		0.24	22	78		23.2	26.1	-5.8
573	HDB-10	298		-247.171			2004/11/4	650	38	27	4.8				15	7.3			<0.05		0.09	0.09	0.12	0.4	330	3	1				953	<0.1	253	6		4.15		<0.1	13	55		31.0	33.5	-3.9
574	HDB-10	400.02		-349.191			2004/11/30	610	21	19	2.2				19	5.6			0.07		0.3	0.3	0.13	0.9	270	2.8	1				895	<0.1	318	0		5.21		<0.1	19	56		28.2	31.5	-5.5
575	HDB-10	500		-449.171			2004/12/8	770	37	49	6.9				14	7.7			<0.05		0.16	0.16	0.51	0.6	440	4.3	2				1082	<0.1	193	0		3.17		<0.1	13	41		37.5	38.1	-0.9
576	HDB-10	550		-499.171			2005/1/6	470	6.5	7.1	1.3				7.7	4.5			<0.05		0.23	0.23	0.12	1.1	370	3.6	1				408	<0.1	291	37		6.01		0.62	17	55		21.1	25.1	-8.7
577	HDB-10	45.00		5.829			2005/6/23	250	15	12	5.5		0.03	0.53	1.4		0.14	N.D.	<0.05	<0.01	<0.01		0.01	0.21	250	2.3	1.3	1.9		<0.1	0.5	1	280	0.8		230				6.2	58		12.4	11.7	2.7
578	HDB-10	495.89	550.00	-445.061	-499.171		2005/6/27	5700	130	190	120		0.17	17	49		3.3	N.D.	0.1	<0.01	0.02		0.02	0.18	8100	80	34	0.02		220	0.3		2200	3.3	1900					18	470		285.2	265.4	3.6
579	HDB-10	495.89	550.00	-445.061	-499.171		2005/11/9	5300	150	210	130		0.19	17	48		3.5	N.D.	0.1	<0.01	0.02		0.02	<0.1	8000	80	29	<0.1		230	1		2100	2.8	1900					17	460		270.7	260.9	1.8
580	HDB-10	495.89	550.00	-445.061	-499.171		2006/9/15	5400	130	170	110		0.03	19	57		2.7	N.D.	0.2	<0.01	0.03		0.02	0.05	7600	78	30	0.03		180	0.7		2300	3.1	2000					22	510		268.4	252.9	3.0
581	HDB-10	495.89	550	-445.061	-499.171		2007/10/29	5300	100	188	113		0.08		27	144			<2.5		2.77	2.69		<0.5	7100	71		<1.0		96.2	<1.0	0.028	2230	0.98					47.3	575		257.1	237.5	3.9
582	HDB-10	495.89	550	-445.061	-499.171		2008/10/3	5100	120	59	73		0.04	16	58		3.2	<0.01	0.3	<0.01	0.03		0.01	0.08	7300	75	34	0.02		200	0.4	<0.1	2300	1.6	2000					22	530		247.2	244.3	0.6
583	HDB-10	495.89	550	-445.061	-499.171		2008/10/3	4930	129	105	110		0.065		25	136			<5.0		2.74	2.74		<1.0	7300	76		<2.0	<20.0	220	<2.0	0.025	2290	1					22	590		244.2	244.7	-0.1
584	HDB-11	30.60	31.00	36.25	35.85			1400	92	68	29			3.9											1400						84		1500	18					39	300		69.6	66.4	2.3
585	HDB-11	49.64	49.87	17.21	16.98			1600	42	60	28			4.4											1700						220		1400	10					52	290		76.6	75.8	0.5
586	HDB-11	96.75	97.00	-29.90	-30.15			2160	152	71	38														2600	19	0.63				1200													
587	HDB-11	99.00	99.40	-32.15	-32.55																																								
588	HDB-11	99.40	99.72	-32.55	-32.87			3000	150	58	63			11											3200						180		2100	67					71	420		143.9	130.7	4.8
589	HDB-11	114.09	114.30	-47.24	-47.45			3497	180	80.6	60.1			17.9							<0.2				4793						86.8		3160	0					169	581		168.2	188.6	-5.7
590	HDB-11	120.00	120.38	-53.15	-53.53			3090	191	76	52														4300	38	0.47				120													
591	HDB-11	134.20	134.45	-67.35	-67.60			4200	180	84	71			16											5600						220		1900	14					57	390		199.6	194.0	1.4
592	HDB-11	138.20	138.57	-71.35	-71.72			3780	239	87	68														5600	42	0.11				350													
593	HDB-11	169.53	169.83	-102.68	-102.98			5090	439	543	925														6250	50	0.61				9900													
594	HDB-11	171.65	171.85	-104.80	-105.00			5400	230	150	120			20											7600						730		1600	6					170	320		260.9	255.7	1.0
595	HDB-11	199.00	199.55	-132.15	-132.70																																								
596	HDB-11	231.00	231.35	-164.15	-164.50			5070	335	297	183														8990	70	0.73				2970													
597	HDB-11	251.10	251.45	-184.25	-184.60			6500	270	150	140			23											9800						750		940	6.6					42	190		311.8	307.3	0.7
598	HDB-11	271.75	272.00	-204.90	-205.15			6338	279	259	154			34							0.245				10131						6.64		2928	0					190	492		313.2	333.5	-3.1
599	HDB-11	298.60	299.00	-231.75	-232.15																																								
600	HDB-11	300.36	300.56	-233.51	-233.71			5800	200	190	130			18											8700						260		1400	6					49	290		280.1	273.6	1.2
601	HDB-11	332.50	332.70	-265.65	-265.85			5500	170	160	120			16											7700						340		1700	7					33	340		263.6	252.1	2.2
602	HDB-11	335.47	335.72	-268.62	-268.87			5160	349	688	575														7550	59	0.44				7350													
603	HDB-11	383.85	384.00	-317.00	-317.15			5430	350	568	1265														6150	44	0.05				11400													
604	HDB-11	388.62	388.82	-321.77	-321.97			4800	120	79	110			13											6500						210		1700	7					16	340		226.6	215.6	2.5
605	HDB-11	392.30	392.70	-325.45	-325.85																																								
606	HDB-11	396.00	396.22	-329.15	-329.37			6440	438	496	3232														5380	40	0.72				20400													
607	HDB-11	421.13	421.35	-354.28	-354.50			5067	162	143	96.5			12							0.137				7126						14.5		2088	188					56.4	382		241.3	242.0	-0.1
608	HDB-11	439.64	440.00	-372.79	-373.15			4540	277	606	1627														5900	42	0.71				12400													
609	HDB-11	448.70	449.00	-381.85	-382.15			5000	140	170	130			14											6930						1750		870	13					34	170		242.2	246.3	-0.9
610	HDB-11	473.00	473.23	-406.15	-406.38			4540	126	181	143														7200	49	0.89				1200													
611	HDB-11	496.55	496.75	-429.70	-429.90																																								
612	HDB-11	498.00	498.39	-431.15	-431.54			5600	66	63	150			15											8500						590		550	7					24	110		262.8	261.0	0.4
613	HDB-11	547.51	548.00	-480.66	-481.15			6400	71	42	150			11											9700						190		1000	13					40	210		296.1	294.0	0.3
614	HDB-11	572.8	573	-505.95	-506.15			6696	124	232	158			12.5							0.2				10957						7.76		1163	150					<24	246		320.7	333.2	-1.9
615	HDB-11	595.4	595.8	-528.55	-528.95																																								
616	HDB-11	599.05	599.5	-532.20	-532.65			6800	100	280	240			14											9200						3300		360	1.4					52	72		333.9	333.7	0.0

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (27/64)

Index	Sample point	sampling zone (GL) Min.	sampling zone (GL) Max.	sampling zone (EL) Min.	sampling zone (EL) Max.	sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases: Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	Isotopes: ^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{36}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_w]	[cc_{STP}/g_w]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
537	HDB-10	548	548.5	-497.17	-497.67																												-32.5	1.1											
538	HDB-10	195.65	195.85	-144.82	-145.02			×																									-44.5	-3.04											
539	HDB-10	397.4	397.7	-346.57	-346.87			×																																					
540	HDB-10	484.8	485	-433.97	-434.17			×																																					
541	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13	○																																					
542	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13	○																																					
543	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13	○																																					
544	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13	○																																					
545	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13	○																																					
546	HDB-10	41.33	59.88	9.50	-9.05		2004/10/14	○	617/7252		4.9		1.02	0.119		11.4		82.6		0.005		<0.001	N.D.	N.D.						<0.5		<0.4	-61.4	-6.4	-70	-1.8				0.7±0.7			-4.8	0.708504±0.000010
547	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19	○																																					
548	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19	○																																					
549	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19	○																																					
550	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19	○																																					
551	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19	○																																					
552	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/20	○																																					
553	HDB-10	445.84	469.89	-395.011	-419.061		2004/12/20	○	8505/8293		2.05		0.53	0.054		19.6		76.5		0.008		<0.001	N.D.	N.D.						<0.5		<0.4	-42.3	-1.9	-57.3	0.0				2.1±2.4*			-9	0.708089±0.000018
554	HDB-10	445.84	469.89	-395.011	-419.061		2004/12/22																																						
555	HDB-10						2004/8/9	○																								4.2±0.2	-69.3	-10.7						66±5			-0.2	0.705538±0.000013
556	HDB-10						2004/9/12	○																																					
557	HDB-10						2004/10/9	○																																					
558	HDB-10						2004/11/5	○																																					
559	HDB-10						2004/12/9	○																																					
560	HDB-10						2005/1/7	○																																					
561	HDB-10						2005/2/3	○																								6.4±0.2	-70	-10.8						44.9±4.3			-10.8	0.706873±0.000011
562	HDB-10						2004/8/9	○																																					
563	HDB-10						2004/9/12	○																																					
564	HDB-10						2004/10/9	○																																					
565	HDB-10						2004/11/5	○																																					
566	HDB-10						2004/12/9	○																																					
567	HDB-10						2005/1/7	○																																					
568	HDB-10						2005/2/3	○																																					
569	HDB-10						2004/9/16	○																								1.1±0.2	-68.4	-10.6						37±6			14.6	0.710718±0.000018
570	HDB-10	100.03		-49.201			2004/10/3	○																																					
571	HDB-10	136		-85.171			2004/10/5	○																								2.0±0.2	-64.5	-9.4						13±3			-2.8	0.707347±0.000016
572	HDB-10	200.13		-149.301			2004/10/29	○																																					
573	HDB-10	298		-247.171			2004/11/4	○																								1.7±0.2	-59.5	-9						15±3			-9.5	0.706103±0.000013
574	HDB-10	400.02		-349.191			2004/11/30	○																																					
575	HDB-10	500		-449.171			2004/12/8	○																								1.7±0.2	-60.3	-8.6						4.1±2.4			-10.4	0.707643±0.000012
576	HDB-10	550		-499.171			2005/1/6	○																																					
577	HDB-10	45.00		5.829			2005/6/22	x																																					
578	HDB-10	495.89	550.00	-445.061	-499.171		2005/6/27	x																																					
579	HDB-10	495.89	550.00	-445.061	-499.171		2005/11/9	x																																					
580	HDB-10	495.89	550.00	-445.061	-499.171		2006/9/15	○																																					
581	HDB-10	495.89	550	-445.061	-499.171		2007/10/29	○																																					
582	HDB-10	495.89	550	-445.061	-499.171		2008/10/3	x																								<0.2	-34.8	0.5											
583	HDB-10	495.89	550	-445.061	-499.171		2008/10/3	○		<3.0		<18.0			101.3	21.6	59.5	77.39	4.1		0.02										1000				-57	10.8								
584	HDB-11	30.60	31.00	36.25	35.85																												-63.9	-7.2											
585	HDB-11	49.64	49.87	17.21	16.98																												-63.5	-6.9											
586	HDB-11	96.75	97.00	-29.90	-30.15																												-56	-5.3											
587	HDB-11	99.00	99.40	-32.15	-32.55						54.6		12.7	0.73		0.77		14.0		0.001		<0.001	<0.001	N.D.						<0.5					-62.4	-18.0								
588	HDB-11	99.40	99.72	-32.55	-32.87																												-53	-4.7											
589	HDB-11	114.09	114.30	-47.24	-47.45			x																									-46.4	-3.45											
590	HDB-11	120.00	120.38	-53.15	-53.53																												-47	-3.2											
591	HDB-11	134.20	134.45	-67.35	-67.60																												-40.4	-1.9											
592	HDB-11	138.20	138.57	-71.35	-71.72																												-41	-1.6											
593	HDB-11	169.53	169.83	-102.68	-102.98																												-35	-0.2											
594	HDB-11	171.65	171.85	-104.80	-105.00																												-35.7	0.2											
595	HDB-11	199.00	199.55	-132.15	-132.70						43.9		11.1	1.1		0.9		27.9		0.003		<0.001	<0.001	N.D.						<0.5					-56.6	-6.9								
596	HDB-11	231.00	231.35	-164.15	-164.50																												-27	1.6											
597	HDB-11	251.10	251.45	-184.25	-184.60																												-22.4	2.3											
598	HDB-11	271.75	272.00	-204.90	-205.15			x																									-18.7	2.95											
599	HDB-11	298.60	299.00	-231.75	-232.15						45.4		10.5	0.679		1.39		40.8		0.005		0.001	N.D.	N.D.						<0.5					-56.2	-13.6								
600	HDB-11	300.36	300.56	-233.51	-233.71																												-30.1	1.1											
601	HDB-11	332.50	332.70	-265.65	-265.85																												-31.9	0.8											
602	HDB-11	335.47	335.72	-268.62	-268.87																												-28	1.3											
603	HDB-11	383.85	384.00	-317.00	-317.15																												-32	0.4											
604	HDB-11	388.62	388.82	-321.77	-321.97																												-35.6	-0.2											
605	HDB-11	392.30	392.70	-325.45	-325.85						40.4		9.41	0.434		1.12		33		0.004		<0.001	N.D.	N.D.						<0.5					-56.4	-7.4								
606	HDB-11	396.00	396.22	-329.15	-329.37																												-33	0.1											
607	HDB-11	421.13	421.35	-354.28	-354.50			x																																					
608	HDB-11	439.64	440.00	-372.79	-373.15																												-33	0.1											
609	HDB-11	448.70	449.00	-381.85	-382.15																												-29.6	0.2											
610	HDB-11	473.00	473.23	-406.15	-406.38																												-29	0.9											
611	HDB-11	496.55	496.75	-429.70	-429.90						42.9		9.04	0.72		1.5		45.1		0.005		<0.001	N.D.	N.D.						<0.5					-61.0	-14.9								
612	HDB-11	498.00	498.39	-431.15	-431.54																												-29	1.7											
613	HDB-11	547.51	548.00	-480.66	-481.15																												-26.3	2.0											
614	HDB-11	572.8	573	-505.95	-506.15			x																																					
615	HDB-11	595.4	595.8	-528.55	-528.95						34.1		1.57	0.705		1.71		61.7		0.013		<0.001	N.D.	N.D.						<0.5					-55.7	-13.8								
616	HDB-11	599.05	599.5	-532.20	-532.65																												-20.1	2.6											

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (28/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Organics				Microbiology																					
		Min.	Max.	Min.	Max.			Humic acid	Fuluvic acid	Acetate	Formate	Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
537	HDB-10	548	548.5	-497.17	-497.67																												
538	HDB-10	195.65	195.85	-144.82	-145.02																												
539	HDB-10	397.4	397.7	-346.57	-346.87																												
540	HDB-10	484.8	485	-433.97	-434.17																												
541	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13																										
542	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13																										
543	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13																										
544	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13																										
545	HDB-10	41.33	59.88	9.50	-9.05		2004/10/13																										
546	HDB-10	41.33	59.88	9.50	-9.05		2004/10/14	27	250	<1	<1	4.3.E+05	1.3.E+03	3.0.E+00	3.4.E+02	<0.18	<0.18	<0.18	<0.18	<0.18	3.3.E+01	1.3.E+03	3.3.E+01	2.4.E+02				2.0.E-01	7.9.E+00	<0.18			
547	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19																										
548	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19																										
549	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19																										
550	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19																										
551	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/19																										
552	HDB-10	445.84	469.89	-395.01	-419.06		2004/12/20																										
553	HDB-10	445.84	469.89	-395.011	-419.061		2004/12/20	4.9	118	<1	<1	3.0E (± 0.5)+03																					
554	HDB-10	445.84	469.89	-395.011	-419.061		2004/12/22					5.70.E+03	2.3.E+02	1.0.E+02	4.8.E+01	<0.18	<0.18	<0.18	1.3.E+01	1.1.E+01	3.3.E+00	6.2.E+01	1.7.E+01	1.1.E+01				2.3.E+00	7.9.E+01	<0.18			
555	HDB-10						2004/8/9																										
556	HDB-10						2004/9/12																										
557	HDB-10						2004/10/9																										
558	HDB-10						2004/11/5																										
559	HDB-10						2004/12/9																										
560	HDB-10						2005/1/7																										
561	HDB-10						2005/2/3																										
562	HDB-10						2004/8/9																										
563	HDB-10						2004/9/12																										
564	HDB-10						2004/10/9																										
565	HDB-10						2004/11/5																										
566	HDB-10						2004/12/9																										
567	HDB-10						2005/1/7																										
568	HDB-10						2005/2/3																										
569	HDB-10						2004/9/16	0.03	0.1	<1	<1	2.30.E+04	4.2.E+03	<1	7.20.E+03	<0.18	<0.18	<0.18	<0.18	<0.18	2.3.E+00	2.2.E+04	2.3.E+00	2.2.E+04				<0.18	<0.18	<0.18			
570	HDB-10	100.03		-49.201			2004/10/3																										
571	HDB-10	136		-85.171			2004/10/5	24	78	<1	<1																						
572	HDB-10	200.13		-149.301			2004/10/29																										
573	HDB-10	298		-247.171			2004/11/4	120	89	<1	<1																						
574	HDB-10	400.02		-349.191			2004/11/30																										
575	HDB-10	500		-449.171			2004/12/8	35	212	<1	<1																						
576	HDB-10	550		-499.171			2005/1/6																										
577	HDB-10	45.00		5.829			2005/6/22																										
578	HDB-10	495.89	550.00	-445.061	-499.171		2005/6/27																										
579	HDB-10	495.89	550.00	-445.061	-499.171		2005/11/9																										
580	HDB-10	495.89	550.00	-445.061	-499.171		2006/9/15																										
581	HDB-10	495.89	550	-445.061	-499.171		2007/10/29																										
582	HDB-10	495.89	550	-445.061	-499.171		2008/10/3																										
583	HDB-10	495.89	550	-445.061	-499.171		2008/10/3						1.08.E+03									2.10.E+03		7.80.E+02	1.30.E+02	3.40.E+02		3.30.E+01		1.03.E+01	6.22.E+01	3.95.E+02	2.56.E+00
584	HDB-11	30.60	31.00	36.25	35.85																												
585	HDB-11	49.64	49.87	17.21	16.98																												
586	HDB-11	96.75	97.00	-29.90	-30.15																												
587	HDB-11	99.00	99.40	-32.15	-32.55																												
588	HDB-11	99.40	99.72	-32.55	-32.87																												
589	HDB-11	114.09	114.30	-47.24	-47.45																												
590	HDB-11	120.00	120.38	-53.15	-53.53																												
591	HDB-11	134.20	134.45	-67.35	-67.60																												
592	HDB-11	138.20	138.57	-71.35	-71.72																												
593	HDB-11	169.53	169.83	-102.68	-102.98																												
594	HDB-11	171.65	171.85	-104.80	-105.00																												
595	HDB-11	199.00	199.55	-132.15	-132.70																												
596	HDB-11	231.00	231.35	-164.15	-164.50																												
597	HDB-11	251.10	251.45	-184.25	-184.60																												
598	HDB-11	271.75	272.00	-204.90	-205.15																												
599	HDB-11	298.60	299.00	-231.75	-232.15																												
600	HDB-11	300.36	300.56	-233.51	-233.71																												
601	HDB-11	332.50	332.70	-265.65	-265.85			27	250	1	1																						
602	HDB-11	335.47	335.72	-268.62	-268.87																												
603	HDB-11	383.85	384.00	-317.00	-317.15																												
604	HDB-11	388.62	388.82	-321.77	-321.97																												
605	HDB-11	392.30	392.70	-325.45	-325.85																												
606	HDB-11	396.00	396.22	-329.15	-329.37																												
607	HDB-11	421.13	421.35	-354.28	-354.50																												
608	HDB-11	439.64	440.00	-372.79	-373.15																												
609	HDB-11	448.70	449.00	-381.85	-382.15																												
610	HDB-11	473.00	473.23	-406.15	-406.38																												
611	HDB-11	496.55	496.75	-429.70	-429.90																												
612	HDB-11	498.00	498.39	-431.15	-431.54																												
613	HDB-11	547.51	548.00	-480.66	-481.15																												
614	HDB-11	572.8	573	-505.95	-506.15																												
615	HDB-11	595.4	595.8	-528.55	-528.95																												
616	HDB-11	599.05	599.5	-532.20	-532.65			4.9	118	1	1																						

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (29/64)

Index	Sample point	sampling zone (GL) Min.	sampling zone (GL) Max.	sampling zone (EL) Min.	sampling zone (EL) Max.	sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII) X	location (WGS 84, XII) Y	location (WGS 84, XII) Z (middle depth)	location (WGS84, UTM, Zone54) East	location (WGS84, UTM, Zone54) North	location (WGS84, UTM, Zone54) Z (middle depth)	Physico-chemical parameter: EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temperature at site	Contamination indicator: Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	Comments
		[m]	[m]	[m]	[m]													[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]	[mg/l]		
617	HDB-11	644.81	645	-577.96	-578.15				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-578.06	568463.268766	4987289.753180	-578.06		2900	8.4									
618	HDB-11	697.8	698	-630.95	-631.15				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-631.05	568463.268766	4987289.753180	-631.05												
619	HDB-11	703.5	704	-636.65	-637.15				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-636.90	568463.268766	4987289.753180	-636.90		2700	8.2									
620	HDB-11	722	722.39	-655.15	-655.54				core under Atmosphere Control	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-655.35	568463.268766	4987289.753180	-655.35			8.34									
621	HDB-11	748.6	748.38	-681.75	-681.53				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-681.64	568463.268766	4987289.753180	-681.64		2700	7.8									
622	HDB-11	793.5	793.9	-726.65	-727.05				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-726.85	568463.268766	4987289.753180	-726.85												
623	HDB-11	800.73	801	-733.88	-734.15				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-734.02	568463.268766	4987289.753180	-734.02		2700	8.1									
624	HDB-11	852.8	853	-785.95	-786.15				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-786.05	568463.268766	4987289.753180	-786.05		2500	8.7									
625	HDB-11	871	871.6	-804.15	-804.75				core under Atmosphere Control	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-804.45	568463.268766	4987289.753180	-804.45			8.25									
626	HDB-11	895.8	896.2	-828.95	-829.35				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-829.15	568463.268766	4987289.753180	-829.15												
627	HDB-11	901.3	901.7	-834.45	-834.85				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-834.65	568463.268766	4987289.753180	-834.65		2600	8.6									
628	HDB-11	950	950.2	-883.15	-883.35				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-883.25	568463.268766	4987289.753180	-883.25		2700	8									
629	HDB-11	994	994.35	-927.15	-927.50				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-927.33	568463.268766	4987289.753180	-927.33		3000	8.6									
630	HDB-11	995.9	996.3	-929.05	-929.45				core	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-929.25	568463.268766	4987289.753180	-929.25												
631	HDB-11	171	237.05	-104.15	-170.20		2004/12/7		pump	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-137.18	568463.268766	4987289.753180	-137.18	15.6		7.11			112	5.1		10.2		A	
632	HDB-11	171	237.05	-104.15	-170.20		2004/12/8		pump	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-137.18	568463.268766	4987289.753180	-137.18	518		6.96			-69	11.6		7.78		A	
633	HDB-11	171	237.05	-104.15	-170.20		2004/12/10		pump	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-137.18	568463.268766	4987289.753180	-137.18	794		7.11			-271	8.6		6.02		A	
634	HDB-11	171	237.05	-104.15	-170.20		2004/12/12		pump	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-137.18	568463.268766	4987289.753180	-137.18	1143		7.02			-217	17		5.46		A	
635	HDB-11	171	237.05	-104.15	-170.20		2004/12/12		pump	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-137.18	568463.268766	4987289.753180	-137.18	1147		7.03			-216	17.5		5.5		A	
636	HDB-11	606	644.15	-539.15	-577.30		2005/3/13		pump	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-558.23	568463.268766	4987289.753180	-558.23	2979		6.2			-119	35.2		1.02		A	
637	HDB-11	606	644.15	-539.15	-577.30		2005/3/17		pump	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-558.23	568463.268766	4987289.753180	-558.23	2948		6.2			-90	35.2		0.93		A	
638	HDB-11	606	644.15	-539.15	-577.30		2005/3/18		pump	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-558.23	568463.268766	4987289.753180	-558.23	2995		6.2			-127	35.3		0.92		A	
639	HDB-11	606	644.15	-539.15	-577.30		2005/3/25		pump	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-558.23	568463.268766	4987289.753180	-558.23	3035		6.2			-118	35.4		0.91		A	
640	HDB-11	606	644.15	-539.15	-577.30		2005/3/30		pump	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-558.23	568463.268766	4987289.753180	-558.23	3796		6.2			-166	35.5		0.89		A	Gas, Microbiology: sampled by pressure-charged bottles
641	HDB-11	606	644.15	-539.15	-577.30		2005/3/30		pump	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-558.23	568463.268766	4987289.753180	-558.23	3796		6.2			-166	35.5		0.89		A	Microbiology: reffered from Shimizu et al., 2006 [6]
642	HDB-11						2004/10/9		river (up the stream)									10		6.28				10.8		0.07		A	
643	HDB-11						2004/11/5		river (up the stream)									10.6		6				7.3		0.07		A	
644	HDB-11						2004/12/9		river (up the stream)									10.3		5.71				1.5		<0.05		A	
645	HDB-11						2005/1/7		river (up the stream)									12.3		6.43				0.6		<0.05		A	
646	HDB-11						2005/2/3		river (up the stream)									12.6		6.21				0		0.05		A	
647	HDB-11						2005/3/13		river (up the stream)									13.6		6.05				1.2		<0.05		A	
648	HDB-11						2005/4/3		river (up the stream)									12.1		5.42				3.2		<0.05		A	
649	HDB-11						2005/5/6		river (up the stream)									8.4		6.07				4.5		<0.05		A	
650	HDB-11						2005/6/7		river (up the stream)									9.1		6.55				12.2		<0.05		A	
651	HDB-11						2005/7/5		river (up the stream)									10		6.64				14.1		0.07		A	
652	HDB-11						2005/7/29		river (up the stream)									10.8		6.54				15.3		0.08		A	
653	HDB-11						2004/9/9		river (up the stream)									8.9		5.83				13.6		0.05		A	
654	HDB-11						2004/10/9		river (down the stream)									9.7		5.82				11.3		0.07		A	
655	HDB-11						2004/11/5		river (down the stream)									10.2		6.11				7.3		0.06		A	
656	HDB-11						2004/12/9		river (down the stream)									11		5.74				1.5		<0.05		A	
657	HDB-11						2005/1/7		river (down the stream)									12		6.62				0.1		<0.05		A	
658	HDB-11						2005/2/3		river (down the stream)									12.9		6.22				0		0.05		A	
659	HDB-11						2005/3/13		river (down the stream)									13.3		6.02				0.8		<0.05		A	
660	HDB-11						2005/4/3		river (down the stream)									12.2		5.44				2		<0.05		A	
661	HDB-11						2005/5/6		river (down the stream)									8.5		6.11				4.6		<0.05		A	
662	HDB-11						2005/6/7		river (down the stream)									9.2		6.53				12.2		<0.05		A	
663	HDB-11						2005/7/5		river (down the stream)									10.3		6.64				13.9		0.07		A	
664	HDB-11						2005/7/29		river (down the stream)									10.8		6.57				15.2		0.08		A	
665	HDB-11	70					2004/9/16		well																				
666	HDB-11						2005/7/7		well									14.1		6.67				8.4		<0.05		A	
667	HDB-11		100.66		-33.81		2004/10/29		return	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-33.81	568463.268766	4987289.753180	-33.81	167		9.21				10.1		9.94		A	
668	HDB-11		153		-86.15		2004/10/30		return	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-86.15	568463.268766	4987289.753180	-86.15	213		8.76				14.2		10.1		A	
669	HDB-11		200.18		-133.33		2004/11/17		return	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-133.33	568463.268766	4987289.753180	-133.33	259		9.81				14.7		10.94		A	
670	HDB-11		299.55		-232.70		2004/11/21		return	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-232.70	568463.268766	4987289.753180	-232.70	316		8.9				13.7		9.45		A	
671	HDB-11		400.7		-333.85		2004/11/25		return	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-333.85	568463.268766	4987289.753180	-333.85	303		8.54				15.8		9.61		A	
672	HDB-11		453		-386.15		2004/11/27		return	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-386.15	568463.268766	4987289.753180	-386.15	319		8.52				15.2		9.16		A	
673	HDB-11		500		-433.15		2005/1/7		return	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	115154.541430	-30003.562369	-433.15	568463.268766	4987289.753180	-433.15	272		9.38				16.2		9.83		A	
674	HDB-11		600.61		-533.76		2005/1/12		return	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-533.76	568463.268766	4987289.753180	-533.76	340		8.21				15.4		9.61		A	
675	HDB-11		699.72		-632.87		2005/1/19		return	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-632.87	568463.268766	4987289.753180	-632.87	321		8.05				19.3		9.13		A	
676	HDB-11		803		-736.15		2005/1/26		return	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-736.15	568463.268766	4987289.753180	-736.15	320		7.72				20.2		9.36		A	
677	HDB-11		900		-833.15		2005/5/12		return	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-833.15	568463.268766	4987289.753180	-833.15	282		8.92				26.8		9.31		A	
678	HDB-11		1000		-933.15		2005/5/24		return	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-933.15	568463.268766	4987289.753180	-933.15	250		8.36				27.4		10.43		A	
679	HDB-11		1020		-953.15		2005/5/26		return	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-953.15	568463.268766	4987289.753180	-953.15	233		8.44				27.5		10.38		A	
680	HDB-11						2005/7/19		return		siliceous mudstone	115154.541430	-30003.562369		568463.268766	4987289.753180		45.2		11.23				15		9.51		A	exchanged with the well water to wash the borehole wall
681	HDB-11	224.96	236.3	-158.112	-169.452	3	2006/12/22		bottle	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-163.782	568463.268766	4987289.753180	-163.782		2400		7.8								
682	HDB-11	395.61	404.45	-328.762	-337.602	5	2006/12/22		bottle	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-333.182	568463.268766	4987289.753180	-333.182		1900		8.2								
683	HDB-11	224.96	236.3	-158.112	-169.452	3	2009/10/26	2009/11/2-	bottle	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-163.782	568463.268766	4987289.753180	-163.782	2210	2600	9.43	9.3				<0.002	0.88		B	
684	HDB-11	395.61	404.45	-328.762	-337.602	5	2009/10/28	2009/11/4-	bottle	Koetoi Fm.	diatomaceous mudstone	115154.541430	-30003.562369	-333.182	568463.268766	4987289.753180	-333.182	1861	2100	8.92	8.9				<0.002	0.45		B	
685	HDB-11	621.13	631.99	-554.282	-565.142	9	2009/10/26	2009/11/2-	bottle	Wakkanai Fm.	siliceous mudstone	115154.541430	-30003.562369	-559.712	568463.268766	4987289.753180	-559.712	813	1600	9.22	9.1				<0.002	2.1		B	
686	H-17-1-01	35	38	24.511	21.511		2007/10/18		pump	Koetoi Fm.	diatomaceous mudstone	116508.304	-29781.611	23.0	568664.243697	4988646.437255	23.0				7.45								referred from JAEA, 2008 [4]
687	HGW-V-01	20	23	40	37		2006/4/30	2006/9/4-9/29	inflow			116239.181	-30754.906	38.5	567695.465971	4988362.391752	38.5		21		7.3								
688	HGW-V-01	25	26	35	34		2006/5/28	2006/9/4-9/29	inflow			116239.181	-30754.906	34.5	567695.465971	4988362.391752	34.5		25		7.1								
689	HGW-V-03	9	12	51	48		2006/10/10	2006/11/16-12-6	inflow			116214.9487	-30778.1041	49.5	567672.650579	4988337.810469	49.5		10		7.2					3.2		A	
690	HGW-V-03	38	40	22	20		2006/10/15	2006/11/16-12/6	inflow			116214.9487	-30778.1041	21.0	567672.650579	4988337.810469	21.0		1600		7.8					0.93		A	
691	PB-V01	182.30	182.89	-122.3	-122.9		2007/12/12		core	Koetoi Fm.	diatomaceous mudstone	116238.9221	-30755.5000	-122.60	567694.876190	4988362.123780	-122.60		710										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [1)]
692	PB-V01	206.45	206.75	-146.45	-146.8		2007/12/14		core	Koetoi Fm.	diatomaceous mudstone	116238.9221	-30755.5000	-146.60	567694.876190	4988362.123780	-146.60		700										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [1)]
693	PB-V01	218.27	218.57	-158.27	-158.6		2007/12/14		core	Koetoi Fm.	diatomaceous mudstone	116238.9221	-30755.5000	-158.42	567694.876190	4988362.123780	-158.42		730										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [1)]
694	PB-V01	247.38	247.68	-187.38	-187.7		2007/12/16		core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-187.53	567694.876190	4988362.123780	-187.53		740										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [1)]
695	PB-V01	264.0		-204.00					core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-204.00	567694.876190	4988362.123780	-204.00		650										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [1)]
696	PB-V01	276.26	276.56	-216.26	-216.6		2007/12/18		core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-216.41	567694.876190	4988362.123780	-216.41		760										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [1)]
697	PB-V01	280		-220.00					core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-220.00	567694.876190	4988362.123780	-220.00		790										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [1)]

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (30/64)

Index	Sample point	sampling zone (GL) Min.	sampling zone (GL) Max.	sampling zone (EL) Min.	sampling zone (EL) Max.	sampling zone No.	sampling date	Geochemistry Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
617	HDB-11	644.81	645	-577.96	-578.15			6200	31	49	150			14											9400						680		620	8					44	130		287.2	289.4	-0.4
618	HDB-11	697.8	698	-630.95	-631.15																																							
619	HDB-11	703.5	704	-636.65	-637.15			6400	54	88	150			10											9700						700		430	3					65	86		297.8	294.9	0.5
620	HDB-11	722	722.39	-655.15	-655.54			6720	87.3	72.1	136			9.04							<0.2				10145						7.32		1707	0					29.8	301		310.5	313.9	-0.5
621	HDB-11	748.6	748.38	-681.75	-681.53			6400	70	200	150			8.9											8300						2400		440	1.4					99	90		303.7	291.0	2.1
622	HDB-11	793.5	793.9	-726.65	-727.05																																							
623	HDB-11	800.73	801	-733.88	-734.15			6600	34	210	130			7.9											9500						830		480	2					100	99		310.1	292.8	2.9
624	HDB-11	852.8	853	-785.95	-786.15			5600	20	71	100			6											8300						140		790	18					110	160		256.6	250.3	1.2
625	HDB-11	871	871.6	-804.15	-804.75			6624	65.8	244	117			6.58							<0.2				10838						22.9		1270	155					80	228		312.4	332.1	-3.1
626	HDB-11	895.8	896.2	-828.95	-829.35																																							
627	HDB-11	901.3	901.7	-834.45	-834.85			5900	20	58	120			5.6											8500						150		730	13					110	150		270.6	255.0	3.0
628	HDB-11	950	950.2	-883.15	-883.35			6200	37	150	100			4.3											8700						740		800	3.7					120	160		286.8	273.7	2.3
629	HDB-11	994	994.35	-927.15	-927.50			6900	20	100	110			3.7											9800						550		590	11					110	120		315.1	297.6	2.9
630	HDB-11	995.9	996.3	-929.05	-929.45																																							
631	HDB-11	171	237.05	-104.15	-170.20		2004/12/7	18	1.5	7.1	3.6				17	0.03			0.16		0.03	<0.05	0.01	0.1	19	<1	<1				5.1	<0.1	37.0	0		0.71		<0.1	4	9		1.5	1.3	0.2
632	HDB-11	171	237.05	-104.15	-170.20		2004/12/8	1200	69	55	27				19	29			<0.05		0.06	<0.05	0.01	0.1	1800	15	6				11	<0.1	730	0		12.8		<0.1	24	110		58.9	63.1	-3.4
633	HDB-11	171	237.05	-104.15	-170.20		2004/12/10	2400	110	53	57				22	57			<0.05		0.05	0.05	0.01	0.1	3600	30	10				12	<0.1	1200	0		23.1		<0.1	16	210		114.5	121.7	-3.1
634	HDB-11	171	237.05	-104.15	-170.20		2004/12/12	3200	150	75	80				24	76			<0.05		0.05	0.05	<0.01	0.1	5000	40	15				12	<0.1	1500	0		29.9		<0.1	16	260		153.3	166.2	-4.0
635	HDB-11	171	237.05	-104.15	-170.20		2004/12/12	3300	160	40	84		0.02	12	26	80	2.2	0.002	<0.05	<0.002	6.9	2.6	<0.01	<0.1	5100	42	16	0.3	<0.1	190	11	<0.1	1410	0		30.1		<0.1	19	260		168.9	167.5	0.4
636	HDB-11	606	644.15	-539.15	-577.30		2005/3/13	6300	130	240	170				27	120			<0.05		4.1	4.1	<0.01	0.2	10000	77	27				<0.2	<0.1	2100	0		43.1		<0.1	34	460		303.3	317.1	-2.2
637	HDB-11	606	644.15	-539.15	-577.30		2005/3/17	6500	140	220	170				28	120			<0.05		3.9	3.9	0.01	0.1	10000	78	27				<0.2	<0.1	2700	0		43.5		<0.1	17	450		311.2	326.9	-2.5
638	HDB-11	606	644.15	-539.15	-577.30		2005/3/18	6500	140	240	170				29	140			<0.05		3.2	3.2	<0.01	0.2	10000	79	27				<0.2	<0.1	2100	0		45.1		<0.1	39	460		312.2	317.1	-0.8
639	HDB-11	606	644.15	-539.15	-577.30		2005/3/25	6500	140	170	170				29	130			<0.05		3	3	<0.01	0.12	11000	81	30				<0.2	<0.1	2200	0		42.9		<0.1	27	430		308.7	346.9	-5.8
640	HDB-11	606	644.15	-539.15	-577.30		2005/3/30	6600	140	250	170		0.01	12	27	120	4.3	<0.001	<0.05	<0.01	2.3	2.3	<0.01	0.1	10000	78	29	0.1	<0.1	200	<0.2	<0.1	2200	0		43.6		<0.1	31	450		329.9	318.7	1.7
641	HDB-11	606	644.15	-539.15	-577.30		2005/3/30	6600	140	250	170		0.01	12	27	120	4.3	<0.001	<0.05	<0.01	2.3	2.3	<0.01	0.1	10000	78	29	0.1	<0.1	200	<0.2	<0.1	2200	0		43.6		<0.1	31	450		329.9	318.7	1.7
642	HDB-11						2004/10/9	11	1.4	2.3	1.9		0.02	0.01	22	0.13	0.03	<0.001	<0.05	<0.01	1.1	0.06	0.38	<0.1	14	<1	<1	0.2	<0.1	<0.1	6.4	<0.1	12	0		0.2		<0.1	5	3		0.9	0.8	0.1
643	HDB-11						2004/11/5	12	1.6	2.6	2		0.02	0.01	19	0.18	0.02	<0.001	<0.05	<0.01	1.1	<0.05	0.12	<0.1	16	<1	<1	0.1	<0.1	0.1	7.7	<0.1	13	0		0.22		<0.1	5	3		0.9	0.9	0.0
644	HDB-11						2004/12/9	10	1	3.2	2.2		0.03	<0.01	18	0.06	0.02	<0.001	<0.05	<0.01	0.43	0.16	0.34	<0.1	16	<1	<1	0.8	<0.1	<0.1	11	<0.1	5	0		0.08		<0.1	2	1		0.9	0.8	0.1
645	HDB-11						2005/1/7	12	1.3	3.5	2.4		0.04	0.02	20	0.14	0.02	<0.001	<0.05	<0.01	0.36	0.06	0.18	<0.1	18	<1	<1	0.9	<0.1	<0.1	14	<0.1	11	0		0.18		<0.1	3	2		1.0	1.0	-0.1
646	HDB-11						2005/2/3	13	1.4	4.1	2.6		0.06	0.03	19	0.17	0.03	<0.001	0.05	0.02	4.2	0.21	1.8	<0.1	17	<1	<1	0.7	<0.1	0.14	13	<0.1	12	0		0.2		<0.1	3	3		1.3	1.0	0.3
647	HDB-11						2005/3/13	13	1.5	4.2	2.6		0.06	0.02	18	0.15	0.03	<0.001	<0.05	<0.01	1	0.27	1	<0.1	17	<1	<1	0.6	<0.1	0.2	20	<0.1	7.3	0		0.12		<0.1	3	2		1.2	1.0	0.1
648	HDB-11						2005/4/3	11	1	3.6	2.3		0.05	0.01	13	0.41	0.02	<0.001	<0.05	<0.01	0.55	0.16	0.84	<0.1	17	<1	<1	0.5	<0.1	<0.1	17	<0.1	3.1	0		0.05		<0.1	2	<1		1.0	0.9	0.1
649	HDB-11						2005/5/6	9.2	1.1	2.7	1.6		0.01	0.01	20	0.04	0.06	<0.001	<0.05	0.01	0.5	0.07	0.58	<0.1	9	<1	<1	0.8	<0.1	0.1	7.2	<0.1	3.1	0		0.05		<0.1	2	1		0.8	0.5	0.3
650	HDB-11						2005/6/7	11	1.2	2.1	1.7		<0.01	0.02	22	0.12	0.02	<0.001	<0.05	<0.01	0.71	0.09	0.12	<0.1	16	<1	<1	1	<0.1	0.1	6.5	<0.1	9.2	0		0.15		<0.1	5	2		0.8	0.8	0.0
651	HDB-11						2005/7/5	13	1.3	2.5	1.8		0.01	0.03	25	0.18	0.02	<0.001	0.08	<0.01	1.6	0.1	0.12	<0.1	17	<1	<1	1.1	<0.1	<0.1	5.6	<0.1	13	0		0.22		<0.1	7	3		0.9	0.9	0.1
652	HDB-11						2005/7/29	13	1.6	3	2.1		0.03	0.03	24	0.18	0.03	<0.001	0.05	<0.01	3	0.84	0.25	<0.1	17	<1	<1	1.2	<0.1	0.1	7.5	<0.1	17	0		0.28		<0.1	9	3		1.0	1.0	0.1
653	HDB-11						2004/9/9	8.9	1.4	2.5	1.7		0.04	<0.01	23	0.04	0.02	<0.001	<0.05	<0.01	0.81	<0.05	0.35	<0.1	14	<1	<1	0.5	<0.1	0.11	6.6	<0.1	13	0		0.22		<0.1	7	<1		0.7	0.8	0.0
654	HDB-11						2004/10/9	11	1.5	2.4	1.9		0.02	0.01	23	0.2	0.02	<0.001	<0.05	<0.01	1.3	0.11	0.27	<0.1	13	<1	<1	0.3	<0.1	<0.1	6.4	<0.1	15	0		0.24		<0.1	5	3		0.9	0.8	0.1
655	HDB-11						2004/11/5	12	1.6	2.6	1.9		0.02	0.01	20	0.14	0.02	<0.001	0.05	0.01	1.2	0.14	0.14	<0.1	16	<1	<1	<0.1	<0.1	0.1	7	<0.1	15	0		0.24		<0.1	5	3		0.9	0.9	0.0
656	HDB-11						2004/12/9	10	1	3	2.2		0.03	<0.01	17	0.06	0.02	<0.001	<0.05	<0.01	0.52	0.15	0.44	<0.1	16	<1	<1	0.8	<0.1	<0.1	11	<0.1	4.9	0		0.08		<0.1	3	1		0.9	0.8	0.1
657	HDB-11						2005/1/7	12	1.4	3.5	2.4		0.05	0.02	19	0.14	0.03	<0.001	0.09	<0.01	2.8	0.06	1.9	<0.1	17	<1	<1	0.9	<0.1	<0.1	14	<0.1	6.1	0		0.1		<0.1	6	2		1.2	0.9	0.3
658	HDB-11						2005/2/3	13	1.4	4	2.6		0.04	0.03	19	0.17	0.03	<0.001	<0.05	<0.01	1.7	0.3	0.67	<0.1	17	<1	<1	0.7	<0.1	0.14	13	<0.1	12	0		0.2		<0.1	3	3		1.1	1.0	0.2
659	HDB-11						2005/3/13	13	1.5	4	2.5		0.05	0.02	18	0.15	0.03	<0.001	<0.05	<0.01	1.3	0.24	1.4	<0.1	17	<1	<1	0.6	<0.1	0.2	20	<0.1	6.1	0		0.1		<0.1	4	1		1.2	1.0	0.2
660	HDB-11						2005/4/3	10	1.1	3.7	2.4		0.05	<0.01	14	0.42	0.03	<0.001	0.08	<0.01	0.58	0.14	1	<0.1	18	<1	<1	0.5	<0.1	0.2	17	<0.1	3.1	0		0.05		<0.1	2	<1		1.0	0.9	0.0
661	HDB-11						2005/5/6	9.5	1.1	1.6	1.5		<0.01	0.01	20	0.04	0.02	<0.001	<0.05	<0.01	0.34	0.06	0.43	<0.1	16	<1	<1	0.8	<0.1	<0.1	7.1	<0.1	3.1	0		0.05		<0.1	2	<1		0.7	0.7	0.0
662	HDB-11						2005/6/7	11	1.2	2.1	1.7		0.01	0.02	22	0.12	0.02	<0.001	<0.05	<0.01	0.85	0.09	0.15	<0.1	16	<1	<1	1.1	<0.1	0.13	6.5	<0.1	9.2	0		0.15		<0.1	5	2		0.8	0.8	0.0
663	HDB-11						2005/7/5	13	1.4	6.5	2		0.02	0.03	26	0.17	0.05	<0.001	0.09	<0.01	1.8	0.22	0.15	<0.1	16	<1	<1	1	<0.1	0.1	5.7	<0.1	13	0		0.22		<0.1	7	5		1.1	0.8	0.3
664	HDB-11						2005/7/29	13	1.7	3.1	2.1		0.02	0.03	24	0.18	0.03	<0.001	0.16	<0.01	2.8	0.73	0.2	<0.1	17	<1	<1	1.4	<0.1	0.1	7.3	<0.1	17	0		0.28		<0.1	9	3		1.0	1.0	0.1
665	HDB-11	70					2004/9/16																																					
666	HDB-11						2005/7/7	16	1.4	5.5	3.3				18	0.01			0.22		<0.01	<0.05	<0.01	0.1	17	<1	<1				4.4	<0.1	40	0		0.66			<1	8		1.3	1.2	0.0
667	HDB-11		100.66		-33.81		2004/10/29	290	5.8	5.7	1				13	3.1			0.62		0.23	0.06	0.43	0.8	120	<1	<1				115	<0.1	380	0		7.41		0.95	26	76		13.2	12.1	4.4
668	HDB-11		153		-86.15		2004/10/30	420	12	5.1	0.85				13	7.9			0.22		0.16	0.12	0.21	0.6	290	2	<1				124	<0.1	490	2.8		8.45		0.7	27	93		18.9	18.9	0.0
669	HDB-11		200.18		-133.33		2004/11/17	500	19	18	0.42				43	12			0.36		0.62	0.31	0.3	0.8	530	5	2				185	<0.1	0	190		7.73		3.46	100	38		23.2	25.7	-5.0
670	HDB-11		299.55		-232.70		2004/11/21	690	30	19	1.2				25	15			0.3		0.55	0.33	0.58	0.5	880	7	3				262	<0.1	150	60		5.75		1.35	140	36		31.9	35.0	-4.6
671	HDB-11		400.7		-333.85		2004/11/25	620	33	19	3				20	12			0.19		0.63	0.29	0.35	0.4	750	6	2				263	<0.1	300	16		6.25		0.55	65	60		29.0	32.2	-5.1
672	HDB-11		453		-386.15		2004/11/27	700	38	20	2.8				18	14			0.14		0.53	0.29	0.22	0.4	810	7	2				294	<0.1	180	5.5		6.96		0.48	45	72		32.7	32.2	0.7
673	HDB-11		500		-433.15		2005/1/7	480	17	13	0.36				29	11			0.08		0.13	0.28	0.06	0.7	560	4.5	2				248	<0.1	110	58		4.55		2.36	35	23		22.0	24.9	-6.2
674	HDB-11		600.61		-533.76		2005/1/12	690	22	15	3.3				12	13			0.07		0.05	0.2	0.03	0.9	760	7.4	2				267	<0.1	430	19		7.2		0	29	90		31.6	34.8	-4.9
675	HDB-11		699.72		-632.87		2005/1/19	640	20	12	3				12	11			<0.05		0.06	0.14	0.14	0.8	690	7	2				221	<0.1	480	27		10.2		0	22	100		29.2	33.0	-6.1
676	HDB-11		803		-736.15		2005/1/26	790	22	16	5				10	12			<0.05		0.05	0.19	0.09	0.6	790	6	2				352	<0.1	580	18		12.9		0	22	100		36.1	39.8	-4.9
677	HDB-11		900		-833.15		2005/5/12	530	6.5	8.7	0.92				7.9	4.6			0.05		0.08	0.17	0.1	1.6	320	2.3	<1				425	<0.1	340	0		5.76		0.76	75	66		23.7	23.5	0.4
678	HDB-11		1000		-933.15		2005/5/24	460	9.6	5.6	0.83				6.1	4.8			<0.05		0.1	0.08	0.06	1.1	400	2.9	<1				175	<0.1	370	9.4		6.05		0.12	19	75		20.6	21.4	-1.9
679	HDB-11		1020		-953.15		2005/5/26	440	9.7	5	0.8				5.8	4.9			0.06		0.06	<0.05	0.05	1	400	2.9	<1				172	<0.1	360	0		5.98		0.2	21	73		19.7	20.8	-2.8
680	HDB-11						2005/7/19	25	3.9	27	0.05				18	0.08			<0.05		<0.01	<0.05	0.16	0.1	20	<1	<1				9.2	<0.1	0	18		2.19		1.71	2	6		2.6	1.4	1.1
681	HDB-11	224.96	236.3	-158.112	-169.452	3	2006/12/22	5100	250	70	100			14	48		2.7	<0.01	0.2	<0.01	0.04		0.01	0.43	7600	80	26	<0.1		290	0.8		2500	8.5	2200					31	520		258.0	256.4	0.3
682	HDB-11	395.61	404.45	-328.762	-337.602	5	2006/12/22	4300	200	20	42			7.1	56		1	<0.01	0.5	<0.01	0.08		<0.1	0.62	5600	44	18	<0.1		170	15		2300	20	2000					23	460		207.0	197.1	2.5
683	HDB-11	224.96	236.3	-158.112	-169.452	3	2009/10/28	5500	300	6.8	15		<0.01	18	14.0		0.73	<0.01	0.7	<0.01	0.17	0.14	<0.1	0.2	7700	60	20.0	<1		300	15	0.018	1200	120	2700		840			38	260		267.7	241.9	5.0
684	HDB-11	395.61	404.45	-328.762	-337.602	5	2009/10/28	4500	260	3.8	20		<0.01	11	20.0		1.20	<0.01	0.4	<0.01	0.15	0.105	<0.1	<0.1	6100	46	15.0	<1		210	0.4	0.032	1400	55	2600		360			72	290		217.4	197.4	4.8
685	HDB-11	621.13	631.99	-554.282	-565.142	9	2009/10/26	3400	79	4.8	13		<0.01	5.7	3.8		0.65	<0.01	<0.1	<0.01	0.08	0.06	<0.1	0.1	5200	35	11.0	<1		120	0.2	0.062	660	46	970		260			24	140		158.7	159.4	-0.2
686	H-17-1-01	35	38	24.511	21.511		2007/10/18	856	30.6	23	11.1		0.03		24.3	36			6.5		0.26			<0.1	388	1.3		<0.2	<2	25.4	<0.2	0.005	1920	2.84					38.2	406		41.5	42.6	-1.3
687	HGW-V-01	20	23	40	37		2006/4/30	24	3.2	10	5		0.28	0.05	22.0		0.04	<0.01	<0.1	<0.01	<0.01		<0.01	0.13	23	<0.1	0.01	11		<0.01	9.1	<0.1	54	<0.1	46					1.2	12		2.0	1.9	0.1
688	HGW-V-01	25	26	35	34		2006/5/28	27	3.3	8.5	5.3		0.16	0.07	49.0		0.03	<0.01	<0.1	<0.01	0.01		0.02	0.15	28	0.1	<0.01	5.4		0.81	16	<0.1	49	<0.1	42					1.6	12		2.2	2.0	0.2
689	HGW-V-03	9	12	51	48		2006/10/10	16	3.1	0.53	0.27		0.01	0.03	34.0		<0.01	<0.01	<0.1	<0.01	0.16		0.27	0.18	20	0.1	0.05	0.01		1	3.2	<0.1	13	<0.1	11					3.8	2.9		0.9	0.9	0.1
690	HGW-V-03	38	40	22	20		2006/10/15	3300	130	140	89		0.85	9.7	39.0		2.60	<0.01	0.1	<0.01	0.04		0.01	0.01	4700	34	13.0	<0.01		180	0.7	<0.1	2700	9.2	2300					27	560		172.5	177.4	-1.4
691	PB-V01	182.30	182.89	-122.3	-122.9		2007/12/12	1676	60	30	18														1280	6	3.3				5.48														
692	PB-V01	206.45	206.75	-146.45	-146.8		2007/12/14	1646	72	31	18														1390	5	3.4				9.01														
693	PB-V01	218.27	218.57	-158.27	-158.6		2007/12/14	1739	55	35	20														1560	23	4.3				8.68														
694	PB-V01	247.38	247.68	-187.38	-187.7		2007/12/16	1777	52	36	21														1560	22	4.3				5.52														
695	PB-V01	264.0		-204.00				1597	39	29	18														1510	17	3.0				579														
696	PB-V01	276.26	276.56	-216.26	-216.6		2007/12/18	1982	49	15	26														1970	19	5.4				4.29														
697	PB-V01	280		-220.00				1943	42	37	25														2000	17	4.4				436														

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (31/64)

Index	Sample point	sampling zone (GL) Min.	sampling zone (GL) Max.	sampling zone (EL) Min.	sampling zone (EL) Max.	sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases: Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	Isotopes: ^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{36}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_{aq}]	[cc_{STP}/g_{aq}]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
617	HDB-11	644.81	645	-577.96	-578.15																																								
618	HDB-11	697.8	698	-630.95	-631.15						33.1		2.76	0.652		1.84		60.2		0.044		0.009	0.001	0.001						<0.5			-23.6	3.3		-54.2	-13.5								
619	HDB-11	703.5	704	-636.65	-637.15																												-23.1	3.5											
620	HDB-11	722	722.39	-655.15	-655.54			x																																					
621	HDB-11	748.6	748.38	-681.75	-681.53																												-20.3	3.3											
622	HDB-11	793.5	793.9	-726.65	-727.05						40		0.24	1.09		1.23		56.7		0.161		0.048	0.006	0.003						<0.5					-53.0	-13.5								
623	HDB-11	800.73	801	-733.88	-734.15																												-24	3.5											
624	HDB-11	852.8	853	-785.95	-786.15																												-29	1.7											
625	HDB-11	871	871.6	-804.15	-804.75			x																																					
626	HDB-11	895.8	896.2	-828.95	-829.35						36.2		8.12	0.731		3.12		50.1		0.141		0.041	0.007	0.003						<0.5					-60.8	-21.0								
627	HDB-11	901.3	901.7	-834.45	-834.85																												-28.5	2.3											
628	HDB-11	950	950.2	-883.15	-883.35																												-24.9	2.0											
629	HDB-11	994	994.35	-927.15	-927.50																												-27.6	2.9											
630	HDB-11	995.9	996.3	-929.05	-929.45						34.5		9.23	0.764		1.49		53.5		0.136		0.031	0.004	0.002						<0.5					-57.1	-20.2								
631	HDB-11	171	237.05	-104.15	-170.20		2004/12/7	○																																					
632	HDB-11	171	237.05	-104.15	-170.20		2004/12/8	○																																					
633	HDB-11	171	237.05	-104.15	-170.20		2004/12/10	○																																					
634	HDB-11	171	237.05	-104.15	-170.20		2004/12/12	○																																					
635	HDB-11	171	237.05	-104.15	-170.20		2004/12/12	○			3.75		0.882	0.064		7.75		84.6		0.008		<0.001	<0.001	N.D.						<0.5		0.8±0.2	-46.1	-3.6	-57.6	-1.5				2.5±2.5			1.2	0.708117±0.000011
636	HDB-11	606	644.15	-539.15	-577.30		2005/3/13	○																																					
637	HDB-11	606	644.15	-539.15	-577.30		2005/3/17	○																																					
638	HDB-11	606	644.15	-539.15	-577.30		2005/3/18	○																																					
639	HDB-11	606	644.15	-539.15	-577.30		2005/3/25	○																																					
640	HDB-11	606	644.15	-539.15	-577.30		2005/3/30	○	15259.43/15645.52		1.03		0.331	0.054		25.6		71.7		0.015		<0.001	<0.001	<0.001						<0.5		<0.3	-24.2	3.5	-58.2	-8.3				2.9±2.8			5.8	0.708157±0.000009
641	HDB-11	606	644.15	-539.15	-577.30		2005/3/30	○	15259.43/15645.52																							<0.3	-24.2	3.5						2.9±2.8			5.8	0.708157±0.000009
642	HDB-11						2004/10/9	○																																					
643	HDB-11						2004/11/5	○																																					
644	HDB-11						2004/12/9	○																																					
645	HDB-11						2005/1/7	○																																					
646	HDB-11						2005/2/3	○																																					
647	HDB-11						2005/3/13	○																																					
648	HDB-11						2005/4/3	○																																					
649	HDB-11						2005/5/6	○																																					
650	HDB-11						2005/6/7	○																																					
651	HDB-11						2005/7/5	○																																					
652	HDB-11						2005/7/29	○																																					
653	HDB-11						2004/9/9	○																								4.4±0.2	-65.6	-9.9						27±5			-1.8	0.709140±0.000018
654	HDB-11						2004/10/9	○																																					
655	HDB-11						2004/11/5	○																																					
656	HDB-11						2004/12/9	○																																					
657	HDB-11						2005/1/7	○																																					
658	HDB-11						2005/2/3	○																																					
659	HDB-11						2005/3/13	○																																					
660	HDB-11						2005/4/3	○																																					
661	HDB-11						2005/5/6	○																																					
662	HDB-11						2005/6/7	○																																					
663	HDB-11						2005/7/5	○																																					
664	HDB-11						2005/7/29	○																								6.11±0.21	-72.4	-10.8									-9.7	0.707798±0.000011
665	HDB-11	70					2004/9/16																																						
666	HDB-11						2005/7/7	○																								2.18±0.16	-68.2	-10.6									14.0	0.707259±0.000014
667	HDB-11		100.66		-33.81		2004/10/29	○																																					
668	HDB-11		153		-86.15		2004/10/30	○																								1.4±0.2	-67.8	-9.9						4.5±2.6			-3.1	0.705673±0.000011
669	HDB-11		200.18		-133.33		2004/11/17	○																																					
670	HDB-11		299.55		-232.70		2004/11/21	○																																					
671	HDB-11		400.7		-333.85		2004/11/25	○																																					
672	HDB-11		453		-386.15		2004/11/27	○																								1.8±0.2	-62.6	-8.2						2.5±2.5			5.7	0.707651±0.000011
673	HDB-11		500		-433.15		2005/1/7	○																																					
674	HDB-11		600.61		-533.76		2005/1/12	○																																					
675	HDB-11		699.72		-632.87		2005/1/19	○																																					
676	HDB-11		803		-736.15		2005/1/26	○																								2.7±0.2	-58.4	-7.8						3±2.7			-0.1	0.707651±0.000013
677	HDB-11		900		-833.15		2005/5/12	○																																					
678	HDB-11		1000		-933.15		2005/5/24	○																																					
679	HDB-11		1020		-953.15		2005/5/26	○																								2.15±0.15	-62.9	-8.6									-0.9	0.707525±0.000012
680	HDB-11						2005/7/19	○																																					
681	HDB-11	224.96	236.3	-158.112	-169.452	3	2006/12/22	×																																					
682	HDB-11	395.61	404.45	-328.762	-337.602	5	2006/12/22	×																																					
683	HDB-11	224.96	236.3	-158.112	-169.452	3	2009/10/26	○																								≦0.23	-35.4	-0.3										
684	HDB-11	395.61	404.45	-328.762	-337.602	5	2009/10/28	○																								≦0.22	-39.9	-1.1										
685	HDB-11	621.13	631.99	-554.282	-565.142	9	2009/10/26	○																									-47	-3.8										
686	H-17-1-01	35	38	24.511	21.511		2007/10/18	○																																					
687	HGW-V-01	20	23	40	37		2006/4/30	×																																					
688	HGW-V-01	25	26	35	34		2006/5/28	×																																					
689	HGW-V-03	9	12	51	48		2006/10/10	×																									-68.3	-10.5										
690	HGW-V-03	38	40	22	20		2006/10/15	×																									-50.8	-4.5										
691	PB-V01	182.30	182.89	-122.3	-122.9		2007/12/12																										-60	-6.3						2.5 ± 1.2				
692	PB-V01	206.45	206.75	-146.45	-146.8		2007/12/14																										-62	-7.0										
693	PB-V01	218.27	218.57	-158.27	-158.6		2007/12/14																										-61	-7.0						5.7 ± 1.2				
694	PB-V01	247.38	247.68	-187.38	-187.7		2007/12/16																										-61	-6.8						1.7 ± 1.0				
695	PB-V01	264.0		-204.00																													-58	-6.7										
696	PB-V01	276.26	276.56	-216.26	-216.6		2007/12/18																										-57	-6.2										
697	PB-V01	280		-220.00																													-53	-5.5										

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (32/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Organics				Microbiology																					
		Min.	Max.	Min.	Max.			Humic acid	Fuluvic acid	Acetate	Formate	Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
617	HDB-11	644.81	645	-577.96	-578.15																												
618	HDB-11	697.8	698	-630.95	-631.15																												
619	HDB-11	703.5	704	-636.65	-637.15																												
620	HDB-11	722	722.39	-655.15	-655.54																												
621	HDB-11	748.6	748.38	-681.75	-681.53																												
622	HDB-11	793.5	793.9	-726.65	-727.05																												
623	HDB-11	800.73	801	-733.88	-734.15																												
624	HDB-11	852.8	853	-785.95	-786.15																												
625	HDB-11	871	871.6	-804.15	-804.75																												
626	HDB-11	895.8	896.2	-828.95	-829.35																												
627	HDB-11	901.3	901.7	-834.45	-834.85																												
628	HDB-11	950	950.2	-883.15	-883.35																												
629	HDB-11	994	994.35	-927.15	-927.50																												
630	HDB-11	995.9	996.3	-929.05	-929.45																												
631	HDB-11	171	237.05	-104.15	-170.20		2004/12/7																										
632	HDB-11	171	237.05	-104.15	-170.20		2004/12/8																										
633	HDB-11	171	237.05	-104.15	-170.20		2004/12/10																										
634	HDB-11	171	237.05	-104.15	-170.20		2004/12/12																										
635	HDB-11	171	237.05	-104.15	-170.20		2004/12/12					1.5.E+06	2.9.E+05	1.6.E+02		2.4.E+05	1.6.E+05	N.D.				4.0.E+03		2.4.E+04			1.3.E+02			8.0.E-01			
636	HDB-11	606	644.15	-539.15	-577.30		2005/3/13																										
637	HDB-11	606	644.15	-539.15	-577.30		2005/3/17																										
638	HDB-11	606	644.15	-539.15	-577.30		2005/3/18																										
639	HDB-11	606	644.15	-539.15	-577.30		2005/3/25																										
640	HDB-11	606	644.15	-539.15	-577.30		2005/3/30					7.6.E+05	1.9.E+01	4.0.E+03		7.9.E+01	2.4.E+01	N.D.				N.D		7.0.E-01			7.9.E+00			3.3.E+03			
641	HDB-11	606	644.15	-539.15	-577.30		2005/3/30					3.2.E+05																					
642	HDB-11						2004/10/9																										
643	HDB-11						2004/11/5																										
644	HDB-11						2004/12/9																										
645	HDB-11						2005/1/7																										
646	HDB-11						2005/2/3																										
647	HDB-11						2005/3/13																										
648	HDB-11						2005/4/3																										
649	HDB-11						2005/5/6																										
650	HDB-11						2005/6/7																										
651	HDB-11						2005/7/5																										
652	HDB-11						2005/7/29																										
653	HDB-11						2004/9/9																										
654	HDB-11						2004/10/9																										
655	HDB-11						2004/11/5																										
656	HDB-11						2004/12/9																										
657	HDB-11						2005/1/7																										
658	HDB-11						2005/2/3																										
659	HDB-11						2005/3/13																										
660	HDB-11						2005/4/3																										
661	HDB-11						2005/5/6																										
662	HDB-11						2005/6/7																										
663	HDB-11						2005/7/5																										
664	HDB-11						2005/7/29																										
665	HDB-11	70					2004/9/16					2.0.E+06	6.7.E+03	N.D		3.5.E+03	5.4.E+03	N.D.				9.0.E+02		9.0.E+02			3.3.E+00	3.3		N.D.			
666	HDB-11						2005/7/7	0.04	<0.1	<1	<1	1.3.E+04	8.7.E+02	N.D.		4.9.E+01	7.9.E+02	N.D.				7.0.E+00		2.2.E+01			N.D.	N.D.		N.D.			
667	HDB-11		100.66		-33.81		2004/10/29																										
668	HDB-11		153		-86.15		2004/10/30																										
669	HDB-11		200.18		-133.33		2004/11/17																										
670	HDB-11		299.55		-232.70		2004/11/21																										
671	HDB-11		400.7		-333.85		2004/11/25																										
672	HDB-11		453		-386.15		2004/11/27	24	78	1	1																						
673	HDB-11		500		-433.15		2005/1/7																										
674	HDB-11		600.61		-533.76		2005/1/12	120	89	1	1																						
675	HDB-11		699.72		-632.87		2005/1/19																										
676	HDB-11		803		-736.15		2005/1/26	35	212	1	1																						
677	HDB-11		900		-833.15		2005/5/12																										
678	HDB-11		1000		-933.15		2005/5/24																										
679	HDB-11		1020		-953.15		2005/5/26																										
680	HDB-11						2005/7/19																										
681	HDB-11	224.96	236.3	-158.112	-169.452	3	2006/12/22																										
682	HDB-11	395.61	404.45	-328.762	-337.602	5	2006/12/22																										
683	HDB-11	224.96	236.3	-158.112	-169.452	3	2009/10/26																										
684	HDB-11	395.61	404.45	-328.762	-337.602	5	2009/10/28																										
685	HDB-11	621.13	631.99	-554.282	-565.142	9	2009/10/26																										
686	H-17-1-01	35	38	24.511	21.511		2007/10/18																										
687	HGW-V-01	20	23	40	37		2006/4/30																										
688	HGW-V-01	25	26	35	34		2006/5/28																										
689	HGW-V-03	9	12	51	48		2006/10/10																										
690	HGW-V-03	38	40	22	20		2006/10/15																										
691	PB-V01	182.30	182.89	-122.3	-122.9		2007/12/12																										
692	PB-V01	206.45	206.75	-146.45	-146.8		2007/12/14																										
693	PB-V01	218.27	218.57	-158.27	-158.6		2007/12/14																										
694	PB-V01	247.38	247.68	-187.38	-187.7		2007/12/16																										
695	PB-V01	264.0		-204.00																													
696	PB-V01	276.26	276.56	-216.26	-216.6		2007/12/18																										
697	PB-V01	280		-220.00																													

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (33/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII)			location (WGS84, UTM, Zone54)			Physico-chemical parameter							Contamination indicator				Comments
		Min.	Max.	Min.	Max.							X	Y	Z (middle depth)	East	North	Z (middle depth)	EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temper-ature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	
		[m]	[m]	[m]	[m]													[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]	[mg/l]		
698	PB-V01	289.5		-229.50					core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-229.50	567694.876190	4988362.123780	-229.50		950										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [11]
699	PB-V01	297.3		-237.30					core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-237.30	567694.876190	4988362.123780	-237.30		990										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [11]
700	PB-V01	304.86	305.16	-244.86	-245.2		2007/12/20		core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-245.01	567694.876190	4988362.123780	-245.01		1090										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [11]
701	PB-V01	335.60	335.90	-275.60	-275.9		2007/12/22		core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-275.75	567694.876190	4988362.123780	-275.75		1260										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [11]
702	PB-V01	342.48	342.78	-282.48	-282.8		2007/12/23		core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-282.63	567694.876190	4988362.123780	-282.63		1320										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [11]
703	PB-V01	375.17	375.47	-315.17	-315.5		2008/1/19		core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-315.32	567694.876190	4988362.123780	-315.32		1520										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [11]
704	PB-V01	403.00	403.30	-343.00	-343.3		2008/1/21		core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-343.15	567694.876190	4988362.123780	-343.15		1940										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [11]
705	PB-V01	419.00	419.25	-359.00	-359.3		2008/1/23		core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-359.13	567694.876190	4988362.123780	-359.13		1990										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [11]
706	PB-V01	448.70	449.00	-388.70	-389.0		2008/1/25		core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-388.85	567694.876190	4988362.123780	-388.85		>2000										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [11]
707	PB-V01	472.10	472.40	-412.10	-412.4		2008/1/27		core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-412.25	567694.876190	4988362.123780	-412.25		>2000										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [11]
708	PB-V01	489.49	489.79	-429.49	-429.8		2008/1/29		core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-429.64	567694.876190	4988362.123780	-429.64		>2000										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [11]
709	PB-V01	505.70	506.00	-445.70	-446.0		2008/1/30		core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-445.85	567694.876190	4988362.123780	-445.85		>2000										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [11]
710	PB-V01	516.00	516.30	-456.00	-456.3		2008/1/31		core	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-456.15	567694.876190	4988362.123780	-456.15		>2000										pore water extraction: squeeze (300MPa), referred from CRIEPI, 2009a [11]
711	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/12 19:30	2008/9/22-11/5	pump	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116238.9221	-30755.5000	-180.89	567694.876190	4988362.123780	-180.89	32	37	8.1	8.1	107	313		2.93	9.6		A	
712	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/12 22:30	2008/9/22-11/5	pump	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116238.9221	-30755.5000	-180.89	567694.876190	4988362.123780	-180.89	515	540	7.2	8.5	15	221		1.35	4.19		A	
713	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/12 23:30	2008/9/22-11/5	pump	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116238.9221	-30755.5000	-180.89	567694.876190	4988362.123780	-180.89	706	720	7.2	8.4	-19	187		0.62	2.4		A	
714	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/13 0:30	2008/9/22-11/5	pump	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116238.9221	-30755.5000	-180.89	567694.876190	4988362.123780	-180.89	776	790	7.2	8.3	-28	178		0.33	1.62		A	
715	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/14 9:10	2008/2/13-2/26	pump	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116238.9221	-30755.5000	-180.89	567694.876190	4988362.123780	-180.89	813	830	7.3	7.9	-162	44		0.07	0.66		A	
716	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/14 8:30	2008/9/22-11/5	pump	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116238.9221	-30755.5000	-180.89	567694.876190	4988362.123780	-180.89	813	820	7.3	8.3	-162	44		0.07	0.66		A	
717	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 14:30	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-210.36	567694.876190	4988362.123780	-210.36	18	21	7.9	7.8	138	344		3.07	9.7		A	
718	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 20:00	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-210.36	567694.876190	4988362.123780	-210.36	149	250	7.5	8.6	35	241		2.35	7.77		A	
719	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 20:30	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-210.36	567694.876190	4988362.123780	-210.36	380	450	7.4	8.6	24	230		1.61	5.76		A	
720	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 21:30	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-210.36	567694.876190	4988362.123780	-210.36	651	720	7.6	8.5	-30	176		0.73	2.97		A	
721	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/8 12:30	2008/2/13-2/26	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-210.36	567694.876190	4988362.123780	-210.36	949	970	7.5	7.8	-135	71		0.04	0.52		A	
722	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/8 12:30	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-210.36	567694.876190	4988362.123780	-210.36	949	940	7.5	8.2	-135	71		0.04	0.52		A	
723	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 1:00	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-303.33	567694.876190	4988362.123780	-303.33	19	20	9	7.4	124	330		2.79	9.03		A	
724	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 12:00	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-303.33	567694.876190	4988362.123780	-303.33	114	130	6.7	8.1	42	248		2.47	7.05		A	
725	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 13:00	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-303.33	567694.876190	4988362.123780	-303.33	419	460	6.8	8.4	-9	197		1.93	4.93		A	
726	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 16:00	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-303.33	567694.876190	4988362.123780	-303.33	1246	1200	6.9	8.2	-56	150		0.61	2.07		A	
727	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/27 13:05	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-303.33	567694.876190	4988362.123780	-303.33	1737	1700	6.9	8.2	-195	11		0.015	0.43		A	
728	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 1:00	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-303.33	567694.876190	4988362.123780	-303.33	21	20	8.6	7.5	124	330		3.10	9.28		A	
729	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 19:00	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-303.33	567694.876190	4988362.123780	-303.33	534	540	6.8	8.1	46	252		2.23	6.38		A	
730	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 21:00	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-303.33	567694.876190	4988362.123780	-303.33	1072	1100	6.8	7.8	19	225		1.28	3.95		A	
731	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 23:30	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-303.33	567694.876190	4988362.123780	-303.33	1383	1400	6.8	7.9	-11	195		0.59	1.93		A	
732	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/8 17:30	2008/9/22-11/5	pump	Wakkanai Fm.	siliceous mudstone	116238.9221	-30755.5000	-303.33	567694.876190	4988362.123780	-303.33	1755	1800	6.8	8.3	-136	70	24.9	0.013	0.34		A	
733	SAB-1	266.5	286.55	-206.5	-226.55		2008/12/1		bottle	Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116187.0000	-30707.7630	-216.53	567743.3967	4988310.958	-216.53			6.9			-27						referred from AIST, 2011 [17]
734	SAB-1	270	289	-210	-229	2	2009/12/15		pump	Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-219.50	567743.3967	4988310.958	-219.50			7.1			-185						unit for CO2, CH4:mM, unit for H2: M. referred from AIST, 2011 [17]
735	SAB-1	270	289	-210	-229	2	2009/12/15		pump	Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-219.50	567743.3967	4988310.958	-219.50												referred from AIST, 2011 [17]
736	SAB-1	270	289	-210	-229	2	2010			Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-219.50	567743.3967	4988310.958	-219.50			7.2									P: analyzed as PO_4, referred from AIST, 2011 [17]
737	SAB-1	270	289	-210	-229	2	2010			Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-219.50	567743.3967	4988310.958	-219.50												referred from AIST, 2011 [17]
738	SAB-1	270	289	-210	-229	2	2010			Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-219.50	567743.3967	4988310.958	-219.50												referred from AIST, 2011 [17]
739	SAB-1	319.3	328	-259.3	-268		2008/12/12		bottle	Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-263.65	567743.3967	4988310.958	-263.65			6.6			-63						referred from AIST, 2011 [17]
740	SAB-1	319.3	328	-259.3	-268		2008/12/12		bottle	Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-263.65	567743.3967	4988310.958	-263.65												P: analyzed as PO_4, referred from AIST, 2011 [17]
741	SAB-1	310	339	-250	-279	4	2009/12/9		pump	Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-264.50	567743.3967	4988310.958	-264.50			6.8			-132						P: analyzed as PO_4, referred from AIST, 2011 [17]
742	SAB-1	310	339	-250	-279	4	2009/12/9		pump	Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-264.50	567743.3967	4988310.958	-264.50												referred from AIST, 2011 [17]
743	SAB-1	310	339	-250	-279	4	2010			Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-264.50	567743.3967	4988310.958	-264.50			6.9			-35						P: analyzed as PO_4, referred from AIST, 2011 [17]
744	SAB-1	310	339	-250	-279	4	2010			Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-264.50	567743.3967	4988310.958	-264.50												referred from AIST, 2011 [17]
745	SAB-1	310	339	-250	-279	4	2010			Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-264.50	567743.3967	4988310.958	-264.50												referred from AIST, 2011 [17]
746	SAB-1	470.3	512.8	-410.3	-452.8		2009/1/31		bottle	Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-431.55	567743.3967	4988310.958	-431.55			6.3									referred from AIST, 2011 [17]
747	SAB-1	470.3	512.8	-410.3	-452.8		2009/1/31		bottle	Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-431.55	567743.3967	4988310.958	-431.55												referred from AIST, 2011 [17]
748	SAB-1	470.3	512.8	-410.3	-452.8		2009/1/31		bottle	Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-431.55	567743.3967	4988310.958	-431.55												referred from AIST, 2011 [17]
749	SAB-1	465	512	-405	-452	6	2009/12/4		pump	Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-428.50	567743.3967	4988310.958	-428.50			6.4			-78						P: analyzed as PO_4, referred from AIST, 2011 [17]
750	SAB-1	465	512	-405	-452	6	2010		bottle	Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-428.50	567743.3967	4988310.958	-428.50			6.3			-72						P: analyzed as PO_4, referred from AIST, 2011 [17]
751	SAB-1	465	512	-405	-452	6	2010		bottle	Wakkanai Fm.	siliceous mudstone	116187.0000	-30707.7630	-428.50	567743.3967	4988310.958	-428.50												referred from AIST, 2011 [17]
752	SAB-2	100.75	100.95	-10.754	-10.954				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-10.85	569569.3467	4987689.046	-10.85												referred from JAEA, 2011 [18]
753	SAB-2	151.00	151.35	-61.004	-61.354				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-61.18	569569.3467	4987689.046	-61.18												referred from JAEA, 2011 [18]
754	SAB-2	197.00	197.30	-107.004	-107.304				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-107.15	569569.3467	4987689.046	-107.15												referred from JAEA, 2011 [18]
755	SAB-2	249.30	249.60	-159.304	-159.604				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-159.45	569569.3467	4987689.046	-159.45												referred from JAEA, 2011 [18]
756	SAB-2	299.11	299.40	-209.114	-209.404				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-209.26	569569.3467	4987689.046	-209.26												referred from JAEA, 2011 [18]
757	SAB-2	346.00	346.35	-256.004	-256.354				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-256.18	569569.3467	4987689.046	-256.18												referred from JAEA, 2011 [18]
758	SAB-2	399.00	399.33	-309.004	-309.334				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-309.17	569569.3467	4987689.046	-309.17												referred from JAEA, 2011 [18]
759	SAB-2	451.00	451.35	-361.004	-361.354				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-361.18	569569.3467	4987689.046	-361.18												referred from JAEA, 2011 [18]
760	SAB-2	481.40	481.70	-391.404	-391.704				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-391.55	569569.3467	4987689.046	-391.55												referred from JAEA, 2011 [18]
761	SAB-2	501.00	501.30	-411.004	-411.304				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-411.15	569569.3467	4987689.046	-411.15												referred from JAEA, 2011 [18]
762	SAB-2	550.72	551.00	-460.724	-461.004				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-460.86	569569.3467	4987689.046	-460.86												referred from JAEA, 2011 [18]
763	SAB-2	584.05	584.35	-494.054	-494.354				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-494.20	569569.3467	4987689.046	-494.20												referred from JAEA, 2011 [18]
764	SAB-2	598.40	598.70	-508.404	-508.704				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-508.55	569569.3467	4987689.046	-508.55												referred from JAEA, 2011 [18]
765	SAB-2	650.70	651.00	-560.704	-561.004				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-560.85	569569.3467	4987689.046	-560.85												referred from JAEA, 2011 [18]
766	SAB-2	671.40	671.70	-581.404	-581.704				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-581.55	569569.3467	4987689.046	-581.55												referred from JAEA, 2011 [18]
767	SAB-2	702.40	702.70	-612.404	-612.704				core	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-612.55	569569.3467	4987689.046	-612.55												referred from JAEA, 2011 [18]
768	SAB-2	242.00	297.05	-152.004	-207.054		2010/3/27		pump	Wakkanai Fm.	siliceous mudstone	115536.8090	-28891.1720	-179.53	569569.3467	4987689.046	-179.53	1147		7.03	7.57		-45			1			referred from JAEA, 2011 [18]
769	SAB-3	27.00	27.29	-17.657	-17.947				core	Yuchi Fm.		114560.1810	-35232.7220	-17.80	563245.2621	4986614.925	-17.80				8.7									referred from JAEA, 2011 [18]
770	SAB-3	70.30	70.50	-60.957	-61.157				core	Yuchi Fm.		114560.1810	-35232.7220	-61.06	563245.2621	4986614.925	-61.06				8.9									referred from JAEA, 2011 [18]
771	SAB-3	108.22	108.41	-98.877	-99.067				core	Yuchi Fm.		114560.1810	-35232.7220	-98.97	563245.2621	4986614.925	-98.97				8.7									referred from JAEA, 2011 [18]
772	SAB-3	154.00	154.25	-144.657	-144.907				core	Koetoi Fm.	siliceous mudstone	114560.1810	-35232.7220	-144.78	563245.2621	4986614.925	-144.78				8.7									referred from JAEA, 2011 [18]
773	SAB-4	30.22	30.45	-20.877	-21.107				core	Yuchi Fm.		110769.0160	-34131.4870	-20.99	564404.5567	4982842.202	-20.99				8.5									referred from JAEA, 2011 [18]
774	SAB-4	68.00	68.37	-58.657	-59.027				core	Koetoi Fm.	siliceous mudstone	110769.0160	-34131.4870	-58.84	564404.5567	4982842.202	-58.84				8.6									referred from JAEA, 2011 [18]
775	SAB-4	111.50	111.77	-102.157	-102.427				core	Koetoi Fm.	siliceous mudstone	110769.0160	-34131.4870	-102.29	564404.5567	4982842.202	-102.29				8.5									referred from JAEA, 2011 [18]
776	SAB-4	148.18	148.50	-138.837	-139.157				core	Koetoi Fm.	siliceous mudstone	110769.0160	-34131.4870	-139.00	564404.5567	4982842.202	-139.00				8.7									referred from JAEA, 2011 [18]
777	SFI-1	20.35	20.50	-15.137	-15.287				core	Alluvium		110661.804	-44317.522	-15.21	554224.1946	4982577.955	-15.21		134										sample name: SFI-01p, pore water extraction: squeeze (200MPa), referred from CRIEPI, 2009a [11]
778	SFI-1	20.35	20.50	-15.137	-15.287				core	Alluvium		110661.804	-44317.522	-15.21	554224.1946	4982577.955	-15.21		162										sample name: SFI-01p, pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2009a [11]
779	SFI-1	37.85	39.63	-32.637	-34.417				core	Alluvium		110661.804	-44317.522	-33.53	554224.1946	4982577.955	-33.53		380										sample name: SFI-02p, pore water extraction: squeeze (200MPa), referred from CRIEPI, 2009a [11]
780	SFI-1	37.85	39.63	-32.637	-34.417				core	Alluvium		110661.804	-44317.522	-33.53	554224.1946	4982577.955	-33.53		420										sample name: SFI-02p, pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2009a [11]
781	SFI-1	49.00	49.60	-43.787	-44.387				core	Alluvium		110661.804	-44317.522	-44.09	554224.1946	4982577.955	-44.09		240										sample name: SFI-03p, pore water extraction: squeeze (200MPa), referred from CRIEPI, 2009a [11]
782	SFI-1	49.00	49.60	-43.787	-44.387				core	Alluvium		110661.804	-44317.522	-44.09	554224.1946	4982577.955	-44.09		200										sample name: SFI-03p, pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2009a [11]
783	SFI-1	60.25	61.90	-55.037	-56.687				core	Alluvium		110661.804	-44317.522	-55.86	554224.1946	4982577.955	-55.86		132										sample name: SFI-04p, pore water extraction: squeeze (200MPa), referred from CRIEPI, 2009a [11]
784	SFI-1	60.25	61.90	-55.037	-56.687				core	Alluvium		110661.804	-44317.522	-55.86	554224.1946	4982577.955	-55.86		124										sample name: SFI-04p, pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2009a [11]
785	SFI-1	72.50	72.85	-67.287	-67.637				core	Alluvium		110661.804	-44317.522	-67.46	554224.1946	4982577.955	-67.46		79										sample name: SFI-05p, pore water extraction: squeeze (200MPa), referred from CRIEPI, 2009a [11]

