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# 格納容器圧力抑制系信頼性実証試験
# データレポート・4 (TEST 1101)

1980年3月

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# 格納容器圧力抑制系信頼性実証試験
## データレポート・4（TEST 1101）

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格納容器圧力抑制系信頼性実証試験は，LOCA時にBWR用Mark II格納容器圧力抑制系に発生すると予想される熱水力現象に関する試験を行い，格納容器信頼性の実証に資するデータを得ることを目的としている。試験装置の体積縮小率は1/18であり，ウェットウェル部は実炉のウェットウェルの実物大20°セクタ模型である。

本報告は，昭和54年3月30日に実施したTEST 1101のデータ報告である。本試験は，原研による最初の公式試験であり，破断口径200mmの水放出試験である。得られたドライウェル初期圧力上昇率は約155 kPa/s，ベント管内最大蒸気重量速度は約100 kg/m$^2$-sであった。

本試験計画は，電源開発促進対策特別事業の一環として科学技術庁より原研に委託されたものである。
本報告は先に作成した原研所内資料JAERI-memo 8325（1979年7月）の内容に検討・修正を加え公開に付するものである。

# Full-Scale Mark II CRT Program
# Data Report No. 4 (TEST 1101)

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The Full-Scale Mark II CRT (Containment Response Test) Program* was initiated in 1977 to provide a data base for evaluation of the LOCA hydrodynamic loads for the Mark II pressure suppression system. The test facility is 1/18 in volume and has a wetwell which is a full-scale replica of one 20°-sector of that of a reference Mark II.

TEST 1101 is a large (200 mm) water break test performed on March 30, 1979. The test conditions were similar to those for TEST 0004 performed on February 28, 1979, except for small alterations in pool initial temperature and depth. Though the test was performed for a supernominal break area (approx. 160 % of the scaled break area for a postulated double-ended break in the recirculation line), the obtained drywell initial pressurization rate (155 kPa/s) was smaller than the safety analysis value for the reference Mark II.

Keywords : BWR, LOCA, Pressure Suppression, Mark II Containment, Hydrodynamic Loads, Full-Scale Test, Data

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* Work performed under the auspices of the Atomic Energy Bureau, the Science and Technology Agency of Japan.

This report supersedes JAERI internal document JAERI-memo 8325 (July 1979).

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# 1. まえがき

格納容器圧力抑制系信頼性実証試験は，わが国の最新型沸騰水型炉に使用されているMark Ⅱ格納容器における冷却材喪失事故時の熱水力現象を模擬した試験を行い，格納容器の信頼性実証に資するデータを得ることを目的としている。本試験計画は，電源開発促進対策事業の一環として，科学技術庁より原研に委託されたものであり，昭和５２年度を初年度として５年間にわたり実施される予定である。原研内では，安全工学部安全工学第１研究室が試験計画の立案および試験結果の解析を担当し，同安全試験技術室が試験装置の建設，運転，管理を担当している。試験装置は昭和５４年３月原研東海研究所敷地内に完成し，以後１カ月に約１回の割合で試験を実施している。

本報告書は，昭和５４年３月３０日に実施したTEST 1101のデータ報告である。本試験は，原研による最初の公式試験であり，昭和５４年２月２８日に実施した試験装置検収試験TEST 0004とほぼ同様な条件による大口径（200mm）水放出試験であって，運転要員の慣熟と試験結果の再現性の確認を目的としている。破断断面積は幾何学的スケーリングによる値より過大に設定したが，得られたドライウェル初期圧力上昇率は参照炉の評価値を下回った。

# 2. 試 験 装 置

試験装置の概略をFig.2.1に示す。試験装置主要部は試験格納容器，圧力容器，放出配管等により構成される。試験格納容器ウェットウェル部は，1100 MWe級Mark Ⅱ格納容器のウェットウェルの中心角20°の1セクタを模擬したものであり，各部の高さ，内部のベント管等の寸法は実炉とほぼ同一である。ドライウェル，1次系の容積は，実炉の相当部分の約1/18である。これらの諸元をTable 2.1に示す。

本試験装置における計測の項目をTable 2.2に，計測チャンネルリストおよび計測点位置をTable 2.5～2.7およびFig.2.2～2.9に示す。データは2系統の収録装置によって収録する。比較的変化の遅い信号（温度，水位計出力等）は小型計算機により1チャンネルあたり50 data/s のサンプリング速度で収録する。一方，比較的変化の速い信号（圧力，歪，加速度等）はPCM（Pulse Code Modulation）方式により455.55 data/s のサンプリング速度で収録し，試験後，小型計算機を介してデータを再編集する。以後の処理はいずれも原研計算センターの大型計算機によって行う。データ収録装置の主要諸元をTable 2.3に示す。

本試験における計測器の動作状態をTable 2.8～2.10に，圧力・差圧変換器の較正係数をTable 2.11に，計測レンジの設定値をTable 2.12に示す。

本試験に先立ち2月18日から28日にかけて，計4回の試験装置検収試験を実施した。この過程で変換器の絶縁不良をはじめとする障害が発生したが，これらは本試験の開始前にすべて補修を完了した。本試験においては特に大きな計測上の障害は発生しなかったが，ウェットウェルの水位計80チャンネルのうち23チャンネルに関しては，コネクタの接触不良等のため試験データを得ることができなかった。

試験装置本体に関しても大きな障害は発生しなかったが，放出開始直前に圧力容器予備ノズルからわずかな漏洩を生じた。

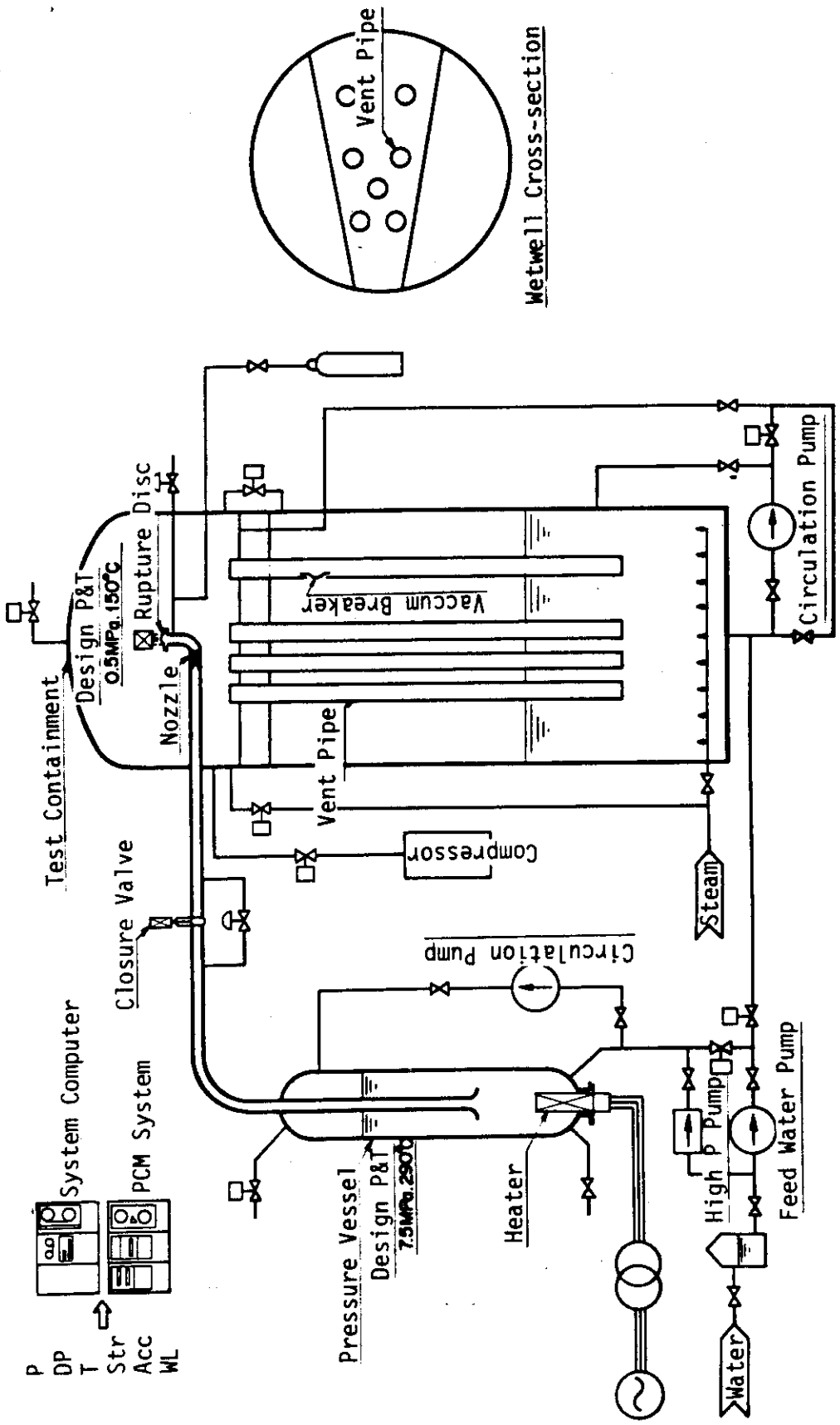


Fig. 2.1 Schematic Flow Diagram of Test Facility

Table 2.1 Comparison of Major Design Parameters

| Parameter | | Reference Mark II | CRT Facility |
|---|---|---|---|
| Drywell | | | |
| Free Volume, Including Air Volumes in Vent Pipes | ($m^3$) | 5700 | 329 |
| Vent Pipe | | | |
| Number | (-) | 108 | 7 |
| Length | (m) | 14.2 | 13.6 |
| Clearance, to Pool Bottom | (m) | 3.66 | 3.66 |
| Number of Vacuum Breakers | (-) | 11 | 1 |
| Wetwell | | | |
| Free Volume | ($m^3$) | 4100 | 255 |
| Water Volume | ($m^3$) | 3200 | 188 |
| Height, to Diaphragm Floor | (m) | 17.3 | 17.0 |
| Pressure Vessel | | | |
| Inside Diameter | (m) | 6.4 | 2.2 |
| Height | (m) | 22.0 | 10.4 |

Table 2.2 Summary of Data Channels

| Location | Item | Data Acqusition | | |
|---|---|---|---|---|
| | | Computer | PCM Track-1 | PCM Track-2 |
| Pressure Vessel | Pressure | 2 | | |
| | Diff. Press. | 6 | | |
| | Temperature | 6 | | |
| | Water Level | 6 | | |
| Blowdown Pipe | Pressure | 2 | | |
| | Diff. Press. | 1 | | |
| | Temperature | 3 | | |
| | Timing Sig. | 2 | 2 | 2 |
| Drywell | Pressure | 1 | 1 | |
| | Temperature | 8 | | |
| | Water Level | 4 | | |
| Vent Pipe | Pressure | | 9 | |
| | Temperature | 6 | | |
| | Water Level | 19 | | |
| | Strain | | 4 | |
| | Acceleration | | | 4 |
| | Timing Sig. | 1 | | |
| Wetwell | Pressure | 1 | 20 | |
| | Diff. Press. | 2 | | |
| | Temperature | 32 | | |
| | Water Level | 80 | | 15 |
| | Acceleration | | | 12 |

Table 2.3 Summary of Data Acquisition Systems

| | | Computer | PCM System |
|---|---|---|---|
| Max. Number of Channels | | 192 | 39 x 2 tracks |
| Input Range | (V) | ±10.00 | ±10.00 |
| Resolution | (mV/digit) | 4.883 | 19.53 |
| Sampling Rate | (data/ch./s) | 50.00 | 455.56 |
| Skew | (ms/ch.) | 0.028 | 0.0488 |

Table 2.4 Identification of Data Channels

Channel Code = A B C D - E F G

A B Location

= P V Pressure Vessel
= B P Blowdown Pipe
= D W Drywell
= V P Vent Pipe
= W W Wetwell

C Measurement Item

= P Pressure
= D Differential Pressure
= T Temperature
= L Water Level Signal
= S Strain
= A Acceleration
= M Actuation Signal

D Data Acquisition System

= S Computer Recorded , 50 data/s
= F PCM Recorded , 455.6 data/s

E Group Number

F G Sequential Number

Table 2.5 List of Data channels (Computer Recorded Channels)

| Channel No. | Channel Code | Measurement Location |
|---|---|---|
| 1 | BPMS-001 | RUPTURE DISC BREAK SIGNAL |
| 2 | BPMS-002 | MAIN DISCHARGE VALVE CLOSE SIGNAL |
| 3 | VPMS-001 | OPENING OF VACUUM BREAKER (5-STEPS) |
| 4 | | |
| 5 | BPPS-001 | BLOWDOWN PIPE (8.4M FROM OUTL.) |
| 6 | PVPS-002 | VESSEL STEAM DOME |
| 7 | PVPS-001 | VESSEL STEAM DOME |
| 8 | BPPS-002 | BLOWDOWN PIPE (0.9M FROM OUTL.) |
| 9 | DWPS-001 | DRYWELL |
| 10 | WWPS-001 | WETWELL AIRSPACE (15.0M ABOVE BOTT.) |
| 11 | | |
| 12 | PVDS-001 | DP OVER VESSEL (EL = 0.0M - +9.2M) |
| 13 | PVDS-002 | DP OVER VESSEL (EL = 0.0M - +2.6M) |
| 14 | PVDS-003 | DP OVER VESSEL (EL = +2.2M - +4.2M) |
| 15 | PVDS-004 | DP OVER VESSEL (EL = +3.8M - +5.8M) |
| 16 | PVDS-005 | DP OVER VESSEL (EL = +5.4M - +7.4M) |
| 17 | PVDS-006 | DP OVER VESSEL (EL = +7.0M - +9.2M) |
| 18 | BPDS-001 | DYNAMIC PRESS. IN BLOWDOWN PIPE |
| 19 | WWDS-001 | DP OVER POOL (EL = 4.5M -15.5M) |
| 20 | WWDS-002 | DP ACROSS DIAPHRAGM FLOOR |
| 21 | | |
| 22 | PVTS-001 | VESSEL (EL = 0.6M) |
| 23 | PVTS-002 | VESSEL (EL = 2.2M) |
| 24 | PVTS-003 | VESSEL (EL = 3.8M) |
| 25 | PVTS-004 | VESSEL (EL = 5.4M) |
| 26 | PVTS-005 | VESSEL (EL = 7.0M) |
| 27 | PVTS-006 | VESSEL (EL = 8.6M) |
| 28 | BPTS-001 | BLOWDOWN PIPE (6.5M FROM OUTL.) |
| 29 | BPTS-002 | BLOWDOWN PIPE (4.1M FROM OUTL.) |
| 30 | BPTS-003 | BLOWDOWN PIPE (0.9M FROM OUTL.) |
| 31 | DWTS-101 | DRYWELL (0.5M ABOVE DF) |
| 32 | DWTS-102 | DRYWELL (2.5M ABOVE DF) |
| 33 | DWTS-103 | DRYWELL (4.5M ABOVE DF) |
| 34 | DWTS-201 | DRYWELL (0.5M ABOVE DF) |
| 35 | DWTS-202 | DRYWELL (2.5M ABOVE DF) |
| 36 | DWTS-203 | DRYWELL (4.5M ABOVE DF) |
| 37 | DWTS-301 | DRYWELL (0.5M ABOVE DF) |
| 38 | DWTS-302 | DRYWELL (3.5M ABOVE DF) |
| 39 | VPTS-101 | VP1 ( 0.5M ABOVE OUTL.) |
| 40 | VPTS-102 | VP1 (11.5M ABOVE OUTL.) |
| 41 | VPTS-201 | VP2 ( 0.5M ABOVE OUTL.) |
| 42 | VPTS-202 | VP2 (11.5M ABOVE OUTL.) |
| 43 | VPTS-301 | VP3 ( 0.5M ABOVE OUTL.) |
| 44 | VPTS-302 | VP3 (11.5M ABOVE OUTL.) |
| 45 | WWTS-101 | WETWELL (T1. 1.0M ABOVE BOTT.) |
| 46 | WWTS-102 | WETWELL (T1. 3.0M ABOVE BOTT.) |
| 47 | WWTS-103 | WETWELL (T1. 5.0M ABOVE BOTT.) |
| 48 | WWTS-104 | WETWELL (T1. 7.0M ABOVE BOTT.) |
| 49 | WWTS-105 | WETWELL (T1. 9.0M ABOVE BOTT.) |
| 50 | WWTS-106 | WETWELL (T1. 11.0M ABOVE BOTT.) |
| 51 | WWTS-107 | WETWELL (T1. 13.0M ABOVE BOTT.) |
| 52 | WWTS-108 | WETWELL (T1. 15.0M ABOVE BOTT.) |

Table 2.5 (Continued)

| Channel No. | Channel Code | Measurement Location |
|---|---|---|
| 53 | WWTS-201 | WETWELL (T2, 1.0M ABOVE BOTT.) |
| 54 | WWTS-202 | WETWELL (T2, 3.0M ABOVE BOTT.) |
| 55 | WWTS-203 | WETWELL (T2, 5.0M ABOVE BOTT.) |
| 56 | WWTS-204 | WETWELL (T2, 7.0M ABOVE BOTT.) |
| 57 | WWTS-205 | WETWELL (T2, 9.0M ABOVE BOTT.) |
| 58 | WWTS-206 | WETWELL (T2, 11.0M ABOVE BOTT.) |
| 59 | WWTS-207 | WETWELL (T2, 13.0M ABOVE BOTT.) |
| 60 | WWTS-208 | WETWELL (T2, 15.0M ABOVE BOTT.) |
| 61 | WWTS-301 | WETWELL (T3, 1.0M ABOVE BOTT.) |
| 62 | WWTS-302 | WETWELL (T3, 3.0M ABOVE BOTT.) |
| 63 | WWTS-303 | WETWELL (T3, 5.0M ABOVE BOTT.) |
| 64 | WWTS-304 | WETWELL (T3, 7.0M ABOVE BOTT.) |
| 65 | WWTS-305 | WETWELL (T3, 9.0M ABOVE BOTT.) |
| 66 | WWTS-306 | WETWELL (T3, 11.0M ABOVE BOTT.) |
| 67 | WWTS-307 | WETWELL (T3, 13.0M ABOVE BOTT.) |
| 68 | WWTS-308 | WETWELL (T3, 15.0M ABOVE BOTT.) |
| 69 | WWTS-401 | WETWELL (T4, 1.0M ABOVE BOTT.) |
| 70 | WWTS-402 | WETWELL (T4, 3.0M ABOVE BOTT.) |
| 71 | WWTS-403 | WETWELL (T4, 5.0M ABOVE BOTT.) |
| 72 | WWTS-404 | WETWELL (T4, 7.0M ABOVE BOTT.) |
| 73 | WWTS-405 | WETWELL (T4, 9.0M ABOVE BOTT.) |
| 74 | WWTS-406 | WETWELL (T4, 11.0M ABOVE BOTT.) |
| 75 | WWTS-407 | WETWELL (T4, 13.0M ABOVE BOTT.) |
| 76 | WWTS-408 | WETWELL (T4, 15.0M ABOVE BOTT.) |
| 77 | | |
| 78 | PVLS-001 | VESSEL (EL = 0.6M) |
| 79 | PVLS-002 | VESSEL (EL = 2.2M) |
| 80 | PVLS-003 | VESSEL (EL = 3.8M) |
| 81 | PVLS-004 | VESSEL (EL = 5.4M) |
| 82 | PVLS-005 | VESSEL (EL = 7.0M) |
| 83 | PVLS-006 | VESSEL (EL = 8.6M) |
| 84 | DWLS-001 | DRYWELL (0.048M ABOVE DF) |
| 85 | DWLS-002 | DRYWELL (0.096M ABOVE DF) |
| 86 | DWLS-003 | DRYWELL (0.144M ABOVE DF) |
| 87 | DWLS-004 | DRYWELL (0.192M ABOVE DF) |
| 88 | VPLS-101 | VP1 (0.042M ABOVE OUTL.) |
| 89 | VPLS-103 | VP1 (2.042M ABOVE OUTL.) |
| 90 | VPLS-105 | VP1 (4.042M ABOVE OUTL.) |
| 91 | VPLS-201 | VP2 (0.042M ABOVE OUTL.) |
| 92 | VPLS-203 | VP2 (2.042M ABOVE OUTL.) |
| 93 | VPLS-205 | VP2 (4.042M ABOVE OUTL.) |
| 94 | VPLS-301 | VP3 (0.042M ABOVE OUTL.) |
| 95 | VPLS-302 | VP3 (1.042M ABOVE OUTL.) |
| 96 | VPLS-303 | VP3 (2.042M ABOVE OUTL.) |
| 97 | VPLS-304 | VP3 (3.042M ABOVE OUTL.) |
| 98 | VPLS-305 | VP3 (4.042M ABOVE OUTL.) |
| 99 | VPLS-401 | VP4 (0.042M ABOVE OUTL.) |
| 100 | VPLS-403 | VP4 (2.042M ABOVE OUTL.) |
| 101 | VPLS-405 | VP4 (4.042M ABOVE OUTL.) |
| 102 | VPLS-501 | VP5 (0.042M ABOVE OUTL.) |
| 103 | VPLS-502 | VP5 (1.042M ABOVE OUTL.) |
| 104 | VPLS-503 | VP5 (2.042M ABOVE OUTL.) |
| 105 | VPLS-504 | VP5 (3.042M ABOVE OUTL.) |
| 106 | VPLS-505 | VP5 (4.042M ABOVE OUTL.) |

