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TITLE : ISOTOPE CORRELATION TECHNIQUES FOR TOKAI REPROCESSING PLANT SAFEGUARDS(II)

SUB TITLE : EVALUATION OF THE FOUR CAMPAIGN DATA AND HEEL CORRECTION

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ISOTOPE CORRELATION TECHNIQUES FOR TOKAI REPROCESSING PLANT SAFEGUARDS (II)

Evaluation of The Four Campaign Data and Heel Correction

西田　恭輔*　　久野　祐輔*
黒沢　　明*　　寺門　　茂*
秋山　孝夫*

要　　旨

同位体相関技術（ICTs）はJASPAS（日本のIAEA保障措置支援計画）の一環として，再処理工場の入量計量検証技術の確立を目的に開発されてきたものである。本技術の概要は，対象燃料における炉側の初期データ（初期装荷ウラン量，初期濃縮度）および燃焼後のウラン・プルトニウムの同位体比（測定値）を用い，燃焼度に依存したいくつかの相関関係から使用済燃料中のウラン，プルトニウムの量を推定するものである。オリジナルの解析ソフトウエアは日本原子力研究所に委託制作されたものを用いたが，事業団ではこれらを大型コンピューターに導入し，入力に必要とされる情報，すなわち各燃料の初期装荷量，初期濃縮度等を直接転送できるように改造した。前回の報告では東海再処理工場に於ける86－1，86－2キャンペーンのデータについて取り扱ったが，キャンペーンのトータルの評価としては入量計量測定値に対し約2％程度で一致する結果が得られた。しかし，各バッチベースの評価では平均で約10％にも達する結果となり，保障措置を目的とした施設側データの検証手段の開発目的から考えれば満足出来るものではなかった。そのため，今回は前回の検討における誤差の最大の要因と考えられる溶解槽と計量槽間の貯槽ヒール部の残液問題について主に取り組んだ。すなわち，使用済燃料集合体単位に適用されるべき本ICTは，再処理工場の溶解槽においてのみ有効である。しかし，実際の計量槽は溶解槽からいくつもの貯槽を経た位置にあり，さらにそれらの貯槽には溶液が残る。このため，溶解液と計量液は等価とはならないことから，本技術を評価する場合にはこれらに基づく補正が必要となる。本補正を行う場合，運転に係る詳細な情報を必要とするが，これらの情報をもとにその補正の効果について検討した。その結果，これまで各バッチベースのデータは，精度が10％またはそれ以上の値であったが，本補正により4－5％の精度まで改良できることがわかった。本報告書では補正方法，結果等を扱う他，同位体相関計算パラメータを一部変更することにより86－2キャンペーンデータの再計算するとともに，87－1，88－1キャンペーンのデータの評価についても記述している。

＊再処理工場工務部分析課

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Isotope Correlation Techniques For Tokai Reprocessing Plant Safeguards (II)

— Evalution of The Four Compaign Date and Heel Correction —

K.Nishida*, A.Kurosawa*, Y.Kuno*
S.Terakado*, T.Akiyama*

ABSTRACT

Isotopic Correlation Techniques (ICTs) have been developed to verify the input accountability of reprocessing plant. Institute (JAERI) was introduced to the Tokai reprocessing plant of Power Reactor and Nuclear Fuel Developement Corporation (PNC) in 1985. Besides, that was inprroved to be capable of automatically traneferring sorce data necessary for the calculation to the program by PNC.

The result of data evaluation of the 1986 campaigns shown in the previous report suggested that reduction of precision be essential to apply the ICTs to the safeguards, because the scatter (1σ) of the difference between measured value and ICTs' on batch-based verification was approximately 10% .

The heel corrections, which should be the largest cause of the error, were dealt with in the report. As the results, the scatters of uranium and plutonium in the 86-1 campaign were reduced dramatically to 4% and 5%, respectively, whereas those in the 86-2 campaign were 4% and 5% respectively.

Content

1. INTRODUCTION

This work has been carried out to demonstrate the applicability of isotopic correlation techniques as a verification method for the accountability measurement at the Tokai reprocessing plant.

The data obtained in the 86-1, 86-2, 87-1 and 88-1 campaigns were analyzed by using the software of ICTs developed at JAERI.

The 86-1 campaign consisted of 13 reprocessing batches of spent fuels of IKATA (PWR) and 2 rinsing batches, whereas 97 batches of spent fuels were processed in the 86-2 campaign. The fuels treated in the latter campaign are as follows; 40 batches of FUKUSHIMA-1 (BWR) , 17 batches of FUKUSHIMA-2 (BWR) , 17 batches of HAMAOKA-1 (BWR) , and 23 batches of MIHAMA-1 (PWR) .

The 130 batches of spent fuels shown below were processed in the 87-1 campaign; 12 batches of IKATA-1 (PWR) , 17 batches of SHIMANE-1 (BWR) , 60 batches of TOKAI-2 (BWR) 17 batches of HAMAOKA-1 and 24 batches of FUKUSHIMA-1. In the 88-1 campaign, totally 105 batches of spent fuels compoesd of 14 batches of IKATA-1, 27 batches of MIHAMA-1, 17 batches of FUKUSHIMA-2, 21 batches of SHIMANE-1, 17 batches of FUKUSHIMA-3 and 9 batches of TOKAI-2 were processed.

The scatters of ICT estimated data of each batch relative to the measured ones on plutonium concentration were approximately 8.6 % and 9.3 % for the 86-1 campaign and the 86-2 camapign, respectively, described in the previous report .1) From the point of view of the safeguards, it was concluded that the precision on the batch analysis of ICTs be improved. It was thought that the heel correction in the vessels located between the dissolver vessel and the accountancy one could be the best solution for the improvement. This report, therefore, mainly deals with the heel corrections on the data of the 86-1 and the 86-2 campaigns, in addition to the conventional method of ICTs calculation on the data of 87-1 and 88-1 campaigns by using the new computer program for on-line data transfer.

2. ANALYTICAL METHOD

2.1 Determination of plutonium by the Pu/U ratio method

The input mass of plutonium of reprocessing plant is usually determined from measurementts of plutonium concentration and total volume of the solution of spent fuel dissolved in nitric acid with an input accountability vessel at the reprocessing plant. On the other hand, the amount of plutonium may be determined by the so-called plutonium-to-uranium ratio method that has been proposed as task-L of TASTEX without need of any absolute measurments of the volume and concentration. That is based on the relations derived bellow. The mass of plutonium in spent fuel is given by

$$Pu = (Pu/U) \times U. \qquad \text{(Eq. 1)}$$

where U stands for the mass of uranium remaining in the fuel discharged from reactor core. The initial masses of uranium charged in the fuel assemblies questioned are most accurately known from fuel fabrication record. Material balance of heavy metals before and after irradiation of the fuel is expressed as

$$U^{\circ} = U + F + Pu + TU, \qquad \text{(Eq. 2)}$$

where F stands for the number of fissions occured, and U°, U, Pu and TU are the number of the atoms of pre-irradiation uranium, post-irradiation uranium, plutonium accumulated, and the other transuranium elements formed respectively. Equation 2 is also valid in mass unit, if minor terms are neglected of released energy and nucleons. Term TU is usually small enough to be neglected. Introducing burnup B in fission-per-initial-metal-atom (FIMA) unit which is defined as F/U°, Eq. 1 is reduced to

$$Pu = (Pu/U)\ U^{\circ}\ [1 - B - (Pu/U)\ (1 - B - Pu/U)]\ , \qquad \text{(Eq, 3)}$$

where the last term of Pu/U is Pu/U° to be exact, but it may be approximated because of secondary correction. Besides, another expression is derived on the same basis:

$$U = U^{\circ} (1 - B) / (1 + Pu/U) , \qquad \text{(Eq. 3')}$$

If relationship between the plutonium-to-uranium ratio and some isotopic data or reduced parameters can be established, the plutonium-to-uranium ratio will be predicted from isotopic data of either heavy elements of fission products for a given reprocessing batch of spent fuel, and the amount of plutonium in the batch will be independently determined on the basis of the fabrication data, U°, and its burnup, B.

2.2 Data available from reprocessing plant

In consideration of the routine measurements for the input and output accountability at the reprocessing plant, the data were confined to utilizing concentrations and isotope abundances of uranium and plutonium. For the reprocessing batches of the campaigns and some gamma-ray emitting fission products were measured, but the precision of the radioactivity data was not high enough to discuss correlation among those in detail.

Following information is useful of fuel assemblies and most of those were supplied by the customers of reprocessing:

(1) Reactor specifications; name, type, moderator and output power

(2) Fuel specifications; measured values of the initial amount and isotopic composition of uranium, calculated results of burn up and the final amounts of the isotopes of uranium and plutonium, as well as identification code and general description of design data such as cladding dimensinos, material and lattice pitch

of each fuel assembly.

(3) Irradiation history of each fuel assembly; operational history for core and each assembly, loaded positions in core, dates of charge and discharge.

The collected data were compiled and stored in four kinds of files:

- Fuel assembly data file,
- Reprocessing batch data file,
- Plutonium product data file and
- Uranium product data file.

It was difficult to follow individual batch of the input accountability measurements up to the product batches of plutonium and uranium.
Another difficulty was to determine an exact amount of recycled acid to dissolver and consequently into the input accountability vessel. However, concentration of nuclear material in the recovered acid was measured to very low so that feedback of it with the recycled acid wasleft out consideration.

2.3 Burnup determination

An established method to determine burnup of spent fuel needs to measure ^{148}Nd formed as fission product by the isotope dilution mass spectrometry as well as uranium and plutonium. Under the present circumstances of the data availability, burnup had to be evaluated from only uranium and plutonium data.

Burnup in FIMA unit is given by

$$B = F25/U^{\circ} + F28/U^{\circ} + F49/U^{\circ} + F41/U^{\circ}, \qquad \text{(Eq. 4)}$$

where

$F25/U^{\circ} = A28^{\circ}\ [R25/28^{\circ} + R26/28^{\circ} - f\ (R25/28 + R26/28)]$,

$F_{28}/U^{\circ} = p\ (f/\alpha_{28})\ [1 + (A_{40} + A_{41} + A_{42}\ (1 + \alpha_{49} + \alpha_{41})\ /\alpha_{41})\ /\alpha_{49}]$,

$F_{49}/U^{\circ} = p\ (f/\alpha_{49})\ [A_{40} + A_{41} + A_{42}\ (1 + 1/\alpha_{41})]$,

$F_{41}/U^{\circ} = p\ (f/\alpha_{41})\ A_{42}$,

$f = [(1 + Pu/U)\ [1 + A_{40}/\alpha_{49} + A_{41}/\alpha_{49} + A_{42}\ (1 + \alpha_{49} + \alpha_{41})\ /\ (\alpha_{49}\alpha_{41})]$
$(1 + 1/\alpha_{28})\ /A_{28}]^{-1}$ and

$p = (A_{28}^{\circ}/A_{28})\ (Pu/U)$,

where, symbol A stands for isotope fraction in atom unit, F number of fissions, R atom ratio, Pu/U atom ratio of total plutonium to uranium, α ratio of capture to fission occured, and first digit of suffix gives atomic number and second one mass number of heavy metal atoms concerned, symbol " ° " refers to its initial value.

The α-values depend slightly upon burn up and type of reactor.
Typical values of those are as follows;

For BWR, $\alpha_{28} = 8.36$, $\alpha_{49} = 0.588$, $\alpha_{41} = 0.331$,
For PWR, $\alpha_{28} = 8.64$, $\alpha_{49} = 0.581$, $\alpha_{41} = 0.337$.

The burnup thus derived may be converted to that in MWD/t unit, if required, by burnup (MWD/t) $= Q_{25}\ (F_{25}/U^{\circ}) + Q_{28}\ (F_{28}/U^{\circ}) + Q_{49}\ (F_{49}/U^{\circ}) + Q_{41}\ (F_{41}/U^{\circ})$, (Eq. 5)

where symbol Q stands for conversion factors relating to released energy per fission. Those are given bellow:

$Q_{25} = 957159$, $Q_{28} = 947775$ and $Q_{49} = Q_{41} = 989533$.

2.4 Procedures

Relation among data used for ICTs calculation is given in Fig. 1.

(1) Preparations for applying Isotope Correlation

The fuel assembly data would be supplied at once for all relevant ones and stored in a data bank.

For evaluating reprocessing batch data, two approaches are to be followed. First one is to establish isotope correlation based on the historical data which were obtained from measurement of spent fuel having very similar characteristics to those in question and stored in the data bank. Second approach is to use calculated results which could be obtained from reactor operator's burn up calculation, or independently performed simple burn up calculation would provide necessary isotopic values.

For either historical batch data or calculated data, nine isotopic variables are computed. Those are defined as follows;

$$V1 = {}^{235}U^{\circ} - {}^{235}U$$
$$V2 = {}^{236}U - {}^{236}U^{\circ}$$
$$V3 = \ln\ [({}^{238}U/{}^{234}U)\ ({}^{234}U^{\circ}/{}^{238}U^{\circ})]$$
$$V4 = \ln\ [({}^{238}U/{}^{235}U)\ ({}^{235}U^{\circ}/{}^{238}U^{\circ})]$$
$$V5 = 100 - {}^{239}Pu$$
$$V6 = {}^{240}Pu/{}^{239}Pu$$
$$V7 = {}^{241}Pu/{}^{240}Pu$$
$$V8 = ({}^{241}Pu + {}^{242}Pu)\ /{}^{240}Pu$$
$$V9 = {}^{239}Pu \times {}^{242}Pu/\ ({}^{240}Pu^{2})\ ,$$

where symbol of each isotope denotes its isotope abundance in weight percent and symbol " ° " refers to its initial values.
Decay correction of ^{241}Pu is necessary for cooling period after discharge from reactor core.

Correlation among those variables and another interesting parameter Pu/U ratio might be first examined. The correlation usually has burnup dependence that would be fitted to a first-order linear function of burnup, within a limited range of burnup as follws;

$$Pu/U = (\alpha_i + \beta_i B) \times V_i, \qquad ; i = 1, 2, 3 \cdots\cdots 9 \qquad \text{(Eq. 6)}$$

The value of α_i and β_i are determined from the fitting of the data collected in campaign. These vary in different initial enrichment and type of reactor. Therefore some set of α_i and β_i corresponding to initial enrichment and type of reactor are prepared for some spent BWR and PWR fuel data. The value would be better established as more data are acumulated.

2.5 Information necessary for the calculation

The data used to calculate the burn up, uranium and plutonium content shown in Fig. 1 are as follows;

1) Initial uranium amount (A1)
2) Initial uranium isotopic abundances (A 2)
3) Date of fuel charge and discharge (B 4)
4) Measured uranium isotopic abundances (C 4)
5) Measured plutonium isotopic abundances (C 5)
6) Data of plutonium isotopic measurement (C 6)

The rest of informations in Fig. 1 is used for data evaluation such as SRD, I/O comparison.

3. RESULT AND DISCUSSIN

3.1 Conventional calculation method of ICTs

3.1.1 Estimate of total amounts of heavy metals obtained throughout campaign (Campaign analysis)

The results of the 86-1 campaign and the 86-2 campaign dealt with in the previous report are summarized in Table 1 and Table 2. Here, the results of ICT estimation on plutonium gave approximately 10% higher than those of measurement in the 86-1 campaign, whereas good agreement (within 1%) was observed between them on the uranium results of the same campaign. Checking the data of the 86-1 campaign consisting of 23 batches of PWR fuels and 74 batches of BWR ones, it became obvious that the error was mainly due to the BWR results. That indicated that some bias crrection was needed for the ICT calculation for BWR fuels. Coarse correction of the BWR fuels was examined. The parameters of αi and βi in the equation 6, of $Pu/U = (\alpha i + \beta i B)\ Vi$ were changed as shown in Table 3, where each parameter was multiplied by 0.87, mean ratio of the measured and the ICTs' in the BWR results. The results in the 86-2, the 87-1 and the 88-1 campaigns calculated with those new parameters are given in Table 4, Table 5 and Table 6, respectively. As can be seen from those tables, the differences between the ICT estimated and the measured of the 87-1 campaign were within 1% and 2.4% on uranium and plutonium results, respectively, while those of the 88-1 campaign showed good agreement within 1% on both elements except for the calculated results on HAMAOKA fuels. Further studies using detailed systematic corrections might be necessary to observe better results.

3.1.2 Estimate of heavy metals at each batch (Batch analysis)

The ratios of the ICT estimated and the measured on uranium analysis were 1.03 ± 0.08 (1σ), 1.00 ± 0.06, 1.00 ± 0.07 and 0.99 ± 0.09 for the 86-1,

the 86-2, the 87-1 and the 88-1 campaigns, whereas those on plutonium analysis were 1.03 ± 0.09 (1σ), 1.02 ± 0.07, 0.98 ± 0.08 and 1.00 ± 0.1 for those campaigns, respectively. The scatters of the ratios of ICT estimated relative to the measured were 6 to 9% for uranium and 7 to 10% for plutonium, although no statistically significant diference was found between the mean values of the estimated and the measured. In addition, the first batch on each campaign gave large error of at most 25%.

It should be noted that there are heel volumes in the most of vessels located between the dissolver point and accountability point. The sum of the heel volumes sometimes gives the ICT calculation around 25% error. Because the data of ICT estimated are got for each batch in the dissolver vessel equivalent to each fuel assembly whereas the data measured are obtained at accountability vessel. Therefore those errors shown above should be very much due to the heel volumes. For instance, the bias detected at the first batch of each campaign mentioned above suggests that a portion of the batch solution may significantly left in most of the vessels, where no solution has been present. The amount of solution reached to the accountability vessel is consequently thought to be much less (e.g. 25%) than that in the dissolver vessel. For another example, large bias found during campaign can result from the operation change. Namely the errors more than 10% were detected at the batch of MI 1-077, MI 1-085 and FU 1-090 and so on in the 86-2 campaign. That seems to be due to the fact that the remaining heel solution in the pulse filter were transfered to the accountability vessel prior to washing pulse filter. That operation should temporarily increase the volume of the solution in the accountancy vessel compared with that at the normal operation. Other large scatters observed in Table 1, 4, 5 and 6 also could result from the change of the operations.

3.2 Heel correction and correction based on operational mode

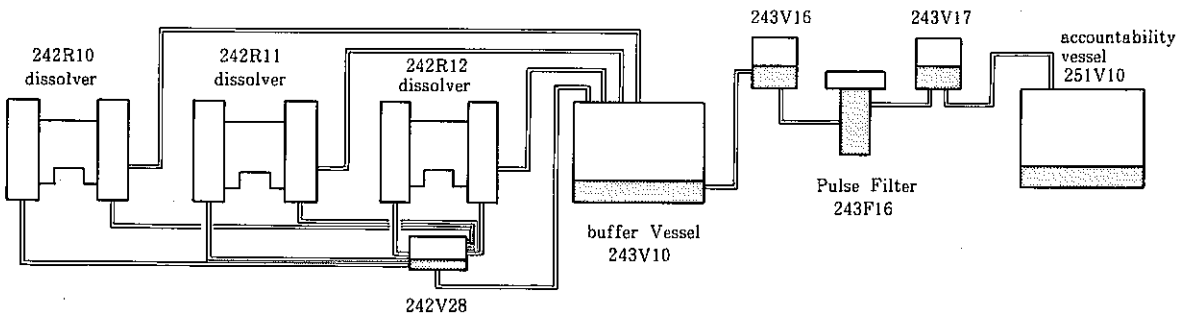
The informations of the heel solutions and the flows in the actual campaign of the reprocessing plant were investigated owing to the large contribution

of heel volumes on the evaluation.

3.2.1 Correction method

1) Configuration of vessels between the points of dissolution and accountancy, and their heel volumes

Existing vessels between the points of dissolution and accountancy in the Tokai Reprocessing Plant are shown;



There are three dissolver vessels named 242 R 10, 242 R 11 and 242 R 12. Buffer vessel, 243 V 10, to collect dissolved solution and transfer it to the pulsed filter is located next to dissolver vessel. A vessel named 242 V 20 to collect heel solution of dissolver vessels of 242 R 11 and 12 is present under the dissolver ones. (Two of these three dissolver vessels have no significant heel volume. As for 242 R 10 the line connected to 242 V 20 is clogged. The hell solution remains.) Solution in the 242 R 20 is also transfered to the 243 V 10, buffer vessel. A pulsed filter, which has also significant volume, is located between the 243 V 10 and the input accountancy vessel, 251 V 10. There are two other vessels numbered 243 V 14 and 243 V 17 just before and behind the pulsed filter. Since these two vessels do not have significant heel solution, their effects on the heel correction discussed below was negligible as well as two of three dissolver vessels.

The heel volumes normally obtained on the solution transfer are as follows;

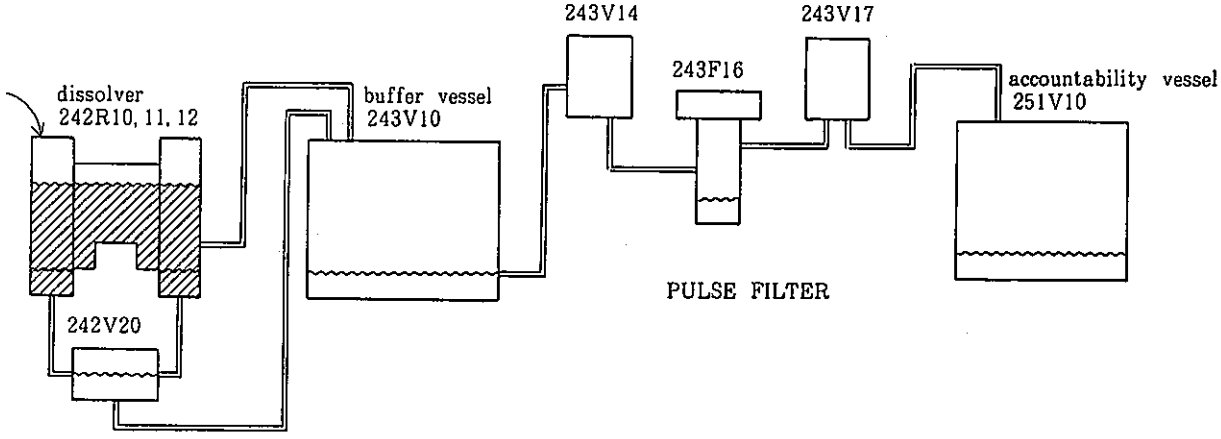
242 R 10	:	approx. 150 l,
242 R 11,12	:	0 l,
243 V 10	:	300 l,
242 V 20	:	70 l,
243 V 14	:	0 l,
243 F 16	:	190 l,
243 V 17	:	0 l,
251 V 10	:	8 l.

2) Heel corrections on normal operation of solution transfer

It is assumed on the discussion that following solutions already remain in tne vessels.

		Concentration (g/l)	Volume (l)
242 R 10 or 11 or 12	:	A 1	V 1
242 V 20	:	A 2	V 2
243 V 10	:	A 3	V 3
243 F 16	:	A 4	V 4
251 V 10	:	A 5	V 5

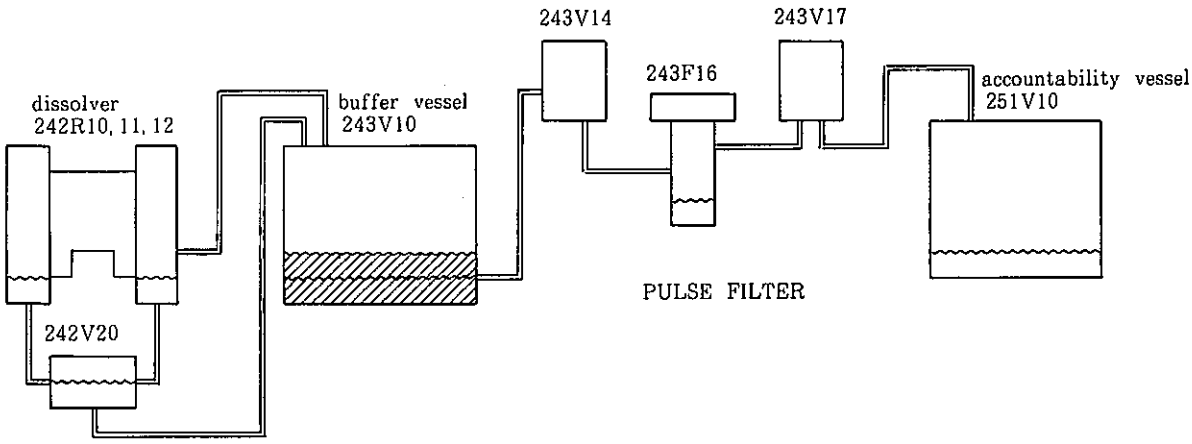
Concentration of a specific heavy metal ($A_{(1)}$) , solution volume ($V_{(1)}$) in an dissolver vessel after adding solution of the next batch to remaining heel solution are given as follows;



$$A_{(1)} = \frac{AV + A_1V_1}{V + V_1}$$

$$V_{(1)} = V + V_1 ,$$

where A (g/l) , V (l) , A_1 (g/l) and V_1 (l) are the concentration and volume of the next batch and those of the heel solution of previous batch.



The dissolver solution mentioned above is transferred to the buffer bessel (243 V 10) by steam jet. Then significant amount of water from steam jet is added to the dissolver solution. The concentration ($A_{(2)}$) and volume ($V_{(2)}$) of the dissolver vessel are described as follows;

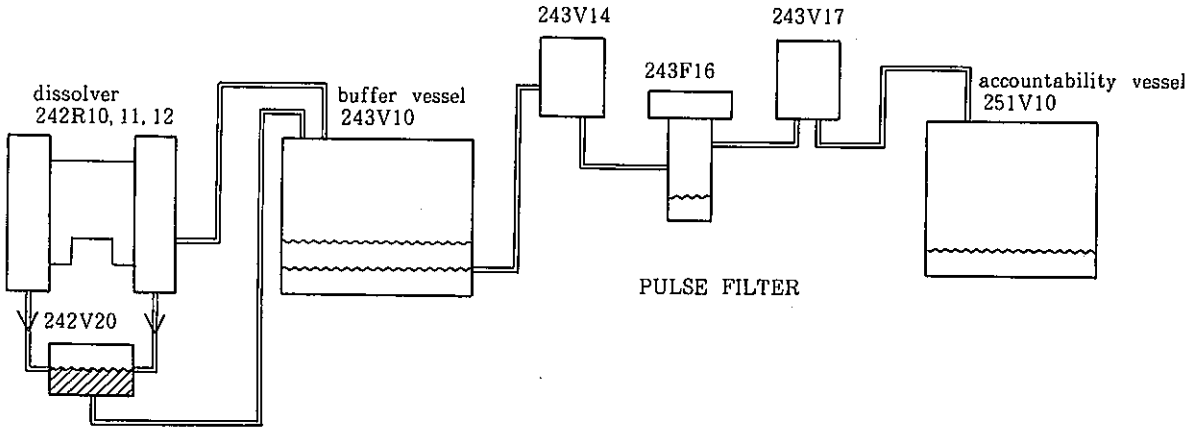
$$A_{(2)} = \frac{AV + A_1V_1}{V + V_1}$$

$$V_{(2)} = V_{H11} ,$$

where V_{H11} is the heel in the dissolver vessel at this stage, while the concentration ($A_{(3)}$) and volume ($V_{(3)}$) of the buffer vessel are as follows;

$$A_{(3)} = \frac{A_{(1)}(V_{(1)} - V_{(2)}) + A_3V_3}{V_{(1)} - V_{(2)} + V_{(3)} + V_{S1}}$$

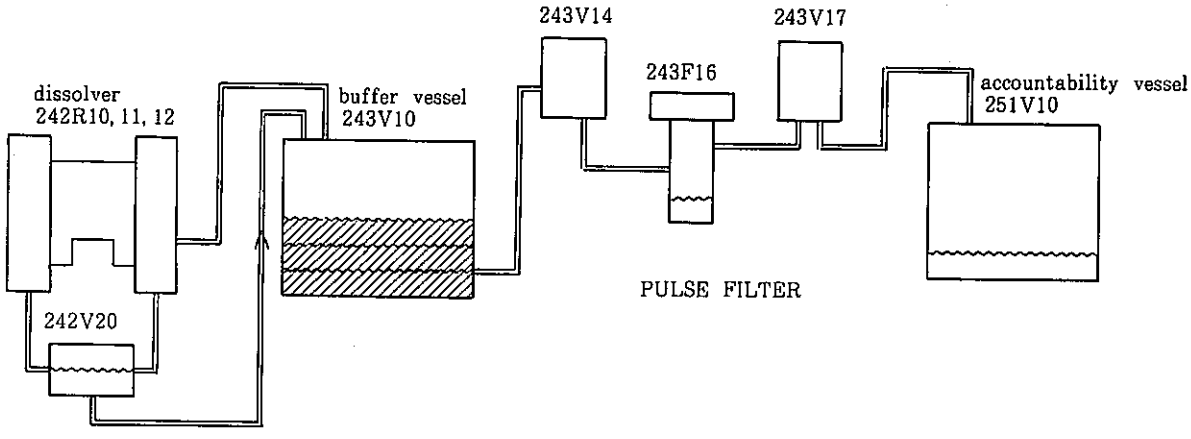
$$V_{(3)} = V_{(1)} - V_{(2)} + V_{(3)} + V_{S1}$$



On the other hand, the heel solution in dissolver vessel ($A_{(2)}$, $V_{(2)}$) is transferred to the 242 V 20 vessel, whose heel of the previous batch is described, as shown above, A_2 and V_2. The dissolver vessel, however, sometimes has heel solution ($A_{(2)}$, V_{H12}) even after the solution transfer. The concentration ($A_{(4)}$) and volume ($V_{(4)}$) in the 242 V 20 vessel are described as follows;

$$A_{(4)} = \frac{A_{(2)}(V_{(2)} - V_{H12}) + A_2V_2}{V_{(2)} - V_{H12} + V_{(2)}}$$

$$V_{(4)} = V_{(2)} - V_{H12} + V_{(2)}$$

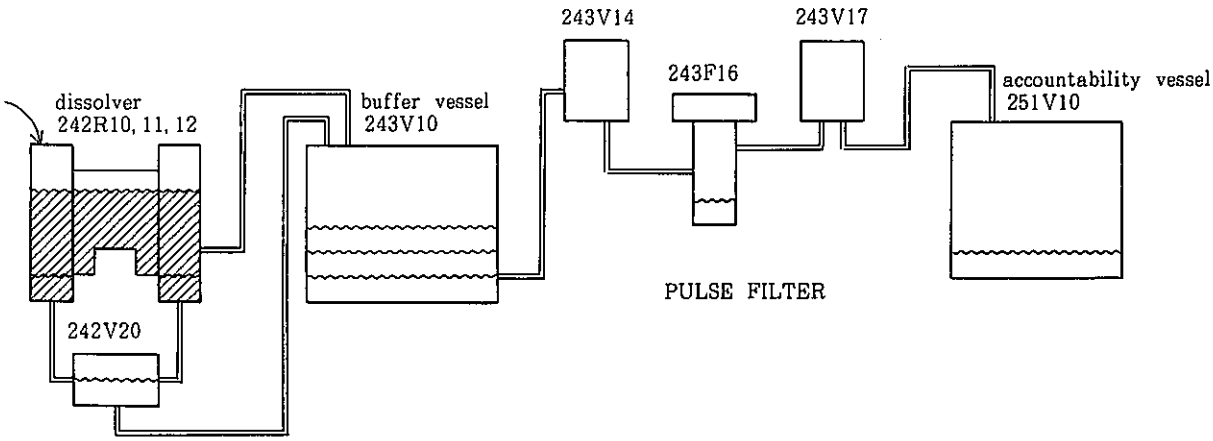


In the case the solution in 242 V 20 goes through the buffer vessel (243 V 10), the solution is diluted with water due to steam jet. The concentration ($A_{(3)}$) and volume ($V_{(3)}$) of the solution in 243 V 10 should be, therefore, changed to $A_{(5)}$ and $V_{(5)}$.

$$A_{(5)} = \frac{A_{(4)}(V_{(4)} - V_{H21}) + A_{(3)}V_{(3)}}{V_{(4)} - V_{H21} + V_{S21} + V_{(3)}}$$

$$V_{(5)} = V_{(4)} - V_{H21} + V_{S21} + V_{(3)},$$

where V_{S21} and V_{H21} are the volume of water added to 243 V 10 and that of the heel in 242 V 20 after solution transfer.