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (34/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Geochemistry																																						
		Min.	Max.	Min.	Max.			Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr^+	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
698	PB-V01	289.5		-229.50				2598	51	47	34														2560	26	7.1				275														
699	PB-V01	297.3		-237.30				2368	54	36	34														2680	33	7.7				653														
700	PB-V01	304.86	305.16	-244.86	-245.2		2007/12/20	2760	170	19	41														2770	23	9.3				3.28														
701	PB-V01	335.60	335.90	-275.60	-275.9		2007/12/22	3120	57	24	54														3550	22	11.0				6.05														
702	PB-V01	342.48	342.78	-282.48	-282.8		2007/12/23	3180	57	27	55														3930	25	12.3				5.6														
703	PB-V01	375.17	375.47	-315.17	-315.5		2008/1/19	3980	52	31	92														5370	51	15.6				5.86														
704	PB-V01	403.00	403.30	-343.00	-343.3		2008/1/21	4906	70	55	127														6777	59	21.0				5.88														
705	PB-V01	419.00	419.25	-359.00	-359.3		2008/1/23	5478	68	32	138														7276	67	21.0				4.97														
706	PB-V01	448.70	449.00	-388.70	-389.0		2008/1/25	5622	64	53	149														8130	69					10.8														
707	PB-V01	472.10	472.40	-412.10	-412.4		2008/1/27	6220	64	53	176														8970	92	29.3				8.14														
708	PB-V01	489.49	489.79	-429.49	-429.8		2008/1/29	6506	64	29	176														9375	87	30.2				5.01														
709	PB-V01	505.70	506.00	-445.70	-446.0		2008/1/30	6270	61	59	174														9109	94	27.8				5.58														
710	PB-V01	516.00	516.30	-456.00	-456.3		2008/1/31	6156	51	62	188														8899	92	33.3				5.67														
711	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/12 19:30	57	2.6	8.9	2.7		<0.01	0.08	35		0.03	<0.01	<0.1	<0.01	0.03		<0.01	0.19	50	0.3	<1	3.8		0.01	14	<0.1	81	0.5	70				2.9	16		3.2	3.1	0.1
712	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/12 22:30	1200	32	31	17		0.01	2.0	44		0.15	<0.01	0.3	<0.01	0.52		0.32	0.18	1200	7.9	3.3	140		0.02	11	<0.1	930	14	850				9.5	190		56.3	52.1	3.8
713	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/12 23:30	1600	44	37	21		<0.01	3.2	48		0.23	<0.01	0.4	<0.01	<0.01		<0.01	0.19	1600	11	4.4	190		0.01	11	<0.1	1300	16	1200				11	260		74.7	70.4	3.0
714	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/13 0:30	1800	48	44	22		0.02	3.5	51		0.26	<0.01	0.5	<0.01	<0.01		<0.01	0.18	1800	12	5	210		0.02	13	<0.1	1500	16	1300				12	300		84.0	79.7	2.6
715	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/14 9:10	1700	54	42	23		0.03	4.1	62		0.53	<0.01	0.9	<0.01	0.02		<0.01	0.18	1800	12	5.7	0.1		74	5.7	<0.1	2200	8.7	1800				14	440		84.0	87.4	-2.0
716	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/14 8:30	1800	55	20	22		<0.01	3.6	62		0.18	<0.01	0.8	<0.01	0.01		<0.01	0.2	1800	12	5	0.02		74	6.3	<0.1	1900	21	1700				12	390		87.1	82.9	2.5
717	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 14:30	27	1.7	7.9	2.8		<0.01	<0.01	36		0.02	<0.01	<0.1	<0.01	<0.01		<0.01	0.19	23	<0.1	<1	0.09		0.01	11	<0.1	51	0.2	46				2.7	10		1.8	1.7	0.1
718	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 20:00	530	11	13	3.5		<0.01	0.5	31		0.07	<0.01	<0.1	<0.01	0.04		0.03	0.32	460	3	0.69	82		0.02	120	<0.1	350	7.2	320				6.9	70		24.3	22.8	3.2
719	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 20:30	970	22	19	8.5		<0.01	1.1	31		0.13	<0.01	0.1	<0.01	0.03		0.01	0.29	1100	6.2	2.3	130		0.05	110	<0.1	660	14	610				8.5	130		44.5	46.8	-2.4
720	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 21:30	1700	40	18	18		<0.01	2.6	36		0.17	<0.01	0.3	<0.01	0.01		<0.01	0.22	1700	11	4.6	190		0.02	64	<0.1	1100	17	1100				11	230		77.7	71.1	4.5
721	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/8 12:30	2100	58	50	27		0.04	4.7	53		0.64	<0.01	0.7	<0.01	0.02		<0.01	0.16	2200	15	7.1	0.02		84	4	<0.1	2300	7.8	1900				15	470		102.8	100.2	1.3
722	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/8 12:30	2100	59	50	29		<0.01	3.9	53		0.26	<0.01	0.7	<0.01	0.01		<0.01	0.17	2200	16	6.6	47		0.08	4.2	<0.1	1700	15	1500				13	340		98.3	91.4	3.6
723	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 1:00	19	2	15	3		<0.01	0.0	39		0.07	<0.01	0.1	<0.01	<0.01		<0.01	0.21	19	<0.1	<1	0.46		<0.2	8.1	<0.1	62	<0.1	56				2.3	14		1.9	1.7	0.1
724	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 12:00	250	6.7	17	5.3		<0.01	0.4	34		0.15	<0.01	<0.1	<0.01	0.02		<0.01	0.18	290	2	0.16	25		<0.2	26	<0.1	170	1.1	150				3.3	34		12.4	12.0	1.8
725	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 13:00	930	20	31	14		0.06	1.8	30		0.39	<0.01	<0.1	<0.01	0.01		<0.01	0.2	1200	8.1	0.41	97		0.08	57	<0.1	440	5.5	400				6.2	88		43.9	44.1	-0.2
726	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 16:00	2700	57	54	45		0.02	5.5	39		1.20	<0.01	0.3	<0.01	<0.01		<0.01	0.11	3400	24	4.8	25		0.08	40	<0.1	1300	11	1100				14	250		126.0	119.0	2.9
727	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/27 13:05	4000	81	27	67		<0.01	7.9	50		1.30	<0.01	0.5	<0.01	0.02		<0.01	0.05	5000	34	11	0.03		130	4.3	<0.1	2300	20	2100				18	460		191.2	179.8	3.1
728	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 1:00	23	1.9	13	3.1		<0.01	<0.01	38		0.02	<0.01	0.1	<0.01	<0.01		<0.01	0.21	22	<0.1	<1.0	1.6		0.01	8.7	<0.1	60	<0.1	53				2.5	13		2.0	1.8	0.1
729	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 19:00	1100	25	35	20		0.08	1.9	30		0.18	<0.01	<0.1	<0.01	<0.01		<0.01	0.15	1400	9.5	3.7	100		0.04	15	<0.1	570	3.8	500				8.3	110		52.1	51.0	1.1
730	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 21:00	2400	51	65	42		0.09	4.4	35		0.96	<0.01	0.3	<0.01	<0.01		<0.01	0.14	3000	21	8.8	20		4.2	13	<0.1	1100	3.8	990				12	230		113.2	103.5	4.5
731	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 23:30	3100	64	82	55		0.11	5.9	39		1.40	<0.01	0.4	<0.01	<0.01		<0.01	0.14	3900	28	11	21		38	9	<0.1	1700	6.7	1500				15	340		148.0	138.9	3.2
732	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/8 17:30	4000	83	100	72		0.03	7.7	51		1.80	<0.01	0.4	<0.01	<0.01		<0.01	0.07	5100	37	14	1.5		130	0.9	<0.1	2400	26	2200				19	490		195.3	184.4	2.9
733	SAB-1	266.5	286.55	-206.5	-226.55		2008/12/1															0.3			1999	13.68	4.73	0.05	<0.01	81	0.02	<0.001			2354.6				30				56.5	
734	SAB-1	270	289	-210	-229	2	2009/12/15															0.9			2246	15.41	5.48	<0.06	<0.01	74	1.53	0.0013			2143.8				11					
735	SAB-1	270	289	-210	-229	2	2009/12/15																																					
736	SAB-1	270	289	-210	-229	2	2010	1971	45.56	49.16	26.03					49.2			2.4					0.16	2331	15.35	3.829	<0.01	<0.01	73	7.2		1221		2000.5				14			95.5	86.0	5.2
737	SAB-1	270	289	-210	-229	2	2010																																					
738	SAB-1	270	289	-210	-229	2	2010																																					
739	SAB-1	319.3	328	-259.3	-268		2008/12/12															0.9			3537	24	8.17	0.18	<0.01	106	0.03	<0.001	2828		2684				39				146.3	
740	SAB-1	319.3	328	-259.3	-268		2008/12/12												0.4					0.15	3589	24.36	8.19	3.66			0.78		2804										147.5	
741	SAB-1	310	339	-250	-279	4	2009/12/9	3103	69.3	69.3	48.9		0.09	7.95		115	1.12		0.96		0.54	0.5		0.06	3610	24.9	12.1	<0.01	0.02	120	0.15	0.0033	2791		2791.1				17			152.0	147.8	1.4
742	SAB-1	310	339	-250	-279	4	2009/12/9																																					
743	SAB-1	310	339	-250	-279	4	2010	3239	63.7	73.6	47.13					83			1.07			0.7		0.09	4682	24.9	6.0	<0.01	<0.01	104	0.03	0.004	1700		2786.5				17			155.8	160.1	-1.4
744	SAB-1	310	339	-250	-279	4	2010																																					
745	SAB-1	310	339	-250	-279	4	2010																																					
746	SAB-1	470.3	512.8	-410.3	-452.8		2009/1/31																	0.18	8931	70.1	11.3	0.8	<0.01	159	26.10		2346						66				291.5	
747	SAB-1	470.3	512.8	-410.3	-452.8		2009/1/31																	0.17	8810	68.3	5.7	6.0	393		359		2324										303.2	
748	SAB-1	470.3	512.8	-410.3	-452.8		2009/1/31																		8954	69.0	7.3	1.4	267		322		2341										304.0	
749	SAB-1	465	512	-405	-452	6	2009/12/4	6315	102.5	218.6	153.5		0.21	12.65		91.5	4.15		0.06		2.57	2.3		0.04	9780	67.7	32.1	<0.01	0.58	213	2.86	0.008	2447		2447.2				16			314.4	316.5	-0.3
750	SAB-1	465	512	-405	-452	6	2010	6583	90.4	143.1	148.7					94.6			0.6			3.5		0.05	9157	71	21.87	<0.01	0.05	169	4.3	0.0033	1455		2384				21			317.3	282.8	5.8
751	SAB-1	465	512	-405	-452	6	2010																																					
752	SAB-2	100.75	100.95	-10.754	-10.954			160	7.5	3.8	2.7										<1.0				35	<1.0	<1.0				58		270	38								7.6	8.0	-2.6
753	SAB-2	151.00	151.35	-61.004	-61.354			300	5.6	1.5	0.7										<1.0				45	<1.0	<1.0				39		600	72								13.3	14.5	-4.2
754	SAB-2	197.00	197.30	-107.004	-107.304			620	16	1.7	0.9										<1.0				220	<1.0	<1.0				93		1100	65								27.5	28.5	-1.7
755	SAB-2	249.30	249.60	-159.304	-159.604			930	24	4.5	2.5										<1.0				540	2.0	<1.0				13		1500	59								41.5	42.2	-0.8
756	SAB-2	299.11	299.40	-209.114	-209.404			1400	18	13	6.6										<1.0				1100	4.0	1.7				52		1800	38								62.5	63.0	-0.4
757	SAB-2	346.00	346.35	-256.004	-256.354			2300	19	24	16										<1.0				2400	8.0	4.9				17		2000	0								103.0	100.8	1.1
758	SAB-2	399.00	399.33	-309.004	-309.334			2700	18	59	30										<1.0				3200	11	6.9				36		2000	0								123.3	123.8	-0.2
759	SAB-2	451.00	451.35	-361.004	-361.354			2600	15	42	29										<1.0				3100	11	5.7				28		1600	33								117.9	115.5	1.1
760	SAB-2	481.40	481.70	-391.404	-391.704			3100	22	56	23										<1.0				3900	15	2.1				570		400	160								140.0	134.2	2.1
761	SAB-2	501.00	501.30	-411.004	-411.304			2900	29	20	24										<1.0				3700	14	6.3				270		1200	0								129.8	129.7	0.1
762	SAB-2	550.72	551.00	-460.724	-461.004			2800	28	19	22										<1.0				3500	13	5.6				220		1100	71								125.2	123.9	0.5
763	SAB-2	584.05	584.35	-494.054	-494.354			3200	29	69	27										<1.0				3800	15	2.4				760		670	51								145.6	135.8	3.5
764	SAB-2	598.40	598.70	-508.404	-508.704			2900	27	21	23										<1.0				3600	13	5.8				130		1100	92								129.7	125.6	1.6
765	SAB-2	650.70	651.00	-560.704	-561.004			3000	25	20	27										<1.0				3800	14	6.5				130		1100	0								134.3	128.0	2.4
766	SAB-2	671.40	671.70	-581.404	-581.704			3600	24	58	25										<1.0				4400	15	2.6				860		620	0								162.1	152.2	3.2
767	SAB-2	702.40	702.70	-612.404	-612.704			2500	23	21	19										<1.0				3100	12	4.3				93		1000	51								111.9	107.6	2.0
768	SAB-2	242.00	297.05	-152.004	-207.054		2010/3/27	1200	15	19	7				38	41.0			0.3		8.50	<0.1	4.90	0.2	830	<0.1	2.0				16	<0.1	1900	0	1600				84	230		54.8	54.9	-0.1
769	SAB-3	27.00	27.29	-17.657	-17.947			1200	66	25	39										<1.0				1300	14	2.8				690		490	44								58.3	60.7	-2.0
770	SAB-3	70.30	70.50	-60.957	-61.157			2100	120	5.1	16										<1.0				2100	22	5.5				530		1000	250								96.0	95.8	0.1
771	SAB-3	108.22	108.41	-98.877	-99.067			4400	280	18	82										<1.0				6000	57	22				880		1200	290								206.1	218.1	-2.8
772	SAB-3	154.00	154.25	-144.657	-144.907			8300	480	60	290										<1.0				12000	133	59				370		3100	540								400.0	417.5	-2.1
773	SAB-4	30.22	30.45	-20.877	-21.107			2400	160	140	140										<1.0				3100	32	7.0				950		850	76								127.0	124.1	1.1
774	SAB-4	68.00	68.37	-58.657	-59.027			8300	460	55	110										<1.0				11000	127	35				680		2300	320								384.4	374.7	1.3
775	SAB-4	111.50	111.77	-102.157	-102.427			9600	540	64	140										<1.0				14000	161	47				270		3200	210								445.9	462.0	-1.8
776	SAB-4	148.18	148.50	-138.837	-139.157			9500	540	54	110										<1.0				13000	152	33				230		2400	540								438.6	431.5	0.8
777	SFI-1	20.35	20.50	-15.137	-15.287			147	48.5	74.7	41.4														66.5	0.4	<0.2				363													
778	SFI-1	20.35	20.50	-15.137	-15.287			172	57.3	129	55.3														68.5	0.4	<0.2				501													
779	SFI-1	37.85	39.63	-32.637	-34.417			1000	22.5	127	30.9														178	<1.0	<1.0				1180													
780	SFI-1	37.85	39.63	-32.637	-34.417			872	21.3	25.9	21.9														120	<1.0	<1.0				1295													
781	SFI-1	49.00	49.60	-43.787	-44.387			575	33.3	34	49.2														237	2.3	0.7				81.3													
782	SFI-1	49.00	49.60	-43.787	-44.387			451	36.6	17.1	25.9														281	2.8	0.7				115													
783	SFI-1	60.25	61.90	-55.037	-56.687			149	26.8	37.6	46.8														203	2.2	0.7				75.8													
784	SFI-1	60.25	61.90	-55.037	-56.687			126	33.7	24.8	33.2														264	2.9	0.9				114													
785	SFI-1	72.50	72.85	-67.287	-67.637			121	8.1	18	12.6														113	1.1	0.5				83.9													

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (35/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases																								Isotopes												
		Min.	Max.	Min.	Max.				Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{36}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_w]	[cc_{STP}/g_w]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
698	PB-V01	289.5		-229.50																													-52	-5.2											
699	PB-V01	297.3		-237.30																													-51	-4.7						5.4 ± 1.1					
700	PB-V01	304.86	305.16	-244.86	-245.2		2007/12/20																										-50	-4.1											
701	PB-V01	335.60	335.90	-275.60	-275.9		2007/12/22																										-44	-2.7											
702	PB-V01	342.48	342.78	-282.48	-282.8		2007/12/23																										-42	-2.0						3.2 ± 1.1					
703	PB-V01	375.17	375.47	-315.17	-315.5		2008/1/19																										-35	-0.3											
704	PB-V01	403.00	403.30	-343.00	-343.3		2008/1/21																										-28	1.4						4.8 ± 1.3					
705	PB-V01	419.00	419.25	-359.00	-359.3		2008/1/23																										-26	1.5											
706	PB-V01	448.70	449.00	-388.70	-389.0		2008/1/25																										-24	2.2											
707	PB-V01	472.10	472.40	-412.10	-412.4		2008/1/27																										-23	2.3						3.0 ± 0.9					
708	PB-V01	489.49	489.79	-429.49	-429.8		2008/1/29																										-22	2.6											
709	PB-V01	505.70	506.00	-445.70	-446.0		2008/1/30																										-22	2.7						1.8 ± 0.7					
710	PB-V01	516.00	516.30	-456.00	-456.3		2008/1/31																										-22	2.8											
711	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/12 19:30	x																																					
712	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/12 22:30	x																																					
713	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/12 23:30	x																																					
714	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/13 0:30	x																																					
715	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/14 9:10	×																								<0.3	-63.3	-7.1										
716	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/14 8:30	×																																					
717	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 14:30	x																																					
718	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 20:00	x																																					
719	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 20:30	x																																					
720	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 21:30	x																																					
721	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/8 12:30	×																								<0.3	-57.7	-6.1										
722	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/8 12:30	×																																					
723	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 1:00	×																								2.3 ±0.1	-74.3	-9.3										
724	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 12:00	×																								2.5 ±0.1	-74.8	-9.0										
725	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 13:00	×																								2.3 ±0.1	-68.9	-7.5										
726	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 16:00	×																								0.9 ±0.1	-61.8	-3.3										
727	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/27 13:05	×																								<0.2	-45.6	-0.9										
728	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 1:00	×																								2.1 ±0.1	-70.4	-9.3										
729	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 19:00	×																								1.5 ±0.1	-60.3	-6.7										
730	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 21:00	×																								1.0 ±0.1	-58.4	-4.2										
731	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 23:30	×																								0.4 ±0.1	-49.4	-2.8										
732	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/8 17:30	×																								<0.2	-41.9	-0.9										
733	SAB-1	266.5	286.55	-206.5	-226.55		2008/12/1	○																									-60	-6.2											
734	SAB-1	270	289	-210	-229	2	2009/12/15	○																									-57	-6.3											
735	SAB-1	270	289	-210	-229	2	2009/12/15																																						
736	SAB-1	270	289	-210	-229	2	2010																														18.0								
737	SAB-1	270	289	-210	-229	2	2010																														18.0								
738	SAB-1	270	289	-210	-229	2	2010																														17.6								
739	SAB-1	319.3	328	-259.3	-268		2008/12/12																										-47	-2.8											
740	SAB-1	319.3	328	-259.3	-268		2008/12/12																										-46	-2.9											
741	SAB-1	310	339	-250	-279	4	2009/12/9	○																									-46	-3.1											
742	SAB-1	310	339	-250	-279	4	2009/12/9																																						
743	SAB-1	310	339	-250	-279	4	2010	○																													18.4								
744	SAB-1	310	339	-250	-279	4	2010																														18.4								
745	SAB-1	310	339	-250	-279	4	2010																														18.1								
746	SAB-1	470.3	512.8	-410.3	-452.8		2009/1/31																										-26	1.6											
747	SAB-1	470.3	512.8	-410.3	-452.8		2009/1/31																										-25	1.6											
748	SAB-1	470.3	512.8	-410.3	-452.8		2009/1/31																										-26	1.7											
749	SAB-1	465	512	-405	-452	6	2009/12/4	○																									-22	2.4											
750	SAB-1	465	512	-405	-452	6	2010	○																													11.9								
751	SAB-1	465	512	-405	-452	6	2010																														12.6								
752	SAB-2	100.75	100.95	-10.754	-10.954																												-72.3	-11.1						28					
753	SAB-2	151.00	151.35	-61.004	-61.354																												-73.3	-11.3						31					
754	SAB-2	197.00	197.30	-107.004	-107.304																												-76.8	-10.7						10					
755	SAB-2	249.30	249.60	-159.304	-159.604																												-65.2	-8.6						8					
756	SAB-2	299.11	299.40	-209.114	-209.404																												-55.4	-6.0						6					
757	SAB-2	346.00	346.35	-256.004	-256.354																												-43.3	-3.2						4					
758	SAB-2	399.00	399.33	-309.004	-309.334																												-32.9	-0.8						4.4					
759	SAB-2	451.00	451.35	-361.004	-361.354																												-30.3	-0.5						3.6					
760	SAB-2	481.40	481.70	-391.404	-391.704																												-27.3	0.7						59					
761	SAB-2	501.00	501.30	-411.004	-411.304																												-30.1	0.2						78					
762	SAB-2	550.72	551.00	-460.724	-461.004																												-29.8	0.2						14.2					
763	SAB-2	584.05	584.35	-494.054	-494.354																												-26.0	0.3						21					
764	SAB-2	598.40	598.70	-508.404	-508.704																												-29.0	0.3						21.1					
765	SAB-2	650.70	651.00	-560.704	-561.004																												-28.6	0.3						9.8					
766	SAB-2	671.40	671.70	-581.404	-581.704																												-26.0	0.4						17					
767	SAB-2	702.40	702.70	-612.404	-612.704																												-27.9	0.2						6.8					
768	SAB-2	242.00	297.05	-152.004	-207.054		2010/3/27	○																								<0.23	-66.2	-8.6						6.10				0.70781
769	SAB-3	27.00	27.29	-17.657	-17.947																												-68.4	-9.7											
770	SAB-3	70.30	70.50	-60.957	-61.157																												-68.3	-8.4											
771	SAB-3	108.22	108.41	-98.877	-99.067																												-50.9	-5.2											
772	SAB-3	154.00	154.25	-144.657	-144.907																												-28.6	-0.1											
773	SAB-4	30.22	30.45	-20.877	-21.107																												-60.4	-8.2											
774	SAB-4	68.00	68.37	-58.657	-59.027																												-33.6	-0.3											
775	SAB-4	111.50	111.77	-102.157	-102.427																												-21.4	2.2											
776	SAB-4	148.18	148.50	-138.837	-139.157																												-24.0	1.8											
777	SFI-1	20.35	20.50	-15.137	-15.287																																								
778	SFI-1	20.35	20.50	-15.137	-15.287																																								
779	SFI-1	37.85	39.63	-32.637	-34.417																																								
780	SFI-1	37.85	39.63	-32.637	-34.417																																								
781	SFI-1	49.00	49.60	-43.787	-44.387																												-73	-10.6						1.2 ± 0.6					
782	SFI-1	49.00	49.60	-43.787	-44.387																												-74	-10.6											
783	SFI-1	60.25	61.90	-55.037	-56.687																												-77	-10.8											
784	SFI-1	60.25	61.90	-55.037	-56.687																												-73	-9.9											
785	SFI-1	72.50	72.85	-67.287	-67.637																												-74	-10.6						4.2 ± 1.0					

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (36/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Organics				Microbiology																					
		Min.	Max.	Min.	Max.			Humic acid	Fuluvic acid	Acetate	Formate	Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
698	PB-V01	289.5		-229.50																													
699	PB-V01	297.3		-237.30																													
700	PB-V01	304.86	305.16	-244.86	-245.2		2007/12/20																										
701	PB-V01	335.60	335.90	-275.60	-275.9		2007/12/22																										
702	PB-V01	342.48	342.78	-282.48	-282.8		2007/12/23																										
703	PB-V01	375.17	375.47	-315.17	-315.5		2008/1/19																										
704	PB-V01	403.00	403.30	-343.00	-343.3		2008/1/21																										
705	PB-V01	419.00	419.25	-359.00	-359.3		2008/1/23																										
706	PB-V01	448.70	449.00	-388.70	-389.0		2008/1/25																										
707	PB-V01	472.10	472.40	-412.10	-412.4		2008/1/27																										
708	PB-V01	489.49	489.79	-429.49	-429.8		2008/1/29																										
709	PB-V01	505.70	506.00	-445.70	-446.0		2008/1/30																										
710	PB-V01	516.00	516.30	-456.00	-456.3		2008/1/31																										
711	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/12 19:30																										
712	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/12 22:30																										
713	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/12 23:30																										
714	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/13 0:30																										
715	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/14 9:10																										
716	PB-V01	233.86	247.91	-173.86	-187.91		2008/1/14 8:30																										
717	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 14:30																										
718	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 20:00																										
719	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 20:30																										
720	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/6 21:30																										
721	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/8 12:30																										
722	PB-V01	263.3	277.41	-203.3	-217.41		2008/1/8 12:30																										
723	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 1:00																										
724	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 12:00																										
725	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 13:00																										
726	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/26 16:00																										
727	PB-V01	355.8	370.85	-295.8	-310.85		2008/2/27 13:05																										
728	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 1:00																										
729	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 19:00																										
730	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 21:00																										
731	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/3 23:30																										
732	PB-V01	355.8	370.85	-295.8	-310.85		2008/3/8 17:30																										
733	SAB-1	266.5	286.55	-206.5	-226.55		2008/12/1					2.1.E+04																					
734	SAB-1	270	289	-210	-229	2	2009/12/15					1.1.E+05																					
735	SAB-1	270	289	-210	-229	2	2009/12/15																										
736	SAB-1	270	289	-210	-229	2	2010					4.0.E+03																					
737	SAB-1	270	289	-210	-229	2	2010																										
738	SAB-1	270	289	-210	-229	2	2010																										
739	SAB-1	319.3	328	-259.3	-268		2008/12/12																										
740	SAB-1	319.3	328	-259.3	-268		2008/12/12																										
741	SAB-1	310	339	-250	-279	4	2009/12/9					3.0.E+04																					
742	SAB-1	310	339	-250	-279	4	2009/12/9																										
743	SAB-1	310	339	-250	-279	4	2010					9.0.E+03																					
744	SAB-1	310	339	-250	-279	4	2010																										
745	SAB-1	310	339	-250	-279	4	2010																										
746	SAB-1	470.3	512.8	-410.3	-452.8		2009/1/31																										
747	SAB-1	470.3	512.8	-410.3	-452.8		2009/1/31																										
748	SAB-1	470.3	512.8	-410.3	-452.8		2009/1/31																										
749	SAB-1	465	512	-405	-452	6	2009/12/4					8.9.E+04																					
750	SAB-1	465	512	-405	-452	6	2010					1.5.E+04																					
751	SAB-1	465	512	-405	-452	6	2010																										
752	SAB-2	100.75	100.95	-10.754	-10.954																												
753	SAB-2	151.00	151.35	-61.004	-61.354																												
754	SAB-2	197.00	197.30	-107.004	-107.304																												
755	SAB-2	249.30	249.60	-159.304	-159.604																												
756	SAB-2	299.11	299.40	-209.114	-209.404																												
757	SAB-2	346.00	346.35	-256.004	-256.354																												
758	SAB-2	399.00	399.33	-309.004	-309.334																												
759	SAB-2	451.00	451.35	-361.004	-361.354																												
760	SAB-2	481.40	481.70	-391.404	-391.704																												
761	SAB-2	501.00	501.30	-411.004	-411.304																												
762	SAB-2	550.72	551.00	-460.724	-461.004																												
763	SAB-2	584.05	584.35	-494.054	-494.354																												
764	SAB-2	598.40	598.70	-508.404	-508.704																												
765	SAB-2	650.70	651.00	-560.704	-561.004																												
766	SAB-2	671.40	671.70	-581.404	-581.704																												
767	SAB-2	702.40	702.70	-612.404	-612.704																												
768	SAB-2	242.00	297.05	-152.004	-207.054		2010/3/27																										
769	SAB-3	27.00	27.29	-17.657	-17.947																												
770	SAB-3	70.30	70.50	-60.957	-61.157																												
771	SAB-3	108.22	108.41	-98.877	-99.067																												
772	SAB-3	154.00	154.25	-144.657	-144.907																												
773	SAB-4	30.22	30.45	-20.877	-21.107																												
774	SAB-4	68.00	68.37	-58.657	-59.027																												
775	SAB-4	111.50	111.77	-102.157	-102.427																												
776	SAB-4	148.18	148.50	-138.837	-139.157																												
777	SFI-1	20.35	20.50	-15.137	-15.287																												
778	SFI-1	20.35	20.50	-15.137	-15.287																												
779	SFI-1	37.85	39.63	-32.637	-34.417																												
780	SFI-1	37.85	39.63	-32.637	-34.417																												
781	SFI-1	49.00	49.60	-43.787	-44.387																												
782	SFI-1	49.00	49.60	-43.787	-44.387																												
783	SFI-1	60.25	61.90	-55.037	-56.687																												
784	SFI-1	60.25	61.90	-55.037	-56.687																												
785	SFI-1	72.50	72.85	-67.287	-67.637																												

Table 3.1 Chemical and isotopic composition of groundwater (37/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII)			location (WGS84, UTM, Zone54)			Physico-chemical parameter							Contamination indicator				Comments
		Min.	Max.	Min.	Max.							X	Y	Z (middle depth)	East	North	Z (middle depth)	EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temper-ature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	
		[m]	[m]	[m]	[m]													[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]	[mg/l]		
786	SFI-1	72.50	72.85	-67.287	-67.637				core	Alluvium		110661.804	-44317.522	-67.46	554224.1946	4982577.955	-67.46		77										sample name: SFI-05p, pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2009a [11]
787	SFI-1	107.40	110.00	-102.187	-104.787				core	Sarabetsu Fm.		110661.804	-44317.522	-103.49	554224.1946	4982577.955	-103.49		113										sample name: SFI-06p, pore water extraction: squeeze (200MPa), referred from CRIEPI, 2009a [11]
788	SFI-1	107.40	110.00	-102.187	-104.787				core	Sarabetsu Fm.		110661.804	-44317.522	-103.49	554224.1946	4982577.955	-103.49		200										sample name: SFI-06p, pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2009a [11]
789	SFI-1	120.10	123.90	-114.887	-118.687				core	Sarabetsu Fm.		110661.804	-44317.522	-116.79	554224.1946	4982577.955	-116.79		129										sample name: SFI-07p, pore water extraction: squeeze (200MPa), referred from CRIEPI, 2009a [11]
790	SFI-1	120.10	123.90	-114.887	-118.687				core	Sarabetsu Fm.		110661.804	-44317.522	-116.79	554224.1946	4982577.955	-116.79		167										sample name: SFI-07p, pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2009a [11]
791	SFI-1	130.00	130.50	-124.787	-125.287				core	Sarabetsu Fm.		110661.804	-44317.522	-125.04	554224.1946	4982577.955	-125.04		320										sample name: SFI-08p, pore water extraction: squeeze (200MPa), referred from CRIEPI, 2009a [11]
792	SFI-1	130.00	130.50	-124.787	-125.287				core	Sarabetsu Fm.		110661.804	-44317.522	-125.04	554224.1946	4982577.955	-125.04		280										sample name: SFI-08p, pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2009a [11]
793	SFI-1	142.40	144.00	-137.187	-138.787				core	Sarabetsu Fm.		110661.804	-44317.522	-137.99	554224.1946	4982577.955	-137.99		129										sample name: SFI-09p, pore water extraction: squeeze (200MPa), referred from CRIEPI, 2009a [11]
794	SFI-1	142.40	144.00	-137.187	-138.787				core	Sarabetsu Fm.		110661.804	-44317.522	-137.99	554224.1946	4982577.955	-137.99		189										sample name: SFI-09p, pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2009a [11]
795	SFI-1	154.30	154.80	-149.087	-149.587				core	Sarabetsu Fm.		110661.804	-44317.522	-149.34	554224.1946	4982577.955	-149.34		127										sample name: SFI-10p, pore water extraction: squeeze (200MPa), referred from CRIEPI, 2009a [11]
796	SFI-1	154.30	154.80	-149.087	-149.587				core	Sarabetsu Fm.		110661.804	-44317.522	-149.34	554224.1946	4982577.955	-149.34		101										sample name: SFI-10p, pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2009a [11]
797	DD-1	183.02	183.32	-177.807	-178.107				core	Sarabetsu Fm.	silt with coarse sand	110683.720	-44296.994	-177.96	554244.3763	4982600.178	-177.96		57										sample name: SFI-11, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
798	DD-1	183.02	183.32	-177.807	-178.107				core	Sarabetsu Fm.	silt with coarse sand	110683.720	-44296.994	-177.96	554244.3763	4982600.178	-177.96		55										sample name: SFI-11, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
799	DD-1	204.94	205.19	-199.727	-199.977				core	Sarabetsu Fm.	silt (bedded)	110683.720	-44296.994	-199.85	554244.3763	4982600.178	-199.85		60										sample name: SFI-12, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
800	DD-1	204.94	205.19	-199.727	-199.977				core	Sarabetsu Fm.	silt (bedded)	110683.720	-44296.994	-199.85	554244.3763	4982600.178	-199.85		57										sample name: SFI-12, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
801	DD-1	220.70	221.00	-215.487	-215.787				core	Sarabetsu Fm.	fine sand	110683.720	-44296.994	-215.64	554244.3763	4982600.178	-215.64		168										sample name: SFI-13, Tracer type: amino G acid, contamination ratio of drilling fluid: >10 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
802	DD-1	220.70	221.00	-215.487	-215.787				core	Sarabetsu Fm.	fine sand	110683.720	-44296.994	-215.64	554244.3763	4982600.178	-215.64		143										sample name: SFI-13, Tracer type: amino G acid, contamination ratio of drilling fluid: >10 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
803	DD-1	239.85	240.10	-234.637	-234.887				core	Sarabetsu Fm.	fine sandstone	110683.720	-44296.994	-234.76	554244.3763	4982600.178	-234.76		93										sample name: SFI-14, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
804	DD-1	239.85	240.10	-234.637	-234.887				core	Sarabetsu Fm.	fine sandstone	110683.720	-44296.994	-234.76	554244.3763	4982600.178	-234.76		109										sample name: SFI-14, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
805	DD-1	257.60	257.90	-252.387	-252.687				core	Sarabetsu Fm.	silt/ fine sandstone	110683.720	-44296.994	-252.54	554244.3763	4982600.178	-252.54		87										sample name: SFI-15, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
806	DD-1	257.60	257.90	-252.387	-252.687				core	Sarabetsu Fm.	silt/ fine sandstone	110683.720	-44296.994	-252.54	554244.3763	4982600.178	-252.54		92										sample name: SFI-15, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
807	DD-1	279.60	279.86	-274.387	-274.647				core	Sarabetsu Fm.	silt (bedded)	110683.720	-44296.994	-274.52	554244.3763	4982600.178	-274.52		84										sample name: SFI-16, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
808	DD-1	279.60	279.86	-274.387	-274.647				core	Sarabetsu Fm.	silt (bedded)	110683.720	-44296.994	-274.52	554244.3763	4982600.178	-274.52		87										sample name: SFI-16, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
809	DD-1	308.10	308.25	-302.887	-303.037				core	Sarabetsu Fm.	silt (bedded)	110683.720	-44296.994	-302.96	554244.3763	4982600.178	-302.96		63										sample name: SFI-17, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
810	DD-1	308.10	308.25	-302.887	-303.037				core	Sarabetsu Fm.	silt (bedded)	110683.720	-44296.994	-302.96	554244.3763	4982600.178	-302.96		55										sample name: SFI-17, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
811	DD-1	324.35	324.55	-319.137	-319.337				core	Sarabetsu Fm.	fine sand	110683.720	-44296.994	-319.24	554244.3763	4982600.178	-319.24		290										sample name: SFI-18, Tracer type: amino G acid, contamination ratio of drilling fluid: >10 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
812	DD-1	324.35	324.55	-319.137	-319.337				core	Sarabetsu Fm.	fine sand	110683.720	-44296.994	-319.24	554244.3763	4982600.178	-319.24		320										sample name: SFI-18, Tracer type: amino G acid, contamination ratio of drilling fluid: >10 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
813	DD-1	342.00	342.25	-336.787	-337.037				core	Sarabetsu Fm.	fine sand (bedded)	110683.720	-44296.994	-336.91	554244.3763	4982600.178	-336.91		107										sample name: SFI-19, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
814	DD-1	342.00	342.25	-336.787	-337.037				core	Sarabetsu Fm.	fine sand (bedded)	110683.720	-44296.994	-336.91	554244.3763	4982600.178	-336.91		173										sample name: SFI-19, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
815	DD-1	356.70	357.00	-351.487	-351.787				core	Sarabetsu Fm.	silt (bedded)	110683.720	-44296.994	-351.64	554244.3763	4982600.178	-351.64		270										sample name: SFI-20, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
816	DD-1	356.70	357.00	-351.487	-351.787				core	Sarabetsu Fm.	silt (bedded)	110683.720	-44296.994	-351.64	554244.3763	4982600.178	-351.64		300										sample name: SFI-20, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
817	DD-1	374.70	375.00	-369.487	-369.787				core	Sarabetsu Fm.	silt	110683.720	-44296.994	-369.64	554244.3763	4982600.178	-369.64		330										sample name: SFI-21, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
818	DD-1	374.70	375.00	-369.487	-369.787				core	Sarabetsu Fm.	silt	110683.720	-44296.994	-369.64	554244.3763	4982600.178	-369.64		360										sample name: SFI-21, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
819	DD-1	394.70	395.00	-389.487	-389.787				core	Sarabetsu Fm.	silt	110683.720	-44296.994	-389.64	554244.3763	4982600.178	-389.64		360										sample name: SFI-22, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
820	DD-1	394.70	395.00	-389.487	-389.787				core	Sarabetsu Fm.	silt	110683.720	-44296.994	-389.64	554244.3763	4982600.178	-389.64		390										sample name: SFI-22, Tracer type: amino G acid, pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
821	DD-1	422.75	423.05	-417.537	-417.837				core	Sarabetsu Fm.	fine sandstone	110683.720	-44296.994	-417.69	554244.3763	4982600.178	-417.69		490								3.66	A	sample name: SFI-23, Tracer type: amino G acid, contamination ratio of drilling fluid: 12.2 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
822	DD-1	422.75	423.05	-417.537	-417.837				core	Sarabetsu Fm.	fine sandstone	110683.720	-44296.994	-417.69	554244.3763	4982600.178	-417.69		490								3.82	A	sample name: SFI-23, Tracer type: amino G acid, contamination ratio of drilling fluid: 12.7 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
823	DD-1	447.90	448.2	-442.687	-442.987				core	Sarabetsu Fm.	fine sand with conglomerate	110683.720	-44296.994	-442.84	554244.3763	4982600.178	-442.84		560								28.75	A	sample name: SFI-24, Tracer type: amino G acid, contamination ratio of drilling fluid: 95.8 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
824	DD-1	472.43	472.73	-467.217	-467.517				core	Sarabetsu Fm.	silt	110683.720	-44296.994	-467.37	554244.3763	4982600.178	-467.37		183								2.19	A	sample name: SFI-25, Tracer type: amino G acid, contamination ratio of drilling fluid: 7.3 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
825	DD-1	472.43	472.73	-467.217	-467.517				core	Sarabetsu Fm.	silt	110683.720	-44296.994	-467.37	554244.3763	4982600.178	-467.37		183								2.42	A	sample name: SFI-25, Tracer type: amino G acid, contamination ratio of drilling fluid: 8.1 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
826	DD-1	495.55	495.85	-490.337	-490.637				core	Sarabetsu Fm.	fine sandstone	110683.720	-44296.994	-490.49	554244.3763	4982600.178	-490.49		350								17.47	A	sample name: SFI-26, Tracer type: amino G acid, contamination ratio of drilling fluid: 58.2 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
827	DD-1	522.63	522.96	-517.417	-517.747				core	Yuchi Fm.	silt	110683.720	-44296.994	-517.58	554244.3763	4982600.178	-517.58		590								0.82	A	sample name: SFI-27, Tracer type: amino G acid, contamination ratio of drilling fluid: 2.7 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (38/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Geochemistry																																				
		Min.	Max.	Min.	Max.			Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
786	SFI-1	72.50	72.85	-67.287	-67.637			113	7.9	14.7	10.1														146	1.4	0.4				90.2														
787	SFI-1	107.40	110.00	-102.187	-104.787			234	21.5	16	29.8														81.7	0.8	<0.2				90.7														
788	SFI-1	107.40	110.00	-102.187	-104.787			293	50.1	103	45.4														90.8	0.7	<0.4				600														
789	SFI-1	120.10	123.90	-114.887	-118.687			295	27.7	14.8	17.7														91.2	0.8	<0.2				87.1														
790	SFI-1	120.10	123.90	-114.887	-118.687			260	30.7	62.9	23.4														131	1.4	<0.4				356														
791	SFI-1	130.00	130.50	-124.787	-125.287			787	37.4	145	75														136	0.7	<0.2				617														
792	SFI-1	130.00	130.50	-124.787	-125.287			360	43.3	158	103														115	0.9	<0.4				1152														
793	SFI-1	142.40	144.00	-137.187	-138.787			168	29.8	41.6	39.2														155	1.5	0.2				200														
794	SFI-1	142.40	144.00	-137.187	-138.787			201	34.4	70.2	53.4														125	1.0	<0.2				619														
795	SFI-1	154.30	154.80	-149.087	-149.587			162	27.8	47.2	46.3														112	0.8	<0.2				323														
796	SFI-1	154.30	154.80	-149.087	-149.587			112	28.1	32.1	25.9														100	1.0	<0.2				219														
797	DD-1	183.02	183.32	-177.807	-178.107			85	18.6	14.8	14.4				31.1	8.6									38	0.28	0.08				14														
798	DD-1	183.02	183.32	-177.807	-178.107			60	28.4	16.4	11.6				6.8	0.9									37	0.38	0.33				56														
799	DD-1	204.94	205.19	-199.727	-199.977			101	23.5	18.5	11.8				22.0	10.2									31	0.27	0.03				24														
800	DD-1	204.94	205.19	-199.727	-199.977			88	29.6	10.7	9.5				7.2	1.9									46	0.42	0.03				59														
801	DD-1	220.70	221.00	-215.487	-215.787			266	59.6	141.6	71.6				23.8	10.1									82	0.52	0.03				3														
802	DD-1	220.70	221.00	-215.487	-215.787			225	63.9	123.7	63.6				10.5	0.6									59	0.52	0.02				0.3														
803	DD-1	239.85	240.10	-234.637	-234.887			126	36.3	32.8	24.8				24.7	6.0									54	0.41	0.03				76														
804	DD-1	239.85	240.10	-234.637	-234.887			119	51.8	50.3	33.6				8.5	0.8									47	0.48	0.03				125														
805	DD-1	257.60	257.90	-252.387	-252.687			124	35.6	20.6	22.7				26.6	8.1									45	0.32	0.02				29														
806	DD-1	257.60	257.90	-252.387	-252.687			107	49	19.6	21.3				8.1	1.1									43	0.42	<0.02				109														
807	DD-1	279.60	279.86	-274.387	-274.647			129	18.6	16.3	31.0				31.8	12.4									36	0.26	<0.02				24														
808	DD-1	279.60	279.86	-274.387	-274.647																				134						99														
809	DD-1	308.10	308.25	-302.887	-303.037			90	16.8	15.2	20.3				27.7	9.0									61	0.39	0.03				47														
810	DD-1	308.10	308.25	-302.887	-303.037			63	25.8	12.2	14.3				9.5	1.1									55	0.5	0.04				63														
811	DD-1	324.35	324.55	-319.137	-319.337			593	54.9	169.1	171				25.8	7.2									106	0.85	0.03				288														
812	DD-1	324.35	324.55	-319.137	-319.337			721	69	201	178				8.2	0.6									92	0.9	0.03				872														
813	DD-1	342.00	342.25	-336.787	-337.037			151	33.3	32.2	27.8				26.5	5.3									131	1.73	0.23				112														
814	DD-1	342.00	342.25	-336.787	-337.037			215	68.3	125	90.3				10.2	0.4									100	1.54	0.18				330														
815	DD-1	356.70	357.00	-351.487	-351.787			489	75.8	60.8	53.0				28.4	9.3									745	9.17	2.47				68														
816	DD-1	356.70	357.00	-351.487	-351.787			530	120	48.7	49.5				10.2	2.0									878	10.37	2.43				120														
817	DD-1	374.70	375.00	-369.487	-369.787			614	79.3	83.5	61.6				29.6	7.7									1020	12.24	2.89				36														
818	DD-1	374.70	375.00	-369.487	-369.787			627	135	60.8	51.7				11.1	1.3									1165	14.41	4.18				70														
819	DD-1	394.70	395.00	-389.487	-389.787			768	66.0	61.1	48.8				24.9	8.7									1104	13.38	2.62				44														
820	DD-1	394.70	395.00	-389.487	-389.787			822	109.0	41.7	46.8				9.5	1.6									1290	16.05	2.74				79														
821	DD-1	422.75	423.05	-417.537	-417.837			1150	69.0	24	51				26	5.9									1194	13	30				164		1165												
822	DD-1	422.75	423.05	-417.537	-417.837			1242	82.0	25	44				14	1.6									1226	15	8				121		1434												
823	DD-1	447.90	448.2	-442.687	-442.987																												3246												
824	DD-1	472.43	472.73	-467.217	-467.517			400	22.1	61	9.0				30	6.1									344	3.3	1.5				94		465												
825	DD-1	472.43	472.73	-467.217	-467.517			498	210	13	17.0				11	1.1									471	5	2				142		493												
826	DD-1	495.55	495.85	-490.337	-490.637																												1665												
827	DD-1	522.63	522.96	-517.417	-517.747			1328	89.6	29	61				22	4.0									1962	22	11				37		795												

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (39/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases																									Isotopes												
		Min.	Max.	Min.	Max.				Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{36}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_w]	[cc_{STP}/g_w]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
786	SFI-1	72.50	72.85	-67.287	-67.637																												-74	-10.3											
787	SFI-1	107.40	110.00	-102.187	-104.787																												-80	-11.2											
788	SFI-1	107.40	110.00	-102.187	-104.787																																								
789	SFI-1	120.10	123.90	-114.887	-118.687																												-79	-10.8						5.7 ± 1.4				
790	SFI-1	120.10	123.90	-114.887	-118.687																																								
791	SFI-1	130.00	130.50	-124.787	-125.287																																		5.4 ± 1.3					
792	SFI-1	130.00	130.50	-124.787	-125.287																																								
793	SFI-1	142.40	144.00	-137.187	-138.787																												-76	-10.7											
794	SFI-1	142.40	144.00	-137.187	-138.787																																								
795	SFI-1	154.30	154.80	-149.087	-149.587																												-74	-10.6						5.3 ± 1.1				
796	SFI-1	154.30	154.80	-149.087	-149.587																												-76	-10.8											
797	DD-1	183.02	183.32	-177.807	-178.107																												-77	-10.7											
798	DD-1	183.02	183.32	-177.807	-178.107																												-76	-10.5											
799	DD-1	204.94	205.19	-199.727	-199.977																												-84	-11.3											
800	DD-1	204.94	205.19	-199.727	-199.977																												-80	-10.8											
801	DD-1	220.70	221.00	-215.487	-215.787																												-68	-10.2											
802	DD-1	220.70	221.00	-215.487	-215.787																												-70	-10.9											
803	DD-1	239.85	240.10	-234.637	-234.887																												-82	-11.5											
804	DD-1	239.85	240.10	-234.637	-234.887																												-81	-11.3											
805	DD-1	257.60	257.90	-252.387	-252.687																												-83	-11.5											
806	DD-1	257.60	257.90	-252.387	-252.687																												-82	-11.0											
807	DD-1	279.60	279.86	-274.387	-274.647																												-82	-11.4						5.2 ± 1.5				
808	DD-1	279.60	279.86	-274.387	-274.647																												-78	-10.5											
809	DD-1	308.10	308.25	-302.887	-303.037																												-67	-10.1											
810	DD-1	308.10	308.25	-302.887	-303.037																												-63	-9.7											
811	DD-1	324.35	324.55	-319.137	-319.337																					8.7.E-08	2.7.E-07						-57	-8.5							1.3.E-06	298		
812	DD-1	324.35	324.55	-319.137	-319.337																												-56	-8.8											
813	DD-1	342.00	342.25	-336.787	-337.037																					7.6.E-08	1.9.E-07						-65	-10.1							9.6.E-07	298		
814	DD-1	342.00	342.25	-336.787	-337.037																												-63	-10.0											
815	DD-1	356.70	357.00	-351.487	-351.787																					7.2.E-08	9.2.E-08						-68	-10.1						4.8 ± 1.1	4.7.E-07	294		
816	DD-1	356.70	357.00	-351.487	-351.787																												-67	-9.8											
817	DD-1	374.70	375.00	-369.487	-369.787																					6.2.E-08	4.4.E-08						-73	-10.4						3.3 ± 0.9	4.1.E-07	295		
818	DD-1	374.70	375.00	-369.487	-369.787																												-71	-9.9											
819	DD-1	394.70	395.00	-389.487	-389.787																					7.5.E-08	7.0.E-08						-73	-10.3						5.5 ± 1.2	3.8.E-07	300		
820	DD-1	394.70	395.00	-389.487	-389.787																												-70	-9.9											
821	DD-1	422.75	423.05	-417.537	-417.837																												-71	-10.1											
822	DD-1	422.75	423.05	-417.537	-417.837																												-69	-9.9											
823	DD-1	447.90	448.2	-442.687	-442.987																																								
824	DD-1	472.43	472.73	-467.217	-467.517																					1.2.E-07	1.3.E-07						-70	-10.3						3.4 ± 0.8	5.8.E-07	299		
825	DD-1	472.43	472.73	-467.217	-467.517																												-67	-9.7											
826	DD-1	495.55	495.85	-490.337	-490.637																																								
827	DD-1	522.63	522.96	-517.417	-517.747																												-70	-9.9						2.8 ± 0.8				

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (40/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Organics				Microbiology																					
		Min.	Max.	Min.	Max.			Humic acid	Fuluvic acid	Acetate	Formate	Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/BZA)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
786	SFI-1	72.50	72.85	-67.287	-67.637																												
787	SFI-1	107.40	110.00	-102.187	-104.787																												
788	SFI-1	107.40	110.00	-102.187	-104.787																												
789	SFI-1	120.10	123.90	-114.887	-118.687																												
790	SFI-1	120.10	123.90	-114.887	-118.687																												
791	SFI-1	130.00	130.50	-124.787	-125.287																												
792	SFI-1	130.00	130.50	-124.787	-125.287																												
793	SFI-1	142.40	144.00	-137.187	-138.787																												
794	SFI-1	142.40	144.00	-137.187	-138.787																												
795	SFI-1	154.30	154.80	-149.087	-149.587																												
796	SFI-1	154.30	154.80	-149.087	-149.587																												
797	DD-1	183.02	183.32	-177.807	-178.107																												
798	DD-1	183.02	183.32	-177.807	-178.107																												
799	DD-1	204.94	205.19	-199.727	-199.977																												
800	DD-1	204.94	205.19	-199.727	-199.977																												
801	DD-1	220.70	221.00	-215.487	-215.787																												
802	DD-1	220.70	221.00	-215.487	-215.787																												
803	DD-1	239.85	240.10	-234.637	-234.887																												
804	DD-1	239.85	240.10	-234.637	-234.887																												
805	DD-1	257.60	257.90	-252.387	-252.687																												
806	DD-1	257.60	257.90	-252.387	-252.687																												
807	DD-1	279.60	279.86	-274.387	-274.647																												
808	DD-1	279.60	279.86	-274.387	-274.647																												
809	DD-1	308.10	308.25	-302.887	-303.037																												
810	DD-1	308.10	308.25	-302.887	-303.037																												
811	DD-1	324.35	324.55	-319.137	-319.337																												
812	DD-1	324.35	324.55	-319.137	-319.337																												
813	DD-1	342.00	342.25	-336.787	-337.037																												
814	DD-1	342.00	342.25	-336.787	-337.037																												
815	DD-1	356.70	357.00	-351.487	-351.787																												
816	DD-1	356.70	357.00	-351.487	-351.787																												
817	DD-1	374.70	375.00	-369.487	-369.787																												
818	DD-1	374.70	375.00	-369.487	-369.787																												
819	DD-1	394.70	395.00	-389.487	-389.787																												
820	DD-1	394.70	395.00	-389.487	-389.787																												
821	DD-1	422.75	423.05	-417.537	-417.837																												
822	DD-1	422.75	423.05	-417.537	-417.837																												
823	DD-1	447.90	448.2	-442.687	-442.987																												
824	DD-1	472.43	472.73	-467.217	-467.517																												
825	DD-1	472.43	472.73	-467.217	-467.517																												
826	DD-1	495.55	495.85	-490.337	-490.637																												
827	DD-1	522.63	522.96	-517.417	-517.747																												

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (41/64)

Index	Sample point	sampling zone (GL) Min. [m]	sampling zone (GL) Max. [m]	sampling zone (EL) Min. [m]	sampling zone (EL) Max. [m]	sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII) X	Y	Z (middle depth)	location (WGS84, UTM, Zone54) East	North	Z (middle depth)	Physico-chemical parameter EC at site [mS/m]	EC at lab [mS/m]	pH at site	pH at lab	ORP Observ. [mV]	ORP SHE [mV]	Temper-ature at site [℃]	Contamination indicator Tracer (uranine) [mg/l]	Tracer (Na-naphtionate) [mg/l]	Tracer (amino G acid) [mg/l]	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	Comments
828	DD-1	522.63	522.96	-517.417	-517.747				core	Yuchi Fm.	silt	110683.720	-44296.994	-517.58	554244.3763	4982600.178	-517.58		590								0.74	A	sample name: SFI-27, Tracer type: amino G acid, contamination ratio of drilling fluid: 2.5 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
829	DD-1	541.52	541.82	-536.307	-536.607				core	Yuchi Fm.	fine sandstone with coarse sandstone	110683.720	-44296.994	-536.46	554244.3763	4982600.178	-536.46		1160								3.69	A	sample name: SFI-28, Tracer type: amino G acid, contamination ratio of drilling fluid: 12.3 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
830	DD-1	541.52	541.82	-536.307	-536.607				core	Yuchi Fm.	fine sandstone with coarse sandstone	110683.720	-44296.994	-536.46	554244.3763	4982600.178	-536.46		1160								3.34	A	sample name: SFI-28, Tracer type: amino G acid, contamination ratio of drilling fluid: 11.1 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
831	DD-1	570.07	570.37	-564.857	-565.157				core	Yuchi Fm.	silt (with gas)	110683.720	-44296.994	-565.01	554244.3763	4982600.178	-565.01		1130								3.14	A	sample name: SFI-29, Tracer type: amino G acid, contamination ratio of drilling fluid: 10.5 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
832	DD-1	570.07	570.37	-564.857	-565.157				core	Yuchi Fm.	silt (with gas)	110683.720	-44296.994	-565.01	554244.3763	4982600.178	-565.01		1130								3.51	A	sample name: SFI-29, Tracer type: amino G acid, contamination ratio of drilling fluid: 11.7 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
833	DD-1	593.97	594.27	-588.757	-589.057				core	Yuchi Fm.	silt	110683.720	-44296.994	-588.91	554244.3763	4982600.178	-588.91		1280								1.39	A	sample name: SFI-30, Tracer type: amino G acid, contamination ratio of drilling fluid: 4.6 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
834	DD-1	593.97	594.27	-588.757	-589.057				core	Yuchi Fm.	silt	110683.720	-44296.994	-588.91	554244.3763	4982600.178	-588.91		1280								1.66	A	sample name: SFI-30, Tracer type: amino G acid, contamination ratio of drilling fluid: 5.5 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
835	DD-1	626.95	627.32	-621.737	-622.107		2010		core	Yuchi Fm.	fine sandstone	110683.720	-44296.994	-621.92	554244.3763	4982600.178	-621.92		1580								3.90	A	sample name: SFI-11, Tracer type: amino G acid, contamination ratio of drilling fluid: 13.0 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
836	DD-1	626.95	627.32	-621.737	-622.107		2010		core	Yuchi Fm.	fine sandstone	110683.720	-44296.994	-621.92	554244.3763	4982600.178	-621.92		1580								4.96	A	sample name: SFI-11, Tracer type: amino G acid, contamination ratio of drilling fluid: 16.5 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
837	DD-1	647.80	648.10	-642.587	-642.887		2010		core	Yuchi Fm.	silt	110683.720	-44296.994	-642.74	554244.3763	4982600.178	-642.74		1930								1.84	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 6.1 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
838	DD-1	647.80	648.10	-642.587	-642.887		2010		core	Yuchi Fm.	silt	110683.720	-44296.994	-642.74	554244.3763	4982600.178	-642.74		1930								2.16	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 7.2 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
839	DD-1	672.00	672.25	-666.787	-667.037		2010		core	Yuchi Fm.	silt (tuffaceous)	110683.720	-44296.994	-666.91	554244.3763	4982600.178	-666.91		2000								2.44	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 8.1 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
840	DD-1	672.00	672.25	-666.787	-667.037		2010		core	Yuchi Fm.	silt (tuffaceous)	110683.720	-44296.994	-666.91	554244.3763	4982600.178	-666.91		2000								2.66	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 8.9 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
841	DD-1	692.60	692.90	-687.387	-687.687		2010		core	Yuchi Fm.	silt	110683.720	-44296.994	-687.54	554244.3763	4982600.178	-687.54		2050								1.78	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 5.9 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
842	DD-1	720.60	720.90	-715.387	-715.687		2010		core	Yuchi Fm.	fine sandstone	110683.720	-44296.994	-715.54	554244.3763	4982600.178	-715.54		2050								8.33	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 27.8 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
843	DD-1	720.60	720.90	-715.387	-715.687		2010		core	Yuchi Fm.	fine sandstone	110683.720	-44296.994	-715.54	554244.3763	4982600.178	-715.54		2050								4.62	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 15.4 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
844	DD-1	752.15	752.40	-746.937	-747.187		2010		core	Yuchi Fm.	silt	110683.720	-44296.994	-747.06	554244.3763	4982600.178	-747.06		2050								1.99	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 6.6 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
845	DD-1	774.55	774.85	-769.337	-769.637		2010		core	Yuchi Fm.	fine sandstone	110683.720	-44296.994	-769.49	554244.3763	4982600.178	-769.49		2050								1.96	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 6.5 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
846	DD-1	774.55	774.85	-769.337	-769.637		2010		core	Yuchi Fm.	fine sandstone	110683.720	-44296.994	-769.49	554244.3763	4982600.178	-769.49		2050								1.65	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 5.5 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
847	DD-1	800.57	800.85	-795.357	-795.637		2010		core	Yuchi Fm.	silt	110683.720	-44296.994	-795.50	554244.3763	4982600.178	-795.50		2050								2.14	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 7.1 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
848	DD-1	800.57	800.85	-795.357	-795.637		2010		core	Yuchi Fm.	silt	110683.720	-44296.994	-795.50	554244.3763	4982600.178	-795.50		2050								2.05	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 6.8 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
849	DD-1	824.05	824.35	-818.837	-819.137		2010		core	Yuchi Fm.	fine sandstone	110683.720	-44296.994	-818.99	554244.3763	4982600.178	-818.99		2050								2.46	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 8.2 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
850	DD-1	824.05	824.35	-818.837	-819.137		2010		core	Yuchi Fm.	fine sandstone	110683.720	-44296.994	-818.99	554244.3763	4982600.178	-818.99		2050								1.90	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 6.3 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
851	DD-1	842.85	843.10	-837.637	-837.887		2010		core	Yuchi Fm.	fine sandstone	110683.720	-44296.994	-837.76	554244.3763	4982600.178	-837.76		2050								3.44	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 11.5 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
852	DD-1	842.85	843.10	-837.637	-837.887		2010		core	Yuchi Fm.	fine sandstone	110683.720	-44296.994	-837.76	554244.3763	4982600.178	-837.76		2050								2.38	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 7.9 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
853	DD-1	869.17	869.42	-863.957	-864.207		2010		core	Yuchi Fm.	silt	110683.720	-44296.994	-864.08	554244.3763	4982600.178	-864.08		2050								2.56	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 8.5 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
854	DD-1	869.17	869.42	-863.957	-864.207		2010		core	Yuchi Fm.	silt	110683.720	-44296.994	-864.08	554244.3763	4982600.178	-864.08		2050								2.11	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 7.0 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
855	DD-1	890.67	890.99	-885.457	-885.777		2010		core	Yuchi Fm.	mudstone	110683.720	-44296.994	-885.62	554244.3763	4982600.178	-885.62		2050								2.25	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 7.5 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
856	DD-1	921.45	921.67	-916.237	-916.457		2010		core	Yuchi Fm.	mudstone	110683.720	-44296.994	-916.35	554244.3763	4982600.178	-916.35		2050								2.67	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 8.9 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
857	DD-1	921.45	921.67	-916.237	-916.457		2010		core	Yuchi Fm.	mudstone	110683.720	-44296.994	-916.35	554244.3763	4982600.178	-916.35		2050								2.42	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 8.1 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
858	DD-1	950.50	950.80	-945.287	-945.587		2010		core	Yuchi Fm.	fine sandstone	110683.720	-44296.994	-945.44	554244.3763	4982600.178	-945.44		2050								3.19	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 10.6 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
859	DD-1	950.50	950.80	-945.287	-945.587		2010		core	Yuchi Fm.	fine sandstone	110683.720	-44296.994	-945.44	554244.3763	4982600.178	-945.44		2050								3.01	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 10.0 % pore water extraction: centrifugation (6000 rpm, 270 min) referred from CRIEPI, 2011a [15]
860	DD-1	975.85	976.11	-970.637	-970.897		2010		core	Yuchi Fm.	mudstone	110683.720	-44296.994	-970.77	554244.3763	4982600.178	-970.77		2050								2.84	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 9.5 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
861	DD-1	994.00	994.25	-988.787	-989.037		2010		core	Yuchi Fm.	mudstone	110683.720	-44296.994	-988.91	554244.3763	4982600.178	-988.91		2050								3.13	A	Tracer type: amino G acid, contamination ratio of drilling fluid: 10.4 % pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2011a [15]
862	DD-2	32.70	33.00	-27.564	-27.864				core	Alluvium	mudstone	100670.622	-44322.253	-27.71	554373.4134	4972590.763	-27.71		280										sample name: SFI-02', pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
863	DD-2	32.70	33.00	-27.564	-27.864				core	Alluvium	mudstone	100670.622	-44322.253	-27.71	554373.4134	4972590.763	-27.71		260										sample name: SFI-02', pore water extraction: centrifugation (6000 rpm, 270 min)
864	DD-2	44.15	44.45	-39.014	-39.314				core	Alluvium	silt/ fine sandstone	100670.622	-44322.253	-39.16	554373.4134	4972590.763	-39.16		350										sample name: SFI-03', pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
865	DD-2	44.15	44.45	-39.014	-39.314				core	Alluvium	silt/ fine sandstone	100670.622	-44322.253	-39.16	554373.4134	4972590.763	-39.16		340										sample name: SFI-03', pore water extraction: centrifugation (6000 rpm, 270 min)
866	DD-2	62.15	62.50	-57.014	-57.364				core	Alluvium	fine sand with silt	100670.622	-44322.253	-57.19	554373.4134	4972590.763	-57.19		105										sample name: SFI-04', pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
867	DD-2	62.15	62.50	-57.014	-57.364				core	Alluvium	fine sand with silt	100670.622	-44322.253	-57.19	554373.4134	4972590.763	-57.19		95										sample name: SFI-04', pore water extraction: centrifugation (6000 rpm, 270 min)
868	DD-2	88.00	88.30	-82.864	-83.164				core	Sarabetsu Fm.	middle sand	100670.622	-44322.253	-83.01	554373.4134	4972590.763	-83.01		90										sample name: SFI-05', pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
869	DD-2	88.00	88.30	-82.864	-83.164				core	Sarabetsu Fm.	middle sand	100670.622	-44322.253	-83.01	554373.4134	4972590.763	-83.01		60										sample name: SFI-05', pore water extraction: centrifugation (6000 rpm, 270 min)

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (42/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Geochemistry																																				
		Min.	Max.	Min.	Max.			Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
828	DD-1	522.63	522.96	-517.417	-517.747			1419	127	58	59				14	1.9									2188	22	10				67		663												
829	DD-1	541.52	541.82	-536.307	-536.607			3199	149	27	114				22	7.5									4372	46	24				137		1864												
830	DD-1	541.52	541.82	-536.307	-536.607			3218	170	37	110				10	2.7									4518	206	1476				206		1476												
831	DD-1	570.07	570.37	-564.857	-565.157			3120	112	31	89				27	7.4									4223	43	39				122		1690												
832	DD-1	570.07	570.37	-564.857	-565.157			3332	180	35	92				15	2.8									4484	44	21				193		1342												
833	DD-1	593.97	594.27	-588.757	-589.057			3647	120	61	96				30	7.6									5338	55	35				55		1350												
834	DD-1	593.97	594.27	-588.757	-589.057			4132	211	43	102				14	2.7									5855	59	26				170		1275												
835	DD-1	626.95	627.32	-621.737	-622.107		2010	5763	213	46	174				24	8.5									8261	84	45				52		2400												
836	DD-1	626.95	627.32	-621.737	-622.107		2010	5742	224	37	171				13	2.6									8222	87	39				26		2460												
837	DD-1	647.80	648.10	-642.587	-642.887		2010	6668	212	60	182				30	10.0									9588	102	51				24		2451												
838	DD-1	647.80	648.10	-642.587	-642.887		2010	6810	257	61	180				13	2.9									9980	109	47				6		1977												
839	DD-1	672.00	672.25	-666.787	-667.037		2010	7259	261	62	168				29	10.8									10930	110	53				36		2169												
840	DD-1	672.00	672.25	-666.787	-667.037		2010	7709	319	50	169				13	3.0									11694	130	56				41		1870												
841	DD-1	692.60	692.90	-687.387	-687.687		2010	8016	247	79	206				31	10.6									12097	135	69				27		2072												
842	DD-1	720.60	720.90	-715.387	-715.687		2010	7892	300	63	260				25	9.2									11723	136	67				32		2871												
843	DD-1	720.60	720.90	-715.387	-715.687		2010	8467	360	53	278				13	3.6									12930	151	66				69		2508												
844	DD-1	752.15	752.40	-746.937	-747.187		2010	9406	296	111	369				28	10.1									14849	176	84				35		2375												
845	DD-1	774.55	774.85	-769.337	-769.637		2010	10361	350	134	436				30	10.3									16521	197	95				25		2712												
846	DD-1	774.55	774.85	-769.337	-769.637		2010	10466	467	38	351				12	3.5									16993	204	87				75		1597												
847	DD-1	800.57	800.85	-795.357	-795.637		2010	10252	323	93	398				26	9.2									16278	191	90				28		2577												
848	DD-1	800.57	800.85	-795.357	-795.637		2010	10525	411	76	343				14	3.8									17021	201	86				79		1780												
849	DD-1	824.05	824.35	-818.837	-819.137		2010	10787	343	98	348				28	10.7									16683	188	87				35		3120												
850	DD-1	824.05	824.35	-818.837	-819.137		2010	11157	415	78	328				14	4.1									17838	206	86				46		2378												
851	DD-1	842.85	843.10	-837.637	-837.887		2010	10720	359	86	310				24	10.1									16509	185	82				69		3040												
852	DD-1	842.85	843.10	-837.637	-837.887		2010	10997	412	79	311				12	4.5									17033	194	83				88		2830												
853	DD-1	869.17	869.42	-863.957	-864.207		2010	10444	305	131	365				27	8.6									16689	189	87				42		2257												
854	DD-1	869.17	869.42	-863.957	-864.207		2010	10906	449	95	324				13	3.6									17782	205	86				69		1628												
855	DD-1	890.67	890.99	-885.457	-885.777		2010	9730	248	125	372				28	9.7									15741	176	83				31		1825												
856	DD-1	921.45	921.67	-916.237	-916.457		2010	10298	303	108	311				27	9.0									16376	182	76				63		2123												
857	DD-1	921.45	921.67	-916.237	-916.457		2010	10842	441	75	271				14	3.6									17571	202	82				96		1641												
858	DD-1	950.50	950.80	-945.287	-945.587		2010	10853	342	93	238				28	9.3									16629	186	83				60		2646												
859	DD-1	950.50	950.80	-945.287	-945.587		2010	10970	414	70	207				15	3.9									17136	194	80				93		2334												
860	DD-1	975.85	976.11	-970.637	-970.897		2010	10083	268	90	225				28	10.3									15702	173	78				46		2049												
861	DD-1	994.00	994.25	-988.787	-989.037		2010	9969	252	83	191				29	10.6									15379	167	76				58		2081												
862	DD-2	32.70	33.00	-27.564	-27.864			753	32.5	8.8	16.4				34.5	12.9									312	2.32	0.13				4														
863	DD-2	32.70	33.00	-27.564	-27.864			734	36.8	9	16.2				15.7	2.6									301	2.46	0.15				3														
864	DD-2	44.15	44.45	-39.014	-39.314			1009	42.2	22.3	50.9				20.5	8.9									571	5.58	0.45				12														
865	DD-2	44.15	44.45	-39.014	-39.314			871	38.8	18.4	39.6				9.2	1.6									582	6.08	0.45				16														
866	DD-2	62.15	62.50	-57.014	-57.364			138	19.5	27.1	28.6				20.6	8.9									206	3.35	0.61				7														
867	DD-2	62.15	62.50	-57.014	-57.364			110	19.8	25.9	27.6				11.6	1.4									213	3.92	0.51				11														
868	DD-2	88.00	88.30	-82.864	-83.164			215	13.3	8.9	3.5				26.0	6.5									74	0.51	<0.02				1														
869	DD-2	88.00	88.30	-82.864	-83.164			127	11.1	11.4	6.1				4.1	0.6									62	0.51	<0.02				2														