Table 2.5 (Continued)

| Channel No. | Channel Code | Measurement Location |
|---|---|---|
| 107 | WWLS-104 | WETWELL (L1, 5.75M ABOVE BOTT.) |
| 108 | WWLS-105 | WETWELL (L1, 6.50M ABOVE BOTT.) |
| 109 | WWLS-106 | WETWELL (L1, 7.25M ABOVE BOTT.) |
| 110 | WWLS-107 | WETWELL (L1, 8.00M ABOVE BOTT.) |
| 111 | WWLS-108 | WETWELL (L1, 8.75M ABOVE BOTT.) |
| 112 | WWLS-109 | WETWELL (L1, 9.50M ABOVE BOTT.) |
| 113 | WWLS-110 | WETWELL (L1, 10.25M ABOVE BOTT.) |
| 114 | WWLS-111 | WETWELL (L1, 11.00M ABOVE BOTT.) |
| 115 | WWLS-112 | WETWELL (L1, 11.75M ABOVE BOTT.) |
| 116 | WWLS-113 | WETWELL (L1, 12.50M ABOVE BOTT.) |
| 117 | WWLS-114 | WETWELL (L1, 13.25M ABOVE BOTT.) |
| 118 | WWLS-115 | WETWELL (L1, 14.00M ABOVE BOTT.) |
| 119 | WWLS-116 | WETWELL (L1, 14.75M ABOVE BOTT.) |
| 120 | WWLS-201 | WETWELL (L2, 3.50M ABOVE BOTT.) |
| 121 | WWLS-202 | WETWELL (L2, 4.25M ABOVE BOTT.) |
| 122 | WWLS-203 | WETWELL (L2, 5.00M ABOVE BOTT.) |
| 123 | WWLS-204 | WETWELL (L2, 5.75M ABOVE BOTT.) |
| 124 | WWLS-205 | WETWELL (L2, 6.50M ABOVE BOTT.) |
| 125 | WWLS-206 | WETWELL (L2, 7.25M ABOVE BOTT.) |
| 126 | WWLS-207 | WETWELL (L2, 8.00M ABOVE BOTT.) |
| 127 | WWLS-208 | WETWELL (L2, 8.75M ABOVE BOTT.) |
| 128 | WWLS-209 | WETWELL (L2, 9.50M ABOVE BOTT.) |
| 129 | WWLS-210 | WETWELL (L2, 10.25M ABOVE BOTT.) |
| 130 | WWLS-211 | WETWELL (L2, 11.00M ABOVE BOTT.) |
| 131 | WWLS-212 | WETWELL (L2, 11.75M ABOVE BOTT.) |
| 132 | WWLS-213 | WETWELL (L2, 12.50M ABOVE BOTT.) |
| 133 | WWLS-214 | WETWELL (L2, 13.25M ABOVE BOTT.) |
| 134 | WWLS-215 | WETWELL (L2, 14.00M ABOVE BOTT.) |
| 135 | WWLS-216 | WETWELL (L2, 14.75M ABOVE BOTT.) |
| 136 | WWLS-303 | WETWELL (L3, 5.00M ABOVE BOTT.) |
| 137 | WWLS-305 | WETWELL (L3, 6.50M ABOVE BOTT.) |
| 138 | WWLS-307 | WETWELL (L3, 8.00M ABOVE BOTT.) |
| 139 | WWLS-309 | WETWELL (L3, 9.50M ABOVE BOTT.) |
| 140 | WWLS-311 | WETWELL (L3, 11.00M ABOVE BOTT.) |
| 141 | WWLS-313 | WETWELL (L3, 12.50M ABOVE BOTT.) |
| 142 | WWLS-315 | WETWELL (L3, 14.00M ABOVE BOTT.) |
| 143 | WWLS-401 | WETWELL (L4, 3.50M ABOVE BOTT.) |
| 144 | WWLS-402 | WETWELL (L4, 4.25M ABOVE BOTT.) |
| 145 | WWLS-403 | WETWELL (L4, 5.00M ABOVE BOTT.) |
| 146 | WWLS-404 | WETWELL (L4, 5.75M ABOVE BOTT.) |
| 147 | WWLS-405 | WETWELL (L4, 6.50M ABOVE BOTT.) |
| 148 | WWLS-406 | WETWELL (L4, 7.25M ABOVE BOTT.) |
| 149 | WWLS-407 | WETWELL (L4, 8.00M ABOVE BOTT.) |
| 150 | WWLS-408 | WETWELL (L4, 8.75M ABOVE BOTT.) |
| 151 | WWLS-409 | WETWELL (L4, 9.50M ABOVE BOTT.) |
| 152 | WWLS-410 | WETWELL (L4, 10.25M ABOVE BOTT.) |
| 153 | WWLS-411 | WETWELL (L4, 11.00M ABOVE BOTT.) |
| 154 | WWLS-412 | WETWELL (L4, 11.75M ABOVE BOTT.) |
| 155 | WWLS-413 | WETWELL (L4, 12.50M ABOVE BOTT.) |
| 156 | WWLS-414 | WETWELL (L4, 13.25M ABOVE BOTT.) |
| 157 | WWLS-415 | WETWELL (L4, 14.00M ABOVE BOTT.) |
| 158 | WWLS-416 | WETWELL (L4, 14.75M ABOVE BOTT.) |
| 159 | WWLS-503 | WETWELL (L5, 5.00M ABOVE BOTT.) |
| 160 | WWLS-505 | WETWELL (L5, 6.50M ABOVE BOTT.) |

Table 2.5 (Continued)

| Channel No. | Channel Code | Measurement Location |
|---|---|---|
| 161 | WWLS-507 | WETWELL (L5, 8,00M ABOVE BOTT.) |
| 162 | WWLS-509 | WETWELL (L5, 9,50M ABOVE BOTT.) |
| 163 | WWLS-511 | WETWELL (L5, 11,00M ABOVE BOTT.) |
| 164 | WWLS-513 | WETWELL (L5, 12,50M ABOVE BOTT.) |
| 165 | WWLS-515 | WETWELL (L5, 14,00M ABOVE BOTT.) |
| 166 | WWLS-604 | WETWELL (L6, 5,75M ABOVE BOTT.) |
| 167 | WWLS-606 | WETWELL (L6, 7,25M ABOVE BOTT.) |
| 168 | WWLS-608 | WETWELL (L6, 8,75M ABOVE BOTT.) |
| 169 | WWLS-610 | WETWELL (L6, 10,25M ABOVE BOTT.) |
| 170 | WWLS-612 | WETWELL (L6, 11,75M ABOVE BOTT.) |
| 171 | WWLS-614 | WETWELL (L6, 13,25M ABOVE BOTT.) |
| 172 | WWLS-616 | WETWELL (L6, 14,75M ABOVE BOTT.) |
| 173 | WWLS-704 | WETWELL (L7, 5,75M ABOVE BOTT.) |
| 174 | WWLS-706 | WETWELL (L7, 7,25M ABOVE BOTT.) |
| 175 | WWLS-708 | WETWELL (L7, 8,75M ABOVE BOTT.) |
| 176 | WWLS-710 | WETWELL (L7, 10,25M ABOVE BOTT.) |
| 177 | WWLS-712 | WETWELL (L7, 11,75M ABOVE BOTT.) |
| 178 | WWLS-714 | WETWELL (L7, 13,25M ABOVE BOTT.) |
| 179 | WWLS-716 | WETWELL (L7, 14,75M ABOVE BOTT.) |
| 180 | WWLS-804 | WETWELL (L8, 5,75M ABOVE BOTT.) |
| 181 | WWLS-806 | WETWELL (L8, 7,25M ABOVE BOTT.) |
| 182 | WWLS-808 | WETWELL (L8, 8,75M ABOVE BOTT.) |
| 183 | WWLS-810 | WETWELL (L8, 10,25M ABOVE BOTT.) |
| 184 | WWLS-812 | WETWELL (L8, 11,75M ABOVE BOTT.) |
| 185 | WWLS-814 | WETWELL (L8, 13,25M ABOVE BOTT.) |
| 186 | WWLS-816 | WETWELL (L8, 14,75M ABOVE BOTT.) |
| 187 | | |
| 188 | | |
| 189 | | |
| 190 | | |
| 191 | | |
| 192 | | |

Table 2.6 List of Data Channels (PCM Track-1 Channels)

| Channel No. | Channel Code | Measurement Location |
|---|---|---|
| 1 | BPMF-001 | RUPTURE DISC BREAK SIGNAL |
| 2 | BPMF-002 | MAIN DISCHARGE VALVE CLOSE SIGNAL |
| 3 | | |
| 4 | DWPF-001 | DRYWELL |
| 5 | VPPF-101 | VP1 ( 0.5M ABOVE OUTL.) |
| 6 | VPPF-201 | VP2 ( 0.5M ABOVE OUTL.) |
| 7 | VPPF-301 | VP3 ( 0.5M ABOVE OUTL.) |
| 8 | VPPF-302 | VP3 ( 6.0M ABOVE OUTL.) |
| 9 | VPPF-303 | VP3 (11.5M ABOVE OUTL.) |
| 10 | VPPF-401 | VP4 ( 0.5M ABOVE OUTL.) |
| 11 | VPPF-501 | VP5 ( 0.5M ABOVE OUTL.) |
| 12 | VPPF-502 | VP5 ( 6.0M ABOVE OUTL.) |
| 13 | VPPF-503 | VP5 (11.5M ABOVE OUTL.) |
| 14 | WWPF-101 | POOL BOTT., UNDER VP1 |
| 15 | WWPF-102 | POOL BOTT., UNDER VP2 |
| 16 | WWPF-103 | POOL BOTT., UNDER VP3 |
| 17 | WWPF-104 | POOL BOTT., UNDER VP4 |
| 18 | WWPF-105 | POOL BOTT., UNDER VP5 |
| 19 | WWPF-106 | POOL BOTT., BETW. VP1, VP6 & PEDESTAL |
| 20 | WWPF-107 | POOL BOTT., BETW. VP2 & VP3 |
| 21 | WWPF-201 | WALL BESIDE VP2 (P1, 1.8M ABOVE BOTT.) |
| 22 | WWPF-202 | WALL BESIDE VP2 (P1, 3.6M ABOVE BOTT.) |
| 23 | WWPF-203 | WALL BESIDE VP2 (P1, 6.0M ABOVE BOTT.) |
| 24 | WWPF-301 | WALL BESIDE VP3 (P2, 1.8M ABOVE BOTT.) |
| 25 | WWPF-302 | WALL BESIDE VP3 (P2, 3.6M ABOVE BOTT.) |
| 26 | WWPF-303 | WALL BESIDE VP3 (P2, 6.0M ABOVE BOTT.) |
| 27 | WWPF-401 | SHELL BESIDE VP3 (P3, 1.8M ABOVE BOTT.) |
| 28 | WWPF-402 | SHELL BESIDE VP3 (P3, 3.6M ABOVE BOTT.) |
| 29 | WWPF-501 | SHELL BESIDE VP4 (P4, 1.8M ABOVE BOTT.) |
| 30 | WWPF-502 | SHELL BESIDE VP4 (P4, 3.6M ABOVE BOTT.) |
| 31 | WWPF-602 | WALL BESIDE VP4 (P5, 3.6M ABOVE BOTT.) |
| 32 | WWPF-702 | WALL BESIDE VP7 (P6, 3.6M ABOVE BOTT.) |
| 33 | WWPF-001 | WETWELL AIRSPACE (15.0M ABOVE BOTT.) |
| 34 | | |
| 35 | VPSF-101 | LOWER BRACE BETW. VP1 & WALL |
| 36 | VPSF-102 | LOWER BRACE BETW. VP1 & VP2 |
| 37 | VPSF-103 | LOWER BRACE BETW. VP1 & VP6 |
| 38 | VPSF-201 | UPPER BRACE BETW. VP1 & PEDESTAL |
| 39 | | |

Table 2.7 List of Data Channels (PCM Track−2 Channels)

| Channel No. | Channel Code | Measurement Location |
|---|---|---|
| 1 | BPMF-001 | RUPTURE DISC BREAK SIGNAL |
| 2 | BPMF-002 | MAIN DISCHARGE VALVE CLOSE SIGNAL |
| 3 | | |
| 4 | VPAF-101 | VP2 OUTL, ( 0DEG) |
| 5 | VPAF-102 | VP2 OUTL, (90DEG) |
| 6 | VPAF-201 | VP5 OUTL, ( 0DEG) |
| 7 | VPAF-202 | VP5 OUTL, (90DEG) |
| 8 | WWAF-001 | POOL BOTT., UNDER VP5 |
| 9 | WWAF-002 | POOL BOTT., BETW, VP2, VP3, VP4 & VP7 |
| 10 | WWAF-003 | WALL BESIDE VP2 (3.0M ABOVE BOTT.) |
| 11 | WWAF-004 | WALL BESIDE VP7 (3.0M ABOVE BOTT.) |
| 12 | WWAF-005 | SHELL BESIDE VP3 (3.0M ABOVE BOTT.) |
| 13 | WWAF-006 | SHELL BESIDE VP3 (6.0M ABOVE BOTT.) |
| 14 | WWAF-007 | SHELL BESIDE VP4 (3.0M ABOVE BOTT.) |
| 15 | WWAF-008 | SHELL BESIDE VP4 (6.0M ABOVE BOTT.) |
| 16 | WWAF-009 | PEDESTAL (3.0M ABOVE BOTT.) |
| 17 | WWAF-010 | PEDESTAL (6.0M ABOVE BOTT.) |
| 18 | WWAF-011 | SHELL AT DF LEVEL ( 0DEG) |
| 19 | WWAF-012 | SHELL AT DF LEVEL (90DEG) |
| 20 | | |
| 21 | WWLF-101 | PHASE BDRY, (0.9M BELOW OUTL., CENTER) |
| 22 | WWLF-102 | PHASE BDRY, (0.9M BELOW OUTL., 0DEG) |
| 23 | WWLF-104 | PHASE BDRY, (0.9M BELOW OUTL., 90DEG) |
| 24 | WWLF-106 | PHASE BDRY, (0.9M BELOW OUTL., 180DEG) |
| 25 | WWLF-108 | PHASE BDRY, (0.9M BELOW OUTL., 270DEG) |
| 26 | WWLF-201 | PHASE BDRY, (0.6M BELOW OUTL., CENTER) |
| 27 | WWLF-203 | PHASE BDRY, (0.6M BELOW OUTL., 45DEG) |
| 28 | WWLF-205 | PHASE BDRY, (0.6M BELOW OUTL., 135DEG) |
| 29 | WWLF-207 | PHASE BDRY, (0.6M BELOW OUTL., 225DEG) |
| 30 | WWLF-209 | PHASE BDRY, (0.6M BELOW OUTL., 315DEG) |
| 31 | WWLF-301 | PHASE BDRY, (0.3M BELOW OUTL., CENTER) |
| 32 | WWLF-302 | PHASE BDRY, (0.3M BELOW OUTL., 0DEG) |
| 33 | WWLF-304 | PHASE BDRY, (0.3M BELOW OUTL., 90DEG) |
| 34 | WWLF-306 | PHASE BDRY, (0.3M BELOW OUTL., 180DEG) |
| 35 | WWLF-308 | PHASE BDRY, (0.3M BELOW OUTL., 270DEG) |
| 36 | | |
| 37 | | |
| 38 | | |
| 39 | | |

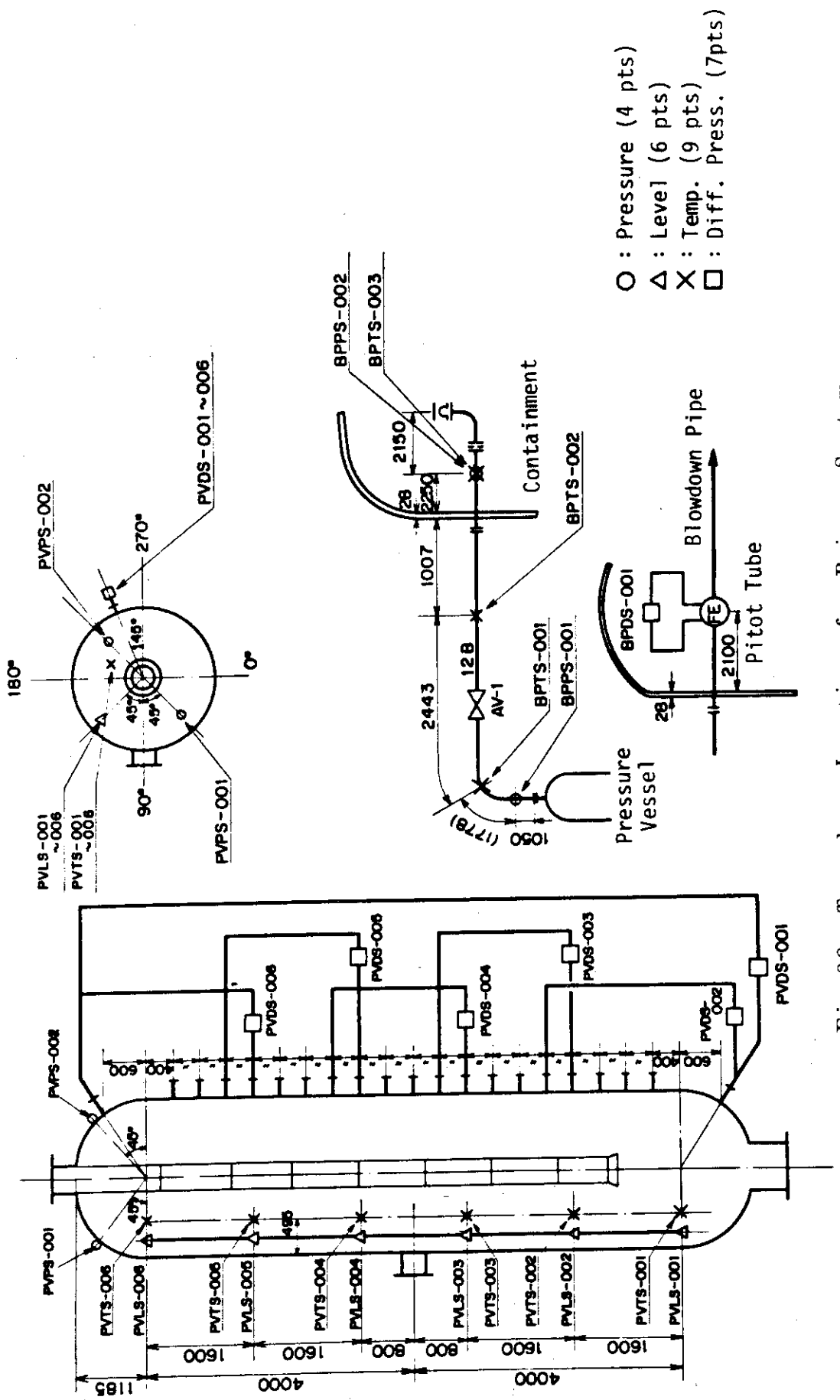


Fig. 2.2 Transducer Locations for Primary System

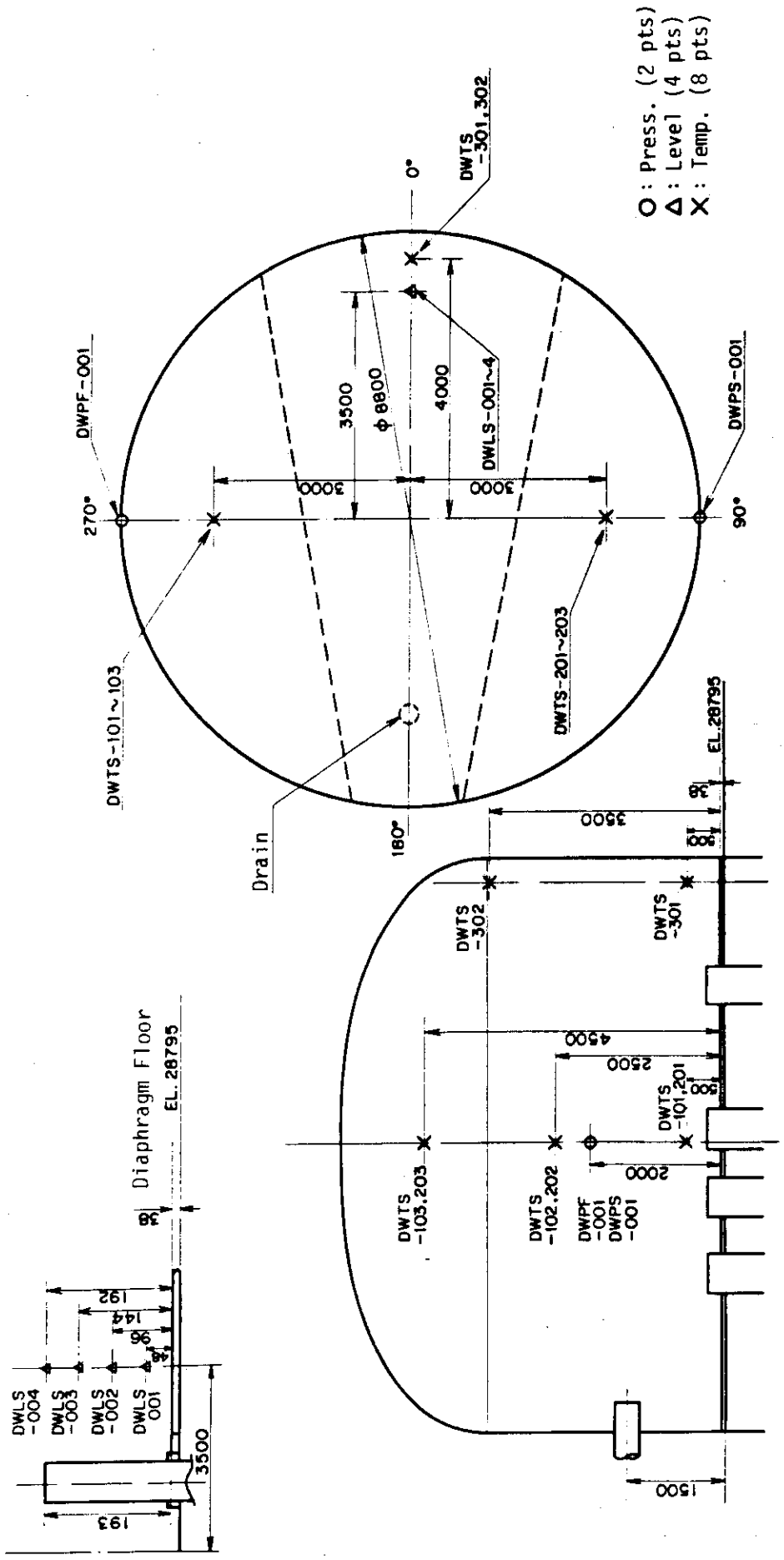


Fig. 23 Transducer Location for Drywell

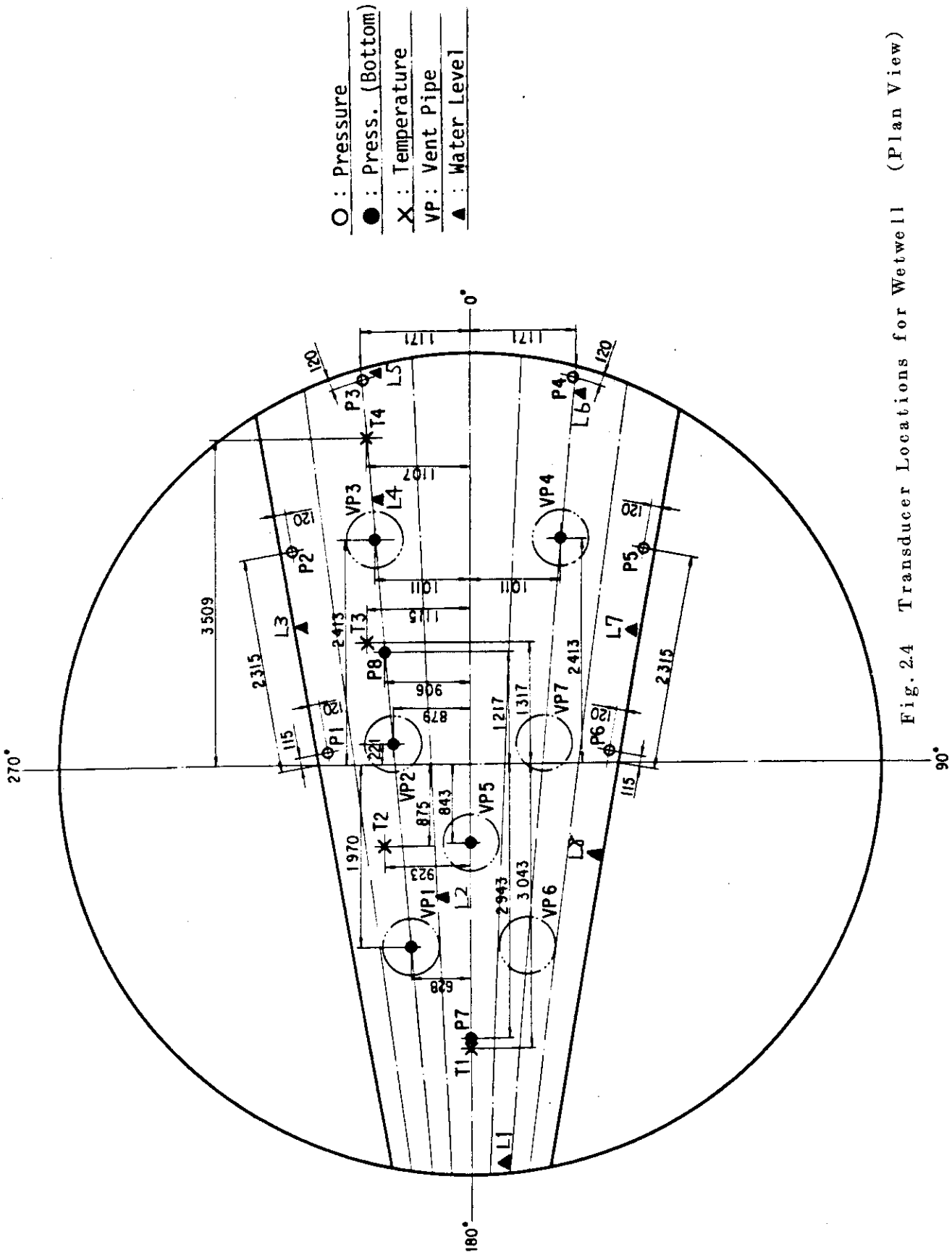


Fig. 2.4 Transducer Locations for Wetwell (Plan View)