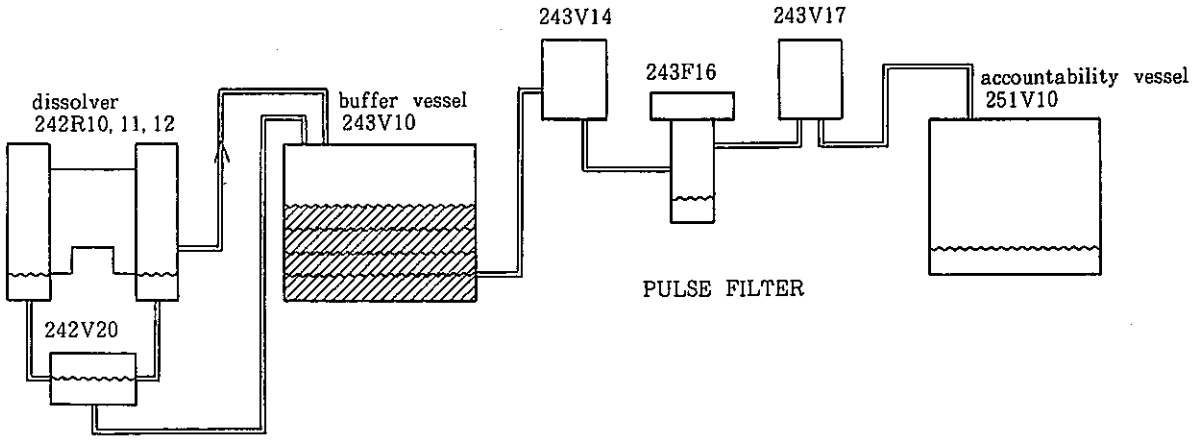


The dissolver vessel is rinsed every transfer of dissolver solution. The concentration (A (6)) and volume (V (6)) of rinsing solution in the dissolver vessel are given below.

$$A_{(6)} = \frac{A_{(2)}V_{H12}}{{}_{H12} + V_R}$$

$$V_{(6)} = {}_{H12} + V_R$$

where V_R is the volume of solution added for rinsing.

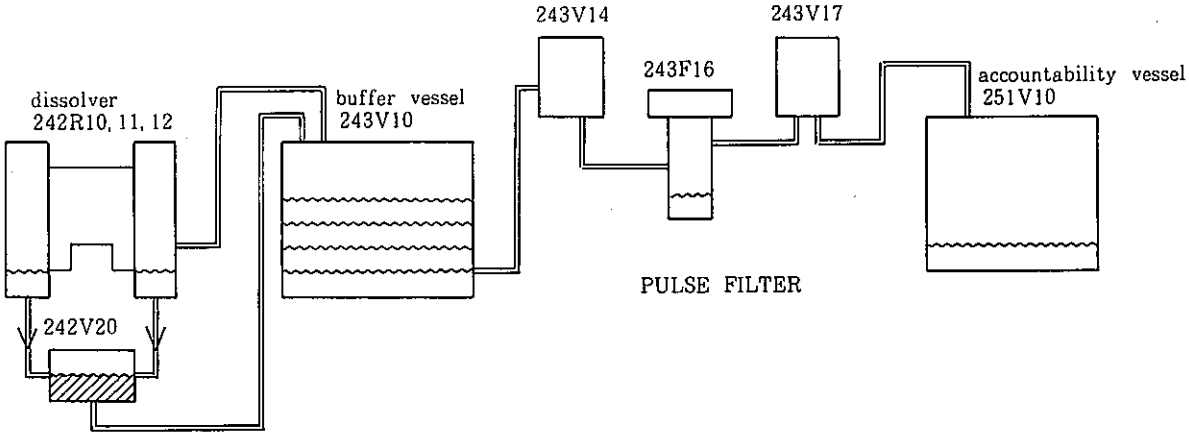


The rinsing solution in the dissolver vessel is transferred to the buffer vessel (243 V 10) , where the solution ($A_{(5)}$, $V_{(5)}$) has already been present. Then significant amount of water V_{S12} from steam jet is also added to the buffer vessel. The concentration ($A_{(5)}$) and volume ($V_{(5)}$) of the solution in 243 V 10 are turned into $A_{(7)}$ and $V_{(7)}$ described as follows;

$$A_{(7)} = \frac{A_{(6)}(V_{(6)} - V_{H13}) + A_{(5)}V_{(5)}}{V_{(6)} - V_{H13} + V_{S12} + V_{(5)}}$$

$$V_{(7)} = V_{(6)} - V_{H13} + V_{S12} + V_{(5)},$$

where V_{H13} is the heel volume of rinsing solution in dissolver vessel after the solution's transfer.

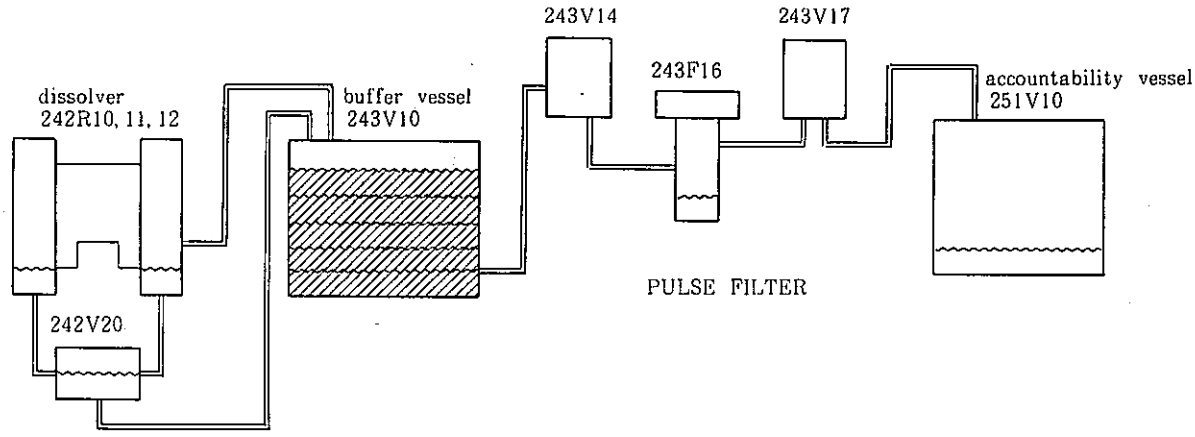


The heel of rinsing solution in dissolver vessel ($A_{(6)}$, V_{H13}) is removed to the 242 V 20 vessl, whose remaining heel solution is (A_4, V_{H21}) . he concentration ($A_{(8)}$) and volume ($V_{(8)}$) in the 242 V 20 vessel are described as follows;

$$A_{(8)} = \frac{A_{(6)}(V_{H13} - V_{H14}) + A_{(4)}V_{H2}}{V_{H13} - V_{H14} + V_{H2}}$$

$$V_{(8)} = V_{H13} - V_{H14} + V_{H2},$$

where V_{H14} shows the heel volume in dissolver vessel after the solution transfer.

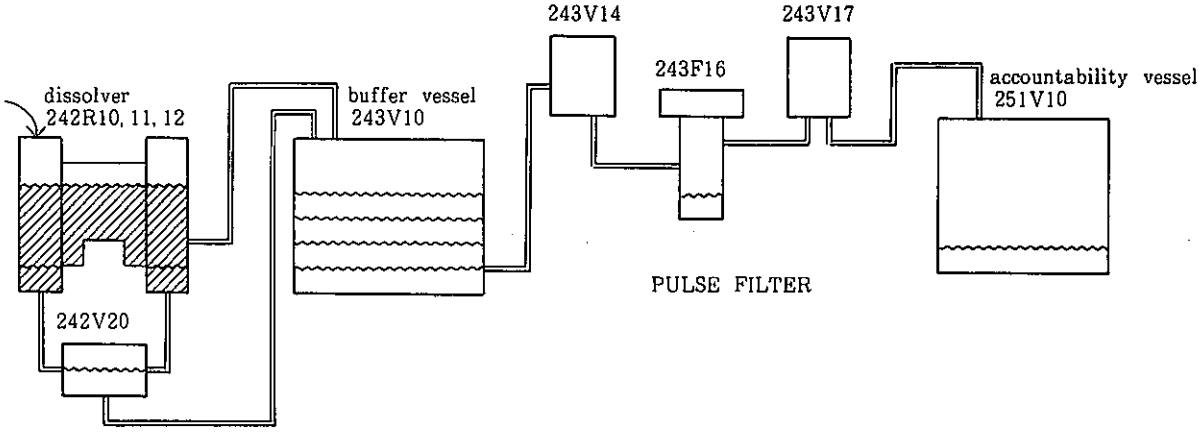


The solution in the vessel of 242 V 20 mentioned above is transferred to the buffer vessel (243 V 10) , where the solution ($A_{(7)}$, $V_{(7)}$) has already been present. The solution is diluted with water due to steam jet. The concentration and volume of the solution in 243 V 10 is changed to $A_{(9)}$ and $V_{(9)}$.

$$A_{(9)} = \frac{A_{(8)}(V_{(8)} - V_{H22}) + A_{(7)}V_{(7)}}{V_{(8)} - V_{H22} + V_{S22} + V_{(7)}}$$

$$V_{(9)} = V_{(8)} - V_{H22} + V_{S22} + V_{(7)},$$

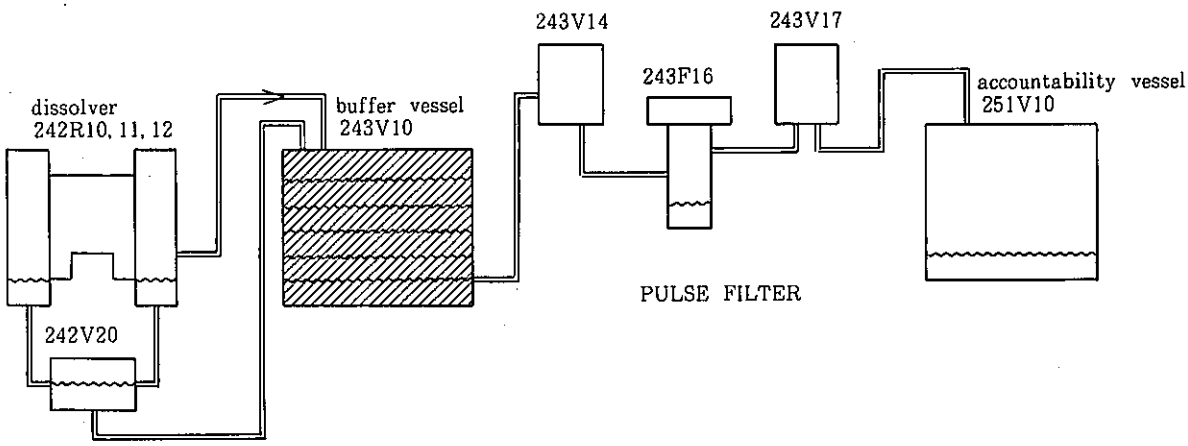
where V_{H22} and V_{S22} are the volume of the heel in the 242 V 20 after the solution transfer and that of water added by steam jet, respectively.



One of the three dissolver vessels (242 R 10) needs another rinsing operation based on the fact that the solution transfer to 242 V 20 can not be performed due to its particular condition. The concentration ($A_{(10)}$) , and volume ($V_{(10)}$) of the solution in the dissolver vessel after pouring additional rinsing solution are as follows;

$$A_{(10)} = \frac{A_{(6)}V_{H14}}{V_D + V_{H14}}$$

$$V_{(10)} = V_D + V_{H14}$$



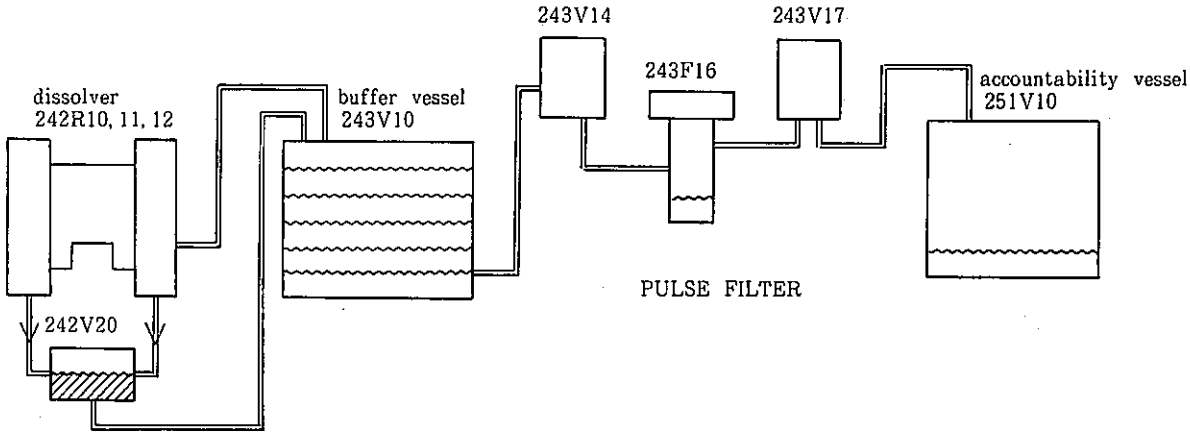
As same operation as described above, the rinsing solution is transferred to the 243 V 10 buffer vessel in the absence of another route going through 242 V 10. Here the concentration and volume in the 243 V 10 vessel after the solution transfer from the 242 R 10 vessel are shown below;

$$A_{(11)} = \frac{A_{(10)}(V_{(10)} - V_{H15}) + A_{(9)}V_{(9)}}{V_{(10)} - V_{H15} + V_{S13} + V_{(9)}}$$

$$V_{(11)} = V_{(10)} - V_{H15} + V_{S13} + V_{(9)},$$

where VH_{15} and V_{S13} are the volume of the heel in the 242 R 10 after the solution transfer and that of water added by steam jet, respectively.

The transfer from dissolver to burrer vessel basically is shown above mention. The process does not alway set. It is variable. The correction contains transfer from the dissolver to 242 V 20 and from 242 V 20 to 243 V 10 to correspond the change of process.

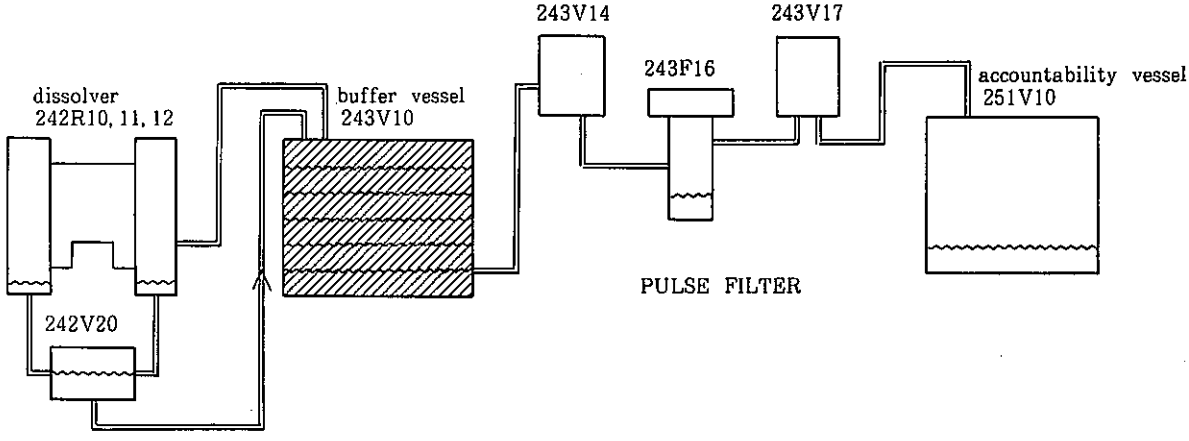


The heel of rinsing solution in dissolver vessel ($A_{(10)}$, V_{H15}) is removed to 242 V 20, whose remaining heel solution is ($A_{(8)}$, V_{H22}) . The concentration ($A_{(12)}$) and volume ($V_{(12)}$) in 242 V 20 are described as follows;

$$A\ (12) = \frac{A_{(10)}(V_{H15}-V_{H16})+A_{(8)}V_{H22}}{V_{H15}-V_{H16}+V_{H22}}$$

$$V\ (12) = V_{H15}-V_{H16}+V_{H22}$$

where V_{H16} shows the heel volume in dissolver vessel after the solution transfer.

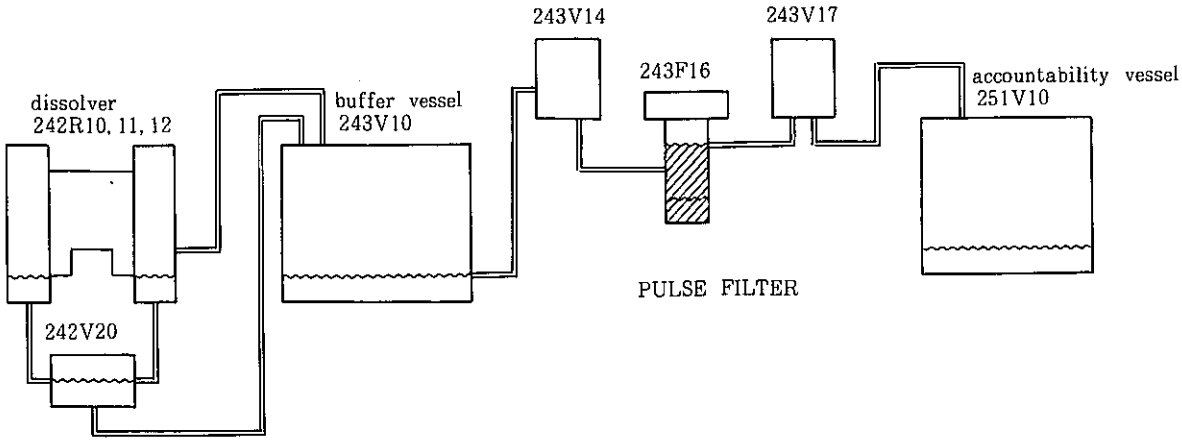


The solution in the vesser of 242 V 20 mentioned above is transferred to the buffer vessel (243 V 10) , where the solution (A (9)) has already been present. The solution is diluted with water steam jet. The concentration and volume of the solution in 243 V 10 are changed to $A_{(12)}$ and $V_{(13)}$.

$$A\ (13) = \frac{A_{(12)}(V_{(12)} - V_{H23}) + A_{(11)}V_{(11)}}{V_{(12)} - V_{H23} + V_{(11)} + V_{S23}}$$

$$V\ (13) = V_{(12)} - V_{H23} + V_{(11)} + V_{S23}$$

where V_{H23} and V_{s23} are the volume of the neel in the 242 V 20 after the solution and that of water added by steam jet.

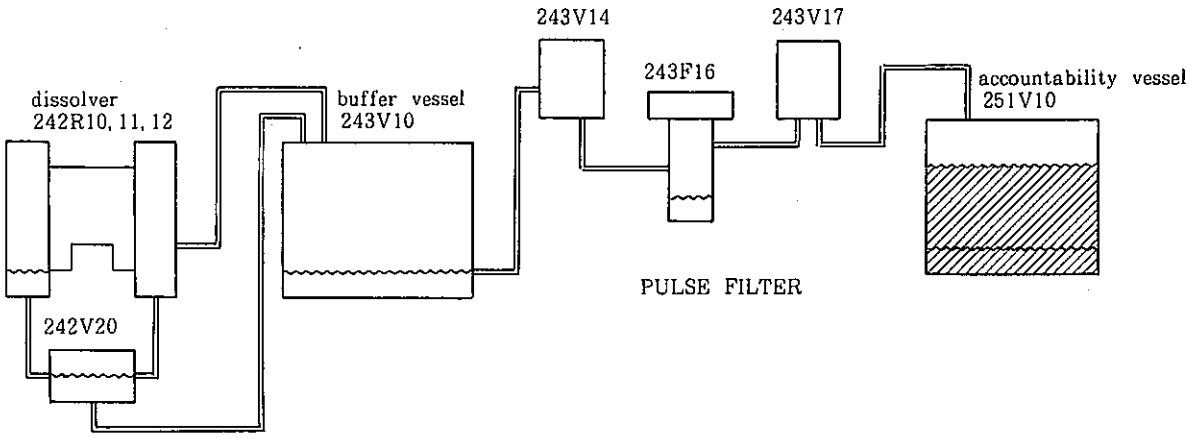


The solution collected in the 243 V 10 is transferred to the pulse filter named 243 F 16, where the previous heel solution (A_4, V_4) has already been present. The concentration ($A_{(14)}$) and volume ($V_{(14)}$) are described as follows;

$$A_{(14)} = \frac{A_{(13)}(V_{(13)} - V_{H3}) + A_4V_4}{V_{(11)} - V_{H3} + V_{S3} + V_4}$$

$$V_{(14)} = V_{(11)} - V_{H3} + V_{S3} + V_4,$$

where V_{H3} and V_{S3} are the volume of the heel in the 243 V 10 after the solution transfer and that of water added by steam jet, respectively.



The solution in 243 F 16 is transferred to the accountability vessel, 251 V 10, where the previous heel solution (A_5, V_5) has already been present. The concentration ($A_{(13)}$) and volume ($V_{(13)}$) are described as follows;

$$A_{(15)} = \frac{A_{(14)}(V_{(14)} - V_{H4}) + A_5V_5}{V_{(12)} - V_{H4} + V_{S4} + V_5 + V_C}$$

$$V_{(15)} = V_{(14)} - V_{H4} + V_{S4} + V_5 + V_C,$$

where V_{H4}, V_{S4} and V_C are the volume of the heel in the 243 F 16 after the solution transfer, that of water added by steam jet and that of the solution added to adjust the condition of solution for the feed, respectively.

The equations for the heel corrections shown thus far enable to calculate the concentration and the volume of the accounability vessel from the initial data at the dissolver vessel given by the original ICT, if heel informations necesarry for above calculations are available. However the description mentioned above is the simplest mode of the operation in the Tokai reprocessing plant. Hence it can be said that the further information on practial operation gives the better heel corrections. The correction dealt with in this report was carried out based on the above equations and the specific modes applied for individual operations.

3.2.2 Results of corrections

The concentrations and volumes in the vessels existing between the dissolver point and accountability one were calculated based on the equations shown in 3.2.1. Table 7 and Table 8 give the results for uranium and for plutonium in the 86-1 campaign, respectively. Those of the 86-2 campaign are shown in Table 9 and Table 10. Further comparisons between the corrected values and the measured ones of both the campaigns are shown in Table 11, Fig .2, Table 12, and Fig .3. As can be seen in the tables, the scatters on the ratios of the ICT estimated relative to the measured in the 86-1 campaign were 4.0% with Uranium and 5.4% with Plutonium, while those of the 86-2 campaign were 3.6% and 5.2% . Those suggest that the errors on the corrected value of ICTs result compared to the measured can be reduced to one-half of the conventional ones where the ICT results of 16 batches gave errors beyond 10% . It has consequently been apparent that the corrections dealt with in this report are efficient to reduce the errors mainly due to the configurations of the head end process.

4. CONCLUTION AND FUTURE WORK

The examination of ICTs has been performed for the data of the the last four campaigns, the 86-1, the 86-2, the 87-1 and the 88-1. The program used was originally developed at JEARI and improved to be capable of directly and automatically transferring source data to the program by PNC. The differences on the total amount of uranium result of the estimated data and the measured ones throughout gave approximately 1%, while those of plutonium showed 1～2.4%. As for batch analysis, the scatters of the ratios of the ICT established relative to the measured were 6 to 9% for uranium and 7 to 10% for plutonium.

The corrections in the ICTs estimate have been examined based on the assumption that the presence of heel solutions between the dissolver vessel and accountability one cause large errors shown above. The results were dramatically improved compared with the conventional ones. The remaining problems are that the many informations concerning plant operation shoul be needed for the corrections. That implies the data input related to heel information may be too complicated for the practical use.

Detailed study of parameters such as α and β will be performed, which could improve the data obtained by the conventional method. The corrections shown above will be included in the existing ICTs program.

ACKNOULEDGEMENTS

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Chugoku Electric Power Company and the Japan Atomic Electric Power Company in furnishing the data of their spent fuels to the work are also greatly appreciated.