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (43/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases																							Isotopes												
		Min.	Max.	Min.	Max.				Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{36}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_w]	[cc_{STP}/g_w]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
828	DD-1	522.63	522.96	-517.417	-517.747																												-67	-9.2											
829	DD-1	541.52	541.82	-536.307	-536.607																												-59	-8.1											
830	DD-1	541.52	541.82	-536.307	-536.607																												-57	-7.9											
831	DD-1	570.07	570.37	-564.857	-565.157																												-58	-7.7											
832	DD-1	570.07	570.37	-564.857	-565.157																												-58	-7.5											
833	DD-1	593.97	594.27	-588.757	-589.057																					4.8.E-08	1.4.E-08					-56	-7.5						2.6 ± 0.9	3.0.E-07	312		
834	DD-1	593.97	594.27	-588.757	-589.057																												-56	-7.1											
835	DD-1	626.95	627.32	-621.737	-622.107		2010																										-45	-5.8											
836	DD-1	626.95	627.32	-621.737	-622.107		2010																										-46	-5.7											
837	DD-1	647.80	648.10	-642.587	-642.887		2010																										-40	-4.7						3.1 ± 0.8					
838	DD-1	647.80	648.10	-642.587	-642.887		2010																										-40	-4.8											
839	DD-1	672.00	672.25	-666.787	-667.037		2010																										-33	-3.9											
840	DD-1	672.00	672.25	-666.787	-667.037		2010																										-33	-3.8											
841	DD-1	692.60	692.90	-687.387	-687.687		2010																			4.1.E-08	1.8.E-08					-27	-3.0						2.8 ± 0.8	4.0.E-07	297		
842	DD-1	720.60	720.90	-715.387	-715.687		2010																										-28	-3.1											
843	DD-1	720.60	720.90	-715.387	-715.687		2010																										-25	-2.8											
844	DD-1	752.15	752.40	-746.937	-747.187		2010																										-18	-1.8						3.4 ± 0.9					
845	DD-1	774.55	774.85	-769.337	-769.637		2010																										-15	-1.0											
846	DD-1	774.55	774.85	-769.337	-769.637		2010																										-15	-1.0											
847	DD-1	800.57	800.85	-795.357	-795.637		2010																			4.2.E-08	6.5.E-09					-13	-0.3						3.2 ± 0.9	1.7.E-07	301		
848	DD-1	800.57	800.85	-795.357	-795.637		2010																										-12	-0.4											
849	DD-1	824.05	824.35	-818.837	-819.137		2010																										-13	-0.2											
850	DD-1	824.05	824.35	-818.837	-819.137		2010																										-10	0.3											
851	DD-1	842.85	843.10	-837.637	-837.887		2010																										-13	0.1						3.2 ± 0.9					
852	DD-1	842.85	843.10	-837.637	-837.887		2010																										-11	0.2											
853	DD-1	869.17	869.42	-863.957	-864.207		2010																										-11	0.3											
854	DD-1	869.17	869.42	-863.957	-864.207		2010																										-9	0.7											
855	DD-1	890.67	890.99	-885.457	-885.777		2010																			4.2.E-08	1.2.E-08					-13	0.3						4.8 ± 1.0	2.7.E-07	295		
856	DD-1	921.45	921.67	-916.237	-916.457		2010																										-11	0.6											
857	DD-1	921.45	921.67	-916.237	-916.457		2010																										-9	1.0											
858	DD-1	950.50	950.80	-945.287	-945.587		2010																										-12	0.9						2.6 ± 0.8					
859	DD-1	950.50	950.80	-945.287	-945.587		2010																										-10	1.2											
860	DD-1	975.85	976.11	-970.637	-970.897		2010																										-12	0.9											
861	DD-1	994.00	994.25	-988.787	-989.037		2010																			6.2.E-08	2.0.E-08					-13	1.0						5.2 ± 1.0	3.9.E-07	293		
862	DD-2	32.70	33.00	-27.564	-27.864																												-58	-9.1											
863	DD-2	32.70	33.00	-27.564	-27.864																												-59	-9.0											
864	DD-2	44.15	44.45	-39.014	-39.314																												-70	-10.2											
865	DD-2	44.15	44.45	-39.014	-39.314																												-69	-10.6											
866	DD-2	62.15	62.50	-57.014	-57.364																												-80	-9.9											
867	DD-2	62.15	62.50	-57.014	-57.364																												-79	-10.1											
868	DD-2	88.00	88.30	-82.864	-83.164																												-63	-8.7											
869	DD-2	88.00	88.30	-82.864	-83.164																												-62	-8.9											

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (44/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Organics				Microbiology																					
		Min.	Max.	Min.	Max.			Humic acid	Fuluvic acid	Acetate	Formate	Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
828	DD-1	522.63	522.96	-517.417	-517.747																												
829	DD-1	541.52	541.82	-536.307	-536.607																												
830	DD-1	541.52	541.82	-536.307	-536.607																												
831	DD-1	570.07	570.37	-564.857	-565.157																												
832	DD-1	570.07	570.37	-564.857	-565.157																												
833	DD-1	593.97	594.27	-588.757	-589.057																												
834	DD-1	593.97	594.27	-588.757	-589.057																												
835	DD-1	626.95	627.32	-621.737	-622.107		2010																										
836	DD-1	626.95	627.32	-621.737	-622.107		2010																										
837	DD-1	647.80	648.10	-642.587	-642.887		2010																										
838	DD-1	647.80	648.10	-642.587	-642.887		2010																										
839	DD-1	672.00	672.25	-666.787	-667.037		2010																										
840	DD-1	672.00	672.25	-666.787	-667.037		2010																										
841	DD-1	692.60	692.90	-687.387	-687.687		2010																										
842	DD-1	720.60	720.90	-715.387	-715.687		2010																										
843	DD-1	720.60	720.90	-715.387	-715.687		2010																										
844	DD-1	752.15	752.40	-746.937	-747.187		2010																										
845	DD-1	774.55	774.85	-769.337	-769.637		2010																										
846	DD-1	774.55	774.85	-769.337	-769.637		2010																										
847	DD-1	800.57	800.85	-795.357	-795.637		2010																										
848	DD-1	800.57	800.85	-795.357	-795.637		2010																										
849	DD-1	824.05	824.35	-818.837	-819.137		2010																										
850	DD-1	824.05	824.35	-818.837	-819.137		2010																										
851	DD-1	842.85	843.10	-837.637	-837.887		2010																										
852	DD-1	842.85	843.10	-837.637	-837.887		2010																										
853	DD-1	869.17	869.42	-863.957	-864.207		2010																										
854	DD-1	869.17	869.42	-863.957	-864.207		2010																										
855	DD-1	890.67	890.99	-885.457	-885.777		2010																										
856	DD-1	921.45	921.67	-916.237	-916.457		2010																										
857	DD-1	921.45	921.67	-916.237	-916.457		2010																										
858	DD-1	950.50	950.80	-945.287	-945.587		2010																										
859	DD-1	950.50	950.80	-945.287	-945.587		2010																										
860	DD-1	975.85	976.11	-970.637	-970.897		2010																										
861	DD-1	994.00	994.25	-988.787	-989.037		2010																										
862	DD-2	32.70	33.00	-27.564	-27.864																												
863	DD-2	32.70	33.00	-27.564	-27.864																												
864	DD-2	44.15	44.45	-39.014	-39.314																												
865	DD-2	44.15	44.45	-39.014	-39.314																												
866	DD-2	62.15	62.50	-57.014	-57.364																												
867	DD-2	62.15	62.50	-57.014	-57.364																												
868	DD-2	88.00	88.30	-82.864	-83.164																												
869	DD-2	88.00	88.30	-82.864	-83.164																												

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (45/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII)			location (WGS84, UTM, Zone54)			Physico-chemical parameter							Contamination indicator				Comments
		Min.	Max.	Min.	Max.							X	Y	Z (middle depth)	East	North	Z (middle depth)	EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temper-ature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	
		[m]	[m]	[m]	[m]													[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]	[mg/l]		
870	DD-2	99.30	99.55	-94.164	-94.414				core	Sarabetsu Fm.	mudstone	100670.622	-44322.253	-94.29	554373.4134	4972590.763	-94.29		100										sample name: SFI-06', pore water extraction: squeeze (<200MPa) referred from CRIEPI, 2010a [13]
871	DD-2	99.30	99.55	-94.164	-94.414				core	Sarabetsu Fm.	mudstone	100670.622	-44322.253	-94.29	554373.4134	4972590.763	-94.29		104										sample name: SFI-06', pore water extraction: centrifugation (6000 rpm, 270 min)
872	HCD-3	168.74	168.92	-146.586	-146.766		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-146.68	571935.6424	4983485.082	-146.68												pore water extraction: squeeze (100MPa), sampling depth: 201 m along the borehole referred from CRIEPI, 2007a [7]
873	HCD-3	168.74	168.92	-146.586	-146.766		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-146.68	571935.6424	4983485.082	-146.68												pore water extraction: squeeze (100MPa), sampling depth: 201 m along the borehole referred from CRIEPI, 2007b [8]
874	HCD-3	176.14	176.23	-153.986	-154.076		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-154.03	571935.6424	4983485.082	-154.03												pore water extraction: squeeze, sampling depth: 209 m along borehole referred from CRIEPI, 2007b [8]
875	HCD-3	184.39	184.48	-162.236	-162.326		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-162.28	571935.6424	4983485.082	-162.28												pore water extraction: squeeze, sampling depth: 219 m along borehole referred from CRIEPI, 2007b [8]
876	HCD-3	193.38	193.47	-171.226	-171.316		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-171.27	571935.6424	4983485.082	-171.27												pore water extraction: squeeze, sampling depth: 230 m along borehole referred from CRIEPI, 2007b [8]
877	HCD-3	200.86	201.03	-178.706	-178.876		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-178.79	571935.6424	4983485.082	-178.79												pore water extraction: squeeze, sampling depth: 239 m along borehole referred from CRIEPI, 2007b [8]
878	HCD-3	209.08	209.16	-186.926	-187.006		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-186.97	571935.6424	4983485.082	-186.97												pore water extraction: squeeze (100MPa), sampling depth: 249 m along the borehole referred from CRIEPI, 2007a [7]
879	HCD-3	218.49	218.65	-196.336	-196.496		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-196.42	571935.6424	4983485.082	-196.42												pore water extraction: squeeze, sampling depth: 260 m along borehole referred from CRIEPI, 2007b [8]
880	HCD-3	228.97	229.05	-206.816	-206.896		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-206.86	571935.6424	4983485.082	-206.86												pore water extraction: squeeze, sampling depth: 273 m along borehole referred from CRIEPI, 2007b [8]
881	HCD-3	234.66	234.74	-212.506	-212.586		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-212.55	571935.6424	4983485.082	-212.55												pore water extraction: squeeze, sampling depth: 280 m along borehole referred from CRIEPI, 2007b [8]
882	HCD-3	240.61	240.69	-218.456	-218.536		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-218.50	571935.6424	4983485.082	-218.50												pore water extraction: squeeze, sampling depth: 288 m along borehole referred from CRIEPI, 2007b [8]
883	HCD-3	251.34	251.49	-229.186	-229.336		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-229.26	571935.6424	4983485.082	-229.26												pore water extraction: squeeze (100MPa), sampling depth: 302 m along the borehole referred from CRIEPI, 2007a [7]
884	HCD-3	257.19	257.27	-235.036	-235.116		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-235.08	571935.6424	4983485.082	-235.08												pore water extraction: squeeze, sampling depth: 310 m along borehole referred from CRIEPI, 2007b [8]
885	HCD-3	264.63	264.78	-242.476	-242.626		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-242.55	571935.6424	4983485.082	-242.55												pore water extraction: squeeze, sampling depth: 320 m along borehole referred from CRIEPI, 2007b [8]
886	HCD-3	272.12	272.19	-249.966	-250.036		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-250.00	571935.6424	4983485.082	-250.00												pore water extraction: squeeze, sampling depth: 330 m along borehole referred from CRIEPI, 2007b [8]
887	HCD-3	279.5	279.64	-257.346	-257.486		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-257.42	571935.6424	4983485.082	-257.42												pore water extraction: squeeze, sampling depth: 340 m along borehole referred from CRIEPI, 2007b [8]
888	HCD-3	288.58	288.72	-266.426	-266.566		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-266.50	571935.6424	4983485.082	-266.50												pore water extraction: squeeze (100MPa), sampling depth: 353 m along the borehole referred from CRIEPI, 2007a [7]
889	HCD-3	291.92	292.05	-269.766	-269.896		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-269.83	571935.6424	4983485.082	-269.83												pore water extraction: squeeze (100MPa), sampling depth: 358 m along the borehole referred from CRIEPI, 2007a [7]
890	HCD-3	300.57	300.63	-278.416	-278.476		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-278.45	571935.6424	4983485.082	-278.45												pore water extraction: squeeze, sampling depth: 370 m along borehole referred from CRIEPI, 2007b [8]
891	HCD-3	306.72	306.85	-284.566	-284.696		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-284.63	571935.6424	4983485.082	-284.63												pore water extraction: squeeze, sampling depth: 379 m along borehole referred from CRIEPI, 2007b [8]
892	HCD-3	315.62	315.68	-293.466	-293.526		2006		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-293.50	571935.6424	4983485.082	-293.50												pore water extraction: squeeze, sampling depth: 393 m along borehole referred from CRIEPI, 2007b [8]
893	HCD-3	322.08	322.21	-299.926	-300.056		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-299.99	571935.6424	4983485.082	-299.99												pore water extraction: squeeze, sampling depth: 403 m along borehole referred from CRIEPI, 2008b [10]
894	HCD-3	322.08	322.34	-299.926	-300.186		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-300.06	571935.6424	4983485.082	-300.06												pore water extraction: squeeze (100MPa), sampling depth: 403 m along the borehole referred from CRIEPI, 2008a [9]
895	HCD-3	327.31	327.37	-305.156	-305.216		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-305.19	571935.6424	4983485.082	-305.19												pore water extraction: squeeze, sampling depth: 411 m along borehole referred from CRIEPI, 2008b [10]
896	HCD-3	332.43	332.49	-310.276	-310.336		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-310.31	571935.6424	4983485.082	-310.31												pore water extraction: squeeze, sampling depth: 419 m along borehole referred from CRIEPI, 2008b [10]
897	HCD-3	339.52	339.64	-317.366	-317.486		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-317.43	571935.6424	4983485.082	-317.43												pore water extraction: squeeze, sampling depth: 431 m along borehole referred from CRIEPI, 2008b [10]
898	HCD-3	344.41	34.47	-322.256	-12.316		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-167.29	571935.6424	4983485.082	-167.29												pore water extraction: squeeze, sampling depth: 439 m along borehole referred from CRIEPI, 2008b [10]
899	HCD-3	350.84	351.07	-328.686	-328.916		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-328.80	571935.6424	4983485.082	-328.80												pore water extraction: squeeze (100MPa), sampling depth: 450 m along the borehole referred from CRIEPI, 2008a [9]
900	HCD-3	352.85	352.91	-330.696	-330.756		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-330.73	571935.6424	4983485.082	-330.73												pore water extraction: squeeze, sampling depth: 453 m along borehole referred from CRIEPI, 2008b [10]
901	HCD-3	355.8	355.86	-333.646	-333.706		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-333.68	571935.6424	4983485.082	-333.68												pore water extraction: squeeze, sampling depth: 458 m along borehole referred from CRIEPI, 2008b [10]
902	HCD-3	362.18	362.23	-340.026	-340.076		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-340.05	571935.6424	4983485.082	-340.05												pore water extraction: squeeze, sampling depth: 470 m along borehole referred from CRIEPI, 2008b [10]
903	HCD-3	370	370.05	-347.846	-347.896		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-347.87	571935.6424	4983485.082	-347.87												pore water extraction: squeeze, sampling depth: 485 m along borehole referred from CRIEPI, 2008b [10]
904	HCD-3	373.65	373.7	-351.496	-351.546		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-351.52	571935.6424	4983485.082	-351.52												pore water extraction: squeeze, sampling depth: 492 m along borehole referred from CRIEPI, 2008b [10]
905	HCD-3	377.71	377.76	-355.556	-355.606		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-355.58	571935.6424	4983485.082	-355.58												pore water extraction: squeeze, sampling depth: 500 m along borehole referred from CRIEPI, 2008b [10]
906	HCD-3	378.27	378.42	-356.116	-356.266		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-356.19	571935.6424	4983485.082	-356.19												pore water extraction: squeeze (100MPa), sampling depth: 501 m along the borehole referred from CRIEPI, 2008a [9]
907	HCD-3	383.64	383.68	-361.486	-361.526		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-361.51	571935.6424	4983485.082	-361.51												pore water extraction: squeeze, sampling depth: 512 m along borehole referred from CRIEPI, 2008b [10]
908	HCD-3	388.61	388.65	-366.456	-366.496		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-366.48	571935.6424	4983485.082	-366.48												pore water extraction: squeeze, sampling depth: 522 m along borehole referred from CRIEPI, 2008b [10]
909	HCD-3	393.22	393.26	-371.066	-371.106		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-371.09	571935.6424	4983485.082	-371.09												pore water extraction: squeeze, sampling depth: 532 m along borehole referred from CRIEPI, 2008b [10]
910	HCD-3	396.83	396.87	-374.676	-374.716		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-374.70	571935.6424	4983485.082	-374.70												pore water extraction: squeeze, sampling depth: 541 m along borehole referred from CRIEPI, 2008b [10]
911	HCD-3	401.01	401.09	-378.856	-378.936		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-378.90	571935.6424	4983485.082	-378.90												pore water extraction: squeeze, sampling depth: 551 m along borehole referred from CRIEPI, 2008b [10]
912	HCD-3	401.70	401.82	-379.546	-379.666		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-379.61	571935.6424	4983485.082	-379.61												pore water extraction: squeeze (100MPa), sampling depth: 553 m along the borehole referred from CRIEPI, 2008a [9]
913	HCD-3	405.42	405.46	-383.266	-383.306		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-383.29	571935.6424	4983485.082	-383.29												pore water extraction: squeeze, sampling depth: 562 m along borehole referred from CRIEPI, 2008b [10]
914	HCD-3	409.35	409.39	-387.196	-387.236		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-387.22	571935.6424	4983485.082	-387.22												pore water extraction: squeeze, sampling depth: 572 m along borehole referred from CRIEPI, 2008b [10]
915	HCD-3	413.42	413.46	-391.266	-391.306		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-391.29	571935.6424	4983485.082	-391.29												pore water extraction: squeeze, sampling depth: 584 m along borehole referred from CRIEPI, 2008b [10]
916	HCD-3	416.42	416.45	-394.266	-394.296		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-394.28	571935.6424	4983485.082	-394.28												pore water extraction: squeeze, sampling depth: 593 m along borehole referred from CRIEPI, 2008b [10]
917	HCD-3	418.98	419.04	-396.826	-396.886		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-396.86	571935.6424	4983485.082	-396.86												pore water extraction: squeeze (100MPa), sampling depth: 601 m along the borehole referred from CRIEPI, 2008a [9]
918	HCD-3	419.86	419.89	-397.706	-397.736		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-397.72	571935.6424	4983485.082	-397.72												pore water extraction: squeeze, sampling depth: 604 m along borehole referred from CRIEPI, 2008b [10]
919	HCD-3	421.56	421.59	-399.406	-399.436		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-399.42	571935.6424	4983485.082	-399.42												pore water extraction: squeeze, sampling depth: 610 m along borehole referred from CRIEPI, 2008b [10]
920	HCD-3	424.24	424.27	-402.086	-402.116		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-402.10	571935.6424	4983485.082	-402.10												pore water extraction: squeeze, sampling depth: 620 m along borehole referred from CRIEPI, 2008b [10]
921	HCD-3	426.65	426.68	-404.496	-404.526		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-404.51	571935.6424	4983485.082	-404.51												pore water extraction: squeeze, sampling depth: 630 m along borehole referred from CRIEPI, 2008b [10]
922	HCD-3	428.8	428.82	-406.646	-406.666		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-406.66	571935.6424	4983485.082	-406.66												pore water extraction: squeeze, sampling depth: 640 m along borehole referred from CRIEPI, 2008b [10]
923	HCD-3	430.72	430.77	-408.566	-408.616		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-408.59	571935.6424	4983485.082	-408.59												pore water extraction: squeeze (100MPa), sampling depth: 651 m along the borehole referred from CRIEPI, 2008a [9]
924	HCD-3	430.79	430.81	-408.636	-408.656		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-408.65	571935.6424	4983485.082	-408.65												pore water extraction: squeeze, sampling depth: 651 m along borehole referred from CRIEPI, 2008b [10]
925	HCD-3	432.17	432.19	-410.016	-410.036		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-410.03	571935.6424	4983485.082	-410.03												pore water extraction: squeeze, sampling depth: 660 m along borehole referred from CRIEPI, 2008b [10]
926	HCD-3	433.56	433.58	-411.406	-411.426		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-411.42	571935.6424	4983485.082	-411.42												pore water extraction: squeeze, sampling depth: 670 m along borehole referred from CRIEPI, 2008b [10]

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (46/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Geochemistry																																			
		Min.	Max.	Min.	Max.			Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
870	DD-2	99.30	99.55	-94.164	-94.414			182	25.8	16.1	18.7				29.0	11.5									130	1.98	0.26				5													
871	DD-2	99.30	99.55	-94.164	-94.414			166	34.4	17.2	19.7				10.5	2.1									168	2.72	0.38				9													
872	HCD-3	168.74	168.92	-146.586	-146.766		2006	3502	195	41	39														3767						1045													
873	HCD-3	168.74	168.92	-146.586	-146.766		2006			41	39														3767						1045													
874	HCD-3	176.14	176.23	-153.986	-154.076		2006			8.9	38.0														4129						330.26													
875	HCD-3	184.39	184.48	-162.236	-162.326		2006			58.3	42.3														4079						1430.94													
876	HCD-3	193.38	193.47	-171.226	-171.316		2006			15.4	30.5														3999						341.46													
877	HCD-3	200.86	201.03	-178.706	-178.876		2006			5.3	26.1														3892						206.55													
878	HCD-3	209.08	209.16	-186.926	-187.006		2006	3564	192	8	29														4474						201													
879	HCD-3	218.49	218.65	-196.336	-196.496		2006			26.7	37.9														3611						143.55													
880	HCD-3	228.97	229.05	-206.816	-206.896		2006			32.3	31.7														4249						176.69													
881	HCD-3	234.66	234.74	-212.506	-212.586		2006			87.6	25.8														4444						229.28													
882	HCD-3	240.61	240.69	-218.456	-218.536		2006			7.2	26.4														4101						248.65													
883	HCD-3	251.34	251.49	-229.186	-229.336		2006	2993	154	7.0	21														3785						209													
884	HCD-3	257.19	257.27	-235.036	-235.116		2006			32.7	27.4														3989						146.07													
885	HCD-3	264.63	264.78	-242.476	-242.626		2006			133.7	19.9														3766						203.07													
886	HCD-3	272.12	272.19	-249.966	-250.036		2006			45.3	27.3														4196						238.79													
887	HCD-3	279.5	279.64	-257.346	-257.486		2006			23.1	25.0														4381						552.4													
888	HCD-3	288.58	288.72	-266.426	-266.566		2006	4258	249	81	45														4212						2078													
889	HCD-3	291.92	292.05	-269.766	-269.896		2006	3942	154	63	37														4078						1916													
890	HCD-3	300.57	300.63	-278.416	-278.476		2006			197.3	22.6														4448						284.31													
891	HCD-3	306.72	306.85	-284.566	-284.696		2006			38.2	23.1														4709						189.73													
892	HCD-3	315.62	315.68	-293.466	-293.526		2006			17.7	20.0														4240						379.85													
893	HCD-3	322.08	322.21	-299.926	-300.056		2007			45.9	38.3														4430						940													
894	HCD-3	322.08	322.34	-299.926	-300.186		2007	2850	38	52	26														3810	16	14				830													
895	HCD-3	327.31	327.37	-305.156	-305.216		2007			28.7	32.7														4610						420													
896	HCD-3	332.43	332.49	-310.276	-310.336		2007			42.6	366.2														4700						210													
897	HCD-3	339.52	339.64	-317.366	-317.486		2007			31.4	309.1														4780						320													
898	HCD-3	344.41	34.47	-322.256	-12.316		2007			41.6	33.0														4790						190													
899	HCD-3	350.84	351.07	-328.686	-328.916		2007	3220	51	46	29														4710	20	13				1350													
900	HCD-3	352.85	352.91	-330.696	-330.756		2007			128.2	66.4														4170						3130													
901	HCD-3	355.8	355.86	-333.646	-333.706		2007			442.8	217.5														4390						8820													
902	HCD-3	362.18	362.23	-340.026	-340.076		2007			43.7	33.1														4080						360													
903	HCD-3	370	370.05	-347.846	-347.896		2007			73.6	43.3														4830						750													
904	HCD-3	373.65	373.7	-351.496	-351.546		2007			45.9	32.8														3340						570													
905	HCD-3	377.71	377.76	-355.556	-355.606		2007			96.5	58.4														4800						1660													
906	HCD-3	378.27	378.42	-356.116	-356.266		2007	3800	45	29	26														4410	18	10				310													
907	HCD-3	383.64	383.68	-361.486	-361.526		2007			40.7	39.3														4350						380													
908	HCD-3	388.61	388.65	-366.456	-366.496		2007			247.2	133.7														4410						6060													
909	HCD-3	393.22	393.26	-371.066	-371.106		2007			52.2	42.1														4410						220													
910	HCD-3	396.83	396.87	-374.676	-374.716		2007			72.2	50.9														4470						900													
911	HCD-3	401.01	401.09	-378.856	-378.936		2007			41.4	51.5														4890						900													
912	HCD-3	401.70	401.82	-379.546	-379.666		2007	3200	64	25	34														4940	24	13				220													
913	HCD-3	405.42	405.46	-383.266	-383.306		2007			84.6	58.5														5200						800													
914	HCD-3	409.35	409.39	-387.196	-387.236		2007			336.0	187.03														4910						6940													
915	HCD-3	413.42	413.46	-391.266	-391.306		2007			57.4	43.6														4210						360													
916	HCD-3	416.42	416.45	-394.266	-394.296		2007			58.3	46.7														4930						360													
917	HCD-3	418.98	419.04	-396.826	-396.886		2007	2690	33	38	35														4340	22	9.2				250													
918	HCD-3	419.86	419.89	-397.706	-397.736		2007			56.4	49.8														4900						320													
919	HCD-3	421.56	421.59	-399.406	-399.436		2007			402.3	220.3														4750						7660													
920	HCD-3	424.24	424.27	-402.086	-402.116		2007			469.4	466.1														4430						13400													
921	HCD-3	426.65	426.68	-404.496	-404.526		2007			138.9	102.8														5550						3120													
922	HCD-3	428.8	428.82	-406.646	-406.666		2007			81.0	60.8														4890						1210													
923	HCD-3	430.72	430.77	-408.566	-408.616		2007	3190	47	66	55														4470	26	0.2				1130													
924	HCD-3	430.79	430.81	-408.636	-408.656		2007			47.9	42.1														4270						160													
925	HCD-3	432.17	432.19	-410.016	-410.036		2007			62.5	51.4														5280						820													
926	HCD-3	433.56	433.58	-411.406	-411.426		2007			101.0	75.4														5020						1560													

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (47/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases																						Isotopes												
		Min.	Max.	Min.	Max.				Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{36}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_{sw}]	[cc_{STP}/g_{sw}]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
870	DD-2	99.30	99.55	-94.164	-94.414																												-82	-11.0											
871	DD-2	99.30	99.55	-94.164	-94.414																												-81	-10.8											
872	HCD-3	168.74	168.92	-146.586	-146.766		2006																										-28.6	0.5											
873	HCD-3	168.74	168.92	-146.586	-146.766		2006																										-28.6	0.5											
874	HCD-3	176.14	176.23	-153.986	-154.076		2006																																						
875	HCD-3	184.39	184.48	-162.236	-162.326		2006																																						
876	HCD-3	193.38	193.47	-171.226	-171.316		2006																																						
877	HCD-3	200.86	201.03	-178.706	-178.876		2006																																						
878	HCD-3	209.08	209.16	-186.926	-187.006		2006																										-23.1	2.2											
879	HCD-3	218.49	218.65	-196.336	-196.496		2006																																						
880	HCD-3	228.97	229.05	-206.816	-206.896		2006																																						
881	HCD-3	234.66	234.74	-212.506	-212.586		2006																																						
882	HCD-3	240.61	240.69	-218.456	-218.536		2006																																						
883	HCD-3	251.34	251.49	-229.186	-229.336		2006																										-21.3	2.9											
884	HCD-3	257.19	257.27	-235.036	-235.116		2006																																						
885	HCD-3	264.63	264.78	-242.476	-242.626		2006																																						
886	HCD-3	272.12	272.19	-249.966	-250.036		2006																																						
887	HCD-3	279.5	279.64	-257.346	-257.486		2006																																						
888	HCD-3	288.58	288.72	-266.426	-266.566		2006																										-23.9	2.6											
889	HCD-3	291.92	292.05	-269.766	-269.896		2006																										-25.5	2.2											
890	HCD-3	300.57	300.63	-278.416	-278.476		2006																																						
891	HCD-3	306.72	306.85	-284.566	-284.696		2006																																						
892	HCD-3	315.62	315.68	-293.466	-293.526		2006																																						
893	HCD-3	322.08	322.21	-299.926	-300.056		2007																																						
894	HCD-3	322.08	322.34	-299.926	-300.186		2007																										-27	0.6											
895	HCD-3	327.31	327.37	-305.156	-305.216		2007																																						
896	HCD-3	332.43	332.49	-310.276	-310.336		2007																																						
897	HCD-3	339.52	339.64	-317.366	-317.486		2007																																						
898	HCD-3	344.41	34.47	-322.256	-12.316		2007																																						
899	HCD-3	350.84	351.07	-328.686	-328.916		2007																										-25	1.5											
900	HCD-3	352.85	352.91	-330.696	-330.756		2007																																						
901	HCD-3	355.8	355.86	-333.646	-333.706		2007																																						
902	HCD-3	362.18	362.23	-340.026	-340.076		2007																																						
903	HCD-3	370	370.05	-347.846	-347.896		2007																																						
904	HCD-3	373.65	373.7	-351.496	-351.546		2007																																						
905	HCD-3	377.71	377.76	-355.556	-355.606		2007																																						
906	HCD-3	378.27	378.42	-356.116	-356.266		2007																										-25	1.4											
907	HCD-3	383.64	383.68	-361.486	-361.526		2007																																						
908	HCD-3	388.61	388.65	-366.456	-366.496		2007																																						
909	HCD-3	393.22	393.26	-371.066	-371.106		2007																																						
910	HCD-3	396.83	396.87	-374.676	-374.716		2007																																						
911	HCD-3	401.01	401.09	-378.856	-378.936		2007																																						
912	HCD-3	401.70	401.82	-379.546	-379.666		2007																										-23	2.5											
913	HCD-3	405.42	405.46	-383.266	-383.306		2007																																						
914	HCD-3	409.35	409.39	-387.196	-387.236		2007																																						
915	HCD-3	413.42	413.46	-391.266	-391.306		2007																																						
916	HCD-3	416.42	416.45	-394.266	-394.296		2007																																						
917	HCD-3	418.98	419.04	-396.826	-396.886		2007																										-25	1.8											
918	HCD-3	419.86	419.89	-397.706	-397.736		2007																																						
919	HCD-3	421.56	421.59	-399.406	-399.436		2007																																						
920	HCD-3	424.24	424.27	-402.086	-402.116		2007																																						
921	HCD-3	426.65	426.68	-404.496	-404.526		2007																																						
922	HCD-3	428.8	428.82	-406.646	-406.666		2007																																						
923	HCD-3	430.72	430.77	-408.566	-408.616		2007																										-21	2.8											
924	HCD-3	430.79	430.81	-408.636	-408.656		2007																																						
925	HCD-3	432.17	432.19	-410.016	-410.036		2007																																						
926	HCD-3	433.56	433.58	-411.406	-411.426		2007																																						

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (48/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Organics				Microbiology																					
		Min.	Max.	Min.	Max.			Humic acid	Fuluvic acid	Acetate	Formate	Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
870	DD-2	99.30	99.55	-94.164	-94.414																												
871	DD-2	99.30	99.55	-94.164	-94.414																												
872	HCD-3	168.74	168.92	-146.586	-146.766		2006																										
873	HCD-3	168.74	168.92	-146.586	-146.766		2006																										
874	HCD-3	176.14	176.23	-153.986	-154.076		2006																										
875	HCD-3	184.39	184.48	-162.236	-162.326		2006																										
876	HCD-3	193.38	193.47	-171.226	-171.316		2006																										
877	HCD-3	200.86	201.03	-178.706	-178.876		2006																										
878	HCD-3	209.08	209.16	-186.926	-187.006		2006																										
879	HCD-3	218.49	218.65	-196.336	-196.496		2006																										
880	HCD-3	228.97	229.05	-206.816	-206.896		2006																										
881	HCD-3	234.66	234.74	-212.506	-212.586		2006																										
882	HCD-3	240.61	240.69	-218.456	-218.536		2006																										
883	HCD-3	251.34	251.49	-229.186	-229.336		2006																										
884	HCD-3	257.19	257.27	-235.036	-235.116		2006																										
885	HCD-3	264.63	264.78	-242.476	-242.626		2006																										
886	HCD-3	272.12	272.19	-249.966	-250.036		2006																										
887	HCD-3	279.5	279.64	-257.346	-257.486		2006																										
888	HCD-3	288.58	288.72	-266.426	-266.566		2006																										
889	HCD-3	291.92	292.05	-269.766	-269.896		2006																										
890	HCD-3	300.57	300.63	-278.416	-278.476		2006																										
891	HCD-3	306.72	306.85	-284.566	-284.696		2006																										
892	HCD-3	315.62	315.68	-293.466	-293.526		2006																										
893	HCD-3	322.08	322.21	-299.926	-300.056		2007																										
894	HCD-3	322.08	322.34	-299.926	-300.186		2007																										
895	HCD-3	327.31	327.37	-305.156	-305.216		2007																										
896	HCD-3	332.43	332.49	-310.276	-310.336		2007																										
897	HCD-3	339.52	339.64	-317.366	-317.486		2007																										
898	HCD-3	344.41	34.47	-322.256	-12.316		2007																										
899	HCD-3	350.84	351.07	-328.686	-328.916		2007																										
900	HCD-3	352.85	352.91	-330.696	-330.756		2007																										
901	HCD-3	355.8	355.86	-333.646	-333.706		2007																										
902	HCD-3	362.18	362.23	-340.026	-340.076		2007																										
903	HCD-3	370	370.05	-347.846	-347.896		2007																										
904	HCD-3	373.65	373.7	-351.496	-351.546		2007																										
905	HCD-3	377.71	377.76	-355.556	-355.606		2007																										
906	HCD-3	378.27	378.42	-356.116	-356.266		2007																										
907	HCD-3	383.64	383.68	-361.486	-361.526		2007																										
908	HCD-3	388.61	388.65	-366.456	-366.496		2007																										
909	HCD-3	393.22	393.26	-371.066	-371.106		2007																										
910	HCD-3	396.83	396.87	-374.676	-374.716		2007																										
911	HCD-3	401.01	401.09	-378.856	-378.936		2007																										
912	HCD-3	401.70	401.82	-379.546	-379.666		2007																										
913	HCD-3	405.42	405.46	-383.266	-383.306		2007																										
914	HCD-3	409.35	409.39	-387.196	-387.236		2007																										
915	HCD-3	413.42	413.46	-391.266	-391.306		2007																										
916	HCD-3	416.42	416.45	-394.266	-394.296		2007																										
917	HCD-3	418.98	419.04	-396.826	-396.886		2007																										
918	HCD-3	419.86	419.89	-397.706	-397.736		2007																										
919	HCD-3	421.56	421.59	-399.406	-399.436		2007																										
920	HCD-3	424.24	424.27	-402.086	-402.116		2007																										
921	HCD-3	426.65	426.68	-404.496	-404.526		2007																										
922	HCD-3	428.8	428.82	-406.646	-406.666		2007																										
923	HCD-3	430.72	430.77	-408.566	-408.616		2007																										
924	HCD-3	430.79	430.81	-408.636	-408.656		2007																										
925	HCD-3	432.17	432.19	-410.016	-410.036		2007																										
926	HCD-3	433.56	433.58	-411.406	-411.426		2007																										

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (49/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII)			location (WGS84, UTM, Zone54)			Physico-chemical parameter							Contamination indicator				Comments
		Min.	Max.	Min.	Max.							X	Y	Z (middle depth)	East	North	Z (middle depth)	EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temper-ature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	
		[m]	[m]	[m]	[m]													[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]	[mg/l]		
927	HCD-3	434.76	434.77	-412.606	-412.616		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-412.61	571935.6424	4983485.082	-412.61												pore water extraction: squeeze, sampling depth: 680 m along borehole referred from CRIEPI, 2008b [10]
928	HCD-3	435.52	435.53	-413.366	-413.376		2007		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-413.37	571935.6424	4983485.082	-413.37												pore water extraction: squeeze, sampling depth: 687 m along borehole referred from CRIEPI, 2008b [10]
929	HCD-3	436.24	436.25	-414.086	-414.096		2008		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-414.09	571935.6424	4983485.082	-414.09												pore water extraction: squeeze, sampling depth: 695 m along borehole referred from CRIEPI, 2009b [12]
930	HCD-3	436.72	436.72	-414.566	-414.566				core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-414.57	571935.6424	4983485.082	-414.57		1430										pore water extraction: squeeze (<300MPa), sampling depth: 950 m along the borehole referred from CRIEPI, 2011a [15]
931	HCD-3	436.73	436.73	-414.576	-414.576		2010		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-414.58	571935.6424	4983485.082	-414.58												pore water extraction: squeeze, sampling depth: 946 m along borehole referred from CRIEPI, 2011b [16]
932	HCD-3	436.75	436.75	-414.596	-414.596		2010		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-414.60	571935.6424	4983485.082	-414.60												pore water extraction: squeeze, sampling depth: 939 m along borehole referred from CRIEPI, 2011b [16]
933	HCD-3	436.78	436.73	-414.626	-414.576		2010		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-414.60	571935.6424	4983485.082	-414.60												pore water extraction: squeeze, sampling depth: 931 m along borehole referred from CRIEPI, 2011b [16]
934	HCD-3	436.81	436.83	-414.656	-414.676				core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-414.67	571935.6424	4983485.082	-414.67												pore water extraction: squeeze (300MPa), sampling depth: 703 m along the borehole referred from CRIEPI, 2009a [11]
935	HCD-3	436.83	436.83	-414.676	-414.676		2008		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-414.68	571935.6424	4983485.082	-414.67												pore water extraction: squeeze, sampling depth: 703 m along borehole referred from CRIEPI, 2009b [12]
936	HCD-3	436.85	436.86	-414.696	-414.706				core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-414.70	571935.6424	4983485.082	-414.70		1480										pore water extraction: squeeze (<300MPa), sampling depth: 925 m along the borehole referred from CRIEPI, 2011a [15]
937	HCD-3	436.98	436.97	-414.826	-414.816		2010		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-414.82	571935.6424	4983485.082	-414.67												pore water extraction: squeeze, sampling depth: 921 m along borehole referred from CRIEPI, 2011b [16]
938	HCD-3	437.32	437.33	-415.166	-415.176		2008		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-415.17	571935.6424	4983485.082	-414.67												pore water extraction: squeeze, sampling depth: 712 m along borehole referred from CRIEPI, 2009b [12]
939	HCD-3	437.49	437.48	-415.336	-415.326		2010		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-415.33	571935.6424	4983485.082	-414.67												pore water extraction: squeeze, sampling depth: 909 m along borehole referred from CRIEPI, 2011b [16]
940	HCD-3	437.6	437.6	-415.446	-415.446		2008		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-415.45	571935.6424	4983485.082	-414.67												pore water extraction: squeeze, sampling depth: 724 m along borehole referred from CRIEPI, 2009b [12]
941	HCD-3	437.65	437.65	-415.496	-415.496		2008		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-415.50	571935.6424	4983485.082	-414.67												pore water extraction: squeeze, sampling depth: 733 m along borehole referred from CRIEPI, 2009b [12]
942	HCD-3	437.69	437.69	-415.536	-415.536		2008		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-415.54	571935.6424	4983485.082	-414.67												pore water extraction: squeeze, sampling depth: 744 m along borehole referred from CRIEPI, 2009b [12]
943	HCD-3	437.72	437.72	-415.566	-415.566				core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-415.57	571935.6424	4983485.082	-415.57												pore water extraction: squeeze (300MPa), sampling depth: 752 m along the borehole referred from CRIEPI, 2009a [11]
944	HCD-3	437.72	437.72	-415.566	-415.566		2008		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-415.57	571935.6424	4983485.082	-415.57												pore water extraction: squeeze, sampling depth: 752 m along borehole referred from CRIEPI, 2009b [12]
945	HCD-3	437.77	437.77	-415.616	-415.616		2008		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-415.62	571935.6424	4983485.082	-415.57												pore water extraction: squeeze, sampling depth: 760 m along borehole referred from CRIEPI, 2009b [12]
946	HCD-3	437.89	437.89	-415.736	-415.736		2008		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-415.74	571935.6424	4983485.082	-415.57												pore water extraction: squeeze, sampling depth: 773 m along borehole referred from CRIEPI, 2009b [12]
947	HCD-3	437.93	437.92	-415.776	-415.766		2010		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-415.77	571935.6424	4983485.082	-415.57												pore water extraction: squeeze, sampling depth: 901 m along borehole referred from CRIEPI, 2011b [16]
948	HCD-3	438.00	437.98	-415.846	-415.826				core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-415.84	571935.6424	4983485.082	-415.84		1370										pore water extraction: squeeze (<300MPa), sampling depth: 899 m along the borehole referred from CRIEPI, 2010a [13]
949	HCD-3	438.06	438.06	-415.906	-415.906		2008		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-415.91	571935.6424	4983485.082	-415.57												pore water extraction: squeeze, sampling depth: 783 m along borehole referred from CRIEPI, 2009b [12]
950	HCD-3	438.28	438.29	-416.126	-416.136		2008		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.13	571935.6424	4983485.082	-415.57												pore water extraction: squeeze, sampling depth: 794 m along borehole referred from CRIEPI, 2009b [12]
951	HCD-3	438.39	438.39	-416.236	-416.236		2008		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.24	571935.6424	4983485.082	-415.57												pore water extraction: squeeze, sampling depth: 798 m along borehole referred from CRIEPI, 2009b [12]
952	HCD-3	438.18	438.17	-416.026	-416.016		2009		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.02	571935.6424	4983485.082	-415.57												pore water extraction: squeeze, sampling depth: 896 m along borehole referred from CRIEPI, 2010b [14]
953	HCD-3	438.40	438.41	-416.246	-416.256		2009		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.25	571935.6424	4983485.082	-416.25												pore water extraction: squeeze (300MPa), sampling depth: 799 m along the borehole referred from CRIEPI, 2009a [11]
954	HCD-3	438.48	438.48	-416.326	-416.326		2009		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.33	571935.6424	4983485.082	-416.25												pore water extraction: squeeze, sampling depth: 803 m along borehole referred from CRIEPI, 2010b [14]
955	HCD-3	438.60	438.6	-416.446	-416.446		2009		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.45	571935.6424	4983485.082	-416.25												pore water extraction: squeeze, sampling depth: 810 m along borehole referred from CRIEPI, 2010b [14]
956	HCD-3	438.67	438.66	-416.516	-416.506		2009		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.51	571935.6424	4983485.082	-416.25												pore water extraction: squeeze, sampling depth: 879 m along borehole referred from CRIEPI, 2010b [14]
957	HCD-3	438.69	438.68	-416.536	-416.526		2009		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.53	571935.6424	4983485.082	-416.53		1360										pore water extraction: squeeze (<300MPa), sampling depth: 877 m along the borehole referred from CRIEPI, 2010a [13]
958	HCD-3	438.70	438.7	-416.546	-416.546		2009		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.55	571935.6424	4983485.082	-416.25												pore water extraction: squeeze, sampling depth: 821 m along borehole referred from CRIEPI, 2010b [14]
959	HCD-3	438.70	438.69	-416.546	-416.536		2009		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.54	571935.6424	4983485.082	-416.25		1230										pore water extraction: squeeze (<300MPa), sampling depth: 824 m along the borehole referred from CRIEPI, 2010a [13]
960	HCD-3	438.71	438.71	-416.556	-416.556		2009		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.56	571935.6424	4983485.082	-416.25												pore water extraction: squeeze, sampling depth: 830 m along borehole referred from CRIEPI, 2010b [14]
961	HCD-3	438.72	438.72	-416.566	-416.566		2009		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.57	571935.6424	4983485.082	-416.25												pore water extraction: squeeze, sampling depth: 842 m along borehole referred from CRIEPI, 2010b [14]
962	HCD-3	438.72	438.72	-416.566	-416.566		2009		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.57	571935.6424	4983485.082	-416.25												pore water extraction: squeeze, sampling depth: 850 m along borehole referred from CRIEPI, 2010b [14]
963	HCD-3	438.72	438.72	-416.566	-416.566		2009		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.57	571935.6424	4983485.082	-416.25												pore water extraction: squeeze, sampling depth: 872 m along borehole referred from CRIEPI, 2010b [14]
964	HCD-3	438.73	438.74	-416.576	-416.586		2009		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.58	571935.6424	4983485.082	-416.25		1300										pore water extraction: squeeze (<300MPa), sampling depth: 856 m along the borehole referred from CRIEPI, 2010a [13]
965	HCD-3	438.74	438.74	-416.586	-416.586		2009		core	Wakkanai Fm.	siliceous mudstone (siliceous shale)	111295.777	-26589.463	-416.59	571935.6424	4983485.082	-416.25												pore water extraction: squeeze, sampling depth: 859 m along borehole referred from CRIEPI, 2010b [14]

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (50/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Geochemistry																																				
		Min.	Max.	Min.	Max.			Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
927	HCD-3	434.76	434.77	-412.606	-412.616		2007			67.9	51.4														5180						120													
928	HCD-3	435.52	435.53	-413.366	-413.376		2007			149.6	126.0														5560						3780													
929	HCD-3	436.24	436.25	-414.086	-414.096		2008			42.5	64.5														6000						100													
930	HCD-3	436.72	436.72	-414.566	-414.566			4402	122	132	69				41	95									6150	44	16				30		4449											
931	HCD-3	436.73	436.73	-414.576	-414.576		2010			64.26	58.13														6007.39						257.29													
932	HCD-3	436.75	436.75	-414.596	-414.596		2010			84.48	56.57														5807.95						894.17													
933	HCD-3	436.78	436.73	-414.626	-414.576		2010			90.63	56.71														6179.05						552.85													
934	HCD-3	436.81	436.83	-414.656	-414.676			3685	54.7	58.1	43.6														5380	27.0	13.6				176													
935	HCD-3	436.83	436.83	-414.676	-414.676		2008			41.6	57.5														6070						100													
936	HCD-3	436.85	436.86	-414.696	-414.706			4520	126	77	62				36	86									6090	44	15				477		3530											
937	HCD-3	436.98	436.97	-414.826	-414.816		2010			67.92	53.83														5980.71						533.35													
938	HCD-3	437.32	437.33	-415.166	-415.176		2008			48.4	57.9														5520						122													
939	HCD-3	437.49	437.48	-415.336	-415.326		2010			59.47	44.33														5727.1						111.34													
940	HCD-3	437.6	437.6	-415.446	-415.446		2008			57.6	64.3														5490						1571													
941	HCD-3	437.65	437.65	-415.496	-415.496		2008			133	197														5530						3857													
942	HCD-3	437.69	437.69	-415.536	-415.536		2008			59.1	31														5090						1041													
943	HCD-3	437.72	437.72	-415.566	-415.566			4690	102	131	104														5610	32.7	12.4				2000													
944	HCD-3	437.72	437.72	-415.566	-415.566		2008			94.9	145														6144						1873													
945	HCD-3	437.77	437.77	-415.616	-415.616		2008			57	91														5730						191													
946	HCD-3	437.89	437.89	-415.736	-415.736		2008			59.4	87														6040						136													
947	HCD-3	437.93	437.92	-415.776	-415.766		2010			62.31	48.85														5463.48						295.16													
948	HCD-3	438.00	437.98	-415.846	-415.826			4673	127.7	57.2	61.3				41.2	84.4									6027	44.6	6.8				906													
949	HCD-3	438.06	438.06	-415.906	-415.906		2008			76.4	105														6260						759													
950	HCD-3	438.28	438.29	-416.126	-416.136		2008			71.7	103														6670						400													
951	HCD-3	438.39	438.39	-416.236	-416.236		2008			67.8	98.1														6050						335													
952	HCD-3	438.18	438.17	-416.026	-416.016		2009			93.1	66.4														5669						296.35													
953	HCD-3	438.40	438.41	-416.246	-416.256		2009	4245	92.7	88.6	74.4														5800	35.1	13.2				649													
954	HCD-3	438.48	438.48	-416.326	-416.326		2009			66.0	56.6														5966						151.08													
955	HCD-3	438.60	438.6	-416.446	-416.446		2009			56.5	60.0														6003						302.4													
956	HCD-3	438.67	438.66	-416.516	-416.506		2009			82.5	55.1														5479						160.15													
957	HCD-3	438.69	438.68	-416.536	-416.526		2009	4550	95.4	65.3	59.6				45.4	76.9									6087	42.5	8.4				99													
958	HCD-3	438.70	438.7	-416.546	-416.546		2009			46.2	47.9														5566						60.74													
959	HCD-3	438.70	438.69	-416.546	-416.536		2009	4059	64.5	72.9	60.1				32.0	58.0									5786	42.3	7.4				208													
960	HCD-3	438.71	438.71	-416.556	-416.556		2009			116.7	86.6														5685						1512.29													
961	HCD-3	438.72	438.72	-416.566	-416.566		2009			83.9	63.2														5331						712.65													
962	HCD-3	438.72	438.72	-416.566	-416.566		2009			79.5	71.3														6267						373.89													
963	HCD-3	438.72	438.72	-416.566	-416.566		2009			111.1	78.1														6230						596.48													
964	HCD-3	438.73	438.74	-416.576	-416.586		2009	4273	74.9	53.9	59.1				54.8	68.8									5605	40.8	7.4				285													
965	HCD-3	438.74	438.74	-416.586	-416.586		2009			125.46	85.7														5878						1840.31													

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (51/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases																							Isotopes											
		Min.	Max.	Min.	Max.				Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{36}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_{sw}]	[cc_{STP}/g_{sw}]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
927	HCD-3	434.76	434.77	-412.606	-412.616		2007																																					
928	HCD-3	435.52	435.53	-413.366	-413.376		2007																																					
929	HCD-3	436.24	436.25	-414.086	-414.096		2008																																					
930	HCD-3	436.72	436.72	-414.566	-414.566																											-24	2.9						3.1 ± 0.9				
931	HCD-3	436.73	436.73	-414.576	-414.576		2010																																					
932	HCD-3	436.75	436.75	-414.596	-414.596		2010																																					
933	HCD-3	436.78	436.73	-414.626	-414.576		2010																																					
934	HCD-3	436.81	436.83	-414.656	-414.676																											-20	3.1						6.0 ± 1.5				
935	HCD-3	436.83	436.83	-414.676	-414.676		2008																																					
936	HCD-3	436.85	436.86	-414.696	-414.706																											-24	2.6						4.3 ± 0.9				
937	HCD-3	436.98	436.97	-414.826	-414.816		2010																																					
938	HCD-3	437.32	437.33	-415.166	-415.176		2008																																					
939	HCD-3	437.49	437.48	-415.336	-415.326		2010																																					
940	HCD-3	437.6	437.6	-415.446	-415.446		2008																																					
941	HCD-3	437.65	437.65	-415.496	-415.496		2008																																					
942	HCD-3	437.69	437.69	-415.536	-415.536		2008																																					
943	HCD-3	437.72	437.72	-415.566	-415.566																											-21	3.0						3.2 ± 1.6				
944	HCD-3	437.72	437.72	-415.566	-415.566		2008																																					
945	HCD-3	437.77	437.77	-415.616	-415.616		2008																																					
946	HCD-3	437.89	437.89	-415.736	-415.736		2008																																					
947	HCD-3	437.93	437.92	-415.776	-415.766		2010																																					
948	HCD-3	438.00	437.98	-415.846	-415.826																											-24	3.1						3.5 ± 0.9				
949	HCD-3	438.06	438.06	-415.906	-415.906		2008																																					
950	HCD-3	438.28	438.29	-416.126	-416.136		2008																																					
951	HCD-3	438.39	438.39	-416.236	-416.236		2008																																					
952	HCD-3	438.18	438.17	-416.026	-416.016		2009																																					
953	HCD-3	438.40	438.41	-416.246	-416.256		2009																									-21	3.3						7.2 ± 1.9				
954	HCD-3	438.48	438.48	-416.326	-416.326		2009																																					
955	HCD-3	438.60	438.6	-416.446	-416.446		2009																																					
956	HCD-3	438.67	438.66	-416.516	-416.506		2009																																					
957	HCD-3	438.69	438.68	-416.536	-416.526		2009																									-24	3.1						3.3 ± 0.8				
958	HCD-3	438.70	438.7	-416.546	-416.546		2009																																					
959	HCD-3	438.70	438.69	-416.546	-416.536		2009																									-25	2.6						3.2 ± 0.8				
960	HCD-3	438.71	438.71	-416.556	-416.556		2009																																					
961	HCD-3	438.72	438.72	-416.566	-416.566		2009																																					
962	HCD-3	438.72	438.72	-416.566	-416.566		2009																																					
963	HCD-3	438.72	438.72	-416.566	-416.566		2009																																					
964	HCD-3	438.73	438.74	-416.576	-416.586		2009																									-26	2.5						5.6 ± 1.1				
965	HCD-3	438.74	438.74	-416.586	-416.586		2009																																					

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (52/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Organics				Microbiology																					
		Min.	Max.	Min.	Max.			Humic acid	Fuluvic acid	Acetate	Formate	Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
927	HCD-3	434.76	434.77	-412.606	-412.616		2007																										
928	HCD-3	435.52	435.53	-413.366	-413.376		2007																										
929	HCD-3	436.24	436.25	-414.086	-414.096		2008																										
930	HCD-3	436.72	436.72	-414.566	-414.566																												
931	HCD-3	436.73	436.73	-414.576	-414.576		2010																										
932	HCD-3	436.75	436.75	-414.596	-414.596		2010																										
933	HCD-3	436.78	436.73	-414.626	-414.576		2010																										
934	HCD-3	436.81	436.83	-414.656	-414.676																												
935	HCD-3	436.83	436.83	-414.676	-414.676		2008																										
936	HCD-3	436.85	436.86	-414.696	-414.706																												
937	HCD-3	436.98	436.97	-414.826	-414.816		2010																										
938	HCD-3	437.32	437.33	-415.166	-415.176		2008																										
939	HCD-3	437.49	437.48	-415.336	-415.326		2010																										
940	HCD-3	437.6	437.6	-415.446	-415.446		2008																										
941	HCD-3	437.65	437.65	-415.496	-415.496		2008																										
942	HCD-3	437.69	437.69	-415.536	-415.536		2008																										
943	HCD-3	437.72	437.72	-415.566	-415.566																												
944	HCD-3	437.72	437.72	-415.566	-415.566		2008																										
945	HCD-3	437.77	437.77	-415.616	-415.616		2008																										
946	HCD-3	437.89	437.89	-415.736	-415.736		2008																										
947	HCD-3	437.93	437.92	-415.776	-415.766		2010																										
948	HCD-3	438.00	437.98	-415.846	-415.826																												
949	HCD-3	438.06	438.06	-415.906	-415.906		2008																										
950	HCD-3	438.28	438.29	-416.126	-416.136		2008																										
951	HCD-3	438.39	438.39	-416.236	-416.236		2008																										
952	HCD-3	438.18	438.17	-416.026	-416.016		2009																										
953	HCD-3	438.40	438.41	-416.246	-416.256		2009																										
954	HCD-3	438.48	438.48	-416.326	-416.326		2009																										
955	HCD-3	438.60	438.6	-416.446	-416.446		2009																										
956	HCD-3	438.67	438.66	-416.516	-416.506		2009																										
957	HCD-3	438.69	438.68	-416.536	-416.526		2009																										
958	HCD-3	438.70	438.7	-416.546	-416.546		2009																										
959	HCD-3	438.70	438.69	-416.546	-416.536		2009																										
960	HCD-3	438.71	438.71	-416.556	-416.556		2009																										
961	HCD-3	438.72	438.72	-416.566	-416.566		2009																										
962	HCD-3	438.72	438.72	-416.566	-416.566		2009																										
963	HCD-3	438.72	438.72	-416.566	-416.566		2009																										
964	HCD-3	438.73	438.74	-416.576	-416.586		2009																										
965	HCD-3	438.74	438.74	-416.586	-416.586		2009																										

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater

Boreholes and inflow from the shaft wall in the gallery of the Horohobe URL

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Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (53/64)