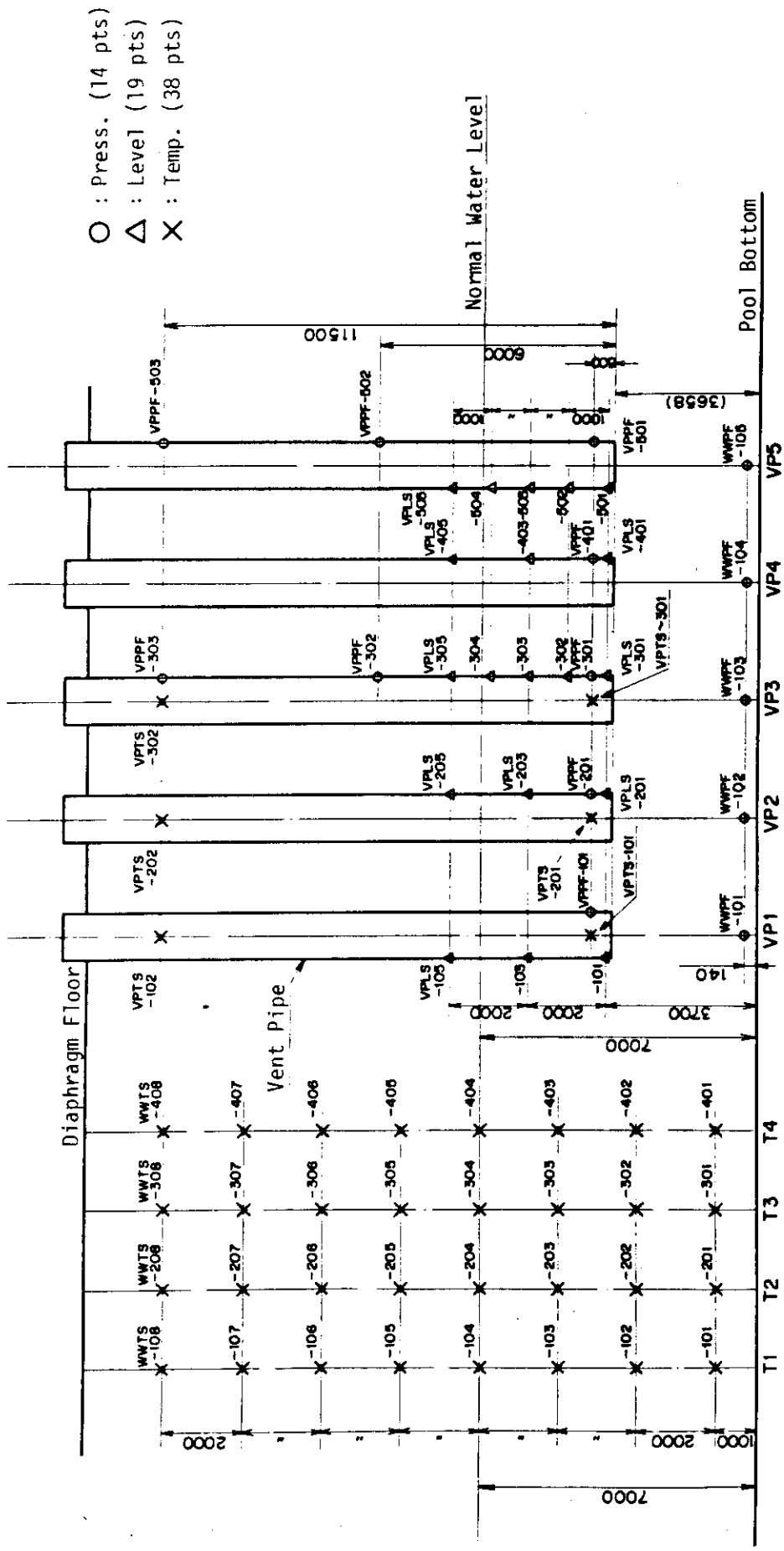


Fig. 2.5 Transducer Location for Vent Pipes and Thermocouple Locations for Wetwell

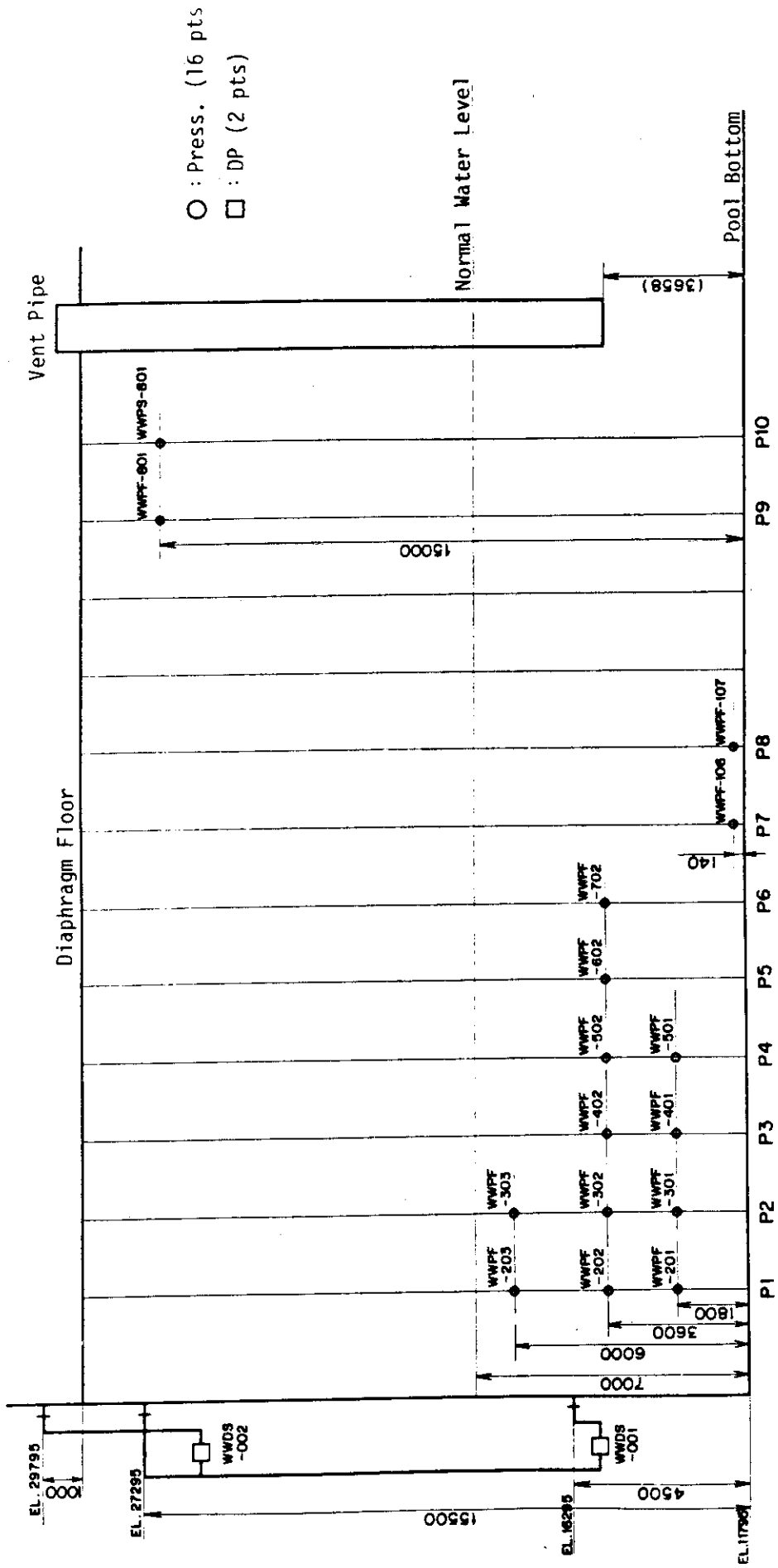


Fig. 2.6 Pressure and Differential Pressure Transducer Locations for Wetwell

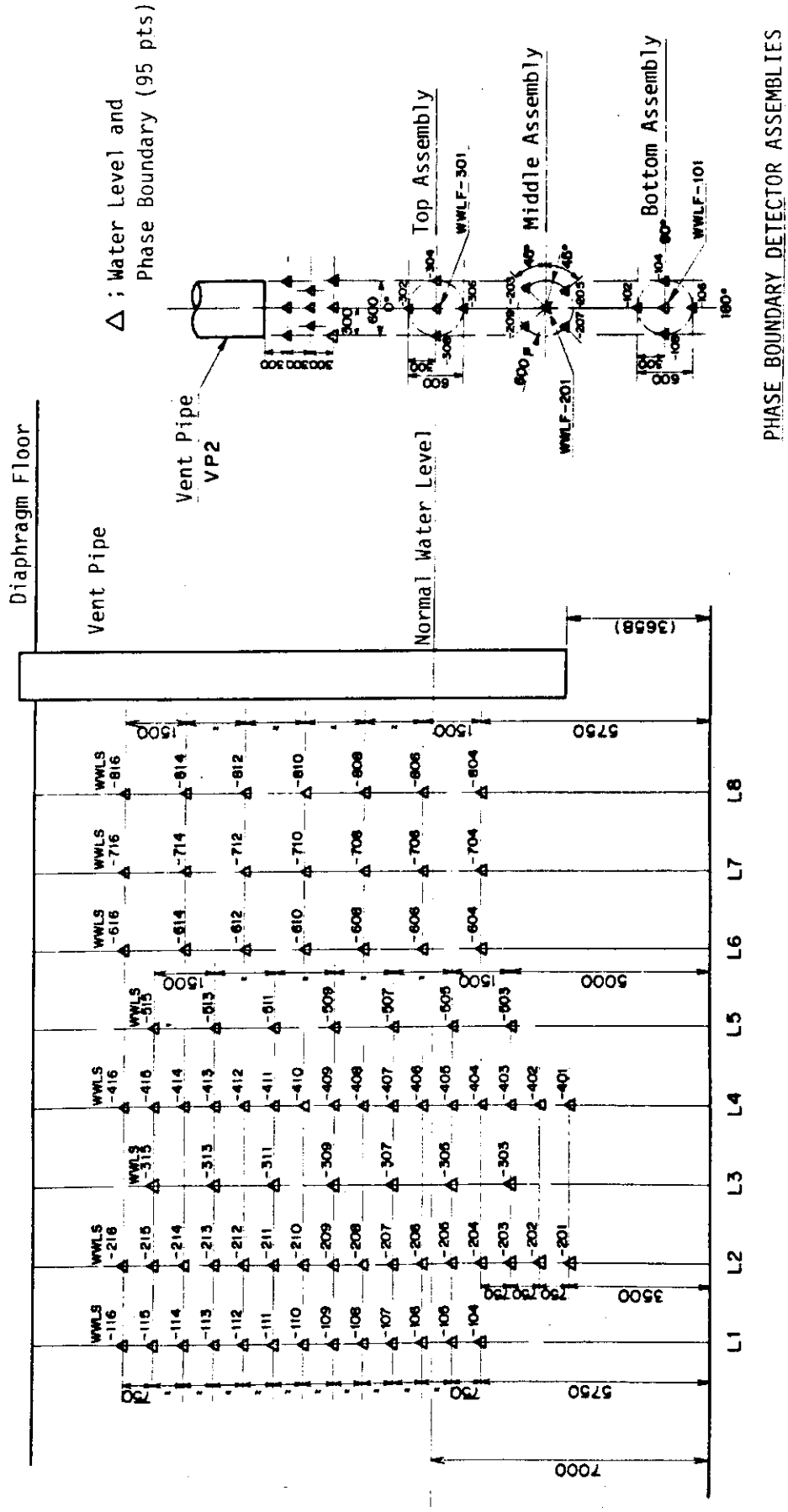


Fig. 2.7 Water Level Detector and Phase Boundary Detector Locations for Wetwell

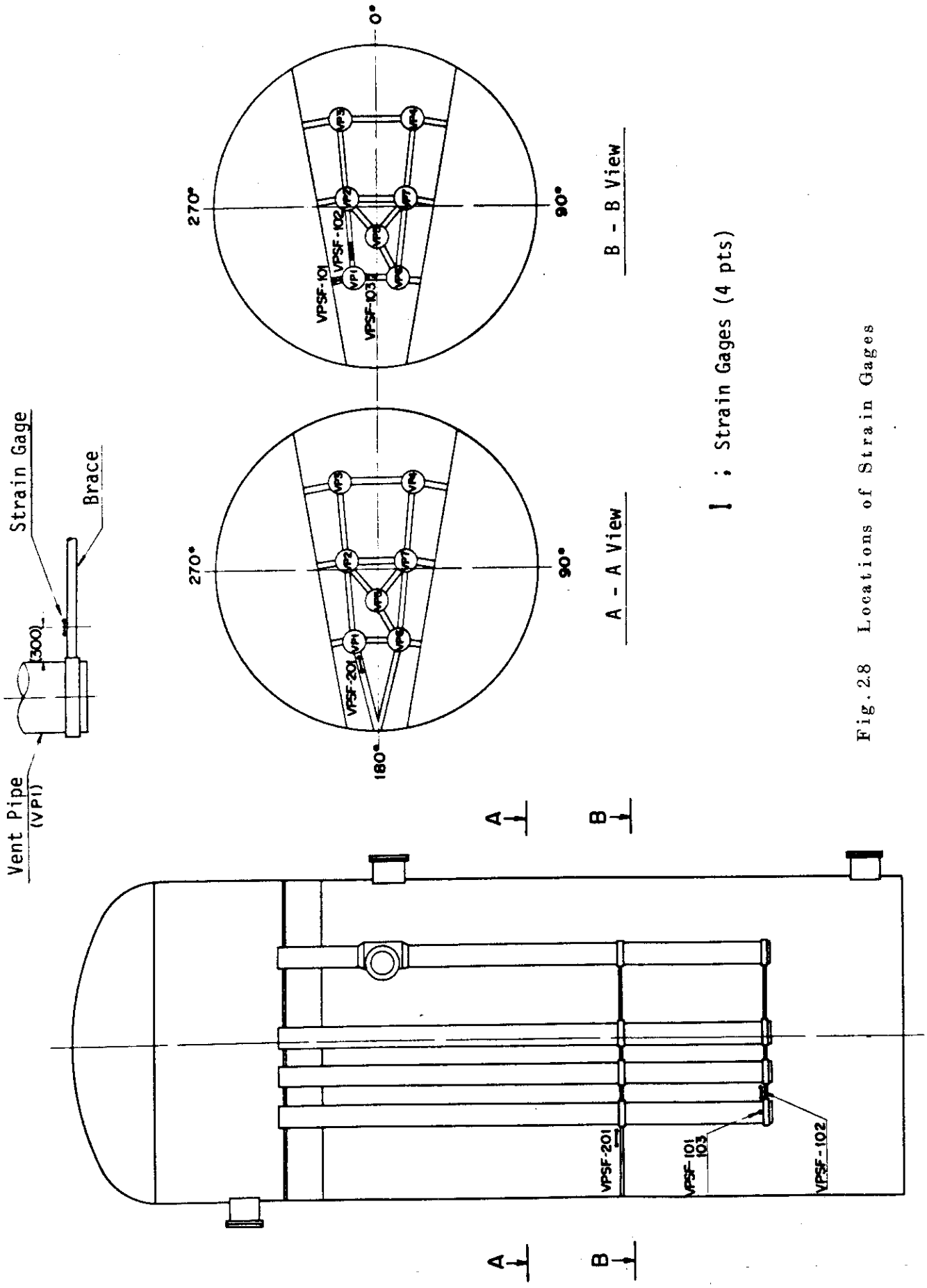


Fig. 2.8 Locations of Strain Gages

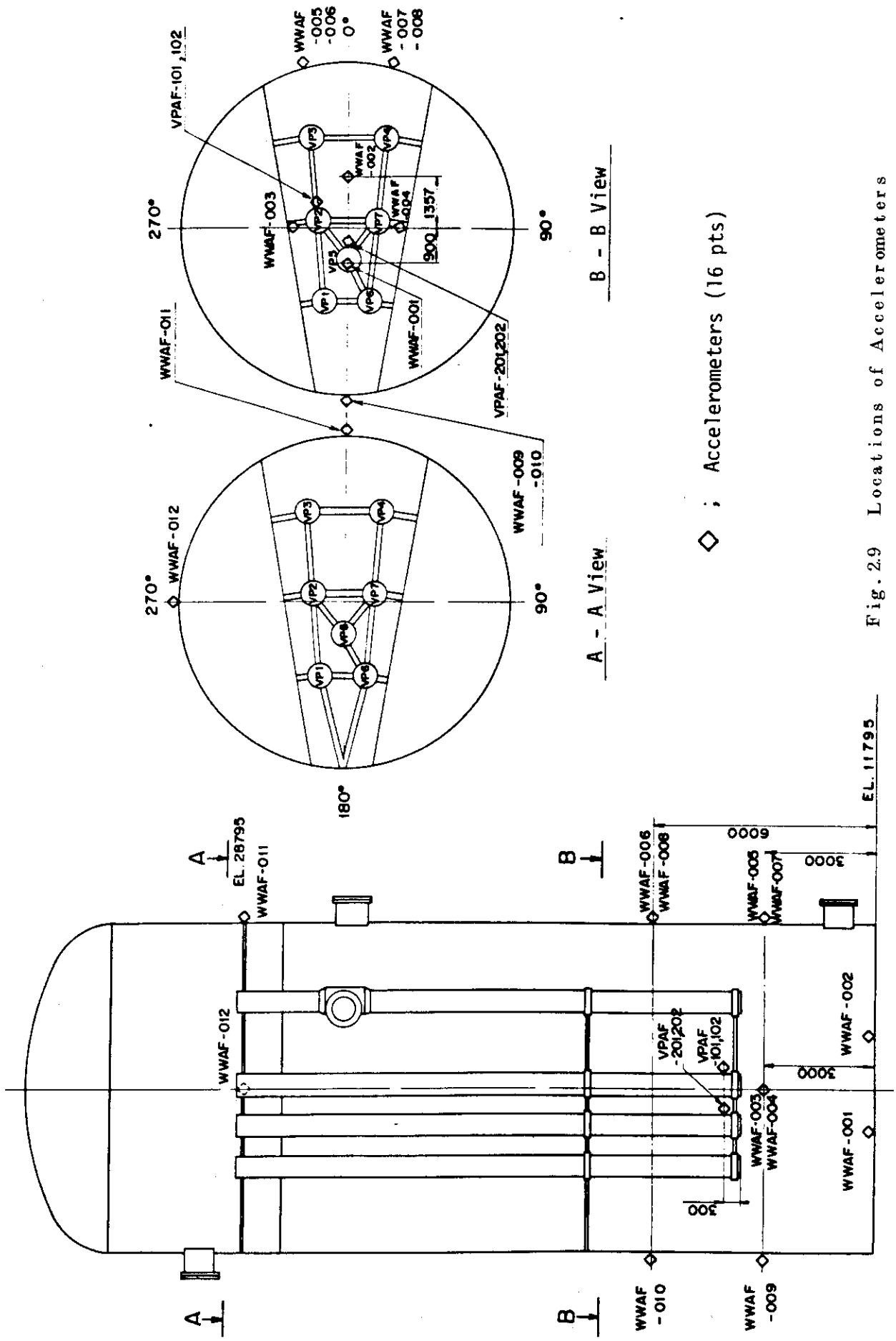


Fig. 2.9 Locations of Accelerometers

Table 2.8 State of Measurement Equipments (Computer Recorded Channels)

| Channel No. | Channel Code | Acceptability o Yes | ø No | Remarks |
|---|---|---|---|---|
| 1 | BPMS-001 | o | | |
| 2 | BPMS-002 | o | | Spurious signal after 1.9sec. |
| 3 | VPMS-001 | o | | |
| 4 | | | | |
| 5 | BPPS-001 | o | | |
| 6 | PVPS-002 | o | | |
| 7 | PVPS-001 | o | | |
| 8 | BPPS-002 | o | | |
| 9 | DWPS-001 | o | | |
| 10 | WWPS-001 | o | | |
| 11 | | | | |
| 12 | PVDS-001 | o | | |
| 13 | PVDS-002 | o | | |
| 14 | PVDS-003 | o | | |
| 15 | PVDS-004 | o | | Unreliable during 24-60sec. |
| 16 | PVDS-005 | o | | |
| 17 | PVDS-006 | o | | |
| 18 | BPDS-001 | | ø | Unreliable |
| 19 | WWDS-001 | o | | |
| 20 | WWDS-002 | o | | Temporarily saturated |
| 21 | | | | |
| 22 | PVTS-001 | o | | |
| 23 | PVTS-002 | o | | |
| 24 | PVTS-003 | o | | |
| 25 | PVTS-004 | o | | |
| 26 | PVTS-005 | o | | |
| 27 | PVTS-006 | o | | |
| 28 | BPTS-001 | o | | |
| 29 | BPTS-002 | o | | |
| 30 | BPTS-003 | o | | |

Table 2.8 (continued)

| Channel No. | Channel Code | Acceptability o Yes ø No | Remarks |
|---|---|---|---|
| 31 | DWTS-101 | o | |
| 32 | DWTS-102 | o | |
| 33 | DWTS-103 | o | |
| 34 | DWTS-201 | o | |
| 35 | DWTS-202 | o | |
| 36 | DWTS-203 | o | |
| 37 | DWTS-301 | o | |
| 38 | DWTS-302 | o | |
| 39 | VPTS-101 | o | |
| 40 | VPTS-102 | o | |
| 41 | VPTS-201 | o | |
| 42 | VPTS-202 | o | |
| 43 | VPTS-301 | o | |
| 44 | VPTS-302 | o | |
| 45 | WWTS-101 | o | |
| 46 | WWTS-102 | o | |
| 47 | WWTS-103 | o | |
| 48 | WWTS-104 | o | |
| 49 | WWTS-105 | o | Wetted during pool swell |
| 50 | WWTS-106 | o | Wetted during pool swell |
| 51 | WWTS-107 | o | |
| 52 | WWTS-108 | o | |
| 53 | WWTS-201 | o | |
| 54 | WWTS-202 | o | |
| 55 | WWTS-203 | o | |
| 56 | WWTS-204 | o | |
| 57 | WWTS-205 | o | Wetted during pool swell |
| 58 | WWTS-206 | o | Wetted during pool swell |
| 59 | WWTS-207 | o | |
| 60 | WWTS-208 | o | |

Table 2.8 (continued)

| Channel No. | Channel Code | Acceptability o Yes | ø No | Remarks |
|---|---|---|---|---|
| 61 | WWTS-301 | | o | |
| 62 | WWTS-302 | | o | |
| 63 | WWTS-303 | | o | |
| 64 | WWTS-304 | | o | |
| 65 | WWTS-305 | | o | Wetted during pool swell |
| 66 | WWTS-306 | | o | Wetted during pool swell |
| 67 | WWTS-307 | | o | |
| 68 | WWTS-308 | | o | |
| 69 | WWTS-401 | | o | |
| 70 | WWTS-402 | | o | |
| 71 | WWTS-403 | | o | |
| 72 | WWTS-404 | | o | |
| 73 | WWTS-405 | | o | Wetted during pool swell |
| 74 | WWTS-406 | | o | Wetted during pool swell |
| 75 | WWTS-407 | | o | |
| 76 | WWTS-408 | | o | |
| 77 | | | | |
| 78 | PVLS-001 | | o | |
| 79 | PVLS-002 | | o | |
| 80 | PVLS-003 | | o | |
| 81 | PVLS-004 | | o | |
| 82 | PVLS-005 | | o | |
| 83 | PVLS-006 | | o | |
| 84 | DWLS-001 | | o | |
| 85 | DWLS-002 | | o | |
| 86 | DWLS-003 | | o | |
| 87 | DWLS-004 | | o | |
| 88 | VPLS-101 | | o | |
| 89 | VPLS-103 | | o | |
| 90 | VPLS-105 | | o | |