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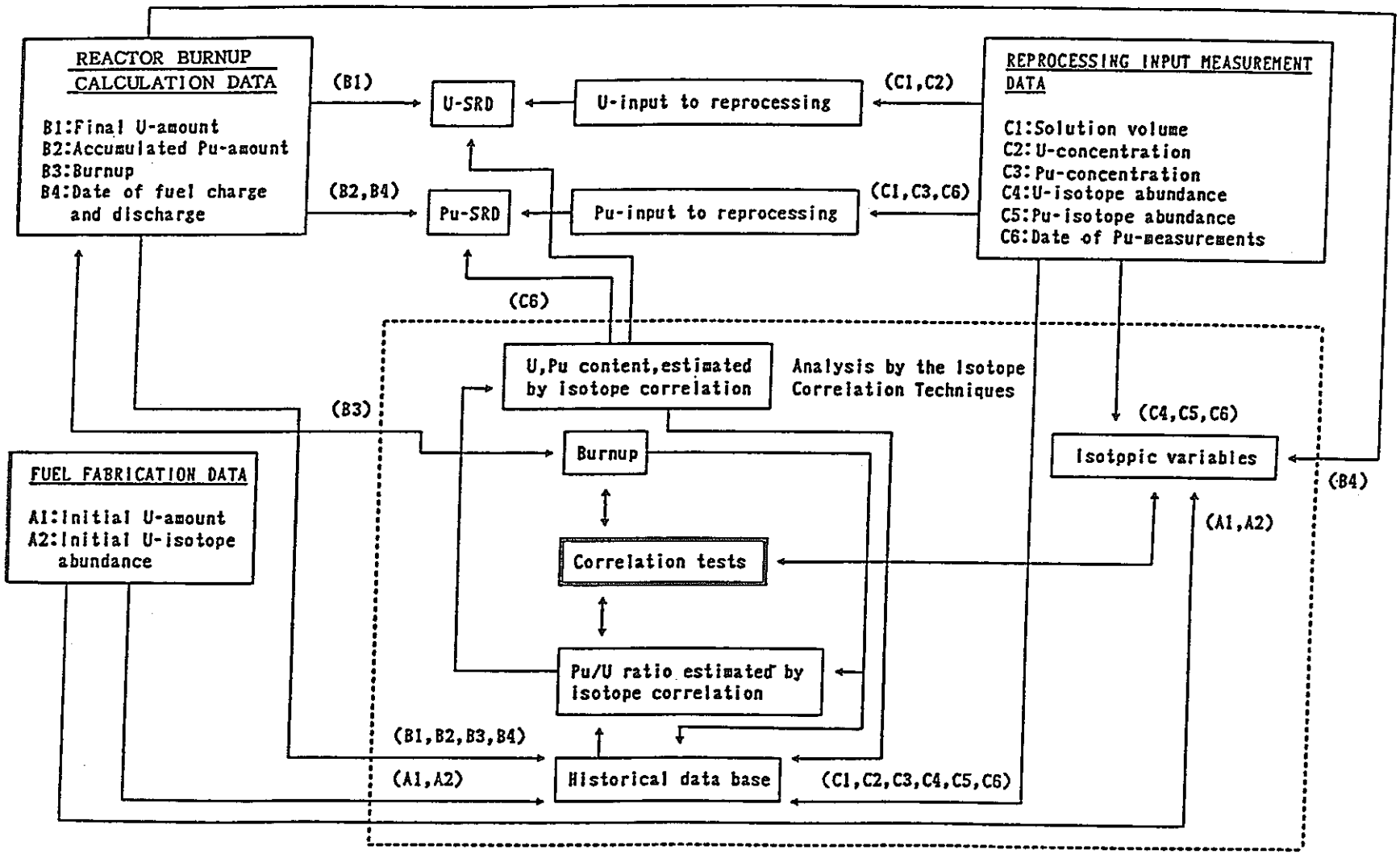
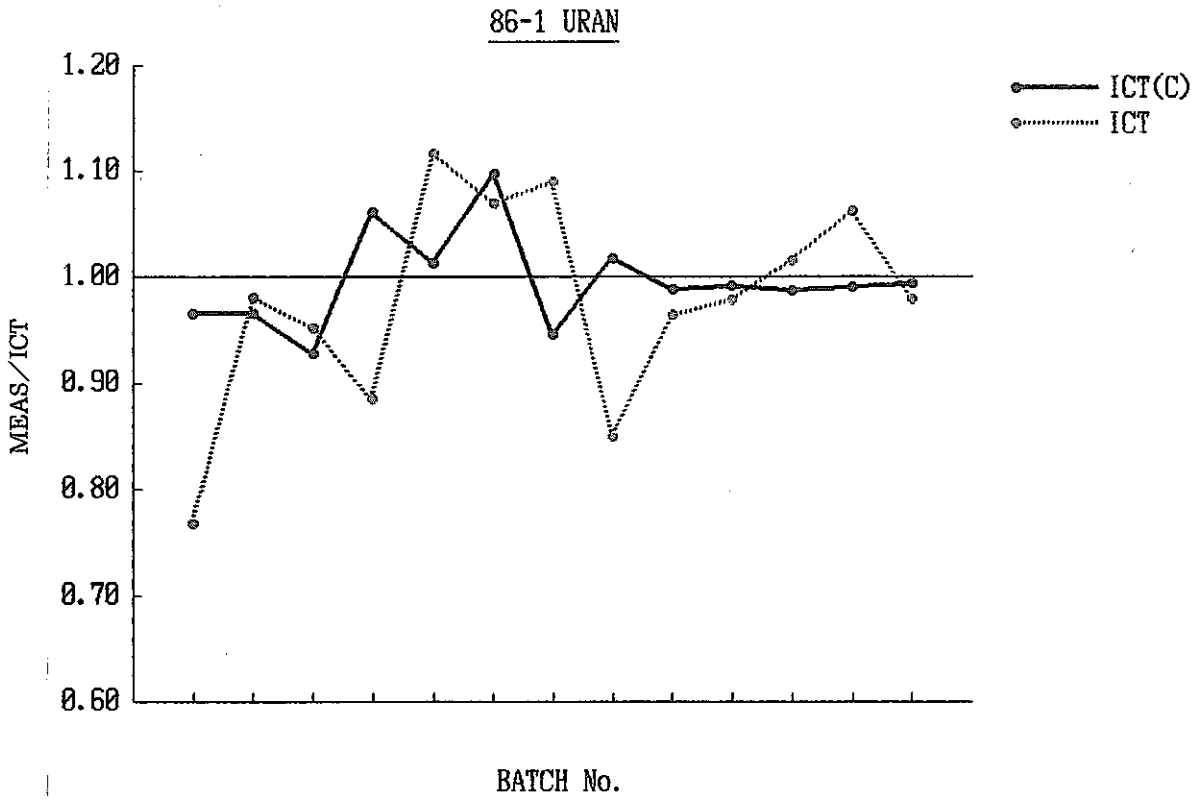
1) N. HAYASHI et al. " Isotope Correlation Techniques For Takai Plant Safeguards " PNC SN 8410 88 – 031 (1988)

2) H.Umezawa, Y.Nakahara, " Isotope safeguards Techniques at the Tokai Reprocessing Plant Ⅲ " ,JAERI-MEMO 9572 (1981)


REACTOR BURNUP CALCULATION DATA
B1:Final U-amount
B2:Accumulated Pu-amount
B3:Burnup
B4:Date of fuel charge and discharge
(B1)
(B2,B4)
U-SRD
Pu-SRD
U-input to reprocessing
Pu-input to reprocessing
(C1,C2)
(C1,C3,C6)
REPROCESSING INPUT MEASUREMENT DATA
C1:Solution volume
C2:U-concentration
C3:Pu-concentration
C4:U-isotope abundance
C5:Pu-isotope abundance
C6:Date of Pu-measurements
(C6)
U,Pu content,estimated by isotope correlation
Analysis by the Isotope Correlation Techniques
(B3)
(C4,C5,C6)
Burnup
Isotppic variables
(B4)
FUEL FABRICATION DATA
A1:Initial U-amount
A2:Initial U-isotope abundance
(A1,A2)
Correlation tests
Pu/U ratio estimated by isotope correlation
(B1,B2,B3,B4)
(A1,A2)
Historical data base
(C1,C2,C3,C4,C5,C6)



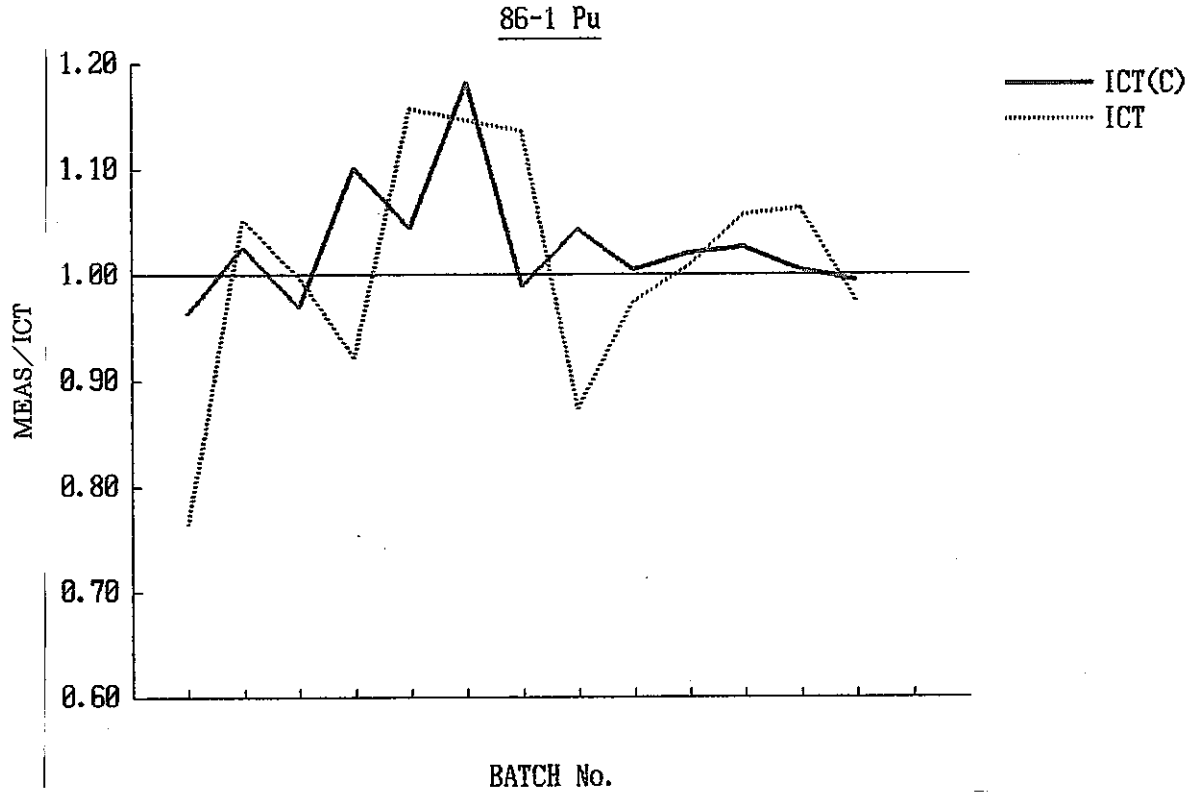
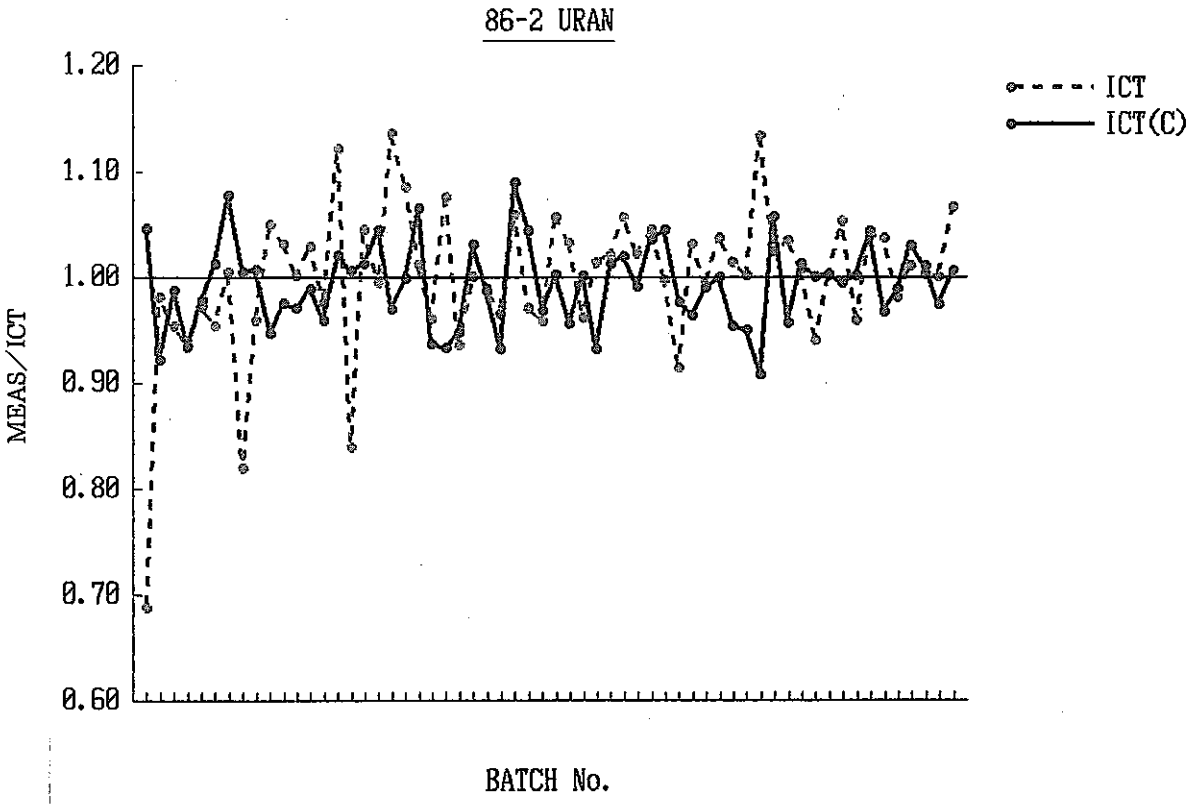


Fig. 2 Result of Comparison Between the Measured Value and the ICT Corrected (86 − 1 Campaign)



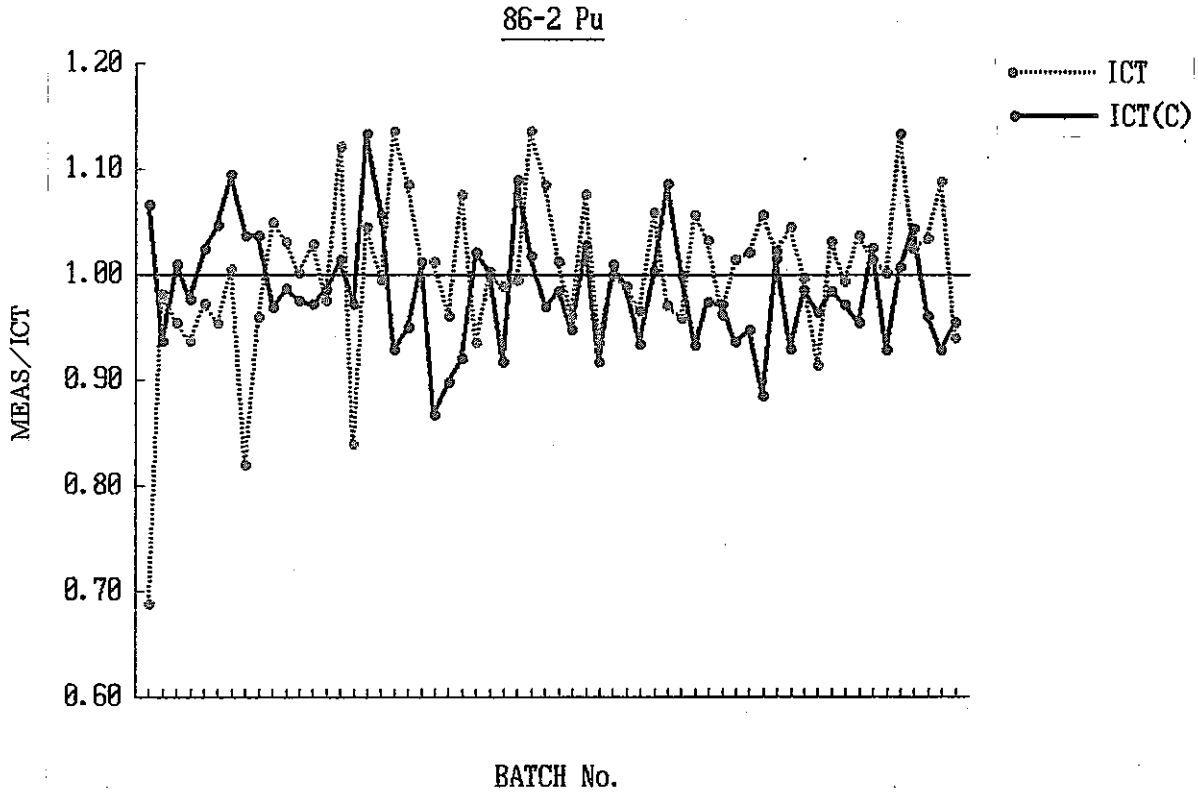


Fig. 3 Result of Comparison Between the Measured Value and the ICT Corrected (86 − 2 Campaign)

Table 1. Results of 86-1 CAMPAIGN

BATCH No.	Pu (g) ICT	Pu (g) MEASURED	MEAS/ICT RATIO	U (g) ICT	U (g) MEASURED	MEAS/ICT RATIO
IK1-043	3197.92	2449.29	0.7659	387028	297456	0.7686
IK1-044	2990.91	3152.93	1.0542	378514	371545	0.9816
IK1-045	2961.7	2958.76	0.9990	379258	361487	0.9531
IK1-046	3003.51	2771.18	0.9226	388155	343821	0.8858
IK1-047	2933.76	3398.99	1.1586	388347	434115	1.1179
IK1-048	2980.28	3418.59	1.1471	388115	415268	1.0700
IK1-049	3009.15	3421.54	1.1370	388322	423223	1.0899
IK1-050	2959.1	2586.76	0.8742	387982	330155	0.8510
IK1-051	3038.02	2965.63	0.9762	387876	374343	0.9651
IK1-052	2987.28	3015.67	1.0095	388357	380207	0.9790
IK1-053	2995.52	3170.07	1.0583	388250	394712	1.0166
IK1-054	3147.2	3374.32	1.0722	387347	411420	1.0621
IK1-055	3179.86	3108.57	0.9776	387182	379443	0.9800
IK1-R01		162.145			16145.5	
IK1-R02		322.535			30553.8	
AVERAGE			1.0117			0.9785
STDEV			0.11295			0.09934
C.V(%)			11.1642			10.1518

Table 2. Results of 86-2 CAMPAIGN

BATCH No.	Pu(g) ICT	Pu(g) MEASURED	MEAS/ICT RATIO	U(g) ICT	U(g) MEASURED	MEAS/ICT RATIO
MI1-070	2274.53	1574.54	0.6922	328314	230201	0.7012
MI1-071	2409.12	2369.34	0.9835	327281	330794	1.0107
MI1-072	2349.26	2069.7	0.8810	327885	319414	0.9742
MI1-073	2375.43	2248.48	0.9466	327788	321654	0.9813
MI1-074	2381.04	2334.95	0.9806	327074	333349	1.0192
MI1-075	2363.4	2268.26	0.9597	327384	322181	0.9841
MI1-076	2293.69	2298.43	1.0021	327791	331088	1.0101
MI1-077	2752.89	2259.39	0.8207	323982	281828	0.8699
MI1-078	2787.32	2674.46	0.9595	324174	325623	1.0045
MI1-079	2558.01	2664.85	1.0418	324995	341010	1.0493
MI1-080	2528.76	2589.76	1.0241	325010	336549	1.0355
MI1-081	2526.67	2512.85	0.9945	324720	326196	1.0045
MI1-082	2697.91	2781.66	1.0310	324808	334754	1.0306
MI1-083	2759.94	2706.06	0.9805	323792	327637	1.0119
MI1-084	2515.89	2739.34	1.0888	315240	342975	1.0880
MI1-085	2404.05	2033.02	0.8457	315149	255098	0.8095
MI1-087	2420.84	2428.69	1.0032	314872	304489	0.9670
MI1-088	2187.13	2496.79	1.1416	311741	330141	1.0590
MI1-086	2368.23	2485.96	1.0497	315172	314991	0.9994
MI1-090	2364.1	2404.41	1.0171	314893	303567	0.9640
MI1-091	2402.71	2698.68	1.1232	314259	335566	1.0678
MI1-089	2302.66	2510.64	1.0903	315673	313931	0.9945
MI1-092	2410.43	2603.5	1.0801	315364	329993	1.0464
FU1-090	2288.82	1863.92	0.8144	366185	317116	0.8660
FU1-091	2774.64	2348.2	0.8463	363963	370275	1.0173
FU1-092	2708.72	2181.15	0.8052	364613	364679	1.0002
FU1-093	2802.09	2248.02	0.8023	363004	349733	0.9634
FU1-094	2726.47	2359.43	0.8654	363880	382224	1.0504
FU1-095	2817.49	2278.27	0.8086	363187	348471	0.9595
FU1-096	2611.6	2163.38	0.8284	363487	348366	0.9584
FU1-097	2785.67	2435.76	0.8744	363157	379280	1.0444
FU1-098	2746.95	2342.99	0.8529	363692	373338	1.0265
FU1-099	2794.05	2324.69	0.8320	362407	364740	1.0064
FU1-100	2852.08	2382.03	0.8352	363121	363175	1.0001
FU1-101	2831.04	2356.22	0.8323	363211	369021	1.0160

FU1-102	2793.78	2507.12	0.8974	363843	375783	1.0328
FU1-103	2923.71	2329.08	0.7966	362758	348236	0.9600
FU1-104	2931.37	2537.63	0.8657	363136	374554	1.0314
FU1-105	2880.28	2483.97	0.8624	363610	382599	1.0522
FU1-106	2743.25	2037.48	0.7427	363604	334499	0.9200
FU1-107	2721.03	2326.16	0.8549	363683	363652	0.9999
FU1-108	2849.3	2380.03	0.8353	363007	362444	0.9984
FU1-109	2766.47	2378.28	0.8597	363207	365020	1.0050
FU1-110	2867.99	2446.17	0.8529	363267	367398	1.0114
FU1-111	2852.16	2399.96	0.8415	362944	364132	1.0033
FU1-112	2812.97	2639.6	0.9384	363172	400569	1.1030
FU1-113	2681.63	2332.31	0.8697	364234	356056	0.9775
FU1-114	2677.7	2393.39	0.8938	363361	367474	1.0113
FU1-115	2730.33	2566.61	0.9400	362936	387966	1.0690
FU1-116	2572.78	2061.63	0.8013	363810	325752	0.8954
FU1-117	2881.48	2429.91	0.8433	362602	365548	1.0081
FU1-118	2784.86	2419.35	0.8688	363567	372376	1.0242
FU1-119	2892.9	2394.51	0.8277	362854	361425	0.9961
FU1-120	2745.79	2413.49	0.8790	363316	373699	1.0286
FU1-121	2727.45	2335.6	0.8563	362974	359947	0.9917
FU1-122	2815.29	2389.61	0.8488	363312	370486	1.0197
FU1-123	2812.7	2459.69	0.8745	363101	375606	1.0344
FU2-042	3023.57	2614.09	0.8646	354866	346022	0.9751
FU2-043	3051.5	2686.39	0.8804	354449	350413	0.9886
FU2-044	3109.89	2860.69	0.9199	357880	365352	1.0209
FU2-045	3105.93	2770.41	0.8920	353920	354798	1.0025
FU2-046	3215.44	2824.07	0.8783	354077	351569	0.9929
FU2-047	3058.12	2709.5	0.8860	355003	359687	1.0132
FU2-048	3189.38	3075.38	0.9643	353731	382081	1.0801
FU2-049	3110.88	2420.11	0.7780	354824	311942	0.8791
FU2-050	3235.76	2975.49	0.9196	353538	364241	1.0303
FU2-051	3077.89	2623.7	0.8524	354225	347316	0.9805
FU2-052	3229.82	2938.66	0.9099	353642	369756	1.0456
FU2-053	3137.25	2656.33	0.8467	353255	343012	0.9710
FU2-054	3228.89	2731.03	0.8458	365179	365957	1.0021
FU2-055	3108.56	2995.27	0.9636	353773	387089	1.0942
FU2-056	3148.65	2297.85	0.7298	354302	307971	0.8692
FU2-057	3161.24	2797.41	0.8849	353740	352444	0.9963
FU2-058	3191.93	2923.64	0.9159	354058	362120	1.0228

HA1-087	2986.21	2771.8	0.9282	356349	351359	0.9860
HA1-088	3115.89	2942.74	0.9444	355621	383442	1.0782
HA1-089	2919.91	2572.71	0.8811	356477	360215	1.0105
HA1-090	3041.77	2780.76	0.9142	355642	382663	1.0760
HA1-091	3105.73	2427.64	0.7817	354348	313292	0.8841
HA1-092	2980.02	2639.21	0.8856	355766	363156	1.0208
HA1-093	3212.3	2817.24	0.8770	354113	363387	1.0262
HA1-094	3225.88	2699.62	0.8369	354474	355630	1.0033
HA1-095	3165.97	2905.25	0.9176	354627	361752	1.0201
HA1-096	3151.62	2699.79	0.8566	354356	349681	0.9868
HA1-097	3228.75	3030.89	0.9387	354733	383261	1.0804
HA1-098	3012.36	2521.64	0.8371	354982	316690	0.8921
HA1-099	2772.1	2544.55	0.9179	356473	374752	1.0513
HA1-100	2981.56	2623.45	0.8799	354964	349704	0.9852
HA1-101	3071.1	2728.7	0.8885	355166	348170	0.9803
HA1-102	3095.89	2714.62	0.8768	355704	357674	1.0055
HA1-103	3008.16	2849.96	0.9474	356179	395135	1.1094
FU1-124	2261.72	1939.03	0.8573	360534	317653	0.8811
FU1-125	2371.28	2294.64	0.9677	359734	368746	1.0251
FU1-126	2415.03	2282.9	0.9453	359065	356449	0.9927
FU1-127	2444.41	2369.96	0.9695	358807	305538	0.8515
FU1-128	2391.6	2296.53	0.9602	359079	363545	1.0124
FU1-129	2344.46	2329.15	0.9935	358748	375043	1.0454
AVERAGE			0.9002			0.9973
STDEV			0.08392			0.06401
C.V(%)			9.3223			6.4182

Table 3. Modification of Paramater

Reactor Name	Initial Enrichme	Number Batch	ICT	Measure	ICT/Me		old		new	
							α	β	α	β
FUKUSHIMA1	2.5	38	0.0074	0.0065	1.155	v1	0.045800	0.004278	0.039965	0.003721
HAMAOKA 1	2.8	17	0.0088	0.0078	1.137	v2	0.199800	0.022340	0.174000	0.019450
FUKUSHIMA1	2.5～2.7	17	0.0087	0.0076	1.140	v3	0.201900	0.022220	0.203100	0.019350
				AVERAGE	1.148	v4	-0.10570	0.010780	-0.02000	0.009390
						v5	0.002049	0.000160	0.001784	0.000139
						v6	0.193200	0.017570	0.168200	0.015300
						v7	0.311800	0.009069	0.271500	0.007896
						v8	0.137300	0.009216	0.119500	0.008024
						v9	0.218500	0.014800	0.190200	0.012890

Table 4. Results of 86-2 CAMPAIGN

BATCH No.	Pu(g) ICT	Pu(g) MEASURED	MEAS/ICT RATIO	U(g) ICT	U(g) MEASURED	MEAS/ICT RATIO
MI1-070	2286.2	1574.54	0.6887149	328240	230201	0.7013192
MI1-071	2412.72	2369.34	0.9820203	327237	330794	1.0108698
MI1-072	2370.24	2264.52	0.9553969	327846	319414	0.9742806
MI1-073	2396.21	2247.72	0.9380313	327731	321634	0.9814574
MI1-074	2397.86	2334.95	0.9737641	326984	333349	1.0194658
MI1-075	2376	2268.26	0.9546549	327305	322181	0.9842449
MI1-076	2284.65	2298.43	1.0060316	327772	331088	1.0101168
MI1-077	2752.49	2259.39	0.8208531	323945	281828	0.8699872
MI1-078	2784.42	2674.46	0.9605088	324150	325623	1.0045442
MI1-079	2537.86	2664.85	1.0500382	325026	341010	1.0491776
MI1-080	2508.55	2589.76	1.0323733	325012	336549	1.0354972
MI1-081	2505.95	2512.85	1.0027534	324725	326196	1.00453
MI1-082	2701.03	2781.66	1.0298516	324776	334754	1.0307227
MI1-083	2771.44	2706.06	0.9764094	323738	327637	1.0120437
MI1-084	2441.56	2739.34	1.121963	315355	342975	1.0875838
MI1-085	2418.21	2033.02	0.8407128	315040	255998	0.8097244
MI1-086	2375.58	2485.96	1.0464544	315112	314991	0.999610
MI1-087	2438.35	2428.69	0.9960383	314773	304489	0.9673268
MI1-088	2196.75	2496.79	1.1365836	311694	330141	1.059183
MI1-089	2311.6	2510.64	1.0861049	315313	313742	0.9940719
MI1-090	2372.88	2404.41	1.0132877	314836	303367	0.9642068
MI1-091	2406.03	2315.68	0.9624485	314202	335566	1.0679945
MI1-092	2418.33	2603.5	1.0765694	315303	329994	1.0465933
FU1-090	1989.32	1863.92	0.9369634	360808	317116	0.8645280
FU1-091	2345.47	2348.2	1.0011639	364931	370275	1.0146439
FU1-092	2202.42	2181.15	0.9903424	365743	364079	0.9970989
FU1-093	2326.38	2248.02	0.9663168	364072	349733	0.9606149
FU1-094	2227.63	2359.43	1.059166	364990	382224	1.0472177
FU1-095	2342.62	2278.27	0.9725308	364248	348471	0.9566861
FU1-096	2253.92	2163.38	0.95983	364284	348386	0.9563033
FU1-097	2302.63	2435.76	1.0578165	364230	379280	1.04132
FU1-098	2265.91	2342.99	1.0340172	364762	373338	1.0235112
FU1-099	2412.88	2324.69	0.9634503	363266	364740	1.0040576
FU1-100	2346.84	2382.03	1.0149946	364275	363175	0.9969803

FU1-101	2305.57	2356.22	1.0219685	364404	369021	1.01267
FU1-102	2371.36	2507.12	1.0572498	364799	375783	1.0301097
FU1-103	2276.45	2329.08	1.0231193	364238	348236	0.9560672
FU1-104	2425.61	2537.63	1.0461822	364325	374554	1.0280766
FU1-105	2486.98	2483.97	0.9987897	364517	382599	1.0496054
FU1-106	2225.65	2037.48	0.9154539	364775	334499	0.9170009
FU1-107	2253.57	2326.16	1.0322111	364728	363652	0.9970499
FU1-108	2391.82	2380.03	0.9950707	364192	362444	0.9952003
FU1-109	2290.43	2378.28	1.0383552	364294	365020	1.0019929
FU1-110	2410.31	2446.17	1.0148778	364330	367398	1.0084209
FU1-111	2393.09	2399.96	1.0028708	364008	364132	1.0003407
FU1-112	2326.15	2639.6	1.1347506	364293	400569	1.0995792
FU1-113	2273.46	2332.31	1.0258857	365168	356056	0.9750471
FU1-114	2311.42	2393.39	1.035463	364181	367474	1.0090422
FU1-115	2356.89	2566.1	1.0887653	363780	387966	1.0664852
FU1-116	2190.35	2061.63	0.9412331	364636	325752	0.8933621
FU1-117	2422.04	2429.91	1.0032493	363679	365548	1.0051391
FU1-118	2294.37	2419.35	1.0544725	364682	372376	1.0210978
FU1-119	2493.23	2394.51	0.9604048	363783	361425	0.9935181
FU1-120	2318.64	2413.49	1.0409076	364274	373699	1.0258734
FU1-121	2250.17	2335.6	1.037966	364052	359947	0.9887241
FU1-122	2431.45	2389.61	0.9827922	364211	370486	1.017229
FU1-123	2430.24	2459.69	1.0121181	363985	375606	1.0319271
FU2-042	2604.85	2614.09	1.0035472	355814	346022	0.97248
FU2-043	2628.39	2686.39	1.0220667	355498	350413	0.9856961
FU2-044	2678.57	2860.69	1.0679915	358873	365352	1.0180537
FU2-045	2675.1	2770.41	1.0356286	354960	354798	0.9995436
FU2-046	2769.85	2824.07	1.0195751	355185	351569	0.9898194
FU2-047	2633.43	2709.5	1.0288863	356048	359687	1.0102205
FU2-048	2747.07	3075.38	1.1195128	354802	382081	1.0768851
FU2-049	2679.08	2420.11	0.9033362	355873	311942	0.8765543
FU2-050	2786.91	2975.49	1.0676663	354635	364241	1.027087
FU2-051	2650.73	2623.7	0.9898028	355317	347316	0.9774821
FU2-052	2782.24	2938.66	1.0562209	354788	369756	1.0421886
FU2-053	2701.88	2656.33	0.9831414	354385	343012	0.9679078
FU2-054	2782.85	2731.03	0.9813788	363204	363957	0.9993255
FU2-055	2677.51	2995.27	1.1186774	354816	387089	1.090957
FU2-056	2721.2	2452.16	0.9011319	355386	307971	0.8665817
FU2-057	2721.29	2796.65	1.0276927	354793	352444	0.9933792
FU2-058	2749.07	2923.64	1.0635015	355087	362120	1.0198064