Index	Sample point	sampling zone (GL) Min. [m]	sampling zone (GL) Max. [m]	sampling zone (EL) Min. [m]	sampling zone (EL) Max. [m]	sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII) X	Y	Z (middle depth)	location (WGS84, UTM, Zone54) East	North	Z (middle depth)	Physico-chemical parameter EC at site [mS/m]	EC at lab [mS/m]	pH at site	pH at lab	ORP Observ. [mV]	ORP SHE [mV]	Temperature at site [℃]	Contamination indicator Tracer (uranine) [mg/l]	Tracer (Na-naphtionate) [mg/l]	Tracer (amino G acid) [mg/l]	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	Comments
Boreholes in the Gallery of the Horonobe URL																													
966	07-V140-M01	138.676	138.676	-78.676	-78.676		2008/2/8	2008/2/13-2/26	inflow	Koetoi Fm.	diatomaceous mudstone	116236.4	-30771.43	-78.676	567678.991083	4988359.356748	-78.676		1500		7.7					0.62		A	
967	07-V140-M01	138.676	138.676	-78.676	-78.676		2008/11/17	2009/1/23-2/11	inflow	Koetoi Fm.	diatomaceous mudstone	116236.4	-30771.43	-78.676	567678.991083	4988359.356748	-78.676		1500		7.6								
968	07-V140-M01	138.676	138.676	-78.676	-78.676		2008/12/19	2009/1/23-2/11	inflow	Koetoi Fm.	diatomaceous mudstone	116236.4	-30771.43	-78.676	567678.991083	4988359.356748	-78.676	1580	1500	7.0	7.5			14.4					
969	07-V140-M01	138.676	138.676	-78.676	-78.676		2009/8/26		inflow	Koetoi Fm.	diatomaceous mudstone	116236.4	-30771.43	-78.676	567678.991083	4988359.356748	-78.676			7.0		-257	-51	16.8					referred from JAEA, 2009 [5]
970	07-V140-M01	138.676	138.676	-78.676	-78.676		2009/12/22	2010/1/13-	inflow	Koetoi Fm.	diatomaceous mudstone	116236.4	-30771.43	-78.676	567678.991083	4988359.356748	-78.676		1600		7.9				<0.002	<0.001		B	
971	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/1/15	2010/1/19-	inflow	Koetoi Fm.	diatomaceous mudstone	116236.4	-30771.43	-78.676	567678.991083	4988359.356748	-78.676		1600		7.3				<0.002	<0.001		B	
972	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/1/18	2010/1/22-	inflow	Koetoi Fm.	diatomaceous mudstone	116236.4	-30771.43	-78.676	567678.991083	4988359.356748	-78.676		1600		7.4				<0.002	<0.001		B	
973	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/2/16	2010/4/2/4/23	inflow	Koetoi Fm.	diatomaceous mudstone	116236.4	-30771.43	-78.676	567678.991083	4988359.356748	-78.676												analyzed at Tono Geoscience center
974	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/7/27	2010/8/20-10/14	inflow	Koetoi Fm.	diatomaceous mudstone	116236.4	-30771.43	-78.676	567678.991083	4988359.356748	-78.676		1500		7.2				<0.002	<0.001		B	
975	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/10/27	2010/11/1-2011/1/19	inflow	Koetoi Fm.	diatomaceous mudstone	116236.4	-30771.43	-78.676	567678.991083	4988359.356748	-78.676		1600		7.6				<0.002	<0.001		B	
976	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/11/19	2010/11/25-12/17	inflow	Koetoi Fm.	diatomaceous mudstone	116236.4	-30771.43	-78.676	567678.991083	4988359.356748	-78.676		1600		7.4								
977	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/11/24	2010/12/1-12/22	inflow	Koetoi Fm.	diatomaceous mudstone	116236.4	-30771.43	-78.676	567678.991083	4988359.356748	-78.676		1600		7.5								
978	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/12/22	2010/12/27-2011/1/20	inflow	Koetoi Fm.	diatomaceous mudstone	116236.4	-30771.43	-78.676	567678.991083	4988359.356748	-78.676		1500		7.5								
979	07-V140-M01	138.676	138.676	-78.676	-78.676		2011/2/1	2011/2/15-3/8	inflow	Koetoi Fm.	diatomaceous mudstone	116236.4	-30771.43	-78.676	567678.991083	4988359.356748	-78.676		1600		7.5				<0.002	<0.001		B	
980	07-V140-M03	139.739	139.739	-79.739	-79.739	1	2010/1/15	2010/1/19-	inflow	Koetoi Fm.	diatomaceous mudstone	116236.76	-30770.31	-79.739	567681.025344	4988360.358026	-79.739	1700	1300	7.24	7.7	-434	-228	17.9	<0.002	<0.001		B	pH and ORP at site: mesured at 2010/1/7
981	07-V140-M03	139.739	139.739	-79.739	-79.739	1	2010/10/28	2010/11/1-2011/2/9	inflow	Koetoi Fm.	diatomaceous mudstone	116236.76	-30770.31	-79.739	567681.025344	4988360.358026	-79.739		1400		7.7				<0.002	<0.001		B	
982	07-V140-M03	139.739	139.739	-79.739	-79.739	1	2010/11/25	2010/12/1-12/22	inflow	Koetoi Fm.	diatomaceous mudstone	116236.76	-30770.31	-79.739	567681.025344	4988360.358026	-79.739		1400		7.6								
983	07-V140-M03	139.739	139.739	-79.739	-79.739	2	2009/10/7		inflow	Koetoi Fm.	diatomaceous mudstone	116236.76	-30770.31	-79.739	567681.025344	4988360.358026	-79.739												
984	08-E140-C01						2009/3/9	2009/3/25-4/7	inflow	Koetoi Fm.	diatomaceous mudstone	116150.330	-30718.918		567732.811885	4988274.129482			1000		8.4					0.51		A	Before installed a monitering system
985	08-E140-C01						2009/3/13	2009/3/25-4/7	inflow	Koetoi Fm.	diatomaceous mudstone	116150.330	-30718.918		567732.811885	4988274.129482			970		7.8					0.5		A	After installed a monitering system, before pressurized packers
986	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2009/4/16	2009/5/26-	inflow	Koetoi Fm.	diatomaceous mudstone	116138.206	-30707.21	-102.71	567744.702631	4988262.190729	-102.71		1300		8.1				0.0023			B	
987	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2009/8/4	2009/8/11-	inflow	Koetoi Fm.	diatomaceous mudstone	116138.206	-30707.21	-102.71	567744.702631	4988262.190729	-102.71		1300		7.5				<0.002	<0.001		B	
988	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2009/9/17	2009/9/25-	inflow	Koetoi Fm.	diatomaceous mudstone	116138.206	-30707.21	-102.71	567744.702631	4988262.190729	-102.71		1300	6.86	7.9	-401	-195		<0.002	<0.001		B	pH and ORP at site: mesured at 2009/11/18
989	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2011/2/4	2011/2/23-3/23	inflow	Koetoi Fm.	diatomaceous mudstone	116138.206	-30707.21	-102.71	567744.702631	4988262.190729	-102.71		1300	6.51	7.1	-414	-208		<0.002	<0.001		B	
990	08-E140-C01	168.62	174.37	-108.62	-114.37	4	2009/4/16	2009/5/26-	inflow	Koetoi Fm.	diatomaceous mudstone	116131.482	-30700.717	-111.50	567751.296983	4988255.569462	-111.50		1200	6.42	8.2	-438	-232		0.0036			B	pH and ORP at site: mesured at 2009/5/26
991	08-E140-C01	168.62	174.37	-108.62	-114.37	4	2009/8/4	2009/8/11-	inflow	Koetoi Fm.	diatomaceous mudstone	116131.482	-30700.717	-111.50	567751.296983	4988255.569462	-111.50		1200	6.89	8.4	-420	-214		<0.002	<0.001		B	pH at site: mesured at 2009/8/10 ORP at site: mesured at 2009/8/16
992	08-E140-C01	168.62	174.37	-108.62	-114.37	4	2009/9/17	2009/9/25-	inflow	Koetoi Fm.	diatomaceous mudstone	116131.482	-30700.717	-111.50	567751.296983	4988255.569462	-111.50		1200		8				<0.002	<0.001		B	
993	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/3/17	2009/3/25-4/7	inflow	Koetoi Fm.	diatomaceous mudstone	116127.079	-30696.464	-124.67	567751.296983	4988251.233753	-124.67		940		7.8					0.6		A	
994	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/4/16	2009/5/26-	inflow	Koetoi Fm.	diatomaceous mudstone	116127.079	-30696.464	-124.67	567751.296983	4988251.233753	-124.67		980		8.2				0.0034			B	
995	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/8/4	2009/8/11-	inflow	Koetoi Fm.	diatomaceous mudstone	116127.079	-30696.464	-124.67	567751.296983	4988251.233753	-124.67		920		7.5	-425	-219		<0.002	<0.001		B	pH and ORP at site: mesured at 2009/7/8
996	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/9/17	2009/9/25-	inflow	Koetoi Fm.	diatomaceous mudstone	116127.079	-30696.464	-124.67	567751.296983	4988251.233753	-124.67		930		8.1				<0.002	<0.001		B	
997	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2011/2/16	2011/2/18-3/15	inflow	Koetoi Fm.	diatomaceous mudstone	116127.079	-30696.464	-124.67	567751.296983	4988251.233753	-124.67		930	6.62	7.2	-412	-206		<0.002	<0.001		B	
998	08-E140-C01	195	208.87	-135	-148.87	2	2009/3/17	2009/3/25-4/7	inflow	Koetoi Fm.	diatomaceous mudstone	116117.173	-30685.761	-141.94	567766.468237	4988241.496657	-141.94		800		8					0.52		A	
999	08-E140-C01	195	208.87	-135	-148.87	2	2009/4/16	2009/5/26-	inflow	Koetoi Fm.	diatomaceous mudstone	116117.173	-30685.761	-141.94	567766.468237	4988241.496657	-141.94		830		8.3				<0.002			B	
1000	08-E140-C01	195	208.87	-135	-148.87	2	2009/8/4	2009/8/11-	inflow	Koetoi Fm.	diatomaceous mudstone	116117.173	-30685.761	-141.94	567766.468237	4988241.496657	-141.94		780		7.7				<0.002	<0.001		B	
1001	08-E140-C01	195	208.87	-135	-148.87	2	2009/9/17	2009/9/25-	inflow	Koetoi Fm.	diatomaceous mudstone	116117.173	-30685.761	-141.94	567766.468237	4988241.496657	-141.94		800		8.1				<0.002	<0.001		B	
1002	08-E140-C01	195	208.87	-135	-148.87	2	2011/2/16	2011/2/21-2/23	inflow	Koetoi Fm.	diatomaceous mudstone	116117.173	-30685.761	-141.94	567766.468237	4988241.496657	-141.94								<0.002	<0.001		B	
1003	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/3/17	2009/3/25-4/7	inflow	Koetoi Fm.	diatomaceous mudstone	116109.769	-30678.357	-154.20	567773.983743	4988234.209705	-154.20		740		8.1					0.41		A	
1004	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/4/16	2009/5/26-	inflow	Koetoi Fm.	diatomaceous mudstone	116109.769	-30678.357	-154.20	567773.983743	4988234.209705	-154.20		760		8.3	-418	-212		0.003			B	pH and ORP at site: mesured at 2009/4/21
1005	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/8/4	2009/8/11-	inflow	Koetoi Fm.	diatomaceous mudstone	116109.769	-30678.357	-154.20	567773.983743	4988234.209705	-154.20		710		7.7	-423	-217		<0.002	<0.001		B	pH and ORP at site: mesured at 2009/7/10
1006	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/9/17	2009/9/25-	inflow	Koetoi Fm.	diatomaceous mudstone	116109.769	-30678.357	-154.20	567773.983743	4988234.209705	-154.20		750		8.1				<0.002	<0.001		B	
1007	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2011/1/31	2011/2/2-2/18	inflow	Koetoi Fm.	diatomaceous mudstone	116109.769	-30678.357	-154.20	567773.983743	4988234.209705	-154.20		740	6.67	7.5	-429	-223		0.0001	<0.001		B	Isotope: sampled at 2011/2/4
1008	08-E140-M01	139.132		-79.13			2010/2/4	2010/2/10-	inflow	Koetoi Fm.	diatomaceous mudstone	116150.376	-30718.078	-79.13	567733.650861	4988274.188430	-79.13		1400		8.2				<0.002	<0.001		B	Location: estimated by using the data of 08-E140-C01
1009	08-E140-M01	139.132		-79.13			2010/10/29	2010/11/1-2011/2/9	inflow	Koetoi Fm.	diatomaceous mudstone	116150.376	-30718.078	-79.13	567733.650861	4988274.188430	-79.13		1600		7.3				<0.002	<0.001		B	
1010	08-E140-M02	139.182		-79.18		1	2010/1/15	2010/1/19-	inflow	Koetoi Fm.	diatomaceous mudstone	116148.479	-30721.025	-79.18	567730.734243	4988272.246654	-79.18		1600		7.7				<0.002	<0.001		B	Location: estimated by using the data of 08-E140-C01
1011	08-E140-M02	139.182		-79.18		1	2010/2/4	2010/2/10-	inflow	Koetoi Fm.	diatomaceous mudstone	116148.479	-30721.025	-79.18	567730.734243	4988272.246654	-79.18		1500		8								Location: estimated by using the data of 08-E140-C01
1012	08-E140-M02	139.182		-79.18		1	2010/7/20	2010/8/20-10/14	inflow	Koetoi Fm.	diatomaceous mudstone	116148.479	-30721.025	-79.18	567730.734243	4988272.246654	-79.18		1600	7.52	7.1	-415	-209		<0.002	<0.001		B	pH and ORP at site: mesured at 2009/7/14
1013	08-E140-M02	139.182		-79.18		1	2010/10/28	2010/11/1-2011/1/19	inflow	Koetoi Fm.	diatomaceous mudstone	116148.479	-30721.025	-79.18	567730.734243	4988272.246654	-79.18		1500		7.6				<0.002	<0.001		B	
1014	08-E140-M02	139.182		-79.18		1	2011/2/15	2011/2/17-3/10	inflow	Koetoi Fm.	diatomaceous mudstone	116148.479	-30721.025	-79.18	567730.734243	4988272.246654	-79.18		1600		7.3				<0.002	<0.001		B	
1015	08-E140-M02	139.182		-79.18		2	2010/1/15	2010/2/21～2/23	inflow	Koetoi Fm.	diatomaceous mudstone	116148.479	-30721.025	-79.18	567730.734243	4988272.246654	-79.18		1500		8.4								Location: estimated by using the data of 08-E140-C01
1016	08-E140-M02	139.182		-79.18		2	2011/2/15		inflow	Koetoi Fm.	diatomaceous mudstone	116148.479	-30721.025	-79.18	567730.734243	4988272.246654	-79.18								0.12	<0.001		B	
1017	09-V250-M01	249.146		-189.146			2009/12/15	2009/12/18-	inflow	Koetoi Fm.	diatomaceous mudstone	116208.524	-30752.359	-189.146	567698.485201	4988331.785543	-189.146		940		8				<0.002	<0.001		B	Location: estimated by using the data of neighbourhood measurement point
1018	09-V250-M01	249.146		-189.146			2010/1/18	2009/1/21-	inflow	Koetoi Fm.	diatomaceous mudstone	116208.524	-30752.359	-189.146	567698.485201	4988331.785543	-189.146		1000		7.8				<0.002	<0.001		B	Location: estimated by using the data of neighbourhood measurement point
1019	09-V250-M01	249.146		-189.146			2010/6/7	2010/8/20-10/14	inflow	Koetoi Fm.	diatomaceous mudstone	116208.524	-30752.359	-189.146	567698.485201	4988331.785543	-189.146		1000		7.5				<0.002	0.00075		B	Location: estimated by using the data of neighbourhood measurement point
1020	09-V250-M01	249.146		-189.146			2010/10/13	2010/10/18-12/17	inflow	Koetoi Fm.	diatomaceous mudstone	116208.524	-30752.359	-189.146	567698.485201	4988331.785543	-189.146		880		7.9				<0.002	0.00008		B	Location: estimated by using the data of neighbourhood measurement point
1021	09-V250-M01	249.146		-189.146			2011/1/20	2011/1/26-3/14	inflow	Koetoi Fm.	diatomaceous mudstone	116208.524	-30752.359	-189.146	567698.485201	4988331.785543	-189.146		880		7.8				<0.002	0.00039		B	Location: estimated by using the data of neighbourhood measurement point
1022	09-V250-M02	249.146		-189.146			2009/11/17	2009/11/24-	inflow	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116213.58	-30755.216	-189.146	567695.551233	4988336.795553	-189.146		930		7.8				<0.002	0.18		B	Location: estimated by using the data of neighbourhood measurement point
1023	09-V250-M02	249.146		-189.146			2010/1/18	2010/1/21-	inflow	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116213.58	-30755.216	-189.146	567695.551233	4988336.795553	-189.146		930		7.8				<0.002	<0.001		B	Location: estimated by using the data of neighbourhood measurement point
1024	09-V250-M02	249.146		-189.146			2010/6/7	2010/8/20-10/14	inflow	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116213.58	-30755.216	-189.146	567695.551233	4988336.795553	-189.146		940		7.6				<0.002	<0.001		B	Location: estimated by using the data of neighbourhood measurement point
1025	09-V250-M02	249.146		-189.146			2010/10/13	2010/10/18-12/17	inflow	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116213.58	-30755.216	-189.146	567695.551233	4988336.795553	-189.146		940		7.9				<0.002	0.00017		B	Location: estimated by using the data of neighbourhood measurement point
1026	09-V250-M02	249.146		-189.146			2011/1/20	2011/1/26-3/14	inflow	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116213.58	-30755.216	-189.146	567695.551233	4988336.795553	-189.146		930		7.8				<0.002	<0.001		B	Location: estimated by using the data of neighbourhood measurement point
1027	09-V250-M02	249.146		-189.146		1	2011/2/15	2011/2/17-3/25	inflow	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116213.58	-30755.216	-189.146	567695.551233	4988336.795553	-189.146		940		7.5				<0.002	<0.001		B	Location: estimated by using the data of neighbourhood measurement point
1028	09-V250-M02	249.146		-189.146		2	2011/2/15	2011/2/18-3/25	inflow	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116213.58	-30755.216	-189.146	567695.551233	4988336.795553	-189.146		900		7.8				<0.002	0.00031		B	Location: estimated by using the data of neighbourhood measurement point
1029	09-V250-M03	250.146	270.146	-190.146	-210.146		2009/12/15	2009/12/18-	inflow	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116212.916	-30756.434	-200.146	567694.343938	4988336.113002	-200.1		960		8				<0.002	<0.001		B	Location: estimated by using the data of neighbourhood measurement point
1030	09-V250-M03	250.146	270.146	-190.146	-210.146		2010/1/18	2010/1/21-	inflow	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116212.916	-30756.434	-200.146	567694.343938	4988336.113002	-200.1		1000		7.8				<0.002	0.002		B	Location: estimated by using the data of neighbourhood measurement point
1031	09-V250-M03	250.146	270.146	-190.146	-210.146		2010/6/7	2010/8/20-10/14	inflow	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116212.916	-30756.434	-200.146	567694.343938	4988336.113002	-200.1		1100		7.4				<0.002	0.00245		B	Location: estimated by using the data of neighbourhood measurement point
1032	09-V250-M03	250.146	270.146	-190.146	-210.146		2010/10/14	2010/10/18-12/17	inflow	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116212.916	-30756.434	-200.146	567694.343938	4988336.113002	-200.1		1100		7.5				<0.002	0.0011		B	Location: estimated by using the data of neighbourhood measurement point
1033	09-V250-M03	250.146	270.146	-190.146	-210.146		2011/1/20	2011/1/26-3/14	inflow	Koetoi Fm. Wakkanai Fm.	diatomaceous mudstone, siliceous mudstone	116212.916	-30756.434	-200.146	567694.343938	4988336.113002	-200.1		1200		7.3				<0.002	0.00049		B	Location: estimated by using the data of neighbourhood measurement point
Sedimentary rocks from the shaft wall																													
1034	East shaft	5.1	5.1	54.9	54.9				block rocks	Angular gravel layer		116162.8	-30727.5	54.9	567724.040629	4988286.462354	54.9		50		7.6								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1035	East shaft	5.5	5.5	54.5	54.5				block rocks	Angular gravel layer	conglomerate	116162.8	-30727.5	54.5	567724.040629	4988286.462354	54.5		100		7.2								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1036	East shaft	6.5	6.5	53.5	53.5				block rocks	Angular gravel layer	conglomerate	116162.8	-30727.5	53.5	567724.040629	4988286.462354	53.5		120		7.9								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1037	East shaft	7.6	7.6	52.4	52.4				block rocks	Angular gravel layer	conglomerate	116162.8	-30727.5	52.4	567724.040629	4988286.462354	52.4												pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1038	East shaft	9.5	9.5	50.5	50.5				block rocks	Angular gravel layer	conglomerate	116162.8	-30727.5	50.5	567724.040629	4988286.462354	50.5		120		8.3								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1039	East shaft	11.6	11.6	48.4	48.4				block rocks	Angular gravel layer	mudstone	116162.8	-30727.5	48.4	567724.040629	4988286.462354	48.4		90		8.4								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1040	East shaft	13.6	13.6	46.4	46.4				block rocks	Angular gravel layer	mudstone	116162.8	-30727.5	46.4	567724.040629	4988286.462354	46.4												pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1041	East shaft	15.6	15.6	44.4	44.4				block rocks	Angular gravel layer	mudstone	116162.8	-30727.5	44.4	567724.040629	4988286.462354	44.4												pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1042	East shaft	17.6	17.6	42.4	42.4				block rocks	Angular gravel layer	mudstone	116162.8	-30727.5	42.4	567724.040629	4988286.462354	42.4		170		8.4								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1043	East shaft	19.6	19.6	40.4	40.4				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	40.4	567724.040629	4988286.462354	40.4		180		8.4								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1044	East shaft	24.1	24.1	35.9	35.9				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	35.9	567724.040629	4988286.462354	35.9		640		7.9								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1045	East shaft	29	29	31	31				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	31	567724.040629	4988286.462354	31.0												pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1046	East shaft	33	33	27	27				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	27	567724.040629	4988286.462354	27.0		860		8.3								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1047	East shaft	37.1	37.1	22.9	22.9				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	22.9	567724.040629	4988286.462354	22.9												pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1048	East shaft	40.1	40.1	19.9	19.9				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	19.9	567724.040629	4988286.462354	19.9		970		8.2								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1049	East shaft	52.7	52.7	7.3	7.3				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	7.3	567724.040629	4988286.462354	7.3		1100		8.4								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1050	East shaft	60	60	0	0				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	0	567724.040629	4988286.462354	0.0		870		8.4								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1051	East shaft	69.8	69.8	-9.8	-9.8				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-9.8	567724.040629	4988286.462354	-9.8		1270		8.4								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1052	East shaft	80.1	80.1	-20.1	-20.1				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-20.1	567724.040629	4988286.462354	-20.1		1280		8.2								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1053	East shaft	90.1	90.1	-30.1	-30.1				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-30.1	567724.040629	4988286.462354	-30.1		1280		8								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (54/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Geochemistry																																				
		Min.	Max.	Min.	Max.			Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
Boreholes in the Gallery of the Horonobe URL																																												
966	07-V140-M01	138.676	138.676	-78.676	-78.676		2008/2/8	3100	120	96	59		0.03	10	64		1.6	<0.01	1.1	<0.01	0.06		<0.01	0.28	3900	31	13	0.01		170	<0.1	<0.1	3100	8.7	2600				27	650		158.4	161.4	-0.9
967	07-V140-M01	138.676	138.676	-78.676	-78.676		2008/11/17	3500	120	82	55		0.03	8	65		2	<0.01	1.1	<0.01	0.04		<0.01	0.07	3900	31	8.6	<0.01		150	0.1	<0.1	3000	6.5	2600				27	640		173.3	159.7	4.1
968	07-V140-M01	138.676	138.676	-78.676	-78.676		2008/12/19	3400	120	83	55		0.03	8.1	66		1.5	<0.01	1	<0.01	0.04		<0.01	0.12	3900	32	9	<0.01		160	0.1	<0.1	3000	4.5	2600				27	640		169.6	159.6	3.0
969	07-V140-M01	138.676	138.676	-78.676	-78.676		2009/8/26	2800	300	93	62		0.068		27	91					0.79	0.74		<1	4100	11		<2		160	<2	0.026	3200	3.4								148.1	168.3	-6.4
970	07-V140-M01	138.676	138.676	-78.676	-78.676		2009/12/22	3500	120	82	60		<0.01	11	29		1.4	<0.01	0.7	<0.01	0.02		<0.1	<0.1	4300	29	12	<0.1		160	0.2	<0.1	3200	12	2600				23	660		174.8	174.4	0.1
971	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/1/15	3300	100	82	59		0.03	11	29		1.6	<0.01	0.8	<0.01	0.07		<0.1	<0.1	4300	28	12	<0.1		160	<0.1	<0.1	3100	3.6	2300				23	690		165.5	172.4	-2.1
972	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/1/18	3300	100	87	60		<0.01	10	29		1.4	<0.01	0.8	<0.01	0.05		<0.1	<0.1	4000	28	11	<0.1		160	<0.1	<0.1	3100	3.9	2600				23	680		165.7	164.0	0.5
973	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/2/16	2840	115	89	58.5		0.02		22.8	90	1.38				0.03		<0.05	<0.05	4040	29.2		<0.05			<0.05								21.6	591	0.17	135.7	163.4	-9.3
974	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/7/27	3300	110	94	61		0.03	11	26		1.4		1.2		1.1		0.12	0.05	4500	31	11	0.1		150	0.4	<0.1	2800	2.5	2600				26	640				
975	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/10/27	3400	110	93	61		0.02	11	26		1.3		1.2		0.61		0.007	0.05	4000	31	12	<0.1		150	<0.1	<0.1	2900	6.2	2600				25	610				
976	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/11/19	3300	110	93	61		0.03	11	28		1.4		1.3		0.48		<0.01	0.04	4200	31	12	<0.1		150	<0.1	<0.1	2900	3.8	2600				27	630				
977	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/11/24	3300	110	92	61		0.02	10	27		1.3		1.2		0.67		0.02	0.05	4100	31	12	0.03		150	0.03	<0.1	3100	4.6	2700				26	660				
978	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/12/22	3500	110	92	60		0.03	10	26		1.4		1.4		1.5		0.1	0.07	4300	31	11	0.03		160	<0.1	<0.1	2800	4.2	2600				26	590				
979	07-V140-M01	138.676	138.676	-78.676	-78.676		2011/2/1	3300	110	91	60		0.02	10	25		1.2		1.2		0.56		0.008	0.07	4200	31	12	<0.1		150	0.03	<0.1	2800	4.2	2600				25	600				
980	07-V140-M03	139.739	139.739	-79.739	-79.739	1	2010/1/15	2900	91	60	46		0.01	9.6	29		1.1	<0.01	1.7	<0.01	0.58	0.56	<0.1	<0.1	3400	23	8	<0.1		140	<0.1	0.004	2900	7.2	2500				22	610		144.4	143.9	0.2
981	07-V140-M03	139.739	139.739	-79.739	-79.739	1	2010/10/28	3000	97	75	50		0.01	9.5	27		1.1		1.2		0.43		0.009	0.06	3300	26	9.7	<0.1		130	<0.1	<0.1	2800	7.7	2500				26	580				
982	07-V140-M03	139.739	139.739	-79.739	-79.739	1	2010/11/25	2900	95	73	49		0.02	9.2	27		1		1.2		0.4		0.004	0.05	3400	25	9.9	<0.1		120	<0.1	<0.1	3000	6.4	2600				26	620				
983	07-V140-M03	139.739	139.739	-79.739	-79.739	2	2009/10/7																																				
984	08-E140-C01						2009/3/9	2300	64	13	19		0.06	4.6	23		1	<0.01	0.3	<0.01	0.03		0.02	0.23	2300	15	5.9	0.1		79	24		2500	31	2100				24	500		108.9	107.6	0.6
985	08-E140-C01						2009/3/13	2300	75	23	26		0.11	4.5	58		1	<0.01	0.3	<0.01	0.04		<0.01	0.09	2100	14	4.8	0.14		97	0.6		2800	9.6	2300				23	580		111.2	105.6	2.6
986	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2009/4/16	2900	94	55	41		<0.01	14	26		0.86	<0.01	0.4	<0.01	0.02		<0.1	<0.1	2800	19	8	16		120	<0.1	0.0063	3300	22	2700				39	680		143.3	134.3	3.3
987	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2009/8/4	2800	92	52	39		0.03	12	26		0.97	<0.01	0.8	<0.01	1.36	0.37	<0.1	<0.1	2900	23	6	<0.1		120	<0.1	0.001	2900	4.1	2700				28	610		138.3	129.7	3.2
988	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2009/9/17	2800	100	62	45		<0.01	8.1	30		0.72	<0.01	0.7	<0.01	1.27	1.14	<0.1	<0.1	2900	20	8	14		98	<0.1	0.0063	3600	15	2700				29	730		137.7	141.7	-1.4
989	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2011/2/4	2700	89	61	41		0.02	8.4	27		0.82		1.3		0.48	0.55	0.004	0.08	3000	21	8.7	<0.1		110	<0.1	0.0046	2600	1.8	2700				31	610				
990	08-E140-C01	168.62	174.37	-108.62	-114.37	4	2009/4/16	2800	87	48	36		0.03	13	26		0.89	<0.01	0.7	<0.01	0.08		<0.1	<0.1	2800	17	7	15		110	<0.1	0.0013	3200	29	2700				39	670		137.3	132.8	1.7
991	08-E140-C01	168.62	174.37	-108.62	-114.37	4	2009/8/4	2600	88	46	35		0.04	11	26		0.85	<0.01	0.8	<0.01	1.4	1.41	<0.1	<0.1	2700	21	4	<0.1		120	<0.1	0	3100	38	2700		39		27	620		128.8	128.5	0.1
992	08-E140-C01	168.62	174.37	-108.62	-114.37	4	2009/9/17	2900	85	47	35		<0.01	7.7	29		0.63	<0.01	0.7	<0.01	1.25	1.17	<0.1	<0.1	2700	17	7	12		92	<0.1	0.0013	3500	16	2700				26	710		139.7	134.4	1.9
993	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/3/17	2200	74	41	25		0.05	4.1	69		0.62	<0.01	1.5	<0.01	0.08		0.02	0.26	1800	13	5.5	<0.01		94	<0.1	<0.1	2900	10	2400				22	600		107.5	98.8	4.2
994	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/4/16	2200	72	32	25		0.04	9.1	26		0.66	<0.01	1.2	<0.01	0.09		<0.1	<0.1	1800	12	5	8.4		93	<0.1	0.00013	3100	27	2500				27	620		107.6	102.8	2.3
995	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/8/4	2100	67	29	23		0.03	7.8	27		0.57	<0.01	1.2	<0.01	0.89	0.86	<0.1	<0.1	1900	16	4	<0.1		96	<0.1	0.001	2800	4.8	2500				20	580		102.8	99.8	1.5
996	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/9/17	2200	71	37	25		0.01	5.5	30		0.51	<0.01	1.2	<0.01	0.85	0.74	<0.1	<0.1	1900	12	5	7.1		75	<0.1	0.0003	3300	24	2500				21	670		106.4	108.7	-1.1
997	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2011/2/16	2000	67	39	25		0.01	5.6	26		0.48		1.5		0.38		<0.01	<0.1	1800	12	5.2	<0.1		88	<0.1	<0.1	2500	2.3	2500				23	570				
998	08-E140-C01	195	208.87	-135	-148.87	2	2009/3/17	1800	64	32	20		0.04	3.4	70		0.49	<0.01	1.7	<0.01	0.08		0.01	0.09	1500	10	4.3	<0.01		81	<0.1	<0.1	2700	12	2200				19	540		88.1	87.1	0.6
999	08-E140-C01	195	208.87	-135	-148.87	2	2009/4/16	1900	60	25	19		0.04	7	27		0.51	<0.01	1.4	<0.01	0.07		<0.1	<0.1	1600	9.8	4	6.2		80	<0.1	0.017	2700	29	2200				27	550		92.4	90.6	1.0
1000	08-E140-C01	195	208.87	-135	-148.87	2	2009/8/4	1800	64	23	18		0.03	6	25		0.45	<0.01	1.3	<0.01	0.67	0.66	<0.1	<0.1	1600	9.6	<1	0.3		82	<0.1	0.006	2500	6.3	2200				21	520		88.0	86.4	0.9
1001	08-E140-C01	195	208.87	-135	-148.87	2	2009/9/17	1900	60	25	18		0.02	4.5	30		0.44	<0.01	1.4	<0.01	0.67	0.64	<0.1	<0.1	1500	9.8	4	6.1		63	<0.1	0.017	2900	22	2200				18	590		91.0	90.8	0.1
1002	08-E140-C01	195	208.87	-135	-148.87	2	2011/2/16																																				
1003	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/3/17	1700	58	29	17		0.06	3	68		0.45	<0.01	1.6	<0.01	0.07		<0.01	0.13	1400	9.7	4	0.01		72	0.2	<0.1	2300	15	1900				16	470		82.7	77.8	3.0
1004	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/4/16	1600	55	22	16		0.05	5.9	26		0.43	<0.01	1.3	<0.01	0.04		<0.1	<0.1	1300	9.1	3	6.3		72	<0.1	0.018	2300	25	1900				21	470		78.2	75.4	1.8
1005	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/8/4	1600	51	20	17		0.04	5.3	25		0.40	<0.01	1.4	<0.01	0.9	0.89	<0.1	<0.1	1400	8.9	3	5.1		76	<0.1	0.001	2300	5.7	2000				15	470		78.3	77.5	0.5
1006	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/9/17	1800	57	23	18		0.03	3.9	30		0.38	<0.01	1.4	<0.01	0.95	0.95	<0.1	<0.1	1500	9.3	3	6.1		60	<0.1	0.018	2600	19	2000				15	520		86.3	85.8	0.3
1007	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2011/1/31	1600	52	29	18		0.03	4	29		0.37		1.8		0.73	0.64	0.004	<0.1	1400	9.6	4	<0.1		68	0.1	0.025	2300	3.4	1930				17	480				
1008	08-E140-M01	139.132		-79.13			2010/2/4	3400	98	65	51		0.02	9.8	28		1.30	<0.01	0.5	<0.01	10.7	0.57	<0.1	<0.1	4100	24	9	<0.1		150	<0.1	0.004	2800	25	2600				29	570		167.7	162.6	1.6
1009	08-E140-M01	139.132		-79.13			2010/10/29	3400	110	92	61		0.02	11	27		1.20		1.4		2.7	1.75	0.007	0.04	4000	30	12	<0.1		150	<0.1	0.005	2800	3.1	2700				32	630				
1010	08-E140-M02	139.182		-79.18		1	2010/1/15	3400	110	77	58		<0.01	11	29		1.20	<0.01	0.9	<0.01	<0.01		<0.1	<0.1	4300	27	10	<0.1		160	<0.1		3100	8.3	2700				28	650		169.7	172.6	-0.8
1011	08-E140-M02	139.182		-79.18		1	2010/2/4	3500	110	77	58		0.03	10	28		1.60	<0.01	0.8	<0.01	0.08		<0.1	<0.1	4300	27	10	0.2		160	0.1		3300	15	2800				29	660		173.9	176.1	-0.6
1012	08-E140-M02	139.182		-79.18		1	2010/7/20	3600	110	77	60		0.02	11	26		1.40		1.3		0.83	0.67	<0.01	0.05	4600	29	11	<0.1		150	<0.1	0.004	2900	2	2800				32	680				
1013	08-E140-M02	139.182		-79.18		1	2010/10/28	3200	100	82	55		0.01	10	27		1.30		1.3		0.54		0.04	0.05	3700	27	11	<0.1		130	0.02	<0.1	2900	6.2	2800				34	600				
1014	08-E140-M02	139.182		-79.18		1	2011/2/15	3500	110	92	60		0.01	11	24		1.20		1.2		0.48	0.36	<0.01	0.07	4500	30	12	<0.1		150	<0.1	0.005	2800	3.2	2800				33	630				
1015	08-E140-M02	139.182		-79.18		2	2010/1/15	3300	100	71	53		<0.01	11	29		1.10	<0.01	0.8	<0.01	<0.01	0.11	<0.1	<0.1	4000	25	9	<0.1		150	0.1	0.009	3200	38	2500		27		29	640		163.9	166.8	-0.9
1016	08-E140-M02	139.182		-79.18		2	2011/2/15														<0.33	0.11										0.009												
1017	09-V250-M01	249.146		-189.146			2009/12/15	2300	60	45	30		0.03	5.3	28		0.69	<0.01	0.8	<0.01	0.05		<0.1	0.1	2200	14	5.0	<0.5		77	2	<0.1	2400	10	2000				12	480		111.3	101.9	4.4
1018	09-V250-M01	249.146		-189.146			2010/1/18	2200	57	41	30		0.02	6	28		0.69	<0.01	0.6	<0.01	0.02		<0.1	0.1	2500	15	6.0	<0.1		88	0.1	<0.1	2200	7.9	2000				12	460		107.4	107.0	0.2
1019	09-V250-M01	249.146		-189.146			2010/6/7	2300	58	52	32		0.04	5.5	27		0.67		1.0		1.4	0.80	0.26	0.2	2500	16	6.6	<0.1		85	<0.1	0.041	2300	3.3	1900				14	480				
1020	09-V250-M01	249.146		-189.146			2010/10/13	1900	51	39	25		0.02	4.8	27		0.48		1.1		0.26	0.13	0.02	0.3	2000	13	5.4	<0.1		76	<0.1	0.007	2100	8.5	1900				13	430				
1021	09-V250-M01	249.146		-189.146			2011/1/20	1800	51	38	24		0.02	4.6	27		0.48		1.2		0.27		<0.01	0.3	1900	13	5.4	<0.1		66	<0.1	<0.1	2100	7.1	1800				13	430				
1022	09-V250-M02	249.146		-189.146			2009/11/17	2000	55	35	24		0.02	5.1	26		0.58	<0.01	0.8	<0.01	0.05		<0.1	0.1	1900	14	4.0	<0.5		76	<0.1	<0.1	2100	7.1	1800				11	430		97.1	88.4	4.7
1023	09-V250-M02	249.146		-189.146			2010/1/18	2100	54	32	25		<0.01	5.4	26		0.56	<0.01	0.4	<0.01	<0.01		<0.1	0.1	2200	13	5.0	<0.1		78	<0.1	<0.1	2100	7.4	1800				11	430		101.5	96.8	2.3
1024	09-V250-M02	249.146		-189.146			2010/6/7	2100	55	48	29		0.02	5.2	25		0.62		1.2		0.44	0.05	<0.01	0.2	2200	14	5.9	<0.1		80	<0.1	0.004	2200	4.8	1900				12	470		102.7	98.4	2.1
1025	09-V250-M02	249.146		-189.146			2010/10/13	2000	54	46	28		0.02	5.1	25		0.56		1		0.31	0.16	0.006	0.2	2100	14	5.9	<0.1		80	<0.1	0.003	2200	8.7	1900				12	440		98.1	95.7	1.2
1026	09-V250-M02	249.146		-189.146			2011/1/20	2000	53	45	27		0.02	4.9	25		0.55		1		0.28		0.007	0.2	2100	14	5.9	<0.1		70	<0.1	<0.1	2100	7.3	1900				12	440		97.4	94.0	1.7
1027	09-V250-M02	249.146		-189.146		1	2011/2/15	2100	53	45	28		0.02	5	23		0.5		1		0.28	0.16	0.004	0.2	2300	14	5.9	<0.1		76	<0.1	0.001	2100	3.2	1900				12	450		102.2	99.5	1.3
1028	09-V250-M02	249.146		-189.146		2	2011/2/15	1900	52	40	25		0.02	4.8	24		0.46		1.2		1.1		0.04	0.2	2000	13	5.2	<0.1		72	<0.1	<0.1	2100	7.1	1800				13	430		92.7	91.2	0.8
1029	09-V250-M03	250.146	270.146	-190.146	-210.146		2009/12/15	2400	61	47	32		0.03	5.3	27		0.72	<0.01	0.8	<0.01	0.04		<0.1	0.1	2400	16	6.0	<0.5		78	2.3	<0.1	2400	10	2000				12	490		116.0	107.6	3.8
1030	09-V250-M03	250.146	270.146	-190.146	-210.146		2010/1/18	2400	58	43	31		0.02	6.1	28		0.77	<0.01	0.8	<0.01	0.03		<0.1	0.1	2800	15	6.0	<0.1		88	0.2	<0.1	2200	7.2	1900				12	460		116.3	115.4	0.4
1031	09-V250-M03	250.146	270.146	-190.146	-210.146		2010/6/7	2400	61	62	37		0.05	6	26		0.78		1.0		3.3	0.56	0.51	0.2	2800	18	6.9	<0.1		89	0.6	0.082	2200	2.9	2000				13	490		118.0	115.3	1.1
1032	09-V250-M03	250.146	270.146	-190.146	-210.146		2010/10/14	2400	63	66	40		0.03	6.2	25		0.78		0.9		0.77	0.52	0.12	0.2	2800	19	7.8	<0.1		92	<0.1	0.061	2200	3.3	2000				13	470		118.6	115.3	1.4
1033	09-V250-M03	250.146	270.146	-190.146	-210.146		2011/1/20	2400	62	66	40		0.03	6.1	25		0.78		0.9		0.57		0.06	0.2	2900	19	7.9	<0.1		84	<0.1	<0.1	2100	2.4	2000				13	470		118.1	116.5	0.7
Sedimentary rocks from the shaft wall																																												
1034	East shaft	5.1	5.1	54.9	54.9			93	3	5	5		0		43						3.1		2.1	2.4	106	1.6	0.7	7			23					1.3								
1035	East shaft	5.5	5.5	54.5	54.5			182	12	8	6		0.3		55						8		5.1	2.5	237	1.8	0.5	<2			22					1.8								
1036	East shaft	6.5	6.5	53.5	53.5			206	14	10	7		0.4		44						1.6		0.7	2.8	286	2.1	0.5	<2			5					2.6								
1037	East shaft	7.6	7.6	52.4	52.4																																						
1038	East shaft	9.5	9.5	50.5	50.5			197	14	8	6		0.3		40						2		0.6	2.6	261	2.6	0.5	<2			3					3								
1039	East shaft	11.6	11.6	48.4	48.4			166	11	6	4		0.2		49						0.6		0.6	2.7	198	2.7	0.3	<2			4					2.4								
1040	East shaft	13.6	13.6	46.4	46.4																																						
1041	East shaft	15.6	15.6	44.4	44.4																																						
1042	East shaft	17.6	17.6	42.4	42.4			286	17	12	8		0.3		41						0.7		0.8	3.1	370	2.7	0.6	<2			11					3.6								
1043	East shaft	19.6	19.6	40.4	40.4			326	21	11	7		0.7		47						11.6		0.9	1.8	357	2.5	0.6	<2			47					5.6								
1044	East shaft	24.1	24.1	35.9	35.9			1772	78	59	37		0		49						0		0.3	2.3	1790	12	2.7	<2			10					40								
1045	East shaft	29	29	31	31																																						
1046	East shaft	33	33	27	27			2099	89	43	27		0		40						0.3		0	3.2	2020	15	3.1	<2			7		2684			44						97.9	101.4	-1.8
1047	East shaft	37.1	37.1	22.9	22.9																																						
1048	East shaft	40.1	40.1	19.9	19.9			2337	108	47	31		0		39						0.5		0	2.4	2290	16	3.8	<2			15		3051			50						109.3	115.2	-2.6
1049	East shaft	52.7	52.7	7.3	7.3			2674	106	12	36													2.3	2400	19		<1			3		3356			55						122.5	123.1	-0.2
1050	East shaft	60	60	0	0			2046	94	29	19													2.3	1870	22		<1			101		2379			39						94.4	94.2	0.1
1051	East shaft	69.8	69.8	-9.8	-9.8			2768	124	21	42													2.5	3420	22		<1			6		3234			53						128.0	149.9	-7.9
1052	East shaft	80.1	80.1	-20.1	-20.1			3180	104	20	44													2.2	3080	28		<1			19		3417			56						145.5	143.6	0.7
1053	East shaft	90.1	90.1	-30.1	-30.1			3140	120	30	45													2.7	3160	32		<1			2		3417			56						144.8	145.6	-0.3

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (55/64)

Index	Sample point	sampling zone (GL) Min.	sampling zone (GL) Max.	sampling zone (EL) Min.	sampling zone (EL) Max.	sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{35}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_{sw}]	[cc_{STP}/g_{sw}]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
Boreholes in the Gallery of the Horonobe URL																																													
966	07-V140-M01	138.676	138.676	-78.676	-78.676		2008/2/8	×																								<0.3	-44.6	-2											
967	07-V140-M01	138.676	138.676	-78.676	-78.676		2008/11/17	×																								≦0.2	-43.6	-1.7											
968	07-V140-M01	138.676	138.676	-78.676	-78.676		2008/12/19	×																								≦0.2	-33.8	-1.8											
969	07-V140-M01	138.676	138.676	-78.676	-78.676		2009/8/26	○								24.35		73.77																											
970	07-V140-M01	138.676	138.676	-78.676	-78.676		2009/12/22	×																																					
971	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/1/15	×																								≦0.23	-48.5	-3.3			19.68	0.62 ±0.12							
972	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/1/18	×																								≦0.27	-48.4	-3.3											
973	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/2/16	×																																					
974	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/7/27	×																								< 0.3	-45	-2.4											
975	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/10/27	×																									-44	-2.3											
976	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/11/19	×																																					
977	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/11/24	×																																					
978	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/12/22	×																																					
979	07-V140-M01	138.676	138.676	-78.676	-78.676		2011/2/1	×																									-44	-2.4											
980	07-V140-M03	139.739	139.739	-79.739	-79.739	1	2010/1/15	○								9.15		88.95														≦0.22	-52.6	-4.1			20.31	1.00 ±0.12							
981	07-V140-M03	139.739	139.739	-79.739	-79.739	1	2010/10/28	×																								0.4±0.1	-49	-2.9											
982	07-V140-M03	139.739	139.739	-79.739	-79.739	1	2010/11/25	×																																					
983	07-V140-M03	139.739	139.739	-79.739	-79.739	2	2009/10/7									5.87		91.43																											
984	08-E140-C01						2009/3/9	×																								0.5 ±0.1	-44.6	-4.1											
985	08-E140-C01						2009/3/13	×																								<0.2	-51.3	-4.4											
986	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2009/4/16	×																									-51.3	-3.8											
987	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2009/8/4	○																								≦0.25	-50.5	-3.6			19.92	1.06 ±0.04							
988	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2009/9/17	○																								≦0.22	-51	-3.7			20.08	1.20 ±0.05							
989	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2011/2/4	○																								< 0.3	-47	-2.5											
990	08-E140-C01	168.62	174.37	-108.62	-114.37	4	2009/4/16	×																									-53.1	-4.1											
991	08-E140-C01	168.62	174.37	-108.62	-114.37	4	2009/8/4	○																								≦0.25	-51.7	-4.1											
992	08-E140-C01	168.62	174.37	-108.62	-114.37	4	2009/9/17	○																								≦0.23	-52.2	-4.1			20.01	1.27 ±0.05							
993	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/3/17	×																								<0.2	-52.3	-4.6											
994	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/4/16	×																									-58.1	-5.5											
995	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/8/4	○																								≦0.26	-58.2	-5.6			20.07	1.11 ±0.04							
996	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/9/17	○																								≦0.22	-57.2	-5.7			19.47	1.03 ±0.04							
997	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2011/2/16	×																								< 0.3	-55	-4.6											
998	08-E140-C01	195	208.87	-135	-148.87	2	2009/3/17																									0.2 ±0.1	-62.2	-5.4											
999	08-E140-C01	195	208.87	-135	-148.87	2	2009/4/16	×																									-62.2	-6.6											
1000	08-E140-C01	195	208.87	-135	-148.87	2	2009/8/4	○																								≦0.26	-61.5	-6.7											
1001	08-E140-C01	195	208.87	-135	-148.87	2	2009/9/17	○																								≦0.22	-62.8	-6.8			19.47	1.54 ±0.04							
1002	08-E140-C01	195	208.87	-135	-148.87	2	2011/2/16	×																								≦0.22	-62.8	-6.8			19.47	1.54 ±0.04							
1003	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/3/17	×																								<0.2	-59.3	-6.5											
1004	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/4/16	×																									-66.2	-7.6											
1005	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/8/4	○																								≦0.27	-63.5	-7.5			19.54	1.07 ±0.05							
1006	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/9/17	○																								≦0.22	-64.7	-7.5											
1007	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2011/1/31	○																								< 0.3	-61	-6.6											
1008	08-E140-M01	139.132		-79.13			2010/2/4	○																																					
1009	08-E140-M01	139.132		-79.13			2010/10/29	○																								0.4±0.1	-44	-1.3											
1010	08-E140-M02	139.182		-79.18		1	2010/1/15																														21.47	0.39 ±0.12							
1011	08-E140-M02	139.182		-79.18		1	2010/2/4																																						
1012	08-E140-M02	139.182		-79.18		1	2010/7/20	○																								< 0.3	-39	-1.0											
1013	08-E140-M02	139.182		-79.18		1	2010/10/28	×																									-41	-1.1											
1014	08-E140-M02	139.182		-79.18		1	2011/2/15	○																									-41	-1.0											
1015	08-E140-M02	139.182		-79.18		2	2010/1/15	×																																					
1016	08-E140-M02	139.182		-79.18		2	2011/2/15	○																																					
1017	09-V250-M01	249.146		-189.146			2009/12/15	×																								≦0.21	-60.0	-6.9											
1018	09-V250-M01	249.146		-189.146			2010/1/18	×																								≦0.26	-61.7	-6.8			21.67	0.86 ±0.12							
1019	09-V250-M01	249.146		-189.146			2010/6/7	○																								< 0.3	-57	-6.1											
1020	09-V250-M01	249.146		-189.146			2010/10/13	○																								0.4±0.1	-61	-6.6											
1021	09-V250-M01	249.146		-189.146			2011/1/20	×																								< 0.3	-61	-6.8											
1022	09-V250-M02	249.146		-189.146			2009/11/17	×																								≦0.21	-65	-7.6											
1023	09-V250-M02	249.146		-189.146			2010/1/18	×																								≦0.27	-63.9	-7.5			21.81	0.66 ±0.12							
1024	09-V250-M02	249.146		-189.146			2010/6/7	○																								< 0.3	-59	-6.6											
1025	09-V250-M02	249.146		-189.146			2010/10/13	○																								0.4±0.1	-60	-6.4											
1026	09-V250-M02	249.146		-189.146			2011/1/20	×																								< 0.3	-61	-6.6											
1027	09-V250-M02	249.146		-189.146		1	2011/2/15	○																								< 0.3	-60	-6.5											
1028	09-V250-M02	249.146		-189.146		2	2011/2/15	×																								< 0.3	-61	-6.7											
1029	09-V250-M03	250.146	270.146	-190.146	-210.146		2009/12/15	×																								≦0.22	-59.6	-6.9											
1030	09-V250-M03	250.146	270.146	-190.146	-210.146		2010/1/18	×																								≦0.26	-61.3	-6.8			21.37	0.63 ±0.12							
1031	09-V250-M03	250.146	270.146	-190.146	-210.146		2010/6/7	○																								< 0.3	-55	-5.6											
1032	09-V250-M03	250.146	270.146	-190.146	-210.146		2010/10/14	○																								0.4±0.1	-56	-5.3											
1033	09-V250-M03	250.146	270.146	-190.146	-210.146		2011/1/20	×																								< 0.3	-56	-5.4											
Sedimentary rocks from the shaft wall																																													
1034	East shaft	5.1	5.1	54.9	54.9																												-65	-9.5											
1035	East shaft	5.5	5.5	54.5	54.5																												-69	-10.1											
1036	East shaft	6.5	6.5	53.5	53.5																												-68	-10.5											
1037	East shaft	7.6	7.6	52.4	52.4																																								
1038	East shaft	9.5	9.5	50.5	50.5																												-68	-10.5											
1039	East shaft	11.6	11.6	48.4	48.4			×																									-70	-10.6											
1040	East shaft	13.6	13.6	46.4	46.4																																								
1041	East shaft	15.6	15.6	44.4	44.4																																								
1042	East shaft	17.6	17.6	42.4	42.4			×																									-68	-10.3											
1043	East shaft	19.6	19.6	40.4	40.4			×																									-66	-10.2											
1044	East shaft	24.1	24.1	35.9	35.9			×																									-63	-8.1											
1045	East shaft	29	29	31	31																																								
1046	East shaft	33	33	27	27			×																									-59	-6.8											
1047	East shaft	37.1	37.1	22.9	22.9																																								
1048	East shaft	40.1	40.1	19.9	19.9			×																									-57	-6.2											
1049	East shaft	52.7	52.7	7.3	7.3																												-54	-5											
1050	East shaft	60	60	0	0																												-54	-5.5											
1051	East shaft	69.8	69.8	-9.8	-9.8																												-47	-2.9											
1052	East shaft	80.1	80.1	-20.1	-20.1																												-45	-2.7											
1053	East shaft	90.1	90.1	-30.1	-30.1																												-46	-2.4											

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (56/64)

Index	Sample point	sampling zone (GL) Min.	sampling zone (GL) Max.	sampling zone (EL) Min.	sampling zone (EL) Max.	sampling zone No.	sampling date	Organics: Humic acid	Organics: Fuluvic acid	Organics: Acetate	Organics: Formate	Microbiology: Total cell number	Microbiology: Aerobic heterotrophs	Microbiology: Anaerobic heterotrophs (nutrient agar/B2A)	Microbiology: Anaerobic heterotrophs (GAM)	Microbiology: Ammonia-oxidizer	Microbiology: Nitrifying bacteria	Microbiology: Iron-oxidizer	Microbiology: Sulfur-oxidizer (silverman 9k)	Microbiology: Sulfur-oxidizer (starkey)	Microbiology: Nitrate-reducer (PYN)	Microbiology: Nitrate-reducer (Giltay)	Microbiology: Denitrifying bacteria (PYN)	Microbiology: Denitrifying bacteria (Giltay)	Microbiology: Mn-reducer	Microbiology: Iron-reducer	Microbiology: Sulfate-reducer (A)	Microbiology: Sulfate-reducer (E)	Microbiology: Sulfate-reducer (F)	Microbiology: Methanogen (H_2)	Microbiology: Methanogen (acetate)	Microbiology: Methanogen (formate)	Microbiology: Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
Boreholes in the Gallery of the Horonobe URL																																	
966	07-V140-M01	138.676	138.676	-78.676	-78.676		2008/2/8																										
967	07-V140-M01	138.676	138.676	-78.676	-78.676		2008/11/17																										
968	07-V140-M01	138.676	138.676	-78.676	-78.676		2008/12/19																										
969	07-V140-M01	138.676	138.676	-78.676	-78.676		2009/8/26							N.D.								2.3		0.2	N.D.	0.45		0.78			N.D.		
970	07-V140-M01	138.676	138.676	-78.676	-78.676		2009/12/22																										
971	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/1/15																										
972	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/1/18																										
973	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/2/16																										
974	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/7/27																										
975	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/10/27																										
976	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/11/19																										
977	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/11/24																										
978	07-V140-M01	138.676	138.676	-78.676	-78.676		2010/12/22																										
979	07-V140-M01	138.676	138.676	-78.676	-78.676		2011/2/1																										
980	07-V140-M03	139.739	139.739	-79.739	-79.739	1	2010/1/15																										
981	07-V140-M03	139.739	139.739	-79.739	-79.739	1	2010/10/28																										
982	07-V140-M03	139.739	139.739	-79.739	-79.739	1	2010/11/25																										
983	07-V140-M03	139.739	139.739	-79.739	-79.739	2	2009/10/7																										
984	08-E140-C01						2009/3/9																										
985	08-E140-C01						2009/3/13																										
986	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2009/4/16																										
987	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2009/8/4																										
988	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2009/9/17					2.8.E+05																					
989	08-E140-C01	157.55	167.86	-97.55	-107.86	5	2011/2/4					2.0.E+05																					
990	08-E140-C01	168.62	174.37	-108.62	-114.37	4	2009/4/16																										
991	08-E140-C01	168.62	174.37	-108.62	-114.37	4	2009/8/4																										
992	08-E140-C01	168.62	174.37	-108.62	-114.37	4	2009/9/17					2.1.E+05																					
993	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/3/17																										
994	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/4/16																										
995	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/8/4																										
996	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2009/9/17					1.3.E+05																					
997	08-E140-C01	175.13	194.2	-115.13	-134.2	3	2011/2/16					2.8.E+05																					
998	08-E140-C01	195	208.87	-135	-148.87	2	2009/3/17																										
999	08-E140-C01	195	208.87	-135	-148.87	2	2009/4/16																										
1000	08-E140-C01	195	208.87	-135	-148.87	2	2009/8/4																										
1001	08-E140-C01	195	208.87	-135	-148.87	2	2009/9/17					7.3.E+04																					
1002	08-E140-C01	195	208.87	-135	-148.87	2	2011/2/16																										
1003	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/3/17																										
1004	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/4/16																										
1005	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/8/4																										
1006	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2009/9/17					5.4.E+05																					
1007	08-E140-C01	209.69	218.7	-149.69	-158.7	1	2011/1/31					1.4.E+06																					
1008	08-E140-M01	139.132		-79.13			2010/2/4																										
1009	08-E140-M01	139.132		-79.13			2010/10/29																										
1010	08-E140-M02	139.182		-79.18		1	2010/1/15																										
1011	08-E140-M02	139.182		-79.18		1	2010/2/4																										
1012	08-E140-M02	139.182		-79.18		1	2010/7/20					9.1.E+03		2.8.E+02								4.6				0.43		4.6					
1013	08-E140-M02	139.182		-79.18		1	2010/10/28																										
1014	08-E140-M02	139.182		-79.18		1	2011/2/15					2.6.E+04																					
1015	08-E140-M02	139.182		-79.18		2	2010/1/15																										
1016	08-E140-M02	139.182		-79.18		2	2011/2/15																										
1017	09-V250-M01	249.146		-189.146			2009/12/15																										
1018	09-V250-M01	249.146		-189.146			2010/1/18																										
1019	09-V250-M01	249.146		-189.146			2010/6/7																										
1020	09-V250-M01	249.146		-189.146			2010/10/13																										
1021	09-V250-M01	249.146		-189.146			2011/1/20																										
1022	09-V250-M02	249.146		-189.146			2009/11/17																										
1023	09-V250-M02	249.146		-189.146			2010/1/18																										
1024	09-V250-M02	249.146		-189.146			2010/6/7																										
1025	09-V250-M02	249.146		-189.146			2010/10/13																										
1026	09-V250-M02	249.146		-189.146			2011/1/20																										
1027	09-V250-M02	249.146		-189.146		1	2011/2/15																										
1028	09-V250-M02	249.146		-189.146		2	2011/2/15																										
1029	09-V250-M03	250.146	270.146	-190.146	-210.146		2009/12/15																										
1030	09-V250-M03	250.146	270.146	-190.146	-210.146		2010/1/18																										
1031	09-V250-M03	250.146	270.146	-190.146	-210.146		2010/6/7																										
1032	09-V250-M03	250.146	270.146	-190.146	-210.146		2010/10/14																										
1033	09-V250-M03	250.146	270.146	-190.146	-210.146		2011/1/20																										
Sedimentary rocks from the shaft wall																																	
1034	East shaft	5.1	5.1	54.9	54.9																												
1035	East shaft	5.5	5.5	54.5	54.5																												
1036	East shaft	6.5	6.5	53.5	53.5																												
1037	East shaft	7.6	7.6	52.4	52.4																												
1038	East shaft	9.5	9.5	50.5	50.5																												
1039	East shaft	11.6	11.6	48.4	48.4																												
1040	East shaft	13.6	13.6	46.4	46.4																												
1041	East shaft	15.6	15.6	44.4	44.4																												
1042	East shaft	17.6	17.6	42.4	42.4																												
1043	East shaft	19.6	19.6	40.4	40.4																												
1044	East shaft	24.1	24.1	35.9	35.9																												
1045	East shaft	29	29	31	31																												
1046	East shaft	33	33	27	27																												
1047	East shaft	37.1	37.1	22.9	22.9																												
1048	East shaft	40.1	40.1	19.9	19.9																												
1049	East shaft	52.7	52.7	7.3	7.3																												
1050	East shaft	60	60	0	0																												
1051	East shaft	69.8	69.8	-9.8	-9.8																												
1052	East shaft	80.1	80.1	-20.1	-20.1																												
1053	East shaft	90.1	90.1	-30.1	-30.1																												

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (57/64)

Index	Sample point	sampling zone (GL) Min. [m]	sampling zone (GL) Max. [m]	sampling zone (EL) Min. [m]	sampling zone (EL) Max. [m]	sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII) X	Y	Z (middle depth)	location (WGS84, UTM, Zone54) East	North	Z (middle depth)	Physico-chemical parameter EC at site [mS/m]	EC at lab [mS/m]	pH at site	pH at lab	ORP Observ. [mV]	ORP SHE [mV]	Temper-ature at site [℃]	Contamination indicator Tracer (uranine) [mg/l]	Tracer (Na-naphtionate) [mg/l]	Tracer (amino G acid) [mg/l]	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	Comments
1054	East shaft	100.2	100.2	-40.2	-40.2				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-40.2	567724.040629	4988286.462354	-40.2		1250		7.3								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1055	East shaft	110.2	110.2	-50.2	-50.2				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-50.2	567724.040629	4988286.462354	-50.2		1340		8.2								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1056	East shaft	118.2	118.2	-58.2	-58.2				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-58.2	567724.040629	4988286.462354	-58.2		1310		8.2								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1057	East shaft	130.2	130.2	-70.2	-70.2				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-70.2	567724.040629	4988286.462354	-70.2		1210		8.2								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
1058	East shaft	139.8	139.8	-79.8	-79.8				block rocks	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-79.8	567724.040629	4988286.462354	-79.8		1130		8.1								pore water extraction: squeeze (0-300MPa), referred from Oyama et al.,2010 [19]
Inflow from the shaft wall																													
1059	WR-V-28.5	5	28.5	55	31.5		2006/11/27	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	65	96	8.7	8.2			9.5					
1060	WR-V-28.5	5	28.5	55	31.5		2007/1/9	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	104	88	7.9	7.9			3.8					
1061	WR-V-28.5	5	28.5	55	31.5		2007/2/8	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	110	87	7.6	7.6			3.8					
1062	WR-V-28.5	5	28.5	55	31.5		2007/3/16	2007/9/18-10/17	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	104	90	7.0	7.4			3.9					
1063	WR-V-28.5	5	28.5	55	31.5		2007/5/25	2007/9/18-10/17	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	84.8	81	8.4	7.8			8.8					
1064	WR-V-28.5	5	28.5	55	31.5		2007/7/3	2007/9/18-10/17	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	82.2	79	6.9	7.3			16.1					
1065	WR-V-28.5	5	28.5	55	31.5		2007/7/13	2007/9/18-10/17	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	82.2	77	7.1	7.3			13.3					
1066	WR-V-28.5	5	28.5	55	31.5		2007/9/17	2007/9/25-10/17	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	95	78	7.0	7.4			16					
1067	WR-V-28.5	5	28.5	55	31.5		2007/11/12	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	102	77	5.8	7.0			8.6		0.04		A	
1068	WR-V-28.5	5	28.5	55	31.5		2007/12/14	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	525	78	6.9	7.2			8.7		0.037		A	
1069	WR-V-28.5	5	28.5	55	31.5		2008/1/10	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	123	76	6.8	7.2			8.1					
1070	WR-V-28.5	5	28.5	55	31.5		2008/6/11	2008/9/22-11/5	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	830	70	7.2	7.4			10.3					
1071	WR-V-28.5	5	28.5	55	31.5		2008/9/12	2009/1/23-2/11	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	94	74	7.3	7.2			17.1					
1072	WR-V-28.5	5	28.5	55	31.5		2008/11/11	2009/1/23-2/11	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	890	80	7.3	6.7			10.2					
1073	WR-V-28.5	5	28.5	55	31.5		2009/3/10	2009/8/11-	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	925	71	7.5	7.9			4.2					
1074	WR-V-28.5	5	28.5	55	31.5		2010/10/27	2010/11/1-2011/2/9	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	100	80	7.5	7.5			12.8					
1075	WR-V-28.5	5	28.5	55	31.5		2010/11/24	2010/12/1-2010/12/22	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	94	89	7.9	7.6			10.2					
1076	WR-V-28.5	5	28.5	55	31.5		2010/12/22	2010/12/27-2011/1/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	43.3	567688.118052	4988346.521441	43.3	120	98	8.3	7.6			10.4					
1077	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/9/17	2007/9/25-10/17	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	13.9	567688.118052	4988346.521441	13.9	527	510	7.6	8.2			16.8					
1078	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/11/12	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	13.9	567688.118052	4988346.521441	13.9	564	520	6.3	8.0			8.8		0.25		A	
1079	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/11/23	2008/2/18-3/1	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	13.9	567688.118052	4988346.521441	13.9	605	500	7.6	8.1			9.6		0.23		A	
1080	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/12/4	2008/2/20-3/5	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	13.9	567688.118052	4988346.521441	13.9	609	530	7.5	8.0			8.3		0.24		A	
1081	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/12/14	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	13.9	567688.118052	4988346.521441	13.9	554	470	7.5	8.0			8.8		0.22		A	
1082	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/12/20	2008/2/18-3/1	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	13.9	567688.118052	4988346.521441	13.9	439	370	7.4	8.0			8.4		0.17		A	
1083	WR-V-63.8	28.5	63.8	31.5	-3.8		2008/1/10	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	13.9	567688.118052	4988346.521441	13.9	603	480	7.6	8.0			8.9					
1084	WR-V-63.8	28.5	63.8	31.5	-3.8		2008/2/7	2008/2/20-3/5	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	13.9	567688.118052	4988346.521441	13.9	591	500	7.5	8.0			7.2		0.31		A	
1085	WR-V-63.8	28.5	63.8	31.5	-3.8		2010/10/27	2010/11/1-2011/2/9	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	13.9	567688.118052	4988346.521441	13.9	390	390	8	8.1			13.3					
1086	WR-V-63.8	28.5	63.8	31.5	-3.8		2010/11/24	2010/12/1-12/22	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	13.9	567688.118052	4988346.521441	13.9	360	330	7.9	7.9			10.2					
1087	WR-V-63.8	28.5	63.8	31.5	-3.8		2010/12/22	2010/12/27-2011/1/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	13.9	567688.118052	4988346.521441	13.9	320	320	8.0	8.0			10.6					
1088	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/11/8	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9		1300	8.2	8.3			11.9		0.44		A	
1089	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/11/23	2008/2/18-3/1	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9		1200	8.7	8.2			9.8		0.43		A	
1090	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/11/27	2008/2/18-3/6	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9	942	970	8.0	8.6			9.1					
1091	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/12/4	2008/2/18-3/1	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9		1300	8.1	8.2			9		0.43		A	
1092	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/12/14	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9		1200	8.1	8.1			9		0.46		A	
1093	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/12/20	2008/2/18-3/1	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9		1000	8.1	8.0			9.4		0.39		A	
1094	WR-V-98.0	63.8	98.01	-3.8	-38.01		2008/1/10	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9		1100	8.2	8.1			9					
1095	WR-V-98.0	63.8	98.01	-3.8	-38.01		2008/2/7	2008/2/20-3/5	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9		1300	8.3	8.2			5.6		0.59		A	
1096	WR-V-98.0	63.8	98.01	-3.8	-38.01		2009/7/27	2009/8/11-	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9	1200	1000	8.6	8.4			16.4					
1097	WR-V-98.0	63.8	98.01	-3.8	-38.01		2009/11/25	2009/12/1-	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9	1300	1200	8.8	8.2			14.7					
1098	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/1/18	2010/1/22-	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9	1400	1200	9.0	8.4			10.4	<0.002	<0.001		B	
1099	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/7/27	2010/8/23-10/14	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9	190	130	9.1	7.8			19.2					
1100	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/11/24	2010/12/1-12/22	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9	1400	1400	8.6	8.4			10					
1101	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/12/22	2010/12/27-2011/1/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9	1300	1200	8.6	8.4			11.1					
1102	WR-V-98.0	63.8	98.01	-3.8	-38.01		2011/2/1	2011/2/15～3/8	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-20.9	567688.118052	4988346.521441	-20.9	1420	1400	8.8	8.0			6.9					
1103	WR-V-132.0	98.01	132	-38.01	-72		2008/6/17	2008/9/22-11/5	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-55.0	567688.118052	4988346.521441	-55.0	1150	1000	8.4	8.1			14.1					
1104	WR-V-132.0	98.01	132	-38.01	-72		2008/11/11	2009/1/23-2/11	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-55.0	567688.118052	4988346.521441	-55.0	1260	1100	8.4	7.7			12.1					
1105	WR-V-132.0	98.01	132	-38.01	-72		2009/7/27	2009/8/11-	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-55.0	567688.118052	4988346.521441	-55.0	1600	1500	8.3	8.3			17.1					
1106	WR-V-132.0	98.01	132	-38.01	-72		2009/11/25	2009/12/1-	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-55.0	567688.118052	4988346.521441	-55.0	1800	1700	8.4	8.0			15.2					
1107	WR-V-132.0	98.01	132	-38.01	-72		2010/1/18	2010/1/22-	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-55.0	567688.118052	4988346.521441	-55.0	1600	1400	8.7	8.3			11.6	<0.002	<0.001		B	
1108	WR-V-132.0	98.01	132	-38.01	-72		2010/2/16	2010/4/2-4/23	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-55.0	567688.118052	4988346.521441	-55.0	1600		8.7				11.6					analyzed at Tono Geoscience center
1109	WR-V-132.0	98.01	132	-38.01	-72		2010/7/27	2010/8/23-10/14	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-55.0	567688.118052	4988346.521441	-55.0	1400	1200	9.0	8.2			20.6					
1110	WR-V-132.0	98.01	132	-38.01	-72		2010/10/27	2010/11/1-2011/1/19	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-55.0	567688.118052	4988346.521441	-55.0	1600	1600	8.7	8.6			13.4					
1111	WR-V-132.0	98.01	132	-38.01	-72		2010/11/24	2010/12/1～12/22	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-55.0	567688.118052	4988346.521441	-55.0	1600	1600	8.2	8.1			11.5					
1112	WR-V-132.0	98.01	132	-38.01	-72		2010/12/22	2010/12/27-2011/3/8	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-55.0	567688.118052	4988346.521441	-55.0	1700	1600	8.3	8.2			10.6					
1113	WR-V-132.0	98.01	132	-38.01	-72		2011/2/1	2010/2/15-3/23	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-55.0	567688.118052	4988346.521441	-55.0	1750	1600	8.5	8.0			8.4	<0.002	<0.001		B	
1114	WR-V-168.0	132	168.0	-72	-108.0		2008/6/17	2008/9/22-11/5	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-90.0	567688.118052	4988346.521441	-90.0	1340	1200	8.4	7.8			15.3		0.5		A	
1115	WR-V-168.0	132	168.0	-72	-108.0		2008/11/11	2009/1/23-2/11	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-90.0	567688.118052	4988346.521441	-90.0	1550	1300	8.4	7.9			14.8		0.62		A	
1116	WR-V-168.0	132	168.0	-72	-108.0		2009/7/27	2009/8/11-	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-90.0	567688.118052	4988346.521441	-90.0	1300	1200	8.6	8.4			18.9					
1117	WR-V-168.0	132	168.0	-72	-108.0		2009/11/25	2009/12/1-	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-90.0	567688.118052	4988346.521441	-90.0	1400	1300	8.5	8.1			19.3					
1118	WR-V-168.0	132	168.0	-72	-108.0		2010/1/18	2010/1/22-	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-90.0	567688.118052	4988346.521441	-90.0	1400		8.6				16.1	<0.002	<0.001		B	
1119	WR-V-168.0	132	168.0	-72	-108.0		2010/2/16	2010/4/2-4/23	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-90.0	567688.118052	4988346.521441	-90.0	1400		8.6				15.6					analyzed at Tono Geoscience center
1120	WR-V-168.0	132	168.0	-72	-108.0		2010/7/27	2010/8/23-10/14	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-90.0	567688.118052	4988346.521441	-90.0	1400	1100	9.3	8.4			20.4					
1121	WR-V-168.0	132	168.0	-72	-108.0		2010/10/27	2010/11/1-2011/1/19	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-90.0	567688.118052	4988346.521441	-90.0	1400	1500	8.0	8.1			15					
1122	WR-V-168.0	132	168.0	-72	-108.0		2010/11/24	2010/12/1-12/22	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-90.0	567688.118052	4988346.521441	-90.0	1500	1500	8.1	8.0			13.2					
1123	WR-V-168.0	132	168.0	-72	-108.0		2010/12/22	2010/12/27-2011/3/8	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-90.0	567688.118052	4988346.521441	-90.0	1500	1400	8.1	8.1			14.4					
1124	WR-V-168.0	132	168.0	-72	-108.0		2011/2/1	2011/2/15-3/9	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-90.0	567688.118052	4988346.521441	-90.0	1600	1500	8.3	7.8			9.3	<0.002	<0.001		B	
1125	WR-V-202	168	202.0	-108	-142.0		2008/9/12	2009/1/23-2/11	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-125.0	567688.118052	4988346.521441	-125.0		790	8.5	7.8			19.6		0.29		A	
1126	WR-V-202	168	202.0	-108	-142.0		2008/11/11	2009/1/23-2/11	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-125.0	567688.118052	4988346.521441	-125.0	916	840	8.5	7.8			15		0.31		A	
1127	WR-V-202	168	202.0	-108	-142.0		2009/7/27	2009/8/11-	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-125.0	567688.118052	4988346.521441	-125.0	1000	850	8.9	8.6			18.6					
1128	WR-V-202	168	202.0	-108	-142.0		2009/11/25	2009/12/1-	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-125.0	567688.118052	4988346.521441	-125.0	920	860	8.9	8.5			19.1					
1129	WR-V-202	168	202.0	-108	-142.0		2010/1/18	2010/1/22-	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-125.0	567688.118052	4988346.521441	-125.0	1000	860	8.9	8.5			16.1	<0.002	<0.001		B	
1130	WR-V-202	168	202.0	-108	-142.0		2010/2/16	2010/4/2-4/23	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-125.0	567688.118052	4988346.521441	-125.0	1200		9.4				15.5					analyzed at Tono Geoscience center
1131	WR-V-202	168	202.0	-108	-142.0		2010/10/27	2010/11/1-2011/2/9	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-125.0	567688.118052	4988346.521441	-125.0	830	1100	8.5	7.7			15.9					
1132	WR-V-202	168	202.0	-108	-142.0		2010/11/24	2010/12/1-12/22	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-125.0	567688.118052	4988346.521441	-125.0	850	900	8.6	8.4			13.7					
1133	WR-V-202	168	202.0	-108	-142.0		2010/12/22	2010/12/27-2011/3/8	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-125.0	567688.118052	4988346.521441	-125.0	870	860	8.6	8.4			14.7					
1134	WR-V-202	168	202.0	-108	-142.0		2011/2/1	2011/2/15-3/9	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-125.0	567688.118052	4988346.521441	-125.0	1008	980	9.1	8.4			10.6	<0.002	<0.001		B	
1135	V210-IGSW		210.0		-150.0		2008/9/2	2008/9/22-11/5	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-150.0	567696.948	4988356.162	-150.0		1100		7.9								Location: estimated by using the data of neighbourhood measurement point
1136	V210-IGSW		210.0		-150.0		2009/12/22	2010/1/13-	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-150.0	567696.948	4988356.162	-150.0	1200	1100	9.1	8.8			17	<0.002	<0.001		B	Location: estimated by using the data of neighbourhood measurement point
1137	V210-IGSW		210.0		-150.0		2010/1/18	2010/1/22-	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-150.0	567696.948	4988356.162	-150.0	1200	980	8.0	7.8			17.9	<0.002	0.008		B	Location: estimated by using the data of neighbourhood measurement point
1138	V210-IGSW		210.0		-150.0		2010/2/16	2010/4/2-4/23	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-150.0	567696.948	4988356.162	-150.0	1200		8.0				15.9					Location: estimated by using the data of neighbourhood measurement point, analyzed at Tono Geoscience center
1139	V210-IGSW		210.0		-150.0		2010/10/27	2010/11/1-2011/2/9	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-150.0	567696.948	4988356.162	-150.0	1000	970	8.2	8.2			15.2					
1140	V210-IGSW		210.0		-150.0		2010/11/24	2010/12/1-12/22	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-150.0	567696.948	4988356.162	-150.0	990	1000	8.5	8.3			12.8					
1141	V210-IGSW		210.0		-150.0		2010/12/22	2010/12/27-2011/1/20	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-150.0	567696.948	4988356.162	-150.0	1100	1100	8.7	8.5			13.6					
1142	V210-IGSW		210.0		-150.0		2011/2/1	2011/2/15-3/9	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-150.0	567696.948	4988356.162	-150.0	1160	1200	9.0	8.2			9.4	<0.002	0.0062		B	
1143	WR-V-242.0	202	242.0	-142	-182.0		2008/11/11	2009/2/5-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-162.0	567688.118052	4988346.521441	-162.0	952	850	8.0	7.8			17.6		0.2		A	
1144	WR-V-242.0	202	242.0	-142	-182.0		2009/1/13	2010/2/15	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-162.0	567688.118052	4988346.521441	-162.0	1060	850	8.0	8.5			16.7					
1145	WR-V-242.0	202	242.0	-142	-182.0		2009/7/27	2009/8/11-	WR	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-162.0	567688.118052	4988346.521441	-162.0	1000	880	8.9	8.3			18.6					
1146	V250-WCP		250.0		-190.0		2009/8/26	2009/9/25-	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-190.0	567688.118052	4988346.521441	-95.0	1100	960	7.7	7.8			21	<0.002	<0.001		B	
1147	V250-WCP		250.0		-190.0		2009/10/26	2009/11/12-	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-190.0	567688.118052	4988346.521441	-95.0	1200	960	7.2	7.8			21.4	<0.002	<0.001		B	
1148	V250-WCP		250.0		-190.0		2009/11/25	2009/12/1-	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-190.0	567688.118052	4988346.521441	-95.0	1000	980	7.1	8.0			18.3					
1149	V250-WCP		250.0		-190.0		2009/12/22	2010/1/13-	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-190.0	567688.118052	4988346.521441	-95.0	1000	1100	7.6	8.0			17.5					
1150	V250-WCP		250.0		-190.0		2010/1/18	2010/1/22-	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-190.0	567688.118052	4988346.521441	-95.0	1200	1000	8.3	7.8			19					
1151	V250-WCP		250.0		-190.0		2010/2/16	2010/4/2-4/23	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-190.0	567688.118052	4988346.521441	-95.0	1200		7.9				16.5					analyzed at Tono Geoscience center
1152	V250-WCP		250.0		-190.0		2010/7/27	2010/8/20-10/14	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-190.0	567688.118052	4988346.521441	-95.0	1200	1000	8.2	7.6			21.9					
1153	V250-WCP		250.0		-190.0		2010/10/27	2010/11/1-2011/1/19	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-190.0	567688.118052	4988346.521441	-95.0	1100	1100	7.4	7.7			19.9					
1154	V250-WCP		250.0		-190.0		2010/11/24	2010/12/1-12/22	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-190.0	567688.118052	4988346.521441	-95.0	1100	1100	7.5	7.6			18.7					
1155	V250-WCP		250.0		-190.0		2010/12/22	2010/12/27-2011/1/20	inflow	Koetoi Fm.	diatomaceous mudstone	116223.422	-30762.5	-190.0	567688.118052	4988346.521441	-95.0	1100	1100	7.5	7.6			16.8					
1156	V250-IGSW		248.0		-188.0		2010/1/18	2010/1/21-	inflow	Koetoi Fm.	diatomaceous mudstone	116220.353	-30758.988	-188.0	567691.676	4988343.508	-94.0		870		7.6				<0.002	<0.001		B	
1157	WR-E-27.0	5	27	55	33		2007/1/9	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	280	250	7.9	8.1			4.9					
1158	WR-E-27.0	5	27	55	33		2007/2/8	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	359	290	7.6	8.3			2					
1159	WR-E-27.0	5	27	55	33		2007/3/16	2007/9/18/-10/17	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	287	260	6.9	7.4			4.7					
1160	WR-E-27.0	5	27	55	33		2007/5/26	2007/9/18-10/17	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	215	180	7.5	7.3			8.4					
1161	WR-E-27.0	5	27	55	33		2007/6/18	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	387	310	7.5	7.6			9.6					
1162	WR-E-27.0	5	27	55	33		2007/9/13	2007/9/25-10/17	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	349	330	7.5	7.7			17.9					
1163	WR-E-27.0	5	27	55	33		2007/11/23	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	318	280	7.3	7.8			8.7					
1164	WR-E-27.0	5	27	55	33		2007/12/11	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	293	250	7.8	8			8.2		0.16		A	
1165	WR-E-27.0	5	27	55	33		2008/1/10	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	328	290	7.2	7.7			5					
1166	WR-E-27.0	5	27	55	33		2008/6/10	2008/9/22-11/5	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	393	430	8.0	8.0			14.2		0.21		A	
1167	WR-E-27.0	5	27	55	33		2009/4/27	2009/8/11-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	250	230	7.6	8.1			7.2					
1168	WR-E-27.0	5	27	55	33		2010/7/27	2010/8/20-10/14	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	280	230	8.2	7.5			19.6					
1169	WR-E-27.0	5	27	55	33		2010/10/27	2010/11/1-2011/1/19	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	230	230	7.6	7.6			13.2					
1170	WR-E-27.0	5	27	55	33		2010/11/24	2010/12/1-12/22	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	260	230	7.8	7.8			9.5					
1171	WR-E-27.0	5	27	55	33		2010/12/22	2010/12/27-2011/1/20	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	44	567724.040629	4988286.462354	44.0	280	240	7.8	7.6			6.3					
1172	WR-E-63.8	27	63.9	33	-3.9		2007/11/23	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	643	550	7.4	7.9			8.7					
1173	WR-E-63.8	27	63.9	33	-3.9		2007/12/11	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	643	570	7.3	8.0			8.1		0.22		A	
1174	WR-E-63.8	27	63.9	33	-3.9		2007/12/25	2008/2/18-3/1	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	322	580	7.1	7.9			8.3					
1175	WR-E-63.8	27	63.9	33	-3.9		2008/1/10	2008/1/30-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	664	580	7.4	7.9			6					
1176	WR-E-63.8	27	63.9	33	-3.9		2008/2/7	2008/2/20-3/5	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	720	610	7.7	8.0			6.9					