Table 2.8 (continued)

| Channel No. | Channel Code | Acceptability o Yes | ø No | Remarks |
|---|---|---|---|---|
| 91 | VPLS-201 | | o | |
| 92 | VPLS-203 | | o | |
| 93 | VPLS-205 | | o | |
| 94 | VPLS-301 | | o | |
| 95 | VPLS-302 | | o | |
| 96 | VPLS-303 | | o | |
| 97 | VPLS-304 | | o | |
| 98 | VPLS-305 | | o | |
| 99 | VPLS-401 | | o | |
| 100 | VPLS-403 | | o | |
| 101 | VPLS-405 | | o | |
| 102 | VPLS-501 | | o | |
| 103 | VPLS-502 | | o | |
| 104 | VPLS-503 | | o | |
| 105 | VPLS-504 | | o | |
| 106 | VPLS-505 | | o | |
| 107 | WWLS-104 | | o | |
| 108 | WWLS-105 | | o | |
| 109 | WWLS-106 | | o | |
| 110 | WWLS-107 | | o | |
| 111 | WWLS-108 | | o | |
| 112 | WWLS-109 | | o | |
| 113 | WWLS-110 | | o | |
| 114 | WWLS-111 | | o | |
| 115 | WWLS-112 | | o | |
| 116 | WWLS-113 | | o | |
| 117 | WWLS-114 | | o | |
| 118 | WWLS-115 | | o | |
| 119 | WWLS-116 | | o | |
| 120 | WWLS-201 | | o | |

Table 2.8 (continued)

| Channel No. | Channel Code | Acceptability o Yes | ø No | Remarks |
|---|---|---|---|---|
| 121 | WWLS-202 | o | | |
| 122 | WWLS-203 | o | | |
| 123 | WWLS-204 | o | | |
| 124 | WWLS-205 | o | | |
| 125 | WWLS-206 | o | | |
| 126 | WWLS-207 | o | | |
| 127 | WWLS-208 | o | | |
| 128 | WWLS-209 | o | | |
| 129 | WWLS-210 | o | | |
| 130 | WWLS-211 | | ø | Cable connector failure |
| 131 | WWLS-212 | o | | |
| 132 | WWLS-213 | o | | |
| 133 | WWLS-214 | o | | |
| 134 | WWLS-215 | o | | |
| 135 | WWLS-216 | | ø | Spurious signal |
| 136 | WWLS-303 | o | | |
| 137 | WWLS-305 | o | | |
| 138 | WWLS-307 | o | | |
| 139 | WWLS-309 | o | | |
| 140 | WWLS-311 | o | | |
| 141 | WWLS-313 | o | | |
| 142 | WWLS-315 | o | | |
| 143 | WWLS-401 | | ø | |
| 144 | WWLS-402 | | ø | |
| 145 | WWLS-403 | | ø | |
| 146 | WWLS-404 | | ø | Cable connector failure |
| 147 | WWLS-405 | | ø | |
| 148 | WWLS-406 | | ø | |
| 149 | WWLS-407 | | ø | |
| 150 | WWLS-408 | | ø | |

Table 2.8 (continued)

| Channel No. | Channel Code | Acceptability o Yes | ø No | Remarks |
|---|---|---|---|---|
| 151 | WWLS-409 | | ø | |
| 152 | WWLS-410 | | ø | |
| 153 | WWLS-411 | | ø | |
| 154 | WWLS-412 | | ø | |
| 155 | WWLS-413 | | ø | Cable connector failure |
| 156 | WWLS-414 | | ø | |
| 157 | WWLS-415 | | ø | |
| 158 | WWLS-416 | | ø | |
| 159 | WWLS-503 | | ø | |
| 160 | WWLS-505 | o | | |
| 161 | WWLS-507 | o | | |
| 162 | WWLS-509 | | ø | Cable connector failure |
| 163 | WWLS-511 | o | | |
| 164 | WWLS-513 | | ø | Cable connector failure |
| 165 | WWLS-515 | o | | |
| 166 | WWLS-604 | | ø | Cable connector failure |
| 167 | WWLS-606 | o | | |
| 168 | WWLS-608 | o | | |
| 169 | WWLS-610 | o | | |
| 170 | WWLS-612 | | ø | Cable connector failure |
| 171 | WWLS-614 | o | | |
| 172 | WWLS-616 | o | | |
| 173 | WWLS-704 | o | | |
| 174 | WWLS-706 | o | | |
| 175 | WWLS-708 | o | | |
| 176 | WWLS-710 | o | | |
| 177 | WWLS-712 | o | | |
| 178 | WWLS-714 | o | | |
| 179 | WWLS-716 | o | | |
| 180 | WWLS-804 | o | | |

Table 2.8 (continued)

| Channel No. | Channel Code | Acceptability o Yes | ø No | Remarks |
|---|---|---|---|---|
| 181 | WWLS-806 | | o | |
| 182 | WWLS-808 | | o | |
| 183 | WWLS-810 | | o | |
| 184 | WWLS-812 | | o | |
| 185 | WWLS-814 | | o | |
| 186 | WWLS-816 | | o | |
| 187 | | | | |
| 188 | | | | |
| 189 | | | | |
| 190 | | | | |
| 191 | | | | |
| 192 | | | | |

Table 2.9 State of Measurement Equipments (PCM Track-1 Channels)

| Channel No. | Channel No. | Acceptability o Yes | ø No | Remarks |
|---|---|---|---|---|
| 1 | BPMF-001 | o | | |
| 2 | BPMF-002 | o | | |
| 3 | | | | |
| 4 | DWPF-001 | o | | |
| 5 | VPPF-101 | o | | |
| 6 | VPPF-201 | o | | |
| 7 | VPPF-301 | o | | |
| 8 | VPPF-302 | o | | |
| 9 | VPPF-303 | o | | |
| 10 | VPPF-401 | o | | |
| 11 | VPPF-501 | o | | |
| 12 | VPPF-502 | o | | |
| 13 | VPPF-503 | o | | |
| 14 | WWPF-101 | o | | |
| 15 | WWPF-102 | o | | |
| 16 | WWPF-103 | o | | |
| 17 | WWPF-104 | o | | |
| 18 | WWPF-105 | o | | |
| 19 | WWPF-106 | o | | |
| 20 | WWPF-107 | o | | |
| 21 | WWPF-201 | o | | |
| 22 | WWPF-202 | o | | |
| 23 | WWPF-203 | o | | |
| 24 | WWPF-301 | o | | |
| 25 | WWPF-302 | o | | |
| 26 | WWPF-303 | o | | |
| 27 | WWPF-401 | o | | |
| 28 | WWPF-402 | o | | |
| 29 | WWPF-501 | o | | |
| 30 | WWPF-502 | o | | |

Table 2.9 (continued)

| Channel No. | Channel Code | Acceptability o Yes | ø No | Remarks |
|---|---|---|---|---|
| 31 | WWPF-602 | | o | |
| 32 | WWPF-702 | | o | |
| 33 | WWPF-001 | | o | |
| 34 | | | | |
| 35 | VPSF-101 | | o | |
| 36 | VPSF-102 | | o | |
| 37 | VPSF-103 | | ø | Sensor failure. |
| 38 | VPSF-201 | | o | |
| 39 | | | | |

Table 2.10 State of Measurement Equipments (PCM Track-2 Channels)

| Channel No. | Channel Code | Acceptability o Yes ø No | Remarks |
|---|---|---|---|
| 1 | BPMF-001 | o | |
| 2 | BPMF-002 | o | |
| 3 | | | |
| 4 | VPAF-101 | o | |
| 5 | VPAF-102 | ø | Spurious signal |
| 6 | VPAF-201 | o | |
| 7 | VPAF-202 | o | |
| 8 | WWAF-001 | ø | Unreasonable data. |
| 9 | WWAF-002 | ø | Unreasonable data. |
| 10 | WWAF-003 | ø | Unreasonable data. |
| 11 | WWAF-004 | ø | Unreasonable data. |
| 12 | WWAF-005 | o | |
| 13 | WWAF-006 | o | |
| 14 | WWAF-007 | o | |
| 15 | WWAF-008 | o | |
| 16 | WWAF-009 | o | |
| 17 | WWAF-010 | o | |
| 18 | WWAF-011 | o | |
| 19 | WWAF-012 | o | |
| 20 | | | |
| 21 | WWLF-101 | o | |
| 22 | WWLF-102 | o | |
| 23 | WWLF-104 | ø | Cable failure |
| 24 | WWLF-106 | o | |
| 25 | WWLF-108 | o | |
| 26 | WWLF-201 | ø | Cable failure |
| 27 | WWLF-203 | ø | |
| 28 | WWLF-205 | ø | |
| 29 | WWLF-207 | o | |
| 30 | WWLF-209 | o | |

Table 2.10 (continued)

| Channel No. | Channel Code | Acceptability o Yes | ø No | Remarks |
|---|---|---|---|---|
| 31 | WWLF-301 | | o | |
| 32 | WWLF-302 | | o | |
| 33 | WWLF-304 | | o | |
| 34 | WWLF-306 | | ø | Cable failure |
| 35 | WWLF-308 | | o | |
| 36 | | | | |
| 37 | | | | |
| 38 | | | | |
| 39 | | | | |

Table 2.11 Calibration Data

PRESSURE CHANNELS (COMPUTER RECORDED)

Pressure Vessel

Date of Calibration Mar. 26, 1979

Range of Calibration Pressure (kPa) 101 - 7348

Water Level in Pressure Vessel (m) Full

Test Containment

Date of Calibration Mar. 27, 1979

Range of Calibration Pressure (kPa) 101 - 476

Water Level in Wetwell (m) 7.3

| Channel No. | Channel Code | kPa/Digit | Max. Deviation kPa |
|---|---|---|---|
| System Computer | | | |
| 5 | BPPS-001 | 4.911 | 20.4 |
| 6 | PVPS-002 | 4.782 | 17.2 |
| 7 | PVPS-001 | 4.807 | 19.1 |
| 8 | BPPS-002 | 4.844 | 41.6 |
| 9 | DWPS-001 | 0.2395 | 2.9 |
| 10 | WWPS-001 | 0.2392 | 4.9 |

DIFFERENTIAL PRESSURE CHANNELS (COMPUTER RECORDED)

Pressure Vessel

Date of Calibration Mar. 26, 1979

Calibration Conducted by Filling Water into Vessel.

Test Containment

Date of Calibration Feb. 24, 1979

Calibration Conducted by:

[] Filling Water into Containment

[X] Applying Known Pressure on Transducer

| Channel No. | Channel Code | kPa/Digit | Max. Deviation kPa |
|---|---|---|---|
| System Computer | | | |
| 12 | PVDS-001 | 0.04850 | |
| 13 | PVDS-002 | 0.02426 | |
| 14 | PVDS-003 | 0.02436 | |
| 15 | PVDS-004 | 0.02415 | |
| 16 | PVDS-005 | 0.02399 | |
| 17 | PVDS-006 | 0.02400 | |
| 18 | BPDS-001 | 2.461 | |
| 19 | WWDS-001 | 0.04451 | |
| 20 | WWDS-002 | 0.05365 | |

Table 2.11 (Continued)

PRESSURE CHANNELS (PCM RECORDED)

Test Containment

Date of Calibration Mar. 27, 1979

Range of Calibration Pressure (kPa) 101 - 476

Water Level in Wetwell (m) 7.3

| Channel No. | Channel Code | kPa/Digit | Max. Deviation kPa |
|---|---|---|---|
| PCM Track-1 | | | |
| 4 | DWPF-001 | 0.9521 | |
| 5 | VPPF-101 | 0.9485 | |
| 6 | VPPF-201 | 0.9605 | |
| 7 | VPPF-301 | 0.9643 | |
| 8 | VPPF-302 | 0.9602 | |
| 9 | VPPF-303 | 0.9496 | |
| 10 | VPPF-401 | 0.9596 | |
| 11 | VPPF-501 | 0.9512 | |
| 12 | VPPF-502 | 0.9558 | |
| 13 | VPPF-503 | 0.9558 | |
| 14 | WWPF-101 | 0.9549 | |
| 15 | WWPF-102 | 0.9519 | |
| 16 | WWPF-103 | 0.9577 | |

| Channel No. | Channel Code | kPa/Digit | Max. Deviation kPa |
|---|---|---|---|
| PCM Track-1 | | | |
| 17 | WWPF-104 | 0.9596 | |
| 18 | WWPF-105 | 0.9615 | |
| 19 | WWPF-106 | 0.9605 | |
| 20 | WWPF-107 | 0.9549 | |
| 21 | WWPF-201 | 0.9630 | |
| 22 | WWPF-202 | 0.9549 | |
| 23 | WWPF-203 | 0.9687 | |
| 24 | WWPF-301 | 0.9531 | |
| 25 | WWPF-302 | 0.9506 | |
| 26 | WWPF-303 | 0.9540 | |
| 27 | WWPF-401 | 0.9568 | |
| 28 | WWPF-402 | 0.9540 | |
| 29 | WWPF-501 | 0.9615 | |
| 30 | WWPF-502 | 0.9549 | |
| 31 | WWPF-602 | 0.9531 | |
| 32 | WWPF-702 | 0.9605 | |
| 33 | WWPF-001 | 0.9454 | |

Table 2.12 Measurement Ranges

| Ch. No. | Item 1) | Location 1) | Measurement Range: Manufacturer's Specification for Transducer | Measurement Range: Expected Overall Range | Measurement Range: Unit | LPF Cut-Off Freq. (Hz) |
|---|---|---|---|---|---|---|
| Computer Recorded Channels | | | | | | |
| 5 - 8 | P | PV/BP | 101 - 9908 | 101 - 10000 | kPa | 100 |
| 9 | P | DW | 0 - 591 | 0 - 600 2) | kPa | 100 |
| 10 | P | WW | 0 - 591 | 0 - 600 2) | kPa | 100 |
| 12 | D | PV | 0 - 98.1 | 0 - 100 | kPa | 100 |
| 13 - 17 | D | PV | 0 - 49 | 0 - 50 | kPa | 100 |
| 18 | D | BP | 0 - 4904 | 0 - 4950 | kPa | 100 |
| 19 | D | WW | 0 - 98.1 | 0 - 100 | kPa | 100 |
| 20 | D | DW-WW | 0 - 98.1 | 0 - 100 | kPa | 100 |
| 22 - 30 | T | PV/BP | | 0 - 300 | °C | 250 |
| 31 - 38 | T | DW | | 0 - 150 | °C | 250 |
| 39 - 44 | T | VP | | 0 - 150 | °C | 250 |
| 45 - 76 | T | WW | | 0 - 150 | °C | 250 |
| PCM Track-1 Channels | | | | | | |
| 4 | P | DW | 0 - 591 | 0 - 600 | kPa | 250 |
| 5 - 33 | P | WW | 0 - 591 | 0 - 600 | kPa | 250 |
| 34 - 38 | S | VP | | -2300 - +2300 | μm/m | 250 |
| PCM Track-2 Channels | | | | | | |
| 4 - 7 | A | VP | -980 - +980 3) | -980 - +980 | $m/s^2$ | 300 |
| 8 - 19 | A | WW | -980 - +980 3) | -196 - +196 | $m/s^2$ | 300 |

Notes:

1) For meanings of the abbreviations see Table 2.5.

2) Linear response of transducers beyond manufacturer-specified range was expected.

3) Range for transducer and charge preamplifier.

# 3. 試験条件と試験結果

TEST1101は原研による最初の公式試験であり，先に株式会社日立製作所によって行われた試験装置の第4回検収試験と同様な破断口径200mmの水放出試験である。ただし本試験においては圧力抑制プールの初期水位が0.22m低く，プール初期温度が約20℃高い。本試験は主としてプールスウェルに関するデータを得ることを目的としており，すでにTEST 0004に関するデータ報告で述べたように，破断口面積は実炉の想定破断口面積の幾何学的縮尺値に対して過大に設定されている。

昭和54年12月までに実施した試験の試験条件の要約をTable 3.1に，本試験の初期条件，データ収録の状況，試験中の物質・エネルギ移動の要約をTable 3.2～3.4にそれぞれ示す。

圧力容器の昇温・昇圧は3月29日，30日の2日間にわたって行った。放出に先立ち，ラプチャディスクの展開を確実にすることを目的として放出配管の末端部から窒素ガスを注入した。まず主放出弁（AV－1）を閉じ冷水放出弁（CV－2）を開いて主放出弁下流側を約2.5MPaまで減圧し，放出配管内に窒素ガスを注入して圧力容器とほぼ等しい圧力まで加圧し，再び主放出弁を開いて放出配管内の流体の温度上昇を待った。放出開始前後の運転記録をFig.3.1に，圧力容器，放出配管内の初期温度分布をFig.3.2に，ドライウェル，ウェットウェル内の初期および放出終了後の温度分布をそれぞれFig.3.3，Fig.3.4に示す。

試験結果の定量的評価・解析は後報にゆずり，ここでは結果の概要のみを述べる。

放出開始前に窒素ガスの充てんを行ったため，放出配管内の初期水位は明らかでない。放出配管内の初期温度は飽和温度を最大11℃下回った。放出開始直後の放出配管，圧力容器内の圧力・温度挙動はTEST 0004の結果と良く一致した。まず，約0.5秒間にわたり放出配管内に最大3.3MPaの一時的減圧が発生した。また圧力容器蒸気ドーム内には，液相の沸騰遅れのため約0.8秒間にわたり最大0.5MPaの一時的減圧が発生した。圧力容器の水位は放出開始後約22秒で放出配管入口レベルに達し，以後放出流体のクォリティが増大した。

放出初期のドライウェル圧力上昇率（放出開始からベントクリアリングまでの期間の平均値）は約155kPa/sであり，TEST 0004と同様に，実炉の再循環系配管両端破断事故時の想定値である165～200kPa/sには達しなかった。

ベントクリアリングは放出開始0.78秒後に各ベント管においてほぼ同時に生じた。ベントクリアリング後プール内に形成された気泡の下端は，ベント管出口の少くとも0.9m下方に達した。ベントクリアリング直後のプール内圧力上昇（LOCA時の動荷重のうち，いわゆるジェット荷重ないし気泡荷重に相当する）はプール底面において最も大きく，約102kPaであった。

ドライウェルからウエットウェルへの空気のキャリオーバは放出開始後約20秒間にわたり活発であり，ことに放出開始後約5秒間はこれに伴うプール水位の上昇が顕著であった。クリアリング直後から約0.6秒間は水面はほぼ平担に上昇したが，以後は乱れが発生し，水位は不均一となった。プールの平均水位は放出開始後約1.6秒で極大値をとり以後低下したが，水面のブレークスルーが発生した後プール水はフロス状の2相流を形成して再び上昇し，放出開始

後約4秒から5秒にかけてプール水位が最高となった。最高水位は計測点の位置によって異り，計測点L1ではプール底面から14.75m（初期水位から7.46m上方）以上の高さまでプール水が到達した。また，プールスウェルに際してウエットウェル気相部の圧力がベント管内の圧力を一時的に上回り，ベント管VP3に設けられたバキュームブレーカが放出開始後1.5秒から1.9秒にかけて開き，最大開度に達した。

放出開始前のドライウェル温度は層状に分布し，最大20℃の不均一を示した。放出開始後約20秒で温度は均一になり，飽和温度にほぼ一致する値となった。ドライウェル内での気液分離の結果，放出流体の一部がドライウェル底面に蓄積した。試験中の蓄積水量は，全放出量とプール水量増加との差から約1300kgと評価され，これは全放出量の約7%に相当する。

試験開始前のウエットウェル気相部温度，圧力抑制プール温度はそれぞれほぼ均一であった。試験開始後，プールスウェルによる気相部圧縮，およびベント管・ダイアフラムフロアからの熱伝達により気相部温度が上昇した。なお，プール底面から11m以下の位置にある熱電対はプールスウェルに際して冠水し，以後の出力は気相部温度を必ずしも正しく示していないと考えられる。プール水の混合は不完全であり，一般にプール底面および水面付近の温度上昇はベント管出口高さ付近の温度上昇より遅れた。

本試験における最大放出流量は約720kg/s，ベント流中の蒸気の最大重量速度は約100 $kg/m^2$-sと評価される。放出開始後約37秒から54秒にかけてベント管内にプール水が間欠的に流入した。約43秒から50秒にかけて計4回，ベント管内の水位は出口の1m以上上方に達し，プール内の圧力は典型的なチャギングの波形を示した。なお，本試験においてはチャギングに際してバキュームブレーカは動作しなかった。

放出開始後約72秒で主放出弁を全閉とし，試験を終了した。

## 謝　辞

本報告は，先に作成した非公開資料JAERI－memo 8325の内容に検討・修正を加えたものを科学技術庁原子力局技術振興課の指導のもとに公開に付するものである。

試験装置の管理，ならびに試験の実施は，原研安全工学部安全性試験技術室の関口一雄室長，三森武男氏，宮本善夫氏，千葉辰夫氏，伊藤秀雄氏，大崎秀機氏，塚本導雄氏が担当した。本報告の刊行にあたり，ここに深甚なる謝意を表する。

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Table 3.1 Test Matrix

(As of January 1980)

| Test Number | DISCHARGE CONDITIONS | | | | | INITIAL CONDITIONS | | | | | Number of Open Vents | Vacuum Breaker Function-ability | Date of Perform-ance | Ref. Report Number JAERI-M | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Pressure Vessel | | Wetwell | | | | | | | |
| | Disch. Fluid | Nozzle Diam. (mm) | Pipe Inlet Level (m) | Drywell Prepurge (%) | Time of Blowdown (s) | Press. (kPa) | Temp. (°C) | Water Level (m) | Pool Temp. (°C) | Vent Subm. (m) | | | | | |
| 0001 | water | 100 | 2.105 | none | | ca.600 | | | 22.5 | 3.342 | 7 | yes | 2/18/79 | | Shakedown test performed by Hitachi Ltd. Excluded from reporting. |
| 0002 | water | 100 | 2.105 | none | | 7015 | 286 | 6.28 | 24.6 | 3.867 | 7 | yes | 2/21 | 8598 | Shakedown test performed by Hitachi Ltd. |
| 0003 | water | 100 | 2.105 | none | | 6976 | 286 | 7.35 | 27.8 | 3.802 | 7 | yes | 2/23 | present | Shakedown test performed by Hitachi Ltd. |
| 0004 | water | 200 | 2.105 | none | | 7005 | 286 | 6.89 | 9.9 | 3.852 | 7 | yes | 2/28 | present | Shakedown test performed by Hitachi Ltd. |
| 1101 | water | 200 | 2.105 | none | 72 | 7020 | 286 | 7.17 | 29.9 | 3.632 | 7 | yes | 3/30 | present | |
| 2101 | water | 74 | 2.105 | none | 343 | 6966 | 287 | 7.99 | 14.2 | 3.345 | 7 | yes | 4/27 | present | |
| 3101 | water | 74 | 2.105 | 23 | 298 | 6887 | 286 | 7.79 | 18.9 | 3.347 | 7 | yes | 5/25 | present | |
| 3102 | water | 200 | 2.105 | 98 | 68.5 | 6966 | 287 | 7.73 | 33.2 | 3.622 | 7 | yes | 6/29 | present | |
| 1201 | steam | 200 | 9.105 | none | 85 | 6894 | 286 | 5.71 | 52.3 | 3.327 | 7 | yes | 8/24 | | |
| 1202 | steam | 240 | 9.105 | none | 89.0 | 6976 | 286 | 5.44 | 53.5 | 3.342 | 7 | yes | 9/14 | | |
| 1203 | steam | 220 | 9.105 | none | 91.9 | 6974 | 286 | 5.06 | 53.9 | 3.340 | 7 | yes | 10/05 | | |
| 1204 | steam | 220 | 9.105 | none | 89.9 | 6971 | 286 | 5.32 | 18.7 | 3.338 | 7 | yes | 10/22 | | |
| 1205 | steam | 220 | 9.105 | none | 94.5 | 6966 | 287 | 5.77 | 53.5 | 3.350 | 7 | no | 11/09 | | |
| 1206 | steam | 220 | 9.105 | none | 85.1 | 6966 | | | | 1.962 | 7 | yes | 11/29 | | |

TEST NO. = A B C D

A = 1 Pool Swell Test

A = 2 Condensation Oscillation Test without Prepurge

A = 3 Condensation Oscillation Test with Prepurge

B = 1 Water Blowdown

B = 2 Steam Blowdown

B = 3 Air Blowdown

CD = Sequential Number

Table 3.2 Test Specifications

FULL-SCALE MARK II CRT DATA SHEET (TEST SPECIFICATIONS)

TEST NUMBER 1101 DATE OF PERFORMANCE Mar. 30, 1979

(A) SPECIFICATIONS FOR TEST FACILITY CONFIGURATION AND TEST PROCEDURE

(1) Diameter of Discharge Nozzle (mm) 200

(2) Inlet Level of Blowdown Pipe (m) 2.105

(3) Percentage of Prepurge, Specified/Performed (%) None

(4) Number of Open Vent Pipes 7

(5) Vacuum Breaker Functionability yes

(B) SPECIFICATIONS FOR INITIAL CONDITIONS

(1) Pressure Vessel

| Item | Specified | Performed |
|---|---|---|
| Pressure (kPa) | 6966 | 7020 * |
| Temperature (°C) | 285 | 285.8 |
| Water Level (m) | 5.0 | 7.160 |

(2) Test Containment

| Item | | Specified | Performed | |
|---|---|---|---|---|
| | | | Before Prepurge | Before Break |
| Pressure (kPa) | Drywell | 101 | | 101 |
| | Wetwell | 101 | | 101 |
| Pool Temp. (°C) | | 25 | | 29.9 |
| Pool Level (m) | | 7.5 | | 7.290 |

* Pressure vessel slightly leaked before the test.