HA1-087	2625.21	2771.8	1.0558393	356983	351359	0.9842457
HA1-088	2682.51	2942.74	1.0970099	356636	383442	1.0751635
HA1-089	2464.94	2572.71	1.0437211	357474	360215	1.0076677
HA1-090	2548.35	2780.76	1.0912002	356722	382663	1.0727205
HA1-091	2753.39	2427.64	0.8816913	355171	313292	0.8820878
HA1-092	2564.98	2639.21	1.0289398	356700	363130	1.0180992
HA1-093	2763.02	2817.24	1.0196235	355157	363387	1.0231729
HA1-094	2778.85	2699.62	0.9714882	355526	355630	1.0002925
HA1-095	2795.6	2905.25	1.0392223	355493	361782	1.0176065
HA1-096	2687.31	2699.79	1.004644	355414	349681	0.9838095
HA1-097	2781.73	3030.89	1.0895702	355708	383201	1.0772779
HA1-098	2675.94	2521.64	0.942338	355995	316690	0.8895911
HA1-099	2316.96	2544.55	1.0982279	357486	374752	1.0482984
HA1-100	2568.18	2623.45	1.0215211	355966	349704	0.9825741
HA1-101	2643.24	2728.7	1.0323315	356214	348170	0.9774181
HA1-102	2666.15	2714.62	1.0181798	356725	357674	1.0026603
HA1-103	2527.3	2849.96	1.1276698	357281	395135	1.1059502
FU1-124	1965.28	1939.03	0.9866431	361138	317653	0.879589
FU1-125	2028.15	2294.64	1.1313956	360460	368746	1.0229873
FU1-126	2059.14	2282.9	1.1086667	359817	350449	0.9905897
FU1-127	2144.22	2369.96	1.1052784	359432	351425	0.9777202
FU1-128	2070.72	2296.53	1.109049	359815	363545	1.0103634
FU1-129	2030.56	2329.15	1.1470481	359406	373043	1.0435079
AVERAGE			1.0166328			0.9904809
STD			0.0713192			0.0619793
C.V.%			7.01323			6.21982

Table5. Results of 87-1 Campaign

BATCH No.	Pu(g) ICT	Pu(g) MEASURED	MEAS/ICT RATIO	U(g) ICT	U(g) MEASURED	MEAS/ICT RATIO
IK1-056	2985.18	2103.96	0.7048017	378253	261766	0.6920395
IK1-057	3008.04	2862.12	0.95149	387526	362846	0.936314
IK1-058	3163.34	3319.54	1.0493782	379075	401244	1.0584818
IK1-059	3084.43	3166.21	1.0265138	387348	388274	1.0023906
IK1-060	3213.54	3173.12	0.987422	386882	388090	1.0031224
IK1-061	2996.56	3185.36	1.0630056	387010	400160	1.0339785
IK1-062	3228.95	2958.32	0.9161864	378216	355594	0.9401876
IK1-063	2966.44	3014.45	1.0161844	388433	367389	0.9458233
IK1-064	3205.98	3378.17	1.053709	378906	403962	1.0661272
IK1-065	3258.95	3227.8	0.9904417	378488	385513	1.0185607
IK1-066	3236.72	2920.15	0.9021942	378950	342171	0.902945
SH1-120	1483.63	1321.14	0.8904781	379558	283036	0.7456989
SH1-121	2486.24	2636.45	1.0604165	377681	369484	0.9782965
SH1-122	2488.61	2713.41	1.0903316	376968	388285	1.0300211
SH1-123	2496.2	2770.68	1.1099591	380860	396712	1.0416216
SH1-124	2566.89	2768.36	1.078488	377531	405632	1.0744336
SH1-125	2557.14	2454.11	0.9597089	379281	343781	0.9064018
SH1-126	2556.34	2576.2	1.0077689	377321	372932	0.988368
SH1-127	2528.24	2608.89	1.0318997	376902	370281	0.9824331
SH1-128	2609.49	2714.22	1.0401343	380004	385475	1.0143972
SH1-129	2565.84	2724.3	1.0617576	379449	377283	0.9942917
SH1-130	2579.16	2745.18	1.0643698	379475	400062	1.0542513
SH1-131	2576.94	2585.7	1.0033994	376916	377999	1.0028733
SH1-132	2604.33	2551.6	0.9797529	379962	372259	0.9797269
SH1-133	2362.56	2443.61	1.034306	384317	415626	1.0814666
SH1-134	2226.07	1881.9	0.8453912	384768	341046	0.8863679
SH1-135	2394.08	2201.62	0.91961	384071	383895	0.9995418
SH1-136	2396.62	2191.88	0.9145714	383697	379112	0.9880505
TK2-060	2400.43	2598.27	1.0824186	362727	383463	1.057167
TK2-061	2414.83	2530.75	1.0480034	362628	357372	0.9855058
TK2-062	2404.84	2519.69	1.0477579	362512	354325	0.9774159
TK2-063	2952.93	2678.83	0.9071769	361526	371718	1.0281916
TK2-064	2464.27	2503.92	1.01609	362382	366659	1.0118025
TK2-065	2438.71	2534.43	1.0392503	362609	373520	1.0300903

TK2-066	2452.76	2562.22	1.0446273	361970	380754	1.0518938
TK2-067	2448.54	2168.24	0.8855236	361906	325616	0.8997253
TK2-068	2423.13	2391.26	0.9868476	362314	361703	0.9983136
TK2-069	2429.63	2404.42	0.9896239	362858	369293	1.0177342
TK2-070	2425.61	2362.28	0.9738911	362162	355573	0.9818065
TK2-071	2416.88	2451.16	1.0141836	362201	363809	1.0044395
TK2-072	2604.16	2626.4	1.0085402	360644	364048	1.0094387
TK2-073	2567.18	2757.39	1.074093	362412	372345	1.027408
TK2-074	2846.47	2997.18	1.0529463	362413	393794	1.0865891
TK2-075	2877.92	2577.5	0.8956121	362151	324322	0.8955436
TK2-076	2841.54	2857.04	1.0054548	361489	361198	0.999195
TK2-077	2928.95	2895.89	0.9887127	362123	364008	1.0052054
TK2-078	2857.16	2959.17	1.0357033	362026	368929	1.0190677
TK2-079	2837.76	2967.13	1.0455888	361935	365607	1.0101455
TK2-080	2807.47	3001.47	1.0691014	361468	373041	1.0320167
TK2-081	2835.21	2758.98	0.9731131	361806	351089	0.9703792
TK2-082	2846.35	2889.17	1.0150438	361756	397363	1.0984282
TK2-083	2887.49	2243.43	0.7769481	361316	300408	0.8314273
TK2-084	2980.64	2766.74	0.9282369	361319	366270	1.0137026
TK2-085	2946.28	2916	0.9897226	361837	365019	1.008794
TK2-086	2794.92	3046.28	1.0899346	362082	378575	1.0455505
TK2-087	2810.26	2821.67	1.0040601	361709	362930	1.0033756
TK2-088	2852.86	2748.5	0.9634192	361885	356015	0.9837794
TK2-089	2839.37	2898.57	1.0208497	361698	368783	1.0195882
TK2-090	2923.37	2878.57	0.9846752	361652	356121	0.9847063
TK2-091	2928.91	3217.97	1.098692	362195	406199	1.1214926
TK2-092	2886.3	2468.6	0.8552818	361561	306761	0.848435
TK2-093	2926.87	3078.52	1.051813	361753	373408	1.0322181
TK2-094	2876.05	2936.62	1.0210601	361804	368756	1.0192148
TK2-095	2981.03	3032.91	1.0174034	361597	366429	1.0133629
TK2-096	2911.58	2758.73	0.9475027	361236	334074	0.9248082
TK2-097	2966.78	3057.74	1.0306595	361725	371619	1.0273523
TK2-098	2937.04	3128.77	1.06528	361608	383112	1.0594677
TK2-099	2903.13	2511.32	0.8650388	362040	316348	0.873793
TK2-100	2848.64	2924.1	1.0264898	362208	372987	1.0297591
TK2-101	2875.8	2941.68	1.0229084	362235	373694	1.0316342
TK2-102	2920.56	2960.82	1.013785	360989	372792	1.0326963
TK2-103	2896.85	2858.46	0.9867477	361894	357585	0.9880932
TK2-104	2853.45	2823.29	0.9894303	361703	357005	0.9870114

TK2-105	2864.65	3131.98	1.0933203	362572	388600	1.0717871
TK2-106	2878.26	2393.88	0.8317108	361487	310939	0.8601665
TK2-107	2883.4	2982.33	1.0343102	362194	377066	1.0410609
TK2-108	2916.1	2890.41	0.9911903	361541	364507	1.0082038
TK2-109	2832.46	2990.25	1.0557078	362221	366743	1.0124841
TK2-110	3615.29	3543.52	0.9801482	289731	287869	0.9935733
TK2-111	2902.55	2944.69	1.0145183	361359	364981	1.0100233
TK2-112	2932.18	2768.24	0.9440894	361801	357064	0.9869072
TK2-113	2950.22	2964.82	1.0049488	361995	374401	1.0342712
TK2-114	2914.9	2653.73	0.9104017	361673	327893	0.9066007
TK2-115	2978.75	3005.91	1.0091179	361429	379017	1.0486624
TK2-116	2938.85	2946.75	1.0026881	361573	372137	1.0292168
TK2-117	2943.52	2964.71	1.0071989	361569	356332	0.9855159
TK2-118	2965.39	3020.59	1.0186148	361324	367990	1.0184488
TK2-119	1507.22	1667.22	1.1061557	180662	199088	1.1019916
HA1-104	2707.64	2484.65	0.9176441	357258	350123	0.9800284
HA1-105	2919.25	2700.24	0.9249773	355878	365303	1.0264838
HA1-106	2994.8	2582.64	0.8623748	355815	335397	0.9426162
HA1-107	3108.27	2674.31	0.8603854	355764	343910	0.9666802
HA1-108	3162.46	2802.69	0.8862373	354648	365805	1.0314594
HA1-109	2997.18	2581.34	0.8612562	355936	351092	0.9863908
HA1-110	2865.47	2705.58	0.9442011	356028	361663	1.0158274
HA1-111	3017.1	2831.76	0.9385702	354608	386367	1.0895609
HA1-112	3075.26	2505.59	0.8147571	355265	328304	0.9241102
HA1-113	2885.98	2648.41	0.9176813	356221	354481	0.9951154
HA1-114	2929.84	2593.53	0.8852122	356399	345860	0.9704292
HA1-115	2924.87	2658.97	0.90909	356368	360301	1.0110363
HA1-116	3017.41	2564.8	0.8500005	355253	352037	0.9909473
HA1-117	3107.2	2800.17	0.9011876	355127	377357	1.0625973
HA1-118	3126.21	2879.53	0.921093	355049	370519	1.0435715
HA1-119	2971.29	2367.91	0.79693	355431	316577	0.8906848
HA1-120	2947.22	2823.01	0.9578552	356159	364562	1.0235934
FU1-130	2442.81	2422.65	0.9917472	358456	363287	1.0134772
FU1-131	2434.36	2531.74	1.0400023	358671	381428	1.0634481
FU1-132	2455.54	2315.2	0.9428476	358257	339991	0.9490143
FU1-133	2472.51	2556.39	1.033925	358190	375770	1.0490801
FU1-134	2389.29	2287.46	0.9573806	358110	342332	0.9559249
FU1-135	2621.51	2560.22	0.9766203	357984	372614	1.0408677
FU1-136	2621.58	2772.18	1.0574463	356627	384355	1.0777507

FU1-137	2540.45	2271.95	0.8943101	358494	333653	0.9307073
FU1-138	2492.6	2456.15	0.9853767	358393	368358	1.0278047
FU1-139	2572.01	2635.76	1.0247861	357874	376004	1.0506603
FU1-140	2374.73	2406.1	1.0132099	359024	353751	0.985313
FU1-141	2255.83	2277.84	1.0097569	358974	365250	1.0174832
FU1-142	2294.11	2174.3	0.947775	359997	354250	0.984036
FU1-143	2299.8	2209.36	0.9606748	359489	360572	1.0030126
FU1-144	2900.62	2480.92	0.8553068	356282	362762	1.0181878
FU1-145	2895.12	2804.44	0.9686783	356874	393362	1.1022434
FU1-146	2889.99	2183.31	0.7554732	355829	297135	0.83505
FU1-147	2586.43	2808.91	1.0860182	357375	398947	1.116326
FU1-148	2552.91	2552.97	1.0000235	357015	360514	1.0081065
FU1-149	2472.19	2376.71	0.9613784	358644	360341	1.0047317
FU1-150	2473	2386.17	0.9648888	357741	367421	1.0270587
FU1-151	2515.96	2349.12	0.9336873	357031	337466	0.9452008
FU1-152	3199.18	2673.15	0.8355735	354507	359195	1.013224
FU1-153	3195.9	2783.5	0.8709597	354968	372257	1.0487058
IK1-067	3476.83	3261.8	0.9381534	377570	396326	1.0496756
AVERAGE			0.9758653			0.9984855
STD			0.0787028			0.0658649
C.V.%			8.06492			6.59648

Table6. Results of 88-1 Campaign

BATCH No.	Pu(g) ICT	Pu(g) MEASURED	MEAS/ICT RATIO	U(g) ICT	U(g) MEASURED	MEAS/ICT RATIO
IK1-071	3309.63	2439.32	0.7370371	386627	280886	0.7265038
IK1-072	3524.21	3327.86	0.9442854	385285	381470	0.9900982
IK1-073	3345.1	3324.42	0.9938178	385797	382964	0.9926568
IK1-074	3475.58	3392.05	0.9759666	385639	390732	1.0132067
IK1-075	3487.09	3663.33	1.0505407	385552	417265	1.0822535
IK1-076	3500.34	2948.76	0.842421	385237	337166	0.8752171
IK1-077	3491.41	3464.56	0.9923097	385188	394237	1.0234924
IK1-078	3513.7	3483.14	0.9913026	385527	390674	1.0133506
IK1-079	3499.05	3547.9	1.0139609	385004	391403	1.0166206
IK1-080	3497.81	3467.7	0.9913918	385390	389621	1.0109785
IK1-081	3492.19	3517.74	1.0073163	386344	402232	1.041124
IK1-082	3111.23	2634.8	0.8468676	378499	332411	0.8782348
IK1-083	3193.14	2839.62	0.8892877	377331	341411	0.9048051
IK1-084	3202.51	3206.48	1.0012397	377436	386202	1.0232251
MI1-093	2399.92	2464.54	1.0269259	328672	339070	1.0316364
MI1-094	2358.7	2232.06	0.9463094	326489	311549	0.9542404
MI1-095	2397.8	2648.84	1.104696	326892	368695	1.1278802
MI1-096	2430.5	1935.89	0.7964987	327154	271633	0.8302909
MI1-097	2430.42	2411.14	0.9920672	326845	335133	1.0253576
MI1-098	2373.28	2443.37	1.029533	327548	352982	1.0776497
MI1-099	2344.01	1932.35	0.8243779	327517	281828	0.8604988
MI1-100	2297.04	2065.06	0.8990092	328147	304703	0.9285564
MI1-101	2317.73	2628.01	1.1338724	328279	388185	1.182485
MI1-102	2351.57	1810.36	0.7698516	326456	260914	0.7992317
MI1-103	2354.79	2500.25	1.061772	327418	369799	1.12944
MI1-104	2274.67	1880.12	0.8265463	326713	272074	0.8327615
MI1-105	2385.99	1974.28	0.8274469	326369	281181	0.8615432
MI1-106	2397.12	2532.61	1.056522	326649	358222	1.0966573
MI1-107	2399.08	2525.49	1.052691	326318	354215	1.0854902
MI1-108	2192.16	2255.28	1.0287935	324733	354489	1.0916322
MI1-109	1814.38	2279.23	1.2562032	325686	361193	1.1090222
MI1-110	2276.39	2184.47	0.9596203	327651	312917	0.9550314
MI1-111	2367.92	2264.26	0.9562232	327787	323359	0.9864912

MI1-112	2348.86	2275.97	0.9689679	327409	330156	1.0083901
MI1-113	2280.87	2309.33	1.0124777	328368	335424	1.0214881
MI1-114	2289.05	2329.89	1.0178415	327581	338209	1.0324439
MI1-115	2250.33	2405.65	1.069021	328372	348623	1.0616709
MI1-116	2358.78	2060.74	0.8736465	327949	288847	0.880768
MI1-117	2374.01	2425.74	1.0217901	326282	329501	1.0098657
MI1-118	2459.92	2509.99	1.0203543	325107	335827	1.0329738
MI1-119	2482.47	2257.37	0.9093242	325800	304046	0.933229
MI1-120	2816.29	3176.58	1.1279307	322747	362934	1.1245155
FU2-059	2643.94	2470.03	0.9342232	357575	313393	0.8764399
FU2-060	2593.6	2485.07	0.9581547	356904	331218	0.9280311
FU2-061	2674.31	2873.71	1.0745613	356799	372530	1.0440892
FU2-062	2651.81	2722.87	1.0267968	356708	355506	0.9966303
FU2-063	2709.09	3043.85	1.1235692	356211	382452	1.073667
FU2-064	2699.03	2538.18	0.9404045	356326	320558	0.89962
FU2-065	2668.16	2815.86	1.0553565	356064	369716	1.0383414
FU2-066	2682.42	2749.62	1.025052	356354	354012	0.9934279
FU2-067	2616.07	2648.05	1.0122244	355308	347390	0.9777151
FU2-068	2604.26	2594.52	0.99626	356701	339752	0.952484
FU2-069	2643.65	2923.27	1.1057704	356428	382202	1.0723119
FU2-070	2703.8	2421.64	0.8956432	354754	309763	0.8731769
FU2-071	2668.86	2747.46	1.0294508	355988	360776	1.0134499
FU2-072	2645.92	2697.6	1.019532	355608	356987	1.0038779
FU2-073	2665.93	2758.75	1.0348171	356587	352195	0.9876832
FU2-074	2651	2698.61	1.0179593	356534	355998	0.9984966
FU2-075	2683.78	2836.88	1.0570464	355547	372308	1.0471414
SH1-137	2105.08	1742.84	0.827921	384430	331273	0.8617252
SH1-138	2085.77	2028.09	0.9723459	384674	383413	0.9967219
SH1-139	2073.04	2109.3	1.0174912	385216	403640	1.0478277
SH1-140	2045.78	1954.11	0.9551907	384774	393161	1.0217972
SH1-141	2073.09	2118.27	1.0217936	381608	377958	0.9904352
SH1-142	2099.12	1959.52	0.9334959	384686	355747	0.9247724
SH1-143	2165.71	2030.97	0.9377848	383211	378398	0.9874403
SH1-144	2125.38	2085.46	0.9812175	384349	391378	1.0182881
SH1-145	2153.58	2178.86	1.0117386	384175	405635	1.05586
SH1-146	2113.3	1826.31	0.8641982	383725	344049	0.896603
SH1-147	2088.04	2274.84	1.0894619	384593	416831	1.0838237
SH1-148	2148.58	1988.57	0.9255276	384213	379615	0.9880327
SH1-149	2070.99	1953.47	0.9432542	384003	386447	1.0063645

SH1-150	2070.99	1921.33	0.927735	384081	375101	0.9766195
SH1-151	2063.43	1990.18	0.9645009	385319	384062	0.9967378
SH1-152	2151.19	2019.75	0.9388989	383806	386642	1.0073891
SH1-153	2124.51	2244.37	1.0564177	381181	376765	0.988415
FU1-154	2545.02	2505.66	0.9845345	356511	360372	1.01083
FU1-155	2025.52	2249.41	1.1105346	359806	359153	0.9981851
FU1-156	2038.05	2336.71	1.146542	359886	377446	1.0487932
FU1-157	1897.47	1794.47	0.9457172	360609	307906	0.85385
FU3-001	2579.05	2605.24	1.0101549	356630	358299	1.0046799
FU3-002	2629.85	2695.97	1.0251421	356271	357798	1.0042861
FU3-003	2636.21	2787.92	1.0575485	356739	363787	1.0197567
FU3-004	2676.64	3061.51	1.1437885	355416	394050	1.1087008
FU3-005	2659.27	2502.99	0.941232	354888	326383	0.9196789
FU3-006	2535.36	2627	1.0361448	357748	358662	1.0025549
FU3-007	2622.37	2670.78	1.0184604	357606	352255	0.9850366
FU3-008	2636.17	2679.63	1.016486	358030	353095	0.9862162
FU3-009	2635.39	2851.03	1.0818247	355895	368564	1.0355976
FU3-010	2656.45	2604.65	0.9805003	356060	334876	0.9405044
FU3-011	2686.43	2811.75	1.0466493	351192	356071	1.0138927
FU3-012	2679.54	2064.04	0.7702964	355282	263194	0.7408031
FU3-013	2666.68	2607.61	0.9778489	355386	330509	0.9300001
FU3-014	2562.68	2856.16	1.1145207	356357	390846	1.0967822
FU3-015	2629.99	3441.52	1.3085677	356711	434900	1.2191942
FU3-016	2611.17	2497.6	0.9565061	357986	325691	0.909787
FU3-017	2633.63	2414.17	0.9166701	356187	314429	0.8827638
TK2-120	2645.6	2792.38	1.0554808	362778	366562	1.0104306
TK2-121	2676.57	2904.51	1.0851612	361975	375473	1.0372899
TK2-122	2620.19	2921.89	1.1151443	361087	384264	1.0641867
TK2-123	2518.95	2884.11	1.1449652	361850	404248	1.1171701
TK2-124	2598.98	2521.81	0.9703076	362283	331165	0.9141058
TK2-125	2525.19	2683.74	1.0627874	361722	366289	1.0126257
TK2-126	2620.14	2771.65	1.0578252	362400	359281	0.9913935
TK2-127	2495.47	2669.49	1.0697344	361983	364718	1.0075556
TK2-128	2458.66	2728.14	1.1096044	362761	376539	1.0379809
TK2-129	2168.56	2780.63	1.2822472	363051	390233	1.074871
AVERAGE			1.0006241			0.9931584
STD			0.0991567			0.0850063
C.V.%			9.9094804			8.5591891

Table7. Reesults of Heel Correkction on Uranium in 86-1 Campain

Batch No.	A	V	A1	V1	A(1)	V(1)	VH11	A(2)	V(2)	A3	V3	VS1
IK1-043	498.73711	776	0	0	498.73711	776	150	498.73711	150	0	50	117
IK1-044	501.33245	755	0	0	501.33245	755	150	501.33245	150	221.01311	350	110
IK1-045	497.70472	762	0	0	497.70472	762	93	497.70472	93	232.84059	290	55
IK1-046	633.19086	613	34.914291	159	509.97069	772	150	509.97069	150	221.70592	310	1089
IK1-047	636.61967	610	35.426926	150	517.96321	760	150	517.96321	150	190.88933	350	0
IK1-048	519.55288	747	46.164198	0	519.55288	747	135	519.55288	135	246.61709	150	132
IK1-049	720.43228	539	92.83447	150	583.79996	689	159	583.79996	159	301.28001	230	180
IK1-050	528.57493	734	43.883917	0	528.57493	734	136	528.57493	136	253.89399	150	75
IK1-051	505.02083	768	0	0	505.02083	768	144	505.02083	144	244.72453	410	129
IK1-052	641.89917	605	46.043746	150	523.5173	755	150	523.5173	150	265.98567	300	141
IK1-053	539.97497	719	0	0	539.97497	719	69	539.97497	69	222.48456	380	0
IK1-054	643.24419	602	0	0	643.24419	602	149	643.24419	149	259.33953	362	300
IK1-055	634.7	610	38.87556	150	517.10307	760	154	517.10307	154	222.17989	250	102

A(3)	V(3)	A2	V2	VH12	A(4)	V(4)	VH21	VS21	A(5)	V(5)	VR	A(6)
393.70672	793	0.0001	144	150	0.0001	144	144	0	393.70672	793	646	93.983124
357.42791	1065	0.0001	144	150	0.0001	144	144	0	357.42791	1065	556	106.51539
394.95881	1014	0.0001	144	69	71.10076	168	144	51	369.32475	1089	674	46.220223
190.96022	2021	47.617644	52	150	47.617644	52	51	0	190.88933	2022	674	92.83447
398.71752	960	47.617644	51	66	340.27711	135	77	0	395.38791	1018	713	43.883917
397.04578	894	144.42258	58	59	357.18305	134	53	40	378.21749	1015	0	519.55288
402.88125	940	128.92313	121	159	128.92313	121	121	0	402.88125	940	561	128.92249
430.34254	823	128.92313	121	50	294.96204	207	52	53	387.86714	1031	0	528.57493
357.23994	1163	132.25382	129	66	272.71675	207	49	81	327.07511	1402	0	505.02083
379.08572	1046	406.03909	115	150	406.03909	115	115	0	379.08572	1046	568	109.36991
422.84258	1030	406.03909	115	10	451.45413	174	49	94	393.88281	1249	0	539.97497
345.53411	1115	129.86605	120	69	335.21731	200	52	47	331.97152	1310	0	643.24419
385.08292	958	146.76899	181	154	146.76899	181	154	0	378.55045	985	617	103.28648

A(10)	V(10)	VS13	VH15	A(11)	V(11)	VH16	A(12)	V(12)	VH23	VS23	A(13)	V(13)
34.914291	428	27	159	221.01311	1726	159	0.0001	144	144	0	221.01311	1726
35.426926	454	11	150	232.84059	1935	150	0.0001	144	144	0	232.84059	1935
46.164198	825	0	824	367.61284	1102	0	47.617644	875	52	79	221.70592	2004
92.83447	824	0	824	190.88933	2022	824	47.617644	51	51	0	190.88933	2022
43.883917	150	0	150	256.93422	1674	0	144.42258	227	58	0	246.61709	1843
0	819	0	819	381.76077	1074	690	128.92313	182	121	252	301.28001	1387
46.043746	420	50	150	253.89399	1830	150	128.92313	121	121	0	253.89399	1830
0	708	0	109	250.21722	1680	0	132.25382	161	129	23	244.72453	1735
0	696	240	696	271.14965	1790	696	406.03909	49	115	0	265.98567	1724
38.87556	422	223	150	222.48456	2109	150	406.03909	115	115	0	222.48456	2109
0	720	0	127	268.13562	1852	0	129.86605	176	120	35	259.33953	1943
0	815	51	129	222.17989	2116	0	146.76899	181	181	0	222.17989	2116
38.881514	433	224	153	212.9505	2097	153	146.76899	154	154	0	212.9505	2097

V(6)	VH13	VS12	A(7)	V(7)	VH14	A(8)	V(8)	VH22	VS22	A(9)	V(9)	VD
796	159	0	260.19348	1430	159	0.0001	144	144	0	260.19348	1430	269
706	151	0	271.46714	1620	151	0.0001	144	144	0	271.46714	1620	303
743	824	0	395.2885	1008	824	71.10076	144	51	0	367.9048	1101	1
824	824	0	190.88933	2022	824	47.617644	51	51	0	190.88933	2022	0
779	150	27	256.93422	1674	150	340.27711	77	77	0	256.93422	1674	0
59	59	0	378.21749	1015	0	442.71716	112	53	0	381.76077	1074	819
720	150	0	299.46636	1510	150	128.92313	121	121	0	299.46636	1510	270
50	50	0	387.86714	1031	0	409.47816	102	52	0	388.86673	1081	708
66	66	0	327.07511	1402	0	406.03909	115	49	82	313.13412	1550	696
718	150	0	284.16715	1614	150	406.03909	115	115	0	284.16715	1614	272
10	10	0	393.88281	1249	0	466.45766	59	49	0	394.45926	1259	720
69	69	0	331.97152	1310	0	510.869	121	52	0	340.92288	1379	815
771	163	0	273.4905	1593	163	146.76899	154	154	0	273.4905	1593	270

VS3	VH3	A4	V4	A(14)	V(14)	A5	V5	VS4	VH4	VC	A(15)	V(15)
390.45	350	0	5	171.6752	1771.45	0	7.04	0	5	169.14	156.10572	1942.63
498.4	290	171.6752	5	178.68235	2148.4	156.10572	7.29	0	5	229.12	161.41026	2379.81
357.85	310	178.68235	5	183.02902	2056.85	161.41026	7.3	0	5	200.64	166.70858	2259.79
679.67	350	183.02902	5	135.81965	2356.67	166.70858	7.33	0	5	210.8	124.76651	2569.8
646.41	150	135.81965	5	178.38255	2344.41	124.76651	7.44	300	5	256.66	144.04572	2903.51
754.91	230	178.38255	5	182.31053	1916.91	144.04572	7.6	500	5	256.66	130.65541	2676.17
870.86	150	182.31053	5	167.24447	2555.86	130.65541	7.44	0	5	212.72	154.30755	2771.02
435.68	410	167.24447	5	184.11956	1765.68	154.30755	6.87	20	5	155.48	167.38584	1943.03
455.05	300	184.11956	5	201.52554	1884.05	167.38584	7.21	370	5	0	168.36864	2256.26
248.38	380	201.52554	5	194.55575	1982.38	168.36864	7.52	0	5	129	182.58989	2113.9
286.79	362	194.55575	5	219.45257	1872.79	182.58989	7.15	200	5	99.35	189.11775	2174.29
337.68	250	219.45257	5	188.20515	2208.68	189.11775	7.18	113	5	175.06	166.51265	2498.92
396.29	300	188.20515	5	174.50522	2198.29	166.51265	7.04	0	5	156.61	162.88611	2356.94

Table8. Results of Heel Correction on Plutonium in 86-1 Campaign

Batch No.	A	V	A1	V1	A(1)	V(1)	VH11	A(2)	V(2)	A3	V3	VS1
IK1-043	4.1240206	776	0	0	4.1240206	776	150	4.1240206	150	0	50	117
IK1-044	3.9645695	755	0	0	3.9645695	755	150	3.9645695	150	1.8275412	350	110
IK1-045	3.8895276	762	0	0	3.8895276	762	93	3.8895276	93	1.8557445	290	55
IK1-046	4.904633	613	0.2887037	159	3.9539429	772	150	3.9539429	150	1.737849	310	1089
IK1-047	4.8144262	610	0.2801584	150	3.9195049	760	150	3.9195049	150	1.4829168	350	0
IK1-048	3.993842	747	0.36077	0	3.993842	747	135	3.993842	135	1.8737653	150	132
IK1-049	5.5885158	539	0.7197712	150	4.5285569	689	159	4.5285569	159	2.3130042	230	180
IK1-050	4.0353678	734	0.3320762	0	4.0353678	734	136	4.0353678	136	1.9664438	150	75
IK1-051	3.9613802	768	0	0	3.9613802	768	144	3.9613802	144	1.8711279	410	129
IK1-052	4.9426777	605	0.357163	150	4.0316483	755	150	4.0316483	150	2.0733073	300	141
IK1-053	4.1704451	719	0	0	4.1704451	719	69	4.1704451	69	1.7169175	380	0
IK1-054	5.2739037	602	0	0	5.2739037	602	149	5.2739037	149	2.0047834	362	300
IK1-055	5.2206393	610	0.2993838	150	4.2493389	760	154	4.2493389	154	1.7980553	250	102