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (58/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Geochemistry																																				
		Min.	Max.	Min.	Max.			Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
1054	East shaft	100.2	100.2	-40.2	-40.2			3350	124	74	49													1.6	3530	26		<1			7		3295			54						156.5	154.0	0.8
1055	East shaft	110.2	110.2	-50.2	-50.2			3262	114	43	46		0		50						0		0	1	3910	28	13.7	<1			16		3112			51						150.7	161.9	-3.6
1056	East shaft	118.2	118.2	-58.2	-58.2			3172	108	59	47		0		54						0		0	0.9	3610	27	16.9	<1			5		3173			52						147.5	154.2	-2.2
1057	East shaft	130.2	130.2	-70.2	-70.2			2820	97	64	41		0		53						0		0	0.5	3240	24	15.1	<1			19		3112			51						131.7	143.0	-4.1
1058	East shaft	139.8	139.8	-79.8	-79.8			2650	97	19	35		0		52						0		0	0.5	2830	21	14.2	<1			11		3112			51						121.5	131.3	-3.9
Inflow from the shaft wall																																												
1059	WR-V-28.5	5	28.5	55	31.5		2006/11/27	150	13	30	9.6		0.03	0.38	60		0.23	<0.01	0.5	<0.01	0.14		<0.1	0.17	85	0.6	0.22	0.05		12	130	<0.1	240	2.1	200				4.3	48		9.9	9.1	4.0
1060	WR-V-28.5	5	28.5	55	31.5		2007/1/9	140	14	25	8.8		<0.01	0.3	58		0.19	<0.01	0.3	<0.01	<0.01		<0.1	0.15	74	0.6	0.09	19		0.02	150	<0.1	150	0.6	130				3.8	31		8.5	8.0	2.8
1061	WR-V-28.5	5	28.5	55	31.5		2007/2/8	130	9.4	28	10		0.09	0.31	61		0.17	<0.01	0.2	<0.01	0.03		<0.1	0.16	73	0.5	0.06	1.3		5.6	150	<0.1	170	0.4	140				3.8	35		8.5	8.0	2.8
1062	WR-V-28.5	5	28.5	55	31.5		2007/3/16	130	10	34	14		0.21	0.34	59		0.24	<0.01	N.D.	<0.01	0.08		<0.1	0.13	65	0.4	0.13	0.98		7.5	200	<0.1	150	0.2	130				3.2	33		9.2	8.5	4.2
1063	WR-V-28.5	5	28.5	55	31.5		2007/5/25	100	17	41	10		<0.01	0.23	41		0.32	<0.01	N.D.	<0.01	0.01		<0.1	0.15	54	0.4	0.08	1.1		9.6	190	<0.1	140	0.5	110				2.8	29		8.2	7.8	2.6
1064	WR-V-28.5	5	28.5	55	31.5		2007/7/3	99	13	38	15		0.23	0.23	56		0.23	<0.01	N.D.	<0.01	<0.01		<0.1	0.15	56	0.4	0.09	0.52		10	180	<0.1	130	0.1	110				2.7	29		8.4	7.5	5.6
1065	WR-V-28.5	5	28.5	55	31.5		2007/7/13	91	10	36	13		0.23	0.23	58		0.22	<0.01	N.D.	<0.01	<0.01		<0.1	0.14	57	0.3	0.10	0.04		10	180	<0.1	130	0.1	100				2.9	28		7.7	7.5	1.2
1066	WR-V-28.5	5	28.5	55	31.5		2007/9/17	100	15	27	10		0.26	0.24	60		0.22	<0.01	N.D.	<0.01	0.01		<0.1	0.17	56	0.3	0.09	0.19		10	170	<0.1	140	0.2	120				3.2	31		7.5	7.4	0.5
1067	WR-V-28.5	5	28.5	55	31.5		2007/11/12	99	11	31	13		0.01	0.22	58		0.19	<0.01	N.D.	<0.01	0.01		<0.1	0.18	57	0.4	0.02	20		3.4	170	<0.1	99	<0.1	85				3.3	24		7.4	7.1	2.3
1068	WR-V-28.5	5	28.5	55	31.5		2007/12/14	95	10	35	15		<0.01	0.19	56		0.18	<0.01	N.D.	<0.01	<0.01		<0.1	0.18	58	0.4	0.02	2.3		8.7	170	<0.1	120	0.1	100				3.2	28		7.9	7.2	4.6
1069	WR-V-28.5	5	28.5	55	31.5		2008/1/10	95	9.9	31	14		0.25	0.2	55		0.18	<0.01	N.D.	<0.01	0.04		<0.1	0.17	57	0.4	0.08	0.03		9.9	170	<0.1	120	0.1	100				3.2	27		7.7	7.1	3.7
1070	WR-V-28.5	5	28.5	55	31.5		2008/6/11	92	11	29	12		<0.01	0.13	54		0.18	<0.01	N.D.	<0.01	0.01		<0.1	0.2	54	0.3	0.02	29		0.02	150	<0.1	84	0.1	74				3.3	18		6.7	6.5	1.8
1071	WR-V-28.5	5	28.5	55	31.5		2008/9/12	98	13	28	12		<0.01	0.19	58		0.14	<0.01	N.D.	<0.01	<0.01		<0.1	0.18	56	0.4	0.01	31		<2.0	170	<0.1	68	<0.1	60				3.4	16		7.1	6.7	2.8
1072	WR-V-28.5	5	28.5	55	31.5		2008/11/11	110	12	29	12		<0.01	0.21	56		0.16	<0.01	N.D.	<0.01	<0.01		<0.1	0.15	62	0.4	0.01	36		0.01	180	<0.1	70	<0.1	63				3.9	21		7.6	7.2	2.2
1073	WR-V-28.5	5	28.5	55	31.5		2009/3/10	97	9.1	26	12		<0.01	0.2	18		0.18	<0.01	<0.1	<0.01	0.01		<0.1	0.1	60	0.4	<1	18		<2.0	170	<0.1	79	<0.5	52				4.6	16		6.9	6.8	0.3
1074	WR-V-28.5	5	28.5	55	31.5		2010/10/27	100	13	40	4.4		0.1	0.2	18		0.23		0.3		0.34		<0.0	0.2	49	0.4	0.09	1.8		<4.8	200	<0.1	110	<0.2	100				5.6	23		7.3	7.4	-0.4
1075	WR-V-28.5	5	28.5	55	31.5		2010/11/24	120	13	49	2.5		0.01	0.2	12		0.24		0.1		0.25		<0.0	0.2	50	0.4	0.03	6.9		<3.4	250	<0.1	90	<0.2	70				4.8	19		8.4	8.2	1.3
1076	WR-V-28.5	5	28.5	55	31.5		2010/12/22	140	13	42	5.5		0.02	0.3	18		0.23		0.2		0.22		<0.1	0.2	94	0.7	0.04	12		<4.4	190	<0.1	160	<0.3	140				5.5	34		9.3	9.4	-1.0
1077	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/9/17	1100	52	37	15		0.05	2.3	60		0.46	<0.01	1.3	<0.01	0.06		0.01	0.20	960	7.4	1.9	0.08		52	7	<0.1	1400	12	1200				18	290		55.5	50.7	4.5
1078	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/11/12	1100	49	33	14		<0.01	3	57		0.5	<0.01	1.4	<0.01	0.03		<0.1	0.18	1000	7.5	0.5	1.2		53	3.6	<0.1	1500	7	1300				17	300		55.3	53.2	1.9
1079	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/11/23	1000	48	33	12		0.02	3.2	54		0.33	<0.01	1.4	<0.01	0.04		<0.1	0.15	960	7.4	0.59	2.4		55	10	<0.1	1500	9.7	1200				17	300		50.9	52.3	-1.4
1080	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/12/4	1100	50	34	15		0.03	3.1	56		0.33	<0.01	1.5	<0.01	0.03		<0.1	0.13	1000	7.7	0.56	0.67		60	4	<0.1	1500	7.1	1300				17	310		55.8	53.2	2.4
1081	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/12/14	980	47	28	15		0.03	2.5	56		0.36	<0.01	1.2	<0.01	0.02		<0.1	0.19	840	6.4	0.53	0.4		50	37	<0.1	1300	6.2	1100				16	270		49.6	46.1	3.7
1082	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/12/20	740	39	34	12		0.01	2.3	57		0.29	<0.01	1	<0.01	0.02		<0.1	0.15	670	5	0.4	1.4		43	64	<0.1	1000	4.9	890				13	210		38.6	36.9	2.3
1083	WR-V-63.8	28.5	63.8	31.5	-3.8		2008/1/10	1000	46	34	14		0.03	2.6	54		0.36	<0.01	1.7	<0.01	0.04		<0.1	0.19	870	6.3	0.34	0.02		53	19	<0.1	1400	6.5	1200				17	280		50.8	48.2	2.7
1084	WR-V-63.8	28.5	63.8	31.5	-3.8		2008/2/7	990	46	33	14		0.05	3	53		0.31	<0.01	1.3	<0.01	0.04		<0.1	0.13	900	6.9	2.2	0.07		56	7.8	<0.1	1400	6.7	1200				15	290		50.6	48.8	1.8
1085	WR-V-63.8	28.5	63.8	31.5	-3.8		2010/10/27	790	37	30	11		0.03	2.3	25		0.28		1.8		1.1		0.03	0.30	730	5.2	0.36	27		34	36	<0.1	1100	7.1	920				13	220		39.9	40.1	-0.2
1086	WR-V-63.8	28.5	63.8	31.5	-3.8		2010/11/24	640	31	32	10		0.03	1.8	24		0.25		1		0.16		0.03	0.20	560	4.2	0.44	22		26	60	<0.1	890	3.6	770				12	180		32.7	32.2	0.9
1087	WR-V-63.8	28.5	63.8	31.5	-3.8		2010/12/22	620	30	30	9.9		0.04	1.8	23		0.24		1.1		0.47		0.03	0.30	580	4.2	0.37	28		27	47	<0.1	860	4	740				12	170		31.8	32.1	-0.4
1088	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/11/8	2800	110	44	43		0.01	8	58		0.95	<0.01	0.80	<0.01	0.1		<0.1	0.20	3100	22	4.4	2.2		110	130	<0.1	2600	27	2300				30	520		137.6	133.9	1.3
1089	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/11/23	2800	110	58	44		0.01	9.5	56		0.80	<0.01	0.80	<0.01	0.08		<0.1	0.15	3100	23	4.2	4.4		110	110	<0.1	2700	23	2300				31	550		138.6	135.1	1.3
1090	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/11/27	2100	62	19	22		<0.01	6.2	21		0.65	<0.01	<0.1	<0.01	0.01		0.02	0.22	2300	17	0.96	21		55	240	<0.1	1500	31	1400				28	300		99.6	96.0	1.8
1091	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/12/4	2800	100	43	43		0.01	9.3	54		0.74	<0.01	0.80	<0.01	0.09		<0.1	0.17	3100	23	4.4	4.6		110	97	<0.1	2700	23	2300				30	550		137.4	134.8	1.0
1092	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/12/14	2600	100	38	45		0.01	8.7	55		1.00	<0.01	0.80	<0.01	0.08		<0.1	0.16	2800	21	4.7	10		72	110	<0.1	2400	16	2100				29	490		126.5	121.5	2.0
1093	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/12/20	2100	85	43	34		<0.01	7.7	56		0.76	<0.01	0.60	<0.01	0.04		<0.1	0.14	2400	18	4.6	11		57	100	<0.1	2000	9.4	1700				24	410		102.7	103.2	-0.2
1094	WR-V-98.0	63.8	98.01	-3.8	-38.01		2008/1/10	2500	93	40	40		0.01	8.4	39		1.10	<0.01	0.60	<0.01	0.07		<0.1	0.13	2800	20	4.2	13		70	89	<0.1	2200	15	1900				28	450		121.5	117.8	1.5
1095	WR-V-98.0	63.8	98.01	-3.8	-38.01		2008/2/7	2900	100	41	45		0.01	9	39		0.83	<0.01	0.80	<0.01	0.08		<0.1	0.06	3200	24	5.8	15		89	71	<0.1	2600	23	2200				33	530		140.6	135.6	1.8
1096	WR-V-98.0	63.8	98.01	-3.8	-38.01		2009/7/27	2400	87	30	35		0.02	8.2	21		0.7	<0.01	0.7	<0.01	0.04		<0.1	<0.1	2500	20	4	220		2.9	46	<0.1	1600	20	1400		23		54	320		112.3	102.1	4.7
1097	WR-V-98.0	63.8	98.01	-3.8	-38.01		2009/11/25	2800	95	25	37		0.01	8.5	25		0.76	<0.01	0.7	<0.01	0.07		<0.1	<0.1	3100	14	6	280		33	26	<0.1	2000	17	1700				25	400		131.5	126.0	2.2
1098	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/1/18	2700	95	24	39		0.02	8.2	23		0.73	<0.01	0.7	<0.01	0.07		<0.1	0.1	3000	20	5	250		22	43	<0.1	1800	24	1800		38		25	370		126.6	120.1	2.7
1099	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/7/27	200	18	58	6.9		0.04	0.5	27		0.27		0.4		0.96		0.04	0.3	170	1.2	0.18	42		<0.2	150	<0.1	240	0.8	200				14	49		12.7	12.6	0.6
1100	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/11/24	2900	100	49	50		0.02	9.9	24		0.79		0.8		0.1		0.005	0.095	3300	25	6.5	240		32	23	<0.1	2500	32	2200		40		32	510		138.4	139.8	-0.5
1101	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/12/22	2800	95	48	47		0.02	9.3	22		0.76		0.7		0.28		0.06	0.1	3200	23	6.8	250		29	20	<0.1	2300	29	2000		60		31	460		133.4	133.6	-0.1
1102	WR-V-98.0	63.8	98.01	-3.8	-38.01		2011/2/1	3100	100	52	54		0.02	10	22		0.82		0.8		0.25		0.02	0.1	3900	25	7.6	190		35	27	<0.1	2600	12	2200				32	520		147.8	156.9	-3.0
1103	WR-V-132.0	98.01	132	-38.01	-72		2008/6/17	2300	89	40	34		<0.01	6.3	55		0.67	<0.01	0.9	3.3	0.02		<0.1	0.24	2500	18	3.3	300			46	<0.1	1700	12	1500				25	350		108.0	104.8	1.5
1104	WR-V-132.0	98.01	132	-38.01	-72		2008/11/11	2500	92	41	33		0.03	6.3	58		0.68	<0.01	1.0	5.1	0.05		<0.1	0.64	2600	20	5.1	160			26	<0.1	1900	5.3	1600				27	400		116.7	108.0	3.9
1105	WR-V-132.0	98.01	132	-38.01	-72		2009/7/27	3500	120	42	45		0.03	12	27		0.97	<0.01	0.7	8	0.09		<0.1	0.2	3800	28	8	130			33	<0.1	2600	25	2200				29	520		162.8	153.7	2.9
1106	WR-V-132.0	98.01	132	-38.01	-72		2009/11/25	3900	130	44	50		0.02	12	27		1.2	<0.01	0.7	10	0.09		<0.1	<0.1	4300	24	10	100			17	<0.1	2800	13	2500				29	560		180.9	169.8	3.2
1107	WR-V-132.0	98.01	132	-38.01	-72		2010/1/18	3100	100	37	44		0.02	9.4	25		0.93	<0.01	0.8	7	0.1		<0.1	<0.1	3500	23	7	210			28	<0.1	2300	22	2100				28	460		144.2	141.3	1.0
1108	WR-V-132.0	98.01	132	-38.01	-72		2010/2/16	3340	140	44	54		0.009		21.9	104	0.67				0.07		<0.05	<0.05	4110	31		268			27								36.4	600	1.1	155.4	171.0	-4.8
1109	WR-V-132.0	98.01	132	-38.01	-72		2010/7/27	2700	110	44	37		0.02	8.5	24		0.75		1.1		1.2		0.27	0.4	2900	23	6.2	86		68	66	<0.1	2400	21	2000				29	490		130.5	124.9	2.2
1110	WR-V-132.0	98.01	132	-38.01	-72		2010/10/27	3600	130	36	57		0.005	12	26		0.76		1.1		0.71		0.04	0.1	4100	30	8	330		41	19	<0.1	2500	53	2400		160		32	510		170.4	164.5	1.8
1111	WR-V-132.0	98.01	132	-38.01	-72		2010/11/24	3500	120	68	59		0.02	12	25		1.1		0.8		0.71		0.01	0.05	4200	31	10	100		110	4.3	<0.1	3200	21	2600				33	640		171.3	173.6	-0.7
1112	WR-V-132.0	98.01	132	-38.01	-72		2010/12/22	3600	120	66	59		0.02	12	23		1.1		0.9		0.78		0.03	0.08	4300	32	10	110		110	8.2	<0.1	2900	25	2600				34	590		175.6	171.9	1.1
1113	WR-V-132.0	98.01	132	-38.01	-72		2011/2/1	3600	110	74	62		0.02	12	22		1.1		0.8		0.72		0.03	0.07	4600	32	11	110		110	4.6	<0.1	3000	14	2700				32	600		176.0	181.5	-1.6
1114	WR-V-168.0	132	168.0	-72	-108.0		2008/6/17	2800	110	30	31		0.01	6.7	58		0.6	<0.01	0.7	<0.01	0.03		<0.1	0.14	2900	22	5.9	55		11	85	<0.1	2200	7.7	2000				28	460		130.2	121.0	3.7
1115	WR-V-168.0	132	168.0	-72	-108.0		2008/11/11	3100	120	26	31		0.01	7	66		0.54	<0.01	1	<0.01	0.07		<0.1	0.22	3200	26	6.0	56		39	54	<0.1	2700	11	2300				32	550		144.9	137.2	2.7
1116	WR-V-168.0	132	168.0	-72	-108.0		2009/7/27	2700	110	21	24		0.02	10	25		0.5	<0.01	1.1	<0.01	0.11		<0.1	0.3	2600	21	5	47		80	81	<0.1	2700	36	2400		58		28	540		129.1	121.5	3.0
1117	WR-V-168.0	132	168.0	-72	-108.0		2009/11/25	3000	100	21	27		0.01	8.3	28		0.63	<0.01	1.2	<0.01	0.12		<0.1	<0.1	3100	18	6	35		100	35	<0.1	2600	17	2300				25	520		143.0	132.1	4.0
1118	WR-V-168.0	132	168.0	-72	-108.0		2010/1/18	2600	88	24	27		0.02	7.1	28		0.63	<0.01	1	<0.01	0.16		<0.1	<0.1	2700	19	6	6.8		96	30	<0.1	2600	22	2400				23	520		125.1	120.4	1.9
1119	WR-V-168.0	132	168.0	-72	-108.0		2010/2/16	2330	98.3	35.2	30		0.007		21.7	75.3	0.46				0.06		<0.05	<0.05	2420	19.6		43.6			46.3								24.2	560	1.13	108.0	116.7	-3.9
1120	WR-V-168.0	132	168.0	-72	-108.0		2010/7/27	2500	100	25	26		0.01	7.1	23		0.44		1		0.36		0.18	0.4	2500	19	3.8	26		70	120	<0.1	2600	32	2200		52		29	520		119.6	117.4	0.9
1121	WR-V-168.0	132	168.0	-72	-108.0		2010/10/27	3200	110	56	51		0.0076	9.9	25		0.95		1		0.18		0.03	0.08	3600	28	8.3	8.6		110	12	<0.1	2800	18	2400				26	560		156.5	148.7	2.6
1122	WR-V-168.0	132	168.0	-72	-108.0		2010/11/24	3100	100	67	51		0.02	9.7	26		1		1		0.23		0.05	0.07	3700	28	7.9	5.8		120	12	<0.1	3000	14	2500				27	600		153.0	154.6	-0.5
1123	WR-V-168.0	132	168.0	-72	-108.0		2010/12/22	3400	100	66	50		0.02	9.6	25		0.97		1		0.32		0.09	0.1	3900	28	8.5	5.1		130	13	<0.1	2800	19	2500				27	570		166.4	157.1	2.9
1124	WR-V-168.0	132	168.0	-72	-108.0		2011/2/1	3200	100	66	52		0.02	9.9	24		0.91		0.9		0.17		0.008	0.08	3900	28	8.1	9.8		110	19	<0.1	2800	9.5	2500				27	570		156.8	157.0	-0.1
1125	WR-V-202	168	202.0	-108	-142.0		2008/9/12	1900	72	19	15		<0.01	3.5	70		0.3	<0.01	1.2	<0.01	0.1		<0.01	0.21	1700	13	1.8	80		0.06	10	<0.1	1700	6	1500				18	360		87.1	77.6	5.8
1126	WR-V-202	168	202.0	-108	-142.0		2008/11/11	2000	70	21	16		<0.01	3.7	66		0.35	<0.01	1.3	<0.01	0.09		<0.01	0.23	1800	13	2.2	130		16	11	<0.1	1900	6.6	1600				19	400		92.5	84.6	4.5
1127	WR-V-202	168	202.0	-108	-142.0		2009/7/27	2000	79	20	15		<0.01	6.3	25		0.33	<0.01	1.2	<0.01	0.11		<0.1	0.2	2000	15	3	100		47	38	<0.1	2000	36	1900		64		20	410		94.7	93.0	0.9
1128	WR-V-202	168	202.0	-108	-142.0		2009/11/25	1900	77	10	12		<0.01	4.7	30		0.35	<0.01	1.1	<0.01	0.15		<0.1	0.1	2000	8.8	3	130		52	16	<0.1	2100	30	1900		62		18	420		89.6	94.4	-2.6
1129	WR-V-202	168	202.0	-108	-142.0		2010/1/18	2000	67	13	14		0.01	4.6	30		0.38	<0.01	1.3	<0.01	0.17		<0.1	0.1	1900	11	3	85		64	3.7	<0.1	2100	30	1900		48		17	420		94.7	90.6	2.2
1130	WR-V-202	168	202.0	-108	-142.0		2010/2/16	2080	87.2	30.5	26.2		0.006		24	60.9	0.38				0.08		<0.05	<0.05	2370	16		199	28		9.85								19.3	434	0.4	96.3	107.2	-5.3
1131	WR-V-202	168	202.0	-108	-142.0		2010/10/27	2400	66	61	39		0.03	6.2	26.29		0.76		1		1.3		0.21	0.2	2600	19	6.3	7.5		86	1.6	<0.1	2200	6.1	2000				15	460		118.0	109.9	3.5
1132	WR-V-202	168	202.0	-108	-142.0		2010/11/24	2000	66	25	19		0.0058	5.1	28		0.37		1.3		0.17		0.04	0.1	1900	13	3.4	62		57	5.6	<0.1	2400	30	2000		30		21	480		95.4	95.2	0.1
1133	WR-V-202	168	202.0	-108	-142.0		2010/12/22	1900	65	25	18		0.0078	5	27		0.36		1.3		0.21		0.04	0.2	1900	13	3.1	63		60	5.1	<0.1	2300	28	2600		50		20	450		91.1	93.5	-1.3
1134	WR-V-202	168	202.0	-108	-142.0		2011/2/1	2200	72	25	20		0.0065	5.6	26		0.34		1.4		0.13		0.02	0.2	2200	14	2.9	120		56	6.6	<0.1	2400	31	2100		80		22	490		104.3	104.7	-0.2
1135	V210-IGSW		210.0		-150.0		2008/9/2	2300	71	57	36		<0.01	5.3	62		0.9	<0.01	1	<0.01	0.02		<0.01	0.15	2700	18	6	0.11		95	1.3	<0.1	2300	9.1	2000				14	460		113.7	114.3	-0.3
1136	V210-IGSW		210.0		-150.0		2009/12/22	2500	80	14	29		<0.01	6.2	33		0.43	<0.01	1.4	<0.01	0.04		<0.1	0.1	2800	16	4	0.8		<0.2	3.5	<0.1	1800	57	1800		130		15	370		114.7	110.7	1.8
1137	V210-IGSW		210.0		-150.0		2010/1/18	2100	61	41	29		0.03	4.9	30		0.7	<0.01	0.9	<0.01	0.09		0.2	<0.1	2300	14	6	<0.5		90	0.4	<0.1	2200	7.9	1900				12	460		103.0	101.3	0.8
1138	V210-IGSW		210.0		-150.0		2010/2/16	1840	68.3	49.7	30.1		0.017		23.3	46.7	0.51				0.016		<0.05	<0.05	2040	14.6		<0.05			0.46								12.3	448	0.27	86.7	95.0	-4.6
1139	V210-IGSW		210.0		-150.0		2010/10/27	2100	64	50	30		0.03	5.3	29		0.64		1.3		1.5		0.28	0.2	2300	15	5.3	0.6		78	0.4	<0.1	2100	18	1900				14	420		103.1	100.1	1.5
1140	V210-IGSW		210.0		-150.0		2010/11/24	2200	65	51	32		0.02	5.4	29		0.62		1.1		0.07		0.03	0.09	2400	10	3.5	0.5		69	0.3	<0.1	2300	25	2000				15	470		107.1	106.3	0.4
1141	V210-IGSW		210.0		-150.0		2010/12/22	2500	75	48	36		0.02	6.2	31		0.65		1.1		0.06		0.02	0.2	2800	18	5.5	6.2		9.3	0.4	<0.1	2100	30	1900		75		16	420		117.4	114.7	1.1
1142	V210-IGSW		210.0		-150.0		2011/2/1	2600	77	43	37		0.01	6.5	31		0.59		1.2		0.08		0.04	0.2	2900	18	6.6	9.3		26	0.8	<0.1	2200	19	1900				17	450		122.6	118.8	1.6
1143	WR-V-242.0	202	242.0	-142	-182.0		2008/11/11	1900	59	34	22		0.02	3.6	65		0.52	<0.01	1	<0.01	0.04		0.01	0.17	1900	14	3.9	7.2		40	3.8	<0.1	1900	6.5	1600				13	390		90.4	85.3	2.9
1144	WR-V-242.0	202	242.0	-142	-182.0		2009/1/13	2100	59	33	24		0.02	4.5	28		0.53	<0.01	1	<0.01	0.05		<0.1	0.1	2100	12	3	250		<0.2	3.3	<0.1	1600	23	1500		36		12	330		97.1	90.5	3.5
1145	WR-V-242.0	202	242.0	-142	-182.0		2009/7/27	2100	62	33	24		0.02	6.4	25		0.53	<0.01	0.8	<0.01	0.03		<0.1	0.1	2200	17	3	12		76	7	<0.1	2100	22	1800				14	420		101.7	97.7	2.0
1146	V250-WCP		250.0		-190.0		2009/8/26	2100	58	41	28		<0.01	4.9	27		0.5	<0.01	1	<0.01	<0.01		<0.1	0.1	2200	16	5	9.4		35	0.9	<0.1	2300	7.9	1600				12	470		99.8	100.3	-0.3
1147	V250-WCP		250.0		-190.0		2009/10/26	2100	66	35	25		0.02	5.3	30		0.68	<0.01	0.5	<0.01	0.03		<0.1	<0.1	2100	2.3	4	9.5		87	1.2	<0.1	2200	7.6	1600				14	460		102.4	95.7	3.4
1148	V250-WCP		250.0		-190.0		2009/11/25	2300	66	37	27		0.02	5.1	30		0.68	<0.01	1	<0.01	0.05		<0.1	<0.1	2200	14	4	<0.5		87	1.7	<0.1	2400	11	1900				12	490		111.3	101.9	4.4
1149	V250-WCP		250.0		-190.0		2009/12/22	2200	76	23	21		0.02	6.8	29		0.68	<0.01	1	<0.01	0.06		<0.1	<0.1	2200	21	5	54		82	7.7	<0.1	2500	11	2000				19	500		106.0	104.6	0.7
1150	V250-WCP		250.0		-190.0		2010/1/18	2200	59	39	30		0.1	5.1	25		0.66	<0.01	0.9	<0.01	0.13		<0.1	0.1	2400	14	5	12		67	6.3	<0.1	2100	7.6	1800				12	430		106.0	102.8	1.6
1151	V250-WCP		250.0		-190.0		2010/2/16	1880	62	50.6	30.9		<0.02		21.4	48	0.52				0.008		<0.05	<0.05	2200	15.5		18	<0.05		0.5								11.3	440	0.33	88.4	99.1	-5.7
1152	V250-WCP		250.0		-190.0		2010/7/27	2300	60	53	33		0.03	5.7	26		0.69		1.1		1.1		0.11	0.2	2700	17	5.2	6.6		79	7.9	<0.1	2200	4.7	1900				14	470		112.1	112.8	-0.3
1153	V250-WCP		250.0		-190.0		2010/10/27	2300	60	55	34		0.02	5.8	25		0.67		1.1		0.75		0.02	0.2	2400	17	5.9	5.3		81	3.6	<0.1	2100	5.9	1900				12	440		112.4	102.6	4.6
1154	V250-WCP		250.0		-190.0		2010/11/24	2300	58	53	33		0.03	5.6	25		0.65		0.9		0.56		0.03	0.2	2600	17	5.7	5.2		76	3.7	<0.1	2300	4.9	1900				14	480		111.9	111.5	0.2
1155	V250-WCP		250.0		-190.0		2010/12/22	2200	59	55	34		0.03	5.7	24		0.66		1		0.75		0.02	0.2	2600	18	6	6		78	3.2	<0.1	2100	4.5	1900				13	440		107.9	108.2	-0.2
1156	V250-IGSW		248.0		-188.0		2010/1/18	1900	51	28	22		0.02	4.8	28		0.55	<0.01	0.9	<0.01	0.03		<0.1	0.1	1900	11	5	<0.5		78	<0.1	<0.1	2100	4.6	1800				11	440		92.2	88.3	2.2
1157	WR-E-27.0	5	27	55	33		2007/1/9	460	23	42	18		<0.01	1.6	40		0.37	<0.01	0.4	<0.01	<0.01		<0.1	0.18	440	3.4	0.47	3.5		0.06	98	<0.1	470	3.1	410				10	95		24.4	22.4	4.4
1158	WR-E-27.0	5	27	55	33		2007/2/8	560	25	33	18		0.1	1.9	33		0.34	<0.01	0.5	<0.01	0.02		<0.1	0.2	510	3.7	0.36	1.8		16	54	<0.1	660	7	570				11	130		29.3	26.6	4.7
1159	WR-E-27.0	5	27	55	33		2007/3/16	520	26	31	15		0.13	1.6	56		0.32	<0.01	0.3	<0.01	0.01		<0.1	0.19	480	3.6	0.30	2.6		3	130	<0.1	500	0.6	430				11	110		26.5	24.5	3.8
1160	WR-E-27.0	5	27	55	33		2007/5/26	330	20	46	15		<0.01	0.9	47		0.31	<0.01	0.2	<0.01	<0.01		<0.1	0.21	300	2.3	0.08	60		0.08	130	<0.1	350	0.4	290				8.9	77		18.5	17.9	1.7
1161	WR-E-27.0	5	27	55	33		2007/6/18	600	27	33	18		0.02	2.1	42		0.39	<0.01	0.3	<0.01	0.03		<0.1	0.19	560	4.2	0.16	86		6.1	99	<0.1	640	1.4	540				12	130		30.6	29.8	1.2
1162	WR-E-27.0	5	27	55	33		2007/9/13	640	29	33	16		0.11	1.5	60		0.48	<0.01	0.2	<0.01	0.02		0.03	0.2	580	4.2	1.0	0.03		35	110	<0.1	830	2.3	690				13	170		33.7	32.4	2.0
1163	WR-E-27.0	5	27	55	33		2007/11/23	520	23	33	17		0.13	1.7	38		0.27	<0.01	0.3	<0.01	0.01		<0.1	0.21	480	3.6	0.14	0.12		26	78	<0.1	690	2.4	580				12	140		27.9	26.6	2.5
1164	WR-E-27.0	5	27	55	33		2007/12/11	480	21	29	15		0.09	1.5	41		0.23	<0.01	0.5	<0.01	0.03		<0.1	0.21	430	3.3	0.14	4.1		24	84	<0.1	620	2.9	520				11	120		25.6	24.2	2.8
1165	WR-E-27.0	5	27	55	33		2008/1/10	550	24	30	16		0.12	1.7	36		0.21	<0.01	0.2	<0.01	0.03		<0.1	0.19	500	3.6	0.29	0.11		25	88	<0.1	740	2	620				12	150		29.0	28.2	1.4
1166	WR-E-27.0	5	27	55	33		2008/6/10	950	41	30	17		0.02	2.6	58		0.32	<0.01	0.9	<0.01	<0.01		<0.1	0.15	860	6.3	0.74	91		0.03	70	<0.1	910	4.2	780				15	180		45.6	42.3	3.8
1167	WR-E-27.0	5	27	55	33		2009/4/27	450	19	23	14		0.03	1.5	23		0.2	<0.01	0.4	<0.01	0.01		<0.1	0.1	430	3.2	<1	78		<0.2	100	<0.1	430	2.5	350				11	87		22.6	22.6	-0.1
1168	WR-E-27.0	5	27	55	33		2010/7/27	430	21	26	13		0.16	1.3	27		0.22		2.1		5		0.02	0.3	410	3	0.2	9.3		22	88	<0.1	540	0.8	460				12	110		23.1	22.5	1.4
1169	WR-E-27.0	5	27	55	33		2010/10/27	420	19	26	13		0.12	1.2	27		0.19		0.9		0.79		0.06	0.3	390	2.9	0.48	2.1		20	94	<0.1	490	1.1	450				11	100		22.4	21.1	3.0
1170	WR-E-27.0	5	27	55	33		2010/11/24	430	18	24	12		0.1	1.2	25		0.18		0.8		0.53		0.02	0.2	410	3	0.42	1.6		19	80	<0.1	550	1.9	450				12	110		22.6	22.4	0.5
1171	WR-E-27.0	5	27	55	33		2010/12/22	430	18	23	12		0.14	1.3	26		0.22		4.9		16		0.09	0.4	430	3.2	0.1	3.9		21	66	<0.1	520	1.1	480				13	110		22.9	22.2	1.7
1172	WR-E-63.8	27	63.9	33	-3.9		2007/11/23	1200	44	29	16		0.03	3.2	42		0.45	<0.01	1.2	0.87	0.02		0.03	0.12	1100	7.8	0.87	21		49	16	<0.1	1400	5.6	1200				15	290		59.2	54.9	3.8
1173	WR-E-63.8	27	63.9	33	-3.9		2007/12/11	1200	46	30	17		0.03	3.4	33		0.39	<0.01	1.2	0.9	0.02		<0.1	0.12	1100	8.2	0.90	2.9		54	13	<0.1	1500	6.8	1200				16	300		59.7	56.2	3.0
1174	WR-E-63.8	27	63.9	33	-3.9		2007/12/25	1200	49	30	15		0.03	4.5	56		0.47	<0.01	1.3	1	0.02		<0.1	0.08	1200	9.0	1.0	3.2		58	8.2	<0.1	1600	6.3	1300				16	320		60.0	60.6	-0.5
1175	WR-E-63.8	27	63.9	33	-3.9		2008/1/10	1200	49	32	17		0.03	3.7	41		0.44	<0.01	1.3	0.84	0.02		0.01	0.10	1200	8.9	0.84	2.5		56	11	<0.1	1500	6.1	1300				16	310		60.1	59.0	0.9
1176	WR-E-63.8	27	63.9	33	-3.9		2008/2/7	1300	49	33	18		0.02	4.1	56		0.4	<0.01	1.3	1.3	0.02		<0.01	0.06	1300	9.3	1.3	6.5		59	6.8	<0.1	1600	7.4	1300				16	320		64.8	63.5	1.0

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (59/64)

Index	Sample point	sampling zone (GL) Min.	sampling zone (GL) Max.	sampling zone (EL) Min.	sampling zone (EL) Max.	sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases: Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	Isotopes: ^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{35}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_w]	[cc_{STP}/g_w]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
1054	East shaft	100.2	100.2	-40.2	-40.2																												-42	-1.7										
1055	East shaft	110.2	110.2	-50.2	-50.2																												-41	-1.5										
1056	East shaft	118.2	118.2	-58.2	-58.2																												-41	-1.5										
1057	East shaft	130.2	130.2	-70.2	-70.2																												-44	-2.1										
1058	East shaft	139.8	139.8	-79.8	-79.8																												-46	-2.3										
Inflow from the shaft wall																																												
1059	WR-V-28.5	5	28.5	55	31.5		2006/11/27	x																																				
1060	WR-V-28.5	5	28.5	55	31.5		2007/1/9	x																																				
1061	WR-V-28.5	5	28.5	55	31.5		2007/2/8	x																																				
1062	WR-V-28.5	5	28.5	55	31.5		2007/3/16	x																																				
1063	WR-V-28.5	5	28.5	55	31.5		2007/5/25	x																																				
1064	WR-V-28.5	5	28.5	55	31.5		2007/7/3	x																																				
1065	WR-V-28.5	5	28.5	55	31.5		2007/7/13	x																																				
1066	WR-V-28.5	5	28.5	55	31.5		2007/9/17	x																																				
1067	WR-V-28.5	5	28.5	55	31.5		2007/11/12	x																								0.4 ±0.1	-65.8	-10.5										
1068	WR-V-28.5	5	28.5	55	31.5		2007/12/14	x																								<0.3	-65.6	-10.5										
1069	WR-V-28.5	5	28.5	55	31.5		2008/1/10	x																																				
1070	WR-V-28.5	5	28.5	55	31.5		2008/6/11	x																								0.4 ±0.1	-76.2	-9.6										
1071	WR-V-28.5	5	28.5	55	31.5		2008/9/12	x																								0.6 ±0.1	-58.2	-9.6										
1072	WR-V-28.5	5	28.5	55	31.5		2008/11/11	x																								0.4 ±0.1	-69.4	-9.8										
1073	WR-V-28.5	5	28.5	55	31.5		2009/3/10	x																																				
1074	WR-V-28.5	5	28.5	55	31.5		2010/10/27	×																								1.5±0.1	-63	-9.7										
1075	WR-V-28.5	5	28.5	55	31.5		2010/11/24	×																																				
1076	WR-V-28.5	5	28.5	55	31.5		2010/12/22	×																																				
1077	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/9/17	x																																				
1078	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/11/12	x																								<0.3	-63	-8.5										
1079	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/11/23	x																								<0.3	-65.1	-8.6										
1080	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/12/4	x																								<0.3	-66.7	-8.8										
1081	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/12/14	x																								<0.3	-63.2	-8.6										
1082	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/12/20	x																								<0.3	-64.5	-8.7										
1083	WR-V-63.8	28.5	63.8	31.5	-3.8		2008/1/10	x																																				
1084	WR-V-63.8	28.5	63.8	31.5	-3.8		2008/2/7	x																								<0.3	-64.9	-8.7										
1085	WR-V-63.8	28.5	63.8	31.5	-3.8		2010/10/27	×																								0.6±0.1	-62	-8.6										
1086	WR-V-63.8	28.5	63.8	31.5	-3.8		2010/11/24	×																																				
1087	WR-V-63.8	28.5	63.8	31.5	-3.8		2010/12/22	×																																				
1088	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/11/8	x																								0.3 ±0.1	-48	-4.3										
1089	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/11/23	x																								0.3 ±0.1	-51.9	-4.2										
1090	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/11/27	x																																				
1091	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/12/4	x																								<0.3	-51.7	-4.2										
1092	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/12/14	x																								0.4 ±0.1	-50.6	-4.5										
1093	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/12/20	x																								<0.3	-52.2	-5.9										
1094	WR-V-98.0	63.8	98.01	-3.8	-38.01		2008/1/10	x																																				
1095	WR-V-98.0	63.8	98.01	-3.8	-38.01		2008/2/7	x																								<0.3	-49.8	-3.3										
1096	WR-V-98.0	63.8	98.01	-3.8	-38.01		2009/7/27	x																																				
1097	WR-V-98.0	63.8	98.01	-3.8	-38.01		2009/11/25	x																																				
1098	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/1/18	x																								≦0.24	-48	-5										
1099	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/7/27	×																								4.0±0.1	-64	-9.5										
1100	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/11/24	×																																				
1101	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/12/22	×																																				
1102	WR-V-98.0	63.8	98.01	-3.8	-38.01		2011/2/1	×																									-43	-3.1										
1103	WR-V-132.0	98.01	132	-38.01	-72		2008/6/17	×																								0.9 ±0.1	-60	-5.3										
1104	WR-V-132.0	98.01	132	-38.01	-72		2008/11/11	×																								0.7 ±0.1	-45	-4.4										
1105	WR-V-132.0	98.01	132	-38.01	-72		2009/7/27	×																																				
1106	WR-V-132.0	98.01	132	-38.01	-72		2009/11/25	×																																				
1107	WR-V-132.0	98.01	132	-38.01	-72		2010/1/18	×																								≦0.23	-48.5	-4.3										
1108	WR-V-132.0	98.01	132	-38.01	-72		2010/2/16	×																																				
1109	WR-V-132.0	98.01	132	-38.01	-72		2010/7/27	×																								2.0±0.1	-51	-4.7										
1110	WR-V-132.0	98.01	132	-38.01	-72		2010/10/27	×																									-44	-2.7										
1111	WR-V-132.0	98.01	132	-38.01	-72		2010/11/24	×																																				
1112	WR-V-132.0	98.01	132	-38.01	-72		2010/12/22	×																									-43	-1.8										
1113	WR-V-132.0	98.01	132	-38.01	-72		2011/2/1	×																								< 0.3	-39	-1.6										
1114	WR-V-168.0	132	168.0	-72	-108.0		2008/6/17	×																								0.4 ±0.1	-53	-3.3										
1115	WR-V-168.0	132	168.0	-72	-108.0		2008/11/11	×																								0.3 ±0.1	-42.8	-2.1										
1116	WR-V-168.0	132	168.0	-72	-108.0		2009/7/27	×																																				
1117	WR-V-168.0	132	168.0	-72	-108.0		2009/11/25	×																																				
1118	WR-V-168.0	132	168.0	-72	-108.0		2010/1/18	×																								≦0.24	-54	-4.5										
1119	WR-V-168.0	132	168.0	-72	-108.0		2010/2/16	×																																				
1120	WR-V-168.0	132	168.0	-72	-108.0		2010/7/27	×																								1.6±0.1	-53	-4.9										
1121	WR-V-168.0	132	168.0	-72	-108.0		2010/10/27	×																									-46	-2.7										
1122	WR-V-168.0	132	168.0	-72	-108.0		2010/11/24	×																																				
1123	WR-V-168.0	132	168.0	-72	-108.0		2010/12/22	×																									-45	-2.8										
1124	WR-V-168.0	132	168.0	-72	-108.0		2011/2/1	×																									-46	-2.6										
1125	WR-V-202	168	202.0	-108	-142.0		2008/9/12	×																								0.4 ±0.1	-55.2	-5.2										
1126	WR-V-202	168	202.0	-108	-142.0		2008/11/11	×																								0.2 ±0.1	-46.5	-4.9										
1127	WR-V-202	168	202.0	-108	-142.0		2009/7/27	×																																				
1128	WR-V-202	168	202.0	-108	-142.0		2009/11/25	×																																				
1129	WR-V-202	168	202.0	-108	-142.0		2010/1/18	×																								≦0.23	-59.3	-6.3										
1130	WR-V-202	168	202.0	-108	-142.0		2010/2/16	×																																				
1131	WR-V-202	168	202.0	-108	-142.0		2010/10/27	×																								0.6±0.1	-55	-5.4										
1132	WR-V-202	168	202.0	-108	-142.0		2010/11/24	×																																				
1133	WR-V-202	168	202.0	-108	-142.0		2010/12/22	×																									-54	-5.3										
1134	WR-V-202	168	202.0	-108	-142.0		2011/2/1	×																									-53	-4.8										
1135	V210-IGSW		210.0		-150.0		2008/9/2	×																								<0.20	-68.9	-5.0										
1136	V210-IGSW		210.0		-150.0		2009/12/22	×																																				
1137	V210-IGSW		210.0		-150.0		2010/1/18	×																								≦0.27	-62.8	-7.0										
1138	V210-IGSW		210.0		-150.0		2010/2/16	×																																				
1139	V210-IGSW		210.0		-150.0		2010/10/27	×																								< 0.3	-59	-5.9										
1140	V210-IGSW		210.0		-150.0		2010/11/24	×																																				
1141	V210-IGSW		210.0		-150.0		2010/12/22	×																																				
1142	V210-IGSW		210.0		-150.0		2011/2/1	×																									-49	-4.2										
1143	WR-V-242.0	202	242.0	-142	-182.0		2008/11/11	×																								<0.2	-58.3	-6.8										
1144	WR-V-242.0	202	242.0	-142	-182.0		2009/1/13	×																								≦0.22	-64.5	-7.6										
1145	WR-V-242.0	202	242.0	-142	-182.0		2009/7/27																																					
1146	V250-WCP		250.0		-190.0		2009/8/26	×																								0.28±0.08	-63.4	-7.2										
1147	V250-WCP		250.0		-190.0		2009/10/26	×																								≦0.21	-62.2	-7.0										
1148	V250-WCP		250.0		-190.0		2009/11/25	×																								≦0.22	-60.7	-7.0										
1149	V250-WCP		250.0		-190.0		2009/12/22	×																								≦0.23	-59	-6.2										
1150	V250-WCP		250.0		-190.0		2010/1/18	×																								≦0.26	-61.6	-6.8										
1151	V250-WCP		250.0		-190.0		2010/2/16																																					
1152	V250-WCP		250.0		-190.0		2010/7/27	×																								< 0.3	-56	-6.0										
1153	V250-WCP		250.0		-190.0		2010/10/27	×																									-59	-5.8										
1154	V250-WCP		250.0		-190.0		2010/11/24	×																																				
1155	V250-WCP		250.0		-190.0		2010/12/22	×																																				
1156	V250-IGSW		248.0		-188.0		2010/1/18	×																								≦0.26	-65.4	-7.8										
1157	WR-E-27.0	5	27	55	33		2007/1/9	×																																				
1158	WR-E-27.0	5	27	55	33		2007/2/8	×																																				
1159	WR-E-27.0	5	27	55	33		2007/3/16	×																																				
1160	WR-E-27.0	5	27	55	33		2007/5/26	×																																				
1161	WR-E-27.0	5	27	55	33		2007/6/18	×																																				
1162	WR-E-27.0	5	27	55	33		2007/9/13	×																																				
1163	WR-E-27.0	5	27	55	33		2007/11/23	×																																				
1164	WR-E-27.0	5	27	55	33		2007/12/11	×																								0.4±0.1	-66.6	-10.2										
1165	WR-E-27.0	5	27	55	33		2008/1/10	×																																				
1166	WR-E-27.0	5	27	55	33		2008/6/10	×																								0.4±0.1	-60	-7.7										
1167	WR-E-27.0	5	27	55	33		2009/4/27	×																																				
1168	WR-E-27.0	5	27	55	33		2010/7/27	×																								0.5±0.1	-65	-9.6										
1169	WR-E-27.0	5	27	55	33		2010/10/27	×																									-67	-9.6										
1170	WR-E-27.0	5	27	55	33		2010/11/24	×																																				
1171	WR-E-27.0	5	27	55	33		2010/12/22	×																																				
1172	WR-E-63.8	27	63.9	33	-3.9		2007/11/23	×																																				
1173	WR-E-63.8	27	63.9	33	-3.9		2007/12/11	×																								<0.3	-61.3	-8.2										
1174	WR-E-63.8	27	63.9	33	-3.9		2007/12/25	×																																				
1175	WR-E-63.8	27	63.9	33	-3.9		2008/1/10	×																																				
1176	WR-E-63.8	27	63.9	33	-3.9		2008/2/7	×																																				

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (60/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Organics				Microbiology																					
		Min.	Max.	Min.	Max.			Humic acid	Fuluvic acid	Acetate	Formate	Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/BZA)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
1054	East shaft	100.2	100.2	-40.2	-40.2																												
1055	East shaft	110.2	110.2	-50.2	-50.2																												
1056	East shaft	118.2	118.2	-58.2	-58.2																												
1057	East shaft	130.2	130.2	-70.2	-70.2																												
1058	East shaft	139.8	139.8	-79.8	-79.8																												
Inflow from the shaft wall																																	
1059	WR-V-28.5	5	28.5	55	31.5		2006/11/27																										
1060	WR-V-28.5	5	28.5	55	31.5		2007/1/9																										
1061	WR-V-28.5	5	28.5	55	31.5		2007/2/8																										
1062	WR-V-28.5	5	28.5	55	31.5		2007/3/16																										
1063	WR-V-28.5	5	28.5	55	31.5		2007/5/25																										
1064	WR-V-28.5	5	28.5	55	31.5		2007/7/3																										
1065	WR-V-28.5	5	28.5	55	31.5		2007/7/13																										
1066	WR-V-28.5	5	28.5	55	31.5		2007/9/17																										
1067	WR-V-28.5	5	28.5	55	31.5		2007/11/12																										
1068	WR-V-28.5	5	28.5	55	31.5		2007/12/14																										
1069	WR-V-28.5	5	28.5	55	31.5		2008/1/10																										
1070	WR-V-28.5	5	28.5	55	31.5		2008/6/11																										
1071	WR-V-28.5	5	28.5	55	31.5		2008/9/12																										
1072	WR-V-28.5	5	28.5	55	31.5		2008/11/11																										
1073	WR-V-28.5	5	28.5	55	31.5		2009/3/10																										
1074	WR-V-28.5	5	28.5	55	31.5		2010/10/27																										
1075	WR-V-28.5	5	28.5	55	31.5		2010/11/24																										
1076	WR-V-28.5	5	28.5	55	31.5		2010/12/22																										
1077	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/9/17																										
1078	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/11/12																										
1079	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/11/23																										
1080	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/12/4																										
1081	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/12/14																										
1082	WR-V-63.8	28.5	63.8	31.5	-3.8		2007/12/20																										
1083	WR-V-63.8	28.5	63.8	31.5	-3.8		2008/1/10																										
1084	WR-V-63.8	28.5	63.8	31.5	-3.8		2008/2/7																										
1085	WR-V-63.8	28.5	63.8	31.5	-3.8		2010/10/27																										
1086	WR-V-63.8	28.5	63.8	31.5	-3.8		2010/11/24																										
1087	WR-V-63.8	28.5	63.8	31.5	-3.8		2010/12/22																										
1088	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/11/8																										
1089	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/11/23																										
1090	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/11/27																										
1091	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/12/4																										
1092	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/12/14																										
1093	WR-V-98.0	63.8	98.01	-3.8	-38.01		2007/12/20																										
1094	WR-V-98.0	63.8	98.01	-3.8	-38.01		2008/1/10																										
1095	WR-V-98.0	63.8	98.01	-3.8	-38.01		2008/2/7																										
1096	WR-V-98.0	63.8	98.01	-3.8	-38.01		2009/7/27																										
1097	WR-V-98.0	63.8	98.01	-3.8	-38.01		2009/11/25																										
1098	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/1/18																										
1099	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/7/27																										
1100	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/11/24																										
1101	WR-V-98.0	63.8	98.01	-3.8	-38.01		2010/12/22																										
1102	WR-V-98.0	63.8	98.01	-3.8	-38.01		2011/2/1																										
1103	WR-V-132.0	98.01	132	-38.01	-72		2008/6/17																										
1104	WR-V-132.0	98.01	132	-38.01	-72		2008/11/11																										
1105	WR-V-132.0	98.01	132	-38.01	-72		2009/7/27																										
1106	WR-V-132.0	98.01	132	-38.01	-72		2009/11/25																										
1107	WR-V-132.0	98.01	132	-38.01	-72		2010/1/18																										
1108	WR-V-132.0	98.01	132	-38.01	-72		2010/2/16																										
1109	WR-V-132.0	98.01	132	-38.01	-72		2010/7/27																										
1110	WR-V-132.0	98.01	132	-38.01	-72		2010/10/27																										
1111	WR-V-132.0	98.01	132	-38.01	-72		2010/11/24																										
1112	WR-V-132.0	98.01	132	-38.01	-72		2010/12/22																										
1113	WR-V-132.0	98.01	132	-38.01	-72		2011/2/1																										
1114	WR-V-168.0	132	168.0	-72	-108.0		2008/6/17																										
1115	WR-V-168.0	132	168.0	-72	-108.0		2008/11/11																										
1116	WR-V-168.0	132	168.0	-72	-108.0		2009/7/27																										
1117	WR-V-168.0	132	168.0	-72	-108.0		2009/11/25																										
1118	WR-V-168.0	132	168.0	-72	-108.0		2010/1/18																										
1119	WR-V-168.0	132	168.0	-72	-108.0		2010/2/16																										
1120	WR-V-168.0	132	168.0	-72	-108.0		2010/7/27																										
1121	WR-V-168.0	132	168.0	-72	-108.0		2010/10/27																										
1122	WR-V-168.0	132	168.0	-72	-108.0		2010/11/24																										
1123	WR-V-168.0	132	168.0	-72	-108.0		2010/12/22																										
1124	WR-V-168.0	132	168.0	-72	-108.0		2011/2/1																										
1125	WR-V-202	168	202.0	-108	-142.0		2008/9/12																										
1126	WR-V-202	168	202.0	-108	-142.0		2008/11/11																										
1127	WR-V-202	168	202.0	-108	-142.0		2009/7/27																										
1128	WR-V-202	168	202.0	-108	-142.0		2009/11/25																										
1129	WR-V-202	168	202.0	-108	-142.0		2010/1/18																										
1130	WR-V-202	168	202.0	-108	-142.0		2010/2/16																										
1131	WR-V-202	168	202.0	-108	-142.0		2010/10/27																										
1132	WR-V-202	168	202.0	-108	-142.0		2010/11/24																										
1133	WR-V-202	168	202.0	-108	-142.0		2010/12/22																										
1134	WR-V-202	168	202.0	-108	-142.0		2011/2/1																										
1135	V210-IGSW		210.0		-150.0		2008/9/2																										
1136	V210-IGSW		210.0		-150.0		2009/12/22																										
1137	V210-IGSW		210.0		-150.0		2010/1/18																										
1138	V210-IGSW		210.0		-150.0		2010/2/16																										
1139	V210-IGSW		210.0		-150.0		2010/10/27																										
1140	V210-IGSW		210.0		-150.0		2010/11/24																										
1141	V210-IGSW		210.0		-150.0		2010/12/22																										
1142	V210-IGSW		210.0		-150.0		2011/2/1																										
1143	WR-V-242.0	202	242.0	-142	-182.0		2008/11/11																										
1144	WR-V-242.0	202	242.0	-142	-182.0		2009/1/13																										
1145	WR-V-242.0	202	242.0	-142	-182.0		2009/7/27																										
1146	V250-WCP		250.0		-190.0		2009/8/26																										
1147	V250-WCP		250.0		-190.0		2009/10/26																										
1148	V250-WCP		250.0		-190.0		2009/11/25																										
1149	V250-WCP		250.0		-190.0		2009/12/22																										
1150	V250-WCP		250.0		-190.0		2010/1/18																										
1151	V250-WCP		250.0		-190.0		2010/2/16																										
1152	V250-WCP		250.0		-190.0		2010/7/27																										
1153	V250-WCP		250.0		-190.0		2010/10/27																										
1154	V250-WCP		250.0		-190.0		2010/11/24																										
1155	V250-WCP		250.0		-190.0		2010/12/22																										
1156	V250-IGSW		248.0		-188.0		2010/1/18																										
1157	WR-E-27.0	5	27	55	33		2007/1/9																										
1158	WR-E-27.0	5	27	55	33		2007/2/8																										
1159	WR-E-27.0	5	27	55	33		2007/3/16																										
1160	WR-E-27.0	5	27	55	33		2007/5/26																										
1161	WR-E-27.0	5	27	55	33		2007/6/18																										
1162	WR-E-27.0	5	27	55	33		2007/9/13																										
1163	WR-E-27.0	5	27	55	33		2007/11/23																										
1164	WR-E-27.0	5	27	55	33		2007/12/11																										
1165	WR-E-27.0	5	27	55	33		2008/1/10																										
1166	WR-E-27.0	5	27	55	33		2008/6/10																										
1167	WR-E-27.0	5	27	55	33		2009/4/27																										
1168	WR-E-27.0	5	27	55	33		2010/7/27																										
1169	WR-E-27.0	5	27	55	33		2010/10/27																										
1170	WR-E-27.0	5	27	55	33		2010/11/24																										
1171	WR-E-27.0	5	27	55	33		2010/12/22																										
1172	WR-E-63.8	27	63.9	33	-3.9		2007/11/23																										
1173	WR-E-63.8	27	63.9	33	-3.9		2007/12/11																										
1174	WR-E-63.8	27	63.9	33	-3.9		2007/12/25																										
1175	WR-E-63.8	27	63.9	33	-3.9		2008/1/10																										
1176	WR-E-63.8	27	63.9	33	-3.9		2008/2/7																										

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (61/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing date	sampling type	geological Formation	core description	location (WGS 84, XII)			location (WGS84, UTM, Zone54)			Physico-chemical parameter								Contamination indicator				Comments
		Min.	Max.	Min.	Max.							X	Y	Z (middle depth)	East	North	Z (middle depth)	EC at site	EC at lab	pH at site	pH at lab	ORP Observ.	ORP SHE	Temper-ature at site	Tracer (uranine)	Tracer (Na-naphtionate)	Tracer (amino G acid)	Tracer analitical method A: Fluorescence spectrophotometer B:HPLC	
		[m]	[m]	[m]	[m]													[mS/m]	[mS/m]			[mV]	[mV]	[℃]	[mg/l]	[mg/l]	[mg/l]		
1177	WR-E-63.8	27	63.9	33	-3.9		2008/6/10	2008/9/22-11/5	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	1450	600	8.1	8.1			12.2		0.23		A	
1178	WR-E-63.8	27	63.9	33	-3.9		2008/11/12	2009/2/5-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	703	600	8.0	7.7			8.5		0.24		A	
1179	WR-E-63.8	27	63.9	33	-3.9		2009/2/10	2009/8/11-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	755	610	8.1	8.3			4.38					
1180	WR-E-63.8	27	63.9	33	-3.9		2009/12/22	2010/1/13-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	1000	850	8.2	8.1			5.2					
1181	WR-E-63.8	27	63.9	33	-3.9		2010/1/18	2010/1/22-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	1100	890	8.2	7.9			4.2	<0.002	<0.001		B	
1182	WR-E-63.8	27	63.9	33	-3.9		2010/2/16	2010/4/2-4/23	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	1000		8.2				4					analyzed at Tono Geoscience center
1183	WR-E-63.8	27	63.9	33	-3.9		2010/7/27	2010/8/20-10/14	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	810	710	8.6	7.7			17.9					
1184	WR-E-63.8	27	63.9	33	-3.9		2010/10/27	2010/11/1-2011/1/19	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	800	850	7.6	7.8			11.9					
1185	WR-E-63.8	27	63.9	33	-3.9		2010/11/24	2010/12/1-12/22	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	820	860	7.8	7.9			9.5					
1186	WR-E-63.8	27	63.9	33	-3.9		2010/12/22	2010/12/27-2011/3/8	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	890	870	7.6	7.6			4.9					
1187	WR-E-63.8	27	63.9	33	-3.9		2011/2/1	2011/2/15-3/9	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	14.55	567724.040629	4988286.462354	14.6	1000	900	8.0	7.7			7.9					
1188	WR-E-100.0	63.9	100	-3.9	-40		2008/6/10	2008/9/22-11/5	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-21.95	567724.040629	4988286.462354	-22.0	1370	1200	8.1	8.1			14		0.41		A	
1189	WR-E-100.0	63.9	100	-3.9	-40		2008/11/12	2009/2/5-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-21.95	567724.040629	4988286.462354	-22.0	1500	1300	7.6	8.0			10.4		0.41		A	
1190	WR-E-100.0	63.9	100	-3.9	-40		2009/7/27	2009/8/11-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-21.95	567724.040629	4988286.462354	-22.0	1300	1100	7.7	8.1			15					
1191	WR-E-100.0	63.9	100	-3.9	-40		2009/11/25	2009/12/1-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-21.95	567724.040629	4988286.462354	-22.0	1500	1300	8.1	8.1			11					
1192	WR-E-100.0	63.9	100	-3.9	-40		2010/1/18	2010/1/22-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-21.95	567724.040629	4988286.462354	-22.0	1700	1300	8.4	8.0			7.6	<0.002	<0.001		B	
1193	WR-E-100.0	63.9	100	-3.9	-40		2010/2/16	2010/4/2-4/23	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-21.95	567724.040629	4988286.462354	-22.0	1700		8.3				8					analyzed at Tono Geoscience center
1194	WR-E-100.0	63.9	100	-3.9	-40		2010/7/27	2010/8/20-10/14	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-21.95	567724.040629	4988286.462354	-22.0	1600	1300	8.9	8.0			19.4					
1195	WR-E-100.0	63.9	100	-3.9	-40		2010/10/27	2010/11/1-2011/1/19	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-21.95	567724.040629	4988286.462354	-22.0	1300	1400	7.9	8.0			15					
1196	WR-E-100.0	63.9	100	-3.9	-40		2010/11/24	2010/12/1-12/22	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-21.95	567724.040629	4988286.462354	-22.0	1400	1400	8.0	8.0			12.3					
1197	WR-E-100.0	63.9	100	-3.9	-40		2010/12/22	2010/12/27-2011/3/8	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-21.95	567724.040629	4988286.462354	-22.0	1400	1400	8.0	7.9			8.4					
1198	WR-E-132.0	100	132	-40	-72		2008/11/12	2009/2/5-2/20	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-56	567724.040629	4988286.462354	-56.0	1600	1400	8.1	7.8			10.2		0.59		A	
1199	WR-E-132.0	100	132	-40	-72		2009/7/27	2009/8/11-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-56	567724.040629	4988286.462354	-56.0	1400	1300	8.2	8.1			16.6					
1200	WR-E-132.0	100	132	-40	-72		2009/11/25	2009/12/1-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-56	567724.040629	4988286.462354	-56.0	1800	1300	8.4	8.1			15.2					
1201	WR-E-132.0	100	132	-40	-72		2010/1/18	2010/1/22-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-56	567724.040629	4988286.462354	-56.0	1600	1300	8.0	7.8			7.6	<0.002	<0.001		B	
1202	WR-E-132.0	100	132	-40	-72		2010/2/16	2010/4/2-5/10	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-56	567724.040629	4988286.462354	-56.0	1600		8.3				8.5					analyzed at Tono Geoscience center
1203	WR-E-132.0	100	132	-40	-72		2010/7/27	2010/8/23-10/14	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-56	567724.040629	4988286.462354	-56.0	1500	1300	8.6	7.8			19.6					
1204	WR-E-132.0	100	132	-40	-72		2010/10/27	2010/11/1-2011/1/19	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-56	567724.040629	4988286.462354	-56.0	1200	1400	7.7	8.0			14.2					
1205	WR-E-132.0	100	132	-40	-72		2010/11/24	2010/12/1-2010/12/22	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-56	567724.040629	4988286.462354	-56.0	1200	1200	7.8	7.8			12.1					
1206	WR-E-132.0	100	132	-40	-72		2010/12/22	2010/12/27-2011/3/8	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-56	567724.040629	4988286.462354	-56.0	1400	1300	7.7	7.7			7.8					
1207	WR-E-132.0	100	132	-40	-72		2011/2/1	2011/2/15-2011/3/9	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-56	567724.040629	4988286.462354	-56.0	1410	1300	8.0	7.8			8.3	<0.002	<0.001		B	
1208	WR-E-168.0	132	168	-72	-108		2009/11/25	2009/12/1-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-90	567724.040629	4988286.462354	-90.0	1400	1200	8.6	8.3			12.4					
1209	WR-E-168.0	132	168	-72	-108		2009/12/22	2010/1/13-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-90	567724.040629	4988286.462354	-90.0	1400	1200	8.5	8.3			11					
1210	WR-E-168.0	132	168	-72	-108		2010/1/12	2010/1/19-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-90	567724.040629	4988286.462354	-90.0	1200	1200	8.6	8.1			10.2	<0.002	<0.001		B	
1211	WR-E-168.0	132	168	-72	-108		2010/1/18	2010/1/22-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-90	567724.040629	4988286.462354	-90.0	1400	1200	8.7	8.3			7.1					
1212	WR-E-168.0	132	168	-72	-108		2010/1/26	2010/2/2-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-90	567724.040629	4988286.462354	-90.0	1300	1000	8.4	8.2			7.1	<0.002	<0.001		B	
1213	WR-E-168.0	132	168	-72	-108		2010/2/22	2010/2/9-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-90	567724.040629	4988286.462354	-90.0	1500	1200	8.5	8.1			6.7					
1214	WR-E-168.0	132	168	-72	-108		2010/2/9	2010/2/15-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-90	567724.040629	4988286.462354	-90.0	1400	1200	8.5	8.1			7.3					
1215	WR-E-168.0	132	168	-72	-108		2010/2/16	2010/4/2-5/10	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-90	567724.040629	4988286.462354	-90.0	1400		8.5				6.7					analyzed at Tono Geoscience center
1216	WR-E-168.0	132	168	-72	-108		2010/2/22	2010/4/2-5/10	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-90	567724.040629	4988286.462354	-90.0	1400		8.7				8.2					analyzed at Tono Geoscience center
1217	WR-E-168.0	132	168	-72	-108		2010/3/2	2010/4/2-5/10	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-90	567724.040629	4988286.462354	-90.0	1500		8.5				7.2					analyzed at Tono Geoscience center
1218	WR-E-168.0	132	168	-72	-108		2010/10/27	2010/11/1-2011/2/9	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-90	567724.040629	4988286.462354	-90.0	1200	1300	8.2	8.2			16.7					
1219	WR-E-168.0	132	168	-72	-108		2010/11/24	2010/12/1-12/22	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-90	567724.040629	4988286.462354	-90.0	1300	1300	8.3	8.2			14.4					
1220	WR-E-168.0	132	168	-72	-108		2010/12/22	2010/12/27-2011/3/8	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-90	567724.040629	4988286.462354	-90.0	1200	1300	8.2	8.1			10.2					
1221	WR-E-168.0	132	168	-72	-108		2011/2/1	2011/2/15-3/9	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-90	567724.040629	4988286.462354	-90.0	1350	1300	8.5	7.9			10.6	<0.002	<0.001		B	
1222	WR-E-202.0	169	202	-109	-142		2009/12/22	2010/1/13-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-125.5	567724.040629	4988286.462354	-125.5	1200	960	8.6	8.3			10.2					
1223	WR-E-202.0	169	202	-109	-142		2010/1/12	2010/1/19-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-125.5	567724.040629	4988286.462354	-125.5	1200	940	8.6	8.1			10.2	<0.002	<0.001		B	
1224	WR-E-202.0	169	202	-109	-142		2010/1/18	2010/1/22-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-125.5	567724.040629	4988286.462354	-125.5	1100	960	8.5	8.1			7.7					
1225	WR-E-202.0	169	202	-109	-142		2010/1/26	2010/2/2-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-125.5	567724.040629	4988286.462354	-125.5	1100	930	8.4	8.1			7.7	<0.002	<0.001		B	
1226	WR-E-202.0	169	202	-109	-142		2010/2/2	2010/2/9-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-125.5	567724.040629	4988286.462354	-125.5	1200	930	8.4	8.1			7.4					
1227	WR-E-202.0	169	202	-109	-142		2010/2/9	2010/2/15-	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-125.5	567724.040629	4988286.462354	-125.5	1200	970	8.7	8.2			7.8					
1228	WR-E-202.0	169	202	-109	-142		2010/2/16	2010/4/2-5/10	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-125.5	567724.040629	4988286.462354	-125.5	1200	1200	8.4				7.2					analyzed at Tono Geoscience center
1229	WR-E-202.0	169	202	-109	-142		2010/2/22	2010/4/2-5/10	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-125.5	567724.040629	4988286.462354	-125.5	1100	1100	8.5				7.9					analyzed at Tono Geoscience center
1230	WR-E-202.0	169	202	-109	-142		2010/3/2	2010/4/2-5/10	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-125.5	567724.040629	4988286.462354	-125.5	1100	1100	8.4				6.9					analyzed at Tono Geoscience center
1231	WR-E-202.0	169	202	-109	-142		2010/7/27	2010/8/23-10/14	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-125.5	567724.040629	4988286.462354	-125.5	1300	1000	9.4	8.4			19.6					
1232	WR-E-202.0	169	202	-109	-142		2010/10/27	2010/11/1-2011/1/19	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-125.5	567724.040629	4988286.462354	-125.5	950	990	8.3	8.4			19.6					
1233	WR-E-202.0	169	202	-109	-142		2010/11/24	2010/12/1-12/22	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-125.5	567724.040629	4988286.462354	-125.5	960	990	8.5	8.4			16.8					
1234	WR-E-202.0	169	202	-109	-142		2010/12/22	2010/12/27-2011/3/8	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-125.5	567724.040629	4988286.462354	-125.5	960	980	8.4	8.3			15.4					
1235	WR-E-202.0	169	202	-109	-142		2011/2/1	2011/2/15-3/9	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-125.5	567724.040629	4988286.462354	-125.5	967	990	8.9	8.2			11.1	<0.002	<0.001		B	
1236	WR-E-239.0	202	239	-142	-179		2010/5/18	2010/8/23-10/14	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-160.5	567724.040629	4988286.462354	-160.5	820	780	9.0	7.9			11.7	<0.002	<0.001		B	
1237	WR-E-239.0	202	239	-142	-179		2010/6/1	2010/8/23～9/9	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-160.5	567724.040629	4988286.462354	-160.5	880	770	9.0	7.6			14.7					
1238	WR-E-239.0	202	239	-142	-179		2010/6/23	2010/8/23～9/9	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-160.5	567724.040629	4988286.462354	-160.5	880	790	9.1	7.6			19.5					
1239	WR-E-239.0	202	239	-142	-179		2010/7/7	2010/8/23～9/9	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-160.5	567724.040629	4988286.462354	-160.5	1000	780	8.9	7.7			19.0					
1240	WR-E-239.0	202	239	-142	-179		2010/7/21	2010/8/23～9/9	WR	Koetoi Fm.	diatomaceous mudstone	116162.8	-30727.5	-160.5	567724.040629	4988286.462354	-160.5	1000	800	8.9	7.9			19.6					

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (62/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Geochemistry																																									
		Min.	Max.	Min.	Max.			Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T-Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M-Alkalinity	M-Alkalinity	P-Alkalinity	P-Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]	[g/l]	[meq/l]	[meq/l]	[%]
1177	WR-E-63.8	27	63.9	33	-3.9		2008/6/10	1300	52	32	19		0.02	3.6	58		0.44	<0.01	1.3	1.8	0.01		<0.01	0.1	1400	10	1.8	130		0.03	7.9	<0.1	1200	7.9	1000					16	240		61.5	61.8	-0.2
1178	WR-E-63.8	27	63.9	33	-3.9		2008/11/12	1300	50	32	17		0.04	3.4	55		0.45	<0.01	1.3	1.5	0.02		0.01	0.09	1300	10	1.5	84		36	8.5	<0.1	1400	4	1200					16	300		63.3	61.4	1.5
1179	WR-E-63.8	27	63.9	33	-3.9		2009/2/10	1400	48	27	17		0.03	5.7	22		0.45	<0.01	1.3	< 1	0.02		<0.1	<0.1	1400	11	<1	210		<0.2	3.8	<0.1	1200	14	1000					16	250		65.7	63.2	1.9
1180	WR-E-63.8	27	63.9	33	-3.9		2009/12/22	1800	60	39	27		0.04	6.2	25		0.74	<0.01	0.9	<0.01	0.03		<0.1	<0.1	1900	12	3	29		73	18	<0.1	2000	15	1700					19	400		88.9	87.8	0.6
1181	WR-E-63.8	27	63.9	33	-3.9		2010/1/18	2300	67	42	30		0.04	5.8	24		0.74	<0.01	1	2	0.18		<0.1	<0.1	2400	14	2	37		76	28	<0.1	2000	8.2	1800					19	410		111.3	102.0	4.4
1182	WR-E-63.8	27	63.9	33	-3.9		2010/2/16	1510	61.4	47.7	28.4		0.03		19.6	53.9	0.56				0.014		<0.05	<0.05	2080	13		49	<0.05		21.3								18.4	385	0.3	71.9	92.1	-12.3
1183	WR-E-63.8	27	63.9	33	-3.9		2010/7/27	1500	58	39	22		0.03	5	26		0.56		2		3.1		0.005	0.2	1600	11	2.3	80		47	13	<0.1	1700	4.8	1400					19	360		73.8	74.8	-0.7
1184	WR-E-63.8	27	63.9	33	-3.9		2010/10/27	1800	64	47	28		0.03	6	25		0.64		2.2		4.3		0.01	0.1	1900	14	3.4	30		68	2.6	<0.1	1900	6.6	1800					22	400		89.3	85.6	2.1
1185	WR-E-63.8	27	63.9	33	-3.9		2011/1/24	1800	63	47	28		0.03	6	24		0.61		1.4		1.2		0.01	0.09	1900	14	3.2	39		64	3.2	<0.1	2100	8.3	1800					20	420		89.0	89.1	-0.1
1186	WR-E-63.8	27	63.9	33	-3.9		2010/12/22	1800	62	49	29		0.03	6.1	23		0.65		1.6		2.5		0.005	0.1	2000	14	4.1	34		69	2.7	<0.1	1900	4.2	1700					21	410		89.4	88.4	0.6
1187	WR-E-63.8	27	63.9	33	-3.9		2011/2/1	1900	65	48	30		0.03	6.3	23		0.62		1.6		1.4		0.04	0.09	2100	15	3.6	62		67	1.7	<0.1	2000	5.5	1800					21	410		93.8	93.4	0.2
1188	WR-E-100.0	63.9	100	-3.9	-40		2008/6/10	2700	100	51	36		0.03	7	58		0.92	<0.01	0.8	<0.01	0.03		<0.01	0.09	2800	20	5.9	95		43	58	<0.1	2300	16	2100					27	470		128.9	120.1	3.5
1189	WR-E-100.0	63.9	100	-3.9	-40		2008/11/12	2900	100	55	40		0.02	7.6	56		1	<0.01	1	<0.01	0.06		0.01	0.05	3000	23	4.9	1.5		130	34	<0.1	3000	14	2500					28	610		143.0	135.2	2.8
1190	WR-E-100.0	63.9	100	-3.9	-40		2009/7/27	2500	94	49	35		0.03	8.7	23		0.85	<0.01	0.8	<0.01	0.05		<0.1	<0.1	2800	22	4	26		94	10	<0.1	2400	16	2000					24	480		122.9	119.7	1.3
1191	WR-E-100.0	63.9	100	-3.9	-40		2009/11/25	3100	100	45	38		0.02	8.8	25		0.97	<0.01	0.7	<0.01	0.09		<0.1	<0.1	3400	20	5	20		110	15	<0.1	2500	16	2500					24	500		150.1	138.2	4.1
1192	WR-E-100.0	63.9	100	-3.9	-40		2010/1/18	3000	97	51	43		<0.01	9	25		0.82	<0.01	0.6	<0.01	0.02		<0.1	<0.1	3400	22	7	12		120	15	<0.1	2900	14	2600					25	580		147.0	144.6	0.8
1193	WR-E-100.0	63.9	100	-3.9	-40		2010/2/16	2620	99.5	59.9	44		0.014		20.1	89.9	0.7				0.04		<0.05	<0.05	3070	23.5		17.2	<0.05		14								26	587	0.43	123.1	136.3	-5.1
1194	WR-E-100.0	63.9	100	-3.9	-40		2010/7/27	3000	120	53	40		0.02	9.4	26		0.87		1.3		0.69		0.008	0.2	3200	24	7	99		94	10	<0.1	3000	14	2500					31	600		146.0	141.9	1.4
1195	WR-E-100.0	63.9	100	-3.9	-40		2010/10/27	3000	110	61	43		0.03	9.6	25		0.92		1.3		1.3		0.37	0.07	3200	25	6.6	5.2		120	8.1	<0.1	2900	14	2600					30	590		147.9	138.8	3.2
1196	WR-E-100.0	63.9	100	-3.9	-40		2010/11/24	2900	100	62	44		0.02	9.5	25		0.91		1.2		0.41		0.004	0.06	3300	25	7.1	3		120	7	<0.1	3200	15	2600					29	640		143.4	146.5	-1.1
1197	WR-E-100.0	63.9	100	-3.9	-40		2010/12/22	3000	100	63	45		0.02	9.6	23		0.92		1.2		0.65		0.02	0.08	3500	25	7.3	7		120	6.5	<0.1	2900	12	2700					30	590		147.9	147.1	0.3
1198	WR-E-132.0	100	132	-40	-72		2008/11/12	3100	110	50	40		0.02	7	58		1	<0.01	0.9	<0.01	0.06		<0.01	0.05	3300	24	7.2	38		81	16	<0.1	2800	9.5	2300					30	570		148.9	140.4	2.9
1199	WR-E-132.0	100	132	-40	-72		2009/7/27	2800	120	41	36		0.03	9.9	23		0.81	<0.01	0.7	<0.01	0.07		<0.1	<0.1	3100	24	6	53		87	15	<0.1	2500	18	2300					27	510		136.1	130.4	2.1
1200	WR-E-132.0	100	132	-40	-72		2009/11/25	3200	100	49	40		0.03	8.9	26		1	<0.01	0.7	<0.01	0.08		<0.1	<0.1	3300	19	5	9.7		120	8.3	<0.1	2900	19	2600					24	580		155.4	141.7	4.6
1201	WR-E-132.0	100	132	-40	-72		2010/1/18	3000	93	57	42		0.01	8.5	25		0.93	<0.01	0.7	<0.01	0.06		<0.1	<0.1	3200	20	6	0.9		130	8.1	<0.1	3000	10	2600					24	610		147.6	140.1	2.6
1202	WR-E-132.0	100	132	-40	-72		2010/2/16	2330	95.2	61.4	40.4		0.017		20.3	86.9	0.73				0.04		<0.05	<0.05	2970	21.6		0.59	<0.05		7.18								22.8	596	0.19	110.1	133.8	-9.7
1203	WR-E-132.0	100	132	-40	-72		2010/7/27	2800	100	54	40		0.02	8.9	25		0.88		1.4		1		0.03	0.1	2900	21	5.5	23		110	7.7	<0.1	2900	10	2500					28	600		137.7	130.4	2.7
1204	WR-E-132.0	100	132	-40	-72		2010/10/27	3000	110	61	44		0.01	9.6	25		0.91		1.3		0.5		0.02	0.08	3300	25	6.7	6.6		120	8.1	<0.1	2900	13	2600					29	590		148.0	141.6	2.2
1205	WR-E-132.0	100	132	-40	-72		2010/11/24	2800	91	57	39		0.02	8.5	24		0.79		1.1		0.14		0.005	0.08	3000	21	6.7	12		100	9.9	<0.1	2900	10	2500					27	600		128.2	130.3	-0.8
1206	WR-E-132.0	100	132	-40	-72		2010/12/22	2900	94	65	43		0.02	9.1	23		0.9		1.1		0.27		0.04	0.09	3200	23	7.3	7.3		120	6.8	<0.1	2800	7.8	2600					29	590		143.3	136.9	2.3
1207	WR-E-132.0	100	132	-40	-72		2011/2/1	2900	96	64	44		0.02	9.3	22		0.84		1.2		0.64		0.0098	0.08	3400	23	7.3	10		120	7.7	<0.1	2900	9.8	2600					28	590		143.4	144.3	-0.3
1208	WR-E-168.0	132	168	-72	-108		2009/11/25	2900	100	20	26		0.01	7.7	25		0.62	<0.01	0.6	<0.01	0.1		<0.1	<0.1	2800	18	3	1.4		98	88	<0.1	2800	30	2300					29	580		138.3	127.9	3.9
1209	WR-E-168.0	132	168	-72	-108		2009/12/22	2800	96	25	27		0.02	8.3	24		0.66	<0.01	0.5	<0.01	0.1		<0.1	<0.1	2800	17	3	0.9		98	75	<0.1	2700	30	2400		8			29	540		134.3	126.0	3.2
1210	WR-E-168.0	132	168	-72	-108		2010/1/12	2600	85	25	27		0.02	8.6	23		0.67	<0.01	0.5	<0.01	0.14		<0.1	<0.1	2800	17	4	0.6		96	70	<0.1	2700	15	2400					28	550		125.3	125.4	0.0
1211	WR-E-168.0	132	168	-72	-108		2010/1/18	2900	92	24	28		0.02	7.5	24		0.62	<0.01	0.6	<0.01	0.12		<0.1	0.1	3000	18	4	0.9		99	65	<0.1	2600	28	2400		4			27	530		138.5	129.7	3.3
1212	WR-E-168.0	132	168	-72	-108		2010/1/26	2300	71	25	24		0.02	6.4	21		0.56	<0.01	0.4	<0.01	0.07		<0.1	0.1	2400	15	3	2.5		88	65	<0.1	2000	16	2000					23	410		110.9	102.5	3.9
1213	WR-E-168.0	132	168	-72	-108		2010/2/22	2800	87	31	31		0.02	7.6	23		0.67	<0.01	0.6	<0.01	0.07		<0.1	<0.1	3000	18	4	0.6		100	58	<0.1	2700	19	2500					30	540		134.7	130.9	1.4
1214	WR-E-168.0	132	168	-72	-108		2010/2/9	2700	82	31	30		0.02	7.5	23		0.66	<0.01	0.6	<0.01	0.1		<0.1	<0.1	2800	18	4	0.6		100	55	<0.1	2700	16	2400					28	540		130.2	125.1	2.0
1215	WR-E-168.0	132	168	-72	-108		2010/2/16	2210	90.7	32.4	28.5		0.01		18.5	79.7	0.45				0.06		<0.05	<0.05	2850	18.5		1.56	75.8		54.4		2652	39					26	533	1.8	102.4	172.6	-25.5
1216	WR-E-168.0	132	168	-72	-108		2010/2/22	2240	93.6	32.7	29.2		0.009		19.5	80.1	0.46				0.05		<0.05	<0.05	2880	18.7		1.81	37.8		57.3		2644	71					26	537	1.99	103.8	174.1	-25.3
1217	WR-E-168.0	132	168	-72	-108		2010/3/2	2200	89.4	32.5	28.4		0.01		18.7	81.4	0.43				0.04		<0.05	<0.05	2680	19.5		41.9	<0.05		56.3		2682	39					25.5	539	2.02	101.9	167.9	-24.5
1218	WR-E-168.0	132	168	-72	-108		2010/10/27	2800	99	37	33		0.01	8.4	25		0.6		1.2		0.25		0.02	0.1	2800	21	6.4	34		87	16	<0.1	2700	24	2500					34	550		134.9	125.1	3.7
1219	WR-E-168.0	132	168	-72	-108		2010/11/24	2800	96	35	33		0.01	8.3	25		0.59		1.2		0.23		0.03	0.08	3000	21	6.1	51		80	19	<0.1	3000	26	2500					32	610		134.3	136.1	-0.7
1220	WR-E-168.0	132	168	-72	-108		2010/12/22	2800	93	35	32		0.01	8.3	23		0.56		1.2		0.58		0.02	0.1	3000	21	5.5	38		88	27	<0.1	2800	19	2500					35	560		134.6	132.5	0.8
1221	WR-E-168.0	132	168	-72	-108		2011/2/1	3000	96	41	36		0.02	8.8	22		0.61		0.9		0.33		0.03	0.1	3300	22	6.3	73		83	22	<0.1	2700	11	2500					33	560		143.8	139.5	1.5
1222	WR-E-202.0	169	202	-109	-142		2009/12/22	2200	88	16	18		0.01	6.5	30		0.47	<0.01	0.8	<0.01	0.11		<0.1	<0.1	1900	12	4	0.6		90	41	<0.1	2800	31	2400		15			29	560		106.1	101.5	2.2
1223	WR-E-202.0	169	202	-109	-142		2010/1/12	2100	74	18	18		0.02	6.7	28		0.5	<0.01	1	<0.01	0.11		<0.1	<0.1	1900	12	3	0.2		68	39	<0.1	2800	19	2400					28	560		100.3	101.1	-0.4
1224	WR-E-202.0	169	202	-109	-142		2010/1/18	2300	76	19	19		0.02	5.9	27		0.47	<0.01	1	<0.01	0.16		0.1	0.1	2000	12	3	<0.5		88	39	<0.1	2700	19	2400					27	550		110.2	102.3	3.7
1225	WR-E-202.0	169	202	-109	-142		2010/1/26	2400	68	24	20		0.01	6	27		0.49	<0.01	1	<0.01	0.11		<0.1	<0.1	2300	12	2	<0.5		88	33	<0.1	2500	18	2400					27	510		114.7	107.3	3.3
1226	WR-E-202.0	169	202	-109	-142		2010/2/2	2500	71	23	21		0.01	5.9	27		0.48	<0.01	1.4	<0.01	0.1		<0.1	<0.1	2200	13	3	<0.5		88	32	<0.1	3000	20	2500					28	600		119.1	112.7	2.8
1227	WR-E-202.0	169	202	-109	-142		2010/2/9	2300	75	23	21		0.01	6.1	28		0.46	<0.01	1	<0.01	0.15		<0.1	<0.1	2100	12	3	<0.5		82	37	<0.1	3000	29	2500					28	610		110.2	110.3	0.0
1228	WR-E-202.0	169	202	-109	-142		2010/2/16	1850	75	27.5	20.1		0.006		22	71.8	0.33				0.07		<0.05	<0.05	2310	12.9		<0.05	<0.05		31.1		2808	35					25.9	565	0.91	85.4	160.3	-30.5
1229	WR-E-202.0	169	202	-109	-142		2010/2/22	1880	76	27	20		0.007		22.6	72	0.34				0.08		<0.05	<0.05	2120	13.5		<0.05	<0.05		31.4		2731	40					27.2	549	0.89	86.7	152.5	-27.5
1230	WR-E-202.0	169	202	-109	-142		2010/3/2	1940	79.8	27.5	20.5		0.03		21.6	71.6	0.32				0.1		<0.05	<0.05	1920	13.4		<0.05	<0.05		30.6		2768	35					26.4	557	1.08	89.5	147.9	-24.6
1231	WR-E-202.0	169	202	-109	-142		2010/7/27	2400	96	24	22		0.0078	7.1	28		0.42		1.4		0.24		<0.01	0.2	2300	16	4	200		21	26	<0.1	2500	31	2100		49			33	500		112.0	110.9	0.5
1232	WR-E-202.0	169	202	-109	-142		2010/10/27	2200	80	24	19		0.004	6.5	29		0		2		0.34		0.07	0.2	2100	14	3.1	22		80	8.8	<0.1	2800	35	2500		30			33	570		105.9	107.0	-0.6
1233	WR-E-202.0	169	202	-109	-142		2010/11/24	2200	76	24	19		0.007	6.4	28		0		2		0.23		0.03	0.099	2000	14	3.5	20		76	8.6	<0.1	3000	38	2500		40			32	610		105.5	107.6	-1.0
1234	WR-E-202.0	169	202	-109	-142		2010/12/22	2200	72	25	20		0.01	6.4	26		0		2		0.7		0.08	0.2	2000	14	3.1	16		78	8.8	<0.1	2800	29	2500					33	560		105.7	103.9	0.8
1235	WR-E-202.0	169	202	-109	-142		2011/2/1	2300	72	25	20		0.00665	6.4	25		0		1		0.15		0.006	0.1	2100	14	2.9	28		77	9.2	<0.1	2800	24	2500					33	570		109.9	106.7	1.5
1236	WR-E-239.0	202	239	-142	-179		2010/5/18	1700	66	19	14		0.01	4.8	23		0		1		0.15		0.19	0.2	1400	10	1.3	180		<0.2	230	<0.1	2000	8.1	1600					29	410		78.4	80.3	-1.2
1237	WR-E-239.0	202	239	-142	-179		2010/8/1	1800	65	21	15		0.02	4.7	24		0		1		0.35		0.92	0.2	1500	9.5	1.1	7		<0.2	280	<0.1	1900	4.0	1600					30	390		83.0	79.6	2.1
1238	WR-E-239.0	202	239	-142	-179		2010/6/23	1900	76	19	14		0.02	4.6	26		0		2		0.71		0.41	0.3	1500	9.7	1.7	0.3		35	190	<0.1	2200	4.8	2000					31	470		89.3	82.6	3.9
1239	WR-E-239.0	202	239	-142	-179		2010/7/7	1900	68	21	15		0.02	4.7	25		0		1		0.39		0.03	0.3	1600	9.7	1.3	0.8		38	180	<0.1	2200	6.1	1900					31	460		89.4	85.2	2.4
1240	WR-E-239.0	202	239	-142	-179		2010/7/21	2000	72	20	15		0.02	4.8	24		0		1		0.33		0.01	0.3	1700	10	1.3	1.2		56	130	<0.1	2400	9.6	2000					30	490		94.8	90.4	2.4