(C) AMBIENT CONDITIONS

Pressure (kPa) _____ Temperature (°C) 17.4

Table 3.3 Summary of Data Recording

(A) Structure of Computer Processed Tapes

| Tape No. | | 11010 | | 11011 | | 11012 | |
|---|---|---|---|---|---|---|---|
| File No. | Index | Contents | Period (s) | Contents | Period (s) | Contents | Period (s) |
| 1 | | Tape No. Heading | | Tape No. Heading | | Tape No. Heading | |
| 2 | 1 | R0 | | R0 | | R0 | |
| 3 | 2 | R1 | | R1 | | R1 | |
| 4 | 3 | R2 | | R2 | | R2 | |
| 5 | 4 | Data | -14-106 | Data | -11-94 | Data | -13-93 |
| 6 | 5 | | | | | | |

(B) Structure of PCM Tape

| Record No. | Tape Counter Indication | Time Code | Contents |
|---|---|---|---|
| 1 | 1300 - 1353 | 17°45'09" - | R0 |
| 2 | 1353 - 1420 | 17°47'06" - | R1 |
| 3 | 1420 - 1501 | 17°48'36" - | R2 |
| 4 | 1501 - 2040 | 17°54'17" - | Data |
| 5 | | | |
| 6 | | | |

Notes: 1. Last digit of tape number indicates contents of the tape;
0 Online data recorded by the system computer.
1 Data transferred from PCM recorder track 1.
2 Data transferred from PCM recorder track 2.
2. R0, R1, R2 are records for calibration of data channels;
R0 Zero scale calibration outputs.
R1 Full scale calibration outputs.
R2 Initial values.

Table 3.4 Initial and Final Conditions

TEST NUMBER 1101 DATE OF PERFORMANCE Mar.30,'79

| | Unit | Before Test | 100 s after* Break | Change |
|---|---|---|---|---|
| PRESSURE VESSEL | | | | |
| Pressure | kPa | 7020 | | |
| Averaged Liquid Temperature | °C | 285.8 | 142.3 | |
| Max./Min. Liquid Temperature | °C | 286.1/285.4 | | |
| Averaged Steam Temperature | °C | 285.8 | 166.0 | |
| Sat. Press. Based on Liquid Temp. | kPa | 7001 | | |
| Liquid Level Based on PVDS-001 | m | 7.160 | 0.452 | |
| Liquid Level Based on PVDS-002 - 006 | m | 7.160 | 0.423 | |
| Mass of Water | kg | $2.08 \times 10^4$ | $2.20 \times 10^3$ | $-1.86 \times 10^4$ |
| Energy of Water | kJ | $2.68 \times 10^7$ | $1.46 \times 10^6$ | $-2.53 \times 10^7$ |
| BLOWDOWN PIPE | | | | |
| Max./Min. Temperature | °C | 276.6/274.5 | | |
| DRYWELL | | | | |
| Pressure | kPa | 101 | (231) | |
| Sat. Temp. Based on Pressure | °C | | 127.5 | |
| Averaged Gas Phase Temperature | °C | 39.3 | 130.4 | |
| Max./Min. Gas Phase Temperature | °C | 49.0/27.9 | 131.2/127.1 | |
| Liquid Level | m | | 0 - 0.042 | |
| VENT PIPES | | | | |
| Max./Min. Inlet Temperature | °C | 18.1/17.7 | 131.3/70.5 | |
| Max./Min. Outlet Temperature | °C | 30.4/30.3 | 53.3/46.3 | |
| WETWELL | | | | |
| Pressure | kPa | 101 | (226) | |
| Averaged Pool Temperature | °C | 29.9 | 50.2 | |
| Max./Min. Pool temperature | °C | 30.4/29.3 | 54.1/45.3 | |
| Averaged Airspace Temperature | °C | 18.1 | 44.4 | |
| Max./Min. Airspace Temperature | °C | 18.5/17.8 | 54.5/34.5 | |
| Liquid Level | m | 7.290 | 7.924 | |
| Mass of Water | kg | $1.95 \times 10^5$ | $2.12 \times 10^5$ | $1.70 \times 10^4$ |
| Energy of Water | kJ | $2.44 \times 10^7$ | $4.46 \times 10^7$ | $2.02 \times 10^7$ |
| Mass of Air | kg | | | |

REMARKS

* Numbers in parentheses are data measured after opening the equalizer valve between drywell and wetwell.

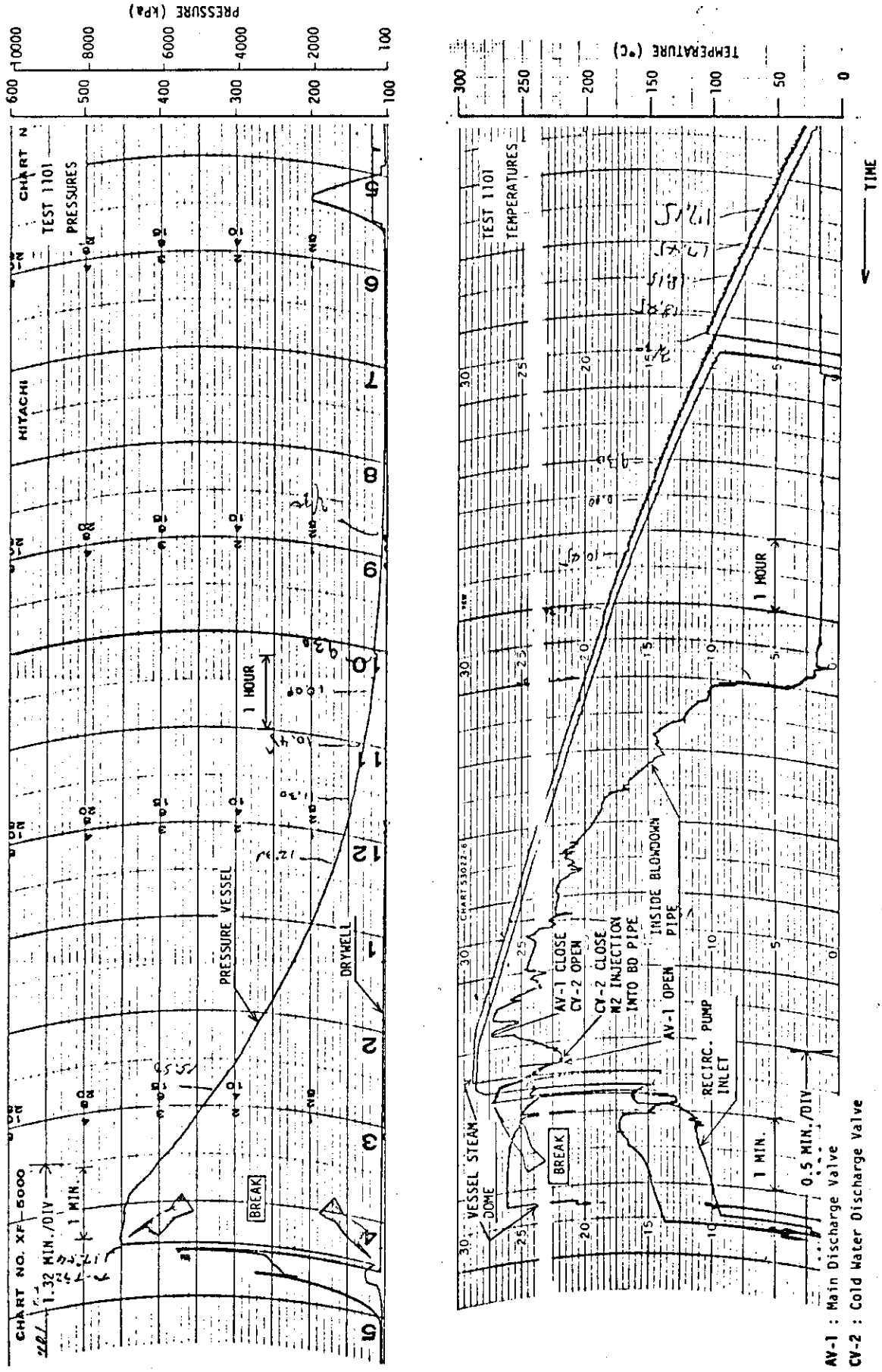



Fig. 3.1 Operation Records

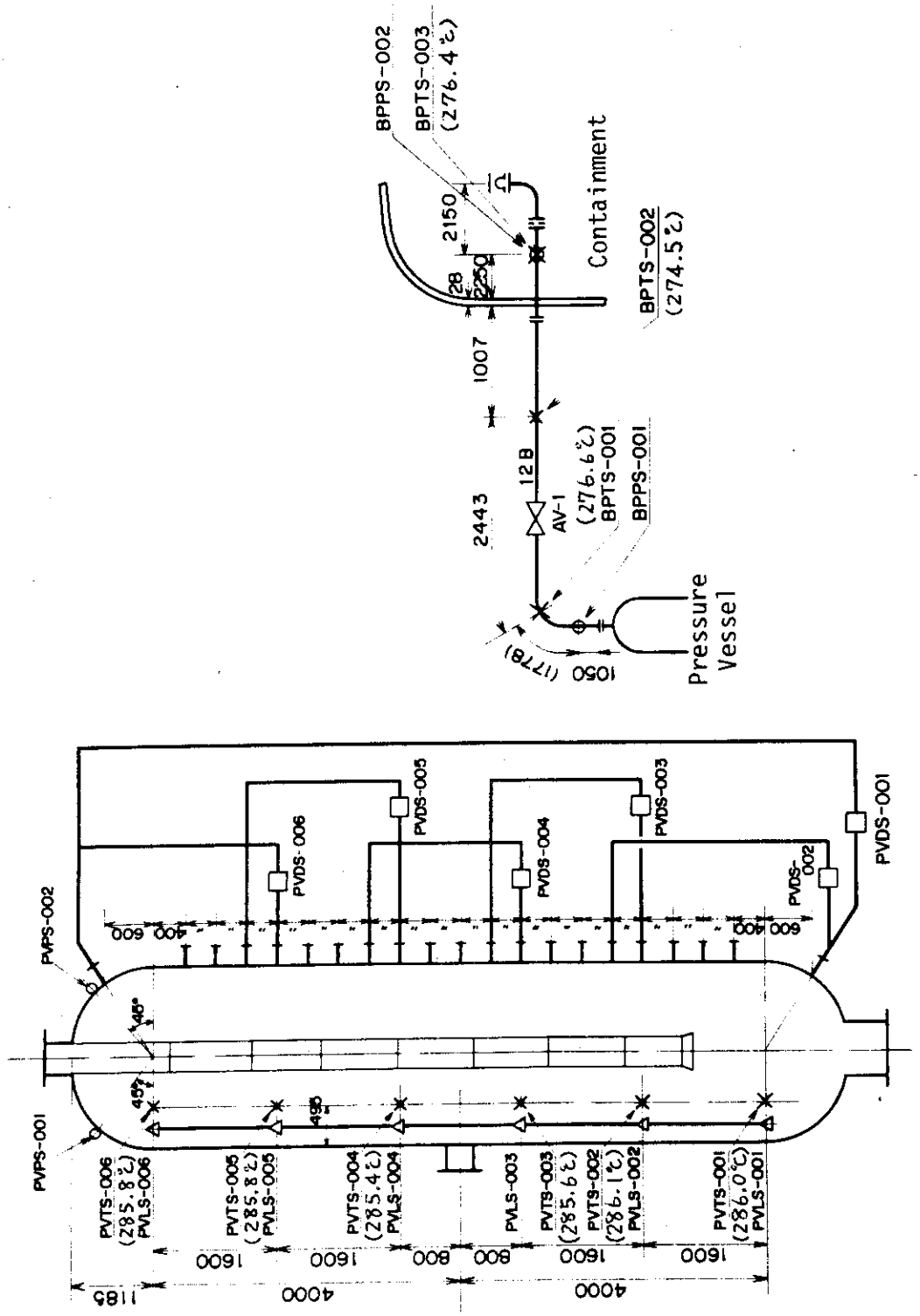
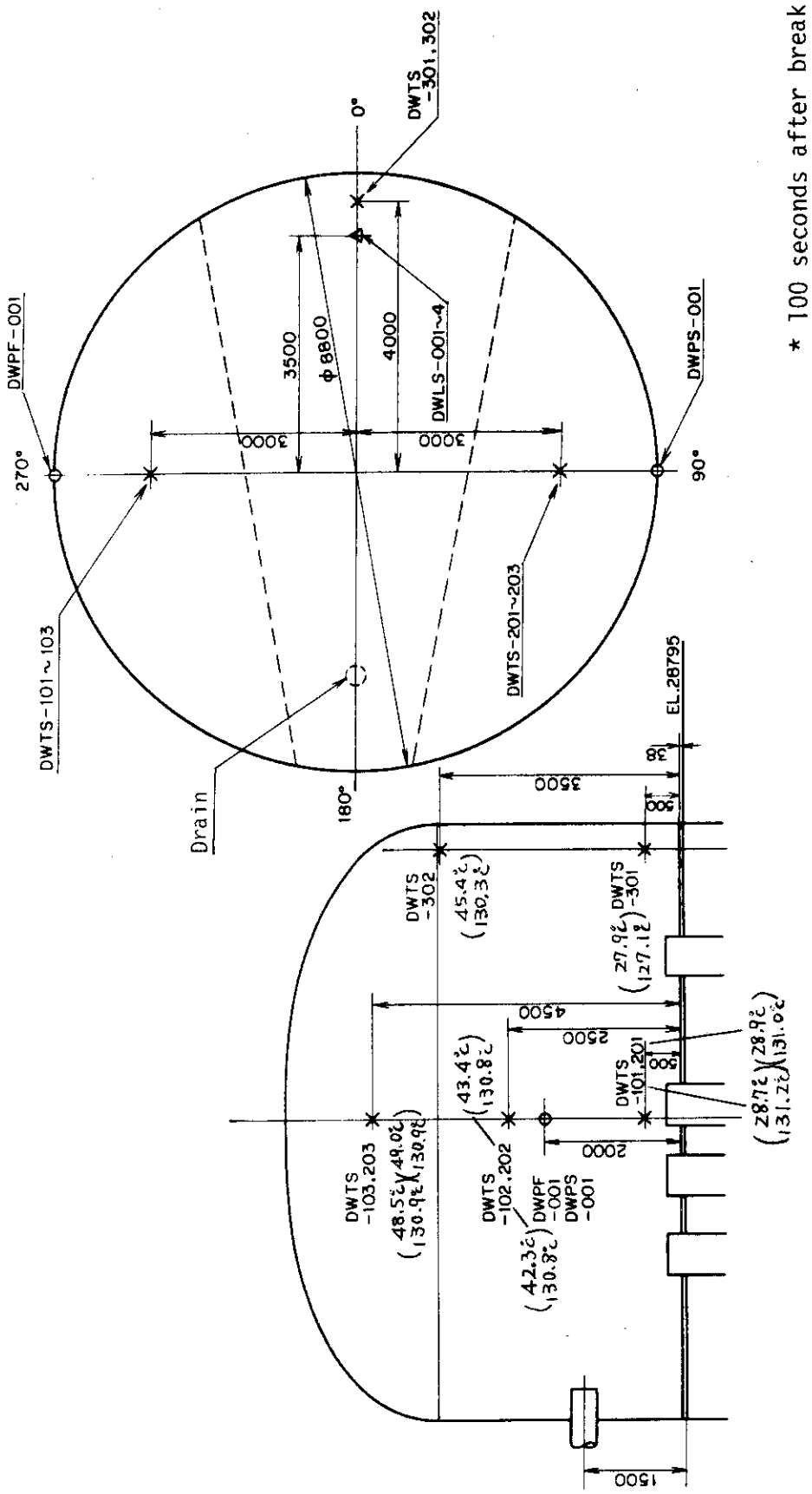
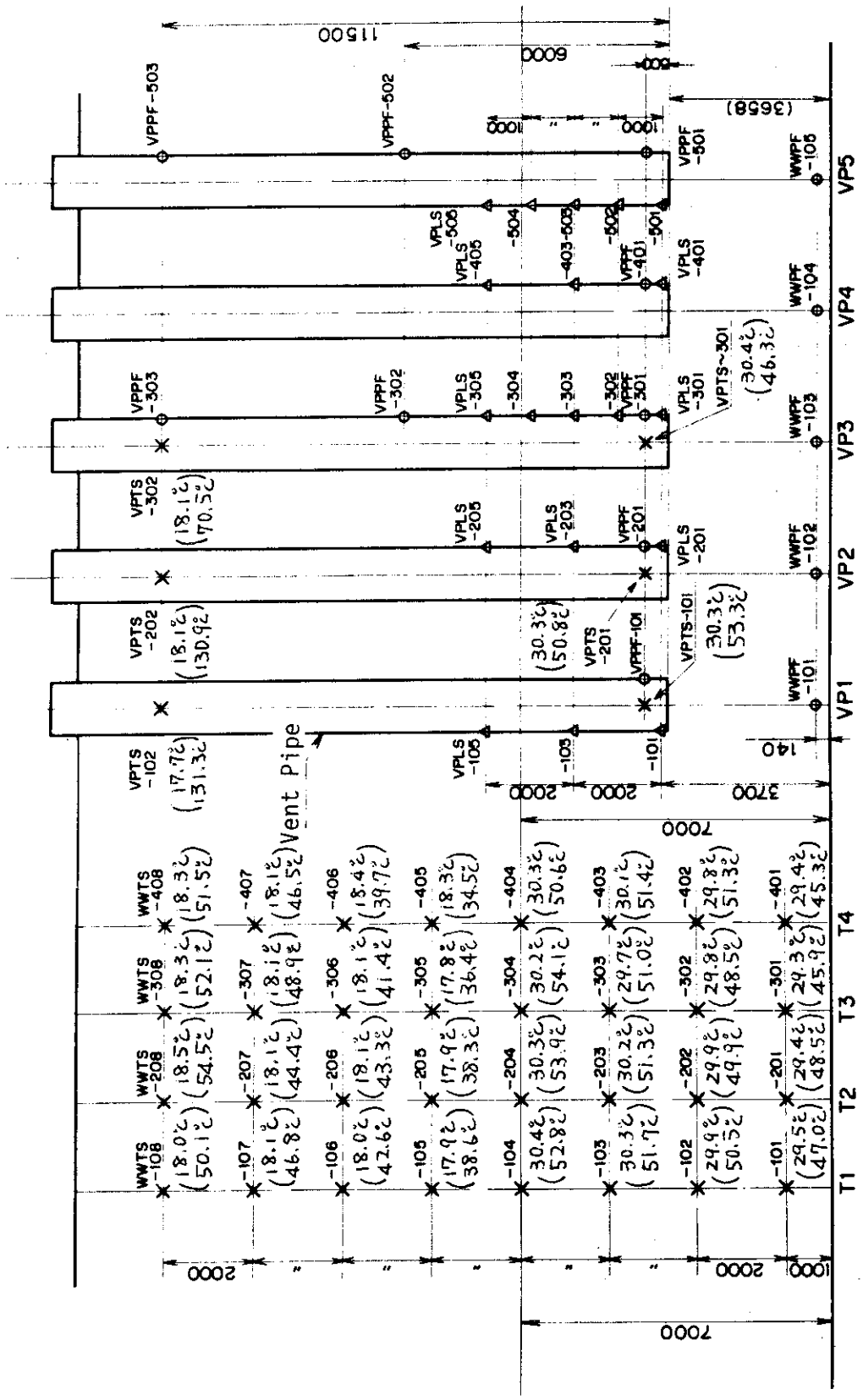



Fig. 3.2 Initial Temperature Distribution in Primary System




* 100 seconds after break

Fig. 3.3 Initial and Final* Temperature Distributions in Drywell




* 100 seconds after break

Fig. 3.4 Initial and Final* Temperature Distributions in Wetwell

## Long Term Plots of Data

Long Term Plot Specification

Period 0 – 100 s

| Plot No. | Recording System | Recording Rate (data/s) | Sampling Rate for Plots | Interval for Envelope Plots (s) | Remarks |
|---|---|---|---|---|---|
| L-0-1 to 37 | Computer | 50.00 | 1/3 | | |
| L-1-1 to 32 | PCM Track-1 | 455.56 | 1/26 | 1.199 | |
| L-2-1 to 14 | PCM Track-2 | 455.56 | 1/26 | 1.199 | |