A(3)	V(3)	A2	V2	VH12	A(4)	V(4)	VH21	VS21	A(5)	V(5)	VR	A(6)
3.255532	793	0.0001	144	150	0.0001	144	144	0	3.255532	793	646	0.7771396
2.8527737	1065	0.0001	144	150	0.0001	144	144	0	2.8527737	1065	556	0.8423306
3.0969032	1014	0.0001	144	69	0.5557325	168	144	51	2.8958654	1089	674	0.3612078
1.4834664	2021	0.3721335	52	150	0.3721335	52	51	0	1.4829168	2022	674	0.7197712
3.0311655	960	0.3721335	51	66	2.5793868	135	77	0	3.0054257	1018	713	0.3320762
3.0484296	894	1.0943798	58	59	2.7388509	134	53	40	2.9035892	1015	0	3.993842
3.1192831	940	0.9900989	121	159	0.9900989	121	121	0	3.1192831	940	561	1.0000563
3.2905426	823	0.9900989	121	50	2.2552831	207	52	53	2.9657472	1031	0	4.0353678
2.7850935	1163	1.0102449	129	66	2.1222669	207	49	81	2.5494878	1402	0	3.9613802
2.9265195	1046	3.177758	115	150	3.177758	115	115	0	2.9265195	1046	568	0.8422664
3.2652602	1030	3.177758	115	10	3.5143588	174	49	94	3.0444458	1249	0	4.1704451
2.7935515	1115	1.0093888	120	69	2.7151948	200	52	47	2.6844724	1310	0	5.2739037
3.1572163	958	1.1992445	181	154	1.1992445	181	154	0	3.103546	985	617	0.8487655

V(6)	VH13	VS12	A(7)	V(7)	VH14	A(8)	V(8)	VH22	VS22	A(9)	V(9)	VD
796	159	0	2.1515208	1430	159	0.0001	144	144	0	2.1515208	1430	269
706	151	0	2.1640108	1620	151	0.0001	144	144	0	2.1640108	1620	303
743	824	0	3.0995433	1008	824	0.5557325	144	51	0	2.884671	1101	1
824	824	0	1.4829168	2022	824	0.3721335	51	51	0	1.4829168	2022	0
779	150	27	1.9524488	1674	150	2.5793868	77	77	0	1.9524488	1674	0
59	59	0	2.9035892	1015	0	3.3999623	112	53	0	2.9308573	1074	819
720	150	0	2.3193101	1510	150	0.9900989	121	121	0	2.3193101	1510	270
50	50	0	2.9657472	1031	0	3.1278736	102	52	0	2.9732461	1081	708
66	66	0	2.5494878	1402	0	3.177758	115	49	82	2.4413638	1550	696
718	150	0	2.1930277	1614	150	3.177758	115	115	0	2.1930277	1614	272
10	10	0	3.0444458	1249	0	3.6255599	59	49	0	3.0490615	1259	720
69	69	0	2.6844724	1310	0	4.1742933	121	52	0	2.7590174	1379	815
771	163	0	2.2429643	1593	163	1.1992445	154	154	0	2.2429643	1593	270

A(10)	V(10)	VS13	VH15	A(11)	V(11)	VH16	A(12)	V(12)	VH23	VS23	A(13)	V(13)
0.2887037	428	27	159	1.8275412	1726	159	0.0001	144	144	0	1.8275412	1726
0.2801584	454	11	150	1.8557445	1935	150	0.0001	144	144	0	1.8557445	1935
0.36077	825	0	824	2.8823807	1102	0	0.3721335	875	52	79	1.737849	2004
0.7197712	824	0	824	1.4829168	2022	824	0.3721335	51	51	0	1.4829168	2022
0.3320762	150	0	150	1.9524488	1674	0	1.0943798	227	58	0	1.8737653	1843
0	819	0	819	2.9308573	1074	690	0.9900989	182	121	252	2.3130042	1387
0.357163	420	50	150	1.9664438	1830	150	0.9900989	121	121	0	1.9664438	1830
0	708	0	109	1.9131423	1680	0	1.0102449	161	129	23	1.8711279	1735
0	696	240	696	2.1140301	1790	696	3.177758	49	115	0	2.0733073	1724
0.2993838	422	223	150	1.7169175	2109	150	3.177758	115	115	0	1.7169175	2109
0	720	0	127	2.0727691	1852	0	1.0093888	176	120	35	2.0047834	1943
0	815	51	129	1.7980553	2116	0	1.1992445	181	181	0	1.7980553	2110
0.3195122	433	224	153	1.7465454	2097	153	1.1992445	154	154	0	1.7465454	2097

VS3	VH3	A4	V4	A𝔇	V𝔇	A5	V5	VS4	VH4	VC	A𝔅	V𝔅
390.45	350	0	5	1.4195697	1771.45	0	7.04	0	5	169.14	1.2908268	1942.63
498.4	290	1.4195697	5	1.4242215	2148.4	1.2908268	7.29	0	5	229.12	1.2866937	2379.81
357.85	310	1.4242215	5	1.4347363	2056.85	1.2866937	7.3	0	5	200.64	1.3068721	2259.79
679.67	350	1.4347363	5	1.0551374	2356.67	1.3068721	7.33	0	5	210.8	0.9693028	2569.8
646.41	150	1.0551374	5	1.3553771	2344.41	0.9693028	7.44	300	5	256.66	1.0945356	2903.51
754.91	230	1.3553774	5	1.3996081	1916.91	1.0945356	7.6	500	5	256.66	1.0030167	2676.17
870.86	150	1.3996081	5	1.2953071	2555.86	1.0030167	7.44	0	5	212.72	1.1950869	2771.02
435.68	410	1.2953071	5	1.4077981	1765.68	1.1950869	6.87	20	5	155.48	1.2799042	1943.03
455.05	300	1.4077981	5	1.5707803	1884.05	1.2799042	7.21	370	5	0	1.3122614	2256.26
248.38	380	1.5707803	5	1.5014298	1982.38	1.3122614	7.52	0	5	129	1.4091326	2113.9
286.79	362	1.5014298	5	1.6964367	1872.79	1.4091326	7.15	200	5	99.35	1.4619314	2174.29
337.68	250	1.6964367	5	1.5229247	2208.68	1.4619314	7.18	113	5	175.06	1.3471962	2498.92
396.29	300	1.5229247	5	1.4311836	2198.29	1.3471962	7.04	0	5	156.61	1.3358359	2356.94

Table 9. Results of Heel Correction on Uranium in 86-2 Campaign

Batch No.	A	V	A1	V1	A(1)	V(1)	VH11	A(2)	V(2)	A3	V3	VS1
MI1-070	440.5906	745	0	150	366.7486	895	150	366.7486	150	94	0	100
MI1-071	426.701	766.9	0	0	426.701	766.9	150	426.701	150	63.1	173.8914	270
MI1-072	576.17926	569	0	150	455.97496	719	150	455.97496	150	0	186.75701	250
MI1-073	438.72959	747	23.898368	0	438.72959	747	154	438.72959	154	95	198.9303	280
MI1-074	433.66578	754	0	0	433.66578	754	150	433.66578	150	145	182.05465	312
MI1-075	542.79436	603	30.165941	150	440.67715	753	150	440.67715	150	98	183.38668	300
MI1-076	429.58322	763	0	0	429.58322	763	150	429.58322	150	107	209.58978	250
MI1-077	575.39076	563	34.552676	150	461.60996	713	150	461.60996	150	101	199.23725	280
MI1-078	427.63852	758	0	0	427.63852	758	150	427.63852	150	56	202.26662	350
MI1-079	452.68245	718	0	0	452.68245	718	150	452.68245	150	132	194.63797	300
MI1-080	565.23826	575	35.065849	150	455.54742	725	157	455.54742	157	122	192.57149	290
MI1-081	427.83267	759	0	0	427.83267	759	150	427.83267	150	125	194.69114	280
MI1-082	433.61282	749	0	0	433.61282	749	150	433.61282	150	112	184.61316	290
MI1-083	517.9808	625	32.749074	150	424.06498	775	150	424.06498	150	149.8	186.19244	235
MI1-084	437.99306	720	0	0	437.99306	720	150	437.99306	150	124	195.5421	286
MI1-085	409.14675	770	0	0	409.14675	770	150	409.14675	150	165	187.31855	190
MI1-087	410.93081	766	30.345266	0	410.93081	766	150	410.93081	150	112	69.023937	989
MI1-088	411.2058	758	0	0	411.2058	758	150	411.2058	150	168	195.44992	380
MI1-086	471.01943	669	30.345266	150	390.30988	819	155	390.30988	155	118	188.08921	253
MI1-089	419.22237	751	0	0	419.22237	751	150	419.22237	150	93	184.9673	320
MI1-090	545.48958	576	33.895872	150	439.7884	726	150	439.7884	150	54	191.1732	340
MI1-091	504.9808	625	35.619498	150	414.13668	775	150	414.13668	150	94	209.20274	270
MI1-092	436.10373	723	0	0	436.10373	723	150	436.10373	150	132	188.55043	275
FU1-090	617.52189	594	0	150	493.02151	744	150	493.02151	150	106	179.8221	305
FU1-091	479.54139	761	0	0	479.54139	761	150	479.54139	150	61	214.62032	400
FU1-092	617.80912	592	32.407198	150	499.46641	742	150	499.46641	150	114	217.90357	253
FU1-093	491.32524	741	0	0	491.32524	741	150	491.32524	150	89	218.48873	300
FU1-094	494.5664	738	0	0	494.5664	738	150	494.5664	150	87	213.37912	380
FU1-095	612.59334	594.6	32.829299	150	495.79962	744.6	158.4	495.79962	158.4	69.4	221.56471	370
FU1-096	493.60976	738	0	0	493.60976	738	150	493.60976	150	111	225.05826	201
FU1-097	595.14706	612	32.432271	150	484.37643	762	150	484.37643	150	165	211.7842	300
FU1-098	500.3594	729	0	0	500.3594	729	150	500.3594	150	163	212.59391	234
FU1-099	602.43118	603	31.19035	150	488.63819	753	150	488.63819	150	148	213.50592	330
FU1-100	481.20872	757	0	0	481.20872	757	150	481.20872	150	70	214.15452	320
FU1-101	468.3856	778	0	0	468.3856	778	150	468.3856	150	90	216.33094	380
FU1-102	587.438	621	33.018374	150	479.57426	771	150	479.57426	150	167	217.00998	280
FU1-103	478.00262	762	0	0	478.00262	762	150	478.00262	150	42	209.27254	315
FU1-104	580.1535	628	30.129058	150	474.10766	778	150	474.10766	150	156	217.58446	370
FU1-105	487.97456	747	30.129058	0	487.97456	747	150	487.97456	150	112	210.53676	280
FU1-106	483.1457	755	0	0	483.1457	755	150	483.1457	150	61	217.41883	277
FU1-107	624.53425	584	32.792668	150	503.60613	734	150	503.60613	150	146	202.79472	280
FU1-108	484.94274	751	0	0	484.94274	751	150	484.94274	150	71	211.68207	350
FU1-109	602.13884	605	30.313695	150	488.5312	755	150	488.5312	150	161	214.37556	250
FU1-110	481.28137	757	30.313695	0	481.28137	757	150	481.28137	150	194	213.62389	266
FU1-111	492.56834	739	0	0	492.56834	739	150	492.56834	150	134	210.34376	320
FU1-112	604.14262	603	30.577367	150	489.88659	753	150	489.88659	150	105	204.94859	330
FU1-113	501.12255	728.7	0	0	501.12255	728.7	150	501.12255	150	39.3	215.04215	322
FU1-114	598.98191	608	28.552755	150	486.10015	758	158	486.10015	158	225	217.76759	230
FU1-115	488.2953	745	0	0	488.2953	745	150	488.2953	150	-59	208.18504	320
FU1-116	492.75135	740	0	0	492.75135	740	150	492.75135	150	260	215.60328	300
FU1-117	607.14357	599	35.495246	167	482.51528	766	150	482.51528	150	103	203.99542	350
FU1-118	481.74637	757	0	0	481.74637	757	150	481.74637	150	84	221.6947	310
FU1-119	590.55519	616	34.35544	150	481.63879	766	150	481.63879	150	69	215.79246	280
FU1-120	464.04331	785	0	0	464.04331	785	150	464.04331	150	66	217.1836	300
FU1-121	502.14069	725	0	0	502.14069	725	150	502.14069	150	168	221.60183	217
FU1-122	593.17752	614	33.203034	150	483.23489	764	150	483.23489	150	119	208.74541	305

FU1-123	485.96128	749	0	0	485.96128	749	150	485.96128	150	51	215.99523	300
FU2-042	572.04823	622	31.6952	150	467.05736	772	150	467.05736	150	71	214.57582	400
FU2-043	464.70327	765	0	0	464.70327	765	150	464.70327	150	111	215.89503	280
FU2-044	574.1968	625	32.621812	150	469.37583	775	150	469.37583	150	65	207.39546	320
FU2-045	476.45638	745	0	0	476.45638	745	150	476.45638	150	96	219.05521	270
FU2-046	563.78571	630	30.057024	150	461.14558	780	150	461.14558	150	84	210.12051	310
FU2-047	464.81462	766	0	0	464.81462	766	150	464.81462	150	107	218.93034	311
FU2-048	476.2443	745	32.816766	0	476.2443	745	150	476.2443	150	111	206.7499	350
FU2-049	573.98871	620	0	150	462.17273	770	150	462.17273	150	184	202.63804	355
FU2-050	462.96997	766	0	0	462.96997	766	150	462.96997	150	96	212.24402	310
FU2-051	568.5072	625	36.292741	150	465.49795	775	150	465.49795	150	123	207.97665	320
FU2-052	463.16971	766	0	0	463.16971	766	150	463.16971	150	90	214.95775	308
FU2-053	567.016	625	35.675809	150	464.17596	775	150	464.17596	150	130	204.22747	234
FU2-054	478.07311	766	0	0	478.07311	766	150	478.07311	150	67	211.35372	310
FU2-055	475.62466	746	0	0	475.62466	746	150	475.62466	150	118	218.19085	300
FU2-056	573.20323	620	31.236045	150	467.62521	770	150	467.62521	150	80	206.28607	310
FU2-057	464.99738	763	0	0	464.99738	763	150	464.99738	150	90	219.23021	327
FU2-058	571.79871	621	32.346185	150	466.84686	771	150	466.84686	150	166	210.26581	247
HA1-087	460.02964	776	0	0	460.02964	776	150	460.02964	150	86	202.66998	310
HA1-088	610.67808	584	31.579796	162	484.92215	746	150	484.92215	150	175	202.37211	310
HA1-089	459.47815	778	0	0	459.47815	778	150	459.47815	150	95	201.01996	340
HA1-090	575.35806	620	29.390963	150	469.00083	770	150	469.00083	150	84	204.17114	330
HA1-091	463.66971	766	0	0	463.66971	766	150	463.66971	150	38	215.62302	280
HA1-092	471.8254	756	0	0	471.8254	756	150	471.8254	150	136.2	201.69439	305
HA1-093	583.18062	609	37.712215	166	466.34481	775	150	466.34481	150	128	204.85637	310
HA1-094	467.18265	761	0	0	467.18265	761	150	467.18265	150	11	211.81923	280
HA1-095	561.60032	633	38.018189	160	455.95954	793	150	455.95954	150	156	204.55301	300
HA1-096	465.81127	763	0	0	465.81127	763	150	465.81127	150	265	211.88187	300
HA1-097	490.71448	725	33.363808	150	412.31151	875	160	412.31151	160	46	204.51773	320
HA1-098	472.76892	753	33.363808	0	472.76892	753	150	472.76892	150	0	199.96034	440
HA1-099	473.49139	755	0	0	473.49139	755	150	473.49139	150	113	208.73233	300
HA1-100	574.04194	620	29.528941	150	467.96798	770	150	467.96798	150	75	203.62401	360
HA1-101	459.03866	776	0	0	459.03866	776	150	459.03866	150	70	221.32325	330
HA1-102	580.04065	615	36.744598	160	467.8763	775	160	467.8763	160	138	224.10769	310
HA1-103	456.29757	783	0	0	456.29757	783	150	456.29757	150	64	218.69506	350
FU1-124	493.35792	732	0	0	493.35792	732	150	493.35792	150	196	206.50104	280
FU1-125	578.58748	623	38.93899	150	473.86914	773	154	473.86914	154	111	194.15888	300
FU1-126	482.32842	746	0	0	482.32842	746	150	482.32842	150	87	210.67376	262
FU1-127	499.21111	720	0	0	499.21111	720	150	499.21111	150	107	212.81797	300
FU1-128	577.55217	623	31.17144	150	471.52745	773	150	471.52745	150	136	211.37873	300
FU1-129	473.52569	759	0	0	473.52569	759	150	473.52569	150	97	213.06946	300

A(3)	V(3)	A2	V2	VH12	A(4)	V(4)	VH21	VS21	A(5)	V(5)	VR	A(6)
290.97732	939	150	0.0001	157	0.0001	157	157	0	290.97732	939	599	73.44765
326.50792	950	100	0.0001	157	103.06795	207	62	52	283.45892	1147	0	426.701
373.7961	819	150	157.24459	114	157.24459	114	114	0	373.7961	819	566	95.525481
326.30902	968	105	157.24459	114	241.86278	163	45	73	297.15871	1159	0	438.72959
300.41016	1061	77	189.83477	107	288.72179	180	59	29	292.04832	1211	0	433.66578
320.4239	1001	150	176.31766	109	176.31766	109	109	0	320.4239	1001	530	97.208194
325.49687	970	76	176.31766	109	278.73106	183	183	43	311.68012	1013	0	429.58322
334.39919	944	150	151.18988	110	151.18988	110	110	0	334.39919	944	562	97.249289
326.23031	1014	94	151.18988	110	244.44966	166	51	83	296.12974	1212	0	427.63852
315.51502	1000	76	178.52527	125	280.47316	199	52	56	296.54578	1203	0	452.68245
321.017	980	157	176.21752	109	176.21752	109	109	0	321.017	980	624	91.576113
310.71362	1014	76	176.21752	109	277.96354	183	69.5	81.5	286.69353	1209	0	427.83267
312.95894	1001	93	175.41032	140	250.11866	197	59	104	279.79748	1243	0	433.61282
305.79901	1009.8	150	182.39402	110	182.39402	110	110	0	305.79901	1009.8	555	90.226592
311.81743	980	111	182.39402	110	249.29578	149	49	161	266.32608	1241	0	437.99306
296.67847	975	61	196.23459	125	284.78217	214	52	55	281.37267	1192	0	409.14675
187.18582	1717	93	154.77263	106	244.34942	163	78	0	189.88222	1802	0	410.93081
280.52257	1156	84	341.03625	121	365.80197	187	64	36	280.81957	1315	0	411.2058
296.37906	1035	155	208.59428	120	208.59428	120	120	0	296.37906	1035	1	102.36553
306.84633	1014	87	208.59428	120	281.10559	183	73	20	299.00681	1144	0	419.22237
328.16186	970	150	183.84856	125	183.84856	125	155	0	332.76761	940	548	94.510401
318.82726	989	68	183.84856	125	275.07381	207	30	79	292.37609	1245	0	414.13668
307.89674	980	121	146.82866	134	198.29478	163	59	39	287.05384	1123	0	436.10373
345.97066	1005	150	187.83408	114	187.83408	114	114	0	345.97066	1005	665	90.740155
353.40291	1072	76	187.83408	114	302.65504	188	56	42	336.11427	1246	0	479.54139
365.81201	959	150	189.33982	127	189.33982	127	127	0	365.81201	959	604	99.363345
363.18351	980	101	189.33982	127	273.4153	176	52	78	329.79977	1182	0	491.32524
352.50153	1055	88	210.69784	121	306.87189	183	66	100	320.59208	1272	0	494.5664
363.3158	1025.6	150	209.78746	121	228.35394	129.4	121	0	362.21939	1034	592.9	100.10761
372.75472	900	91	228.35394	121	315.2989	180	63	67	343.51404	1084	0	493.60976
334.23736	1077	150	213.09973	130	213.09973	130	130	0	334.23736	1077	581	99.393249
347.80232	976	76	213.09973	130	317.30177	204	59	7	341.72325	1128	0	500.3594
337.74818	1081	150	199.11621	137	199.11621	137	137	0	337.74818	1081	619	95.31304
361.70826	997	102	199.11621	114	282.69917	162	54	47	339.54397	1152	0	481.20872
342.76131	1098	116	205.55715	123	262.47541	157	70	63	319.8616	1248	0	468.3856
335.74757	1068	150	212.67405	114	212.67405	114	114	0	335.74757	1068	612	94.404382
369.92617	969	81	212.67405	114	312.71597	183	64	43	349.84231	1131	0	478.00262
327.76938	1154	150	199.09164	121	199.09164	121	121	0	327.76938	1154	591	95.97321
354.16694	989	85	199.09164	121	300.04535	186	45	69.4	327.31157	1199.4	0	487.97456
373.83687	943	105	196.35671	125	272.27144	170	56	153	316.99761	1210	0	483.1457
347.41436	1010	150	212.1463	107	212.1463	107	107	0	347.41436	1010	632	96.599642
357.67056	1022	124	212.1463	107	265.47493	133	59	50	336.11209	1146	0	484.94274
343.65676	1016	150	227.61538	135	227.61538	135	135	0	343.65676	1016	610	96.420631
327.04944	1067	84	227.61538	132	312.17071	198	66	0	325.41141	1199	0	481.28137
342.69679	1043	130	203.43634	122	244.15916	142	70	44	323.56533	1159	0	492.56834
349.74436	1038	150	231.78579	110	231.78579	110	110	0	349.74436	1038	619	95.556553
382.17361	940	75	231.78579	110	340.97637	185	66	68	354.76431	1127	0	501.12255
323.93046	1055	158	206.49014	118	206.49014	118	118	0	323.93046	1055	591	102.54182
366.68883	974	78	206.49014	118	313.27947	190	53	85	334.5102	1196	0	488.2953
309.0472	1150	89	194.62934	133	288.36874	194	51	40	297.55515	1333	0	492.75135
344.83425	1069	150	201.93681	114	201.93681	114	114	0	344.83425	1069	642	91.38547
360.78462	1001	74	201.93681	114	313.86064	190	49	49	340.38602	1191	0	481.74637
370.06361	965	150	186.91723	159	186.91723	159	159	0	370.06361	965	668	88.320071
359.46312	1001	129	186.91723	159	219.2486	180	52	0	343.56634	1129	0	464.04331
350.8526	960	78	215.29461	122	321.75295	194	52	52	331.46223	1154	0	502.14069
347.1807	1038	150	199.63617	112	199.63617	112	112	0	347.1807	1038	599	96.776012

371.62071	950	75	199.63617	112	314.47244	187	55	60	347.98602	1142	0	485.96128
344.31839	1093	150	191.93957	133	191.93957	133	133	0	344.31839	1093	617	91.341074
344.17805	1006	86	191.93957	133	280.55316	197	57	56	320.73258	1202	0	464.70327
356.1648	1010	150	190.97615	134	190.97615	134	134	0	356.1648	1010	604	93.377155
356.54157	961	84	190.97615	134	285.18462	200	64	86	322.4189	1183	0	476.45638
347.32331	1024	150	195.55085	129	195.55085	129	129	0	347.32331	1024	587	93.855952
342.75933	1034	86	195.55085	129	284.84039	193	52	50	322.10256	1225	0	464.81462
336.86347	1056	128	190.22832	125	233.03344	147	56	33	319.43548	1180	0	476.2443
309.30422	1159	150	221.58426	112	221.58426	112	112	0	309.30422	1159	554	98.474303
343.42969	1022	79	221.58426	112	315.23664	183	70	26	332.99473	1161	0	462.96997
334.72729	1068	150	196.12439	129	196.12439	129	129	0	334.72729	1068	549	99.892264
346.6662	1014	85	196.12439	129	285.59834	194	59	76	318.42882	1225	0	463.16971
341.65744	989	150	191.22356	129	191.22356	129	129	0	341.65744	989	598	93.083415
362.55054	993	85	191.22356	129	287.33295	194	45	97	325.12131	1239	0	478.07311
344.11198	1014	103	191.30785	133	265.54613	180	52	65	317.24893	1207	0	475.62466
350.37258	1010	150	205.89422	134	205.89422	134	134	0	350.37258	1010	610	92.294449
346.34143	1030	97	205.89422	134	279.32988	187	59	0	338.93428	1158	0	464.99738
330.60692	1034	150	194.72108	121	194.72108	121	121	0	330.60692	1034	643	88.306467
343.25465	1022	130	194.72108	125	231.31536	145	45	65	315.02762	1187	0	460.02964
325.39219	1081	150	216.04014	121	216.04014	121	121	0	325.39219	1081	617	94.834841
335.747	1063	74	216.04014	121	309.95531	197	52	78	312.47479	1286	0	459.47815
346.38007	1034	158	181.59079	140	164.172	132	140	0	347.8008	1026	653	91.371309
370.44431	934	86	156.53349	140	252.88995	204	56	103	323.56346	1185	0	463.66971
331.78283	1047.2	102.5	185.0597	128.9	262.27836	176.4	55	36.4	314.75815	1205	0	471.8254
333.93319	1063	170	204.18671	121	152.27421	101	121	0	337.41658	1043	597	103.36195
382.21506	902	74	158.2354	121	277.42317	197	39	148	321.68116	1208	0	467.18265
322.60954	1099	160	172.58943	128.9	148.75679	118.9	128.9	0	324.20598	1089	601	95.865343
296.35558	1178	91.9	148.75679	128.9	247.26409	187	63	0	291.6802	1302	0	465.81127
333.25477	1081	160	187.79573	140	187.79573	140	140	0	333.25477	1081	620	84.57672
357.68189	1043	86	101.93858	140	218.27751	204	56	52	326.1201	1243	0	472.76892
342.90962	1018	105	175.10486	131	251.39687	176	52	53	318.20519	1195	0	473.49139
344.49743	1055	159	204.52519	118	182.77303	109	118	0	345.88894	1046	614	96.25732
351.26206	1026	78	101.0407	118	236.70308	190	52	37	327.27719	1201	0	459.03866
336.04639	1063	160	171.8342	140	171.8342	140	140	0	336.04639	1063	609	97.347475
348.97768	1047	86	171.8342	140	261.07761	204	63	68	320.21622	1256	0	456.29757
326.04405	1058	92	186.25244	70	325.40961	128	50	119	295.08888	1255	0	493.35792
341.33268	1030	154	211.16236	122	211.16236	122	122	0	341.33268	1030	628	93.319499
362.60769	945	75	211.16236	122	314.39817	197	59	32	346.23427	1115	0	482.32842
356.59747	977	112	192.69058	121	265.94706	159	63	39	336.26497	1112	0	499.21111
337.27594	1059	150	223.58864	118	223.58864	118	118	0	337.27594	1059	527	104.47432
350.1968	1006	86	191.23661	118	290.5031	182	49	68	323.88972	1207	0	473.52569

V(6)	VH13	VS12	A(7)	V(7)	VH14	A(8)	V(8)	VH22	VS22	A(9)	V(9)	VD
749	150	18	203.87073	1556	150	0.0001	157	157	0	203.87073	1556	311
100	100	0	283.45892	1147	0	302.84144	162	162	0	283.45892	1147	652
716	150	150	234.66217	1535	150	157.24459	114	114	0	234.66217	1535	325
105	105	0	297.15871	1159	0	379.66955	150	150	0	297.15871	1159	725
77	77	0	292.04832	1211	0	370.78567	136	136	0	292.04832	1211	727
680	150	18	240.3258	1549	150	176.31766	109	109	0	240.3258	1549	272
76	76	0	311.68012	1013	0	322.99656	259	132	0	312.94081	1140	700
712	150	11	244.11795	1517	150	151.18988	110	110	0	244.11795	1517	266
94	94	0	296.12974	1212	0	363.20658	145	145	0	296.12974	1212	749
76	76	0	296.54578	1203	0	382.72243	128	128	0	296.54578	1203	663
781	162	25	228.62209	1624	162	176.21752	109	109	0	228.62209	1624	291
76	76	0	286.69353	1209	0	356.2457	145.5	145.5	0	286.69353	1209	736
93	93	0	279.79748	1243	0	362.38811	152	152	0	279.79748	1243	740
705	150	11.9	227.60931	1576.7	150	182.39402	110	110	0	227.60931	1576.7	296
111	111	0	266.32608	1241	0	380.20452	160	160	0	266.32608	1241	583
61	61	0	281.37267	1192	0	351.91703	113	113	0	281.37267	1192	649
93	93	0	189.88222	1802	0	334.94632	171	56	29	195.62517	1946	1
84	84	0	280.81957	1315	0	391.57171	148	171	0	278.84798	1292	738
591	150	169	213.91825	1645	150	208.59428	120	120	0	213.91825	1645	303
87	87	0	299.00681	1144	0	356.20659	160	160	0	299.00681	1144	754
698	150	49	237.21096	1537	150	183.84856	155	155	0	237.21096	1537	248
68	68	0	292.37609	1245	0	371.56641	98	98	0	292.37609	1245	750
121	111	0	288.36937	1133	0	353.57004	170	170	0	288.36937	1133	733
815	150	2	244.04469	1672	150	187.83408	114	114	0	244.04469	1672	270
76	76	0	336.11427	1246	0	404.4987	132	132	0	336.11427	1246	754
754	150	7	261.67464	1570	150	189.33982	127	127	0	261.67464	1570	304
101	101	0	329.79977	1182	0	417.26435	153	153	0	329.79977	1182	693
88	88	0	320.59208	1272	0	414.12589	154	154	0	320.59208	1272	704
742.9	150	18.1	263.7621	1645	150	228.35394	121	121	0	263.7621	1645	313
91	91	0	343.51404	1084	0	420.66441	154	154	0	343.51404	1084	726
731	150	0	251.94277	1658	150	213.09973	130	130	0	251.94277	1658	328
76	76	0	341.72325	1128	0	420.35644	135	135	0	341.72325	1128	782.2
769	150	41	243.59825	1741	150	199.11621	137	137	0	243.59825	1741	283
102	102	0	339.54397	1152	0	412.49388	156	149	0	339.98456	1159	730
116	116	0	319.8616	1248	0	390.89252	186	179	0	320.25779	1255	718
762	150	12	246.07204	1692	150	212.67405	114	114	0	246.07204	1692	320
81	81	0	349.84231	1131	0	405.04851	145	145	0	349.84231	1131	746
741	150	5	248.55202	1750	150	199.09164	121	121	0	248.55202	1750	289
85	85	0	327.31157	1199.4	0	422.92214	130	130	0	327.42077	1199	708
105	105	0	316.99761	1210	0	409.79813	161	161	0	316.99761	1210	738
782	150	16	248.45566	1658	150	212.1463	107	107	0	248.45566	1658	328
124	124	0	336.11209	1146	0	414.18536	183	183	0	336.11209	1146	755
760	150	5	250.13602	1631	150	227.61538	135	135	0	250.13602	1631	323
84	84	0	325.41141	1199	0	406.87268	150	150	0	325.41141	1199	561
130	130	0	323.56533	1159	0	405.62513	200	200	0	323.56533	1159	754
769	150	1	254.63459	1658	150	231.78579	110	110	0	254.63459	1658	352
75	75	0	354.76431	1127	0	426.16051	141	141	0	354.76431	1127	750
749	162	10	243.30429	1652	162	206.49014	118	118	0	243.30429	1652	306
78	78	0	334.5102	1196	0	417.48737	131	131	0	334.5102	1196	745
89	89	0	297.55515	1333	0	418.29768	140	140	0	297.55515	1333	658
792	150	0	249.73541	1711	150	201.93681	114	114	0	249.73541	1711	249
74	74	0	340.38602	1191	0	414.86506	123	123	0	340.38602	1191	757
818	150	0	254.81273	1633	150	186.91723	159	159	0	254.81273	1633	249
129	129	0	343.56634	1129	0	393.71555	181	181	0	343.56634	1129	666
78	78	0	331.46223	1154	0	429.98559	130	130	0	331.46223	1154	750
749	150	28	251.2567	1665	150	199.63617	112	112	0	251.2567	1665	308