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (63/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	analyzing of T-Fe, Fe^{2+}, HS^- at site	Gases																						Isotopes												
		Min.	Max.	Min.	Max.				Gas/Water during pumping test	N_2	N_2	O_2	O_2	Ar	CO_2	CO_2	CH_4	CH_4	C_2H_6	C_2H_6	C_3H_8	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	C_5H_{12}	He	^{4}He	Ne	CO	H_2S	H_2	^{3}H	δD	$\delta^{18}O$	$\delta^{13}C$ (CH_4)	$\delta^{13}C$ (CO_2)	$\delta^{13}C$ (TIC)	$^{14}C/^{12}C$	^{35}Cl	^{36}Cl	$^3He/^4He$	$^{40}Ar/^{36}Ar$	$\delta^{34}S$ (SO_4^{2-})	$^{87}Sr/^{86}Sr$
		[m]	[m]	[m]	[m]				[L/L]	[mmol/Kg]	[%]	[ml/l]	[%]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[mmol/Kg]	[%]	[%]	[%]	[%]	[%]	[cc_{STP}/g_w]	[cc_{STP}/g_w]	[%]	[%]	[mol/Kg]	[T.U]	[‰]	[‰]	[‰]	[‰]	[‰]	[pMC]	[‰]	[x 10^{-15}]			[‰]	[‰]
1177	WR-E-63.8	27	63.9	33	-3.9		2008/6/10	×																								0.2±0.1	-70.3	-7.3										
1178	WR-E-63.8	27	63.9	33	-3.9		2008/11/12	×																								<0.2	-60.6	-7.6										
1179	WR-E-63.8	27	63.9	33	-3.9		2009/2/10	×																																			
1180	WR-E-63.8	27	63.9	33	-3.9		2009/12/22	×																																			
1181	WR-E-63.8	27	63.9	33	-3.9		2010/1/18	×																								≦0.24	-58.5	-6.8										
1182	WR-E-63.8	27	63.9	33	-3.9		2010/2/16	×																																			
1183	WR-E-63.8	27	63.9	33	-3.9		2010/7/27	×																								0.7±0.1	-60	-7.4										
1184	WR-E-63.8	27	63.9	33	-3.9		2010/10/27	×																									-60	-6.7										
1185	WR-E-63.8	27	63.9	33	-3.9		2010/11/24	×																																			
1186	WR-E-63.8	27	63.9	33	-3.9		2010/12/22	×																									-55	-6.3										
1187	WR-E-63.8	27	63.9	33	-3.9		2011/2/1	×																									-54	-5.9										
1188	WR-E-100.0	63.9	100	-3.9	-40		2008/6/10	×																								0.4±0.1	-55.7	-3.1										
1189	WR-E-100.0	63.9	100	-3.9	-40		2008/11/12	×																								<0.2	-49.1	-2.5										
1190	WR-E-100.0	63.9	100	-3.9	-40		2009/7/27	×																																			
1191	WR-E-100.0	63.9	100	-3.9	-40		2009/11/25	×																																			
1192	WR-E-100.0	63.9	100	-3.9	-40		2010/1/18	×																								≦0.24	-49.1	-3.4										
1193	WR-E-100.0	63.9	100	-3.9	-40		2010/2/16	×																																			
1194	WR-E-100.0	63.9	100	-3.9	-40		2010/7/27	×																								0.7±0.1	-48	-3.1										
1195	WR-E-100.0	63.9	100	-3.9	-40		2010/10/27	×																									-49	-2.5										
1196	WR-E-100.0	63.9	100	-3.9	-40		2010/11/24	×																																			
1197	WR-E-100.0	63.9	100	-3.9	-40		2010/12/22	×																									-44	-2.3										
1198	WR-E-132.0	100	132	-40	-72		2008/11/12	×																								<0.2	-48.4	-1.3										
1199	WR-E-132.0	100	132	-40	-72		2009/7/27	×																																			
1200	WR-E-132.0	100	132	-40	-72		2009/11/25	×																																			
1201	WR-E-132.0	100	132	-40	-72		2010/1/18	×																								≦0.24	-52.9	-4.1										
1202	WR-E-132.0	100	132	-40	-72		2010/2/16	×																																			
1203	WR-E-132.0	100	132	-40	-72		2010/7/27	×																								0.3±0.1	-50	-3.5										
1204	WR-E-132.0	100	132	-40	-72		2010/10/27	×																									-47	-2.5										
1205	WR-E-132.0	100	132	-40	-72		2010/11/24	×																																			
1206	WR-E-132.0	100	132	-40	-72		2010/12/22	×																									-45	-3										
1207	WR-E-132.0	100	132	-40	-72		2011/2/1	×																									-47	-2.9										
1208	WR-E-168.0	132	168	-72	-108		2009/11/25	×																																			
1209	WR-E-168.0	132	168	-72	-108		2009/12/22	×																																			
1210	WR-E-168.0	132	168	-72	-108		2010/1/12	×																								≦0.23	-48.7	-3.7										
1211	WR-E-168.0	132	168	-72	-108		2010/1/18	×																								≦0.24	-49.9	-3.6										
1212	WR-E-168.0	132	168	-72	-108		2010/1/26	×																								≦0.23	-53.6	-4.6										
1213	WR-E-168.0	132	168	-72	-108		2010/2/2	×																								≦0.22	-50.9	-3.7										
1214	WR-E-168.0	132	168	-72	-108		2010/2/9	×																																			
1215	WR-E-168.0	132	168	-72	-108		2010/2/16	×																																			
1216	WR-E-168.0	132	168	-72	-108		2010/2/22	×																																			
1217	WR-E-168.0	132	168	-72	-108		2010/3/2	×																																			
1218	WR-E-168.0	132	168	-72	-108		2010/10/27	×																								< 0.3	-47	-2.2										
1219	WR-E-168.0	132	168	-72	-108		2010/11/24	×																																			
1220	WR-E-168.0	132	168	-72	-108		2010/12/22	×																									-44	-2.3										
1221	WR-E-168.0	132	168	-72	-108		2011/2/1	×																									-44	-1.8										
1222	WR-E-202.0	169	202	-109	-142		2009/12/22	×																																			
1223	WR-E-202.0	169	202	-109	-142		2010/1/12	×																								≦0.23	-53.9	-4.9										
1224	WR-E-202.0	169	202	-109	-142		2010/1/18	×																								≦0.24	-55.7	-4.9										
1225	WR-E-202.0	169	202	-109	-142		2010/1/26	×																								≦0.23	-54.8	-4.9										
1226	WR-E-202.0	169	202	-109	-142		2010/2/2	×																								≦0.22	-55.7	-4.9										
1227	WR-E-202.0	169	202	-109	-142		2010/2/9	×																																			
1228	WR-E-202.0	169	202	-109	-142		2010/2/16	×																																			
1229	WR-E-202.0	169	202	-109	-142		2010/2/22	×																																			
1230	WR-E-202.0	169	202	-109	-142		2010/3/2	×																																			
1231	WR-E-202.0	169	202	-109	-142		2010/7/27	×																								0.9±0.1	-53	-4.1										
1232	WR-E-202.0	169	202	-109	-142		2010/10/27	×																									-57	-5.2										
1233	WR-E-202.0	169	202	-109	-142		2010/11/24	×																																			
1234	WR-E-202.0	169	202	-109	-142		2010/12/22	×																									-51	-3.9										
1235	WR-E-202.0	169	202	-109	-142		2011/2/1	×																									-51	-3.8										
1236	WR-E-239.0	202	239	-142	-179		2010/5/18	×																								< 0.3	-53	-5.1										
1237	WR-E-239.0	202	239	-142	-179		2010/6/1	×																																			
1238	WR-E-239.0	202	239	-142	-179		2010/6/23	×																																			
1239	WR-E-239.0	202	239	-142	-179		2010/7/7	×																																			
1240	WR-E-239.0	202	239	-142	-179		2010/7/21	×																																			

Table 3.1 Chemical and isotopic composition and microbial abundance of groundwater (64/64)

Index	Sample point	sampling zone (GL)		sampling zone (EL)		sampling zone No.	sampling date	Organics				Microbiology																				
		Min.	Max.	Min.	Max.			Humic acid	Fuluvic acid	Acetate	Formate	Total cell number	Aerobic heterotrophs	Anaerobic heterotrophs (nutrient agar/B2A)	Anaerobic heterotrophs (GAM)	Ammonia-oxidizer	Nitrifying bacteria	Iron-oxidizer	Sulfur-oxidizer (silverman 9k)	Sulfur-oxidizer (starkey)	Nitrate-reducer (PYN)	Nitrate-reducer (Giltay)	Denitrifying bacteria (PYN)	Denitrifying bacteria (Giltay)	Mn-reducer	Iron-reducer	Sulfate-reducer (A)	Sulfate-reducer (E)	Sulfate-reducer (F)	Methanogen (H_2)	Methanogen (acetate)	Methanogen (formate)	Methanogen (methanol)
		[m]	[m]	[m]	[m]			[mg/l]	[mg/l]	[mg/l]	[mg/l]	[cells/ml]	[CFU/ml]	[CFU/ml]	[CFU/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]	[cells/ml]
1177	WR-E-63.8	27	63.9	33	-3.9		2008/6/10																									
1178	WR-E-63.8	27	63.9	33	-3.9		2008/11/12																									
1179	WR-E-63.8	27	63.9	33	-3.9		2009/2/10																									
1180	WR-E-63.8	27	63.9	33	-3.9		2009/12/22																									
1181	WR-E-63.8	27	63.9	33	-3.9		2010/1/18																									
1182	WR-E-63.8	27	63.9	33	-3.9		2010/2/16																									
1183	WR-E-63.8	27	63.9	33	-3.9		2010/7/27																									
1184	WR-E-63.8	27	63.9	33	-3.9		2010/10/27																									
1185	WR-E-63.8	27	63.9	33	-3.9		2010/11/24																									
1186	WR-E-63.8	27	63.9	33	-3.9		2010/12/22																									
1187	WR-E-63.8	27	63.9	33	-3.9		2011/2/1																									
1188	WR-E-100.0	63.9	100	-3.9	-40		2008/6/10																									
1189	WR-E-100.0	63.9	100	-3.9	-40		2008/11/12																									
1190	WR-E-100.0	63.9	100	-3.9	-40		2009/7/27																									
1191	WR-E-100.0	63.9	100	-3.9	-40		2009/11/25																									
1192	WR-E-100.0	63.9	100	-3.9	-40		2010/1/18																									
1193	WR-E-100.0	63.9	100	-3.9	-40		2010/2/16																									
1194	WR-E-100.0	63.9	100	-3.9	-40		2010/7/27																									
1195	WR-E-100.0	63.9	100	-3.9	-40		2010/10/27																									
1196	WR-E-100.0	63.9	100	-3.9	-40		2010/11/24																									
1197	WR-E-100.0	63.9	100	-3.9	-40		2010/12/22																									
1198	WR-E-132.0	100	132	-40	-72		2008/11/12																									
1199	WR-E-132.0	100	132	-40	-72		2009/7/27																									
1200	WR-E-132.0	100	132	-40	-72		2009/11/25																									
1201	WR-E-132.0	100	132	-40	-72		2010/1/18																									
1202	WR-E-132.0	100	132	-40	-72		2010/2/16																									
1203	WR-E-132.0	100	132	-40	-72		2010/7/27																									
1204	WR-E-132.0	100	132	-40	-72		2010/10/27																									
1205	WR-E-132.0	100	132	-40	-72		2010/11/24																									
1206	WR-E-132.0	100	132	-40	-72		2010/12/22																									
1207	WR-E-132.0	100	132	-40	-72		2011/2/1																									
1208	WR-E-168.0	132	168	-72	-108		2009/11/25																									
1209	WR-E-168.0	132	168	-72	-108		2009/12/22																									
1210	WR-E-168.0	132	168	-72	-108		2010/1/12																									
1211	WR-E-168.0	132	168	-72	-108		2010/1/18																									
1212	WR-E-168.0	132	168	-72	-108		2010/1/26																									
1213	WR-E-168.0	132	168	-72	-108		2010/2/2																									
1214	WR-E-168.0	132	168	-72	-108		2010/2/9																									
1215	WR-E-168.0	132	168	-72	-108		2010/2/16																									
1216	WR-E-168.0	132	168	-72	-108		2010/2/22																									
1217	WR-E-168.0	132	168	-72	-108		2010/3/2																									
1218	WR-E-168.0	132	168	-72	-108		2010/10/27																									
1219	WR-E-168.0	132	168	-72	-108		2010/11/24																									
1220	WR-E-168.0	132	168	-72	-108		2010/12/22																									
1221	WR-E-168.0	132	168	-72	-108		2011/2/1																									
1222	WR-E-202.0	169	202	-109	-142		2009/12/22																									
1223	WR-E-202.0	169	202	-109	-142		2010/1/12																									
1224	WR-E-202.0	169	202	-109	-142		2010/1/18																									
1225	WR-E-202.0	169	202	-109	-142		2010/1/26																									
1226	WR-E-202.0	169	202	-109	-142		2010/2/2																									
1227	WR-E-202.0	169	202	-109	-142		2010/2/9																									
1228	WR-E-202.0	169	202	-109	-142		2010/2/16																									
1229	WR-E-202.0	169	202	-109	-142		2010/2/22																									
1230	WR-E-202.0	169	202	-109	-142		2010/3/2																									
1231	WR-E-202.0	169	202	-109	-142		2010/7/27																									
1232	WR-E-202.0	169	202	-109	-142		2010/10/27																									
1233	WR-E-202.0	169	202	-109	-142		2010/11/24																									
1234	WR-E-202.0	169	202	-109	-142		2010/12/22																									
1235	WR-E-202.0	169	202	-109	-142		2011/2/1																									
1236	WR-E-239.0	202	239	-142	-179		2010/5/18																									
1237	WR-E-239.0	202	239	-142	-179		2010/6/1																									
1238	WR-E-239.0	202	239	-142	-179		2010/6/23																									
1239	WR-E-239.0	202	239	-142	-179		2010/7/7																									
1240	WR-E-239.0	202	239	-142	-179		2010/7/21																									

Table 3.2 Chemical and isotopic composition of river and precipitation

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Table 3.2 Chemical and isotopic composition of river, precipitation, spring and groundwater of shallow boreholes (1/14)

Index	Sampling point		Sampling date	Analyzing date	Physico-chemical parameter					Geochemistry																			
					EC at site	EC at lab	pH at site	pH at lab	Temperature at site	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T.Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-
					[mS/m]	[mS/m]			[℃]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
1	River	P-1	2003/7/28	2003/9/29-10/10	14.58	14	7.45	7.3	16.8	19	2.6	1.9	3		N.D.	0.03	21		0.03	N.D.	0.09	N.D.	0.81		0.01	N.D.	20	N.D.	N.D.
2	River	P-1	2003/8/19	2003/9/29-10/10	12.57	12	7.09	7.2	18	17	2.5	1.6	2.4		N.D.	0.02	21		0.02	N.D.	0.11	N.D.	0.83		0.03	N.D.	18	N.D.	N.D.
3	River	P-1	2003/9/19	2003/9/29-10/10	11.05	11	6.95	7.2	11.9	14	2.1	1.6	3.4		N.D.	0.02	20		0.02	N.D.	0.08	N.D.	0.71		0.05	N.D.	15	N.D.	N.D.
4	River	P-1	2003/10/20	2003/10/21-11/7	10.19	9.9	6.57	6.7	7.4	12	1.8	2	1.9		N.D.	0.02	19		0.02	N.D.	0.05	0.01	0.49		0.07	N.D.	16	0.1	N.D.
5	River	P-1	2003/11/20	2003/11/26-12/10	11.81	11	8.45	6.8	1.2	16	1.9	1.8	2.9		N.D.	0.03	19		0.03	N.D.	0.03	0.01	0.3		N.D.	N.D.	17	0.1	N.D.
6	River	P-1	2003/12/22	2003/12/26-2004/1/19	13.02	12	6.94	6.7	0	21	N.D.	1.9	1.4		N.D.	0.03	19		0.02	N.D.	N.D.	N.D.	0.18		N.D.	N.D.	20	0.1	N.D.
7	River	P-1	2004/1/20	2004/1/20-2/12	16.5	17	6.66	7	0	32	3.6	2.4	3.4		N.D.	0.05	21		0.03	N.D.	0.05	0.02	0.34		N.D.	N.D.	38	0.2	N.D.
8	River	P-1	2004/2/19	2004/2/23-3/4	15.62	14.3	6.72	6.9	0	19	2.1	1.7	3.6		N.D.	0.03	19		0.03	N.D.	0.05	0.01	0.27		N.D.	N.D.	23	0.2	N.D.
9	River	P-1	2004/3/19	2004/7/28-8/24	10.81	11	5.84	6.3	0.1	12	1.8	2.3	2.1		N.D.	N.D.	22		0.02	N.D.	N.D.	N.D.	0.05		0.04	N.D.	21	N.D.	N.D.
10	River	P-1	2004/4/22	2004/7/28-8/24	7.04	6.9	6.49	6.4	4.1	8.8	1.2	1.4	1.2		N.D.	N.D.	37		0.01	N.D.	N.D.	N.D.	0.02		0.02	N.D.	14	N.D.	N.D.
11	River	P-1	2004/5/20	2004/7/28-8/24	8.7	8.4	6.83	6.8	11	11	1.5	1.8	1.7		N.D.	0.01	38		0.01	N.D.	N.D.	N.D.	0.08		0.02	0.01	15	N.D.	N.D.
12	River	P-1	2004/6/22	2004/7/28-8/24	10.42	10	6.67	7	14.6	13	2.3	2.4	2.3		N.D.	0.01	46		0.02	N.D.	N.D.	N.D.	0.31		0.02	0.02	16	N.D.	N.D.
13	River	P-1	2004/7/20	2004/7/28-8/24	10.87	10	7.37	7.3	15.8	14	2.3	2.5	2.3		N.D.	0.02	43		0.03	N.D.	N.D.	N.D.	0.44		0.03	0.02	17	N.D.	N.D.
14	River	P-1	2004/7/26	2004/7/29-8/24	16.8	11	7.13	7	16.8																				
15	River	P-1	2004/8/20	2004/8/26-9/3	10.16	9.6	7.49	7.2	14.6	14	2.1	1.8	1.5		N.D.	0.02	46		0.02	N.D.	N.D.	N.D.	0.26		0.02	0.02	17	N.D.	N.D.
16	River	P-1	2004/9/14	2004/9/25-10/6	6.79	6.9	6.22	6.6	12	8.2	1.5	1.4	1.4		N.D.	N.D.	22		0.01	N.D.	N.D.	N.D.	0.2		0.08	0.02	13	N.D.	N.D.
17	River	P-1	2004/9/17	2004/9/25-10/6	7.82	7.8	7.74	6.8	10.1	10	1.5	1.4	1.2		N.D.	N.D.	44		0.02	N.D.	N.D.	N.D.	0.11		0.02	0.01	14	N.D.	N.D.
18	River	P-1	2004/10/13	2004/10/21-11/4	10.51	10	7.19	7.3	11.2	12	2.4	2.4	2.2		N.D.	0.01	41		0.02	N.D.	N.D.	N.D.	0.29		0.02	0.02	17	N.D.	N.D.
19	River	P-1	2004/10/14	2004/10/21-11/4	10.91	11	7.83	7.2	9.2	13	2.2	2.3	2.1		N.D.	0.02	41		0.02	N.D.	N.D.	N.D.	0.31		0.03	0.02	19	0.1	N.D.
20	River	P-1	2004/11/9	2004/11/18-11/26	8.97	8.7	8.04	6.6	6.3																				
21	River	P-1	2004/11/12	2004/11/18-12/1	7.52	7.3	7.66	6.5	7.5																				
22	River	P-1	2004/11/19	2004/11/30-12/10	9.01	9.4	7.34	6.9	4.5	11	1.6	1.7	1.5		N.D.	N.D.	42		0.02	N.D.	N.D.	N.D.	0.13		0.02	0.01	15	N.D.	N.D.
23	River	P-1	2004/12/7	2004/12/10-12/16		9.7		6.6																					
24	River	P-1	2004/12/22	2004/12/27-2005/1/13	10.84	10	6.87	7	0	13	1.7	2.1	1.9		N.D.	0.01	45		0.02	N.D.	N.D.	N.D.	0.1		0.02	N.D.	17	N.D.	0.01
25	River	P-1	2005/1/20	2005/1/26-1/29	13.48	13	7.42	7.2	0	16	1.9	2.7	2.8		N.D.	0.02	39		0.02	N.D.	N.D.	N.D.	0.1		0.01	0.01	21	0.1	0.02
26	River	P-1	2005/2/18	2005/2/22-3/5		21		7.2		18	2.1	2.8	3		N.D.	0.02	39		0.02	N.D.	N.D.	N.D.	0.14		0.01	0.02	22	0.1	0.02
27	River	P-1	2005/3/18	2005/7/23-8/19	13.03	12	6.5	6.7	5.5	15	2	2.4	2.6		N.D.	0.01	27		0.02	N.D.	N.D.	N.D.	0.05		0.02	0.02	23	N.D.	N.D.
28	River	P-2	2003/7/28	2003/9/29-10/10	13.17	13	7.26	7.1	17.8	19	2.6	1.7	1.8		N.D.	0.02	17		0.03	N.D.	0.05	N.D.	0.19		N.D.	N.D.	19	N.D.	N.D.
29	River	P-2	2003/8/19	2003/9/29-10/10	11.87	12	6.81	7.1	19.1	15	2.5	2	1.8		N.D.	0.02	17		0.03	N.D.	0.06	N.D.	0.35		N.D.	N.D.	16	N.D.	N.D.
30	River	P-2	2003/9/19	2003/9/29-10/10	12.16	12	7.2	7.2	12.5	15	2.3	2.3	2		N.D.	0.01	17		0.03	N.D.	0.06	N.D.	0.52		0.03	N.D.	15	N.D.	N.D.
31	River	P-2	2003/10/20	2003/10/21-11/7	11.1	11	6.98	6.9	7.8	12	1.8	3	2		0.02	0.02	17		0.03	N.D.	N.D.	0.02	0.51		0.07	N.D.	15	0.1	N.D.
32	River	P-2	2003/11/20	2003/11/26-12/10	11.68	11	6.89	6.9	1.8	14	1.7	2.3	2		N.D.	0.02	17		0.03	N.D.	0.01	0.01	0.31		N.D.	N.D.	15	N.D.	N.D.
33	River	P-2	2003/12/22	2003/12/26-2004/1/19	13.18	12	7.07	6.7	-0.1	19	0.6	2.8	1.1		N.D.	0.02	16		0.03	N.D.	N.D.	0.01	0.12		N.D.	N.D.	18	0.1	N.D.
34	River	P-2	2004/1/20	2004/1/20-2/12	12.8	14	6.94	6.8	0	23	3.6	1.5	2.7		N.D.	0.03	17		0.03	N.D.	N.D.	0.02	0.18		N.D.	N.D.	27	0.2	N.D.
35	River	P-2	2004/2/19	2004/2/23-3/4	15.64	14.4	6.8	6.8	0	18	3.9	4.7	3		N.D.	0.02	16		0.03	N.D.	0.06	0.02	0.18		N.D.	N.D.	21	0.1	N.D.
36	River	P-2	2004/3/19	2004/7/28-8/24	10.81	9.8	5.99	6.5	0	11	2	2.9	1.8		N.D.	N.D.	24		0.02	N.D.	N.D.	N.D.	0.02		0.02	0.01	19	N.D.	N.D.
37	River	P-2	2004/4/22	2004/7/28-8/24	7.61	7.1	9.07	6.5	4.3	9.4	1.2	1.8	1.2		N.D.	N.D.	33		0.01	N.D.	N.D.	N.D.	N.D.		0.02	N.D.	13	N.D.	N.D.
38	River	P-2	2004/5/20	2004/7/28-8/24	9.01	8.6	7.09	6.8	11.8	11	1.7	2.2	1.4		N.D.	N.D.	34		0.02	N.D.	N.D.	N.D.	0.05		0.02	0.02	14	N.D.	N.D.
39	River	P-2	2004/6/22	2004/7/28-8/24	10.59	10	7.4	7	15	13	2.4	2.8	1.8		N.D.	0.01	36		0.02	N.D.	N.D.	N.D.	0.18		0.02	0.04	15	0.1	N.D.
40	River	P-2	2004/7/20	2004/7/28-8/24	10.7	10	7.42	7.2	15.9	14	2.1	2.9	1.9		N.D.	0.01	35		0.02	N.D.	N.D.	N.D.	0.35		0.02	0.04	15	0.1	N.D.
41	River	P-2	2004/7/26	2004/7/29-8/24	10.47	11	6.88	7	16.7																				
42	River	P-2	2004/8/20	2004/8/26-9/3	10.24	9.8	7.31	7.2	14.7	14	2	2.3	1.5		N.D.	0.01	38		0.02	N.D.	N.D.	N.D.	0.24		0.02	0.02	16	N.D.	N.D.
43	River	P-2	2004/9/14	2004/9/25-10/6	7.39	7.6	6.52	6.9	12.1	9.1	1.9	1.8	1.2		N.D.	N.D.	24		0.02	N.D.	N.D.	N.D.	0.15		0.07	0.05	12	N.D.	N.D.
44	River	P-2	2004/9/17	2004/9/25-10/6	8.51	8.6	7.86	6.9	10.7	11	1.6	1.9	1.4		N.D.	N.D.	37		0.02	N.D.	N.D.	N.D.	0.11		0.02	0.02	14	N.D.	N.D.
45	River	P-2	2004/10/13	2004/10/21-11/4	11	11	7.09	7.3	11.8	14	2.7	2.7	1.8		N.D.	0.01	35		0.05	N.D.	N.D.	N.D.	0.25		0.02	0.02	17	N.D.	N.D.
46	River	P-2	2004/10/14	2004/10/21-11/4	10.88	11	7.77	7.2	9.7	14	2.1	2.5	1.6		N.D.	0.01	34		0.02	N.D.	N.D.	N.D.	0.27		0.02	0.02	18	N.D.	N.D.
47	River	P-2	2004/11/9	2004/11/18-11/26	10.17	9.8	7.97	6.8	6.3																				
48	River	P-2	2004/11/12	2004/11/18-11/30	8.5	8.2	7.79	6.6	7.5																				
49	River	P-2	2004/11/19	2004/11/30-12/10	9.84	9.4	7.53	7	4.9	12	1.7	2.6	1.6		N.D.	N.D.	36		0.05	N.D.	N.D.	N.D.	0.11		0.02	0.01	15	N.D.	N.D.
50	River	P-2	2004/12/7	2004/12/10-12/16		9.9		6.7																					
51	River	P-2	2004/12/22	2004/12/27-2005/1/13	11.16	10	6.83	7	0	13	1.8	2.8	1.9		0.02	N.D.	38		0.02	N.D.	N.D.	N.D.	0.11		0.01	N.D.	17	N.D.	N.D.
52	River	P-2	2005/1/20	2005/1/26-1/29	13.44	12	8.08	7	0	15	2	3.4	2.3		0.01	0.01	34		0.02	N.D.	N.D.	N.D.	0.1		0.01	0.02	18	0.1	0.01
53	River	P-2	2005/2/18	2005/2/22-3/5		14		7.2		18	2.6	3.4	2.5		0.01	0.02	33		0.02	N.D.	N.D.	N.D.	0.11		0.01	0.02	21	N.D.	0.02
54	River	P-2	2005/3/18	2005/7/23-8/19	13.56	13	6.43	6.6	5.5	14	2.5	3.7	2.6		N.D.	N.D.	26		0.03	N.D.	N.D.	N.D.	0.03		0.02	0.04	21	N.D.	N.D.
55	River	P-3	2003/7/28	2003/9/29-10/10	16.85	17	7.4	7.2	15.4	19	2.6	5.3	3.9		N.D.	0.02	15		0.05	N.D.	0.07	0.01	0.73		N.D.	N.D.	24	N.D.	N.D.
56	River	P-3	2003/8/19	2003/9/29-10/10	19.07	19	7.04	7.3	17.4	19	2.1	6.6	4.2		N.D.	0.03	16		0.06	N.D.	0.07	0.02	1.1		0.02	N.D.	25	N.D.	N.D.
57	River	P-3	2003/9/19	2003/9/29-10/10	18.58	18	7.17	7.3	12.2	18	3.3	7.3	4.4		N.D.	0.02	17		0.06	N.D.	0.07	0.02	1.2		0.04	N.D.	23	N.D.	N.D.
58	River	P-3	2003/10/20	2003/10/21-11/7	15.76	15	7.09	7	7.7	15	3.6	6.3	3.5		0.03	0.02	17		0.05	N.D.	0.06	0.03	0.8		0.14	N.D.	20	0.1	N.D.
59	River	P-3	2003/11/20	2003/11/26-12/10	16.01	11	7.39	6.9	1	15	2.7	5.6	2.2		N.D.	0.02	17		0.03	N.D.	0.01	0.03	0.63		0.07	N.D.	19	0.1	N.D.
60	River	P-3	2003/12/22	2003/12/26-2004/1/19	21.3	20	6.97	7.1	-0.1	30	0.86	5.8	3		N.D.	0.04	14		0.05	N.D.	N.D.	0.02	0.32		N.D.	N.D.	31	0.2	N.D.
61	River	P-3	2004/1/20	2004/1/20-2/12	21.8	20	7.22	6.9	0	33	4.8	5.4	4.3		N.D.	0.04	17		0.06	N.D.	0.05	0.03	0.69		N.D.	N.D.	45	0.4	N.D.
62	River	P-3	2004/3/19	2004/7/28-8/24	12.78	12	6.9	6.6	0	11	2.9	4.2	2.6		N.D.	N.D.	20		0.03	N.D.	N.D.	N.D.	0.02		0.03	0.01	21	N.D.	N.D.
63	River	P-3	2004/4/22	2004/7/28-8/24	10.45	9.8	7.22	6.6	3	10	1.6	4.1	2		N.D.	N.D.	28		0.03	N.D.	N.D.	N.D.	0.01		0.02	0.01	16	N.D.	N.D.
64	River	P-3	2004/5/20	2004/7/28-8/24	12.04	12	7.18	7	10.6	13	1.8	4	2.4		N.D.	0.01	32		0.03	N.D.	N.D.	N.D.	0.19		0.02	0.02	18	N.D.	N.D.
65	River	P-3	2004/6/22	2004/7/28-8/24	14.84	14	7.14	7.1	14.2	17	2.6	5.2	3.1		N.D.	0.02	34		0.04	N.D.	N.D.	N.D.	0.48		0.02	N.D.	22	N.D.	N.D.
66	River	P-3	2004/7/20	2004/7/28-8/24	16.28	16	7.61	7.4	15.2	18	2.9	6.2	3.6		N.D.	0.02	34		0.05	N.D.	N.D.	N.D.	0.73		0.03	0.01	23	N.D.	N.D.
67	River	P-3	2004/7/26	2004/7/29-8/24	16.3	17	6.78	7.1	12.52																				
68	River	P-3	2004/8/20	2004/8/26-9/3	13.86	14	6.97	7.3	14.8	15	2.6	5.8	3		N.D.	0.02	37		0.04	N.D.	N.D.	N.D.	0.55		0.04	0.03	20	0.1	N.D.
69	River	P-3	2004/9/14	2004/9/25-10/6	8.19	8.3	6.44	6.6	12.8	8.2	2.6	2.7	1.7		0.02	N.D.	18		0.02	N.D.	N.D.	N.D.	0.16		0.1	0.05	13	N.D.	N.D.
70	River	P-3	2004/9/17	2004/9/25-10/6	11.16	11	6.94	7	10.7	12	1.9	4.2	2.3		N.D.	N.D.	36		0.03	N.D.	N.D.	N.D.	0.28		0.03	0.02	17	N.D.	N.D.
71	River	P-3	2004/10/13	2004/10/21-11/4	14.8	16	7.51	7.3	12.1	16	3.2	5.4	3.1		N.D.	0.02	32		0.04	N.D.	N.D.	N.D.	0.57		0.03	0.04	22	0.1	N.D.
72	River	P-3	2004/10/14	2004/10/21-11/4	16.88	16	7.87	7.4	9.1	17	3.9	6.7	3.8		N.D.	0.02	33		0.04	N.D.	N.D.	N.D.	0.61		0.03	0.03	24	0.1	N.D.
73	River	P-3	2004/11/9	2004/11/18-11/26	12.85	12	7.56	6.8	6.4																				
74	River	P-3	2004/11/12	2004/11/18-11/30	9.51	9.2	7.27	6.6	7.7																				
75	River	P-3	2004/11/19	2004/11/30-12/10	14.16	14	7.8	7.1	4.4	13	2.5	5.6	2.8		0.02	0.01	33		0.07	N.D.	N.D.	N.D.	0.2		0.04	0.02	19	0.1	0.01
76	River	P-3	2004/12/7	2004/12/10-12/16		13		6.9																					
77	River	P-3	2004/12/22	2004/12/27-2005/1/13	16.79	16	7.97	7.3	0	17	2.8	6.1	3.5		0.02	0.01	34		0.04	N.D.	N.D.	N.D.	0.26		0.02	0.02	24	0.1	0.02
78	River	P-3	2005/1/20	2005/1/26-1/29	20.2	20	7.34	7.3	0	20	3.7	7.9	4.6		0.02	0.02	32		0.05	N.D.	N.D.	N.D.	0.29		0.04	0.03	27	0.2	0.02
79	River	P-3	2005/2/18	2005/2/22-3/5	21.5	20	8.11	7.1	0	22	4.4	8.1	4.6		0.02	0.03	31		0.04	N.D.	N.D.	N.D.	0.66		0.03	0.03	30	0.2	0.02
80	River	P-3	2005/3/18	2005/7/23-8/19	16.65	16	6.39	6.6	0	17	3	5.1	3.2		N.D.	0.01	23		0.04	N.D.	N.D.	N.D.	0.05		0.02	0.02	27	0.1	N.D.
81	River	P-3	2005/4/19	2005/7/23-8/19	9.74	9.4	8.22	6.7	3.2	9.8	1.4	3.2	1.9		N.D.	N.D.	28		0.02	N.D.	N.D.	N.D.	0.06		0.03	0.03	15	N.D.	N.D.
82	River	P-3	2005/5/19	2005/7/23-8/19		7.8		6.5		8	2	2.6	1.5		N.D.	N.D.	16		0.02	N.D.	N.D.	N.D.	0.16		0.09	0.03	12	N.D.	N.D.
83	River	P-3	2005/5/20	2005/7/23-8/19	9.04	8.6	6.44	6.7	6.9	8.9	1.6	3.1	1.8		N.D.	N.D.	24		0.02	N.D.	N.D.	N.D.	0.08		0.04	0.03	14	N.D.	N.D.
84	River	P-3	2005/6/20	2005/7/23-8/19	16.15	16	7.21	7.2	14.8	19	3.1	5.4	3.3		N.D.	0.02	34		0.04	N.D.	N.D.	N.D.	0.64		0.02	0.05	23	0.1	N.D.
85	River	P-3	2005/7/21	2005/7/23-8/19	15.83	17	6.89	7.6	15.7	21	3.2	6.3	4.1		0.01	0.02	35		0.04	N.D.	0.1	N.D.	0.83		0.03	0.07	25	0.1	N.D.
86	River	P-3	2005/8/19	2005/9/22-10/5	19.83	20	7.02	7.6	18.3	22	3.6	8.7	5		N.D.	0.02	34		0.06	N.D.	N.D.	N.D.	0.84		0.02	0.07	29	0.2	N.D.

Table 3.2 Chemical and isotopic composition of river, precipitation, spring and groundwater of shallow boreholes (2/14)

Index	Sampling point		Sampling date	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M Alkalinity	M Alkalinity	P Alkalinity	P Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Tracer (uranine)	Tracer (Na-naphtionate)	Isotope ^3H	Isotope δD	Isotope $\delta^{18}O$	Chromaticity Suspended solids	Chromaticity Total solids	Chromaticity Ignition loss	Chromaticity Spectral values y	Chromaticity Chromaticity coordinates x,y	Turbidity
				[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]		[meq/l]	[meq/l]	[%]	[mg/l]	[mg/l]	[T.U]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]			[NTU]
1	River	P-1	2003/7/28	1.3		N.D.	6.2	N.D.	27	N.D.	25				4.5	6.9															
2	River	P-1	2003/8/19	1.3		N.D.	5.6	N.D.	22	N.D.	19				4.4	5.9															
3	River	P-1	2003/9/19	1.1		N.D.	5.8	N.D.	25	N.D.	19				4.2	4.8															
4	River	P-1	2003/10/20	0.4		0.1	5.7	N.D.	9.9	N.D.	14	0.16227			4.1	3.6		0.82	0.73	0.09											
5	River	P-1	2003/11/20	0.3		0.1	5.6	N.D.	24	N.D.	23	0.39337			4.3	3.8		1.07	0.99	0.08											
6	River	P-1	2003/12/22	1.4		N.D.	5.8	N.D.	22	N.D.	20	0.36059			1.9	5		1.12	1.05	0.08											
7	River	P-1	2004/1/20	2.8		0.06	9.2	N.D.	36	N.D.	30	0.59006			2.3	6.9		1.88	1.85	0.03											
8	River	P-1	2004/2/19	2		0.1	6.3	N.D.	25	N.D.	23	0.40976			2.1	6.3		1.26	1.19	0.07											
9	River	P-1	2004/3/19	1.4		N.D.	7.1	N.D.	4.1	N.D.	4.3	0.067			3.5	1.7		0.86	0.81	0.05											
10	River	P-1	2004/4/22	0.57		N.D.	4.8	N.D.	4.1	N.D.	4.3	0.067			1.6	1.6		0.58	0.56	0.02											
11	River	P-1	2004/5/20	0.73		N.D.	5.4	N.D.	11	N.D.	10	0.18			2.7	2.9		0.75	0.72	0.03						3	99	1	95	0.32,0.33	2
12	River	P-1	2004/6/22	1.4		0.04	5	N.D.	19	N.D.	17	0.311			4.5	4.7		0.93	0.87	0.07						7	120	3	90	0.33,0.34	3
13	River	P-1	2004/7/20	1.3		0.02	4.8	N.D.	20	N.D.	18	0.328			5.1	4.5		0.98	0.91	0.07						7	130	2	89	0.33,0.34	N.D.
14	River	P-1	2004/7/26																							20	140	6	85	0.34,0.35	16
15	River	P-1	2004/8/20	1.3		0.01	5.2	N.D.	13	N.D.	13	0.213			4.1	3		0.88	0.80	0.08						6	120	1	93	0.33,0.34	4
16	River	P-1	2004/9/14	1.3		0.02	4.2	N.D.	4.1	N.D.	4.4	0.067			6.7	1.3		0.58	0.52	0.06						62	140	9	90	0.33,0.34	40
17	River	P-1	2004/9/17	0.84		0.02	4.8	N.D.	6.6	N.D.	6.9	0.108			2.6	1.8		0.64	0.60	0.04						5	98	1	96	0.32,0.33	N.D.
18	River	P-1	2004/10/13	0.92		0.03	6	N.D.	17	N.D.	16	0.279			5	3.8		0.88	0.88	0.00						5	110	1	90	0.33,0.34	6
19	River	P-1	2004/10/14	0.54		0.04	5.9	N.D.	16	N.D.	15	0.262			4.6	3.8		0.91	0.92	-0.01											
20	River	P-1	2004/11/9																							6	93	2	91	0.33,0.34	4
21	River	P-1	2004/11/12																							41	110	6	91	0.33,0.34	22
22	River	P-1	2004/11/19	1.1		0.05	5.4	N.D.	9.2	N.D.	8	0.151			2.3	2.4		0.73	0.69	0.04						2	100	N.D.	96	0.32,0.33	1
23	River	P-1	2004/12/7																							13	92	2	96	0.32,0.33	11
24	River	P-1	2004/12/22	1.3		0.09	5.6	N.D.	13	N.D.	12	0.213			2.1	3.2		0.87	0.81	0.06											
25	River	P-1	2005/1/20	1.6		0.12	6	N.D.	21	N.D.	19	0.344			2.2	4.9		1.11	1.06	0.05											
26	River	P-1	2005/2/18	1.7		0.14	6.6	N.D.	24	N.D.	22	0.393			2.4	5.6		1.22	1.15	0.07											
27	River	P-1	2005/3/18	1.9		N.D.	6.6	N.D.	11	N.D.	10	0.18			2.7	3.2		1.04	0.97	0.07											
28	River	P-2	2003/7/28	1.5		N.D.	8.7	N.D.	19	N.D.	15				3.5	4.9															
29	River	P-2	2003/8/19	1.1		N.D.	8.7	N.D.	18	N.D.	16				3.8	4.7															
30	River	P-2	2003/9/19	0.7		0.2	8.7	N.D.	22	N.D.	19				3.8	5															
31	River	P-2	2003/10/20	0.4		0.1	9.4	N.D.	12	N.D.	16	0.19669			3.1	4.2		0.88	0.82	0.07											
32	River	P-2	2003/11/20	0.3		0.1	8.7	N.D.	17	N.D.	16	0.27864			2.3	4		0.93	0.88	0.05											
33	River	P-2	2003/12/22	1		0.3	8.9	N.D.	21	N.D.	19	0.3442			2	4.8		1.07	1.04	0.03											
34	River	P-2	2004/1/20	1.6		0.08	14	N.D.	16	N.D.	18	0.26225			2.2	4.7		1.39	1.32	0.07											
35	River	P-2	2004/2/19	1.2		0.5	11	N.D.	30	N.D.	19	0.49172			2.7	6.2		1.36	1.31	0.05											
36	River	P-2	2004/3/19	2.2		N.D.	8.8	N.D.	4.9	N.D.	5	0.08			2.5	1.7		0.82	0.80	0.02											
37	River	P-2	2004/4/22	0.94		N.D.	6.2	N.D.	5.4	N.D.	5.6	0.088			1.5	1.9		0.63	0.58	0.04											
38	River	P-2	2004/5/20	1.1		N.D.	7.4	N.D.	11	N.D.	11	0.18			2.5	3		0.75	0.73	0.02						5	95	2	95	0.32,0.33	2
39	River	P-2	2004/6/22	1.4		0.07	8.1	N.D.	19	N.D.	16	0.311			4	4.6		0.91	0.90	0.01						5	110	2	93	0.32,0.33	3
40	River	P-2	2004/7/20	0.81		0.06	7.7	N.D.	18	N.D.	17	0.295			4	4.2		0.96	0.88	0.09						3	100	1	92	0.33,0.34	N.D.
41	River	P-2	2004/7/26																							76	180	16	88	0.33,0.34	67
42	River	P-2	2004/8/20	1		N.D.	8.2	N.D.	12	N.D.	12	0.197			3.7	2.8		0.90	0.82	0.08						2	110	N.D.	94	0.32,0.33	2
43	River	P-2	2004/9/14	1.6		0.02	6.3	N.D.	6.2	N.D.	7.1	0.102			5.4	1.6		0.63	0.57	0.06						240	330	26	92	0.33,0.34	160
44	River	P-2	2004/9/17	1		0.04	7	N.D.	9	N.D.	9.4	0.147			2.4	2.3		0.73	0.69	0.04						5	100	1	96	0.32,0.33	2
45	River	P-2	2004/10/13	0.36		0.11	9.5	N.D.	17	N.D.	16	0.279			4.4	3.8		0.96	0.96	0.00						5	110	1	93	0.33,0.34	5
46	River	P-2	2004/10/14	0.23		0.05	8.8	N.D.	16	N.D.	15	0.262			3.9	3.6		0.92	0.95	-0.03											
47	River	P-2	2004/11/9																							8	96	2	92	0.33,0.34	6
48	River	P-2	2004/11/12																							82	170	10	93	0.32,0.33	55
49	River	P-2	2004/11/19	1.2		0.05	7.8	N.D.	12	N.D.	11	0.197			2.3	2.8		0.83	0.78	0.05						2	100	N.D.	96	0.32,0.33	2
50	River	P-2	2004/12/7																							40	120	7	96	0.32,0.33	26
51	River	P-2	2004/12/22	1.2		0.11	8.6	N.D.	13	N.D.	12	0.213			2.2	3.3		0.91	0.87	0.04											
52	River	P-2	2005/1/20	1.3		0.18	9.3	N.D.	19	N.D.	17	0.311			2.4	4.6		1.06	1.01	0.05											
53	River	P-2	2005/2/18	1.5		0.32	11	N.D.	22	N.D.	19	0.361			2.7	5.1		1.23	1.18	0.04											
54	River	P-2	2005/3/18	3.5		N.D.	11	N.D.	11	N.D.	10	0.18			2.5	3.5		1.07	1.00	0.07											
55	River	P-3	2003/7/28	1		N.D.	7.8	N.D.	38	N.D.	36	0.62284			4.3	7.9		1.48	1.46	0.02											
56	River	P-3	2003/8/19	1.5		N.D.	15	N.D.	33	N.D.	30	0.54089			4.9	7.4		1.56	1.56	0.00											
57	River	P-3	2003/9/19	1.5		0.2	17	N.D.	28	N.D.	25	0.45894			4.7	7.2		1.59	1.46	0.13											
58	River	P-3	2003/10/20	1.4		N.D.	21	N.D.	18	N.D.	18	0.29503			3.9	4.5		1.35	1.30	0.05											
59	River	P-3	2003/11/20	0.6		0.1	15	N.D.	18	N.D.	17	0.29503			4.3	5.9		1.18	1.14	0.04											
60	River	P-3	2003/12/22	2.4		0.1	13	N.D.	36	N.D.	30	0.59006			2.7	7.1		1.86	1.74	0.13											
61	River	P-3	2004/1/20	3.7		0.04	23	N.D.	28	N.D.	27	0.45894			3	6.5		2.18	2.21	-0.03											
62	River	P-3	2004/3/19	3		N.D.	15	N.D.	3.6	N.D.	4.3	0.059			3.5	1.1		0.98	0.96	0.01											
63	River	P-3	2004/4/22	1.4		0.02	11	N.D.	11	N.D.	9.4	0.18			2.3	3.4		0.85	0.86	-0.01											
64	River	P-3	2004/5/20	1.3		N.D.	11	N.D.	16	N.D.	14	0.262			4	3.9		1.01	1.00	0.01						4	110	2	95	0.32,0.33	4
65	River	P-3	2004/6/22	1.8		0.04	9.5	N.D.	28	N.D.	24	0.459			6	6.5		1.32	1.28	0.04						4	140	2	91	0.33,0.34	3
66	River	P-3	2004/7/20	2.2		0.05	12	N.D.	28	N.D.	25	0.459			6.5	6.2		1.46	1.36	0.10						4	140	2	90	0.33,0.34	N.D.
67	River	P-3	2004/7/26																							53	170	15	85	0.34,0.35	53
68	River	P-3	2004/8/20	1.8		N.D.	11	N.D.	21	N.D.	20	0.344			5.6	4.8		1.25	1.14	0.12						3	140	N.D.	93	0.33,0.34	5
69	River	P-3	2004/9/14	1.3		0.09	9.2	N.D.	3.5	N.D.	4.9	0.057			7.6	1.1		0.70	0.62	0.08						110	190	12	91	0.33,0.34	79
70	River	P-3	2004/9/17	1.7		0.02	11	N.D.	12	N.D.	11	0.197			3.9	2.8		0.97	0.91	0.06						5	120	1	95	0.32,0.33	3
71	River	P-3	2004/10/13	1.9		0.02	11	N.D.	24	N.D.	25	0.393			6.3	5.4		1.30	1.24	0.06						9	130	2	91	0.33,0.34	10
72	River	P-3	2004/10/14	2.5		0.13	15	N.D.	27	N.D.	25	0.442			6.6	6		1.49	1.43	0.05											
73	River	P-3	2004/11/9																							48	160	9	91	0.33,0.34	50
74	River	P-3	2004/11/12																							53	150	8	93	0.33,0.33	41
75	River	P-3	2004/11/19	1.9		0.15	15	N.D.	15	N.D.	14	0.246			3.9	3.5		1.14	1.09	0.04						3	130	1	96	0.32,0.33	4
76	River	P-3	2004/12/7																							10	120	3	96	0.32,0.33	17
77	River	P-3	2004/12/22	2		0.34	13	N.D.	24	N.D.	21	0.393			3.7	5.4		1.40	1.34	0.06											
78	River	P-3	2005/1/20	3		0.64	14	N.D.	33	N.D.	30	0.541			4.8	7.4		1.74	1.59	0.14											
79	River	P-3	2005/2/18	3.9		0.72	14	N.D.	37	N.D.	33	0.606			4.4	8.8		1.85	1.74	0.11											
80	River	P-3	2005/3/18	3.6		0.04	14	N.D.	12	N.D.	10	0.197			3.3	3.7		1.33	1.25	0.08											
81	River	P-3	2005/4/19	2.4		N.D.	9.2	N.D.	6.3	N.D.	6	0.103			2.4	1.9		0.78	0.72	0.06											
82	River	P-3	2005/5/19	2.8		N.D.	7.7	N.D.	4	N.D.	4.1	0.066			6.2	1.4		0.65	0.56	0.09						160	240	21	92	0.33,0.34	110
83	River	P-3	2005/5/20	2.4		0.01	8.3	N.D.	5.4	N.D.	5.3	0.088			3.9	1.6		0.73	0.66	0.08											
84	River	P-3	2005/6/20	3.7		N.D.	9.8	N.D.	28	N.D.	25	0.459			5.5	6.4		1.44	1.31	0.13											
85	River	P-3	2005/7/21	1.9		0.02	9.2	N.D.	37	N.D.	31	0.606			7.5	7.7		1.65	1.50	0.14											
86	River	P-3	2005/8/19	2		N.D.	10	N.D.	41	N.D.	31	0.672			6.7	8.5		1.89	1.70	0.20											

Table 3.2 Chemical and isotopic composition of river, precipitation, spring and groundwater of shallow boreholes (3/14)

Index	Sampling point		Sampling date	Analyzing date	Physico-chemical parameter					Geochemistry																			
					EC at site	EC at lab	pH at site	pH at lab	Temperature at site	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T.Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-
					[mS/m]	[mS/m]			[℃]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
87	River	P-3	2005/9/7 11:05	2005/10/31-11/10		19		7.3																					
88	River	P-3	2005/9/7 22:00	2005/10/31-11/10		17		7.2																					
89	River	P-3	2005/9/8 1:59	2005/9/22-10/5		13		6.7																					
90	River	P-3	2005/9/8 3:00	2005/9/22-10/5		12		6.6																					
91	River	P-3	2005/9/8 4:00	2005/9/22-10/5		11		6.4																					
92	River	P-3	2005/9/8 5:00	2005/9/22-10/5		10		6.3																					
93	River	P-3	2005/9/8 5:58	2005/9/22-10/5		9.5		6.2																					
94	River	P-3	2005/9/8 6:58	2005/9/22-10/5		9.4		6.3																					
95	River	P-3	2005/9/8 12:22	2005/10/31-11/10		10		6.2																					
96	River	P-3	2005/9/8 18:10	2005/10/31-11/10		11		6.4																					
97	River	P-3	2005/9/9 16:20	2005/10/31-11/10		12		6.8																					
98	River	P-3	2005/9/20	2005/9/22-10/5	12.5	12	7.57	7.3	12.5	13	2.2	5.4	2.8		0.02	0.01	34		0.04	N.D.	N.D.	N.D.	0.27		0.04	0.05	16	0.1	N.D.
99	River	P-3	2005/10/20	2005/10/31-11/10	16.97	17	7.2	7.3	5	19	2.9	6.7	3.8		N.D.	0.02	35		0.05	N.D.	N.D.	N.D.	0.3		0.02	0.05	23	0.2	N.D.
100	River	P-3	2005/11/21	2005/12/10-12/27	15.01	14	6.8	7.2	1.5	14	2.2	6	3.3		N.D.	0.02	32		0.04	N.D.	N.D.	N.D.	0.19		0.04	0.05	19	0.1	N.D.
101	River	P-3	2005/12/20	2005/12/27-2006/1/17	17.99	17	6.78	7	0	18	2.3	6.5	3.8		0.02	0.02	32		0.04	N.D.	N.D.	N.D.	0.22		0.03	0.04	24	0.1	N.D.
102	River	P-3	2006/1/23	2006/1/31-2/13	17.33	18	7.2	7.2	-0.1	20	2.6	7	4.2		0.01	0.03	32		0.04	N.D.	N.D.	N.D.	0.22		0.02	0.02	25	N.D.	0.01
103	River	P-3	2006/2/20	2006/2/22-3/1	18.55	18	7.42	7.2	-0.1	20	3.1	7.1	4.2		N.D.	0.03	33		0.04	N.D.	N.D.	N.D.	0.36		0.02	0.03	27	0.2	N.D.
104	River	P-3	2006/3/20	2006/8/22-9/29	15.1	14	6.62	7	-0.1	14	2.4	5.6	3		N.D.	N.D.	26		0.03	N.D.	N.D.	N.D.	0.01		0.01	0.03	22	0.1	N.D.
105	River	P-3	2006/4/19	2006/8/22-9/29	11.04	11	6.95	7	2.7	10	1.5	4.1	2.3		N.D.	N.D.	24		0.02	N.D.	N.D.	N.D.	N.D.		0.02	0.03	16	N.D.	N.D.
106	River	P-3	2006/5/22	2006/8/22-9/29	10.39	11	7.29	7.5	10.6	13	1.6	3.5	2.1		N.D.	0.01	34		0.02	N.D.	N.D.	N.D.	0.05		0.01	0.04	17	N.D.	N.D.
107	River	P-3	2006/6/22	2006/8/22-9/29	12.88	14	7.64	7.3	11.3	15	2.7	5.4	3		N.D.	0.02	27		0.03	N.D.	N.D.	N.D.	0.18		0.03	0.05	18	0.1	N.D.
108	River	P-3	2006/7/21	2006/8/22-9/29	15.2	16	7.3	7.8	14.8	18	2.8	6.7	3.5		N.D.	0.01	32		0.03	N.D.	N.D.	N.D.	0.2		0.01	0.05	22	0.1	N.D.
109	River	P-3	2006/8/21	2006/8/22-9/29	18.39	18	7.05	7.6	17.5	19	3.6	8.2	4.2		N.D.	0.02	37		0.04	N.D.	N.D.	N.D.	0.38		0.02	0.06	24	0.2	N.D.
110	River	P-3	2006/9/20	2006/9/21-10/5	13.25	13	6.97	7.4	14.4	14	2.4	6.2	3.1		N.D.	0.01	36		0.03	N.D.	N.D.	N.D.	0.21		0.03	0.04	17	0.1	N.D.
111	River	P-3	2006/10/17	2006/10/18-10/31	12.57	12	7.08	7.2	9	13	2.6	5.3	2.6		0.01	N.D.	34		0.03	N.D.	N.D.	N.D.	0.11		0.02	0.03	17	N.D.	N.D.
112	River	P-3	2006/11/21	2006/11/24-12/6	12.24	12	7.65	7.3	2.4	13	2.1	5.1	2.5		0.02	0.01	35		0.03	N.D.	N.D.	N.D.	0.07		0.05	0.03	17	N.D.	N.D.
113	River	P-3	2006/12/19	2007/1/17-2/1	17.48	17	7.22	7.2	-0.1	17	2.8	6.7	3.5		N.D.	0.02	34		0.03	N.D.	N.D.	N.D.	0.13		0.02	0.03	22	0.1	N.D.
114	River	P-3	2007/1/16	2007/1/18-2/1	16.35	16	8.24	7.3	0	17	2.7	6.2	3.3		N.D.	0.02	32		0.03	N.D.	N.D.	N.D.	0.11		N.D.	0.04	22	0.1	N.D.
115	River	P-3	2007/2/16	2007/2/20-3/2	19.27	18	7.6	7.2	0	19	3.7	7.4	3.8		N.D.	0.02	33		0.03	N.D.	N.D.	N.D.	0.2		0.01	0.03	25	0.2	N.D.
116	River	P-3	2007/3/28	2007/5/10-5/23		13		6.9		13	2.1	6	3		N.D.	N.D.	28		0.03	N.D.	N.D.	N.D.	0.06		0.02	0.03	19	0.1	N.D.
117	River	P-3	2007/4/17	2007/5/10-5/23		9.5		6.9		9.5	1.3	4.2	2		N.D.	N.D.	28		0.02	N.D.	N.D.	N.D.	0.06		0.03	0.02	14	N.D.	N.D.
118	River	P-3	2007/5/22	2007/5/23-6/5		15		7.4		16	2.2	5.9	3.1		0.01	0.02	32		0.03	N.D.	N.D.	N.D.	0.15		0.02	0.06	20	0.1	0.01
119	River	P-3	2007/6/20	2007/6/26-7/11		16		7.7		19	2.5	5.5	3.1		0.01	0.02	33		0.04	N.D.	N.D.	N.D.	0.33		0.02	0.05	22	0.1	N.D.
120	River	P-3	2007/7/23	2007/7/24-8/6		18		7.6		19	3.1	6.8	3.4		0.02	0.01	35		0.03	N.D.	N.D.	N.D.	0.21		N.D.	0.07	23	0.1	N.D.
121	River	P-3	2007/8/21	2007/8/22-9/13		17		7.5		19	3.2	7.3	3.7		0.01	0.02	37		0.04	N.D.	N.D.	N.D.	0.17		0.02	0.05	23	0.1	N.D.
122	River	P-3	2007/9/20	2007/9/21-10/17		16		7.3		16	3.2	8.2	3.7		0.01	0.02	30		0.05	N.D.	N.D.	N.D.	0.16		0.02	0.04	20	0.2	0.01
123	River	P-3	2007/10/18	2007/10/19-11/2		19		7.5		19	3.5	6.9	3.4		0.02	0.02	31		0.07	N.D.	N.D.	N.D.	0.11		0.01	0.06	26	0.2	0.01
124	River	P-3	2007/11/20	2007/11/21-12/5		15		7.1		15	2.4	6	3.2		0.02	0.02	33		0.04	N.D.	N.D.	N.D.	0.07		0.01	0.06	20	0.1	0.01
125	River	P-3	2007/12/17	2007/12/25-2008/1/17		16		7.3		18	2.6	7.4	3.5		0.01	0.02	34		0.04	N.D.	N.D.	N.D.	0.13		N.D.	0.06	23	0.2	0.01
126	River	P-3	2008/1/16	2008/1/23-2/6		19		7.2		20	3.1	5.5	3.2		0.01	0.04	34		0.07	N.D.	N.D.	N.D.	0.21		0.02	0.05	26	0.2	N.D.
127	River	P-3	2008/2/14	2008/2/18-3/3		22		7.3		25	3.6	9.5	4.9		N.D.	0.04	32		0.05	N.D.	N.D.	N.D.	0.13		N.D.	0.05	34	0.2	0.01
128	River	P-3	2008/6/20	2008/9/22-11/5		19		7.5		21	4	7.3	4.2		N.D.	0.03	31		0.15	N.D.	N.D.	N.D.	0.17		0.02	0.05	27	0.1	N.D.
129	River	P-3	2008/12/25	2009/1/13-1/28		14		7.2		16	2.2	5.7	2.9		N.D.	0.02	37		0.04	N.D.	N.D.	N.D.	0.13		0.01	0.03	21	N.D.	0.01
130	River	P-3	2009/8/5	2009/8/11		14		7.2		15	2.7	5.2	3		<0.01	<0.1	14		0.04	<0.01	<0.1	<0.01	0.4		<0.1	<0.1	23	0.1	<1.0
131	River	P-3	2009/12/21	2009/12/24		14		7.1		18	2.2	5.7	3.2		0.01	<0.1	16		0.04	<0.01	<0.1	<0.01	0.17		<0.1	<0.1	22	0.2	<1.0
132	River	P-3-1	2009/12/4	2009/12/7-12/21	33.4		6.7		0.1	12	1.9	5.8	4.3		0.03	N.D.	24		0.04	N.D.	N.D.	N.D.	0.09		N.D.	0.04	16	N.D.	N.D.
133	River	P-3-2	2009/12/4	2009/12/15	66.2	10	6.65	7	0.2	17	1.2	1.7	1.9		<0.01	<0.1	19		0.02	<0.01	<0.1	<0.01	0.14		<0.1	<0.1	20	<0.1	<1.0
134	River	P-3-3	2009/12/4	2009/12/15	227	17	6.52	6.9	0.4	19	3.4	8.3	3.6		<0.01	<0.1	17		0.05	<0.01	<0.1	<0.01	0.15		<0.1	<0.1	24	0.1	<1.0
135	River	P-3-4	2009/12/4	2009/12/15	118.3	8.1	6.62	6.8	1.5	10	1.2	3	1.4		<0.01	<0.1	20		0.03	<0.01	<0.1	<0.01	0.04		<0.1	<0.1	13	<0.1	<1.0
136	River	P-3	2010/10/20	2010/10/26-2011/1/19		16		7.3	24.2	16	3.3	7.6	3.4		0.03	<0.1	17		0.05		<0.1		0.92		0.04	<0.1	22	0.1	<1.0
137	River	P-3	2011/2/9	2011/2/17-3/25		19		7	20.2	20	3.2	7	3.6		0.01	<0.1	14		0.04		<0.1		0.96		0.04	<0.1	28	0.2	<1.0
138	River	P-4	2004/5/20	2004/7/28-8/24	9.19	8.8	6.51	6.8	10.9	12	1.9	2	1.6		N.D.	N.D.	52		0.02	N.D.	N.D.	N.D.	0.04		0.01	0.02	14	N.D.	N.D.
139	River	P-4	2004/6/22	2004/7/28-8/24	9.83	9.6	7.35	6.9	12.8	13	2.1	2.2	1.7		N.D.	0.01	52		0.02	N.D.	N.D.	N.D.	0.18		0.02	0.03	14	N.D.	N.D.
140	River	P-4	2004/7/20	2004/7/28-8/24	10.1	9.8	6.79	7.2	14.3	13	2.2	2.4	1.9		N.D.	0.01	52		0.02	N.D.	N.D.	N.D.	0.43		0.03	0.01	14	N.D.	N.D.
141	River	P-4	2004/7/26	2004/7/29-8/24	10.08	9.9	6.69	6.9	14.5																				
142	River	P-4	2004/8/20	2004/8/26-9/3	9.44	9.2	7.37	7.1	11.5	12	1.9	2.1	1.6		N.D.	N.D.	53		0.02	N.D.	N.D.	N.D.	0.26		0.02	0.01	13	N.D.	N.D.
143	River	P-4	2004/9/14	2004/9/25-10/6	7.88	7.9	6.62	6.6	11.7	8.2	3	2	1.5		N.D.	N.D.	32		0.02	N.D.	0.1	N.D.	0.19		0.09	0.03	12	N.D.	N.D.
144	River	P-4	2004/9/17	2004/9/25-10/6	8.89	8.9	7.34	6.8	9.7	11	2	1.9	1.6		N.D.	N.D.	51		0.02	N.D.	N.D.	N.D.	0.12		0.02	0.01	13	N.D.	N.D.
145	River	P-4	2004/10/13	2004/10/21-11/4	10.48	10	6.85	7.1	10.5	12	2.6	2.3	1.7		N.D.	N.D.	49		0.04	N.D.	N.D.	N.D.	0.34		0.02	0.01	16	N.D.	N.D.
146	River	P-4	2004/10/14	2004/10/21-11/4	9.75	9.5	7.4	7.1	8.5	12	2	2.2	1.5		N.D.	N.D.	54		0.02	N.D.	N.D.	N.D.	0.24		0.02	0.01	15	0.1	N.D.
147	River	P-4	2004/11/9	2004/11/18-11/26	10.2	9.9	7.69	6.8	6.4																				
148	River	P-4	2004/11/12	2004/11/18-11/30	8.39	8.1	6.75	6.6	7.5																				
149	River	P-4	2004/11/19	2004/11/30-12/10	9.58	9.2	7.29	6.8	6.4	11	2.1	2.2	1.5		N.D.	N.D.	51		0.02	N.D.	N.D.	N.D.	0.12		0.02	N.D.	13	N.D.	N.D.
150	River	P-4	2004/12/7	2004/12/10-12/16	11.13	9.1	6.69	6.6	1.5																				
151	River	P-4	2004/12/22	2004/12/27-2005/1/13	9.92	9.3	7.41	6.9	1.5	12	1.9	2.2	1.7		N.D.	N.D.	56		0.02	N.D.	N.D.	N.D.	0.08		0.01	N.D.	15	N.D.	N.D.
152	River	P-4	2005/1/20	2005/1/26-1/29	10.52	9.9	7.68	7	1.6	12	2.1	2.2	1.8		N.D.	N.D.	53		0.02	N.D.	N.D.	N.D.	0.08		0.01	N.D.	14	N.D.	N.D.
153	River	P-4	2005/2/18	2005/2/22-3/5	14.5	11	7.81	7	0	14	3.3	2.3	1.9		N.D.	0.01	50		0.02	N.D.	N.D.	N.D.	0.15		0.02	N.D.	15	N.D.	N.D.
154	River	P-4	2005/3/18	2005/7/23-8/19	11.13	11	6.69	6.9	1.5	13	2.7	2.6	2.1		N.D.	N.D.	39		0.02	N.D.	N.D.	N.D.	0.05		0.01	0.02	18	N.D.	N.D.
155	River	P-4	2005/4/19	2005/7/23-8/19	7.13	7.4	6.6	6.5	7.5	8.9	1.9	2.2	1.4		N.D.	N.D.	41		0.02	N.D.	N.D.	N.D.	0.03		0.01	0.03	12	N.D.	N.D.
156	River	P-4	2005/5/19	2005/7/23-8/19		7.7		6.4		8.6	2.4	2.2	1.4		N.D.	N.D.	28		0.02	N.D.	0.2	N.D.	0.11		0.06	0.05	11	N.D.	N.D.
157	River	P-4	2005/5/20	2005/7/23-8/19	8.19	8.1	6.63	6.6	9.7	9.3	1.9	2	1.4		N.D.	N.D.	42		0.02	N.D.	N.D.	N.D.	0.05		0.02	0.02	12	N.D.	N.D.
158	River	P-4	2005/6/20	2005/7/23-8/19	9.48	9.5	7.16	7.1	12.6	13	1.7	1.9	1.5		N.D.	N.D.	56		0.02	N.D.	N.D.	N.D.	0.17		N.D.	0.04	13	N.D.	N.D.
159	River	P-4	2005/7/21	2005/7/23-8/19	10.14	10	7.23	7.3	14.6	14	2	2	1.7		N.D.	0.01	57		0.02	N.D.	N.D.	N.D.	0.28		0.01	0.02	15	N.D.	N.D.
160	River	P-4	2005/8/19	2005/9/22-10/5	10.69	11	7.27	7.3	16.5	14	2.2	2.5	1.9		N.D.	0.01	55		0.04	N.D.	N.D.	N.D.	0.53		0.02	0.05	14	N.D.	N.D.
161	River	P-4	2005/9/20	2005/9/22-10/5	9.13	9.1	6.37	7.2	10.7	11	2.1	2.3	1.7		N.D.	N.D.	48		0.04	N.D.	N.D.	N.D.	0.19		0.03	0.04	13	N.D.	N.D.
162	River	P-4	2005/10/20	2005/10/31-11/10	9.64	9.6	6.58	7.1	6.7	12	1.9	2.1	1.6		N.D.	N.D.	54		0.02	N.D.	N.D.	N.D.	0.1		0.01	N.D.	13	N.D.	N.D.
163	River	P-4	2005/11/21	2005/12/10-12/27	10.06	9.7	6.59	7.1	2.4	12	2.1	2.2	1.7		N.D.	N.D.	51		0.02	N.D.	N.D.	N.D.	0.14		0.01	0.04	13	N.D.	N.D.
164	River	P-4	2005/12/20	2005/12/27-2006/1/17	9.88	9.6	7.05	6.9	3.2	12	2	2.1	1.7		N.D.	N.D.	53		0.02	N.D.	N.D.	N.D.	0.08		0.01	0.03	14	N.D.	N.D.
165	River	P-4	2006/1/23	2006/1/31-2/13	11.22	11	6.76	7.1	-0.1	13	2.5	2.4	1.8		N.D.	0.01	52		0.02	N.D.	N.D.	N.D.	0.09		0.01	N.D.	14	N.D.	N.D.
166	River	P-4	2006/2/20	2006/2/22-3/1	11.1	10	6.97	7.1	1.3	13	2.6	2.3	1.8		N.D.	0.01	52		0.02	N.D.	N.D.	N.D.	0.12		0.01	0.01	14	N.D.	N.D.
167	River	P-4	2006/3/20	2006/8/22-9/29	10.38	9.9	6.73	6.9	1.3	12	2.1	2.3	1.8		N.D.	N.D.	41		0.02	N.D.	N.D.	N.D.	0.02		0.01	0.03	16	N.D.	N.D.
168	River	P-4	2006/4/19	2006/8/22-9/29	8.89	8.6	7.36	7.3	5.3	10	1.8	2.1	1.5		N.D.	N.D.	43		0.02	N.D.	N.D.	N.D.	N.D.		N.D.	0.02	13	N.D.	N.D.
169	River	P-4	2006/5/22	2006/8/22-9/29	8.97	8.9	7.12	7.2	9.3	11	1.7	1.9	1.5		N.D.	N.D.	54		0.01	N.D.	N.D.	N.D.	0.02		N.D.	0.02	13	N.D.	N.D.
170	River	P-4	2006/6/22	2006/8/22-9/29	9.44	9.5	7.65	7.1	10.4	12	2	2.1	1.7		N.D.	N.D.	50		0.02	N.D.	N.D.	N.D.	0.09		0.01	0.03	13	N.D.	N.D.
171	River	P-4	2006/7/21	2006/8/22-9/29	9.57	9.4	6.63	8.2	12.7	12	1.8	2.1	1.6		N.D.	N.D.	51		0.01	N.D.	N.D.	N.D.	0.12		N.D.	0.03	13	N.D.	N.D.
172	River	P-4	2006/8/21	2006/8/22-9/29	9.73	9.9	7.06	7.2	12.9	12	1.9	2.3	1.8		N.D.	N.D.	55		0.02	N.D.	N.D.	N.D.	0.2		0.01	0.03	13	N.D.	N.D.
173	River	P-4	2006/9/20	2006/9/21-10/5	9.28	9.3	7.01	7.2	12.2	12	2.1	2.2	1.7		N.D.	N.D.	53		0.02	N.D.	N.D.	N.D.	0.15		0.02	0.03	13	N.D.	N.D.