List of Long Term Plots

Computer Recorded Channels

| | | |
|---|---|---|
| Plot L-0-1 | Actuation Signals | |
| L-0-2 | Pressures in Pressure Vessel and Blowdown Pipe | |
| L-0-3 | Pressures in Drywell and Wetwell Airspace | |
| L-0-4 | DP over Pressure Vessel | |
| L-0-5 | DP across Wetwell Pool Surface | |
| L-0-6 | DP across Diaphragm Floor | |
| L-0-7 | Temperatures in Pressure Vessel | |
| L-0-8 | Temperatures in Blowdown Pipe | |
| L-0-9 | Temperatures in Drywell | (DWTS-101-103) |
| L-0-10 | Temperatures in Drywell | (DWTS-201-203) |
| L-0-11 | Temperatures in Drywell | (DWTS-301-302) |
| L-0-12 | Temperatures in Vent Pipe | (VP1) |
| L-0-13 | Temperatures in Vent Pipe | (VP2) |
| L-0-14 | Temperatures in Vent Pipe | (VP3) |
| L-0-15 | Temperatures in Wetwell | (WWTS-101-104) |
| L-0-16 | Temperatures in Wetwell | (WWTS-108-108) |
| L-0-17 | Temperatures in Wetwell | (WWTS-201-204) |
| L-0-18 | Temperatures in Wetwell | (WWTS-208-208) |
| L-0-19 | Temperatures in Wetwell | (WWTS-301-304) |
| L-0-20 | Temperatures in Wetwell | (WWTS-308-308) |
| L-0-21 | Temperatures in Wetwell | (WWTS-401-404) |
| L-0-22 | Temperatures in Wetwell | (WWTS-408-408) |
| L-0-23 | Water Level in Pressure Vessel | |
| L-0-24 | Water Level in Drywell | |
| L-0-25 | Water Level in Vent Pipe | (VP1) |
| L-0-26 | Water Level in Vent Pipe | (VP2) |
| L-0-27 | Water Level in Vent Pipe | (VP3) |
| L-0-28 | Water Level in Vent Pipe | (VP4) |
| L-0-29 | Water Level in Vent Pipe | (VP5) |
| L-0-30 | Water Level in Wetwell | (WWLS-104-116) |
| L-0-31 | Water Level in Wetwell | (WWLS-201-216) |
| L-0-32 | Water Level in Wetwell | (WWLS-303-315) |
| L-0-33 | Water Level in Wetwell | (WWLS-401-416) |
| L-0-34 | Water Level in Wetwell | (WWLS-503-515) |
| L-0-35 | Water Level in Wetwell | (WWLS-604-616) |
| L-0-36 | Water Level in Wetwell | (WWLS-704-716) |
| L-0-37 | Water Level in Wetwell | (WWLS-804-816) |

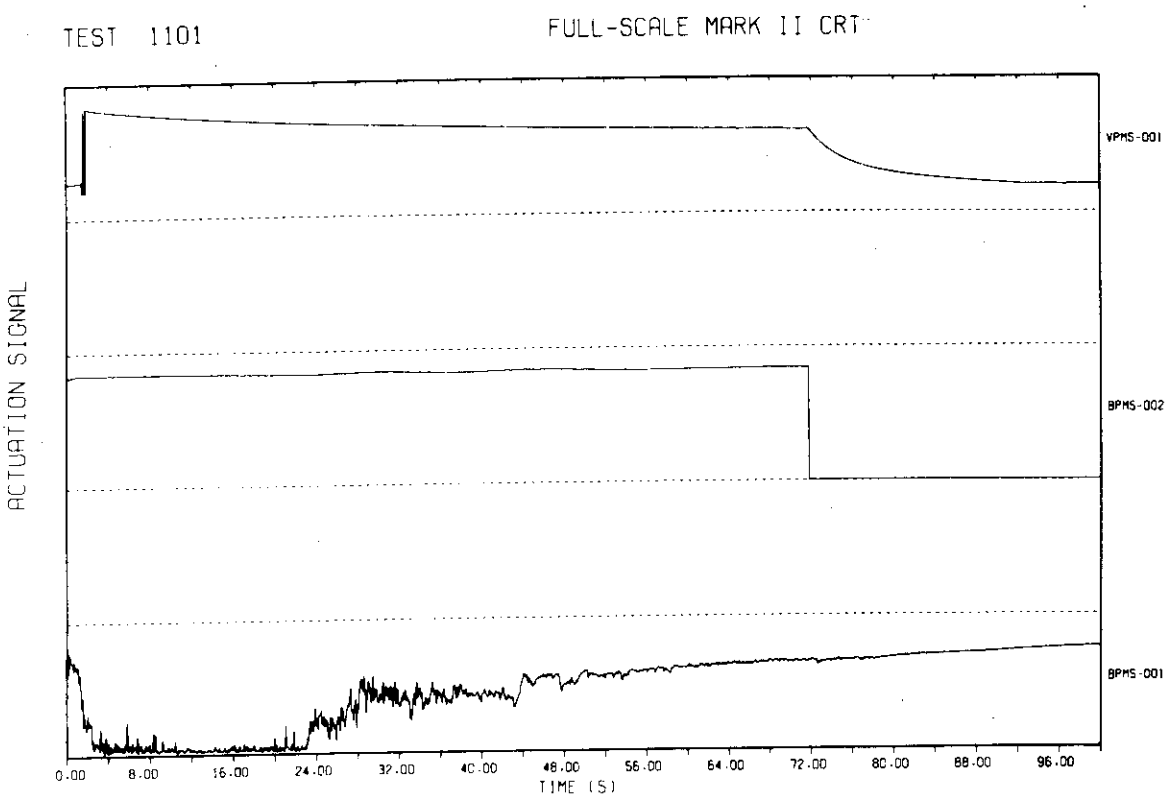
List of Long Term Plots (Continued)

PCM Track-1 Channels

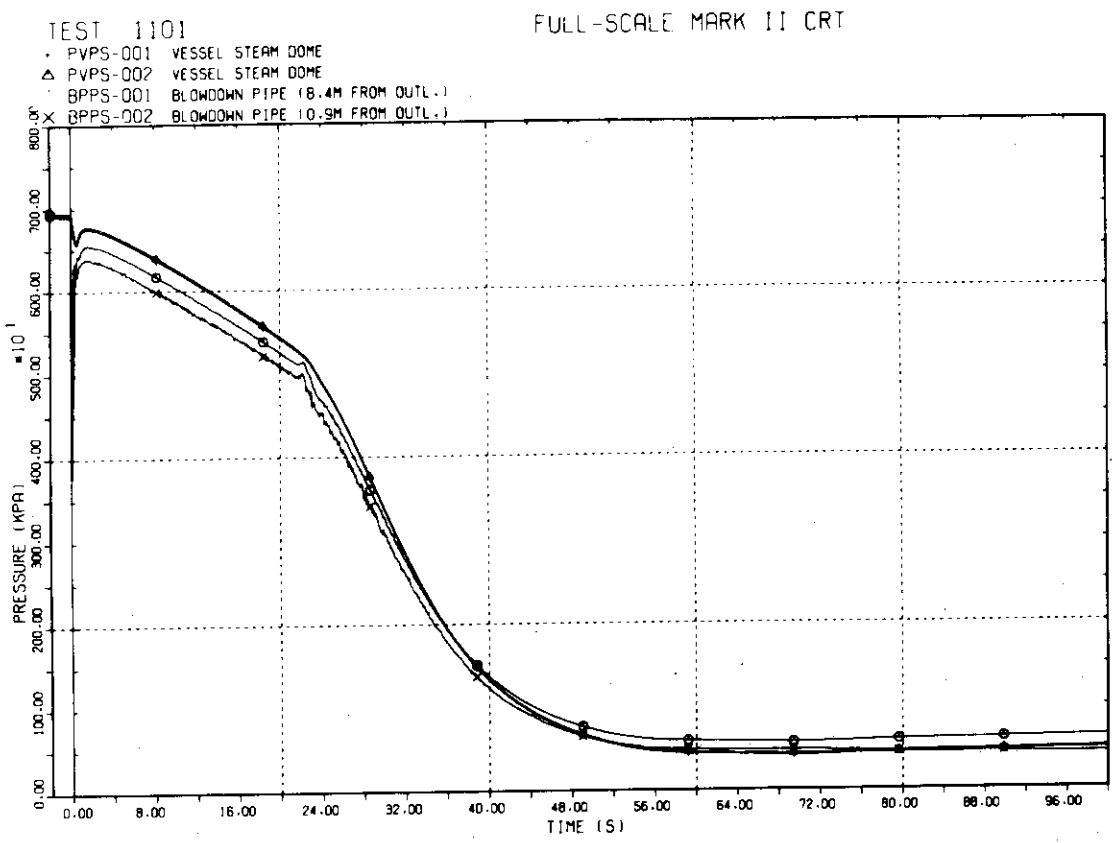
| | | |
|---|---|---|
| Plot L-1-1 | Pressures in Drywell and Wetwell Airspace | |
| L-1-2 | Pressure in Vent Pipe | (VPPF-101) |
| L-1-3 | Pressure in Vent Pipe | (VPPF-201) |
| L-1-4 | Pressure in Vent Pipe | (VPPF-301) |
| L-1-5 | Pressure in Vent Pipe | (VPPF-302) |
| L-1-6 | Pressure in Vent Pipe | (VPPF-303) |
| L-1-7 | Pressure in Vent Pipe | (VPPF-401) |
| L-1-8 | Pressure in Vent Pipe | (VPPF-501) |
| L-1-9 | Pressure in Vent Pipe | (VPPF-502) |
| L-1-10 | Pressure in Vent Pipe | (VPPF-503) |
| L-1-11 | Pressure in Wetwell | (WWPF-101) |
| L-1-12 | Pressure in Wetwell | (WWPF-102) |
| L-1-13 | Pressure in Wetwell | (WWPF-103) |
| L-1-14 | Pressure in Wetwell | (WWPF-104) |
| L-1-15 | Pressure in Wetwell | (WWPF-105) |
| L-1-16 | Pressure in Wetwell | (WWPF-106) |
| L-1-17 | Pressure in Wetwell | (WWPF-107) |
| L-1-18 | Pressure in Wetwell | (WWPF-201) |
| L-1-19 | Pressure in Wetwell | (WWPF-202) |
| L-1-20 | Pressure in Wetwell | (WWPF-203) |
| L-1-21 | Pressure in Wetwell | (WWPF-301) |
| L-1-22 | Pressure in Wetwell | (WWPF-302) |
| L-1-23 | Pressure in Wetwell | (WWPF-303) |
| L-1-24 | Pressure in Wetwell | (WWPF-401) |
| L-1-25 | Pressure in Wetwell | (WWPF-402) |
| L-1-26 | Pressure in Wetwell | (WWPF-501) |
| L-1-27 | Pressure in Wetwell | (WWPF-502) |
| L-1-28 | Pressure in Wetwell | (WWPF-602) |
| L-1-29 | Pressure in Wetwell | (WWPF-702) |
| L-1-30 | Strain of Vent Pipe Brace | (VPSF-101) |
| L-1-31 | Strain of Vent Pipe Brace | (VPSF-102) |
| L-1-32 | Strain of Vent Pipe Brace | (VPSF-201) |

PCM Track-2 Channels

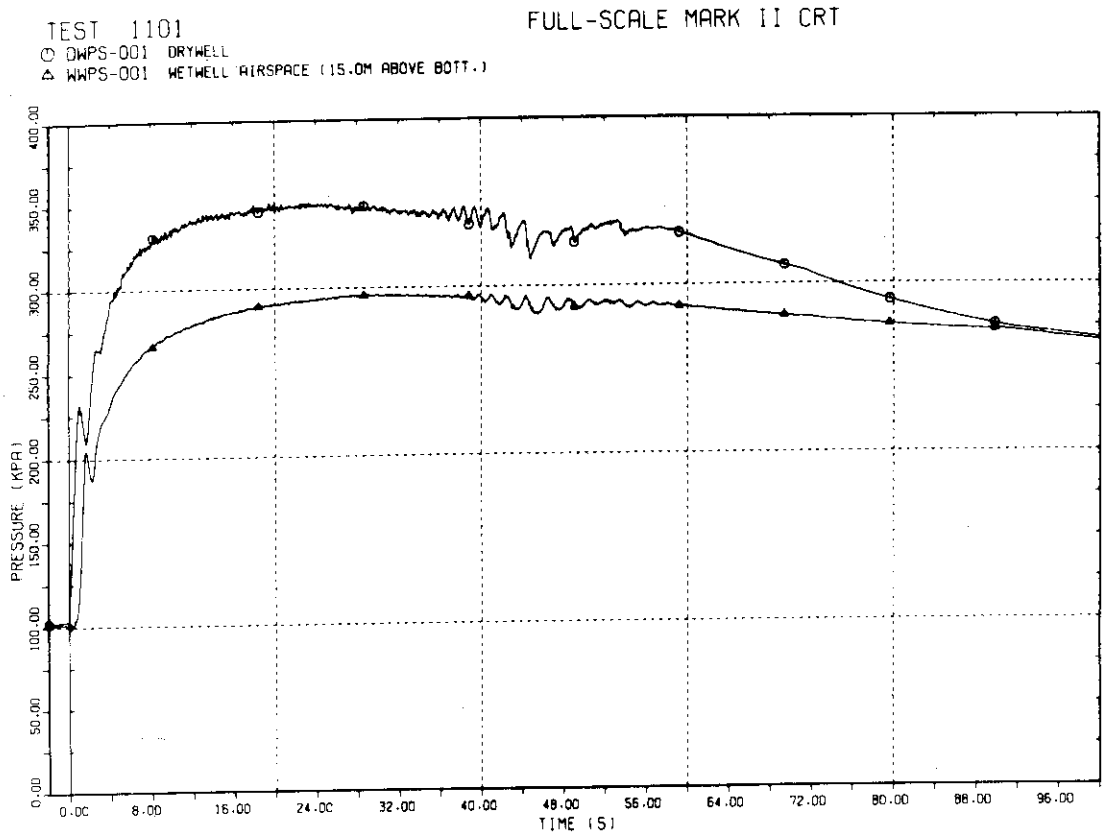
| | | |
|---|---|---|
| Plot L-2-1 | Acceleration of Vent Pipe Outlet | (VPAF-101) |
| L-2-2 | Acceleration of Vent Pipe Outlet | (VPAF-201) |
| L-2-3 | Acceleration of Vent Pipe Outlet | (VPAF-202) |
| L-2-4 | Acceleration of Containment Structure | (WWAF-005) |
| L-2-5 | Acceleration of Containment Structure | (WWAF-006) |
| L-2-6 | Acceleration of Containment Structure | (WWAF-007) |
| L-2-7 | Acceleration of Containment Structure | (WWAF-008) |
| L-2-8 | Acceleration of Containment Structure | (WWAF-009) |
| L-2-9 | Acceleration of Containment Structure | (WWAF-010) |
| L-2-10 | Acceleration of Containment Structure | (WWAF-011) |
| L-2-11 | Acceleration of Containment Structure | (WWAF-012) |
| L-2-12 | Phase Boundary Signals | (WWLF-101-108) |
| L-2-13 | Phase Boundary Signals | (WWLF-201-209) |
| L-2-14 | Phase Boundary Signals | (WWLF-301-308) |