75	75	0	347.98602	1142	0	413.40831	130	130	0	347.98602	1142	792
767	150	2	252.74383	1712	150	191.93957	133	133	0	252.74383	1712	270
86	86	0	320.73258	1202	0	391.30078	143	143	0	320.73258	1202	750
754	150	11	256.07769	1625	150	190.97615	134	134	0	256.07769	1625	316
84	84	0	322.4189	1183	0	393.74427	148	148	0	322.4189	1183	715
737	150	14	252.77078	1625	150	195.55085	129	129	0	252.77078	1625	279
86	86	0	322.10256	1225	0	396.99824	138	138	0	322.10256	1225	771
128	128	0	319.43548	1180	0	402.2236	184	184	0	319.43548	1180	741
704	150	0	241.11988	1713	150	221.58426	112	112	0	241.11988	1713	257
79	79	0	332.99473	1161	0	393.56505	149	149	0	332.99473	1161	757
699	150	0	254.99666	1617	150	196.12439	129	129	0	254.99666	1617	270
85	85	0	318.42882	1225	0	390.41477	144	144	0	318.42882	1225	761
748	150	8	246.74802	1595	150	191.22356	129	129	0	246.74802	1595	297
85	85	0	325.12131	1239	0	412.04767	130	130	0	325.12131	1239	737
103	103	0	317.24893	1207	0	405.1467	155	155	0	317.24893	1207	714
760	150	0	253.19501	1620	150	205.89422	134	134	0	253.19501	1620	278
97	97	0	338.93428	1158	0	394.77698	156	146	0	339.41239	1168	768
793	162	44	232.6325	1709	162	194.72108	121	121	0	232.6325	1709	291
130	130	0	315.02762	1187	0	401.2174	175	175	0	315.02762	1187	749
767	150	51	234.5695	1749	150	216.04014	121	121	0	234.5695	1749	334
74	74	0	312.47479	1286	0	397.77031	126	126	0	312.47479	1286	757
811	175	32	244.95618	1694	175	164.172	140	140	0	244.95618	1694	249
86	86	0	323.56346	1185	0	380.5453	142	142	0	323.56346	1185	760
102.5	102.5	0	314.75815	1205	0	398.65024	157.5	157.5	0	314.75815	1205	686
767	160	35	246.0927	1685	160	152.27421	121	121	0	246.0927	1685	275
74	74	0	321.68116	1208	0	401.69044	113	113	0	321.68116	1208	770
761	150	6	241.28607	1706	150	148.75679	128.9	128.9	0	241.28607	1706	281
91.9	91.9	0	291.6802	1302	0	376.92507	154.9	154.9	0	291.6802	1302	617
780	162	35	237.89897	1734	162	187.79573	140	140	0	237.89897	1734	302
86	86	0	326.1201	1243	0	372.40611	142	142	0	326.1201	1243	728
105	105	0	318.20519	1195	0	399.93142	157	157	0	318.20519	1195	735
773	163	9	252.56264	1665	163	182.77303	118	118	0	252.56264	1665	274
78	78	0	327.27719	1201	0	370.10443	130	130	0	327.27719	1201	614
769	160	0	249.10402	1672	160	171.8342	140	140	0	249.10402	1672	240
86	86	0	320.21622	1256	0	373.7549	149	149	0	320.21622	1256	774
92	92	0	295.08888	1255	0	434.22119	142	142	0	295.08888	1255	692
782	160	6	247.05512	1658	160	211.16236	122	122	0	247.05512	1658	319
75	75	0	346.23427	1115	0	408.38898	134	134	0	346.23427	1115	763
112	112	0	336.26497	1112	0	415.23605	175	175	0	336.26497	1112	694
677	150	106	243.63664	1692	106	191.23661	162	118	0	242.30853	1736	300
86	86	0	323.88972	1207	0	407.09527	135	135	0	323.88972	1207	758

A(10)	V(10)	VS13	VH15	A(11)	V(11)	VH16	A(12)	V(12)	VH23	VS23	A(13)	V(13)
23.898368	461	150	0	173.8914	1867	150	0.0001	157	157	0	173.8914	1867
0	652	150	9	196.09613	1658	0	157.24459	312	186	63	186.75701	1847
30.165941	475	150	0	198.9303	1860	150	157.24459	114	114	0	198.9303	1860
0	725	150	10	197.48104	1744	0	189.83477	300	248	150	182.05465	1946
0	727	150	81	189.22981	1869	0	176.31766	286	142	54	183.38668	2067
34.552676	422	150	0	209.58978	1821	150	176.31766	109	109	0	209.58978	1821
0	700	150	18	208.8715	1708	0	151.18988	282	151	51	199.23725	1890
35.065849	416	150	94	202.26662	1877	150	151.18988	110	110	0	202.26662	1877
0	749	150	6	197.52848	1817	0	178.52527	295	114	12	194.63797	2010
0	663	150	48	202.23616	1764	0	176.21752	278	154	78	192.57149	1966
32.749074	453	150	15	196.29518	1942	150	176.21752	109	109	16	194.69114	1958
0	736	150	36	189.30228	1831	0	175.41032	295.5	175	40.5	184.61316	1992
0	740	150	32	186.48165	1865	0	182.39402	302	160	0	186.19244	2007
30.345266	446	150	8.5	195.5421	1881.2	150	182.39402	110	110	0	195.5421	1881.2
0	583	150	85	187.89691	1759	0	196.23459	310	193	11	187.31855	1887
0	619	535	297	213.22074	1573	535	351.91703	113	113	0	213.22074	1573
0	1	0	0	195.52469	1947	1	341.03625	55	56	0	195.44992	1946
0	738	150	14	190.21731	1894	0	208.59428	321	169	38	188.08921	2084
33.895872	453	150	10	184.9673	1958	150	208.59428	120	120	0	184.9673	1958
0	754	150	3	195.3534	1751	0	183.84856	310	172	33	191.1732	1922
35.619498	398	150	0	209.20274	1785	150	183.84856	155	155	0	209.20274	1785
0	750	150	35	193.6214	1880	0	146.82866	248	137	26	188.55043	2017
0	733	150	30	187.12629	1746	0	187.83408	320	206	76	179.8221	1936
32.407198	420	150	0	214.62032	1942	150	187.83408	114	114	0	214.62032	1942
0	754	150	27	223.12114	1877	0	189.33982	282	168	30	217.90357	2021
32.829299	454	150	52	218.48873	1926	150	189.33982	127	127	0	218.48873	1926
0	693	150	3	225.59221	1728	0	210.69784	303	231	98	213.37912	1898
0	704	150	0	223.32592	1826	0	209.78746	304	125	5	221.56471	2010
32.432271	463	150	15	225.05826	1973	150	228.35394	121	121	0	225.05826	1973
0	726	150	33	219.94638	1693	0	213.09973	304	183	66	211.7842	1880
31.19035	478	150	27	212.59391	2013	150	213.09973	130	130	0	212.59391	2013
0	782.2	150	32.8	214.98261	1793	0	199.11621	285	101	0	213.50592	1977
33.018374	433	150	0	214.15452	2024	150	199.11621	137	137	0	214.15452	2024
0	730	150	16	224.52542	1755	0	205.55715	299	189	61	216.33094	1926
0	718	150	0	220.47368	1823	0	212.67405	329	174	26	217.00998	2004
30.129058	470	150	23.6	209.27254	2035.6	150	212.67405	114	114	0	209.27254	2035.6
0	746	150	56	221.91344	1783	0	199.09164	295	160	24	217.58446	1942
32.792668	439	150	72	210.53676	2111	150	199.09164	121	121	0	210.53676	2111
0	708	150	0	223.43626	1757	0	196.35671	280	129	34	217.41883	1942
0	738	150	50	207.55796	1848	0	212.1463	311	168	50	202.79472	2041
30.313695	478	150	7	211.68207	1993	150	212.1463	107	107	0	211.68207	1993
0	755	150	19	217.61834	1770	0	227.61538	333	216	34	214.37556	1921
30.577367	473	150	2	213.62389	1956	150	227.61538	135	135	0	213.62389	1956
0	711	150	10	220.43406	1770	0	203.43634	300	181	81	210.34376	1970
0	754	150	35	208.57187	1798	0	231.78579	350	188	53	204.94859	2013
28.552755	502	150	0	215.04215	2010	150	231.78579	110	110	0	215.04215	2010
0	750	150	46	225.50444	1773	0	206.49014	291	156	56	217.76759	1964
35.495246	468	167	29	208.18504	1982	167	206.49014	118	118	0	208.18504	1982
0	745	150	0	223.38035	1791	0	194.62934	281	172	54	215.60328	1954
0	658	150	65	208.10126	1906	0	201.93681	290	155	37	203.99542	2078
34.35544	399	150	6	221.6947	1966	150	201.93681	114	114	0	221.6947	1966
0	757	150	6	224.7227	1804	0	186.91723	273	156	59	215.79246	1980
33.203034	399	150	72	217.1836	1954	150	186.91723	159	159	0	217.1836	1954
0	666	150	0	235.7972	1645	0	215.29461	331	107	99	221.60183	1968
0	750	150	24	215.13353	1778	0	199.63617	280	156	49	208.74541	1951
31.6952	458	150	9	215.99623	1982	150	199.63617	112	112	0	215.99623	1982

0	792	150	0	222.75787	1784	0	191.93957	280	166	56	214.57582	1954
32.621812	420	150	63	215.89503	2045	150	191.93957	133	133	0	215.89503	2045
0	750	150	11	212.64234	1813	0	190.97615	293	181	37	207.39546	1962
30.057024	466	150	2	219.05521	1943	150	190.97615	134	134	0	219.05521	1943
0	715	150	0	218.20455	1748	0	195.55085	298	179	59	210.12051	1926
32.816766	429	150	14	218.93034	1918	150	195.55085	129	129	0	218.93034	1918
0	771	150	13	212.25155	1859	0	190.22832	288	157	39	206.7499	2029
0	741	150	38	208.36587	1809	0	221.58426	334	175	66	202.63804	2034
36.292741	407	150	20	212.24402	1990	150	221.58426	112	112	0	212.24402	1990
0	757	150	37	214.18664	1805	0	196.12439	299	178	47	207.97665	1973
35.675809	420	150	76	214.95775	1963	150	196.12439	129	129	0	214.95775	1963
0	761	150	34	208.59642	1870	0	191.22356	294	184	33	204.22747	2013
31.236045	447	150	14	211.35372	1906	150	191.22356	129	129	0	211.35372	1906
0	737	150	0	220.60531	1826	0	191.30785	280	116	0	218.19085	1990
0	714	150	27	212.96966	1798	0	205.89422	305	171	58	206.28607	1990
32.346185	428	150	14	219.23021	1912	150	205.89422	134	134	0	219.23021	1912
0	768	150	0	221.96734	1786	0	194.72108	296	196	92	210.26581	1978
31.579796	453	162	7	202.66998	2007	162	194.72108	121	121	0	202.66998	2007
0	749	150	20	207.05304	1806	0	216.04014	325	218	49	202.37211	1962
29.390963	484	150	3	201.37998	2086	150	216.04014	121	171	0	201.01996	2036
0	757	150	24	209.62054	1917	0	181.59079	276	166	39	204.17114	2066
37.712215	424	175	25	215.62302	1968	166	156.53349	149	149	0	215.62302	1968
0	760	150	46	208.26871	1841	0	185.0597	292	185.2	51.2	201.69439	1999
0	686	150	43	212.6029	1784	0	204.18671	307.5	166.5	67	204.85637	1992
38.018189	435	160	47	211.81923	2007	166	158.2354	115	115	0	211.81923	2007
0	770	150	1	212.46082	1829	0	172.58943	263	161.2	54.8	204.55301	1985.6
33.363808	431	150	0	211.88187	1987	150	148.75679	128.9	128.9	0	211.88187	1987
0	617	156	0	215.40988	1763	0	187.79573	310.9	189.9	84	204.51773	1968
29.528941	464	166	75	199.96034	2107	0	101.93858	306	306	0	199.96034	2107
0	728	160	54	217.35511	1865	0	175.10486	302	190	59	208.73233	2036
0	735	150	59	206.77281	1839	0	204.52519	307	180	29	203.62401	1995
36.744598	427	150	4	221.32325	1946	0	101.0407	268	268	0	221.32325	1946
0	614	150	0	236.07201	1665	0	171.8342	280	139	56	224.10769	1862
38.93899	400	150	27	218.69506	1949	150	171.8342	140	140	0	218.69506	1949
0	774	150	26	211.01342	1906	0	186.25244	299	170	29	206.50104	2064
0	692	150	38	201.81828	1835	0	211.16236	292	148	85	194.15888	2064
31.17144	479	150	6	210.67376	1993	150	211.16236	122	122	0	210.67376	1993
0	763	150	22	220.60069	1750	0	192.69058	284	136	50	212.81797	1948
0	694	150	51	219.05486	1707	0	223.58864	325	169	71	211.37873	1934
27.276548	406	150	15	213.06946	2007	150	191.23661	118	118	0	213.06946	2007
0	758	150	19	213.1597	1834	0	192.8346	285	181	38	207.99073	1976

VS3	VH3	A4	V4	A⊕	V⊕	A5	V5	VS4	VH4	VC	A⊕	V⊕
119.27	270	0	0	161.80704	1716.27	0	7.33	0	190	0	161.03366	1533.6
271.58	250	161.80704	190	159.81613	2058.58	161.03366	7.18	0	190	158.99	147.33281	2034.75
254	280	159.81613	190	170.29394	2024	147.33281	7.8	0	190	89.17	162.33721	1930.97
252.43	312	170.29394	190	158.84626	2076.43	162.33721	7.77	0	190	70.47	153.16247	1964.67
345.87	300	158.84626	190	153.81895	2302.87	153.16247	7.58	0	190	0	153.8166	2120.45
237.05	250	153.81895	190	179.42051	1998.05	153.8166	7.61	0	190	0	179.31319	1815.66
139.54	280	179.42051	190	182.96187	1939.54	179.31319	7.41	0	0	32	179.98968	1978.95
787.16	350	182.96187	0	133.46576	2314.16	179.98968	7.65	0	190	0	133.63272	2131.81
389.32	300	133.46576	190	156.46106	2289.32	133.63272	19.83	0	190	0	156.24744	2119.15
297.51	290	156.46106	190	162.91925	2163.51	156.24744	7.55	0	190	0	162.89382	1981.06
317.67	280	162.91925	190	163.63238	2185.67	162.89382	7.52	0	190	0	163.62961	2003.19
292.31	290	163.63238	190	158.08276	2184.31	163.62961	7.73	0	190	52.46	154.06711	2054.5
306.97	235	158.08276	190	158.64852	2268.97	154.06711	7.79	0	190	0	158.63141	2086.76
434.52	286	158.64852	190	154.10591	2219.72	158.63141	7.81	0	190	0	154.12326	2037.53
151.02	190	154.10591	190	170.34166	2038.02	154.12326	7.55	0	0	231.31	152.98274	2276.88
366.08	225	170.34166	0	167.6827	1714.08	152.98274	7.59	0	190	80.71	159.2199	1612.38
284	380	167.72245	190	165.65776	2040	167.72245	7.45	0	190	38.75	162.28056	1896.2
233.79	253	165.65776	190	166.69682	2254.79	162.28056	7.6	0	190	0	166.68062	2072.39
261.15	320	166.69682	190	160.18421	2089.15	166.68062	7.73	0	190	0	160.21054	1906.88
91.32	340	160.18421	190	178.64404	1863.32	160.21054	7.48	0	0	0	178.57033	1870.8
363.89	270	178.64404	0	168.68585	1878.89	178.57033	7.64	0	190	0	168.73036	1696.53
367.01	275	168.68585	190	156.80887	2299.01	168.73036	7.34	0	190	0	156.85021	2116.35
394.14	400	156.80887	190	144.33029	2120.14	156.85021	7.63	0	0	0	144.37519	2127.77
385.35	400	144.33029	0	171.70962	1927.35	144.37519	7.46	0	190	0	171.59275	1744.81
133.71	253	171.70962	190	199.77834	2091.71	171.59275	7.37	0	190	124.3	187.46378	2033.38
267.98	300	199.77834	190	188.6873	2083.98	187.46378	7.45	0	190	102.86	178.99933	2004.29
222.69	380	188.6873	190	186.33758	1930.69	178.99933	7.43	0	190	0	186.30639	1748.12
83.49	300	186.33758	190	208.86407	1983.49	186.30639	7.58	0	0	81.11	200.60613	2072.18
271.48	201	208.86407	0	195.15887	2043.48	200.60613	7.65	0	190	0	195.18126	1861.13
169.51	300	195.15887	190	191.64594	1939.51	195.18126	7.84	0	190	0	191.66171	1757.35
192.5	234	191.64594	190	191.81925	2161.5	191.66171	7.61	0	190	67.26	185.51395	2046.37
349.44	330	191.81925	190	177.49854	2186.44	185.51395	7.6	0	190	171.94	163.50109	2175.98
304.84	320	177.49854	190	181.29742	2198.84	163.50109	7.82	0	190	0	181.22842	2016.66
412.5	380	181.29742	190	171.69846	2148.5	181.22842	7.55	0	190	99.13	163.49166	2065.18
294.75	280	171.69846	190	184.15299	2208.75	163.49166	7.59	0	190	0	184.0756	2026.34
304.91	315	184.15299	190	178.31714	2215.51	184.0756	7.58	0	190	109.12	169.25439	2142.21
332.11	370	178.31714	190	179.51446	2094.11	169.25439	7.43	0	190	114.97	169.29245	2026.51
277.1	280	179.51446	190	182.58586	2298.1	169.29245	7.44	0	190	120.78	172.68047	2236.32
227.04	277	182.58586	190	190.53124	2082.04	172.68047	7.64	0	0	135.07	178.90232	2224.75
253.31	280	190.53124	0	177.29223	2014.31	178.90232	7.55	0	190	68.41	170.91608	1900.27
340.88	350	177.29223	190	175.48308	2173.88	170.91608	7.53	0	190	126.28	165.00261	2117.69
208.64	250	175.48308	190	189.19394	2069.64	165.00261	7.55	0	190	125.3	177.32375	2012.49
335.78	266	189.19394	190	179.15643	2215.78	177.32375	7.65	0	190	0	179.14953	2033.43
340.73	320	179.15643	190	174.76117	2180.73	179.14953	7.62	0	190	0	174.7779	1998.35
269.33	330	174.76117	190	176.50553	2142.33	174.7779	7.75	0	190	0	176.4987	1960.08
272.82	322	176.50553	190	184.36094	2150.82	176.4987	7.42	0	190	81.09	177.03749	2049.33
161.85	230	184.36094	190	197.82706	2085.85	177.03749	7.62	0	190	93.23	188.51078	1996.7
265	320	197.82706	190	181.19541	2117	188.51078	7.48	0	190	0	181.2237	1934.48
328.07	300	181.19541	190	180.0287	2172.07	181.2237	7.65	0	0	90.75	172.83704	2270.47
214.18	350	180.0287	0	181.49918	1942.18	172.83704	7.7	0	190	0	181.46128	1759.88
208.03	310	181.49918	190	195.52357	2054.03	181.46128	7.92	0	190	0	195.46407	1871.95
207.99	280	195.52357	190	192.56367	2097.99	195.46407	7.63	0	190	0	192.57522	1915.62
211.41	300	192.56367	190	192.56925	2055.41	192.57522	7.7	0	190	98.12	182.98394	1971.23
221.16	217	192.56925	190	196.38369	2162.16	182.98394	7.63	0	190	0	196.33205	1979.79
242.65	305	196.38369	190	183.24771	2078.65	196.33205	7.63	0	190	0	183.30035	1896.28
252.6	300	183.24771	190	187.38714	2124.6	183.30035	7.62	0	190	0	187.37111	1942.22

192.78	330	187.38714	190	191.38854	2006.78	187.37111	7.84	0	0	0	191.3729	2014.62
408.07	280	191.38854	0	175.35318	2173.07	191.3729	7.68	0	190	70.61	169.4063	2061.36
169.26	320	175.35318	190	186.81253	2001.26	169.4063	7.24	0	190	76.33	179.2206	1894.83
234.97	280	186.81253	190	191.4698	2087.97	179.2206	7.37	0	190	26	188.84546	1931.34
182.93	310	191.4698	190	189.01319	1988.93	188.84546	7.33	0	190	0	189.01251	1806.26
182	310.7	189.01319	190	195.92747	1979.3	189.01251	7.29	0	190	0	195.89941	1796.59
219.92	328	195.92747	190	184.23616	2110.92	195.89941	7.25	0	190	0	184.28002	1928.17
156.56	300	184.23616	190	185.70924	2080.56	184.28002	7.3	0	0	0	185.70425	2087.86
185.33	340	185.70924	0	190.8118	1835.33	185.70425	7.38	0	190	0	190.789	1652.71
250.22	320	190.8118	190	181.55743	2093.22	190.789	7.32	0	190	0	181.5928	1910.54
117.9	308	181.55743	190	198.81349	1962.9	181.5928	7.34	0	190	0	198.74249	1780.24
162.02	234	198.81349	190	188.21749	2131.02	198.74249	7.35	0	190	0	188.25719	1948.37
226.98	310	188.21749	190	185.33809	2012.98	188.25719	8.34	0	190	0	185.35138	1831.32
412.91	300	185.33809	190	176.17646	2292.91	185.35138	8.25	0	190	0	176.21231	2111.16
273.13	310	176.17646	190	177.32668	2143.13	176.21231	8.16	0	0	0	177.32245	2151.29
212.66	327	177.32668	0	193.29566	1797.66	177.32245	8.42	0	190	86.86	183.35747	1702.94
157.35	247	193.29566	190	192.79539	2078.35	183.35747	8.39	0	190	0	192.75364	1896.74
294.54	310	192.79539	190	174.44653	2181.54	192.75364	8.38	0	190	0	174.52324	1999.92
234.41	310	174.44653	190	176.97062	2076.41	174.52324	8.46	0	190	0	176.95969	1894.87
349.9	340	176.97062	190	167.51834	2235.9	176.95969	8.52	0	190	0	167.5575	2054.42
345.69	330	167.51834	190	170.03622	2271.69	167.5575	8.43	0	190	0	170.02622	2090.12
330.44	280	170.03622	190	179.43822	2208.44	170.02622	8.6	0	0	0	179.40171	2217.04
213.11	305	179.43822	0	179.15605	1907.11	179.40171	8.57	0	190	0	179.15727	1725.68
190.01	310	179.15605	190	183.61117	2062.01	179.15727	8.43	0	190	0	183.5912	1880.44
197.33	280	183.61117	190	189.51533	2114.33	183.5912	8.35	0	190	0	189.48973	1932.68
219.76	300	189.51533	190	181.73605	2095.36	189.48973	8.55	0	190	0	181.77069	1913.91
258.4	300	181.73605	190	183.56025	2135.4	181.77069	8.48	0	190	79.33	176.3908	2033.21
270.92	320	183.56025	190	176.35646	2108.92	176.3908	8.46	0	190	0	176.35661	1927.38
400.04	440	176.35646	190	162.53217	2257.04	176.35661	8.51	0	0	90.86	156.31508	2356.41
213.41	300	162.53217	0	185.88154	1949.41	156.31508	8.64	0	190	298.87	158.88007	2066.92
247.79	300	185.88154	190	178.38615	2132.79	158.88007	8.69	0	190	0	178.29929	1951.48
193.33	330	178.38615	190	195.84148	1999.33	178.29929	8.43	0	190	0	195.76013	1817.76
207.3	310	195.84148	190	197.51963	1949.3	195.76013	8.44	0	190	100	186.93635	1867.74
341.6	350	197.51963	190	191.6704	2020.25	186.93635	8.46	0	190	43.8	187.18957	1882.51
309.5	280	191.6704	190	177.2784	2283.5	187.18957	8.45	0	0	0	177.31494	2291.95
195.55	311.46	177.2784	0	174.66914	1948.09	177.31494	8.45	0	190	0	174.6818	1766.54
222.83	262	174.66914	190	185.58534	2143.83	174.6818	8.35	0	190	71.12	179.04922	2033.3
218.39	300	185.58534	190	187.70041	2056.39	179.04922	8.42	0	190	0	187.66155	1874.81
161.79	300	187.70041	190	191.89135	1985.79	187.66155	8.42	0	190	0	191.87161	1804.21
218.77	300	191.89135	190	189.1363	2115.77	191.87161	8.6	0	190	54.16	183.99678	1988.53
169.22	318	189.1363	190	188.76698	2017.22	183.99678	8.39	0	0	0	188.74723	2025.61

A(10)	V(10)	VS13	VH15	A(11)	V(11)	VH16	A(12)	V(12)	VH23	VS23	A(13)	V(13)
0.1999667	461	150	0	1.314039	1717	150	0.0001	157	157	0	1.314039	1717
0	652	150	9	1.4510251	1658	0	1.1593801	312	186	63	1.3816359	1847
0.2180918	475	150	0	1.4424383	1860	150	1.1593801	114	114	0	1.4424383	1860
0	725	150	10	1.4424102	1744	0	1.3889956	300	248	150	1.3298002	1946
0	727	150	81	1.3866752	1869	0	1.2926022	286	142	54	1.3438949	2067
0.2508138	422	150	0	1.5234817	1821	150	1.2926022	109	109	0	1.5234817	1821
0	700	150	18	1.4670372	1708	0	1.0663638	282	151	51	1.3996789	1890
0.2972633	416	150	94	1.6715145	1877	150	1.0663638	110	110	0	1.6715145	1877
0	749	150	6	1.6743065	1817	0	1.506899	295	114	12	1.6492356	2010
0	663	150	48	1.6070258	1764	0	1.3892074	278	154	78	1.5295296	1966
0.253164	453	150	15	1.5235471	1942	150	1.3892074	109	109	16	1.5110973	1958
0	736	150	36	1.4632763	1831	0	1.3577731	295.5	175	40.5	1.4271439	1992
0	740	150	32	1.5287527	1865	0	1.5028683	302	160	0	1.5269213	2007
0.2594016	446	150	8.5	1.6634759	1881.2	150	1.5028683	110	110	0	1.6634759	1881.2
0	583	150	85	1.4828681	1759	0	1.529886	310	193	11	1.4771392	1887
0	619	535	297	1.6428122	1573	535	2.7075988	113	113	0	1.6428122	1573
0	1	0	0	1.7710822	1947	1	2.8077111	55	56	0	1.7708495	1946
0	738	150	14	1.4351411	1894	0	1.5303696	321	169	38	1.4159181	2084
0.2560229	453	150	10	1.3964832	1958	150	1.5303696	120	120	0	1.3964832	1958
0	754	150	3	1.4710733	1751	0	1.3791925	310	172	33	1.4392185	1922
0.2727003	398	150	0	1.5974716	1785	150	1.3791925	155	155	0	1.5974716	1785
0	750	150	35	1.4301855	1880	0	1.0785188	248	137	26	1.3923968	2017
0	733	150	30	1.4244328	1746	0	1.4334408	320	206	76	1.3690454	1936
0.1757549	420	150	0	1.2258062	1942	150	1.4334408	114	114	0	1.2258062	1942
0	754	150	27	1.4109498	1877	0	1.2441557	282	168	30	1.380597	2021
0.1974328	454	150	52	1.3231876	1926	150	1.2441557	127	127	0	1.3231876	1926
0	693	150	3	1.4306235	1728	0	1.350583	303	231	98	1.3537194	1898
0	704	150	0	1.3764541	1826	0	1.289667	304	125	5	1.3653013	2010
0.2080987	463	150	15	1.4332741	1973	150	1.4124592	121	121	0	1.4332741	1973
0	726	150	33	1.3656873	1693	0	1.3184442	304	183	66	1.3147023	1880
0.1972215	478	150	27	1.3406221	2013	150	1.3184442	130	130	0	1.3406221	2013
0	782.2	150	32.8	1.33781	1793	0	1.2362105	285	101	0	1.3283541	1977
0.2191802	433	150	0	1.4070865	2024	150	1.2362105	137	137	0	1.4070865	2024
0	730	150	16	1.4494364	1755	0	1.3186449	299	189	61	1.3960601	1926
0	718	150	0	1.4013249	1823	0	1.3484828	329	174	26	1.379057	2004
0.1959082	470	150	23.6	1.3563503	2035.6	150	1.3484828	114	114	0	1.3563503	2035.6
0	746	150	56	1.3962923	1783	0	1.2469096	295	160	24	1.3686518	1942
0.2182584	439	150	72	1.3873324	2111	150	1.2469096	121	121	0	1.3873324	2111
0	708	150	0	1.5107919	1757	0	1.3280277	280	129	34	1.4701306	1942
0	738	150	50	1.2938153	1848	0	1.3116044	311	168	50	1.263366	2041
0.1874937	478	150	7	1.3105505	1993	150	1.3116044	107	107	0	1.3105505	1993
0	755	150	19	1.4107023	1770	0	1.4832173	333	216	34	1.3901507	1921
0.1922109	473	150	2	1.3482925	1956	150	1.4832173	135	135	0	1.3482925	1956
0	711	150	10	1.4474417	1770	0	1.3425621	300	181	81	1.3815923	1970
0	754	150	35	1.3711602	1798	0	1.5247032	350	188	53	1.3474158	2013
0.1822825	502	150	0	1.379247	2010	150	1.5247032	110	110	0	1.379247	2010
0	750	150	46	1.4145467	1773	0	1.2965761	291	156	56	1.3661044	1964
0.2253001	468	167	29	1.3195465	1982	167	1.2965761	118	118	0	1.3195465	1982
0	745	150	0	1.4400685	1791	0	1.2561498	281	172	54	1.3900118	1954
0	658	150	65	1.2694658	1906	0	1.2235159	290	155	37	1.243877	2078
0.2286292	399	150	6	1.4551006	1966	150	1.2235159	114	114	0	1.4551006	1966
0	757	150	6	1.4219906	1804	0	1.1709193	273	156	59	1.3647821	1980
0.20956	399	150	72	1.3711512	1954	150	1.1709193	159	159	0	1.3711512	1954
0	666	150	0	1.4975279	1645	0	1.3677587	331	107	99	1.4074245	1968
0	750	150	24	1.3361842	1778	0	1.2382581	280	156	49	1.2964016	1951
0.2114394	458	150	9	1.4261204	1982	150	1.2382581	112	112	0	1.4261204	1982