Table 3.2 Chemical and isotopic composition of river, precipitation, spring and groundwater of shallow boreholes (4/14)

Index	Sampling point		Sampling date	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M Alkalinity	M Alkalinity	P Alkalinity	P Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Tracer (uranine)	Tracer (Na-naphtionate)	Isotope ^3H	Isotope δD	Isotope $\delta^{18}O$	Chromaticity Suspended solids	Chromaticity Total solids	Chromaticity Ignition loss	Chromaticity Spectral values y	Chromaticity Chromaticity coordinates x,y	Turbidity
				[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]		[meq/l]	[meq/l]	[%]	[mg/l]	[mg/l]	[T.U]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]			[NTU]
87	River	P-3	2005/9/7 11:05																							5	140	2	91	0.33,0.34	7
88	River	P-3	2005/9/7 22:00																							21	150	5	91	0.33,0.34	20
89	River	P-3	2005/9/8 1:59																							160	260	28	88	0.34,0.35	120
90	River	P-3	2005/9/8 3:00																							170	270	29	89	0.34,0.35	130
91	River	P-3	2005/9/8 4:00																							190	280	34	89	0.33,0.35	160
92	River	P-3	2005/9/8 5:00																							200	300	32	89	0.33,0.35	160
93	River	P-3	2005/9/8 5:58																							180	270	28	89	0.33,0.35	130
94	River	P-3	2005/9/8 6:58																							150	250	23	89	0.33,0.35	120
95	River	P-3	2005/9/8 12:22																							72	160	11	92	0.33,0.34	45
96	River	P-3	2005/9/8 18:10																							29	130	6	94	0.33,0.34	19
97	River	P-3	2005/9/9 16:20																							7	120	2	95	0.32,0.33	6
98	River	P-3	2005/9/20	1.6		N.D.	14	N.D.	15	N.D.	14	0.246			5.7	3.3		1.12	0.99	0.13											
99	River	P-3	2005/10/20	2		0.01	15	N.D.	28	N.D.	25	0.459			4.4	6.3		1.55	1.42	0.13											
100	River	P-3	2005/11/21	1.6		N.D.	17	N.D.	16	N.D.	15	0.262			3.7	3.6		1.24	1.15	0.08											
101	River	P-3	2005/12/20	2.2		0.1	17	N.D.	24	N.D.	22	0.393			3.1	5.9		1.48	1.42	0.05											
102	River	P-3	2006/1/23	2.6		0.1	16	N.D.	30	N.D.	25	0.492			3.7	6.9		1.63	1.53	0.10											
103	River	P-3	2006/2/20	3.5		0.1	14	N.D.	33	N.D.	26	0.541			3.4	7.5		1.65	1.59	0.06											
104	River	P-3	2006/3/20	3.9		N.D.	15	N.D.	11	N.D.	9.5	0.18			2.2	2.6		1.20	1.11	0.08											
105	River	P-3	2006/4/19	2.3		N.D.	12	N.D.	7.8	N.D.	7.3	0.128			2	1.9		0.87	0.83	0.04											
106	River	P-3	2006/5/22	0.69		N.D.	9.7	N.D.	11	N.D.	12	0.18			2.7	2.3		0.95	0.86	0.09											
107	River	P-3	2006/6/22	3.2		N.D.	11	N.D.	24	N.D.	21	0.393			6.2	5.6		1.24	1.13	0.11											
108	River	P-3	2006/7/21	1.4		0.04	13	N.D.	27	N.D.	25	0.442			5.7	5.6		1.48	1.33	0.14											
109	River	P-3	2006/8/21	3		0.04	13	N.D.	35	N.D.	30	0.574			7.5	7.4		1.67	1.52	0.15											
110	River	P-3	2006/9/20	1.4		0.07	13	N.D.	22	N.D.	19	0.361			5.8	4.8		1.23	1.11	0.12											
111	River	P-3	2006/10/17	1.7		0.04	12	N.D.	16	N.D.	15	0.262			4.7	3.8		1.11	0.99	0.12				-62.9	-9.8						
112	River	P-3	2006/11/21	2		0.17	11	N.D.	15	N.D.	14	0.246			3.4	3.4		1.08	0.96	0.12											
113	River	P-3	2006/12/19	2.4		0.25	14	N.D.	27	N.D.	24	0.442			3.6	6.2		1.43	1.35	0.08											
114	River	P-3	2007/1/16	2.9		0.2	13	N.D.	27	N.D.	23	0.442			3.5	5.9		1.39	1.33	0.05		0.013									
115	River	P-3	2007/2/16	3.6		0.37	12	N.D.	33	N.D.	29	0.541			4.2	7.5		1.60	1.50	0.11											
116	River	P-3	2007/3/28	3.8		N.D.	14	N.D.	11	N.D.	11	0.18			2.7	2.9		1.16	1.01	0.15											
117	River	P-3	2007/4/17	2.4		0.06	9.8	N.D.	8.2	N.D.	7.9	0.134			2.8	2.1		0.82	0.73	0.09											
118	River	P-3	2007/5/22	1.9		0.03	12	N.D.	23	N.D.	20	0.377			4.6	4.9		1.30	1.19	0.11											
119	River	P-3	2007/6/20	1.5		0.03	8.9	N.D.	33	N.D.	29	0.541			5.8	6.9		1.42	1.35	0.07											
120	River	P-3	2007/7/23	1.4		0.03	12	N.D.	36	N.D.	32	0.59			6.2	7.5		1.52	1.49	0.04											
121	River	P-3	2007/8/21	1.6		0.04	11	N.D.	37	N.D.	32	0.606			6.3	7.7		1.58	1.48	0.09											
122	River	P-3	2007/9/20	1.9		0.05	18	N.D.	25	N.D.	23	0.41			6.6	5.7		1.49	1.35	0.14											
123	River	P-3	2007/10/18	2.5		N.D.	15	N.D.	33	N.D.	27	0.541			4.4	7.1		1.54	1.59	-0.05											
124	River	P-3	2007/11/20	2.1		0.05	15	N.D.	18	N.D.	17	0.295			3.3	4.3		1.28	1.17	0.10											
125	River	P-3	2007/12/17	2.1		0.06	14	N.D.	26	N.D.	23	0.426			3	5.9		1.51	1.37	0.14											
126	River	P-3	2008/1/16	3.2		0.1	14	N.D.	32	N.D.	28	0.524			3.2	7.2		1.49	1.55	-0.06			5.7±0.2	-66.3	-10.5						
127	River	P-3	2008/2/14	4.4		0.08	14	N.D.	40	N.D.	35	0.656			3.6	9		2.06	1.91	0.15											
128	River	P-3	2008/6/20	3.7		0.03	12	N.D.	32	N.D.	30	0.524			7.3	6.8		1.73	1.54	0.19											
129	River	P-3	2008/12/25	2.2		0.14	12	N.D.	19	N.D.	17	0.311			2.7	4.3		1.28	1.15	0.12		0.01	4.9±0.1	-68.8	-9.7						
130	River	P-3	2009/8/5	3.2		<0.2	10	<0.1	26	<0.5	20				5.7	6		1.23	1.34	-0.11	<2	<1	5.60±0.13	-70.6	-11.2						
131	River	P-3	2009/12/21	2.3		<0.2	10	<0.1	25	<0.5	22				2.8	6		1.39	1.28	0.11	<2	<1	3.58±0.12	-69.9	-11.2						
132	River	P-3-1	2009/12/4	0.76		0.1	7.2	N.D.	31	N.D.	27	0.508			3.3	6.7		1.21	1.11	0.11			5.2±0.2	-65.2	-10.31						
133	River	P-3-2	2009/12/4	1.4		<0.2	4.8	<0.1	17	<0.5	13				2.1	4		1.01	0.97	0.05	<2	<1	3.23±0.11	-71.5	-11						
134	River	P-3-3	2009/12/4	2		0.9	13	<0.1	30	<0.5	25				3.3	8		1.67	1.47	0.20	<2	<1	4.64±0.10	-71.7	-11.2						
135	River	P-3-4	2009/12/4	1.3		<0.2	7	<0.1	11	<0.5	10				1.3	3		0.73	0.71	0.02	<2	<1	4.22±0.11	-72.7	-11.5						
136	River	P-3	2010/10/20	4		<0.2	10	<0.1	29	<0.1	25				5	6.4		1.44	1.37	0.07			5.3±0.1	-66.0	-10.3						
137	River	P-3	2011/2/9	5.9		<0.2	9.9	<0.1	29	<0.1	25				4.1	7.06		1.60	1.57	0.03			4.5±0.1	-66.0	-10.7						
138	River	P-4	2004/5/20	3.7		0.03	8.2	N.D.	10	N.D.	9.3	0.164			1.9	2.8		0.80	0.73	0.07						2	110	N.D.	97	0.31,0.32	N.D.
139	River	P-4	2004/6/22	3.4		0.04	8.4	N.D.	13	N.D.	12	0.213			2.8	3.3		0.87	0.78	0.09						4	120	2	95	0.32,0.33	N.D.
140	River	P-4	2004/7/20	3		N.D.	7.7	N.D.	14	N.D.	14	0.229			3.8	3.3		0.90	0.78	0.11						4	130	2	92	0.33,0.33	1
141	River	P-4	2004/7/26																							10	130	4	90	0.33,0.34	13
142	River	P-4	2004/8/20	3.4		N.D.	7.7	N.D.	11	N.D.	11	0.18			2.9	2.6		0.81	0.71	0.10						4	120	1	96	0.32,0.33	4
143	River	P-4	2004/9/14	2.9		0.05	6.5	N.D.	5.3	N.D.	6.4	0.087			6.7	1.7		0.66	0.56	0.10						25	120	5	90	0.33,0.34	21
144	River	P-4	2004/9/17	4.3		N.D.	7.8	N.D.	7.5	N.D.	7.4	0.123			2.2	2.1		0.76	0.65	0.10						4	120	1	97	0.32,0.32	4
145	River	P-4	2004/10/13	3.4		0.05	8.5	N.D.	13	N.D.	12	0.213			4.2	3		0.84	0.84	0.00						8	130	2	93	0.32,0.33	7
146	River	P-4	2004/10/14	3.6		0.02	8.8	N.D.	11	N.D.	11	0.18			2.4	2.7		0.81	0.79	0.02											
147	River	P-4	2004/11/9																							37	160	7	89	0.33,0.34	44
148	River	P-4	2004/11/12																							16	120	4	91	0.33,0.34	16
149	River	P-4	2004/11/19	4.2		0.04	8.4	N.D.	8.4	N.D.	8.4	0.138			2.1	2.3		0.76	0.68	0.08						4	110	1	97	0.32,0.32	2
150	River	P-4	2004/12/7																							26	110	7	96	0.32,0.33	23
151	River	P-4	2004/12/22	4.4		0.04	8.8	N.D.	8.9	N.D.	8.7	0.146			1.7	2.3		0.82	0.75	0.07											
152	River	P-4	2005/1/20	4.1		0.05	8.1	N.D.	12	N.D.	11	0.197			2	2.8		0.83	0.76	0.07											
153	River	P-4	2005/2/18	4.4		0.22	8.8	N.D.	16	N.D.	14	0.262			2.9	3.8		0.96	0.87	0.10											
154	River	P-4	2005/3/18	4.5		N.D.	8.4	N.D.	10	N.D.	8.8	0.164			2.5	2.6		0.94	0.85	0.09											
155	River	P-4	2005/4/19	4.3		N.D.	7	N.D.	5.3	N.D.	4.7	0.087			2	1.8		0.66	0.57	0.09											
156	River	P-4	2005/5/19	4		N.D.	7.7	N.D.	4.2	N.D.	4.7	0.069			5.5	1.6		0.66	0.54	0.12						27	120	6	92	0.33,0.34	24
157	River	P-4	2005/5/20	3.9		0.02	7.5	N.D.	5.9	N.D.	5.4	0.097			2.9	1.9		0.67	0.59	0.08											
158	River	P-4	2005/6/20	3.7		N.D.	8.3	N.D.	11	N.D.	10	0.18			2.4	2.7		0.83	0.72	0.11											
159	River	P-4	2005/7/21	3.3		0.02	8.6	N.D.	14	N.D.	12	0.229			3.2	3		0.90	0.83	0.07											
160	River	P-4	2005/8/19	3.2		N.D.	8.1	N.D.	17	N.D.	16	0.279			3.8	3.8		0.95	0.84	0.10											
161	River	P-4	2005/9/20	2.7		N.D.	8.2	N.D.	11	N.D.	9.8	0.18			3.3	2.4		0.79	0.72	0.07											
162	River	P-4	2005/10/20	3.5		0.02	8.9	N.D.	11	N.D.	10	0.18			2.1	2.5		0.81	0.73	0.08											
163	River	P-4	2005/11/21	2.9		0.02	8.7	N.D.	11	N.D.	11	0.18			2.6	2.6		0.83	0.73	0.10											
164	River	P-4	2005/12/20	3.9		0.02	8.9	N.D.	9.6	N.D.	9.7	0.157			2	2.5		0.82	0.74	0.08											
165	River	P-4	2006/1/23	4.1		0.1	9	N.D.	15	N.D.	13	0.246			2.6	3.4		0.90	0.83	0.07											
166	River	P-4	2006/2/20	4.6		0.02	8.8	N.D.	14	N.D.	13	0.229			2.7	3.3		0.89	0.81	0.09											
167	River	P-4	2006/3/20	3.6		N.D.	8.4	N.D.	7.7	N.D.	7.2	0.126			1.8	2		0.84	0.75	0.09											
168	River	P-4	2006/4/19	3.6		0.01	7.8	N.D.	5.5	N.D.	6.5	0.09			1.5	1.2		0.71	0.62	0.09											
169	River	P-4	2006/5/22	4		N.D.	8.2	N.D.	7.7	N.D.	7.8	0.126			1.3	1.8		0.74	0.66	0.08											
170	River	P-4	2006/6/22	4.1		N.D.	7.8	N.D.	12	N.D.	11	0.197			3.2	2.9		0.82	0.73	0.09											
171	River	P-4	2006/7/21	1.5		0.05	7.5	N.D.	11	N.D.	13	0.18			2.9	2.3		0.80	0.70	0.10											
172	River	P-4	2006/8/21	3.7		0.01	7.8	N.D.	13	N.D.	12	0.213			2.7	3		0.83	0.74	0.09											
173	River	P-4	2006/9/20	3.6		0.01	7.8	N.D.	11	N.D.	10	0.18			3.1	2.6		0.83	0.71	0.12											

Table 3.2 Chemical and isotopic composition of river, precipitation, spring and groundwater of shallow boreholes (5/14)

Index	Sampling point		Sampling date	Analyzing date	Physico-chemical parameter					Geochemistry																			
					EC at site	EC at lab	pH at site	pH at lab	Tempe-rature at site	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T.Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-
					[mS/m]	[mS/m]			[℃]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
174	River	P-4	2006/10/17	2006/10/18-10/31	9.72	9.6	6.7	6.9	8.9	11	2.9	2.5	1.8		N.D.	N.D.	47		0.02	N.D.	N.D.	N.D.	0.1		0.02	0.02	14	N.D.	N.D.
175	River	P-4	2006/11/21	2006/11/24-12/6	12.24	9.1	7.65	7	2.4	11	2	2.2	1.6		N.D.	N.D.	54		0.02	N.D.	N.D.	N.D.	0.03		0.03	0.03	13	N.D.	N.D.
176	River	P-4	2006/12/19	2007/1/17-2/1	9.84	9.6	7.49	7	1.8	12	2	1.9	1.5		N.D.	N.D.	57		0.01	N.D.	N.D.	N.D.	0.04		0.02	0.02	13	N.D.	N.D.
177	River	P-4	2007/1/16	2007/1/18-2/1	10.47	10	8.38	7.2	1.5	12	2.2	2.2	1.7		N.D.	N.D.	53		0.01	N.D.	N.D.	N.D.	0.05		0.01	0.02	14	N.D.	N.D.
178	River	P-4	2007/2/16	2007/2/20-3/2	11.17	10	8.11	7	0	13	2.4	2.4	1.9		N.D.	N.D.	50		0.02	N.D.	N.D.	N.D.	0.07		0.01	N.D.	14	N.D.	N.D.
179	River	P-4	2007/3/28	2007/5/10-5/23		9.6		6.9		11	2.1	2.3	1.7		N.D.	N.D.	43		0.02	N.D.	N.D.	N.D.	0.03		0.01	0.03	15	N.D.	N.D.
180	River	P-4	2007/4/17	2007/5/10-5/23		8.5		6.7		10	1.7	2.1	1.6		N.D.	N.D.	49		0.02	N.D.	N.D.	N.D.	0.02		0.01	0.03	13	N.D.	N.D.
181	River	P-4	2007/5/22	2007/5/23-6/5		9.2		7.3		12	2.1	2	1.7		N.D.	N.D.	53		0.02	N.D.	N.D.	N.D.	0.06		0.01	0.04	13	N.D.	N.D.
182	River	P-4	2007/6/20	2007/6/26-7/11		9.8		7.3		12	1.6	2.2	1.8		N.D.	N.D.	57		0.02	N.D.	N.D.	N.D.	0.11		0.01	0.02	13	N.D.	N.D.
183	River	P-4	2007/7/23	2007/7/24-8/6		11		7.4		13	2.1	2.1	1.7		N.D.	N.D.	56		0.01	N.D.	N.D.	N.D.	0.09		N.D.	0.06	14	0.1	N.D.
184	River	P-4	2007/8/21	2007/8/22-9/13		10		7.1		14	2.3	2.5	1.9		N.D.	0.01	57		0.02	N.D.	N.D.	N.D.	0.17		0.01	0.02	14	N.D.	N.D.
185	River	P-4	2007/9/20	2007/9/21-10/17		11		7.2		12	3.2	2.9	2		0.02	0.02	43		0.04	N.D.	N.D.	N.D.	0.24		0.03	0.04	13	N.D.	N.D.
186	River	P-4	2007/10/18	2007/10/19-11/2		9.8		7.2		12	2	2	1.6		0.01	0.01	45		0.02	N.D.	N.D.	N.D.	0.07		0.01	0.02	14	N.D.	N.D.
187	River	P-4	2007/11/20	2007/11/21-12/5		9.8		7.1		12	2.2	2.2	1.6		N.D.	N.D.	53		0.02	N.D.	N.D.	N.D.	0.04		N.D.	0.03	14	N.D.	N.D.
188	River	P-4	2007/12/17	2007/12/25-2008/1/17		9.6		7		12	2	2.2	1.6		N.D.	0.01	56		0.02	N.D.	N.D.	N.D.	0.05		N.D.	0.01	13	N.D.	N.D.
189	River	P-4	2008/1/16	2008/1/23-2/6		11		7		14	2.4	1.8	1.4		N.D.	0.02	56		0.06	N.D.	N.D.	N.D.	0.14		0.01	0.03	14	N.D.	N.D.
190	River	P-4	2008/2/14	2008/2/18-3/3		11		7.2		15	2.7	3	2.2		N.D.	0.02	48		0.03	N.D.	N.D.	N.D.	0.09		0.01	0.03	15	N.D.	N.D.
191	River	P-4	2008/6/20	2008/9/22-11/5		9.3		7.1		12	2.1	2.2	1.8		N.D.	0.01	43		0.05	N.D.	N.D.	N.D.	0.12		0.02	0.02	12	N.D.	N.D.
192	River	P-4	2008/12/25	2009/1/13-1/28		9.3		6.9		11	1.8	2.1	1.7		N.D.	N.D.	56		0.02	N.D.	N.D.	N.D.	0.07		N.D.	0.01	13	N.D.	N.D.
193	River	P-4	2009/8/6	2009/8/11		8.2		6.9		11	1.6	1.8	1.6		<0.01	<0.1	21		0.02	<0.01	<0.1	<0.01	0.13		<0.1	<0.1	14	<0.1	<1.0
194	River	P-4	2009/12/21	2009/12/24		8.3		7		12	1.8	1.8	1.6		<0.01	<0.1	25		0.03	<0.01	<0.1	<0.01	0.1		<0.1	<0.1	13	<0.1	<1.0
195	River	P-4-1	2009/12/4	2009/12/15	122	8.7	6.46	6.7	4.6	12	1.8	2	1.7		<0.01	<0.1	25		0.02	<0.01	0.7	<0.01	0.04		<0.1	<0.1	13	<0.1	<1.0
196	River	P-4-2	2009/12/4	2009/12/15	130.6	9	7.04	6.8	6	12	1.8	2.1	1.8		<0.01	<0.1	26		0.02	<0.01	0.2	<0.01	0.06		<0.1	<0.1	13	<0.1	<1.0
197	River	P-4-3	2009/12/4	2009/12/15	128.6	9.7	6.24	6.2	6	13	1.8	1.9	1.7		<0.01	<0.1	27		0.02	<0.01	0.3	<0.01	0.05		<0.1	<0.1	14	<0.1	<1.0
198	River	P-4	2010/10/20	2010/10/26-2011/1/19		9.4		6.9	24.1	11	1.8	2.2	1.7		<0.01	<0.1	25		0.02		<0.1		0.46		0.04	<0.1	13	<0.1	<1.0
199	River	P-4	2011/2/9	2011/2/17-3/25		10		7	20	13	1.9	2.2	1.7		<0.01	<0.1	23		0.02		<0.1		0.26		0.01	<0.1	14	<0.1	<1.0
200	River	P-5	2004/5/20	2004/7/28-8/24	9.05	8.6	6.86	6.8	12.5	12	1.8	2.2	1.5		N.D.	N.D.	34		0.02	N.D.	N.D.	N.D.	0.07		0.02	0.02	14	N.D.	N.D.
201	River	P-5	2004/6/22	2004/7/28-8/24	10.67	10	6.93	7	15.2	14	2.4	2.8	1.8		N.D.	0.01	36		0.02	N.D.	N.D.	N.D.	0.19		0.01	0.02	15	N.D.	N.D.
202	River	P-5	2004/7/20	2004/7/28-8/24	10.74	11	6.95	7.3	16.6	14	2.1	2.9	1.9		N.D.	0.01	36		0.02	N.D.	N.D.	N.D.	0.36		0.02	0.03	15	N.D.	N.D.
203	River	P-5	2004/7/26	2004/7/29-8/24	11.29	11	6.9	7.1	17																				
204	River	P-5	2004/8/20	2004/8/26-9/3	10.37	9.9	7	7.2	14.7	13	2	2.3	1.5		N.D.	0.01	38		0.02	N.D.	N.D.	N.D.	0.25		0.02	0.02	16	N.D.	N.D.
205	River	P-5	2004/9/14	2004/9/25-10/6	7.35	7.5	6.82	6.8	12.1	9	1.8	1.8	1.2		N.D.	N.D.	24		0.02	N.D.	N.D.	N.D.	0.16		0.08	0.05	12	N.D.	N.D.
206	River	P-5	2004/9/17	2004/9/25-10/6	8.61	8.6	7.08	6.9	10.9	11	1.7	1.9	1.4		N.D.	N.D.	38		0.02	N.D.	N.D.	N.D.	0.12		0.02	0.02	14	N.D.	N.D.
207	River	P-5	2004/10/13	2004/10/21-11/4	11.37	11	6.89	7.2	12	14	3	2.8	1.9		N.D.	0.01	31		0.02	N.D.	N.D.	N.D.	0.27		0.02	0.02	18	N.D.	N.D.
208	River	P-5	2004/10/14	2004/10/21-11/4	11.01	11	7.23	7.3	9.5	14	2.2	2.7	1.7		N.D.	0.01	35		0.02	N.D.	N.D.	N.D.	0.28		0.02	0.02	17	N.D.	N.D.
209	River	P-5	2004/11/9	2004/11/18-11/26	102	9.9	7.56	6.9	6.2																				
210	River	P-5	2004/11/12	2004/11/18-11/30	8.45	8.2	6.9	6.7	7.4																				
211	River	P-5	2004/11/19	2004/11/30-12/10	9.89	9.4	7.26	7.1	4.8	12	1.8	2.5	1.5		N.D.	N.D.	37		0.02	N.D.	N.D.	N.D.	0.13		0.02	0.01	15	N.D.	N.D.
212	River	P-5	2004/12/7	2004/12/10-12/16	12.92	9.8	6.46	6.8	0																				
213	River	P-5	2004/12/22	2004/12/27-1/13	9.88	11	6.97	7.1	0	13	1.9	2.8	1.8		0.02	N.D.	39		0.03	N.D.	N.D.	N.D.	0.11		0.02	N.D.	18	N.D.	N.D.
214	River	P-5	2005/1/20	2005/1/26-1/29	13.28	12	6.92	7.1	0	15	2.1	3.3	2.3		0.01	0.01	34		0.02	N.D.	N.D.	N.D.	0.1		0.02	0.02	18	0.1	0.01
215	River	P-5	2005/2/18	2005/2/22-3/5	13.64	14	7.44	7	0	17	2.4	3.3	2.4		0.01	0.02	31		0.02	N.D.	N.D.	N.D.	0.16		0.02	0.02	20	N.D.	0.01
216	River	P-5	2005/3/18	2005/7/23-8/19	12.92	12	6.46	6.7	0	14	2.3	3.3	2.4		N.D.	N.D.	26		0.02	N.D.	N.D.	N.D.	0.02		0.01	0.03	21	N.D.	N.D.
217	River	P-5	2005/4/19	2005/7/23-8/19	7.87	7.8	6.19	6.6	6.3	9.2	1.5	2	1.3		N.D.	N.D.	29		0.02	N.D.	N.D.	N.D.	0.03		0.02	0.03	13	N.D.	N.D.
218	River	P-5	2005/5/19	2005/7/23-8/19		6.8		6.6		8.5	1.5	1.8	1.2		N.D.	N.D.	21		0.01	N.D.	N.D.	N.D.	0.09		0.05	0.02	11	N.D.	N.D.
219	River	P-5	2005/5/20	2005/7/23-8/19	15.6	7.4	6.56	6.8	9.5	8.8	1.3	1.8	1.1		N.D.	N.D.	30		0.01	N.D.	N.D.	N.D.	0.05		0.02	0.02	13	N.D.	N.D.
220	River	P-5	2005/6/20	2005/7/23-8/19	11.23	11	6.92	7.2	17.1	16	2.2	2.7	1.8		N.D.	0.01	35		0.02	N.D.	N.D.	N.D.	0.19		0.02	0.03	17	N.D.	N.D.
221	River	P-5	2005/7/21	2005/7/23-8/19	12.99	13	7.27	7.4	18.9	19	2.9	2.9	2		N.D.	0.02	39		0.02	N.D.	N.D.	N.D.	0.35		0.02	0.04	20	N.D.	N.D.
222	River	P-5	2005/8/19	2005/9/22-10/5	12.54	13	7.29	7.3	20.6	17	2.6	3.2	2.1		N.D.	0.01	35		0.02	N.D.	N.D.	N.D.	0.33		0.02	0.04	18	0.1	N.D.
223	River	P-5	2005/9/7 11:30	2005/10/31-11/10		12		7.1																					
224	River	P-5	2005/9/7 22:17	2005/10/31-11/10		10		6.8																					
225	River	P-5	2005/9/8 0:36	2005/9/22-10/5		10		6.8																					
226	River	P-5	2005/9/8 1:45	2005/9/22-10/5		9		6.5																					
227	River	P-5	2005/9/8 2:59	2005/9/22-10/5		7.6		6.5																					
228	River	P-5	2005/9/8 4:17	2005/9/22-10/5		7.2		6.4																					
229	River	P-5	2005/9/8 5:32	2005/9/22-10/5		7.2		6.4																					
230	River	P-5	2005/9/8 6:58	2005/9/22-10/5		7.1		6.3																					
231	River	P-5	2005/9/8 8:18	2005/9/22-10/5		7.1		6.4																					
232	River	P-5	2005/9/8 9:30	2005/9/22-10/5		7.2		6.4																					
233	River	P-5	2005/9/8 11:25	2005/9/22-10/5		7.5		6.5																					
234	River	P-5	2005/9/8 12:37	2005/9/22-10/5		7.6		6.6																					
235	River	P-5	2005/9/8 13:50	2005/9/22-10/5		7.7		6.6																					
236	River	P-5	2005/9/8 15:05	2005/9/22-10/5		7.8		6.6																					
237	River	P-5	2005/9/8 16:30	2005/9/22-10/5		8		6.7																					
238	River	P-5	2005/9/9 16:35	2005/10/31-11/10		8.7		6.8																					
239	River	P-5	2005/9/20	2005/9/22-10/5	9.46	9.5	7.24	7.3	12.1	12	1.9	2.6	1.7		0.01	N.D.	34		0.03	N.D.	N.D.	N.D.	0.15		0.03	0.03	14	N.D.	N.D.
240	River	P-5	2005/10/20	2005/10/31-11/10	10.77	11	6.9	7.3	5.7	13	1.9	3	2		N.D.	0.01	37		0.02	N.D.	N.D.	N.D.	0.15		0.01	0.04	15	N.D.	N.D.
241	River	P-5	2005/11/21	2005/12/10-12/27	11.16	11	7.37	7.8	1	13	1.9	2.8	2		N.D.	0.01	33		0.02	N.D.	N.D.	N.D.	0.17		0.02	0.04	16	N.D.	N.D.
242	River	P-5	2005/12/20	2005/12/27-2006/1/17	11.76	11	6.48	6.8	0	14	1.9	3.1	2.1		0.01	0.01	36		0.02	N.D.	N.D.	N.D.	0.11		0.01	0.03	17	N.D.	N.D.
243	River	P-5	2006/1/23	2006/1/31-2/13	13.57	13	6.59	7	-0.1	16	2.1	3.5	2.4		0.01	0.02	35		0.02	N.D.	N.D.	N.D.	0.11		0.01	0.01	18	N.D.	N.D.
244	River	P-5	2006/2/20	2006/2/22-3/1	13.88	13	7.16	7.1	-0.1	16	2.4	3.4	2.4		0.01	0.02	35		0.02	N.D.	N.D.	N.D.	0.14		N.D.	0.02	18	0.1	N.D.
245	River	P-5	2006/3/20	2006/8/22-9/29	11.47	11	6.72	7	0	13	1.9	3	2		N.D.	N.D.	30		0.02	N.D.	N.D.	N.D.	N.D.		0.01	0.03	17	N.D.	N.D.
246	River	P-5	2006/4/19	2006/8/22-9/29	9.29	9	7.67	7.4	4.6	11	1.5	2.3	1.6		N.D.	N.D.	29		0.01	N.D.	N.D.	N.D.	N.D.		N.D.	0.03	15	N.D.	N.D.
247	River	P-5	2006/5/22	2006/8/22-9/29	7.93	7.9	7.14	7	10.7	10	1.4	1.8	1.1		N.D.	N.D.	36		0.01	N.D.	N.D.	N.D.	0.02		0.01	0.09	13	N.D.	N.D.
248	River	P-5	2006/6/22	2006/8/22-9/29	9.51	9.6	7.73	7.2	12.3	13	2	2.4	1.6		N.D.	N.D.	33		0.01	N.D.	N.D.	N.D.	0.09		0.02	0.04	13	N.D.	N.D.
249	River	P-5	2006/7/21	2006/8/22-9/29	9.69	9.6	7.34	7.7	15.3	13	1.8	2.4	1.5		N.D.	N.D.	34		0.01	N.D.	N.D.	N.D.	0.1		N.D.	0.04	14	N.D.	N.D.
250	River	P-5	2006/8/18 11:00	2006/11/16-12/14		10.1		7.3																					
251	River	P-5	2006/8/21	2006/8/22-9/29	10.45	10	7.02	7.3	18.1	14	2.2	2.8	1.7		N.D.	N.D.	38		0.02	N.D.	N.D.	N.D.	0.15		0.01	0.04	15	N.D.	N.D.
252	River	P-5	2006/8/21 13:30	2006/11/16-11/29		11		7.3																					
253	River	P-5	2006/8/21 16:30	2006/11/16-11/29		11		7.3																					
254	River	P-5	2006/8/21 19:30	2006/11/16-12/14		10		7.2																					
255	River	P-5	2006/8/21 21:30	2006/11/16-12/14		10		7.2																					
256	River	P-5	2006/8/21 23:30	2006/11/16-12/14		10		7.1																					
257	River	P-5	2006/8/22 1:30	2006/11/16-12/14		9.3		7.1																					
258	River	P-5	2006/8/22 2:30	2006/11/16-12/14		9		7																					
259	River	P-5	2006/8/22 3:30	2006/11/16-12/14		9.6		7.2																					
260	River	P-5	2006/8/22 4:30	2006/11/16-12/14		9.5		7.2																					

Table 3.2 Chemical and isotopic composition of river, precipitation, spring and groundwater of shallow boreholes (6/14)

Index	Sampling point		Sampling date	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M Alkalinity	M Alkalinity	P Alkalinity	P Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Tracer (uranine)	Tracer (Na-naphtionate)	Isotope ^3H	Isotope δD	Isotope $\delta^{18}O$	Chromaticity Suspended solids	Chromaticity Total solids	Chromaticity Ignition loss	Chromaticity Spectral values y	Chromaticity Chromaticity coordinates x,y	Turbidity
				[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]		[meq/l]	[meq/l]	[%]	[mg/l]	[mg/l]	[T.U]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]			[NTU]
174	River	P-4	2006/10/17	3.6		N.D.	8.2	N.D.	8.8	N.D.	8.4	0.144			3.6	2.3		0.82	0.71	0.11				-62.8	-10						
175	River	P-4	2006/11/21	4.7		0.05	8.4	N.D.	8.3	N.D.	7.8	0.136			1.7	2		0.77	0.68	0.09											
176	River	P-4	2006/12/19	4.2		0.03	8.5	N.D.	10	N.D.	9.6	0.164			1.6	2.5		0.79	0.71	0.08											
177	River	P-4	2007/1/16	4.3		0.07	8.5	N.D.	12	N.D.	11	0.197			2	2.7		0.83	0.77	0.06		0.0067									
178	River	P-4	2007/2/16	4.1		0.05	8.4	N.D.	14	N.D.	12	0.229			2.3	3.3		0.90	0.80	0.10											
179	River	P-4	2007/3/28	3.9		N.D.	8.6	N.D.	7.5	N.D.	7.4	0.123			2.1	1.9		0.79	0.72	0.07											
180	River	P-4	2007/4/17	5		0.02	8	N.D.	5.7	N.D.	5.4	0.093			1.6	1.7		0.72	0.63	0.09											
181	River	P-4	2007/5/22	4		0.01	8.2	N.D.	10	N.D.	9.4	0.164			2.3	2.3		0.82	0.70	0.11											
182	River	P-4	2007/6/20	3.6		0.02	8.5	N.D.	11	N.D.	11	0.18			2.2	2.5		0.82	0.72	0.10											
183	River	P-4	2007/7/23	3.1		0.03	8.7	N.D.	13	N.D.	13	0.213			3	2.9		0.86	0.79	0.08											
184	River	P-4	2007/8/21	2.7		0.1	7.9	N.D.	16	N.D.	16	0.262			4	3.8		0.95	0.82	0.13											
185	River	P-4	2007/9/20	1.9		0.03	11	N.D.	14	N.D.	13	0.229			5.3	3.3		0.91	0.83	0.09											
186	River	P-4	2007/10/18	3.3		N.D.	9.4	N.D.	12	N.D.	10	0.197			1.9	2.7		0.80	0.79	0.01											
187	River	P-4	2007/11/20	3.5		0.04	9.3	N.D.	11	N.D.	9.8	0.18			1.8	2.5		0.82	0.77	0.05											
188	River	P-4	2007/12/17	4		0.01	8.9	N.D.	10	N.D.	9.5	0.164			1.5	2.5		0.82	0.72	0.10											
189	River	P-4	2008/1/16	4.1		0.1	9.1	N.D.	14	N.D.	13	0.229			2.3	3.5		0.88	0.81	0.06											
190	River	P-4	2008/2/14	4.2		0.06	9.2	N.D.	16	N.D.	15	0.262			2.4	3.8		1.05	0.88	0.18											
191	River	P-4	2008/6/20	2.9		0.03	6.7	N.D.	13	N.D.	13	0.213			5.1	3		0.83	0.69	0.14											
192	River	P-4	2008/12/25	4.2		0.04	8.9	N.D.	8.3	N.D.	8	0.136			1.4	2.1		0.77	0.69	0.08		0.0044	5.2±0.1	-68.3	-10.1						
193	River	P-4	2009/8/6	4.2		<0.2	9	<0.1	12	<0.5	8				2.3	3		0.74	0.85	-0.11	<2	<1	4.70±0.12	-71.5	-11.4						
194	River	P-4	2009/12/21	3.7		<0.2	7.8	<0.1	8.2	<0.5	10				1.4	2		0.79	0.72	0.07	<2	<1	5.08±0.14	-70.3	-11.4						
195	River	P-4-1	2009/12/4	4.9		<0.2	8.7	<0.1	11	<0.5	9				1.2	3		0.81	0.81	0.00	<2	<1	4.49±0.11	-71.5	-11.3						
196	River	P-4-2	2009/12/4	4.4		<0.2	8.4	<0.1	11	<0.5	10				1.1	3		0.82	0.79	0.03	<2	<1	3.93±0.11	-72.4	-11.3						
197	River	P-4-3	2009/12/4	4.3		<0.2	8.2	<0.1	11	<0.5	10				0.8	5		0.85	0.82	0.03	<2	<1	4.13±0.11	-72.4	-11.3						
198	River	P-4	2010/10/20	3.2		<0.2	8.3	<0.1	8.8	<0.1	9.1				2.3	2.3		0.77	0.74	0.04			5.1±0.1	-69	-10.5						
199	River	P-4	2011/2/9	3.7		<0.2	8.8	<0.1	13	<0.1	10				2.3	3.08		0.86	0.85	0.01			4.9±0.1	-67	-10.9						
200	River	P-5	2004/5/20	1.2		0.03	7.3	N.D.	11	N.D.	10	0.18			2.3	3.1		0.80	0.73	0.07						15	110	3	95	0.32,0.33	7
201	River	P-5	2004/6/22	1.4		0.04	8.3	N.D.	19	N.D.	16	0.311			3.9	4.5		0.96	0.91	0.05						8	110	3	92	0.32,0.33	2
202	River	P-5	2004/7/20	0.89		0.04	7.4	N.D.	19	N.D.	17	0.311			3.9	4.3		0.96	0.89	0.08						3	110	1	91	0.33,0.34	N.D.
203	River	P-5	2004/7/26																							90	200	18	88	0.33,0.34	85
204	River	P-5	2004/8/20	1.2		N.D.	8	N.D.	12	N.D.	12	0.197			3.7	2.9		0.85	0.82	0.04						3	110	N.D.	95	0.32,0.33	3
205	River	P-5	2004/9/14	1.7		0.02	6.2	N.D.	5.8	N.D.	6.9	0.095			5.6	1.6		0.63	0.56	0.06						250	330	30	91	0.33,0.34	170
206	River	P-5	2004/9/17	1.2		0.03	7	N.D.	8.9	N.D.	9.2	0.146			2.5	2.3		0.73	0.69	0.04						5	100	1	96	0.32,0.33	2
207	River	P-5	2004/10/13	0.47		0.15	9.2	N.D.	17	N.D.	16	0.279			4.6	3.8		0.98	0.98	0.00						7	120	2	92	0.33,0.34	8
208	River	P-5	2004/10/14	0.36		0.06	9.1	N.D.	17	N.D.	16	0.279			4	3.7		0.94	0.95	-0.01											
209	River	P-5	2004/11/9																							11	110	2	92	0.33,0.34	8
210	River	P-5	2004/11/12																							80	160	10	94	0.32,0.33	54
211	River	P-5	2004/11/19	1.3		0.05	7.9	N.D.	12	N.D.	11	0.197			2.4	2.7		0.82	0.78	0.03						3	97	1	96	0.32,0.33	1
212	River	P-5	2004/12/7																							37	120	7	96	0.32,0.33	21
213	River	P-5	2004/12/22	1.3		0.11	9.1	N.D.	14	N.D.	12	0.229			2.3	3.2		0.90	0.93	-0.02											
214	River	P-5	2005/1/20	1.4		0.19	9.7	N.D.	19	N.D.	17	0.311			2.5	4.5		1.06	1.02	0.04											
215	River	P-5	2005/2/18	1.5		0.29	10	N.D.	22	N.D.	19	0.361			2.6	5.5		1.16	1.13	0.03											
216	River	P-5	2005/3/18	3.3		N.D.	9.9	N.D.	12	N.D.	10	0.197			2.4	3.4		1.03	1.00	0.04											
217	River	P-5	2005/4/19	2.1		N.D.	6.6	N.D.	5.5	N.D.	5.1	0.09			2	1.7		0.64	0.59	0.05											
218	River	P-5	2005/5/19	2.4		N.D.	6	N.D.	3.9	N.D.	4.2	0.064			4	1.2		0.60	0.50	0.10						180	260	20	93	0.32,0.33	120
219	River	P-5	2005/5/20	1.8		0.04	6.2	N.D.	5.3	N.D.	4.8	0.087			2.4	1.5		0.60	0.58	0.01											
220	River	P-5	2005/6/20	1		0.01	8.2	N.D.	17	N.D.	15	0.279			3.8	4		1.04	0.93	0.11											
221	River	P-5	2005/7/21	1.5		N.D.	8.6	N.D.	20	N.D.	18	0.328			5.5	4.4		1.21	1.07	0.14											
222	River	P-5	2005/8/19	1.7		N.D.	7.7	N.D.	22	N.D.	19	0.361			4.9	4.9		1.14	1.03	0.11											
223	River	P-5	2005/9/7 11:30																							10	120	2	95	0.32,0.33	6
224	River	P-5	2005/9/7 22:17																							56	160	10	94	0.32,0.33	43
225	River	P-5	2005/9/8 0:36																							130	230	22	89	0.33,0.35	110
226	River	P-5	2005/9/8 1:45																							230	340	37	87	0.34,0.35	190
227	River	P-5	2005/9/8 2:59																							350	430	56	86	0.34,0.35	270
228	River	P-5	2005/9/8 4:17																							350	420	54	86	0.34,0.35	260
229	River	P-5	2005/9/8 5:32																							420	520	57	87	0.34,0.35	310
230	River	P-5	2005/9/8 6:58																							560	660	77	88	0.34,0.35	440
231	River	P-5	2005/9/8 8:18																							420	530	59	89	0.33,0.35	340
232	River	P-5	2005/9/8 9:30																							330	430	41	89	0.33,0.35	260
233	River	P-5	2005/9/8 11:25																							250	330	28	91	0.33,0.34	200
234	River	P-5	2005/9/8 12:37																							190	300	21	91	0.33,0.34	160
235	River	P-5	2005/9/8 13:50																							160	250	18	91	0.33,0.34	130
236	River	P-5	2005/9/8 15:05																							130	220	16	92	0.33,0.34	110
237	River	P-5	2005/9/8 16:30																							110	200	12	92	0.33,0.34	88
238	River	P-5	2005/9/9 16:35																							17	100	3	95	0.32,0.33	12
239	River	P-5	2005/9/20	1		0.03	8.1	N.D.	12	N.D.	12	0.197			3.7	2.8		0.84	0.76	0.08											
240	River	P-5	2005/10/20	0.64		0.04	8.6	N.D.	17	N.D.	15	0.279			3.1	3.7		0.93	0.88	0.05											
241	River	P-5	2005/11/21	0.37		N.D.	9.2	N.D.	15	N.D.	14	0.246			2.8	3		0.92	0.89	0.03											
242	River	P-5	2005/12/20	1.2		0.11	9.5	N.D.	14	N.D.	15	0.229			2.4	3.9		0.99	0.91	0.08											
243	River	P-5	2006/1/23	1.4		0.27	10	N.D.	22	N.D.	19	0.361			2.5	5.3		1.12	1.08	0.05											
244	River	P-5	2006/2/20	1.5		0.28	10	N.D.	23	N.D.	20	0.377			2.9	5.5		1.12	1.09	0.03											
245	River	P-5	2006/3/20	2.5		N.D.	9.2	N.D.	10	N.D.	9.5	0.164			1.7	2.5		0.93	0.84	0.09											
246	River	P-5	2006/4/19	1.1		0.03	7.6	N.D.	6.8	N.D.	7.6	0.111			1.6	1.5		0.76	0.69	0.07											
247	River	P-5	2006/5/22	1.3		N.D.	6.9	N.D.	7.4	N.D.	7	0.121			1.5	1.8		0.65	0.63	0.02											
248	River	P-5	2006/6/22	1.2		0.01	8.2	N.D.	15	N.D.	13	0.246			3.7	3.4		0.87	0.78	0.08											
249	River	P-5	2006/7/21	0.08		0.05	7.2	N.D.	14	N.D.	14	0.229			3.2	3		0.85	0.77	0.08											
250	River	P-5	2006/8/18 11:00																							12	110	4	92	0.33,0.34	4
251	River	P-5	2006/8/21	1.1		0.08	7.3	N.D.	17	N.D.	16	0.279			4.1	3.8		0.94	0.85	0.09											
252	River	P-5	2006/8/21 13:30																							9	110	1	94	0.32,0.33	3
253	River	P-5	2006/8/21 16:30																							8	100	1	95	0.32,0.33	3
254	River	P-5	2006/8/21 19:30																							10	110	1	95	0.32,0.33	4
255	River	P-5	2006/8/21 21:30																							26	120	4	94	0.32,0.33	15
256	River	P-5	2006/8/21 23:30																							110	190	13	94	0.33,0.34	73
257	River	P-5	2006/8/22 1:30																							93	180	16	91	0.33,0.34	68
258	River	P-5	2006/8/22 2:30																							82	170	12	92	0.33,0.34	61
259	River	P-5	2006/8/22 3:30																							120	220	15	89	0.33,0.34	120
260	River	P-5	2006/8/22 4:30																							66	150	11	91	0.33,0.34	56

Table 3.2 Chemical and isotopic composition of river, precipitation, spring and groundwater of shallow boreholes (7/14)

Index	Sampling point		Sampling date	Analyzing date	Physico-chemical parameter					Geochemistry																			
					EC at site	EC at lab	pH at site	pH at lab	Temperature at site	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T.Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-
					[mS/m]	[mS/m]			[℃]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
261	River	P-5	2006/8/22 5:30	2006/11/16-12/14		9.3		7.1																					
262	River	P-5	2006/8/22 6:30	2006/11/16-12/14		9.4		7.1																					
263	River	P-5	2006/8/22 7:30	2006/11/16-12/14		9		6.9																					
264	River	P-5	2006/8/22 8:30	2006/11/16-12/14		8.5		7.1																					
265	River	P-5	2006/8/22 9:30	2006/11/16-12/14		8.4		7.1																					
266	River	P-5	2006/8/22 10:30	2006/11/16-12/14		8		7																					
267	River	P-5	2006/8/22 11:30	2006/11/16-12/14		7.8		7																					
268	River	P-5	2006/8/22 12:30	2006/11/16-12/14		7.3		6.8																					
269	River	P-5	2006/8/22 13:30	2006/11/16-12/14		7.2		6.8																					
270	River	P-5	2006/8/22 14:30	2006/11/16-12/14		7.4		6.9																					
271	River	P-5	2006/8/22 16:30	2006/11/16-12/14		7.6		6.9																					
272	River	P-5	2006/8/22 18:30	2006/11/16-12/14		7.9		7																					
273	River	P-5	2006/8/22 21:30	2006/11/16-12/14		7.9		7																					
274	River	P-5	2006/8/23 0:30	2006/11/16-12/14		7.9		7.1																					
275	River	P-5	2006/8/23 3:30	2006/11/16-12/14		8.1		7.1																					
276	River	P-5	2006/8/24 15:10	2006/11/16-12/14		8		7																					
277	River	P-5	2006/8/24 21:10	2006/11/16-12/14		7.5		6.9																					
278	River	P-5	2006/8/25 3:10	2006/11/16-12/14		7.8		7																					
279	River	P-5	2006/8/25 5:10	2006/11/16-12/14		7.8		7																					
280	River	P-5	2006/8/25 6:10	2006/11/16-12/14		7.9		7																					
281	River	P-5	2006/8/25 7:10	2006/11/16-12/14		7.9		7																					
282	River	P-5	2006/8/25 8:10	2006/11/16-12/14		8		7																					
283	River	P-5	2006/8/25 9:10	2006/11/16-12/14		8		7																					
284	River	P-5	2006/9/20	2006/9/21-10/5	10.21	10	7.04	7.4	15	13	2.2	2.9	1.8		N.D.	0.01	38		0.02	N.D.	N.D.	N.D.	0.14		0.03	0.03	14	N.D.	N.D.
285	River	P-5	2006/10/11 13:00	2007/11/13-11/26		9		7.1																					
286	River	P-5	2006/10/11 16:00	2007/11/13-11/26		9.1		7																					
287	River	P-5	2006/10/11 19:00	2007/11/13-11/26		9		7.1																					
288	River	P-5	2006/10/11 21:00	2007/11/13-11/26		9		7.1																					
289	River	P-5	2006/10/11 23:00	2007/11/13-11/26		9		7.1																					
290	River	P-5	2006/10/12 0:00	2007/11/13-11/26		9		7.1																					
291	River	P-5	2006/10/12 1:00	2007/11/13-11/26		9		7.1																					
292	River	P-5	2006/10/12 2:00	2007/11/13-11/26		9		7.1																					
293	River	P-5	2006/10/12 3:00	2007/11/13-11/26		9		7.1																					
294	River	P-5	2006/10/12 4:00	2007/11/13-11/26		9		7.1																					
295	River	P-5	2006/10/12 5:00	2007/11/13-11/26		9		7.1																					
296	River	P-5	2006/10/12 6:00	2007/11/13-11/26		9		7.1																					
297	River	P-5	2006/10/12 7:00	2007/11/13-11/26		9		7.1																					
298	River	P-5	2006/10/12 8:00	2007/11/13-11/26		9		7.2																					
299	River	P-5	2006/10/12 9:00	2007/11/13-11/26		9.1		7.2																					
300	River	P-5	2006/10/12 10:00	2007/11/13-11/26		9.1		7.1																					
301	River	P-5	2006/10/12 11:00	2007/11/13-11/26		9.2		7.1																					
302	River	P-5	2006/10/12 12:00	2007/11/13-11/26		9.1		7.2																					
303	River	P-5	2006/10/12 14:00	2007/11/13-11/26		9.2		7.2																					
304	River	P-5	2006/10/12 16:00	2007/11/13-11/26		9.2		7.2																					
305	River	P-5	2006/10/12 19:00	2007/11/13-11/26		9.2		7.2																					
306	River	P-5	2006/10/12 22:00	2007/11/13-11/26		9.2		7.2																					
307	River	P-5	2006/10/13 1:00	2007/11/13-11/26		9.2		7.2																					
308	River	P-5	2006/10/17	2006/10/18-10/31		9.4		7.1		11	2.5	2.6	1.7		0.01	N.D.	36		0.02	N.D.	N.D.	N.D.	0.08		0.02	0.03	14	N.D.	N.D.
309	River	P-5	2006/11/10 1:00	2006/11/16-12/14		8.1		6.8																					
310	River	P-5	2006/11/10 4:00	2006/11/16-12/14		8.2		6.9																					
311	River	P-5	2006/11/10 7:00	2006/11/16-12/14		8.2		6.9																					
312	River	P-5	2006/11/10 9:00	2006/11/16-12/14		8.3		6.9																					
313	River	P-5	2006/11/10 11:00	2006/11/16-12/14		8.3		7																					
314	River	P-5	2006/11/10 12:00	2006/11/16-12/14		8.3		7																					
315	River	P-5	2006/11/10 13:00	2006/11/16-12/14		8.3		7																					
316	River	P-5	2006/11/10 15:00	2006/11/16-12/14		8.3		7																					
317	River	P-5	2006/11/10 17:00	2006/11/16-12/14		8.2		6.9																					
318	River	P-5	2006/11/10 19:00	2006/11/16-12/14		8.2		6.9																					
319	River	P-5	2006/11/10 21:00	2006/11/16-12/14		8.3		7																					
320	River	P-5	2006/11/10 23:00	2006/11/16-12/14		8.3		7																					
321	River	P-5	2006/11/11 1:00	2006/11/16-12/14		8.3		7																					
322	River	P-5	2006/11/11 5:00	2006/11/16-12/14		8.3		7																					
323	River	P-5	2006/11/11 14:00	2006/11/16-12/29		8.5		7.1																					
324	River	P-5	2006/11/21	2006/11/24-12/6		9.2		7.1		11	1.6	2.6	1.6		0.01	0.01	38		0.02	N.D.	N.D.	N.D.	0.06		0.05	0.03	14	N.D.	N.D.
325	River	P-5	2006/12/19	2007/1/17-2/1	9.34	11	7.07	7.1	0	14	1.9	2.9	1.9		N.D.	0.01	38		0.02	N.D.	N.D.	N.D.	0.05		0.01	0.03	16	N.D.	N.D.
326	River	P-5	2007/1/16	2007/1/18-2/1	10.04	12	8.01	7.2	0	14	1.9	3.1	2.1		N.D.	0.01	35		0.02	N.D.	N.D.	N.D.	0.05		N.D.	0.03	17	N.D.	N.D.
327	River	P-5	2007/2/16	2007/2/20-3/2	12.67	12	7.22	7.1	0	15	2.3	3.5	2.3		N.D.	0.01	35		0.02	N.D.	N.D.	N.D.	0.07		0.01	0.01	17	N.D.	N.D.
328	River	P-5	2007/3/28	2007/5/10-5/23		10		7		12	1.6	3	1.9		N.D.	N.D.	30		0.02	N.D.	N.D.	N.D.	0.04		0.02	0.02	17	N.D.	N.D.
329	River	P-5	2007/4/17	2007/5/10-5/23		8.4		6.9		10	1.3	2.4	1.5		N.D.	N.D.	33		0.02	N.D.	N.D.	N.D.	0.04		0.02	0.03	14	N.D.	N.D.
330	River	P-5	2007/5/22	2007/5/23-6/5		9.3		7.4		12	1.7	2.5	1.7		N.D.	0.01	34		0.02	N.D.	N.D.	N.D.	0.09		0.01	0.04	14	N.D.	N.D.
331	River	P-5	2007/6/20	2007/6/26-7/11		12		7.5		15	2.1	2.6	1.7		N.D.	0.01	35		0.02	N.D.	N.D.	N.D.	0.14		0.01	0.02	17	N.D.	N.D.
332	River	P-5	2007/7/23	2007/7/24-8/6		13		7.5		17	2.6	3.3	2.2		N.D.	0.01	38		0.02	N.D.	N.D.	N.D.	0.14		N.D.	0.04	18	0.1	N.D.
333	River	P-5	2007/8/21	2007/8/22-9/13		11		7.2		15	2.1	2.6	1.7		N.D.	0.01	38		0.03	N.D.	N.D.	N.D.	0.11		0.01	0.04	16	N.D.	N.D.
334	River	P-5	2007/9/7 15:40	2007/11/13-11/26		13		7.2																					
335	River	P-5	2007/9/7 21:40	2007/11/13-11/26		13		7.3																					
336	River	P-5	2007/9/8 0:40	2007/11/13-11/26		13		7.2																					
337	River	P-5	2007/9/8 2:40	2007/11/13-11/26		13		7.3																					
338	River	P-5	2007/9/8 4:40	2007/11/13-11/26		13		7.2																					
339	River	P-5	2007/9/8 6:40	2007/11/13-11/26		13		6.9																					
340	River	P-5	2007/9/8 8:40	2007/11/13-11/26		13		7.1																					
341	River	P-5	2007/9/8 10:40	2007/11/13-11/26		11		7																					
342	River	P-5	2007/9/8 12:40	2007/11/13-11/26		12		7.1																					
343	River	P-5	2007/9/8 14:40	2007/11/13-11/26		12		7.2																					
344	River	P-5	2007/9/8 16:40	2007/11/13-11/26		12		7.1																					
345	River	P-5	2007/9/8 18:40	2007/11/13-11/26		12		7.2																					
346	River	P-5	2007/9/8 20:40	2007/11/13-11/26		12		7.2																					
347	River	P-5	2007/9/8 22:40	2007/11/13-11/26		12		7.2																					

Table 3.2 Chemical and isotopic composition of river, precipitation, spring and groundwater of shallow boreholes (8/14)

Index	Sampling point		Sampling date	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M Alkalinity	M Alkalinity	P Alkalinity	P Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Tracer (uranine)	Tracer (Na-naphtionate)	Isotope ^3H	Isotope δD	Isotope $\delta^{18}O$	Chromaticity Suspended solids	Chromaticity Total solids	Chromaticity Ignition loss	Chromaticity Spectral values y	Chromaticity coordinates x,y	Turbidity
				[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]		[meq/l]	[meq/l]	[%]	[mg/l]	[mg/l]	[T.U]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]			[NTU]
261	River	P-5	2006/8/22 5:30																							51	140	8	90	0.33,0.34	39
262	River	P-5	2006/8/22 6:30																							190	290	19	90	0.33,0.35	140
263	River	P-5	2006/8/22 7:30																							240	340	28	88	0.34,0.35	170
264	River	P-5	2006/8/22 8:30																							270	360	40	88	0.34,0.35	180
265	River	P-5	2006/8/22 9:30																							390	470	54	89	0.34,0.35	250
266	River	P-5	2006/8/22 10:30																							350	420	42	87	0.34,0.35	230
267	River	P-5	2006/8/22 11:30																							370	420	44	87	0.34,0.35	240
268	River	P-5	2006/8/22 12:30																							340	440	55	88	0.34,0.35	250
269	River	P-5	2006/8/22 13:30																							320	410	50	88	0.34,0.35	220
270	River	P-5	2006/8/22 14:30																							260	350	38	89	0.34,0.35	190
271	River	P-5	2006/8/22 16:30																							190	260	20	91	0.33,0.34	130
272	River	P-5	2006/8/22 18:30																							130	210	18	91	0.33,0.34	91
273	River	P-5	2006/8/22 21:30																							120	180	17	91	0.33,0.34	84
274	River	P-5	2006/8/23 0:30																							71	130	11	92	0.33,0.34	49
275	River	P-5	2006/8/23 3:30																							56	120	9	92	0.33,0.34	37
276	River	P-5	2006/8/24 15:10																							74	160	8	94	0.32,0.33	58
277	River	P-5	2006/8/24 21:10																							170	260	23	92	0.33,0.34	130
278	River	P-5	2006/8/25 3:10																							74	170	6	95	0.32,0.33	46
279	River	P-5	2006/8/25 5:10																							52	180	6	96	0.32,0.33	30
280	River	P-5	2006/8/25 6:10																							49	160	5	96	0.32,0.33	34
281	River	P-5	2006/8/25 7:10																							35	140	4	97	0.32,0.33	20
282	River	P-5	2006/8/25 8:10																							31	120	6	97	0.32,0.33	17
283	River	P-5	2006/8/25 9:10																							30	120	5	97	0.32,0.33	15
284	River	P-5	2006/9/20	1		0.05	7.7	N.D.	17	N.D.	15	0.279			4.1	3.7		0.91	0.83	0.08											
285	River	P-5	2006/10/11 13:00																							34	140	5	97	0.32,0.33	18
286	River	P-5	2006/10/11 16:00																							10	98	2	97	0.32,0.33	6
287	River	P-5	2006/10/11 19:00																							8	100	2	96	0.32,0.32	4
288	River	P-5	2006/10/11 21:00																							7	100	1	97	0.32,0.32	4
289	River	P-5	2006/10/11 23:00																							7	120	1	96	0.32,0.32	4
290	River	P-5	2006/10/12 0:00																							6	120	1	96	0.32,0.32	4
291	River	P-5	2006/10/12 1:00																							17	110	2	97	0.32,0.33	12
292	River	P-5	2006/10/12 2:00																							9	100	2	96	0.32,0.32	6
293	River	P-5	2006/10/12 3:00																							10	100	2	96	0.32,0.33	7
294	River	P-5	2006/10/12 4:00																							12	110	2	97	0.32,0.33	8
295	River	P-5	2006/10/12 5:00																							9	110	2	96	0.31,0.32	6
296	River	P-5	2006/10/12 6:00																							7	100	2	96	0.32,0.33	4
297	River	P-5	2006/10/12 7:00																							7	100	2	97	0.32,0.33	5
298	River	P-5	2006/10/12 8:00																							7	96	2	98	0.32,0.33	4
299	River	P-5	2006/10/12 9:00																							6	100	2	97	0.32,0.33	5
300	River	P-5	2006/10/12 10:00																							7	100	2	96	0.32,0.33	5
301	River	P-5	2006/10/12 11:00																							6	110	2	96	0.32,0.33	4
302	River	P-5	2006/10/12 12:00																							6	110	1	97	0.32,0.33	3
303	River	P-5	2006/10/12 14:00																							7	110	1	97	0.32,0.33	5
304	River	P-5	2006/10/12 16:00																							6	100	2	96	0.32,0.32	3
305	River	P-5	2006/10/12 19:00																							6	100	1	97	0.32,0.32	4
306	River	P-5	2006/10/12 22:00																							5	100	1	96	0.32,0.32	3
307	River	P-5	2006/10/13 1:00																							5	100	1	97	0.32,0.32	3
308	River	P-5	2006/10/17	1.1		0.06	7.9	N.D.	12	N.D.	11	0.197			3.8	2.7		0.81	0.76	0.06				-63.4	-10						
309	River	P-5	2006/11/10 1:00																							86	160	10	94	0.32,0.33	62
310	River	P-5	2006/11/10 4:00																							98	170	11	94	0.32,0.33	54
311	River	P-5	2006/11/10 7:00																							64	140	8	95	0.32,0.33	37
312	River	P-5	2006/11/10 9:00																							110	190	24	94	0.32,0.33	78
313	River	P-5	2006/11/10 11:00																							60	150	6	95	0.32,0.33	43
314	River	P-5	2006/11/10 12:00																							49	140	5	95	0.32,0.33	32
315	River	P-5	2006/11/10 13:00																							59	140	7	96	0.32,0.33	42
316	River	P-5	2006/11/10 15:00																							52	130	6	95	0.32,0.33	41
317	River	P-5	2006/11/10 17:00																							24	110	4	96	0.32,0.33	15
318	River	P-5	2006/11/10 19:00																							24	100	4	97	0.32,0.33	14
319	River	P-5	2006/11/10 21:00																							21	100	4	95	0.32,0.33	12
320	River	P-5	2006/11/10 23:00																							18	100	3	96	0.32,0.33	10
321	River	P-5	2006/11/11 1:00																							16	96	3	95	0.32,0.33	9
322	River	P-5	2006/11/11 5:00																							21	100	4	95	0.32,0.33	10
323	River	P-5	2006/11/11 14:00																							17	99	2	97	0.32,0.32	10
324	River	P-5	2006/11/21	1.5		0.06	7.5	N.D.	11	N.D.	10	0.18			2	2.6		0.78	0.73	0.05											
325	River	P-5	2006/12/19	1.3		0.11	8.6	N.D.	18	N.D.	16	0.295			1.9	4.2		0.96	0.93	0.03											
326	River	P-5	2007/1/16	1.4		0.16	8.9	N.D.	19	N.D.	17	0.311			2.3	4.3		0.99	0.98	0.01		0.0073									
327	River	P-5	2007/2/16	1.4		0.24	9.1	N.D.	21	N.D.	18	0.344			2.4	5		1.08	1.01	0.06											
328	River	P-5	2007/3/28	2.2		0.01	8.2	N.D.	9.4	N.D.	8.6	0.154			1.8	2.3		0.87	0.80	0.07											
329	River	P-5	2007/4/17	2		0.04	7.1	N.D.	7.2	N.D.	6.7	0.118			1.5	1.9		0.71	0.66	0.05											
330	River	P-5	2007/5/22	0.64		0.03	7.9	N.D.	12	N.D.	11	0.197			2.7	2.7		0.83	0.76	0.07											
331	River	P-5	2007/6/20	0.36		0.05	7.7	N.D.	19	N.D.	17	0.311			3.6	4		0.98	0.95	0.03											
332	River	P-5	2007/7/23	1.4		0.11	7.9	N.D.	22	N.D.	20	0.361			4.7	4.8		1.15	1.03	0.12											
333	River	P-5	2007/8/21	0.98		0.06	8	N.D.	18	N.D.	17	0.295			3.6	4.1		0.98	0.91	0.06											
334	River	P-5	2007/9/7 15:40																							16	140	4	95	0.32,0.33	10
335	River	P-5	2007/9/7 21:40																							10	130	3	94	0.32,0.33	5
336	River	P-5	2007/9/8 0:40																							8	120	3	94	0.32,0.33	5
337	River	P-5	2007/9/8 2:40																							9	140	3	93	0.32,0.33	6
338	River	P-5	2007/9/8 4:40																							20	130	5	94	0.32,0.33	12
339	River	P-5	2007/9/8 6:40																							44	160	8	94	0.32,0.33	27
340	River	P-5	2007/9/8 8:40																							48	160	9	92	0.33,0.34	31
341	River	P-5	2007/9/8 10:40																							39	150	9	93	0.33,0.34	25
342	River	P-5	2007/9/8 12:40																							26	140	7	93	0.33,0.34	15
343	River	P-5	2007/9/8 14:40																							16	130	4	93	0.33,0.34	13
344	River	P-5	2007/9/8 16:40																							12	130	3	92	0.33,0.34	10
345	River	P-5	2007/9/8 18:40																							10	120	3	92	0.33,0.34	8
346	River	P-5	2007/9/8 20:40																							11	140	3	92	0.33,0.34	7
347	River	P-5	2007/9/8 22:40																							9	140	3	91	0.33,0.34	7

Table 3.2 Chemical and isotopic composition of river, precipitation, spring and groundwater of shallow boreholes (9/14)

Index	Sampling point		Sampling date	Analyzing date	Physico-chemical parameter					Geochemistry																			
					EC at site	EC at lab	pH at site	pH at lab	Tempe-rature at site	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T.Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-
					[mS/m]	[mS/m]			[℃]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
348	River	P-5	2007/9/9 0:40	2007/11/13-11/26		12		7.3																					
349	River	P-5	2007/9/9 2:40	2007/11/13-11/26		12		7.3																					
350	River	P-5	2007/9/9 4:40	2007/11/13-11/26		12		7.3																					
351	River	P-5	2007/9/9 6:40	2007/11/13-11/26		12		7.3																					
352	River	P-5	2007/9/9 8:40	2007/11/13-11/26		12		7.3																					
353	River	P-5	2007/9/9 10:40	2007/11/13-11/26		12		7.3																					
354	River	P-5	2007/9/9 12:40	2007/11/13-11/26		12		7.3																					
355	River	P-5	2007/9/9 14:40	2007/11/13-11/26		12		7.3																					
356	River	P-5	2007/9/9 17:40	2007/11/13-11/26		12		7.3																					
357	River	P-5	2007/9/9 20:40	2007/11/13-11/26		12		7.2																					
358	River	P-5	2007/9/20	2007/9/21-10/17		11		7.4		13	2.4	3.5	2.1		0.01	0.01	32		0.03	N.D.	N.D.	N.D.	0.12		0.02	0.05	13	N.D.	N.D.
359	River	P-5	2007/10/18	2007/10/19-11/2		12		7.4		15	2.2	3.2	2		0.02	0.02	33		0.03	N.D.	N.D.	N.D.	0.09		N.D.	0.05	17	N.D.	N.D.
360	River	P-5	2007/11/20	2007/11/21-12/5		12		7.2		15	2.1	3.2	2.1		0.02	0.01	36		0.03	N.D.	N.D.	N.D.	0.07		N.D.	0.06	17	0.1	0.01
361	River	P-5	2007/12/17	2007/12/25-2008/1/17		12		7.2		15	1.9	3.2	1.8		N.D.	0.01	37		0.04	N.D.	N.D.	N.D.	0.08		N.D.	0.06	17	0.1	N.D.
362	River	P-5	2008/1/16	2008/1/23-2/6		13		6.9		17	2	3.1	2		0.01	0.03	36		0.1	N.D.	N.D.	N.D.	0.13		0.01	0.03	19	N.D.	N.D.
363	River	P-5	2008/2/14	2008/2/18-3/3		14		7.1		18	2.6	3.9	2.5		0.01	0.03	36		0.04	N.D.	N.D.	N.D.	0.07		N.D.	0.04	21	0.1	0.01
364	River	P-5	2008/2/14 16:00	2008/2/18-3/3		15		6.8																					
365	River	P-5	2008/6/20	2008/9/22-11/5		11		7		12	2.6	3	2.1		N.D.	0.01	33		0.12	N.D.	N.D.	N.D.	0.13		0.02	0.05	13	N.D.	N.D.
366	River	P-5	2008/12/25	2009/1/13-1/28		10		7		13	1.7	2.9	1.9		N.D.	0.01	39		0.02	N.D.	N.D.	N.D.	0.1		0.01	0.01	16	N.D.	N.D.
367	River	P-5	2009/8/6	2009/8/11		8.8		7.1		12	1.7	2.1	1.5		<0.01	<0.1	16		0.02	<0.01	<0.1	<0.01	0.16		<0.1	<0.1	17	<0.1	<1.0
368	River	P-5	2009/12/21	2009/12/24		10		7		15	1.7	2.8	2.1		<0.01	<0.1	17		0.02	<0.01	<0.1	<0.01	0.12		<0.1	<0.1	16	<0.1	<1.0
369	River	P-5-1	2009/12/4	2009/12/7-12/21	109.8		6.03		0.4	14	1.8	3.1	2.1		0.02	0.01	42		0.02	N.D.	N.D.	N.D.	0.09		0.01	0.02	17	N.D.	N.D.
370	River	P-5-2	2009/12/4	2009/12/7-12/21	106.1		5.94		0.4	13	1.7	3.3	2		0.02	0.01	39		0.02	N.D.	N.D.	N.D.	0.09		0.02	0.02	16	N.D.	N.D.
371	River	P-5-3	2009/12/4	2009/12/7-12/21	85.7		6.58		0.4	11	1.5	2.5	1.6		0.01	N.D.	45		0.02	N.D.	N.D.	N.D.	0.06		N.D.	0.01	14	N.D.	N.D.
372	River	P-5-4	2009/12/4	2009/12/7-12/21	120.9		6.66		0.9	15	1.8	5	2.2		0.03	N.D.	29		0.03	N.D.	N.D.	N.D.	0.11		N.D.	0.03	15	N.D.	N.D.
373	River	P-5	2010/10/20	2010/10/26-2011/1/19		16		7.3	24.2	16	3.3	7.6	3.4		0.03	<0.1	17		0.05		<0.1		0.92		0.04	<0.1	22	0.1	<1.0
374	River	P-5	2011/2/9	2011/2/17-3/25		19		7	20.2	20	3.2	7	3.6		0.01	<0.1	14		0.04		<0.1		0.96		0.04	<0.1	28	0.2	<1.0
375	Rain	HMS	2003/8/14	2003/12/26-2004/1/19		2.6		4.4		2	N.D.	N.D.	N.D.		N.D.	N.D.	N.D.		N.D.	N.D.	0.07	N.D.	N.D.		N.D.	N.D.	1.6	N.D.	N.D.
376	Rain	HMS	2003/10/8	2003/10/14-10/29		1.3		5.5		1.1	0.09	0.2	0.12		N.D.	N.D.	0.05		N.D.	N.D.	N.D.	N.D.	N.D.		N.D.	N.D.	1.8	N.D.	N.D.
377	Rain	HMS	2003/10/20	2003/10/21-11/7		3.5		5.2		3.5	0.19	0.18	0.46		N.D.	N.D.	N.D.		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	N.D.	6.4	N.D.	N.D.
378	Rain	HMS	2003/11/20	2003/11/26-12/10		5.6		4.8		6.3	0.72	0.62	0.74		N.D.	N.D.	0.02		N.D.	N.D.	N.D.	N.D.	N.D.		N.D.	N.D.	11	N.D.	N.D.
379	Rain	HMS	2004/5/20	2004/7/28-8/24		1.6		6		1.1	0.29	0.39	0.16		N.D.	N.D.	0.05		N.D.	N.D.	N.D.	N.D.	N.D.		N.D.	N.D.	1.7	N.D.	N.D.
380	Rain	HMS	2004/6/22	2004/7/28-8/24		3.2		6.7		0.73	0.86	0.49	0.17		N.D.	N.D.	0.08		N.D.	N.D.	0.4	N.D.	N.D.		N.D.	0.01	1.1	N.D.	N.D.
381	Rain	HMS	2004/7/20	2004/7/28-8/24		1.4		5.1		0.45	0.16	0.23	0.07		N.D.	N.D.	0.04		N.D.	N.D.	N.D.	N.D.	N.D.		0.03	N.D.	0.62	N.D.	N.D.
382	Rain	HMS	2004/8/20	2004/8/26-9/3		1.1		5.3		0.7	0.26	0.22	0.09		N.D.	N.D.	0.06		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	N.D.	1	N.D.	N.D.
383	Rain	HMS	2004/9/17	2004/9/25-10/6		3.7		5.8		4.7	0.27	0.25	0.56		N.D.	N.D.	0.04		N.D.	N.D.	N.D.	N.D.	N.D.		N.D.	N.D.	8.6	N.D.	N.D.
384	Rain	HMS	2004/10/14	2004/10/21-11/4		2		4.9		1.7	0.12	0.16	0.16		N.D.	N.D.	0.06		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	N.D.	2.7	N.D.	N.D.
385	Rain	HMS	2004/11/19	2004/11/30-12/10		5.4		4.9		6.2	0.3	0.41	0.66		N.D.	N.D.	0.03		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	N.D.	11	N.D.	N.D.
386	Rain	HMS	2005/4/19	2005/7/23-8/19		6		5.6		6.1	0.3	1.4	0.79		0.01	N.D.	0.14		N.D.	N.D.	N.D.	N.D.	N.D.		0.01	0.03	11	N.D.	N.D.
387	Rain	HMS	2005/5/20	2005/7/23-8/19		1.9		5.7		1.4	0.08	0.6	0.19		0.01	N.D.	0.18		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	0.02	2	N.D.	N.D.
388	Rain	HMS	2005/6/20	2005/7/23-8/19		1.6		4.8		0.83	0.09	0.34	0.1		N.D.	N.D.			N.D.	N.D.	N.D.	N.D.	N.D.		0.07	0.01	0.55	N.D.	N.D.
389	Rain	HMS	2005/8/19	2005/9/22-10/5		1.3		6.1		0.34	0.18	0.14	0.06		N.D.	N.D.	0.13		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	0.02	0.34	N.D.	N.D.
390	Rain	HMS	2005/9/20	2005/9/22-10/5		1.3		4.8		0.88	0.07	0.14	0.1		N.D.	N.D.	0.07		N.D.	N.D.	N.D.	N.D.	N.D.		0.03	N.D.	1.4	N.D.	N.D.
391	Rain	HMS	2005/10/20	2005/10/31-11/10		3.3		5.1		3.4	0.2	0.32	0.39		N.D.	N.D.	0.08		N.D.	N.D.	N.D.	N.D.	N.D.		0.03	0.02	5.5	N.D.	N.D.
392	Rain	HMS	2006/5/22	2006/8/22-9/29		1.9		5.5		0.69	0.14	0.52	0.16		N.D.	N.D.	0.06		N.D.	N.D.	N.D.	N.D.	N.D.		0.01	0.02	1.1	N.D.	N.D.
393	Rain	HMS	2006/6/22	2006/8/22-9/29		4		4.5		0.64	1.1	0.51	0.17		N.D.	N.D.	0.29		N.D.	N.D.	0.4	N.D.	N.D.		0.02	0.02	0.83	N.D.	N.D.
394	Rain	HMS	2006/7/21	2006/8/22-9/29		3.5		5		0.66	0.92	0.35	0.13		N.D.	N.D.	0.23		N.D.	N.D.	0.6	N.D.	N.D.		0.02	0.01	0.85	N.D.	N.D.
395	Rain	HMS	2006/8/21	2006/8/22-9/29		3.6		4.5		0.86	0.27	0.43	0.15		N.D.	N.D.	0.14		N.D.	N.D.	N.D.	N.D.	N.D.		0.08	0.02	1.2	N.D.	N.D.
396	Rain	HMS	2006/9/20	2006/9/21-10/5		1.3		5.2		0.59	0.07	0.16	0.07		N.D.	N.D.	0.09		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	N.D.	0.92	N.D.	N.D.
397	Rain	HMS	2006/10/17	2006/10/18-10/31		3.8		4.8		3.4	0.22	0.44	0.43		N.D.	N.D.	0.06		N.D.	N.D.	N.D.	N.D.	N.D.		0.03	N.D.	5.9	N.D.	N.D.
398	Rain	HMS	2006/11/21	2006/11/24-12/6		6.5		4.4		5.5	0.35	0.56	0.67		N.D.	N.D.	0.05		N.D.	N.D.	N.D.	N.D.	N.D.		0.07	0.01	9.7	N.D.	N.D.
399	Rain	HMS	2007/5/22	2007/5/23-6/5		2.9		5.3		1.7	0.23	0.7	0.35		0.01	N.D.	0.19		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	0.02	3.1	N.D.	N.D.
400	Rain	HMS	2007/6/20	2007/6/26-7/11		2.7		6.3		1.7	0.38	0.81	0.36		0.02	N.D.	0.18		N.D.	N.D.	0.1	N.D.	N.D.		0.01	N.D.	2.4	N.D.	N.D.
401	Rain	HMS	2007/7/23	2007/7/24-8/6		5.1		5.1		3.4	0.98	1.2	0.46		0.01	N.D.	0.34		N.D.	N.D.	0.3	N.D.	0.02		0.07	0.03	4.3	N.D.	N.D.
402	Rain	HMS	2007/8/21	2007/8/22-9/13		3.8		4.5		1.4	0.16	0.42	0.18		N.D.	N.D.	0.09		N.D.	N.D.	N.D.	N.D.	0.01		0.08	0.02	2	N.D.	N.D.
403	Rain	HMS	2007/9/20	2007/9/21-10/17		1.9		5.8		2	0.27	0.38	0.19		N.D.	N.D.	0.07		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	N.D.	3	N.D.	N.D.
404	Rain	HMS	2007/10/18	2007/10/19-11/2		7.9		5.2		10	0.46	0.49	1		N.D.	N.D.	0.07		N.D.	N.D.	N.D.	N.D.	N.D.		0.03	0.01	19	N.D.	N.D.
405	Rain	HMS	2007/11/20	2007/11/21-12/5		10		5		12	0.59	0.8	1.2		N.D.	N.D.	0.05		N.D.	N.D.	N.D.	N.D.	N.D.		0.03	0.02	21	N.D.	N.D.
406	Rain	HMS	2008/6/20	2009/1/13-1/28		2.1		5.3		1	0.15	0.72	0.24		0.02	N.D.	0.27		N.D.	N.D.	N.D.	N.D.	0.01		0.03	N.D.	1.6	N.D.	N.D.
407	Rain	HMS	2009/8/4	2009/8/11		2.7		6.9		1.2	0.9	0.2	0.1		<0.01	<0.1	0.1		<0.01	<0.01	0.2	<0.01	<0.01		<0.1	<0.1	2.1	<0.1	<1.0
408	Rain	HMS	2010/9/6	2010/9/16-11/15		1.3		5	23.3	0.5	<0.1	0.3	0.1		<0.01	<0.1	<0.1		<0.01		<0.1		<0.01		0.04	<0.1	0.6	<0.1	<1.0
409	Rain&Snow	HMS	2004/12/22	2005/1/21-1/29		11		4.9		13	0.64	0.91	1.7		0.01	N.D.	0.05		N.D.	N.D.	N.D.	N.D.	0.07		0.04	0.02	25	N.D.	N.D.
410	Rain&Snow	HMS	2005/11/21	2005/12/10-12/27		6.2		5		5.8	0.47	0.7	0.71		N.D.	N.D.	0.08		N.D.	N.D.	N.D.	N.D.	N.D.		0.04	0.03	10	N.D.	N.D.
411	Snow	HMS	2003/12/10	2003/12/26-1/19		3		5		3.2	0.42	0.23	N.D.		N.D.	N.D.	N.D.		N.D.	N.D.	N.D.	0.014	N.D.		N.D.	N.D.	5.6	0.1	N.D.
412	Snow	HMS	2004/1/6	2004/1/20-2/12		5.7		4.6		7.7	0.52	N.D.	0.78		N.D.	N.D.	N.D.		0.01	N.D.	N.D.	N.D.	0.01		N.D.	N.D.	14	N.D.	N.D.
413	Snow	HMS	2004/2/19	2004/2/27-3/10		4.5		5.6		7.7	0.36	0.41	0.73		N.D.	N.D.	N.D.		N.D.	N.D.	N.D.	N.D.	N.D.		N.D.	N.D.	13	0.2	N.D.
414	Snow	HMS	2004/4/22	2004/7/28-8/24		4.4		5.9		4.7	0.32	1.2	0.59		0.01	N.D.	0.11		N.D.	N.D.	N.D.	N.D.	N.D.		N.D.	0.02	8.1	N.D.	N.D.
415	Snow	HMS	2005/1/20	2005/2/4-2/15		3.3		4.9		3.3	0.18	0.24	0.39		N.D.	N.D.	0.02		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	N.D.	5.6	N.D.	N.D.
416	Snow	HMS	2005/2/18	2005/2/22-3/5		3		4.9		3.2	0.19	0.16	0.36		N.D.	N.D.	0.02		N.D.	N.D.	N.D.	N.D.	N.D.		0.03	N.D.	5.6	N.D.	N.D.
417	Snow	HMS	2005/3/18	2005/7/23-8/19		7.9		4.9		10	0.4	0.72	1.1		N.D.	N.D.	0.1		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	0.02	17	N.D.	N.D.
418	Snow	HMS	2005/12/20	2005/12/27-2006/1/17		5.5		4.9		6.4	0.33	0.38	0.78		N.D.	N.D.	0.06		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	N.D.	12	N.D.	N.D.
419	Snow	HMS	2006/1/23	2006/1/31-2/13		4		5		4.4	0.25	0.26	0.52		N.D.	N.D.	0.023		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	0.01	8.1	N.D.	N.D.
420	Snow	HMS	2006/2/17	2006/2/22-3/1		5.5		4.8		6.2	0.29	0.37	0.74		N.D.	N.D.	0.03		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	N.D.	11	N.D.	N.D.
421	Snow	HMS	2006/3/20	2006/8/22-9/29		4.1		5.2		3.6	0.24	1.1	0.5		0.02	N.D.	0.13		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	0.02	6.4	N.D.	N.D.
422	Snow	HMS	2006/4/19	2006/8/22-9/29		4.3		5.7		4.5	0.18	1.1	0.6		0.01	N.D.	0.14		N.D.	N.D.	N.D.	N.D.	N.D.		N.D.	0.02	8	N.D.	N.D.
423	Snow	HMS	2006/12/19	2007/1/17-2/1		3.4		4.9		3.5	0.22	0.34	0.44		N.D.	N.D.	0.02		N.D.	N.D.	N.D.	N.D.	N.D.		N.D.	N.D.	6.1	N.D.	N.D.
424	Snow	HMS	2007/1/16	2007/1/18-2/1		6.8		4.5		6.8	0.43	0.46	0.85		N.D.	N.D.	0.03		N.D.	N.D.	N.D.	N.D.	N.D.		0.02	0.02	12	N.D.	N.D.
425	Snow	HMS	2007/2/16	2007/2/20-3/2		3.7		4.8		3.6	0.24	0.43	0.47		N.D.	N.D.	0.25		N.D.	N.D.	N.D.	N.D.	N.D.		0.01	0.02	6.3	N.D.	N.D.
426	Snow	HMS	2007/3/28	2007/5/10-5/23		5.8		4.7		6	0.31	0.55	0.78		N.D.	N.D.	0.34		N.D.	N.D.	N.D.	N.D.	0.01		0.02	0.02	11	N.D.	N.D.
427	Snow	HMS	2007/4/17	2007/5/10-5/23		3		4.7		1.7	0.18	0.42	0.25		N.D.	N.D.	0.41		N.D.	N.D.	N.D.	N.D.	0.01		0.02	0.02	2.9	N.D.	N.D.
428	Snow	HMS	2007/12/17	2007/12/25-2008/1/17		3.8		5		4.4	0.28	0.36	0.43		N.D.	N.D.	0.02		0.06	N.D.	N.D.	N.D.	N.D.		N.D.	0.03	7.7	N.D.	N.D.
429	Snow	HMS	2008/1/16	2008/1/23-2/6		7		4.6		7.4	0.44	0.42	0.7		N.D.	N.D.	0.02		N.D.	N.D.	N.D.	N.D.	0.02		0.03	0.03	13	N.D.	N.D.
430	Snow	HMS	2008/2/15	2008/2/18-3/3		3		4.9		2.7	0.2	0.55	0.33		N.D.	N.D.	0.02		N.D.	N.D.	N.D.	N.D.	N.D.		0.01	0.02	4.8	N.D.	N.D.
431	Snow	HMS	2009/1/15	2009/1/23-2/11		6		4.8		7.4	0.34	0.45	0.85		N.D.	N.D.	N.D.		N.D.	N.D.	N.D.	N.D.	N.D.		N.D.	N.D.	13	N.D.	N.D.
432	Snow	HMS	2011/2/9	2011/2/17-3/25		5.4		6.5	20.5	5.4	0.5	2.1	0.7		<0.01	<0.1	<0.1		<0.01		<0.1		<0.01		<0.01	<0.1	9.4	<0.1	<1.0
433	Snow	HDB-2	2010/1/5	2010/1/13		2		4.7		2.3	<0.1	0.1	0.3		<0.01	<0.1	<0.1		<0.01	<0.01	<0.1	<0.01	<0.01		<0.1	<0.1	4.2	<0.1	<1.0
434	Snow	HET	2010/1/5	2010/1/13		1.8		4.7		2.2	<0.1	0.2	0.3		<0.01	<0.1	<0.1		<0.01	<0.01	<0.1	<0.01	0.06		<0.1	<0.1	4.1	<0.1	<1.0

Table 3.2 Chemical and isotopic composition of river, precipitation, spring and groundwater of shallow boreholes (10/14)