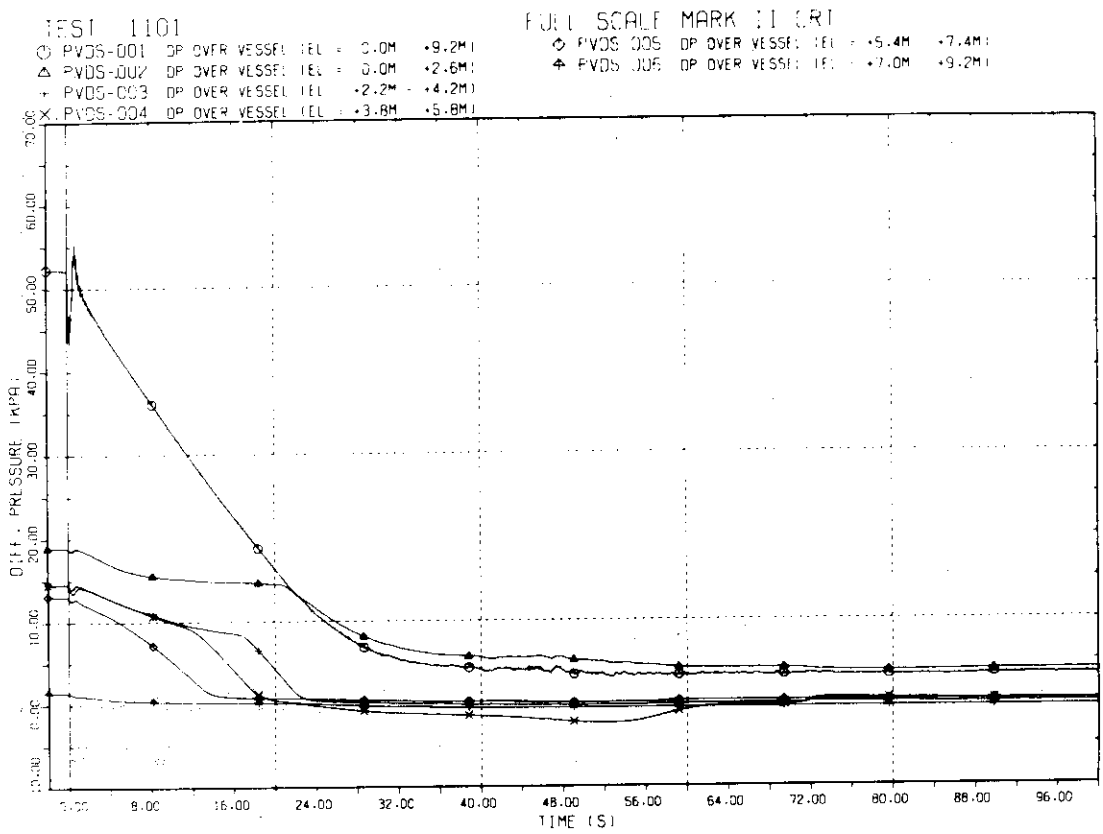

Plot L-0-1 Actuation Signals



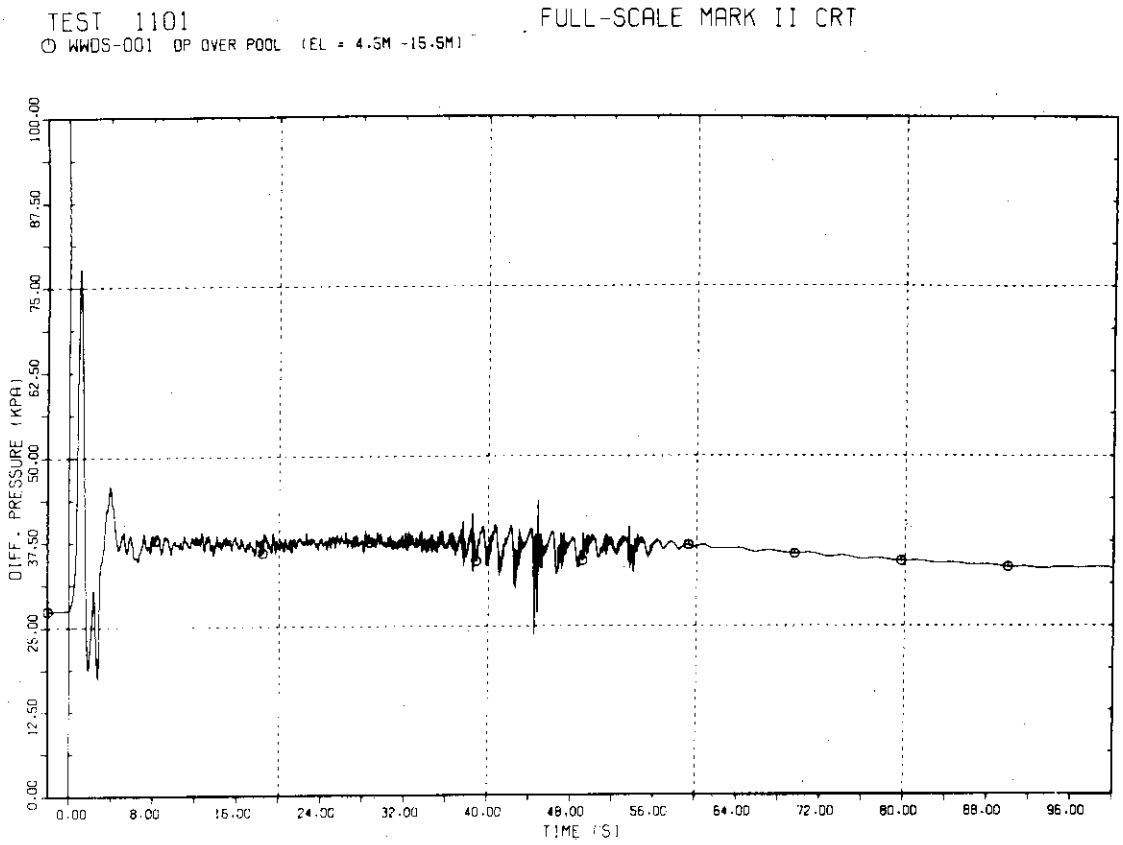

Plot L-0-2 Pressures in Vessel and Blowdown Pipe



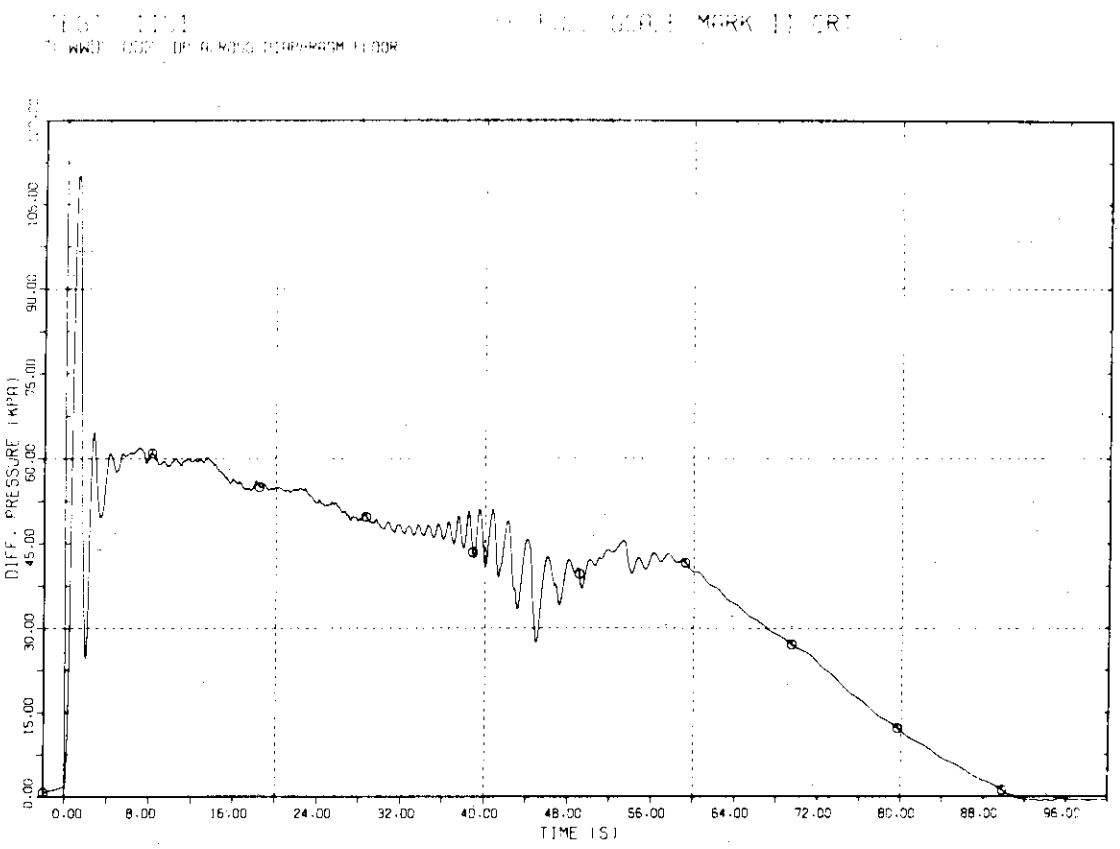

Plot L-0-3 Pressures in Drywell and Wetwell Airspace



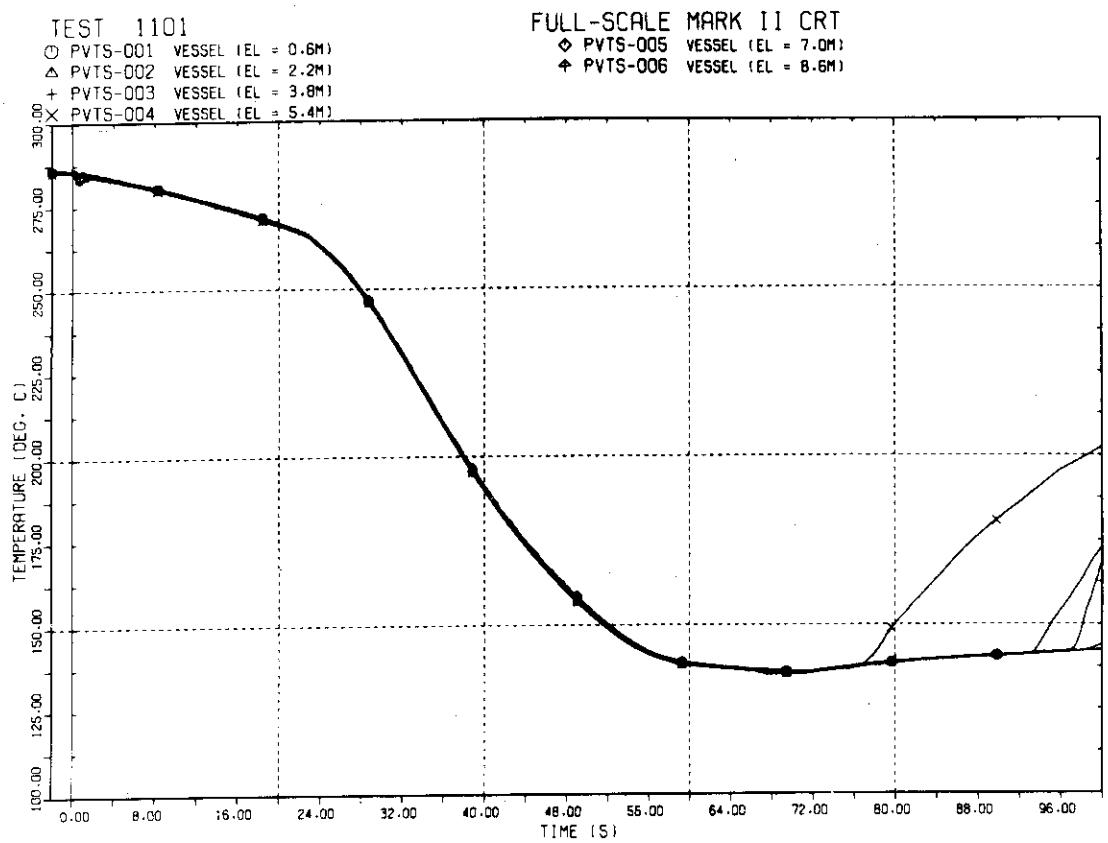

Plot L-0-4 DP over Vessel



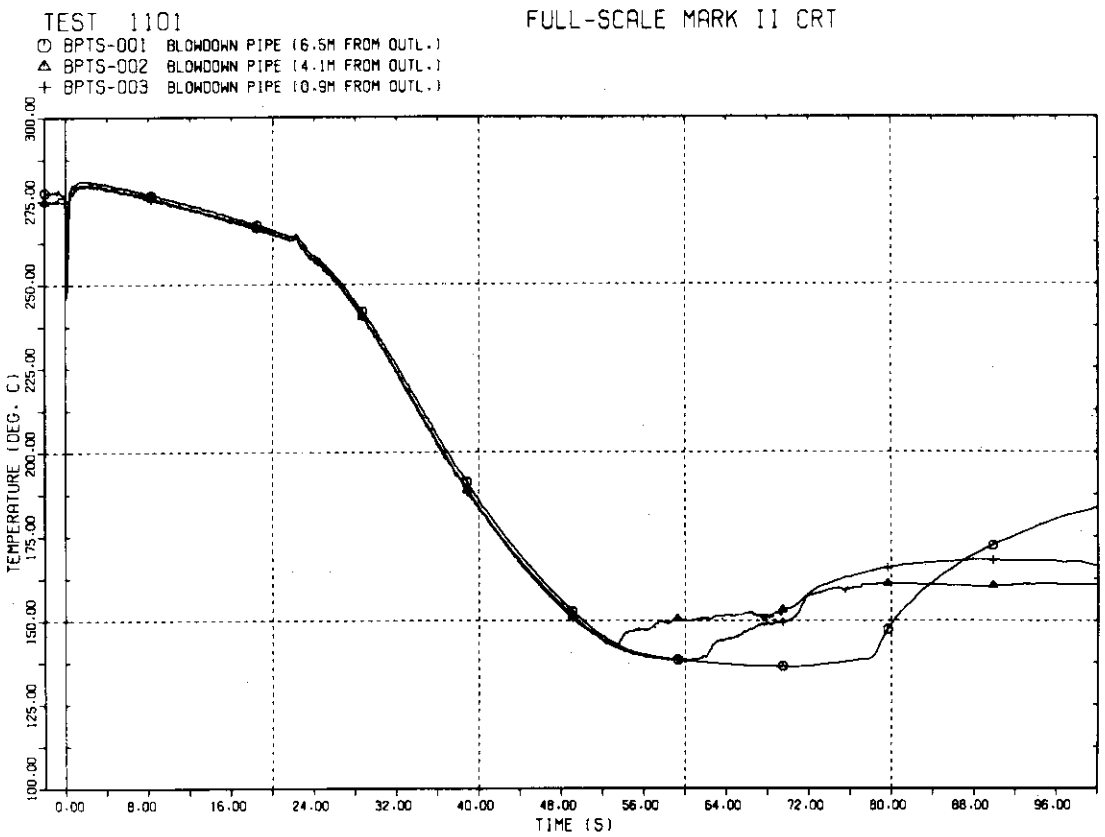

Plot L-0-5 DP across Pool Surface



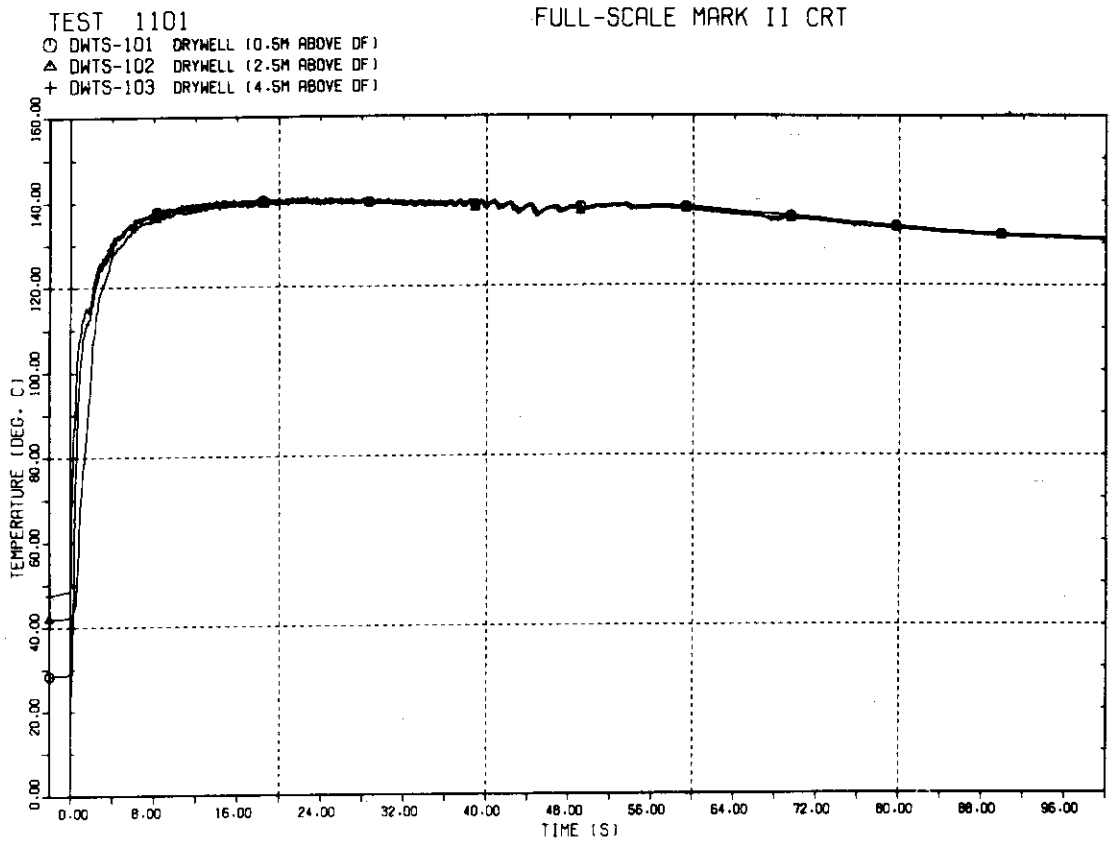

Plot L-0-6 DP across Diaphragm Floor



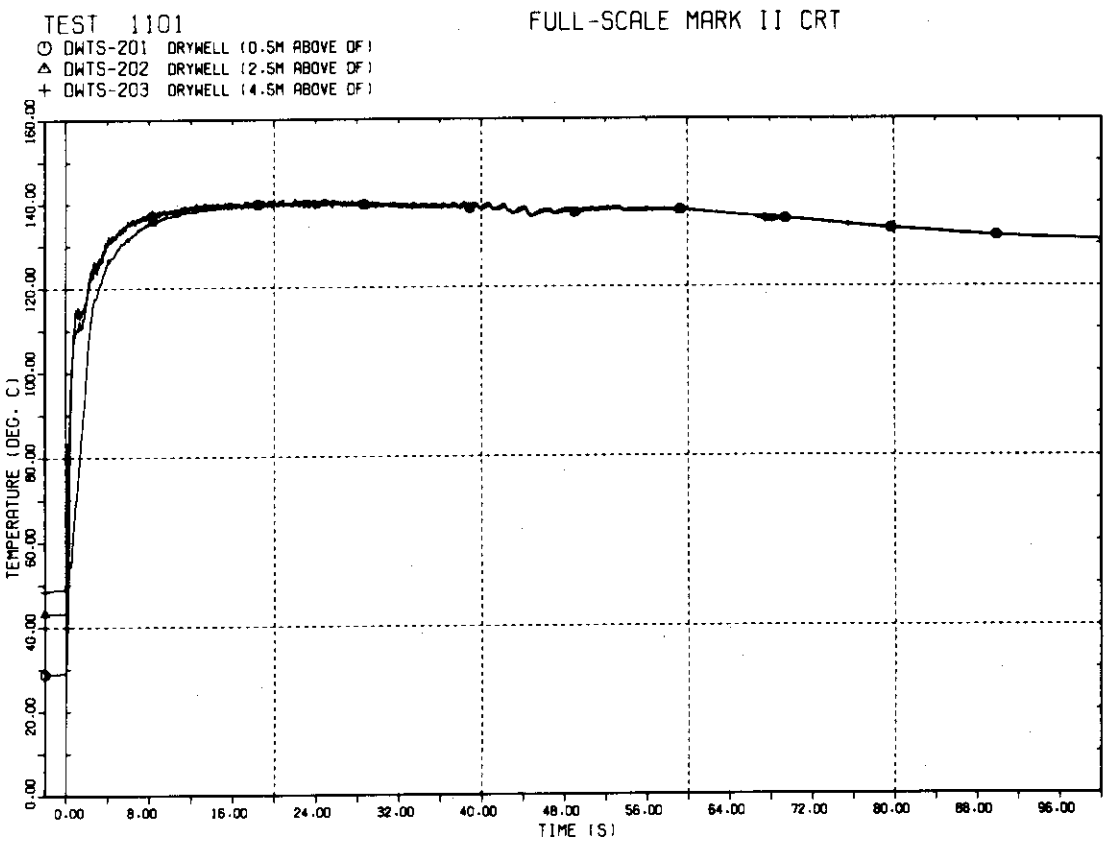

Plot L-0-7 Temperatures in Vessel



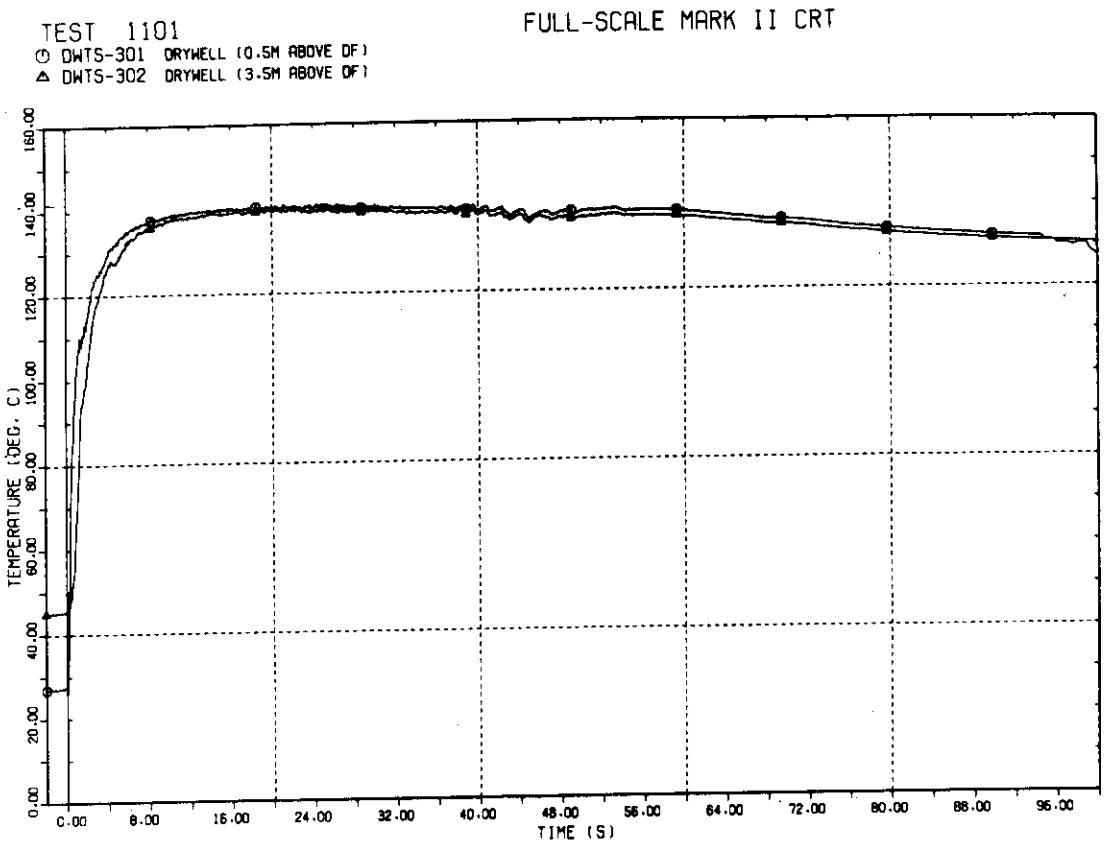

Plot L-0-8 Temperatures in Blowdown Pipe



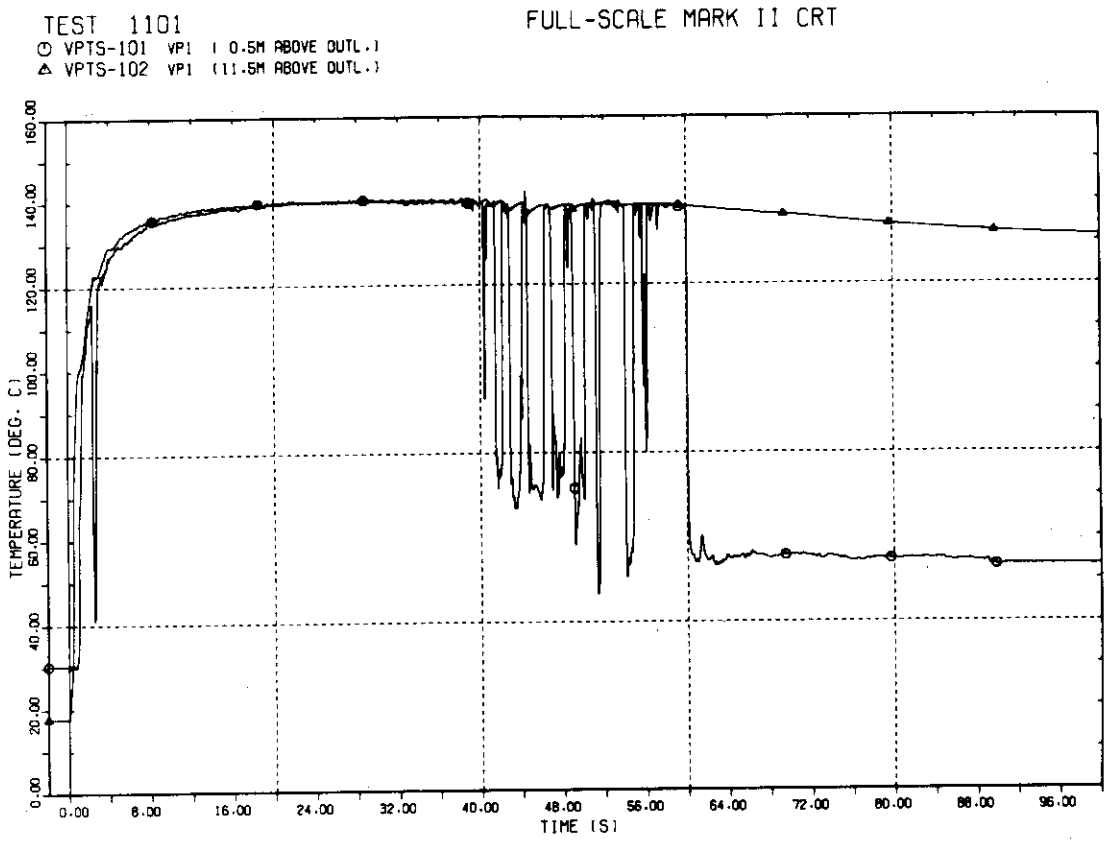

Plot L-0-9 Temperatures in Drywell



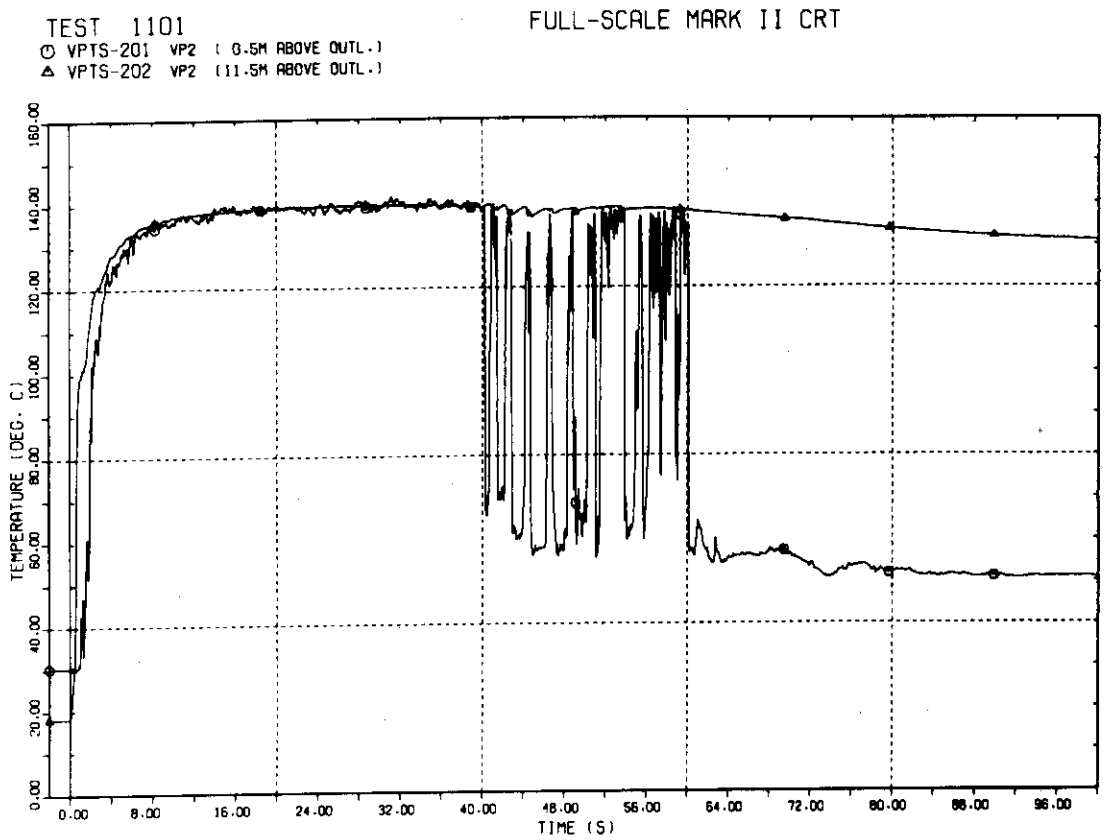