0	792	150	0	1.4804091	1784	0	1.2703972	280	166	56	1.4257293	1954
0.2385389	420	150	63	1.5506488	2045	150	1.2703972	133	133	0	1.5506488	2045
0	750	150	11	1.5573879	1813	0	1.3924583	293	181	37	1.5186032	1962
0.2242795	466	150	2	1.6297797	1943	150	1.3924583	134	134	0	1.6297797	1943
0	715	150	0	1.638766	1748	0	1.4670034	298	179	59	1.5779524	1926
0.2557776	429	150	14	1.6967104	1918	150	1.4670034	129	129	0	1.6967104	1918
0	771	150	13	1.583874	1859	0	1.4094743	288	157	39	1.54217	2029
0	741	150	38	1.5992331	1809	0	1.7065901	334	175	66	1.5557328	2034
0.2732187	407	150	20	1.6032072	1990	150	1.7065901	112	112	0	1.6032072	1990
0	757	150	37	1.6707462	1805	0	1.5362724	299	178	47	1.6226994	1973
0.2661847	420	150	76	1.6154095	1963	150	1.5362724	129	129	0	1.6154095	1963
0	761	150	34	1.6241493	1870	0	1.4993402	294	184	33	1.5907038	2013
0.2380722	447	150	14	1.615069	1906	150	1.4993402	129	129	0	1.615069	1906
0	737	150	0	1.6804462	1826	0	1.4587197	280	116	0	1.6621732	1990
0	714	150	27	1.6105165	1798	0	1.5556165	305	171	58	1.55988	1990
0.2476607	428	150	14	1.675379	1912	150	1.5556165	134	134	0	1.675379	1912
0	768	150	0	1.7001355	1786	0	1.49037	296	196	92	1.6104545	1978
0.2444532	453	162	7	1.5667165	2007	162	1.49037	121	121	0	1.5667165	2007
0	749	150	20	1.5385294	1806	0	1.5957057	325	218	49	1.5032235	1962
0.2211612	484	150	3	1.5124336	2086	150	1.5957057	121	171	0	1.5103886	2036
0	757	150	24	1.4724002	1917	0	1.264425	276	166	39	1.4335324	2066
0.2695839	424	175	25	1.5371599	1968	166	1.0854206	149	149	0	1.5371599	1968
0	760	150	46	1.5870514	1841	0	1.417781	292	185.2	51.2	1.537359	1999
0	686	150	43	1.5480004	1784	0	1.4796545	307.5	166.5	67	1.4910964	1992
0.295355	435	160	47	1.6313442	2007	166	1.0948898	115	115	0	1.6313442	2007
0	770	150	1	1.6493841	1829	0	1.3360628	263	161.2	54.8	1.5877995	1985.6
0.2623198	431	150	0	1.6629234	1987	150	1.1469226	128.9	128.9	0	1.6629234	1987
0	617	156	0	1.6401615	1763	0	1.4230322	310.9	189.9	84	1.5568047	1968
0.2309029	464	166	75	1.557155	2107	0	0.7763216	306	306	0	1.557155	2107
0	728	160	54	1.6471237	1865	0	1.3175082	302	190	59	1.5812606	2036
0	735	150	59	1.3865746	1839	0	1.3486031	307	180	29	1.3640016	1995
0.2654178	427	150	4	1.5795674	1946	0	0.6684812	268	268	0	1.5795674	1946
0	614	150	0	1.7351245	1665	0	1.265699	280	139	56	1.6473931	1862
0.2908704	400	150	27	1.6293885	1949	150	1.265699	140	140	0	1.6293885	1949
0	774	150	26	1.5103267	1906	0	1.3247528	299	170	29	1.4775077	2064
0	692	150	38	1.1594883	1835	0	1.1782665	292	148	85	1.1130481	2064
0.1763042	479	150	6	1.193803	1993	150	1.1782665	122	122	0	1.193803	1993
0	763	150	22	1.2591971	1750	0	1.0988381	284	136	50	1.2146935	1948
0	694	150	51	1.2949738	1707	0	1.3263606	325	169	71	1.2499651	1934
0.1569407	406	150	15	1.2316182	2007	150	1.1293796	118	118	0	1.2316182	2007
0	758	150	19	1.2111551	1834	0	1.0949256	285	181	38	1.1817463	1976

Table 10. Results of Heel Correction on Plutonium in 86-2 Campaign

Batch No.	A	V	A1	V1	A(1)	V(1)	VH11	A(2)	V(2)	A3	V3	VS1
MI1-070	3.0687248	745	0	0	3.0687248	745	150	3.0687248	150	94	0	100
MI1-071	3.1460686	766.9	0	0	3.1460686	766.9	150	3.1460686	150	63.1	1.314039	270
MI1-072	4.1656239	569	0	150	3.2965786	719	150	3.2965786	150	0	1.3816359	250
MI1-073	3.2077778	747	0.1999667	0	3.2077778	747	154	3.2077778	154	95	1.4424383	280
MI1-074	3.1801857	754	0	0	3.1801857	754	150	3.1801857	150	145	1.3298002	312
MI1-075	3.9402985	603	0.2180918	150	3.1988231	753	150	3.1988231	150	98	1.3438949	300
MI1-076	2.9942988	763	0	0	2.9942988	763	150	2.9942988	150	107	1.5234817	250
MI1-077	4.8889698	563	0.2508138	150	3.9132006	713	150	3.9132006	150	101	1.3996789	280
MI1-078	3.6733773	758	0	0	3.6733773	758	150	3.6733773	150	56	1.6715145	350
MI1-079	3.534624	718	0	0	3.534624	718	150	3.534624	150	132	1.6492356	300
MI1-080	4.3626957	575	0.2972633	150	3.5215718	725	157	3.5215718	157	122	1.5295296	290
MI1-081	3.3016469	759	0	0	3.3016469	759	150	3.3016469	150	125	1.5110973	280
MI1-082	3.6061816	749	0	0	3.6061816	749	150	3.6061816	150	112	1.4271439	290
MI1-083	4.434304	625	0.253164	150	3.6250511	775	150	3.6250511	150	149.8	1.5269213	235
MI1-084	3.3910556	720	0	0	3.3910556	720	150	3.3910556	150	124	1.6634759	286
MI1-085	3.1405325	770	0	0	3.1405325	770	150	3.1405325	150	165	1.4771392	190
MI1-087	3.1832245	766	0	0	3.1832245	766	150	3.1832245	150	112	0.9899437	989
MI1-088	2.8980871	758	0	0	2.8980871	758	150	2.8980871	150	168	1.7708495	380
MI1-086	3.5509417	669	0.2594016	150	2.9480955	819	155	2.9480955	155	118	1.4159181	253
MI1-090	3.1596272	751	0	0	3.1596272	751	150	3.1596272	150	93	1.3964832	320
MI1-091	4.1771354	576	0.2560229	150	3.3669882	726	150	3.3669882	150	54	1.4392185	340
MI1-089	3.69856	625	0.2727003	150	3.0354904	775	150	3.0354904	150	94	1.5974716	270
MI1-092	3.3448548	723	0	0	3.3448548	723	150	3.3448548	150	132	1.3923968	275
FU1-090	3.3490236	594	0	150	2.6738172	744	150	2.6738172	150	106	1.3690454	305
FU1-091	3.0820894	761	0	0	3.0820894	761	150	3.0820894	150	61	1.2258062	400
FU1-092	3.7203041	592	0.1757549	150	3.003751	742	150	3.003751	150	114	1.380597	253
FU1-093	3.1395142	741	0	0	3.1395142	741	150	3.1395142	150	89	1.3231876	300
FU1-094	3.0184688	738	0	0	3.0184688	738	150	3.0184688	150	87	1.3537194	380
FU1-095	3.9339825	594.6	0.1974328	150	3.1812529	744.6	158.4	3.1812529	158.4	69.4	1.3653013	370
FU1-096	3.0540921	738	0	0	3.0540921	738	150	3.0540921	150	111	1.4332741	201
FU1-097	3.7624673	612	0.2080987	150	3.0627884	762	150	3.0627884	150	165	1.3147023	300
FU1-098	3.1082442	729	0	0	3.1082442	729	150	3.1082442	150	163	1.3406221	234
FU1-099	4.0014594	603	0.1972215	150	3.2436431	753	150	3.2436431	150	148	1.3283541	330
FU1-100	3.1001849	757	0	0	3.1001849	757	150	3.1001849	150	70	1.4070865	320
FU1-101	2.9634576	778	0	0	2.9634576	778	150	2.9634576	150	90	1.3960601	380
FU1-102	3.8186151	621	0.2191802	150	3.1183359	771	150	3.1183359	150	167	1.379057	280
FU1-103	2.9874672	762	0	0	2.9874672	762	150	2.9874672	150	42	1.3563503	315
FU1-104	3.8624363	628	0.1959082	150	3.1555221	778	150	3.1555221	150	156	1.3686518	370
FU1-105	3.3292905	747	0.1959082	0	3.3292905	747	150	3.3292905	150	112	1.3873324	280
FU1-106	2.9478808	755	0	0	2.9478808	755	150	2.9478808	150	61	1.4701306	277
FU1-107	3.8588527	584	0.2182584	150	3.114862	734	150	3.114862	150	146	1.263366	280
FU1-108	3.1848469	751	0	0	3.1848469	751	150	3.1848469	150	71	1.3105505	350
FU1-109	3.7858347	605	0.1874937	150	3.0709325	755	150	3.0709325	150	161	1.3901507	250
FU1-110	3.1840291	757	0.1874937	0	3.1840291	757	150	3.1840291	150	194	1.3482925	266
FU1-111	3.2382815	739	0	0	3.2382815	739	150	3.2382815	150	134	1.3815923	320
FU1-112	3.8576285	603	0.1922109	150	3.1274656	753	150	3.1274656	150	105	1.3474158	330
FU1-113	3.1198847	728.7	0	0	3.1198847	728.7	150	3.1198847	150	39.3	1.379247	322
FU1-114	3.8016776	608	0.1822825	150	3.0854385	758	158	3.0854385	158	225	1.3661044	230
FU1-115	3.1636107	745	0	0	3.1636107	745	150	3.1636107	150	59	1.3195465	320
FU1-116	2.9599324	740	0	0	2.9599324	740	150	2.9599324	150	260	1.3900118	300
FU1-117	4.0434725	599	0.2253001	167	3.2110511	766	150	3.2110511	150	103	1.243877	350
FU1-118	3.0308719	757	0	0	3.0308719	757	150	3.0308719	150	84	1.4551006	310
FU1-119	3.7243994	616	0.2286292	150	3.0398491	766	150	3.0398491	150	69	1.3647821	280
FU1-120	2.9536815	785	0	0	2.9536815	785	150	2.9536815	150	66	1.3711512	300
FU1-121	3.1036828	725	0	0	3.1036828	725	150	3.1036828	150	168	1.4074245	217
FU1-122	3.9600163	614	0.20956	150	3.2236702	764	150	3.2236702	150	119	1.2964016	305

~~FU1-123~~	~~3.2446462~~	~~749~~	~~0~~	~~0~~	~~3.2446462~~	~~749~~	~~150~~	~~3.2446462~~	~~150~~	~~51~~	~~1.4261204~~	~~300~~
FU2-042	4.1878617	622	0.2114394	150	3.4152408	772	150	3.4152408	150	71	1.4257293	400
FU2-043	3.4358039	765	0	0	3.4358039	765	150	3.4358039	150	111	1.5506488	280
FU2-044	4.285712	625	0.2385389	150	3.5023882	775	150	3.5023882	150	65	1.5186032	320
FU2-045	3.5907383	745	0	0	3.5907383	745	150	3.5907383	150	96	1.6297797	270
FU2-046	4.3965873	630	0.2242795	150	3.5942204	780	150	3.5942204	150	84	1.5779524	310
FU2-047	3.4378982	766	0	0	3.4378982	766	150	3.4378982	150	107	1.6967104	311
FU2-048	3.6873423	745	0.2557776	0	3.6873423	745	150	3.6873423	150	111	1.54217	350
FU2-049	4.3210968	620	0	150	3.4793247	770	150	3.4793247	150	184	1.5557328	355
FU2-050	3.6382637	766	0	0	3.6382637	766	150	3.6382637	150	96	1.6032072	310
FU2-051	4.241168	625	0.2732187	150	3.4731778	775	150	3.4731778	150	123	1.6226994	320
FU2-052	3.6321671	766	0	0	3.6321671	766	150	3.6321671	150	90	1.6154095	308
FU2-053	4.323008	625	0.2661847	150	3.5378164	775	150	3.5378164	150	130	1.5907038	234
FU2-054	3.6329634	766	0	0	3.6329634	766	150	3.6329634	150	67	1.615069	310
FU2-055	3.5891555	746	0	0	3.5891555	746	150	3.5891555	150	118	1.6621732	300
FU2-056	4.3890323	620	0.2380722	150	3.5804037	770	150	3.5804037	150	80	1.55988	310
FU2-057	3.5665662	763	0	0	3.5665662	763	150	3.5665662	150	90	1.675379	327
FU2-058	4.4268438	621	0.2476607	150	3.6137732	771	150	3.6137732	150	166	1.6104545	247
HA1-087	3.3830026	776	0	0	3.3830026	776	150	3.3830026	150	86	1.5667165	310
HA1-088	4.593339	584	0.2444532	162	3.6489429	746	150	3.6489429	150	175	1.5032235	310
HA1-089	3.168329	778	0	0	3.168329	778	150	3.168329	150	95	1.5103886	340
HA1-090	4.1102419	620	0.2211612	150	3.3526288	770	150	3.3526288	150	84	1.4335324	330
HA1-091	3.5945039	766	0	0	3.5945039	766	150	3.5945039	150	38	1.5371599	280
HA1-092	3.3928307	756	0	0	3.3928307	756	150	3.3928307	150	136.2	1.537359	305
HA1-093	4.5369787	609	0.2695839	166	3.6229303	775	150	3.6229303	150	128	1.4910964	310
HA1-094	3.6515769	761	0	0	3.6515769	761	150	3.6515769	150	11	1.6313442	280
HA1-095	4.4164297	633	0.295355	160	3.5849392	793	150	3.5849392	150	156	1.5877995	300
HA1-096	3.5220315	763	0	0	3.5220315	763	150	3.5220315	150	265	1.6629234	300
HA1-097	3.836869	725	0.2623198	150	3.2240891	875	160	3.2240891	160	46	1.5568047	320
HA1-098	3.5537052	753	0.2623198	0	3.5537052	753	150	3.5537052	150	0	1.557155	440
HA1-099	3.0688212	755	0	0	3.0688212	755	150	3.0688212	150	113	1.5812606	300
HA1-100	4.1422258	620	0.2309029	150	3.3802798	770	150	3.3802798	150	75	1.3640016	360
HA1-101	3.4062371	776	0	0	3.4062371	776	150	3.4062371	150	70	1.5795674	330
HA1-102	4.3352033	615	0.2654178	160	3.4949895	775	160	3.4949895	160	138	1.6473931	310
HA1-103	3.2277139	783	0	0	3.2277139	783	150	3.2277139	150	64	1.6293885	350
FU1-124	2.6848087	732	0	0	2.6848087	732	150	2.6848087	150	196	1.4775077	280
FU1-125	3.2554575	623	0.2908704	150	2.6801819	773	154	2.6801819	154	111	1.1130481	300
FU1-126	2.7602413	746	0	0	2.7602413	746	150	2.7602413	150	87	1.193803	262
FU1-127	2.9780833	720	0	0	2.9780833	720	150	2.9780833	150	107	1.2146935	300
FU1-128	3.3237881	623	0.1763042	150	2.7130215	773	150	2.7130215	150	136	1.2499651	300
FU1-129	2.6753096	759	0	0	2.6753096	759	150	2.6753096	150	97	1.2316182	300

A(3)	V(3)	A2	V2	VH12	A(4)	V(4)	VH21	VS21	A(5)	V(5)	VR	A(6)
2.3141841	789	150	0.0001	157	0.0001	157	157	0	2.3141841	789	599	0.6145644
2.4164213	950	100	0.0001	157	0.7599958	207	62	52	2.0974714	1147	0	3.1460686
2.7120417	819	150	1.1593801	114	1.1593801	114	114	0	2.7120417	819	566	0.690624
2.3823295	968	105	1.1593801	114	1.7751561	103	45	73	2.1704602	1159	0	3.2077778
2.2014419	1061	77	1.3889956	107	2.1154227	180	59	29	2.1401288	1211	0	3.1801857
2.329729	1001	150	1.2926022	109	1.2926022	109	109	0	2.329729	1001	530	0.7056227
2.2849233	970	76	1.2926022	109	1.98072	183	183	43	2.1879325	1013	0	2.9942988
2.7489852	944	150	1.0663638	110	1.0663638	110	110	0	2.7489852	944	562	0.8244102
2.77953	1014	94	1.0663638	110	1.9458382	166	51	83	2.5100783	1212	0	3.6733773
2.5024371	1000	76	1.506899	125	2.2609274	199	52	56	2.3564368	1203	0	3.534624
2.4936901	980	157	1.3892074	109	1.3892074	109	109	0	2.4936901	980	624	0.7079216
2.4002073	1014	76	1.3892074	109	2.1625436	183	69.5	81.5	2.216095	1209	0	3.3016469
2.5714031	1001	93	1.3577731	140	2.0083278	197	59	104	2.293744	1243	0	3.6061816
2.5990131	1009.8	150	1.5028683	110	1.5028683	110	110	0	2.5990131	1009.8	555	0.7712875
2.457812	980	111	1.5028683	110	1.9970918	149	49	161	2.1018251	1241	0	3.3910556
2.2849093	975	61	1.529886	125	2.1997343	214	52	55	2.1679057	1192	0	3.1405325
1.7122426	1717	93	1.7482736	106	2.2500663	163	78	0	1.7376116	1802	0	3.1832245
2.1063666	1156	84	2.8077111	121	2.8396085	187	64	36	2.1172864	1315	0	2.8980871
2.2374519	1035	155	1.5303696	120	1.5303696	120	120	0	2.2374519	1035	1	0.7731892
2.3134227	1014	87	1.5303696	120	2.0912616	183	73	20	2.2516166	1144	0	3.1596272
2.5038345	970	150	1.3791925	125	1.3791925	125	155	0	2.5397273	940	548	0.7235648
2.3543972	989	68	1.3791925	125	2.0353105	207	30	79	2.1596376	1245	0	3.0354904
2.3464397	980	121	1.0785188	134	1.4817319	163	59	39	2.1848718	1123	0	3.3448548
1.9958271	1005	150	1.4334408	114	1.4334408	114	114	0	1.9958271	1005	665	0.4921136
2.2140663	1072	76	1.4334408	114	2.082377	188	56	42	2.1254838	1246	0	3.0820894
2.2184689	959	150	1.2441557	127	1.2441557	127	127	0	2.2184689	959	604	0.5975632
2.2983767	980	101	1.2441557	127	1.7718407	176	52	78	2.0914699	1182	0	3.1395142
2.169927	1055	88	1.350583	121	1.9156591	183	66	100	1.9759474	1272	0	3.0184688
2.3108541	1025.6	150	1.289667	121	1.4124592	129.4	121	0	2.3035557	1034	592.9	0.6423313
2.315438	900	91	1.4124592	121	1.95055	180	63	67	2.1329415	1084	0	3.0540921
2.1066269	1077	150	1.3184442	130	1.3184442	130	130	0	2.1066269	1077	581	0.6284792
2.1653473	976	76	1.3184442	130	1.9676854	204	59	7	2.1265012	1128	0	3.1082442
2.2148692	1081	150	1.2362105	137	1.2362105	137	137	0	2.2148692	1081	619	0.6327002
2.3390972	997	102	1.2362105	114	1.7884992	162	54	47	2.1920467	1152	0	3.1001849
2.1781004	1098	116	1.3186449	123	1.6748464	157	70	63	2.0330656	1248	0	2.9634576
2.1747402	1068	150	1.3484828	114	1.3484828	114	114	0	2.1747402	1068	612	0.6138457
2.3277402	969	81	1.3484828	114	1.9664606	183	64	43	2.2012282	1131	0	2.9874672
2.1560391	1154	150	1.2469096	121	1.2469096	121	121	0	2.1560391	1154	591	0.6387697
2.4024666	989	85	1.2469096	121	1.9746233	186	45	69.4	2.2131577	1199.4	0	3.3292905
2.3231114	943	105	1.3280277	125	1.7568123	170	56	153	1.9760088	1210	0	2.9478808
2.1513088	1010	150	1.3116044	107	1.3116044	107	107	0	2.1513088	1010	632	0.5974799
2.3217081	1022	124	1.3116044	107	1.6778022	133	59	50	2.1788334	1146	0	3.1848469
2.1707203	1016	150	1.4832173	135	1.4832173	135	135	0	2.1707203	1016	610	0.6061051
2.1474709	1067	84	1.4832173	132	2.0501545	198	66	0	2.1367572	1199	0	3.1840291
2.2525957	1043	130	1.3425621	122	1.6095649	142	70	44	2.127132	1159	0	3.2382815
2.2451917	1038	150	1.5247032	110	1.5247032	110	110	0	2.2451917	1038	619	0.6100388
2.393186	940	75	1.5247032	110	2.1713984	185	66	68	2.2253693	1127	0	3.1198847
2.0525754	1055	158	1.2965761	118	1.2965761	118	118	0	2.0525754	1055	591	0.6508669
2.3661224	974	78	1.2965761	118	2.004084	190	53	85	2.1564906	1196	0	3.1636107
1.8811858	1150	89	1.2561498	133	1.7918752	194	51	40	1.8151552	1333	0	2.9599324
2.2575907	1069	150	1.2235159	114	1.2235159	114	114	0	2.2575907	1069	642	0.6081536
2.2885319	1001	74	1.2235159	114	1.9464583	190	49	49	2.15388	1191	0	3.0308719
2.3364622	965	150	1.1709193	159	1.1709193	159	159	0	2.3364622	965	668	0.5574295
2.2846485	1001	129	1.1709193	159	1.3789083	180	52	0	2.1819605	1129	0	2.9536815
2.1771132	960	78	1.3677587	122	2.0120192	194	52	52	2.0586962	1154	0	3.1036828
2.2877996	1038	150	1.2382581	112	1.2382581	112	112	0	2.2877996	1038	599	0.6455948

2.4961886	950	75	1.2382581	112	2.0429592	187	55	60	2.3126531	1142	0	3.2446462
2.4652987	1093	150	1.2703972	133	1.2703972	133	133	0	2.4652987	1093	617	0.6679089
2.532009	1006	86	1.2703972	133	1.9738796	197	57	56	2.3490384	1202	0	3.4358039
2.648461	1010	150	1.3924583	134	1.3924583	134	134	0	2.648461	1010	604	0.6967616
2.6810924	961	84	1.3924583	134	2.1178907	200	64	86	2.4214395	1183	0	3.5907383
2.6889884	1024	150	1.4670034	129	1.4670034	129	129	0	2.6889884	1024	587	0.7315238
2.5584354	1034	86	1.4670034	129	2.1205644	193	52	50	2.4036096	1225	0	3.4378982
2.5887577	1056	128	1.4094743	125	1.7503797	147	56	33	2.4517057	1180	0	3.6873423
2.3377623	1159	150	1.7065901	112	1.7065901	112	112	0	2.3377623	1159	554	0.7413334
2.6792218	1022	79	1.7065901	112	2.4560372	183	70	26	2.5974995	1161	0	3.6382637
2.5187265	1068	150	1.5362724	129	1.5362724	129	129	0	2.5187265	1068	549	0.7453171
2.6972003	1014	85	1.5362724	129	2.2385051	194	59	76	2.4793137	1225	0	3.6321671
2.6120929	989	150	1.4993402	129	1.4993402	129	129	0	2.6120929	989	598	0.7094552
2.757882	993	85	1.4993402	129	2.2142139	194	45	97	2.4765898	1239	0	3.6329634
2.6013695	1014	103	1.4587197	133	2.0150002	180	52	65	2.3990958	1207	0	3.5891555
2.6766466	1010	150	1.5556165	134	1.5556165	134	134	0	2.6766466	1010	610	0.7066586
2.6545184	1030	97	1.5556165	134	2.1255648	187	59	0	2.5960503	1158	0	3.5665662
2.5550632	1034	150	1.49037	121	1.49037	121	121	0	2.5550632	1034	643	0.6835637
2.547399	1022	130	1.49037	125	1.7514228	145	45	65	2.3408458	1187	0	3.3830026
2.4428948	1081	150	1.5957057	121	1.5957057	121	121	0	2.4428948	1081	617	0.7136133
2.354885	1063	74	1.5957057	121	2.202403	197	52	78	2.194861	1286	0	3.168329
2.4677906	1034	158	1.264425	140	1.1378672	132	140	0	2.4781604	1026	653	0.6531632
2.8314981	934	86	1.0854206	140	1.872584	204	56	103	2.4656216	1185	0	3.5945039
2.4111439	1047.2	102.5	1.417781	128.9	1.9496112	176.4	55	36.4	2.2918114	1205	0	3.3928307
2.5649777	1063	170	1.4796545	121	1.0552435	101	121	0	2.5939275	1043	597	0.8029963
2.9799222	902	74	1.0948898	121	2.081226	197	39	148	2.4972877	1208	0	3.6515769
2.530897	1099	150	1.3360628	128.9	1.1469226	118.9	128.9	0	2.5436056	1089	601	0.7537323
2.2562668	1178	91.9	1.1469226	128.9	1.8848575	187	63	0	2.2208945	1302	0	3.5220315
2.5933406	1081	160	1.4230322	140	1.4230322	140	140	0	2.5933406	1081	620	0.6613516
2.7114405	1043	86	0.7763216	140	1.6476576	204	56	52	2.4713482	1243	0	3.5537052
2.2897986	1018	105	1.3175082	131	1.7652871	176	52	53	2.1338164	1195	0	3.0688212
2.4519564	1055	159	1.3486031	118	1.18085	109	118	0	2.4628933	1046	614	0.6952969
2.5863174	1026	78	0.6684812	118	1.7059466	190	52	37	2.4054807	1201	0	3.4062371
2.5024557	1063	160	1.265699	140	1.265699	140	140	0	2.5024557	1063	609	0.727176
2.4961116	1047	86	1.265699	140	1.8812331	204	63	68	2.2919449	1256	0	3.2277139
1.8679214	1058	92	1.3247528	70	1.9410281	128	50	119	1.6953474	1255	0	2.6848087
1.9349	1030	154	1.1782665	122	1.1782665	122	122	0	1.9349	1030	628	0.5278108
2.0718309	945	75	1.1782665	122	1.7805411	197	59	32	1.9763183	1115	0	2.7602413
2.110456	977	112	1.0988381	121	1.5479659	159	63	39	1.9878779	1112	0	2.9780833
1.9501435	1059	150	1.3263606	118	1.3263606	118	118	0	1.9501435	1059	527	0.6011126
1.986828	1006	86	1.1293796	118	1.6730034	182	49	68	1.8403136	1207	0	2.6753096