Index	Sampling point		Sampling date	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M Alkalinity	M Alkalinity	P Alkalinity	P Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Tracer (uranine)	Tracer (Na-naphtionate)	Isotope ^3H	Isotope δD	Isotope $\delta^{18}O$	Chromaticity Suspended solids	Chromaticity Total solids	Chromaticity Ignition loss	Chromaticity Spectral values y	Chromaticity Chromaticity coordinates x,y	Turbidity
				[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]		[meq/l]	[meq/l]	[%]	[mg/l]	[mg/l]	[T.U]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]			[NTU]
348	River	P-5	2007/9/9 0:40																							9	140	3	92	0.33,0.34	6
349	River	P-5	2007/9/9 2:40																							8	140	2	92	0.33,0.34	5
350	River	P-5	2007/9/9 4:40																							8	150	2	92	0.33,0.34	6
351	River	P-5	2007/9/9 6:40																							7	130	2	92	0.33,0.34	5
352	River	P-5	2007/9/9 8:40																							5	130	2	92	0.33,0.34	4
353	River	P-5	2007/9/9 10:40																							7	130	2	92	0.33,0.34	4
354	River	P-5	2007/9/9 12:40																							6	130	2	92	0.33,0.34	4
355	River	P-5	2007/9/9 14:40																							5	130	1	92	0.33,0.34	4
356	River	P-5	2007/9/9 17:40																							4	130	1	92	0.33,0.34	3
357	River	P-5	2007/9/9 20:40																							5	120	2	93	0.33,0.34	3
358	River	P-5	2007/9/20	0.96		0.07	10	N.D.	17	N.D.	16	0.279			4.5	3.8		0.97	0.85	0.12											
359	River	P-5	2007/10/18	0.62		0.11	10	N.D.	21	N.D.	17	0.344			2.7	4.5		1.03	1.03	0.00											
360	River	P-5	2007/11/20	1.1		0.07	10	N.D.	18	N.D.	16	0.295			2.2	4.1		1.04	0.98	0.06											
361	River	P-5	2007/12/17	1.2		0.06	9.6	N.D.	17	N.D.	15	0.279			2	3.9		1.01	0.96	0.05											
362	River	P-5	2008/1/16	1.6		0.15	10	N.D.	21	N.D.	19	0.344			2	5.5		1.11	1.09	0.02											
363	River	P-5	2008/2/14	1.7		0.28	10	N.D.	25	N.D.	22	0.41			2.5	5.9		1.25	1.21	0.04											
364	River	P-5	2008/2/14 16:00																							2	120	N.D.	98	0.32,0.32	1
365	River	P-5	2008/6/20	2		0.04	8.8	N.D.	15	N.D.	15	0.246			4.8	3.5		0.91	0.80	0.12											
366	River	P-5	2008/12/25	1.4		0.07	8.1	N.D.	12	N.D.	11	0.197			1.7	2.9		0.91	0.82	0.09		0.0054	5.3±0.1	-63.1	-9.9						
367	River	P-5	2009/8/6	1.6		<0.2	8.2	<0.1	17	<0.5	11				2.7	4		0.79	0.95	-0.16	<2	<1	5.00±0.12	-72.2	-11.4						
368	River	P-5	2009/12/21	1.2		<0.2	7.7	<0.1	16	<0.5	16				1.8	4		1.01	0.89	0.12	<2	<1	4.20±0.14	-71.6	-11.5						
369	River	P-5-1	2009/12/4	1.3		0.06	8.3	N.D.	14	N.D.	13	0.229			3.4	3.4		0.98	0.88	0.10			5.2±0.2	-67.6	-10.66						
370	River	P-5-2	2009/12/4	1.1		0.04	8.6	N.D.	14	N.D.	13	0.229			3.5	3.4		0.94	0.86	0.08			5.3±0.2	-68.4	-10.68						
371	River	P-5-3	2009/12/4	0.75		0.03	6.7	N.D.	10	N.D.	9.4	0.164			2.5	2.4		0.77	0.70	0.08			5.3±0.2	-68	-10.74						
372	River	P-5-4	2009/12/4	0.91		0.02	9.8	N.D.	23	N.D.	21	0.377			3	5.1		1.13	1.00	0.13			5.0±0.2	-66.9	-10.61						
373	River	P-5	2010/10/20	4		<0.2	10	<0.1	29	<0.1	25				5	6.4		0.91	0.83	0.08			5.2±0.1	-66	-10.5						
374	River	P-5	2011/2/9	5.9		<0.2	9.9	<0.1	29	<0.1	25				4.1	7.06		1.05	1.02	0.04			5.0±0.1	-68	-10.8						
375	Rain	HMS	2003/8/14	0.1		0.3	N.D.	N.D.	N.D.	N.D.	N.D.	0			0.9	0.4		0.09	0.05	0.04											
376	Rain	HMS	2003/10/8	0.5		0.1	0.9	N.D.	N.D.	N.D.	2	0			0.6	0.3		0.07	0.07	0.00											
377	Rain	HMS	2003/10/20	0.9		0.4	2.4	N.D.	N.D.	N.D.	1	0			0.9	0.4		0.20	0.23	-0.03											
378	Rain	HMS	2003/11/20	1.4		0.5	3.7	N.D.	0.2	N.D.	5.6	0.00328			1.4	0.6		0.38	0.39	-0.01											
379	Rain	HMS	2004/5/20	0.7		0.78	1.7	N.D.	2	N.D.	2.4	0.033			1	1.3		0.09	0.12	-0.03											
380	Rain	HMS	2004/6/22	1.4		3	3.4	N.D.	7.6	N.D.	6.7	0.125			1.9	2.2		0.09	0.23	-0.14											
381	Rain	HMS	2004/7/20	0.93		0.53	2.1	N.D.	0.1	N.D.	N.D.	0.002			1.5	0.5		0.04	0.06	-0.02											
382	Rain	HMS	2004/8/20	0.64		0.3	1.5	N.D.	0.1	N.D.	N.D.	0.002			1.5	0.3		0.06	0.06	-0.01											
383	Rain	HMS	2004/9/17	0.15		0.09	1.6	N.D.	0.4	N.D.	N.D.	0.007			1.2	0.3		0.27	0.28	-0.01											
384	Rain	HMS	2004/10/14	0.51		0.17	2	N.D.	N.D.	N.D.	N.D.	0			1.3	0.3		0.10	0.12	-0.02											
385	Rain	HMS	2004/11/19	0.76		0.27	2.7	N.D.	N.D.	N.D.	N.D.	0			0.8	0.3		0.35	0.37	-0.02											
386	Rain	HMS	2005/4/19	2.5		0.66	4.8	N.D.	0.7	N.D.	N.D.	0.011			0.5	0.8		0.41	0.42	-0.01											
387	Rain	HMS	2005/5/20	1.4		0.36	2.7	N.D.	0.4	N.D.	N.D.	0.007			1	0.4		0.11	0.12	-0.01											
388	Rain	HMS	2005/6/20	1		0.16	2.3		N.D.	N.D.	N.D.	0			2.7	0.3		0.06	0.06	0.00											
389	Rain	HMS	2005/8/19	0.87		0.78	2.2	N.D.	0.5	N.D.	N.D.	0.008			3.7	0.3		0.03	0.06	-0.03											
390	Rain	HMS	2005/9/20	0.1		0.08	1.5	N.D.	0.1	N.D.	N.D.	0.002			2.3	0.2		0.06	0.07	-0.02											
391	Rain	HMS	2005/10/20	0.94		0.39	2.5	N.D.	0.1	N.D.	N.D.	0.002			1.6	0.4		0.20	0.21	-0.01											
392	Rain	HMS	2006/5/22	1.6		0.71	3	N.D.	0.1	N.D.	N.D.	0.002			1.2	0.2		0.07	0.10	-0.02											
393	Rain	HMS	2006/6/22	2.7		1.6	3.8	N.D.	N.D.	N.D.	N.D.	0			2.5	0.7		0.10	0.10	-0.01											
394	Rain	HMS	2006/7/21	3		2.4	2.5	N.D.	0.1	N.D.	N.D.	0.002			7.7	0.5		0.08	0.08	0.00											
395	Rain	HMS	2006/8/21	3.2		1.3	4.5	N.D.	N.D.	N.D.	N.D.	0			8.5	0.3		0.08	0.13	-0.05											
396	Rain	HMS	2006/9/20	1.1		0.17	1.1	N.D.	0.1	N.D.	N.D.	0.002			2.6	0.4		0.04	0.05	-0.01											
397	Rain	HMS	2006/10/17	1		0.15	2.8	N.D.	N.D.	N.D.	N.D.	0			1.8	0.3		0.21	0.22	-0.01				-52.9	-8.2						
398	Rain	HMS	2006/11/21	2		0.36	4.4	N.D.	N.D.	N.D.	N.D.	0			1.2	0.3		0.33	0.37	-0.04											
399	Rain	HMS	2007/5/22	1.8		0.66	3.7	N.D.	0.1	N.D.	0.3	0.002			2.4	0.3		0.14	0.17	-0.02											
400	Rain	HMS	2007/6/20	1.7		0.98	3.4	N.D.	0.9	N.D.	1.9	0.015			3.8	0.4		0.15	0.15	0.00											
401	Rain	HMS	2007/7/23	2.7		1.4	7	N.D.	N.D.	N.D.	0.5	0			19	0.2		0.27	0.27	0.00											
402	Rain	HMS	2007/8/21	2.8		0.78	4.3	N.D.	N.D.	N.D.	N.D.	0			5.3	0.4		0.10	0.15	-0.05											
403	Rain	HMS	2007/9/20	0.5		0.35	1.5	N.D.	0.6	N.D.	1.1	0.01			3.9	0.5		0.13	0.13	0.00											
404	Rain	HMS	2007/10/18	0.78		0.35	3.9	N.D.	0.2	N.D.	N.D.	0.003			1.9	0.4		0.55	0.62	-0.07											
405	Rain	HMS	2007/11/20	2.1		0.63	5.9	N.D.	N.D.	N.D.	N.D.	0			1.4	0.4		0.68	0.72	-0.04											
406	Rain	HMS	2008/6/20	1.2		0.55	3	N.D.	0.3	N.D.	N.D.	0.005			3.8	0.7		0.10	0.11	-0.01		0.0027	7.0±0.1	-73.7	-9						
407	Rain	HMS	2009/8/4	0.6		2.9	3.2	<0.1	12	<0.5	7				4.9	3					<2	<1	6.22±0.13	-88	-11.9						
408	Rain	HMS	2010/9/6	0.7		0.2	1.5	<0.1	0.2	<0.1	5				4.5	<1		0.06	0.06	-0.01			5.7±0.1	-79	-11.1						
409	Rain&Snow	HMS	2004/12/22	1.4		0.4	5.8	N.D.	N.D.	N.D.	N.D.	0			1.3	0.3		0.77	0.83	-0.06											
410	Rain&Snow	HMS	2005/11/21	2.4		1.1	5.3	N.D.	N.D.	N.D.	N.D.	0			1.6	0.3		0.36	0.39	-0.03											
411	Snow	HMS	2003/12/10	0.4		0.2	1.7	N.D.	N.D.	N.D.	1	0			0.7	0.3		0.00	0.00	0.00											
412	Snow	HMS	2004/1/6	2.6		0.6	4.6	N.D.	N.D.	N.D.	N.D.	0			1.3	0.3		0.41	0.49	-0.08											
413	Snow	HMS	2004/2/19	1.1		0.5	2.8	N.D.	N.D.	N.D.	3	0			1.3	0.2		0.42	0.43	0.00											
414	Snow	HMS	2004/4/22	1.9		0.64	3.9	N.D.	0.8	N.D.	1.4	0.013			0.6	0.6		0.32	0.32	0.00											
415	Snow	HMS	2005/1/20	0.69		0.16	1.3	N.D.	N.D.	N.D.	N.D.	0			1	0.3		0.19	0.18	0.01											
416	Snow	HMS	2005/2/18	0.45		0.12	2.1	N.D.	N.D.	N.D.	N.D.	0			0.9	0.3		0.18	0.20	-0.02											
417	Snow	HMS	2005/3/18	1.8		0.34	4.3	N.D.	N.D.	N.D.	N.D.	0			0.8	0.5		0.57	0.57	0.00											
418	Snow	HMS	2005/12/20	0.72		0.19	2.6	N.D.	N.D.	N.D.	N.D.	0			1.2	0.3		0.37	0.39	-0.02											
419	Snow	HMS	2006/1/23	0.46		0.15	2	N.D.	N.D.	N.D.	N.D.	0			1.1	0.4		0.25	0.27	-0.02											
420	Snow	HMS	2006/2/17	0.97		0.28	2.8	N.D.	N.D.	N.D.	N.D.	0			2.2	0.3		0.36	0.37	-0.01											
421	Snow	HMS	2006/3/20	2.2		0.52	3.9	N.D.	0.2	N.D.	N.D.	0.003			0.4	0.4		0.26	0.27	-0.01											
422	Snow	HMS	2006/4/19	1.6		0.35	3.6	N.D.	0.2	N.D.	N.D.	0.003			0.4	0.2		0.30	0.30	0.00											
423	Snow	HMS	2006/12/19	0.19		0.19	1.7	N.D.	N.D.	N.D.	N.D.	0			0.8	0.3		0.21	0.21	0.00											
424	Snow	HMS	2007/1/16	2.1		0.34	3.7	N.D.	N.D.	N.D.	N.D.	0			1.9	0.3		0.40	0.42	-0.02											
425	Snow	HMS	2007/2/16	0.89		0.21	2.2	N.D.	N.D.	N.D.	N.D.	0			1	0.3		0.22	0.22	0.00											
426	Snow	HMS	2007/3/28	1.3		0.33	3.9	N.D.	N.D.	N.D.	N.D.	0			0.7	0.3		0.36	0.39	-0.03											
427	Snow	HMS	2007/4/17	1.6		0.58	3	N.D.	N.D.	N.D.	N.D.	0			0.9	0.7		0.12	0.14	-0.02											
428	Snow	HMS	2007/12/17	0.81		0.22	1.8	N.D.	N.D.	N.D.	N.D.	0			0.8	0.4		0.25	0.25	0.00											
429	Snow	HMS	2008/1/16	1.9		0.33	3.5	N.D.	N.D.	N.D.	N.D.	0			1.3	0.4		0.41	0.44	-0.03											
430	Snow	HMS	2008/2/15	1.2		0.18	1.8	N.D.	N.D.	N.D.	N.D.	0			1	0.3		0.18	0.17	0.00											
431	Snow	HMS	2009/1/15	0.36		0.08	2.9	N.D.	N.D.	N.D.	N.D.	0			0.5	0.3		0.42	0.43	0.00											
432	Snow	HMS	2011/2/9	1.5		0.3	3	<0.1	4	<0.1	3.4				1.9	1.37		0.43	0.42	0.01			5.5±0.1	-81	-12.7						
433	Snow	HDB-2	2010/1/5	0.3		<0.2	1.1	<0.1	<0.5	<0.5					<0.5	1					<2	<1	1.54±0.08	-90.3	-13.1						
434	Snow	HET	2010/1/5	0.2		<0.2	1.1	<0.1	<0.5	<0.5					<0.5	1					<2	<1	1.47±0.08	-93.9	-13.7						

Table 3.2 Chemical and isotopic composition of river, precipitation, spring and groundwater of shallow boreholes (11/14)

Index	Sampling point		Sampling date	Analyzing date	Physico-chemical parameter					Geochemistry																			
					EC at site	EC at lab	pH at site	pH at lab	Tempe-rature at site	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T.Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-
					[mS/m]	[mS/m]			[℃]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
435	Snow	P-3	2010/1/5	2010/1/13		1.9		4.7		2.6	<0.1	0.2	0.3		<0.01	<0.1	<0.1		<0.01	<0.01	<0.1	<0.01	<0.01		<0.1	<0.1	4.8	<0.1	<1.0
436	Snow	P-4	2010/1/5	2010/1/13		1.5		4.6		1.9	<0.1	<0.1	0.3		<0.01	<0.1	<0.1		<0.01	<0.01	<0.1	<0.01	<0.01		<0.1	<0.1	3.5	<0.1	<1.0
437	Snow	P-5	2009/12/21	2009/12/24		1.7		4.8		2.5	<0.1	0.1	0.3		<0.01	<0.1	<0.1		<0.01	<0.01	<0.1	<0.01	0.05		<0.1	<0.1	4.2	<0.1	<1.0
438	Spring	Y3-01	2009/12/9	2009/12/10-12/21	83.1		6.3		4.7	11	0.68	1.3	1.6		N.D.	N.D.	18		0.01	N.D.	N.D.	N.D.	0.06		0.08	N.D.	18	N.D.	N.D.
439	Spring	Y3-05	2009/12/7	2009/12/8-12/21	263		6.3		4.2	26	1.1	4.5	4		N.D.	N.D.	14		0.06	N.D.	N.D.	N.D.	0.02		0.01	0.01	45	0.1	N.D.
440	Spring	Y3-16	2009/12/9	2009/12/10-12/21	79.1		6.2		4.3	10	1.2	1.6	0.95		N.D.	N.D.	43		0.03	N.D.	N.D.	N.D.	0.02		0.02	0.01	13	N.D.	N.D.
441	Spring	Y4-02	2009/12/7	2009/12/8-12/21	109		5.3		7.2	8.6	1.5	1.2	0.98		0.02	N.D.	61		0.01	N.D.	N.D.	N.D.	0.03		0.02	0.01	10	N.D.	N.D.
442	Spring	Y4-05	2009/12/7	2009/12/8-12/21	101		5.2		7.7	11	1.7	1.3	0.94		N.D.	N.D.	62		0.01	N.D.	N.D.	N.D.	0.02		0.02	N.D.	12	N.D.	N.D.
443	Spring	Y4-07	2009/12/7	2009/12/8-12/21	112		5.1		7.1	8.7	1.4	1.6	1.5		N.D.	N.D.	60		0.02	N.D.	N.D.	N.D.	0.02		0.02	N.D.	10	N.D.	N.D.
444	Spring	Y4-08	2009/12/7	2009/12/8-12/21	127		5.4		7.5	11	1.5	2.1	1.7		0.02	N.D.	65		0.02	N.D.	N.D.	N.D.	0.01		N.D.	N.D.	12	N.D.	N.D.
445	Spring	Y4-11	2009/12/7	2009/12/8-12/21	159		6.1		4.5	12	1.5	2.5	1.5		N.D.	N.D.	53		0.03	N.D.	N.D.	N.D.	0.02		N.D.	N.D.	14	N.D.	N.D.
446	Spring	Y5-04	2009/12/7	2009/12/8-12/21	105		4.1		7.7	13	1.8	1.4	1.6		0.01	N.D.	63		0.02	N.D.	N.D.	N.D.	0.01		0.03	N.D.	16	N.D.	N.D.
447	Spring	Y5-07	2009/12/7	2009/12/8-12/21	99.9		4.3		6.9	12	2.1	1.4	1.1		0.02	N.D.	68		0.02	N.D.	N.D.	N.D.	0.03		0.03	N.D.	15	N.D.	N.D.
448	Spring	Y5-10	2009/12/7	2009/12/8-12/21	121		6.2		2.6	15	2.2	3.5	2		N.D.	N.D.	51		0.03	N.D.	N.D.	N.D.	0.03		0.02	N.D.	20	N.D.	N.D.
449	Spring	Y5-16	2009/12/7	2009/12/8-12/21	103		5.5		2.2	8	3	4	2.4		0.06	N.D.	14		0.03	N.D.	N.D.	N.D.	0.09		0.11	0.05	13	0.2	N.D.
450	Spring	Y5-23	2009/12/8	2009/12/9-12/21	171		6.4		3.4	13	1.2	11	5.6		N.D.	N.D.	16		0.02	N.D.	N.D.	N.D.	N.D.		N.D.	0.06	18	N.D.	N.D.
451	Shallow Groundwater	A-1	2006/12/22	2007/1/17-2/1		1000		7.3		1900	84	150	75		0.16	5.2	54		2.3	N.D.	0.1	0.02	2.8		1.4	0.21	2700	21	8.6
452	Shallow Groundwater	A-1	2007/3/2	2007/8/22-9/13		1000		7.4		1900	82	120	59		0.14	5.8	52		2	N.D.	0.3	N.D.	0.02		0.01	0.09	2700	22	7.6
453	Shallow Groundwater	A-1	2007/5/22	2007/8/22-9/13		1000		7.3		1900	81	130	64		0.15	5.8	53		2	N.D.	0.2	N.D.	0.03		0.01	0.19	2700	21	7.5
454	Shallow Groundwater	A-1	2007/8/4	2007/8/22-9/13		1000		7.3		1900	84	120	60		0.14	5.6	54		1.9	N.D.	0.3	N.D.	0.08		N.D.	0.08	2700	22	10
455	Shallow Groundwater	A-1	2007/11/8	2007/11/9-11/27		1000		7.1		1900	84	220	99		0.13	5.2	55		1.6	N.D.	0.2	N.D.	0.17		0.01	0.11	2700	21	8.5
456	Shallow Groundwater	A-1	2008/2/5	2008/2/6-2/20		960		7.2		1800	80	140	76		0.26	6.1	30		1.7	N.D.	N.D.	N.D.	1		0.01	0.08	2700	21	8.1
457	Shallow Groundwater	A-1	2008/8/1	2008/9/22-11/5		1100		7.5		2000	88	150	76		0.15	5.9	53		1.9	N.D.	0.4	N.D.	0.3		N.D.	0.1	2900	22	9.2
458	Shallow Groundwater	A-1	2008/11/4	2009/1/13-1/28		1100		7.2		2000	86	83	68		0.18	5.1	53		1.8	N.D.	0.3	N.D.	0.08		0.02	0.07	2900	23	8.8
459	Shallow Groundwater	A-1	2009/2/2	2009/2/5-2/5		1100		7.1		2000	88	150	78		0.21	5.3	52		2	N.D.	0.1	N.D.	1.7		0.01	0.06	2900	24	8
460	Shallow Groundwater	A-1	2009/8/3	2009/8/11		640		7.8		1200	50	87	47		0.34	4.6	14		0.97	<0.01	<0.1	<0.01	0.1		<0.1	<0.1	1800	16	3
461	Shallow Groundwater	A-1	2009/11/2	2009/11/10		1200		7.2		2200	87	160	83		0.02	7.1	24		1.8	<0.01	<0.1	<0.01	<0.01		<0.1	<0.1	3200	25	8
462	Shallow Groundwater	A-1	2010/2/1	2010/2/5		670		6.9		1100	48	99	55		0.45	3.3	11		1.1	<0.01	<0.1	<0.01	0.09		<0.1	<0.1	1900	13	6
463	Shallow Groundwater	A-2	2006/12/22	2007/1/17-2/1		370		6.3		550	26	99	53		1.1	1.5	34		0.59	N.D.	N.D.	N.D.	4.5		N.D.	0.16	710	6.3	3.7
464	Shallow Groundwater	A-2	2007/3/2	2007/8/22-9/13		210		2.9		150	8.1	79	47		2.3	0.3	40		0.71	N.D.	N.D.	N.D.	24		1.6	0.07	150	2.6	2.1
465	Shallow Groundwater	A-2	2007/5/22	2007/8/22-9/13		240		4.8		310	17	97	56		1.7	0.7	33		0.77	N.D.	N.D.	N.D.	0.13		0.54	N.D.	410	4.4	1.8
466	Shallow Groundwater	A-2	2007/8/4	2007/8/22-9/13		330		6.4		440	25	99	54		1.5	0.97	33		0.87	N.D.	N.D.	N.D.	57		0.01	0.08	610	5.9	3.7
467	Shallow Groundwater	A-2	2007/11/8	2007/11/9-11/27		440		6.6		670	37	140	69		0.94	1.6	37		0.67	N.D.	N.D.	N.D.	71		0.01	0.06	870	8.2	3.5
468	Shallow Groundwater	A-2	2008/2/5	2008/2/6-2/20		190		5.8		150	9.7	110	60		1.5	0.39	25		0.67	N.D.	N.D.	N.D.	130		0.13	0.06	180	2.7	1.1
469	Shallow Groundwater	A-2	2008/8/1	2008/9/22-11/5		240		5.7		310	19	86	50		1.4	0.75	35		0.71	N.D.	N.D.	N.D.	11		0.01	0.05	420	4.4	1.9
470	Shallow Groundwater	A-2	2008/11/4	2009/1/13-1/28		220		5.8		300	17	69	39		1.2	0.73	37		0.65	N.D.	N.D.	N.D.	0.08		0.06	0.02	380	3.9	1.7
471	Shallow Groundwater	A-2	2009/2/2	2009/2/5-2/5		420		6.6		660	36	88	46		1	2.3	39		0.93	N.D.	N.D.	N.D.	53		0.01	0.07	870	8	2.8
472	Shallow Groundwater	A-2	2009/8/3	2009/8/11		260		7		370	20	76	42		1.1	1.3	13		0.62	<0.01	<0.1	<0.01	26		<0.1	<0.1	510	4.8	1
473	Shallow Groundwater	A-2	2009/11/2	2009/11/10		370		6.4		590	24	79	44		0.91	1.8	17		0.78	<0.01	<0.1	<0.01	0.15		<0.1	<0.1	790	7.1	3
474	Shallow Groundwater	A-2	2010/2/1	2010/2/5		130		5.2		110	6	62	34		1.2	0.3	16		0.43	<0.01	<0.1	<0.01	1.8		0.6	<0.1	160	1.6	<1.0
475	Shallow Groundwater	A-3	2006/12/22	2007/1/17-2/1		620		7.3		1100	53	86	49		0.45	3.1	40		0.71	N.D.	N.D.	N.D.	0.2		0.01	0.3	1500	12	5
476	Shallow Groundwater	A-3	2007/3/2	2007/8/22-9/13		600		7.2		1100	51	77	48		0.57	3	17		0.9	N.D.	N.D.	N.D.	0.03		0.01	0.16	1500	11	5.8
477	Shallow Groundwater	A-3	2007/5/22	2007/8/22-9/13		600		7.2		1100	50	81	48		0.53	3.2	24		0.97	N.D.	N.D.	N.D.	0.22		0.01	0.15	1500	11	4.3
478	Shallow Groundwater	A-3	2007/8/4	2007/8/22-9/13		500		7.6		920	43	76	44		0.88	2.6	38		0.86	N.D.	N.D.	N.D.	3.1		0.01	0.16	1200	8.9	4.9
479	Shallow Groundwater	A-3	2007/11/8	2007/11/9-11/27		600		7.2		1100	51	120	64		0.51	2.5	50		0.72	N.D.	0.2	N.D.	3.4		N.D.	0.15	1500	11	4.4
480	Shallow Groundwater	A-3	2008/2/5	2008/2/6-2/20		600		7.1		1100	51	93	49		0.5	3.3	31		0.99	N.D.	0.2	N.D.	2.3		0.02	0.14	1500	11	4.3
481	Shallow Groundwater	A-3	2008/8/1	2008/9/22-11/5		560		7.5		1100	50	78	47		0.66	2.7	31		0.86	N.D.	0.1	N.D.	0.76		N.D.	0.18	1400	11	4
482	Shallow Groundwater	A-3	2008/11/4	2009/1/13-1/28		580		7.2		1000	48	71	42		0.65	2.6	36		0.91	N.D.	0.2	N.D.	0.5		0.02	0.14	1400	11	4.4
483	Shallow Groundwater	A-3	2009/2/2	2009/2/5-2/5		570		7.2		1000	49	80	46		0.81	3	44		0.97	N.D.	N.D.	N.D.	1.6		0.02	0.17	1400	11	3.7
484	Shallow Groundwater	A-3	2009/8/3	2009/8/11		280		6.8		410	24	78	46		1.9	1.5	12		0.6	<0.01	<0.1	<0.01	3		<0.1	<0.1	500	4.2	1
485	Shallow Groundwater	A-3	2009/11/2	2009/11/10		540		7		890	38	73	45		0.75	3.1	16		0.87	<0.01	<0.1	<0.01	0.3		<0.1	0.1	1200	10	4

Table 3.2 Chemical and isotopic composition of river, precipitation, spring and groundwater of shallow boreholes (12/14)

Index	Sampling point		Sampling date	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M Alkalinity	M Alkalinity	P Alkalinity	P Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Tracer (uranine)	Tracer (Na-naphtionate)	Isotope ^3H	Isotope δD	Isotope $\delta^{18}O$	Chromaticity Suspended solids	Chromaticity Total solids	Chromaticity Ignition loss	Chromaticity Spectral values y	Chromaticity coordinates x,y	Turbidity
				[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]		[meq/l]	[meq/l]	[%]	[mg/l]	[mg/l]	[T.U]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]			[NTU]
435	Snow	P-3	2010/1/5	0.4		<0.2	1.2	<0.1	<0.5	<0.5					<0.5	1					<2	<1	1.70±0.10	-87.4	-13.5						
436	Snow	P-4	2010/1/5	0.1		<0.2	0.8	<0.1	<0.5	<0.5					<0.5	1					<2	<1	1.46±0.08	-97.9	-14.1						
437	Snow	P-5	2009/12/21	0.5		<0.2	1	<0.1	<0.5	<0.5					0.6	<1					<2	<1	2.88±0.13	-91.6	-15.9						
438	Spring	Y3-01	2009/12/9	0.14		N.D.	4.7	N.D.	2.1	N.D.	2.7	0.034			3.4	0.7		0.69	0.64	0.05			6.1±0.2	-64.1	-9.93						
439	Spring	Y3-05	2009/12/7	0.75		N.D.	13	N.D.	7.1	N.D.	7	0.116			1.4	2.1		1.71	1.66	0.06			4.7±0.2	-61	-9.39						
440	Spring	Y3-16	2009/12/9	1.4		N.D.	9.8	N.D.	0.7	N.D.	1.4	0.011			1.2	0.4		0.62	0.58	0.04			4.9±0.2	-67.7	-10.83						
441	Spring	Y4-02	2009/12/7	0.99		N.D.	11	N.D.	1.5	N.D.	1.8	0.025			0.8	1.9		0.55	0.54	0.02			5.9±0.2	-67.1	-10.51						
442	Spring	Y4-05	2009/12/7	4.3		N.D.	6.6	N.D.	6	N.D.	4.7	0.098			0.9	7.6		0.66	0.57	0.09			6.0±0.2	-67.1	-10.72						
443	Spring	Y4-07	2009/12/7	6.1		N.D.	6.9	N.D.	4.7	N.D.	4.7	0.077			1.2	4.8		0.62	0.50	0.11			4.4±0.2	-67.7	-10.79						
444	Spring	Y4-08	2009/12/7	4.9		N.D.	10	N.D.	6.6	N.D.	5.5	0.108			1.1	8.4		0.76	0.66	0.11			4.8±0.2	-67.1	-10.79						
445	Spring	Y4-11	2009/12/7	11		N.D.	6.7	N.D.	3.3	N.D.	3.7	0.054			1.1	1.1		0.81	0.59	0.22			4.5±0.2	-69.2	-10.82						
446	Spring	Y5-04	2009/12/7	9.6		N.D.	8.1	N.D.	1.4	N.D.	1	0.023			1.2	4.7		0.81	0.64	0.17			5.6±0.2	-67.7	-10.7						
447	Spring	Y5-07	2009/12/7	4.2		N.D.	8.5	N.D.	0.4	N.D.	N.D.	0.007			0.8	1.7		0.74	0.61	0.13			7.4±0.2	-69.2	-10.84						
448	Spring	Y5-10	2009/12/7	15		N.D.	6.7	N.D.	1.6	N.D.	2.1	0.026			2	0.7		1.05	0.73	0.32			4.8±0.2	-66.2	-10.63						
449	Spring	Y5-16	2009/12/7	1.2		0.02	12	N.D.	6	N.D.	6.1	0.098			6.1	3.9		0.82	0.72	0.11			5.2±0.2	-65	-10.46						
450	Spring	Y5-23	2009/12/8	2.4		N.D.	16	N.D.	38	N.D.	32	0.623			1.8	8		1.61	1.46	0.14			5.5±0.2	-66	-10.28						
451	Shallow Groundwater	A-1	2006/12/22	N.D.		110	3.6	N.D.	1400	1.6	1300	22.943			16	320		98.45	99.18	-0.37		0.25		-60.3	-7						
452	Shallow Groundwater	A-1	2007/3/2	0.02		110	4.1	N.D.	1500	1.9	1300	24.582			17	320		95.58	100.83	-2.67											
453	Shallow Groundwater	A-1	2007/5/22	N.D.		120	4.5	N.D.	1400	1.6	1300	22.943			17	310		96.47	99.20	-1.40											
454	Shallow Groundwater	A-1	2007/8/4	N.D.		110	3.4	N.D.	1500	1.6	1300	24.582			16	320		95.72	100.82	-2.59											
455	Shallow Groundwater	A-1	2007/11/8	0.04		110	1.7	N.D.	1500	1.1	1300	24.582			17	350		103.92	100.78	1.53											
456	Shallow Groundwater	A-1	2008/2/5	0.13		110	7.1	N.D.	1400	1.3	1200	22.943			21	320		93.58	99.26	-2.94											
457	Shallow Groundwater	A-1	2008/8/1	0.32		120	2.5	N.D.	1500	2.2	1300	24.582			18	320		102.98	106.44	-1.65											
458	Shallow Groundwater	A-1	2008/11/4	N.D.		120	1.3	N.D.	1500	1.4	1300	24.582			18	340		98.93	106.41	-3.65		0.27	0.3±0.1	-49.8	-6.2						
459	Shallow Groundwater	A-1	2009/2/2	0.1		120	4.2	N.D.	1500	1	1300	24.582			19	350		103.15	106.47	-1.59											
460	Shallow Groundwater	A-1	2009/8/3	<0.1		68	130	<0.1	830	2.8	700				26	170															
461	Shallow Groundwater	A-1	2009/11/2	<0.5		120	5.5	<0.1	1500	1.3	1400				18	350															
462	Shallow Groundwater	A-1	2010/2/1	<0.1		68	41	<0.1	830	<0.5	750				42	210															
463	Shallow Groundwater	A-2	2006/12/22	0.02		33	550	N.D.	170	N.D.	190	2.786			6.4	72		33.89	34.26	-0.55		0.048									
464	Shallow Groundwater	A-2	2007/3/2	N.D.		8.8	690	N.D.	N.D.	N.D.	N.D.	0			5.9	18		14.54	18.60	-12.24											
465	Shallow Groundwater	A-2	2007/5/22	N.D.		20	620	N.D.	7.3	N.D.	1.7	0.12			4.7	48		23.37	24.59	-2.56											
466	Shallow Groundwater	A-2	2007/8/4	0.08		32	520	N.D.	210	N.D.	230	3.441			11	78		29.16	31.47	-3.81											
467	Shallow Groundwater	A-2	2007/11/8	0.04		49	500	N.D.	460	0.1	460	7.539			14	140		42.75	42.49	0.31											
468	Shallow Groundwater	A-2	2008/2/5	0.1		11	690	N.D.	84	N.D.	75	1.377			14	72		17.20	20.82	-9.53											
469	Shallow Groundwater	A-2	2008/8/1	0.02		22	520	N.D.	49	N.D.	47	0.803			5.9	50		22.38	23.48	-2.40											
470	Shallow Groundwater	A-2	2008/11/4	N.D.		20	450	N.D.	57	N.D.	57	0.934			5.8	49		20.14	21.02	-2.15		0.028	4.4±0.1	-71.6	-9.4						
471	Shallow Groundwater	A-2	2009/2/2	0.04		49	370	N.D.	460	0.1	460	7.539			18	140		37.80	39.78	-2.55											
472	Shallow Groundwater	A-2	2009/8/3	<0.1		25	410	<0.1	170	<0.5	130				12	40															
473	Shallow Groundwater	A-2	2009/11/2	<0.5		39	300	<0.1	280	<0.5	260				16	110															
474	Shallow Groundwater	A-2	2010/2/1	<0.1		5.9	350	<0.1	11	<0.5	14				15	30															
475	Shallow Groundwater	A-3	2006/12/22	N.D.		68	62	N.D.	1000	1.1	870	16.388			12	220		57.52	59.99	-2.10		0.18		-64.6	-8.1						
476	Shallow Groundwater	A-3	2007/3/2	N.D.		68	100	N.D.	890	0.8	790	14.585			13	200		56.94	58.98	-1.76											
477	Shallow Groundwater	A-3	2007/5/22	0.02		68	13	N.D.	970	0.9	860	15.896			15	220		57.12	58.48	-1.18											
478	Shallow Groundwater	A-3	2007/8/4	0.03		57	68	N.D.	790	1.7	680	12.947			15	160		48.53	48.21	0.33											
479	Shallow Groundwater	A-3	2007/11/8	0.08		69	6	N.D.	1000	0.9	870	16.388			13	230		60.40	58.83	1.32											
480	Shallow Groundwater	A-3	2008/2/5	0.07		70	2.6	N.D.	1000	0.7	910	16.388			14	240		57.82	58.76	-0.80											
481	Shallow Groundwater	A-3	2008/8/1	0.02		63	20	N.D.	930	1.4	810	15.241			14	200		56.88	55.15	1.55											
482	Shallow Groundwater	A-3	2008/11/4	0.02		63	9.3	N.D.	940	0.9	830	15.405			13	220		51.72	55.09	-3.15		0.19	0.5±0.1	-67.6	-7.8						
483	Shallow Groundwater	A-3	2009/2/2	0.07		68	37	N.D.	930	0.8	810	15.241			12	210		52.53	55.50	-2.76											
484	Shallow Groundwater	A-3	2009/8/3	0.2		28	460	<0.1	180	<0.5	190				7.3	52															
485	Shallow Groundwater	A-3	2009/11/2	<0.5		57	92	<0.1	820	<0.5	660				12	200															

Table 3.2 Chemical and isotopic composition of river, precipitation, spring and groundwater of shallow boreholes (13/14)

Index	Sampling point		Sampling date	Analyzing date	Physico-chemical parameter					Geochemistry																			
					EC at site	EC at lab	pH at site	pH at lab	Tempe-rature at site	Na^+	K^+	Ca^{2+}	Mg^{2+}	Mn(II)	T.Mn	Li	Si	B	Sr	Se	P	Ti	T. Fe	Fe^{2+}	Al^{3+}	F^-	Cl^-	Br^-	I^-
					[mS/m]	[mS/m]			[℃]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]
486	Shallow Groundwater	A-3	2010/2/1	2010/2/5		530		7.1		920	45	77	48		0.6	3	12		0.87	＜0.01	<0.1	<0.01	0.05		<0.1	0.1	1300	9.9	4
487	Shallow Groundwater	A-4	2006/12/22	2007/1/17-2/1		7		5.8		8.1	1	1.4	1.5		N.D.	0.02	61		0.01	N.D.	N.D.	N.D.	N.D.		0.02	N.D.	10	N.D.	0.01
488	Shallow Groundwater	A-4	2007/3/2	2007/8/22-9/13		7.3		5.9		8.6	1	1.4	1.6		N.D.	N.D.	60		0.02	N.D.	N.D.	N.D.	N.D.		0.02	0.03	11	N.D.	N.D.
489	Shallow Groundwater	A-4	2007/5/22	2007/8/22-9/13		9.3		6.3		8.2	1.2	4.5	2.3		0.01	N.D.	58		0.02	N.D.	N.D.	N.D.	N.D.		N.D.	N.D.	10	N.D.	N.D.
490	Shallow Groundwater	A-4	2007/8/4	2007/8/22-9/13		7		5.9		7.7	0.96	1.9	1.8		N.D.	N.D.	51		0.02	N.D.	N.D.	N.D.	0.01		0.02	N.D.	9.3	N.D.	N.D.
491	Shallow Groundwater	A-4	2007/11/8	2007/11/9-11/27		6.9		5.6		7.7	0.96	1.9	2		N.D.	0.01	55		0.02	N.D.	N.D.	N.D.	0.01		0.02	0.08	9.8	N.D.	N.D.
492	Shallow Groundwater	A-4	2008/2/5	2008/2/6-2/20		8.1		6		8.1	1.4	3.1	2		0.02	0.01	42		0.02	N.D.	N.D.	N.D.	0.13		0.06	N.D.	9.9	N.D.	N.D.
493	Shallow Groundwater	A-4	2008/8/1	2008/9/22-11/5		7.4		6.1		8.2	1.2	1.6	1.6		N.D.	N.D.	60		0.14	N.D.	N.D.	N.D.	N.D.		0.01	0.01	11	N.D.	N.D.
494	Shallow Groundwater	A-4	2008/11/4	2009/1/13-1/28		7.1		5.7		8.1	0.99	1.3	1.6		N.D.	N.D.	58		0.02	N.D.	N.D.	N.D.	0.01		0.02	N.D.	11	N.D.	N.D.
495	Shallow Groundwater	A-4	2009/2/2	2009/2/5-2/5		7.8		6		8.1	1.1	2.5	2		0.01	N.D.	61		0.02	N.D.	N.D.	N.D.	0.03		0.02	N.D.	11	N.D.	N.D.
496	Shallow Groundwater	A-4	2009/8/3	2009/8/11		7.5		6.8		8.7	0.8	2.2	1.9		0.01	<0.1	19		0.02	<0.01	<0.1	<0.01	0.03		<0.1	<0.1	14	<0.1	<1.0
497	Shallow Groundwater	A-4	2009/11/2	2009/11/10		7400		6		8.7	1	2.4	2.1		<0.01	<0.1	26		0.02	<0.01	<0.1	<0.01	<0.01		<0.1	<0.1	12	<0.1	<1.0
498	Shallow Groundwater	A-4	2010/2/1	2010/2/5		6.8		5.4		8.3	0.9	1.6	1.8		<0.01	<0.1	26		0.02	<0.01	<0.1	<0.01	0.02		<0.1	<0.1	12	<0.1	<1.0
499	Shallow Groundwater	well	2007/6/4	2007/9/18-10/17		14		7.2		17	1.5	5.7	3.3		N.D.	0.01	37		0.04	N.D.	0.2	N.D.	N.D.		N.D.	0.17	17	N.D.	N.D.
500	Shallow Groundwater	well	2007/11/5	2008/2/20-3/5		14		7.2		15	1.3	5.8	3.5		N.D.	0.01	38		0.04	N.D.	0.2	N.D.	N.D.		N.D.	0.18	17	N.D.	N.D.
501	Shallow Groundwater	well	2007/12/3	2008/2/18-3/1		14		7		16	1.3	5.8	3.3		N.D.	N.D.	37		0.04	N.D.	0.2	N.D.	N.D.		N.D.	0.19	17	N.D.	N.D.
502	Shallow Groundwater	well	2008/1/7	2008/2/20-3/5		14		7		15	1.4	5.7	3.5		N.D.	N.D.	37		0.04	N.D.	0.2	N.D.	N.D.		N.D.	0.18	17	N.D.	N.D.
503	Shallow Groundwater	well	2008/2/8	2008/2/18-3/1		14		6.9		15	1.3	6.1	3.3		N.D.	N.D.	37		0.04	N.D.	0.2	N.D.	N.D.		N.D.	0.19	17	N.D.	N.D.
504	Shallow Groundwater	well	2008/6/5	2008/9/22-11/5		14		7.5		17	1.4	5.6	3.5		N.D.	N.D.	38		0.05	N.D.	0.2	N.D.	0.01		N.D.	0.2	17	N.D.	N.D.

Table 3.2 Chemical and isotopic composition of river, precipitation, spring and groundwater of shallow boreholes (14/14)

Index	Sampling point		Sampling date	NO_3^-	NO_2^-	NH_4^+	SO_4^{2-}	HS^-	HCO_3^-	CO_3^{2-}	M Alkalinity	M Alkalinity	P Alkalinity	P Alkalinity	TOC	TIC	U	Σcation	Σanion	ionic balance	Tracer (uranine)	Tracer (Na-naphtionate)	Isotope ^3H	Isotope δD	Isotope $\delta^{18}O$	Chromaticity Suspended solids	Chromaticity Total solids	Chromaticity Ignition loss	Chromaticity Spectral values y	Chromaticity coordinates x,y	Turbidity
				[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[mg/l]	[meq/l]	[mg/l]	[meq/l]	[mg/l]	[mg/l]		[meq/l]	[meq/l]	[%]	[mg/l]	[mg/l]	[T.U]	[‰]	[‰]	[mg/l]	[mg/l]	[mg/l]			[NTU]
486	Shallow Groundwater	A-3	2010/2/1	<0.1		59	52	<0.1	970	0.6	750				6.9	230															
487	Shallow Groundwater	A-4	2006/12/22	0.8		0.05	7	N.D.	9.4	N.D.	6.4	0.154			0.8	8.1		0.57	0.58	-0.01		0.0017		-69.4	-10.5						
488	Shallow Groundwater	A-4	2007/3/2	0.91		0.16	7.2	N.D.	7.7	N.D.	6.5	0.126			0.8	5.7		0.60	0.59	0.02											
489	Shallow Groundwater	A-4	2007/5/22	0.67		0.21	7.5	N.D.	18	N.D.	19	0.295			0.9	7.7		0.80	0.73	0.07											
490	Shallow Groundwater	A-4	2007/8/4	0.63		0.13	7.8	N.D.	7	N.D.	6.6	0.115			1.1	5.2		0.60	0.54	0.06											
491	Shallow Groundwater	A-4	2007/11/8	0.59		0.01	6.7	N.D.	8.5	N.D.	6	0.139			1.4	11		0.62	0.55	0.07											
492	Shallow Groundwater	A-4	2008/2/5	0.81		0.22	7.3	N.D.	14	N.D.	13	0.229			1.1	9.2		0.71	0.66	0.05											
493	Shallow Groundwater	A-4	2008/8/1	1.2		0.16	6.9	N.D.	8.8	N.D.	7.4	0.144			1	4.9		0.60	0.60	0.00											
494	Shallow Groundwater	A-4	2008/11/4	0.67		0.1	6.8	N.D.	7.2	N.D.	5.1	0.118			0.8	7.3		0.57	0.57	0.00		0.0017	4.4±0.1	-75.1	-10.2						
495	Shallow Groundwater	A-4	2009/2/2	0.85		0.01	6.7	N.D.	13	N.D.	9.8	0.213			0.9	8.2		0.67	0.66	0.01											
496	Shallow Groundwater	A-4	2009/8/3	0.5		<0.2	6.7	<0.1	15	<0.5	10				1.3	4															
497	Shallow Groundwater	A-4	2009/11/2	0.7		<0.2	6.9	<0.1	16	<0.5	12				2	10															
498	Shallow Groundwater	A-4	2010/2/1	0.3		<0.2	6.5	<0.1	4.7	<0.5	6				1	9.2															
499	Shallow Groundwater	well	2007/6/4	0.03		N.D.	4.3	N.D.	38	N.D.	34	0.623			0.4	8.7		1.33	1.19	0.14											
500	Shallow Groundwater	well	2007/11/5	0.03		N.D.	4.2	N.D.	40	N.D.	34	0.656			0.5	9.3		1.26	1.22	0.04		<0.0005	2.7±0.1	-68.4	-11.3						
501	Shallow Groundwater	well	2007/12/3	N.D.		N.D.	4.3	N.D.	39	N.D.	34	0.639			0.6	9.6		1.29	1.21	0.08		<0.0005	2.2±0.1	-69.7	-10.8						
502	Shallow Groundwater	well	2008/1/7	0.02		N.D.	4.2	N.D.	38	N.D.	33	0.623			0.7	9.3		1.26	1.19	0.07		<0.0005	2.1±0.1	-68.6	-10.7						
503	Shallow Groundwater	well	2008/2/8	0.12		N.D.	4.3	N.D.	40	N.D.	34	0.656			0.4	10		1.26	1.23	0.03		<0.0005	1.9±0.1	-68.8	-10.6						
504	Shallow Groundwater	well	2008/6/5	0.08		N.D.	4.3	N.D.	37	N.D.	34	0.606			0.6	7.9		1.34	1.18	0.17		0.0006	2.1±0.1	-62	-10.1						

Appendix

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Appendix 1 – nomenclature

This appendix contains explanations to acronyms and technical terms used by JAEA which occur in this report of the Tables 2.3.5, 2.3.6, 3.1 and 3.2.

Sampling point

HMS	Hokushin Meteorological Station (see section 2.1).
HET	Hokushin Evapotranspiration Observation Tower (see Section 2.1).

Sampling zone

GL	Ground level.
EL	Elevation level.

Location

WGS84, XII	World Geodetic System 1984.
UTM Zone54	Universal Transverse Mercator.

Sampling type

bottle	Groundwater collected by using sealed-, pressure-resistant bottles from boreholes.
core	Squeezed pore water in the core samples.
core under Atmosphere Control	Squeezed pore water under anaerobic condition.
inflow	Inflow groundwater from the boreholes or the shaft wall.
return	Returned drilling fluid during drilling boreholes. The values are showed with hatching lines in the tables.
river	River water. “Up the stream” and “down the stream” mean the river water collected at the upstream and downstream of the borehole, respectively.
pump	Groundwater collected by pumping up from boreholes.
pump (last)	The last groundwater samples collected by pumping up from boreholes.
WR	Groundwater collected from the water collection rings.
well	Well water used for drilling fluid of deep boreholes (HDB 1-11, PB-V01).
block rocks	Collected block type of rocks from the bottom of the shaft wall immediately after the shafts excavation

Physico-chemical parameter

ORP_{SHE}	Converted $ORP_{observ.}$ into Standard Hydrogen Electrode.

Isotope

$\delta^{13}C$ (CH_4)	$^{13}C/^{12}C$ of methane gas.
$\delta^{13}C$ (CO_2)	$^{13}C/^{12}C$ of carbon dioxide gas.
$\delta^{13}C$ (DIC)	$^{13}C/^{12}C$ of dissolved inorganic carbon in the groundwater.

Value

<u>0.0012</u>	Under bar means the referential value (although under determination limit, more than detection limit).

Appendix 2 – microbial analysis methods

(1) 好気性従属栄養細菌

従属栄養細菌の計数は, 基本使用濃度を 1/10 に希釈した Nutrient-Agar 培地（Difco 社製）あるいは R2A 培地を用いた寒天平板（塗抹）法 [1)]で行った。20℃で約 2 週間培養を行った後，寒天培地表面に出現したコロニーを計数した。

R2A 培地組成

プロテアーゼペプトン	0.5 g
酵母エキス	0.5 g
カサミノ酸	0.5 g
グルコース	0.5 g
溶性でん粉	0.5 g
リン酸一水素カリウム	0.3 g
硫酸マグネシウム	0.024 g
ピルビン酸ナトリウム	0.3 g
寒天	15 g
精製水	1000 ml

(2) 嫌気性従属栄養細菌

従属栄養細菌の計数は, 基本使用濃度を 1/10 に希釈した Nutrient-Agar 培地（Difco 社製）あるいは R2A を用いた寒天平板（塗抹）法 [1)]で行った。20℃で約 2 週間培養を行った後，寒天培地表面に出現したコロニーを計数した。培地には酸化還元指示薬として濾過滅菌済みの 0.2％レザズリン溶液を培地 1 L に対して 0.3 ml 添加した。オートクレーブ滅菌後、寒天が固まらないうちに嫌気グローブボックス内に移動し、還元剤としてシステイン塩酸塩を 0.025 w/v%添加後良く撹拌し、レザズリンの赤色反応が消えたことを確認した。その後、グローブボックス内で滅菌済みプラスチックシャーレに培地を分注し、そのまま室温で凝固させた。グローブボックス内で細菌懸濁液をプレート上に塗布後、嫌気ジャー内に固定し、20℃で約 2 週間の培養を行い、寒天培地中に出現したコロニーを計数した。

(3) アンモニア酸化菌および亜硝酸酸化菌

アンモニア酸化菌および亜硝酸酸化菌の培養計数用培地 [1)]とし，MPN（5 本）法（最確値法:Most-Probable-Number method）により計数した。培養温度は 20℃とし，暗所で約 60 日以上の期間培養を行った。生育の有無は，培養液の顕微鏡観察，及び培養液中のアンモニア，亜硝酸量の変化を高速液体クロマトグラフまたは，指示薬により確認した。

アンモニア酸化細菌用培地組成

硫酸アンモニウム	0.03 g
リン酸二水素カリウム	0.1 g
エチレンジアミン四酢酸一ナトリウム鉄	0.006 g
硫酸マグネシウム	0.05 g
塩化カルシウム	0.02 g
炭酸水素ナトリウム	0.2 g
炭酸カルシウム	0.002 g
石英砂	少量
精製水	1000 ml

亜硝酸酸化細菌用培地組成

亜硝酸ナトリウム	0.03 g
リン酸二水素カリウム	0.1 g
エチレンジアミン四酢酸一ナトリウム鉄	0.006 g
硫酸マグネシウム	0.05 g
塩化カルシウム	0.02 g
炭酸水素ナトリウム	0.2 g
炭酸カルシウム	0.002 g
石英砂	少量
精製水	1000 ml

(4) 鉄酸化菌

鉄酸化菌（*Thiobacillus ferroxidans*）は MPN（5 本）法により計数を行った。使用した培地は Silverman and Lundgren（1959）[2)]である。オートクレーブ滅菌（120℃，15 分間）した溶液に，γ 線滅菌済みの 0.20 μm ミリポアフィルターにより，ろ過滅菌をした硫酸第一鉄溶液を無菌的に混合する。硫酸第一鉄溶液は 500 ml のオートクレーブ滅菌精製水に溶解させ、全溶液量が 1000 ml になるように調整する。このように調製した液体培地を乾燥滅菌（180℃，4 時間）したアルミキャップ付き 30 ml 試験管に約 20 ml 分注し，MPN（5 本）法による計数用培地とした。なお，1 試料について 2 連で培養計数を実施し，希釈段数は 5 段とした。この計数用培地に試料水原液あるいは段階希釈試料を 10 v/v%接種し，試験管ミキサー（ボルテックスミキサー）にてよく撹拌した。以上のように試料を接種した培養液を温度 30℃，暗条件下において振とう培養した。培養期間は 1 ヶ月とし，培養期間内において培養開始から 5 日目，10 日目，15 日目，20 日目および 30 日目に顕微

鏡観察による生育チェックを行った。

鉄酸化細菌用培地　A

硫酸ナトリウム	3.0 g
塩化カリウム	0.1 g
リン酸二水素カリウム	0.5 g
硫酸マグネシウム	0.5 g
硝酸カルシウム	0.01 g
硫酸第一鉄	20.0 g
精製水	1000 ml

鉄酸化細菌用培地　B

硫酸アンモニウム	3.0 g
塩化カリウム	0.1 g
リン酸一水素カリウム	0.5 g
硫酸マグネシウム	0.5 g
硝酸カルシウム	0.01 g
硫酸第一鉄	10.0 g
精製水	1000 ml

(5) 硫黄酸化細菌

硫黄酸化細菌は、pH の異なる 2 種類の培地を用いて培養を行い、最確数法（5 本法）により菌数を計数した。培地は、酸性培地である Silverman9K 培地および中性培地である Starkey 培地を用いた。培養は 30℃で 2 週間振とう培養後、培養液の pH の低下および顕微鏡により菌体および硫黄顆粒が観察された場合を陽性とし、陽性管数から最確数表により最確数を求めた。なお、そのご 1 ヶ月間まで培養を継続し、菌数の増減を確認した。

硫黄酸化細菌用培地（Silverman 9K）

硫酸ナトリウム	3.0 g
塩化カリウム	0.1 g
リン酸二水素カリウム	0.5 g
硫酸マグネシウム	0.5 g
硝酸カルシウム	0.01 g
チオ硫酸ナトリウム	10.0 g
精製水	1000 ml

硫黄酸化細菌用培地（Starkey）

硫酸アンモニウム	0.3 g
リン酸一水素カリウム	4.0 g
リン酸二水素カリウム	1.5 g
硫酸マグネシウム	0.5 g
酵母エキス	0.3 g
チオ硫酸ナトリウム	10.0 g
微量金属溶液	10 ml
精製水	1000 ml

微量金属溶液

EDTA 二ナトリウム	5.0 g
硫酸亜鉛	2.2 g
塩化カルシウム	7.3 g
塩化マンガン	2.5 g
塩化コバルト	0.5 g
モリブデン酸アンモニウム	0.5 g
硫酸第一鉄	5.0 g
硫酸銅	0.2 g
精製水	1000 ml

（6）硝酸還元菌および脱窒菌

脱窒菌は、亜硝酸性窒素あるいは硝酸性窒素を窒素ガスや亜酸化窒素ガスなどの期待に還元する菌である。これらの菌は好気的に増殖できるものもいるが、酸素が欠乏し、硝酸イオンや亜硝酸イオンが存在する場合、嫌気的に増殖することができる。硝酸還元菌は、硝酸イオンを還元するが窒素ガス非生産のものを示す。

硝酸還元菌および脱窒菌は，MPN（5 本）法により計数を行った。試料水を 10 倍希釈法により希釈し, 各希釈段階の懸濁液 1 ml を, あらかじめ熱して酸素を除去した培地 9 ml を含む試験管（5 本）に接種した。次にダーラム管を試験管に入れ（管内に空気が存在しないことを確認）て，30℃で 10～14 日培養を行った。ガスの発生とブロムチモールブルー（BTB）濃青色（pH 指示薬である BTB 溶液を添加すると、培養前の培地は中性のため緑色を呈しているが，NO_3 が消滅すると培地がアルカリ性となるため濃青色となる）を呈する試験管の数を確認し，最確数を用いて脱窒菌数を求めた。ここで，培地液色が濃青色に変色した試験管は硝酸還元菌陽性，濃青色と同時にダーラム管に脱窒ガスが確認さ

れた場合には脱窒菌陽性とした[3)]。

PYN 培地

ペプトン	5.0 g
酵母エキス	1.0 g
リン酸二水素カリウム	0.1 g
硝酸カリウム	1.0 g
精製水	1000 ml

Giltay 培地

A

硝酸カリウム	1.0 g
アスパラギン	1.0 g
BTB 溶液*	5 ml
蒸留水	500 ml

B

リン酸二水素カリウム	1.0 g
クエン酸ナトリウム	8.5 g
硫酸マグネシウム	1.0 g
塩化鉄（III）	0.05 g
塩化カルシウム	0.2 g
精製水	1000 ml

A と B を混合し，pH7.0-7.2 に調整。

*ブロムチモールブルー1 g をエタノール（95 w/v%）100 ml に溶かす。

（7）硫酸塩還元菌

硫酸塩還元菌は MPN（5 本）法により計数を行った。Postgate の培地を一部改変した培地（須藤，1988）[3)]である。本培地は乳酸と粉末酵母エキスを有機物源（基質）として加えており，乳酸は硫酸塩還元菌の直接の基質として，また，粉末酵母エキスは，硫酸塩還元菌の基質にもなりうるが，むしろ共存する好気性細菌の成育を促進させることにより，より早く培地中の嫌気（還元度）を高めるためのものである。本培地は多種の硫酸塩還元菌を分離･培養するには最も一般的な培地のひとつである。MPN（5 本）法は培地に寒天を 0.3 w/v%添加し半固体培地とし，嫌気的に培地を作成した後に還元剤として $HSCH_2COONa$（チオグリコール酸ナトリウム）および $NaC_6H_7O_4$（アスコルビン酸ナトリウム）を 0.01%添加した。全量が 15 ml の試験管に培地 9 ml を無菌的に分注して使用した。

試料は各 1 ml 接種し，ピペットの先端を培地中に挿入して空気との接触を可能な限り避けて接種した。接種後，直ちに還元剤として $HSCH_2COONa$（チオグリコール酸ナトリウム）および $NaC_6H_7O_4$（アスコルビン酸ナトリウム）を 0.01%添加した 1.5%寒天溶液により培地表面をシールし，空気との接触をなくし無酸素状態を保持した。この試験管を 30℃，暗条件下で静置培養し，培養開始後 7 日目および 14 日目に計数を行った。

硫酸還元菌培地 A

酵母エキス	1.0 g
乳酸ナトリウム	3.5 g
硫酸ナトリウム	1.0 g
リン酸一水素カリウム	0.5 g
硫酸マグネシウム	0.1 g
硫酸鉄（II）七水和物	0.5 g
塩化アンモニウム	1.0 g
塩化カルシウム	0.1 g
寒天	3.0 g
精製水	1000 ml

培地の pH は 7.2 に調整する

硫酸還元菌培地　E 培地

酵母エキス	1.0 g
乳酸ナトリウム	3.5 g
硫酸ナトリウム	1.0 g
リン酸一水素カリウム	0.5 g
硫酸マグネシウム	2.0 g
硫酸鉄（II）七水和物	0.5 g
精製水	1000 ml

硫酸還元菌培地　F 培地

トリプトン	10 g
乳酸ナトリウム	3.5 g
亜硫酸ナトリウム	0.5 g
硫酸マグネシウム	2.0 g
硫酸鉄（II）七水和物	0.5 g
クエン酸アンモニウム鉄（III）	0.5 g
精製水	1000 ml

(8) メタン生成菌

メタン生成菌の計数については，MPN（5 本）法により培養計数を行った。培養容器にはシリコン栓の付いたガラス製バイアルビン（容量 120 ml）をアルミシールで密封して用いた。培地の調製手順は，ガラス製バイアルビンに分注し，アルミシールにて密封した後に，オートクレーブ滅菌を行った。滅菌終了後，ろ過滅菌したビタミン混液，微量金属溶液および炭酸水素ナトリウム溶液をシリンジにより添加し，直ちに流水で冷却しながらバイアルビンの内部を無菌的に水素/炭酸（20/80）混合ガスで置換した。ガス置換はクリーンベンチ内で，滅菌済み注射針とγ線滅菌済み 0.20　m ミリポアフィルターを用いて，減圧およびガス充填を数回繰り返した。このとき，培地中に加えたレサズリンの薄赤色が発色していないことを確認して（レサズリンは酸素が存在すると青～紫色を呈し，微好気環境下では薄赤色へと変わり，無酸素環境下では発色しない），完全な無酸素状態のものを培養計数に使用した。試料の接種および希釈にはシリンジを使用し，グローブボックス内において作業を行った。なお，希釈液には培地と等濃度の割合でレサズリンと還元剤を添加した生理食塩水を，上述と同様な滅菌およびガス置換操作により調製したものを用いた。培養は 25℃，暗条件下で静置培養し，培養開始後，30 日目，45 日目，60 日目および 80 日目に生育の判定を行った。

生育の判定はバイアルビンのヘッドスペース部におけるメタンガスの有無をガスタイトシリンジにより採取し，FID を検出器としたガスクロマトグラフィにより，定性分析を行った。GC の測定条件は定温キャリアガス（分離カラム : porapack-Q 3 m，温度 : 45℃）および窒素流量 35 ml/min とした。

<u>メタン生成菌用培地</u>

基本培地組成

無機塩類溶液 1	50 ml
無機塩類溶液 2	50 ml
微量無機塩溶液	10 ml
ビタミン液	10 ml
硫酸第一鉄	0.002 g
炭酸水素ナトリウム	5.0 g
酢酸ナトリウム	2.5 g
ギ酸ナトリウム	2.5 g
酵母エキス	2.0 g
トリプチケース	2.0 g
システイン塩酸塩	0.5 g
硫化ナトリウム	0.5 g

精製水	1000 ml

無機塩類溶液 1

リン酸一水素カリウム	6.0 g
精製水	1000 ml

無機塩類溶液 2

リン酸一水素カリウム	6.0 g
硫酸アンモニウム	6.0 g
塩化ナトリウム	12.0 g
硫酸マグネシウム	2.6 g
塩化カルシウム	0.16 g
精製水	1000 ml

微量無機塩溶液

ニトリロ 3 酢酸	1.5 g
硫酸マグネシウム	3.0 g
硫酸マンガン	0.5 g
塩化ナトリウム	1.0 g
硫酸第一鉄	0.1 g
硫酸コバルト	0.1 g
塩化カルシウム	0.01 g
硫酸亜鉛	0.1 g
硫酸銅	0.01 g
硫酸アルミニウムカリウム	0.01 g
ホウ酸	0.01 g
モリブデン酸ナトリウム	0.01 g
精製水	1000 ml

ビタミン液

ビオチン	2.0 mg
葉酸	2.0 mg
塩酸ピリドキシン	10.0 mg
塩酸チアミン	5.0 mg
リボフラビン	5.0 mg
ニコチン酸	5.0 mg
DL-パントテン酸カルシウム	5.0 mg
ビタミン B12	0.1 mg
p-アミノ安息香酸	5.0 mg
リポ酸	5.0 mg

精製水　　1000 ml

参考文献：

1）日本水道協会編：上水試験方法，日本水道協会（1993）

2) Silverman, M.P. and Lundgren, D.G.：Studies on the chemoautotrophic iron bacterium Ferrobacillus ferrooxidans. I. An improved medium and a harvesting procedure for securing high cell yields. *J. Bacteriol*. 77: 642-647.　（1959）

3）須藤隆一編：環境微生物実験法，講談社（1988）

Table a.1 The types of culture media for counting microbial abundance in groundwater samples

	HDB-1	HDB-2	HDB-3	HDB-4	HDB-5	HDB-6	HDB-8	HDB-9	HDB-10	HDB-11
Aerobic heterotrophic bacteria	NA*	NA	NA	NA	NA	NA	NA	R2A	R2A	NA
Anaerobic heterotrophic bacteria	NA	NA	NA	NA	NA	NA	NA	R2A, GAM	R2A, GAM	NA
Iron-oxidizing bacteria	B	B	B	B	B	B	B	Silverman9K-Fe	Silverman9K-Fe	B
Sulfur-oxidizing bacteria								Silverman9K-S	Silverman9K-S	
Nitrate-reducing bacteria	Giltay	Giltay	Giltay	Giltay	Giltay	Giltay	Giltay	PYN, Giltay	PYN, Giltay	Giltay
Denitrifying bacteria	Giltay	Giltay	Giltay	Giltay	Giltay	Giltay	Giltay	PYN, Giltay	PYN, Giltay	Giltay
Sulfate-reducing bacteria	A	A	A	A	A	A	A	E, F	E, F	A

国際単位系（SI）

表１．SI 基本単位

基本量	SI 基本単位	
	名称	記号
長さ	メートル	m
質量	キログラム	kg
時間	秒	s
電流	アンペア	A
熱力学温度	ケルビン	K
物質量	モル	mol
光度	カンデラ	cd

表２．基本単位を用いて表されるSI組立単位の例

組立量	SI 基本単位	
	名称	記号
面積	平方メートル	m^2
体積	立法メートル	m^3
速さ，速度	メートル毎秒	m/s
加速度	メートル毎秒毎秒	m/s^2
波数	毎メートル	m^{-1}
密度，質量密度	キログラム毎立方メートル	kg/m^3
面積密度	キログラム毎平方メートル	kg/m^2
比体積	立方メートル毎キログラム	m^3/kg
電流密度	アンペア毎平方メートル	A/m^2
磁界の強さ	アンペア毎メートル	A/m
量濃度[a]，濃度	モル毎立方メートル	mol/m^3
質量濃度	キログラム毎立法メートル	kg/m^3
輝度	カンデラ毎平方メートル	cd/m^2
屈折率[b]	（数字の）　1	1
比透磁率[b]	（数字の）　1	1

(a) 量濃度（amount concentration）は臨床化学の分野では物質濃度（substance concentration）ともよばれる。
(b) これらは無次元量あるいは次元１をもつ量であるが、そのことを表す単位記号である数字の１は通常は表記しない。

表３．固有の名称と記号で表されるSI組立単位

組立量	SI 組立単位			
	名称	記号	他のSI単位による表し方	SI基本単位による表し方
平面角	ラジアン[b]	rad	1 [b]	m/m
立体角	ステラジアン[b]	sr[c]	1 [b]	m^2/m^2
周波数	ヘルツ[d]	Hz		s^{-1}
力	ニュートン	N		$m\ kg\ s^{-2}$
圧力，応力	パスカル	Pa	N/m^2	$m^{-1}\ kg\ s^{-2}$
エネルギー，仕事，熱量	ジュール	J	N m	$m^2\ kg\ s^{-2}$
仕事率，工率，放射束	ワット	W	J/s	$m^2\ kg\ s^{-3}$
電荷，電気量	クーロン	C		s A
電位差（電圧），起電力	ボルト	V	W/A	$m^2\ kg\ s^{-3}\ A^{-1}$
静電容量	ファラド	F	C/V	$m^{-2}\ kg^{-1}\ s^4\ A^2$
電気抵抗	オーム	Ω	V/A	$m^2\ kg\ s^{-3}\ A^{-2}$
コンダクタンス	ジーメンス	S	A/V	$m^{-2}\ kg^{-1}\ s^3\ A^2$
磁束	ウエーバ	Wb	Vs	$m^2\ kg\ s^{-2}\ A^{-1}$
磁束密度	テスラ	T	Wb/m^2	$kg\ s^{-2}\ A^{-1}$
インダクタンス	ヘンリー	H	Wb/A	$m^2\ kg\ s^{-2}\ A^{-2}$
セルシウス温度	セルシウス度[e]	℃		K
光束	ルーメン	lm	cd sr[c]	cd
照度	ルクス	lx	lm/m^2	$m^{-2}\ cd$
放射性核種の放射能[f]	ベクレル[d]	Bq		s^{-1}
吸収線量, 比エネルギー分与, カーマ	グレイ	Gy	J/kg	$m^2\ s^{-2}$
線量当量, 周辺線量当量, 方向性線量当量, 個人線量当量	シーベルト[g]	Sv	J/kg	$m^2\ s^{-2}$
酸素活性	カタール	kat		$s^{-1}\ mol$

(a)SI接頭語は固有の名称と記号を持つ組立単位と組み合わせても使用できる。しかし接頭語を付した単位はもはやコヒーレントではない。
(b)ラジアンとステラジアンは数字の１に対する単位の特別な名称で、量についての情報をつたえるために使われる。実際には、使用する時には記号rad及びsrが用いられるが、習慣として組立単位としての記号である数字の１は明示されない。
(c)測光学ではステラジアンという名称と記号srを単位の表し方の中に、そのまま維持している。
(d)ヘルツは周期現象についてのみ、ベクレルは放射性核種の統計的過程についてのみ使用される。
(e)セルシウス度はケルビンの特別な名称で、セルシウス温度を表すために使用される。セルシウス度とケルビンの単位の大きさは同一である。したがって、温度差や温度間隔を表す数値はどちらの単位で表しても同じである。
(f)放射性核種の放射能（activity referred to a radionuclide）は、しばしば誤った用語で"radioactivity"と記される。
(g)単位シーベルト（PV,2002,70,205）についてはCIPM勧告2（CI-2002）を参照。

表４．単位の中に固有の名称と記号を含むSI組立単位の例

組立量	SI 組立単位		
	名称	記号	SI 基本単位による表し方
粘度	パスカル秒	Pa s	$m^{-1}\ kg\ s^{-1}$
力のモーメント	ニュートンメートル	N m	$m^2\ kg\ s^{-2}$
表面張力	ニュートン毎メートル	N/m	$kg\ s^{-2}$
角速度	ラジアン毎秒	rad/s	$m\ m^{-1}\ s^{-1}=s^{-1}$
角加速度	ラジアン毎秒毎秒	rad/s^2	$m\ m^{-1}\ s^{-2}=s^{-2}$
熱流密度，放射照度	ワット毎平方メートル	W/m^2	$kg\ s^{-3}$
熱容量，エントロピー	ジュール毎ケルビン	J/K	$m^2\ kg\ s^{-2}\ K^{-1}$
比熱容量，比エントロピー	ジュール毎キログラム毎ケルビン	J/(kg K)	$m^2\ s^{-2}\ K^{-1}$
比エネルギー	ジュール毎キログラム	J/kg	$m^2\ s^{-2}$
熱伝導率	ワット毎メートル毎ケルビン	W/(m K)	$m\ kg\ s^{-3}\ K^{-1}$
体積エネルギー	ジュール毎立方メートル	J/m^3	$m^{-1}\ kg\ s^{-2}$
電界の強さ	ボルト毎メートル	V/m	$m\ kg\ s^{-3}\ A^{-1}$
電荷密度	クーロン毎立方メートル	C/m^3	$m^{-3}\ sA$
表面電荷	クーロン毎平方メートル	C/m^2	$m^{-2}\ sA$
電束密度，電気変位	クーロン毎平方メートル	C/m^2	$m^{-2}\ sA$
誘電率	ファラド毎メートル	F/m	$m^{-3}\ kg^{-1}\ s^4\ A^2$
透磁率	ヘンリー毎メートル	H/m	$m\ kg\ s^{-2}\ A^{-2}$
モルエネルギー	ジュール毎モル	J/mol	$m^2\ kg\ s^{-2}\ mol^{-1}$
モルエントロピー, モル熱容量	ジュール毎モル毎ケルビン	J/(mol K)	$m^2\ kg\ s^{-2}\ K^{-1}\ mol^{-1}$
照射線量（X 線及びγ線）	クーロン毎キログラム	C/kg	$kg^{-1}\ sA$
吸収線量率	グレイ毎秒	Gy/s	$m^2\ s^{-3}$
放射強度	ワット毎ステラジアン	W/sr	$m^4\ m^{-2}\ kg\ s^{-3}=m^2\ kg\ s^{-3}$
放射輝度	ワット毎平方メートル毎ステラジアン	$W/(m^2\ sr)$	$m^2\ m^{-2}\ kg\ s^{-3}=kg\ s^{-3}$
酵素活性濃度	カタール毎立方メートル	kat/m^3	$m^{-3}\ s^{-1}\ mol$

表５．SI 接頭語

乗数	接頭語	記号	乗数	接頭語	記号
10^{24}	ヨタ	Y	10^{-1}	デシ	d
10^{21}	ゼタ	Z	10^{-2}	センチ	c
10^{18}	エクサ	E	10^{-3}	ミリ	m
10^{15}	ペタ	P	10^{-6}	マイクロ	μ
10^{12}	テラ	T	10^{-9}	ナノ	n
10^{9}	ギガ	G	10^{-12}	ピコ	p
10^{6}	メガ	M	10^{-15}	フェムト	f
10^{3}	キロ	k	10^{-18}	アト	a
10^{2}	ヘクト	h	10^{-21}	ゼプト	z
10^{1}	デカ	da	10^{-24}	ヨクト	y

表６．SIに属さないが、SIと併用される単位

名称	記号	SI 単位による値
分	min	1 min=60s
時	h	1h =60 min=3600 s
日	d	1 d=24 h=86 400 s
度	°	1°=(π/180) rad
分	’	1’=(1/60)°=(π/10800) rad
秒	”	1”=(1/60)’=(π/648000) rad
ヘクタール	ha	$1ha=1hm^2=10^4m^2$
リットル	L, l	$1L=11=1dm^3=10^3cm^3=10^{-3}m^3$
トン	t	$1t=10^3$ kg

表７．SIに属さないが、SIと併用される単位で、SI単位で表される数値が実験的に得られるもの

名称	記号	SI 単位で表される数値
電子ボルト	eV	$1eV=1.602\ 176\ 53(14)\times10^{-19}J$
ダルトン	Da	$1Da=1.660\ 538\ 86(28)\times10^{-27}kg$
統一原子質量単位	u	1u=1 Da
天文単位	ua	$1ua=1.495\ 978\ 706\ 91(6)\times10^{11}m$

表８．SIに属さないが、SIと併用されるその他の単位

名称	記号	SI 単位で表される数値
バール	bar	$1\ bar=0.1MPa=100kPa=10^5Pa$
水銀柱ミリメートル	mmHg	1mmHg=133.322Pa
オングストローム	Å	$1\ Å=0.1nm=100pm=10^{-10}m$
海里	M	1 M=1852m
バーン	b	$1\ b=100fm^2=(10^{-12}cm)2=10^{-28}m^2$
ノット	kn	1 kn=(1852/3600)m/s
ネーパ	Np	SI単位との数値的な関係は、対数量の定義に依存。
ベル	B	
デジベル	dB	

表９．固有の名称をもつCGS組立単位

名称	記号	SI 単位で表される数値
エルグ	erg	$1\ erg=10^{-7}\ J$
ダイン	dyn	$1\ dyn=10^{-5}N$
ポアズ	P	$1\ P=1\ dyn\ s\ cm^{-2}=0.1Pa\ s$
ストークス	St	$1\ St\ =1cm^2\ s^{-1}=10^{-4}m^2\ s^{-1}$
スチルブ	sb	$1\ sb\ =1cd\ cm^{-2}=10^4cd\ m^{-2}$
フォト	ph	$1\ ph=1cd\ sr\ cm^{-2}\ 10^4lx$
ガル	Gal	$1\ Gal\ =1cm\ s^{-2}=10^{-2}ms^{-2}$
マクスウェル	Mx	$1\ Mx = 1G\ cm^2=10^{-8}Wb$
ガウス	G	$1\ G\ =1Mx\ cm^{-2}\ =10^{-4}T$
エルステッド[c]	Oe	$1\ Oe \triangleq (10^3/4\pi)A\ m^{-1}$

(c) ３元系のCGS単位系とSIでは直接比較できないため、等号「 ≙ 」は対応関係を示すものである。

表10．SIに属さないその他の単位の例

名称	記号	SI 単位で表される数値
キュリー	Ci	$1\ Ci=3.7\times10^{10}Bq$
レントゲン	R	$1\ R = 2.58\times10^{-4}C/kg$
ラド	rad	$1\ rad=1cGy=10^{-2}Gy$
レム	rem	$1\ rem=1\ cSv=10^{-2}Sv$
ガンマ	γ	1 γ =1 nT=10-9T
フェルミ		1フェルミ=1 fm=10-15m
メートル系カラット		1メートル系カラット = 200 mg = 2×10-4kg
トル	Torr	1 Torr = (101 325/760) Pa
標準大気圧	atm	1 atm = 101 325 Pa
カロリー	cal	1cal=4.1858J（「15℃」カロリー），4.1868J（「IT」カロリー）4.184J（「熱化学」カロリー）
ミクロン	μ	$1\ \mu\ =1\mu m=10^{-6}m$

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