V(6)	VH13	VS12	A(7)	V(7)	VH14	A(8)	V(8)	VH22	VS22	A(9)	V(9)	VD
749	150	18	1.5604661	1406	150	0.0001	157	157	0	1.5604661	1406	311
100	100	0	2.0974714	1147	0	2.2328802	162	162	0	2.0974714	1147	652
716	150	150	1.7016647	1535	150	1.1593801	114	114	0	1.7016647	1535	325
105	105	0	2.1704602	1159	0	2.7779913	150	150	0	2.1704602	1159	725
77	77	0	2.1401288	1211	0	2.7182665	136	136	0	2.1401288	1211	727
680	150	18	1.7469586	1549	150	1.2926022	109	109	0	1.7469586	1549	272
76	76	0	2.1879325	1013	0	2.2781408	259	132	0	2.197982	1140	700
712	150	11	2.0160584	1517	150	1.0663638	110	110	0	2.0160584	1517	266
94	94	0	2.5100783	1212	0	3.0657601	145	145	0	2.5100783	1212	749
76	76	0	2.3564368	1203	0	3.0171848	128	128	0	2.3564368	1203	663
781	162	25	1.7746427	1624	162	1.3892074	109	109	0	1.7746427	1624	291
76	76	0	2.216095	1209	0	2.7575391	145.5	145.5	0	2.216095	1209	736
93	93	0	2.293744	1243	0	2.985962	152	152	0	2.293744	1243	740
705	150	11.9	1.936036	1576.7	150	1.5028683	110	110	0	1.936036	1576.7	296
111	111	0	2.1018251	1241	0	2.9641542	160	160	0	2.1018251	1241	583
61	61	0	2.1679057	1192	0	2.7075988	113	113	0	2.1679057	1192	649
93	93	0	1.7376116	1802	0	2.7575734	171	56	29	1.7719923	1946	1
84	84	0	2.1172864	1315	0	2.8727991	148	171	0	2.1038369	1292	738
591	150	169	1.615039	1645	150	1.5303696	120	120	0	1.615039	1645	303
87	87	0	2.2516166	1144	0	2.6721854	160	160	0	2.2516166	1144	754
698	150	49	1.8112279	1537	150	1.3791925	155	155	0	1.8112279	1537	248
68	68	0	2.1596376	1245	0	2.7293129	98	98	0	2.1596376	1245	750
121	111	0	2.19511	1133	0	2.6982416	170	170	0	2.19511	1133	733
815	150	2	1.3953719	1672	150	1.4334408	114	114	0	1.3953719	1672	270
76	76	0	2.1254838	1246	0	2.657969	132	132	0	2.1254838	1246	754
754	150	7	1.5849935	1570	150	1.2441557	127	127	0	1.5849935	1570	304
101	101	0	2.0914699	1182	0	2.674684	153	153	0	2.0914699	1182	693
88	88	0	1.9759474	1272	0	2.5458361	154	154	0	1.9759474	1272	704
742.9	150	18.1	1.6794619	1645	150	1.4124592	121	121	0	1.6794619	1645	313
91	91	0	2.1329415	1084	0	2.6026431	154	154	0	2.1329415	1084	726
731	150	0	1.5886512	1658	150	1.3184442	130	130	0	1.5886512	1658	328
76	76	0	2.1265012	1128	0	2.6097777	135	135	0	2.1265012	1128	782.2
769	150	41	1.600181	1741	150	1.2362105	137	137	0	1.600181	1741	283
102	102	0	2.1920467	1152	0	2.6461399	156	149	0	2.1947893	1159	730
116	116	0	2.0330656	1248	0	2.4784964	186	179	0	2.0355501	1255	718
762	150	12	1.5947377	1692	150	1.3484828	114	114	0	1.5947377	1692	320
81	81	0	2.2012282	1131	0	2.536816	145	145	0	2.2012282	1131	746
741	150	5	1.6374754	1750	150	1.2469096	121	121	0	1.6374754	1750	289
85	85	0	2.2131577	1199.4	0	2.8603672	130	130	0	2.2138961	1199	708
105	105	0	1.9760088	1210	0	2.5335961	161	161	0	1.9760088	1210	738
782	150	16	1.5382565	1658	150	1.3116044	107	107	0	1.5382565	1658	328
124	124	0	2.1788334	1146	0	2.6989691	183	183	0	2.1788334	1146	755
760	150	5	1.5788939	1631	150	1.4832173	135	135	0	1.5788939	1631	323
84	84	0	2.1367572	1199	0	2.6851243	150	150	0	2.1367572	1199	561
130	130	0	2.127132	1159	0	2.6682307	200	200	0	2.127132	1159	754
769	150	1	1.6333673	1658	150	1.5247032	110	110	0	1.6333673	1658	352
75	75	0	2.2253693	1127	0	2.6759124	141	141	0	2.2253693	1127	750
749	162	10	1.5420859	1652	162	1.2965761	118	118	0	1.5420859	1652	306
78	78	0	2.1564906	1196	0	2.6944892	131	131	0	2.1564906	1196	745
89	89	0	1.8151552	1333	0	2.5344259	140	140	0	1.8151552	1333	658
792	150	0	1.6386903	1711	150	1.2235159	114	114	0	1.6386903	1711	249
74	74	0	2.15388	1191	0	2.5988697	123	123	0	2.15388	1191	757
818	150	0	1.6087256	1633	150	1.1709193	159	159	0	1.6087256	1633	249
129	129	0	2.1819605	1129	0	2.5012605	181	181	0	2.1819605	1129	666
78	78	0	2.0586962	1154	0	2.6670174	130	130	0	2.0586962	1154	750
749	150	28	1.6585269	1665	150	1.2382581	112	112	0	1.6585269	1665	308

75	75	0	2.3126531	1142	0	2.7362402	130	130	0	2.3126531	1142	792
767	150	2	1.8146444	1712	150	1.2703972	133	133	0	1.8146444	1712	270
86	86	0	2.3490384	1202	0	2.8530788	143	143	0	2.3490384	1202	750
754	150	11	1.9051013	1625	150	1.3924583	134	134	0	1.9051013	1625	316
84	84	0	2.4214395	1183	0	2.9538312	148	148	0	2.4214395	1183	715
737	150	14	1.9587253	1625	150	1.4670034	129	129	0	1.9587253	1625	279
86	86	0	2.4036096	1225	0	2.9415115	138	138	0	2.4036096	1225	771
128	128	0	2.4517057	1180	0	3.0978319	184	184	0	2.4517057	1180	741
704	150	0	1.8214624	1713	150	1.7065901	112	112	0	1.8214624	1713	257
79	79	0	2.5974995	1161	0	3.0828553	149	149	0	2.5974995	1161	757
699	150	0	1.9166228	1617	150	1.5362724	129	129	0	1.9166228	1617	270
85	85	0	2.4793137	1225	0	3.0611528	144	144	0	2.4793137	1225	761
748	150	8	1.8856515	1595	150	1.4993402	129	129	0	1.8856515	1595	297
85	85	0	2.4765898	1239	0	3.1418578	130	130	0	2.4765898	1239	737
103	103	0	2.3990958	1207	0	3.0610518	155	155	0	2.3990958	1207	714
760	150	0	1.934861	1620	150	1.5556165	134	134	0	1.934861	1620	278
97	97	0	2.5960503	1158	0	3.0215721	156	146	0	2.5996935	1168	768
793	162	44	1.7982821	1709	162	1.49037	121	121	0	1.7982821	1709	291
130	130	0	2.3408458	1187	0	2.9634535	175	175	0	2.3408458	1187	749
767	150	51	1.7616173	1749	150	1.5957057	121	121	0	1.7616173	1749	334
74	74	0	2.194861	1286	0	2.7696929	126	126	0	2.194861	1286	757
811	175	32	1.7461655	1694	175	1.1378672	140	140	0	1.7461655	1694	249
86	86	0	2.4656216	1185	0	2.9154369	142	142	0	2.4656216	1185	760
102.5	102.5	0	2.2918114	1205	0	2.8888493	157.5	157.5	0	2.2918114	1205	686
767	160	35	1.8948873	1685	160	1.0552435	121	121	0	1.8948873	1685	275
74	74	0	2.4972877	1208	0	3.1095974	113	113	0	2.4972877	1208	770
761	150	6	1.8936207	1706	150	1.1469226	128.9	128.9	0	1.8936207	1706	281
91.9	91.9	0	2.2208945	1302	0	2.8561699	154.9	154.9	0	2.2208945	1302	617
780	162	35	1.8524317	1734	162	1.4230322	140	140	0	1.8524317	1734	302
86	86	0	2.4713482	1243	0	2.8020245	142	142	0	2.4713482	1243	728
105	105	0	2.1338164	1195	0	2.6370774	157	157	0	2.1338164	1195	735
773	163	9	1.8019925	1665	163	1.18085	118	118	0	1.8019925	1665	274
78	78	0	2.4054807	1201	0	2.7261209	130	130	0	2.4054807	1201	614
769	160	0	1.8558377	1672	160	1.265699	140	140	0	1.8558377	1672	240
86	86	0	2.2919449	1256	0	2.6583965	149	149	0	2.2919449	1256	774
92	92	0	1.6953474	1255	0	2.4229141	142	142	0	1.6953474	1255	692
782	160	6	1.4000273	1658	160	1.1782665	122	122	0	1.4000273	1658	319
75	75	0	1.9763183	1115	0	2.3288808	134	134	0	1.9763183	1115	763
112	112	0	1.9878779	1112	0	2.463241	175	175	0	1.9878779	1112	694
677	150	106	1.4077945	1692	106	1.1293796	162	118	0	1.4007379	1736	300
86	86	0	1.8403136	1207	0	2.3115096	135	135	0	1.8403136	1207	758

VS3	VH3	A4	V4	A⑭	V⑭	A5	V5	VS4	VH4	VC	A⑮	V⑮
119.27	270	0	0	1.2139762	1566.27	0	7.33	0	190	0	1.2075448	1383.6
271.58	250	1.2139762	190	1.1838879	2058.58	1.2075448	7.18	0	190	158.99	1.0914655	2034.75
254	280	1.1838879	190	1.2371498	2024	1.0914655	7.8	0	190	89.17	1.1794311	1930.97
252.43	312	1.2371498	190	1.1596596	2076.43	1.1794311	7.77	0	190	70.47	1.1181424	1964.67
345.87	300	1.1596596	190	1.1268537	2302.87	1.1181424	7.58	0	190	0	1.1268225	2120.45
237.05	250	1.1268537	190	1.3050184	1998.05	1.1268225	7.61	0	190	0	1.3042715	1815.66
139.54	280	1.3050184	190	1.2897061	1939.54	1.3042715	7.41	0	0	32	1.2689058	1978.95
787.16	350	1.2897061	0	1.1029499	2314.16	1.2689058	7.65	0	190	0	1.1035455	2131.81
389.32	300	1.1029499	190	1.3234294	2289.32	1.1035455	19.83	0	190	0	1.3213718	2119.15
297.51	290	1.3234294	190	1.3011001	2163.51	1.3213718	7.55	0	190	0	1.3011774	1981.06
317.67	280	1.3011001	190	1.2732161	2185.67	1.3011774	7.52	0	190	0	1.2733211	2003.19
292.31	290	1.2732161	190	1.2227705	2184.31	1.2733211	7.73	0	190	52.46	1.1917383	2054.5
306.97	235	1.2227705	190	1.2948743	2268.97	1.1917383	7.79	0	190	0	1.2944893	2086.76
434.52	286	1.2948743	190	1.3062922	2219.72	1.2944893	7.81	0	190	0	1.3062469	2037.53
151.02	190	1.3062922	190	1.3517535	2038.02	1.3062469	7.55	0	0	231.31	1.2142769	2276.88
366.08	225	1.3517535	0	1.291953	1714.08	1.2142769	7.59	0	190	80.71	1.2269168	1612.38
284	380	1.291953	190	1.4794861	2040	1.291953	7.45	0	190	38.75	1.4485151	1896.2
233.79	253	1.4794861	190	1.2744639	2254.79	1.4485151	7.6	0	190	0	1.2751022	2072.39
261.15	320	1.2744639	190	1.2108214	2089.15	1.2751022	7.73	0	190	0	1.211082	1906.88
91.32	340	1.2108214	190	1.3453941	1863.32	1.211082	7.48	0	0	0	1.3448571	1870.8
363.89	270	1.3453941	0	1.2880847	1878.89	1.3448571	7.64	0	190	0	1.2883404	1696.53
367.01	275	1.2880847	190	1.1614962	2299.01	1.2883404	7.34	0	190	0	1.1619361	2116.35
394.14	400	1.1614962	190	1.0959361	2120.14	1.1619361	7.63	0	0	0	1.0961728	2127.77
385.35	400	1.0959361	0	0.9807213	1927.35	1.0961728	7.46	0	190	0	0.9812149	1744.81
133.71	253	0.9807213	190	1.2560214	2091.71	0.9812149	7.37	0	190	124.3	1.1782451	2033.38
267.98	300	1.2560214	190	1.1469146	2083.98	1.1782451	7.45	0	190	102.86	1.0881715	2004.29
222.69	380	1.1469146	190	1.1772267	1930.69	1.0881715	7.43	0	190	0	1.1768482	1748.12
83.49	300	1.1772267	190	1.2898165	1983.49	1.1768482	7.58	0	0	81.11	1.2389169	2072.18
271.48	201	1.2898165	0	1.242861	2043.48	1.2389169	7.65	0	190	0	1.2428448	1861.13
169.51	300	1.242861	190	1.1927617	1939.51	1.2428448	7.84	0	190	0	1.1929851	1757.35
192.5	234	1.1927617	190	1.208231	2161.5	1.1929851	7.61	0	190	67.26	1.1684623	2046.37
349.44	330	1.208231	190	1.105616	2186.44	1.1684623	7.6	0	190	171.94	1.0184728	2175.98
304.84	320	1.105616	190	1.1859628	2198.84	1.0184728	7.82	0	190	0	1.1853133	2016.66
412.5	380	1.1859628	190	1.1094447	2148.5	1.1853133	7.55	0	190	99.13	1.0564679	2065.18
294.75	280	1.1094447	190	1.1718342	2208.75	1.0564679	7.59	0	190	0	1.171402	2026.34
304.91	315	1.1718342	190	1.1538584	2215.51	1.171402	7.58	0	190	109.12	1.0951452	2142.21
332.11	370	1.1538584	190	1.1321057	2094.11	1.0951452	7.43	0	190	114.97	1.0677424	2026.51
277.1	280	1.1321057	190	1.1989494	2298.1	1.0677424	7.44	0	190	120.78	1.1337596	2236.32
227.04	277	1.1989494	190	1.2850703	2082.04	1.1337596	7.64	0	0	135.07	1.2065309	2224.75
253.31	280	1.2850703	0	1.1044912	2014.31	1.2065309	7.55	0	190	68.41	1.0651347	1900.27
340.88	350	1.1044912	190	1.0870369	2173.88	1.0651347	7.53	0	190	126.28	1.0221379	2117.69
208.64	250	1.0870369	190	1.222183	2069.64	1.0221379	7.55	0	190	125.3	1.1453379	2012.49
335.78	266	1.222183	190	1.1331581	2215.78	1.1453379	7.65	0	190	0	1.1332039	2033.43
340.73	320	1.1331581	190	1.1440789	2180.73	1.1332039	7.62	0	190	0	1.1440375	1998.35
269.33	330	1.1440789	190	1.1599874	2142.33	1.1440375	7.75	0	190	0	1.1599243	1960.08
272.82	322	1.1599874	190	1.1849278	2150.82	1.1599243	7.42	0	190	81.09	1.1379509	2049.33
161.85	230	1.1849278	190	1.2435991	2085.85	1.1379509	7.62	0	190	93.23	1.1851298	1996.7
265	320	1.2435991	190	1.1475532	2117	1.1851298	7.48	0	190	0	1.1476985	1934.48
328.07	300	1.1475532	190	1.1588552	2172.07	1.1476985	7.65	0	0	90.75	1.1124985	2270.47
214.18	350	1.1588552	0	1.1067046	1942.18	1.1124985	7.7	0	190	0	1.1067299	1759.88
208.03	310	1.1067046	190	1.2755025	2054.03	1.1067299	7.92	0	190	0	1.2747885	1871.95
207.99	280	1.2755025	190	1.2213953	2097.99	1.2747885	7.63	0	190	0	1.2216079	1915.62
211.41	300	1.2213953	190	1.2162776	2055.41	1.2216079	7.7	0	190	98.12	1.155757	1971.23
221.16	217	1.2162776	190	1.2466667	2162.16	1.155757	7.63	0	190	0	1.2463164	1979.79
242.65	305	1.2466667	190	1.1405208	2078.65	1.2463164	7.63	0	190	0	1.1409465	1896.28
252.6	300	1.1405208	190	1.2310239	2124.6	1.1409465	7.62	0	190	0	1.2306705	1942.22

192.78	330	1.2310239	190	1.270333	2006.78	1.2306705	7.84	0	0	0	1.2701787	2014.62
408.07	280	1.270333	0	1.2594602	2173.07	1.2701787	7.68	0	190	70.61	1.2163584	2061.36
169.26	320	1.2594602	190	1.3655617	2001.26	1.2163584	7.24	0	190	76.33	1.3099822	1894.83
234.97	280	1.3655617	190	1.422329	2087.97	1.3099822	7.37	0	190	26	1.4027527	1931.34
182.93	310	1.422329	190	1.4179552	1988.93	1.4027527	7.33	0	190	0	1.4178935	1806.26
182	310.7	1.4179552	190	1.5139363	1979.3	1.4178935	7.29	0	190	0	1.5135466	1796.59
219.92	328	1.5139363	190	1.3789623	2110.92	1.5135466	7.25	0	190	0	1.3794683	1928.17
156.56	300	1.3789623	190	1.4225226	2080.56	1.3794683	7.3	0	0	0	1.422372	2087.86
185.33	340	1.4225226	0	1.4413168	1835.33	1.422372	7.38	0	190	0	1.4412322	1652.71
250.22	320	1.4413168	190	1.4122606	2093.22	1.4412322	7.32	0	190	0	1.4123716	1910.54
117.9	308	1.4122606	190	1.4987173	1962.9	1.4123716	7.34	0	190	0	1.4983613	1780.24
162.02	234	1.4987173	190	1.4615622	2131.02	1.4983613	7.35	0	190	0	1.461701	1948.37
226.98	310	1.4615622	190	1.4184676	2012.98	1.461701	8.34	0	190	0	1.4186645	1831.32
412.91	300	1.4184676	190	1.3426526	2292.91	1.4186645	8.25	0	190	0	1.3429497	2111.16
273.13	310	1.3426526	190	1.3418236	2143.13	1.3429497	8.16	0	0	0	1.3418279	2151.29
212.66	327	1.3418236	0	1.4771846	1797.66	1.3418279	8.42	0	190	86.86	1.4011702	1702.94
157.35	247	1.4771846	190	1.4763451	2078.35	1.4011702	8.39	0	190	0	1.4760126	1896.74
294.54	310	1.4763451	190	1.3473158	2181.54	1.4760126	8.38	0	190	0	1.3478551	1999.92
234.41	310	1.3473158	190	1.3192555	2076.41	1.3478551	8.46	0	190	0	1.3193832	1894.87
349.9	340	1.3192555	190	1.2577833	2235.9	1.3193832	8.52	0	190	0	1.2580387	2054.42
345.69	330	1.2577833	190	1.2006881	2271.69	1.2580387	8.43	0	190	0	1.2009194	2090.12
330.44	280	1.2006881	190	1.278213	2208.44	1.2009194	8.6	0	0	0	1.2779132	2217.04
213.11	305	1.278213	0	1.3655668	1907.11	1.2779132	8.57	0	190	0	1.3651315	1725.68
190.01	310	1.3655668	190	1.3421282	2062.01	1.3651315	8.43	0	190	0	1.3422313	1880.44
197.33	280	1.3421282	190	1.4531013	2114.33	1.3422313	8.35	0	190	0	1.4526223	1932.68
219.76	300	1.4531013	190	1.4090582	2095.36	1.4526223	8.55	0	190	0	1.4092528	1913.91
258.4	300	1.4090582	190	1.4391088	2135.4	1.4092528	8.48	0	190	79.33	1.3828344	2033.21
270.92	320	1.4391088	190	1.3462079	2108.92	1.3828344	8.46	0	190	0	1.3463687	1927.38
400.04	440	1.3462079	190	1.2634056	2257.04	1.3463687	8.51	0	0	90.86	1.21499	2356.41
213.41	300	1.2634056	0	1.4081535	1949.41	1.21499	8.64	0	190	298.87	1.2037316	2066.92
247.79	300	1.4081535	190	1.2094636	2132.79	1.2037316	8.69	0	190	0	1.2094381	1951.48
193.33	330	1.2094636	190	1.3916557	1999.33	1.2094381	8.43	0	190	0	1.3908107	1817.76
207.3	310	1.3916557	190	1.4472727	1949.3	1.3908107	8.44	0	190	100	1.3695296	1867.74
341.6	350	1.4472727	190	1.4257513	2020.25	1.3695296	8.46	0	190	43.8	1.3923259	1882.51
309.5	280	1.4257513	190	1.2729435	2283.5	1.3923259	8.45	0	0	0	1.2733836	2291.95
195.55	311.46	1.2729435	0	1.00132	1948.09	1.2733836	8.45	0	190	0	1.0026213	1766.54
222.83	262	1.00132	190	1.0526599	2143.83	1.0026213	8.35	0	190	71.12	1.0156348	2033.3
218.39	300	1.0526599	190	1.0707211	2056.39	1.0156348	8.42	0	190	0	1.0704737	1874.81
161.79	300	1.0707211	190	1.1309756	1985.79	1.0704737	8.42	0	190	0	1.1306932	1804.21
218.77	300	1.1309756	190	1.0952314	2115.77	1.1306932	8.6	0	190	54.16	1.0655548	1988.53
169.22	318	1.0952314	190	1.0744635	2017.22	1.0655548	8.39	0	0	0	1.0744266	2025.61

Table 11. Result of comparison Measuremet value with ICT correction value

	URAN			PLUTONIUM		
BATCH	MEASURE	ICT(CORRE)	MEAS/ICT(C)	MEASURE	ICT(CORRE)	ICT(C)/MEAS
IK1-043	151.2	156.4	0.9667519	1.245	1.291	0.9643687
IK1-044	155.8	161.2	0.9665012	1.322	1.287	1.027195
IK1-045	154.9	166.7	0.9292142	1.268	1.307	0.9701607
IK1-046	132.5	124.8	1.0616987	1.068	0.969	1.1021672
IK1-047	146.1	144	1.0145833	1.144	1.095	1.0447489
IK1-048	143.6	130.7	1.0986993	1.182	1	1.182
IK1-049	146.2	154.3	0.9475049	1.182	1.195	0.9891213
IK1-050	170.5	167.4	1.0185185	1.336	1.28	1.04375
IK1-051	166.5	168.4	0.9887173	1.319	1.312	1.0053354
IK1-052	181.3	182.6	0.9928806	1.438	1.409	1.020582
IK1-053	186.9	189.1	0.9883659	1.501	1.462	1.0266758
IK1-054	165.1	166.5	0.9915916	1.354	1.347	1.0051967
IK1-055	162.1	162.9	0.995089	1.328	1.335	0.9947566
AVERAGE			0.996932			1.0289276
STD			0.0450774			0.0583354
CV%			4.5216123			5.6695381

Table. 12 Result of comparison between the measured value and the ICT corrected. (86-2)

	URANIUM			PLUTONIUM		
Batch No.	MEASURE	ICT(CORR)	MEAS/ICT(C)	MEASURE	ICT(CORR)	MEAS/ICT(C)
MI1-070	165.5	173.4	0.9544406	1.132	1.208	0.9370861
MI1-071	162.4	150	1.0826667	1.163	1.091	1.0659945
MI1-072	164.6	162.8	1.0110565	1.167	1.179	0.9898219
MI1-073	163.7	153.2	1.0685379	1.144	1.118	1.0232558
MI1-074	156.9	153.8	1.020156	1.099	1.127	0.9751553
MI1-075	176.7	179.3	0.9854992	1.244	1.304	0.9539877
MI1-076	166.8	180	0.9266667	1.158	1.269	0.9125296
MI1-077	132.8	133.6	0.994012	1.064	1.104	0.9637681
MI1-078	154.9	156.2	0.9916773	1.272	1.321	0.9629069
MI1-079	171.7	162.9	1.0540209	1.342	1.301	1.0315142
MI1-080	167.5	163.6	1.0238386	1.289	1.273	1.0125687
MI1-081	158.5	154.1	1.0285529	1.221	1.192	1.0243289
MI1-082	160.1	158.6	1.0094578	1.33	1.294	1.0278207
MI1-083	160.3	154.1	1.0402336	1.324	1.306	1.0137825
MI1-084	149.6	153	0.9777778	1.195	1.214	0.9843493
MI1-085	158.1	159.2	0.9930905	1.26	1.227	1.0268949
MI1-087	160.1	162.3	0.9864449	1.277	1.449	0.8812974
MI1-088	159.3	166.7	0.9556089	1.205	1.275	0.945098
MI1-086	165	160.2	1.0299625	1.302	1.211	1.0751445
MI1-090	178.4	178.6	0.9988802	1.413	1.345	1.0505576
MI1-091	158.3	168.8	0.9377962	1.273	1.288	0.988354
MI1-089	167.3	156.9	1.0662843	1.338	1.162	1.151463
MI1-092	154.5	144.4	1.0699446	1.219	1.096	1.1122263
FU1-090	180.8	171.6	1.0536131	1.064	0.981	1.0846075
FU1-091	181.7	187.5	0.9690667	1.152	1.178	0.9779287
FU1-092	181.2	179	1.0122905	1.084	1.088	0.9963235
FU1-093	199.5	186.3	1.0708535	1.28	1.176	1.0884354

FU1-094	184	200.6	0.9172483	1.136	1.239	0.9168084
FU1-095	186.8	195.2	0.9569672	1.221	1.244	0.9815113
FU1-096	197.7	191.7	1.0312989	1.228	1.193	1.0293378
FU1-097	184.7	185.5	0.9956873	1.186	1.169	1.0145423
FU1-098	170.8	163.5	1.0446483	1.072	1.018	1.0530452
FU1-099	180.6	181.2	0.9966887	1.151	1.185	0.971308
FU1-100	175.2	163.5	1.0715596	1.149	1.056	1.0880682
FU1-101	181.5	184.1	0.9858772	1.159	1.171	0.9897523
FU1-102	165.8	169.3	0.9793266	1.106	1.095	1.0100457
FU1-103	170.6	169.3	1.0076787	1.141	1.068	1.0683521
FU1-104	166.5	172.7	0.9640996	1.128	1.134	0.994709
FU1-105	171.1	178.9	0.9564002	1.111	1.207	0.920464
FU1-106	174.8	170.9	1.0228204	1.065	1.065	1
FU1-107	170.9	165	1.0357576	1.093	1.022	1.0694716
FU1-108	178.8	177.3	1.0084602	1.174	1.145	1.0253275
FU1-109	178.8	179.1	0.998325	1.165	1.133	1.0282436
FU1-110	183.1	174.8	1.0474828	1.219	1.144	1.0655394
FU1-111	185.4	176.5	1.0504249	1.222	1.16	1.0534483
FU1-112	194.7	177	1.1	1.283	1.138	1.1274165
FU1-113	178	188.5	0.9442971	1.166	1.185	0.9839662
FU1-114	189	181.2	1.0430464	1.231	1.147	1.0732345
FU1-115	170.4	172.8	0.9861111	1.127	1.112	1.0134892
FU1-116	181.2	181.5	0.9983471	1.147	1.107	1.0361337
FU1-117	194.7	195.5	0.9959079	1.294	1.275	1.014902
FU1-118	193.3	192.6	1.0036345	1.256	1.222	1.0278232
FU1-119	182.5	183	0.9972678	1.209	1.156	1.0458478
FU1-120	187.8	196.3	0.9566989	1.213	1.246	0.9735152
FU1-121	189.1	183.3	1.0316421	1.227	1.141	1.0753725
FU1-122	189.3	187.4	1.0101387	1.221	1.231	0.9918765
FU1-123	185.7	191.4	0.9702194	1.216	1.27	0.9574803
FU2-042	167.4	169.4	0.9881936	1.264	1.216	1.0394737
FU2-043	183.8	179.2	1.0256696	1.409	1.31	1.0755725
FU2-044	187.5	188.8	0.9931144	1.468	1.403	1.0463293
FU2-045	195.3	189	1.0333333	1.525	1.418	1.0754584
FU2-046	194.6	195.9	0.993364	1.563	1.514	1.0323646
FU2-047	186.2	184.3	1.0103093	1.403	1.379	1.0174039
FU2-048	182.3	185.7	0.9816909	1.467	1.422	1.0316456
FU2-049	187.9	190.8	0.9848008	1.458	1.441	1.0117974
FU2-050	189.9	181.6	1.0457048	1.531	1.412	1.0984419

FU2-051	194	198.7	0.9763463	1.466	1.498	0.9786382
FU2-052	188.4	188.3	1.0005311	1.497	1.462	1.0239398
FU2-053	186.7	185.4	1.0070119	1.446	1.419	1.0190275
FU2-054	173.1	176.2	0.9824064	1.292	1.343	0.9620253
FU2-055	179.4	177.3	1.0118443	1.388	1.342	1.0342772
FU2-056	180.5	183.4	0.9841876	1.347	1.401	0.9614561
FU2-057	185	192.8	0.9595436	1.468	1.476	0.9945799
FU2-058	180.6	174.5	1.034957	1.458	1.348	1.0816024
HA1-087	184.8	177	1.0440678	1.458	1.319	1.1053829
HA1-088	186.7	167.6	1.1139618	1.433	1.258	1.1391097
HA1-089	172.3	170	1.0135294	1.231	1.201	1.0249792
HA1-090	172.3	179.4	0.9604236	1.252	1.278	0.9796557
HA1-091	181.5	179.2	1.0128348	1.406	1.365	1.0300366
HA1-092	193	183.6	1.0511983	1.403	1.342	1.0454545
HA1-093	187.6	189.5	0.9899736	1.454	1.453	1.0006882
HA1-094	185.2	181.8	1.0187019	1.406	1.41	0.9971631
HA1-095	171.5	176.4	0.9722222	1.377	1.383	0.9956616
HA1-096	181.3	176.4	1.0277778	1.4	1.346	1.0401189
HA1-097	162	156.3	1.0364683	1.281	1.215	1.054321
HA1-098	153.6	158.9	0.9666457	1.223	1.204	1.0157807
HA1-099	188.4	178.3	1.0566461	1.28	1.209	1.0587262
HA1-100	192.7	195.8	0.9841675	1.445	1.391	1.038821
HA1-101	186.2	186.9	0.9962547	1.459	1.37	1.0649635
HA1-102	190.1	187.2	1.0154915	1.443	1.392	1.0366379
HA1-103	172.3	177.3	0.9717992	1.243	1.273	0.9764336
FU1-124	179.4	174.7	1.0269033	1.096	1.003	1.0927218
FU1-125	180.8	179	1.0100559	1.125	1.016	1.1072835
FU1-126	190.2	187.7	1.0133191	1.218	1.07	1.1383178
FU1-127	194	191.9	1.0109432	1.308	1.131	1.1564987
FU1-128	182.5	184	0.9918478	1.157	1.066	1.0853659
FU1-129	185	188.7	0.9803922	1.149	1.074	1.0698324
	AVERAGE		1.0072075			1.026756
	stdev		0.0370634			0.0557629
	CV(%)		3.6800127			5.2381393