Plot L-0-10 Temperatures in Drywell



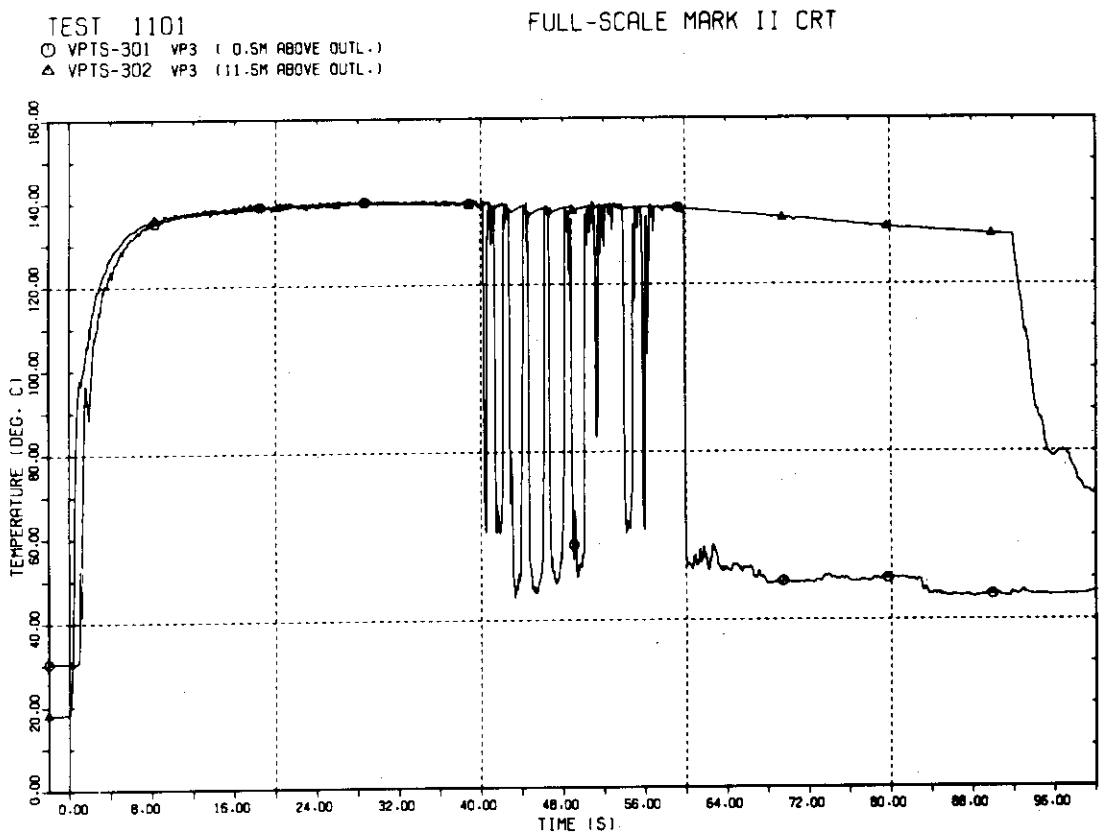

Plot L-0-11 Temperatures in Drywell



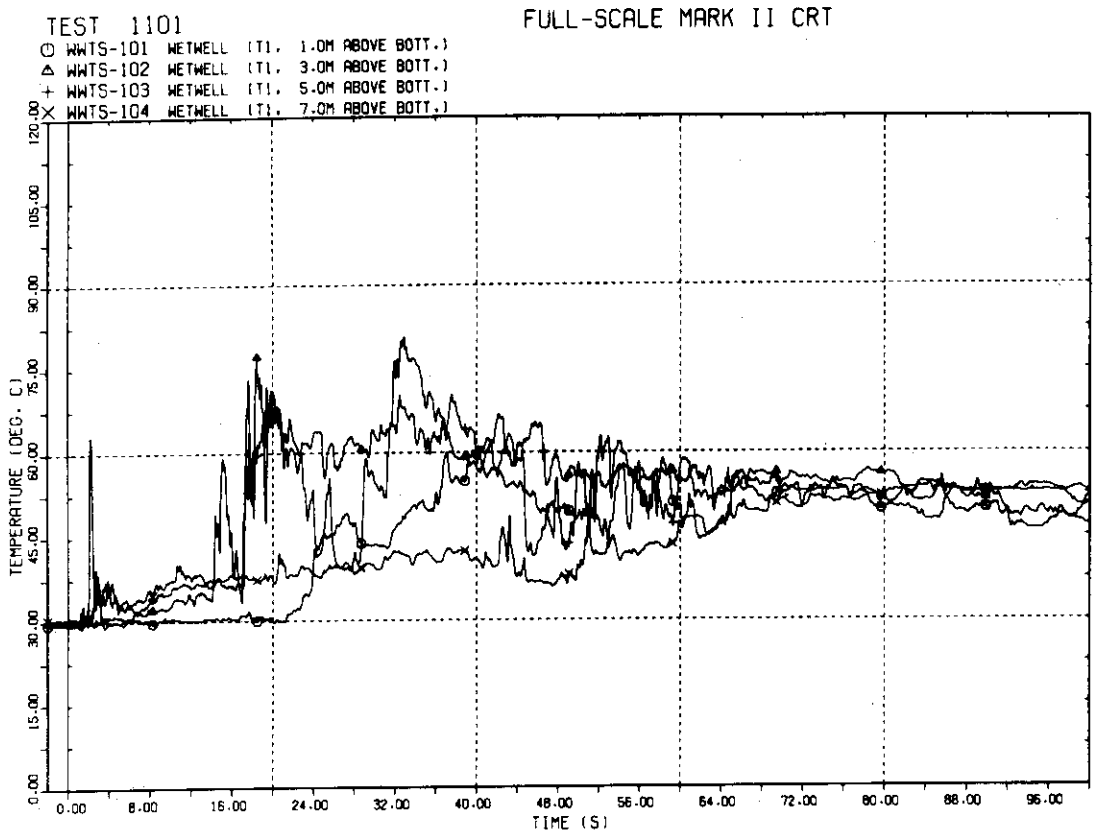

Plot L-0-12 Temperatures in Vent Pipe



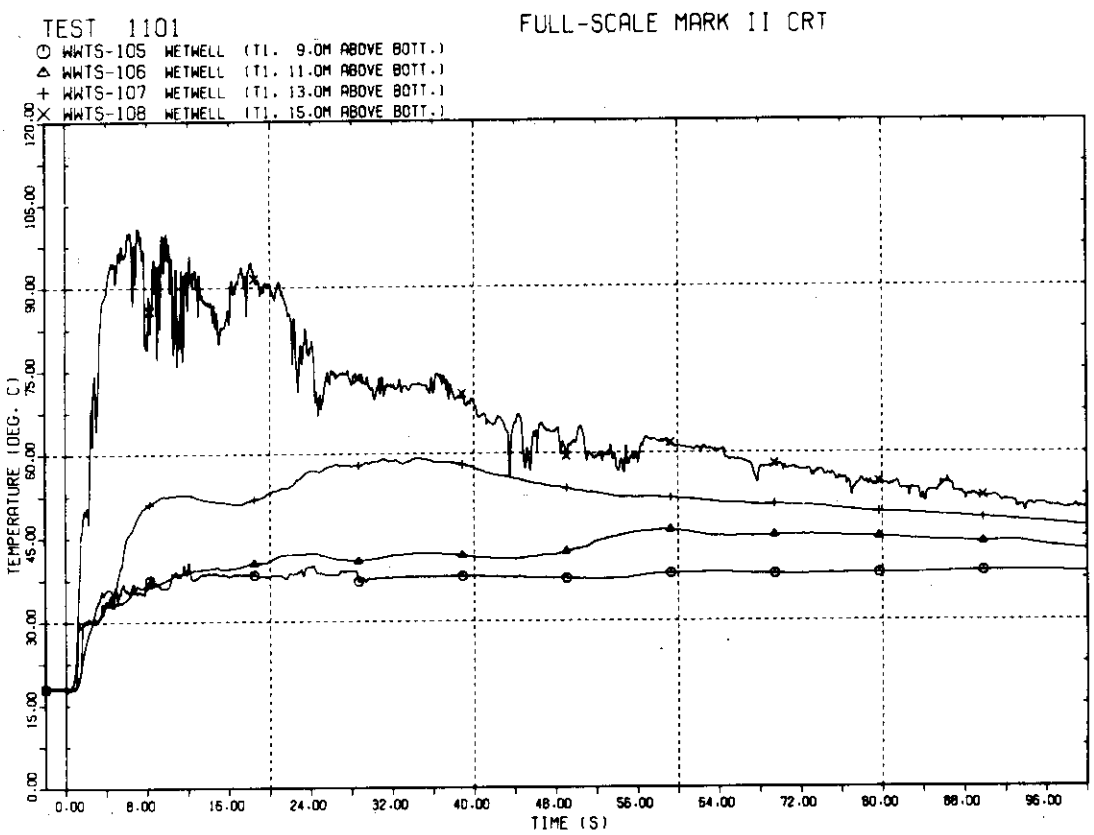

Plot L-0-13 Temperatures in Vent Pipe



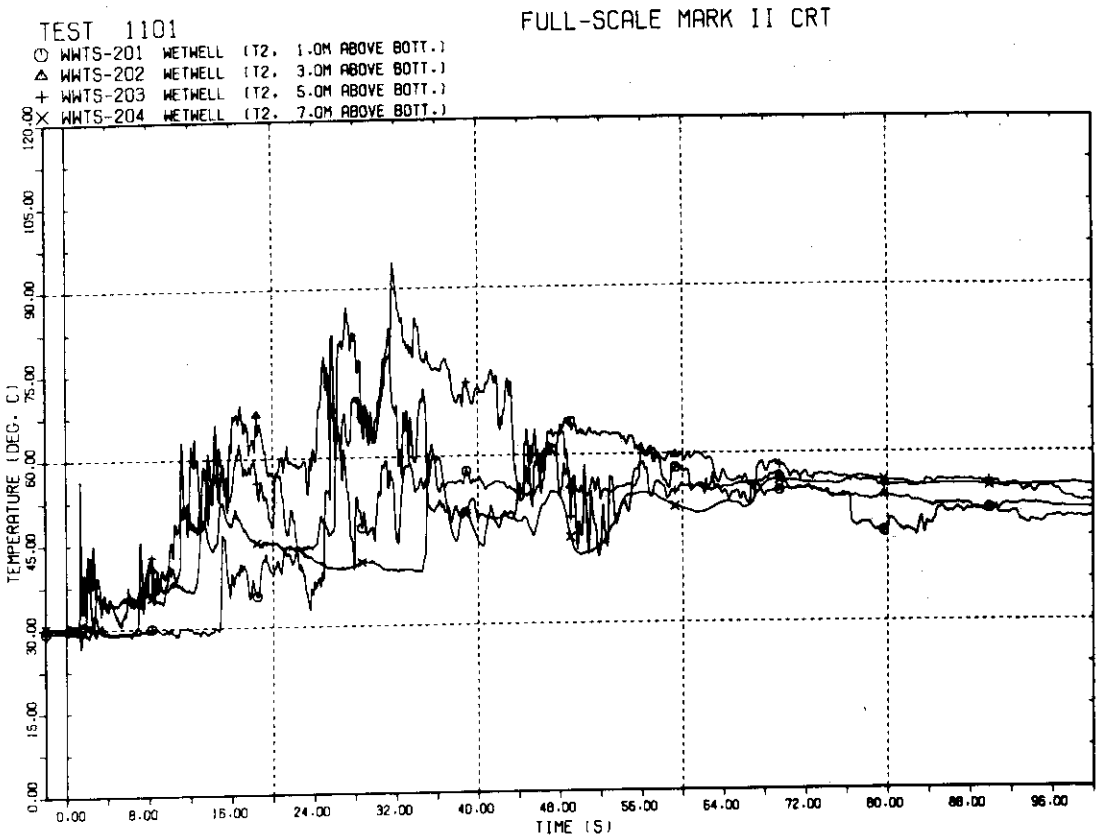

Plot L-0-14 Temperatures in Vent Pipe



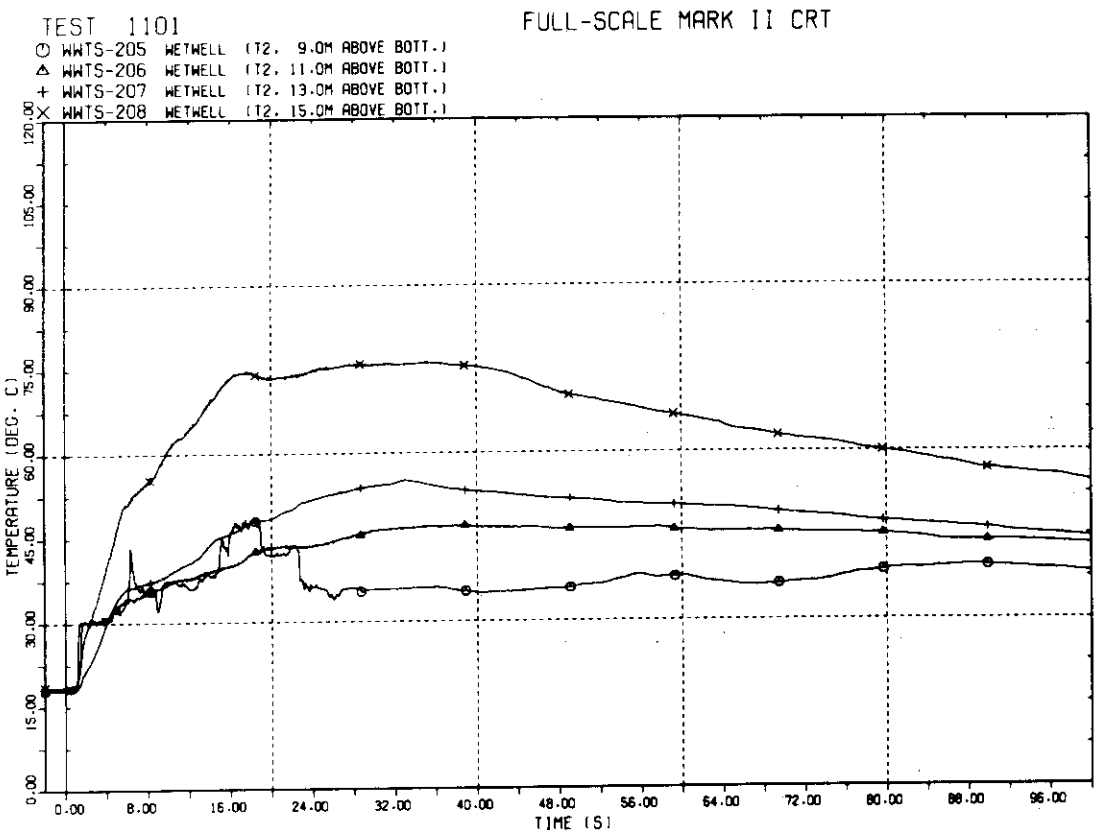

Plot L-0-15 Temperatures in Wetwell



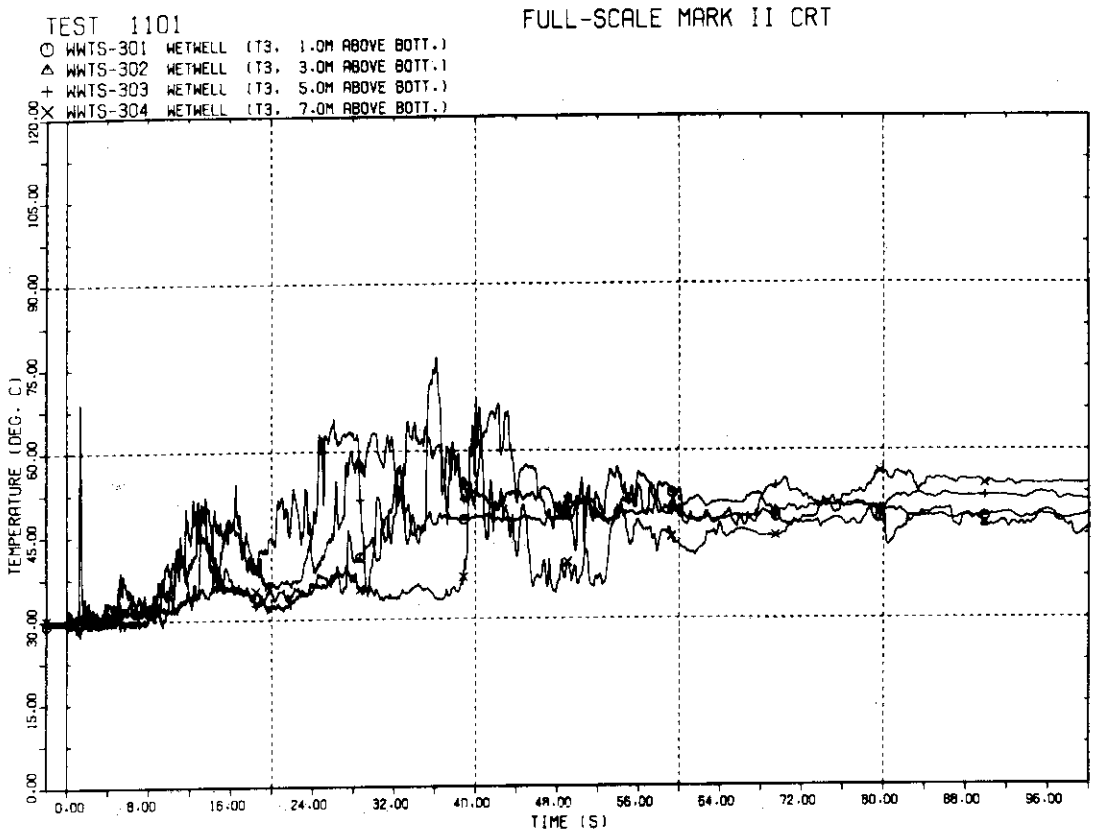

Plot L-0-16 Temperatures in Wetwell



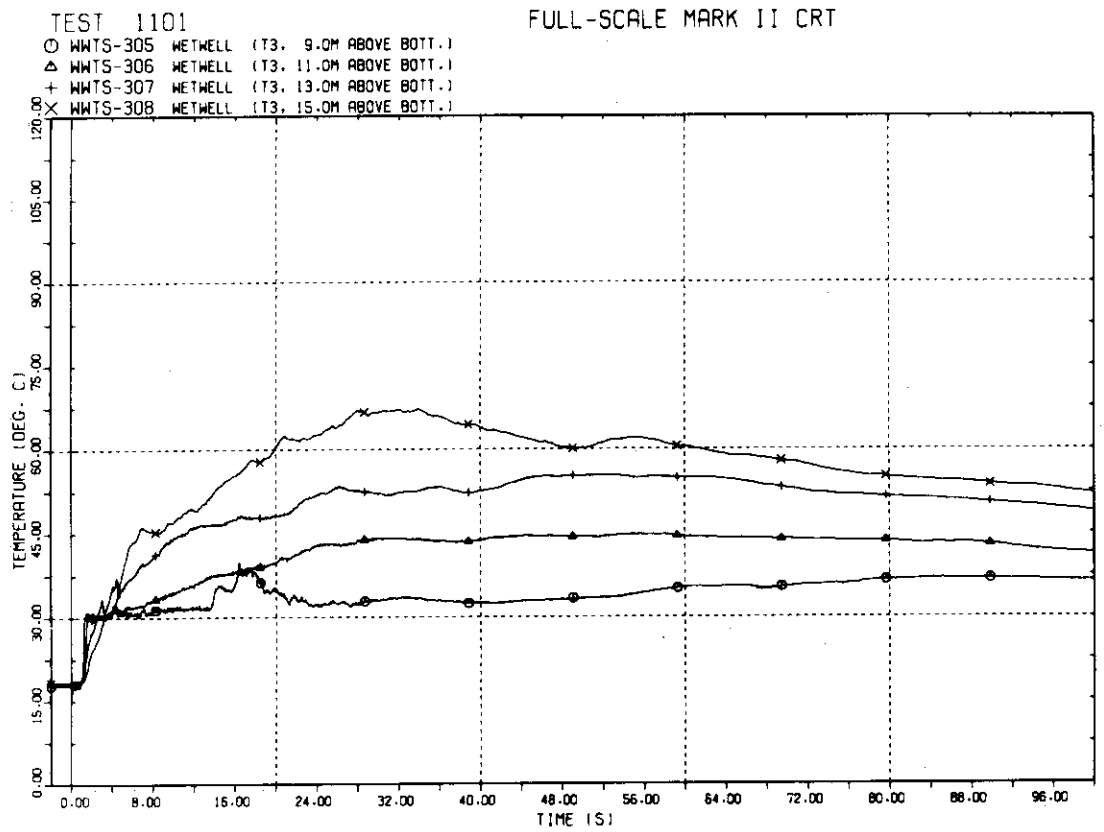

Plot L-0-17 Temperatures in Wetwell



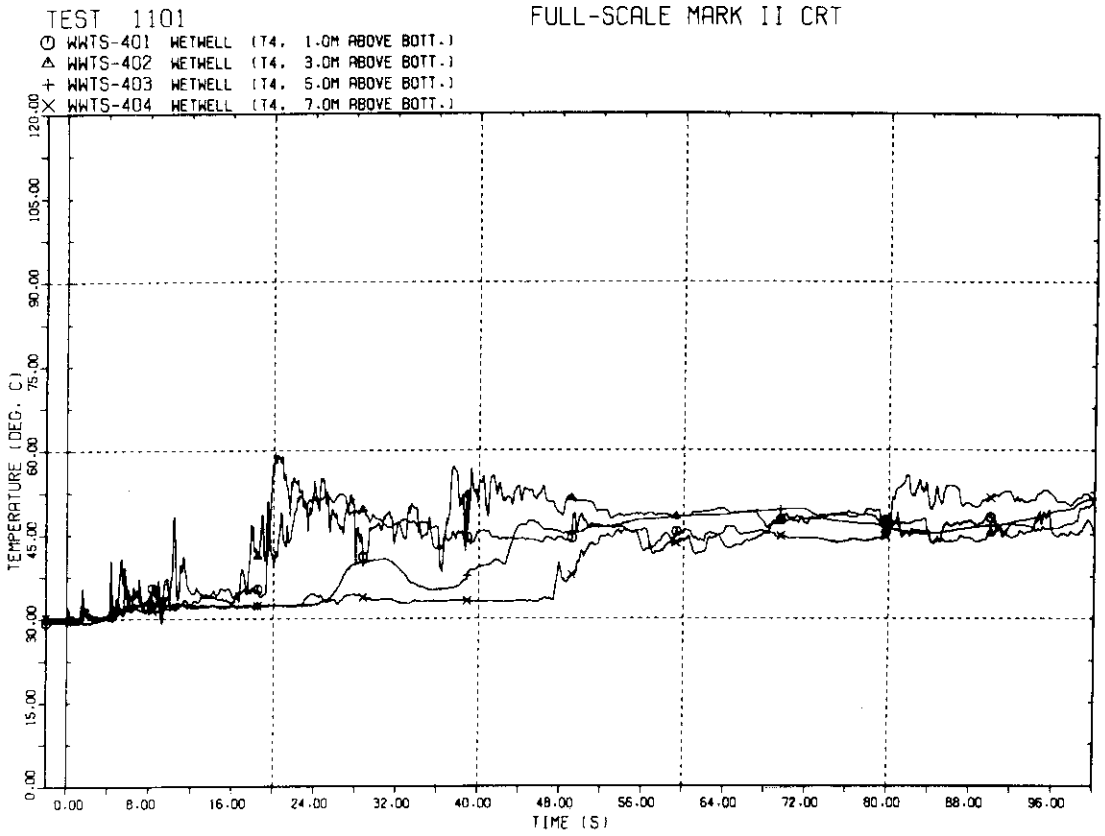

Plot L-0-18 Temperatures in Wetwell



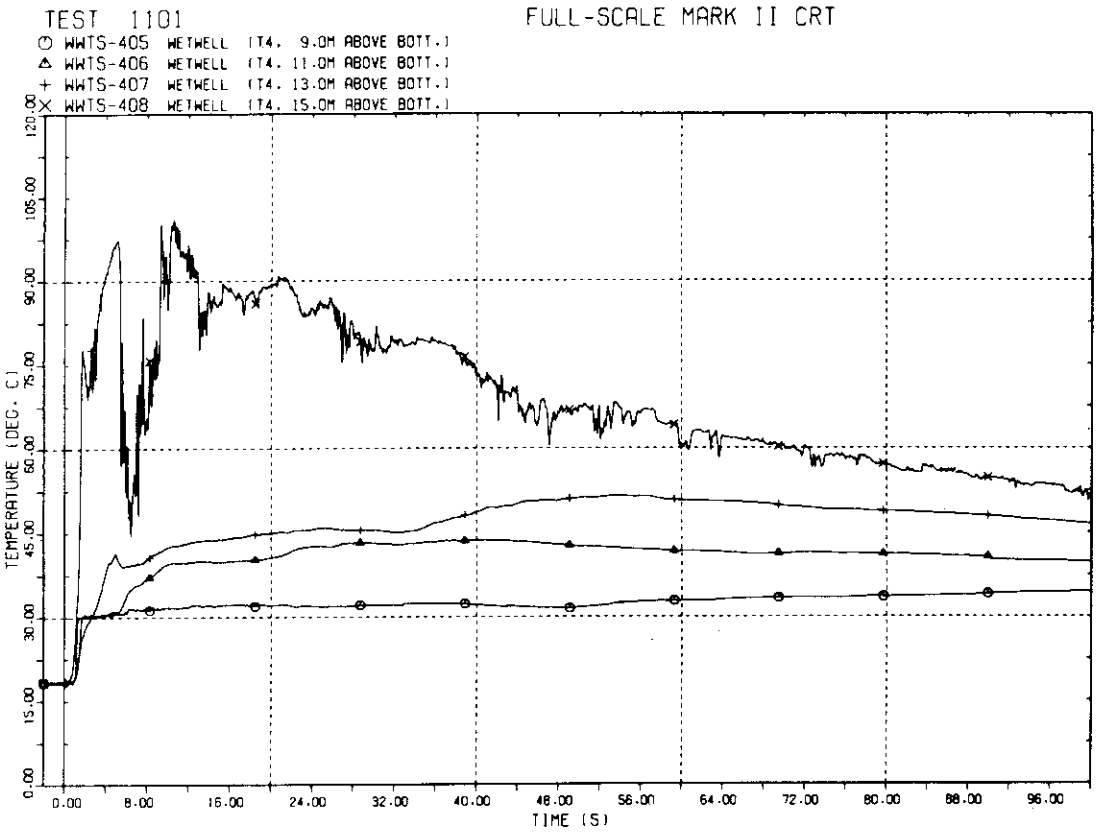

Plot L-0-19 Temperatures in Wetwell



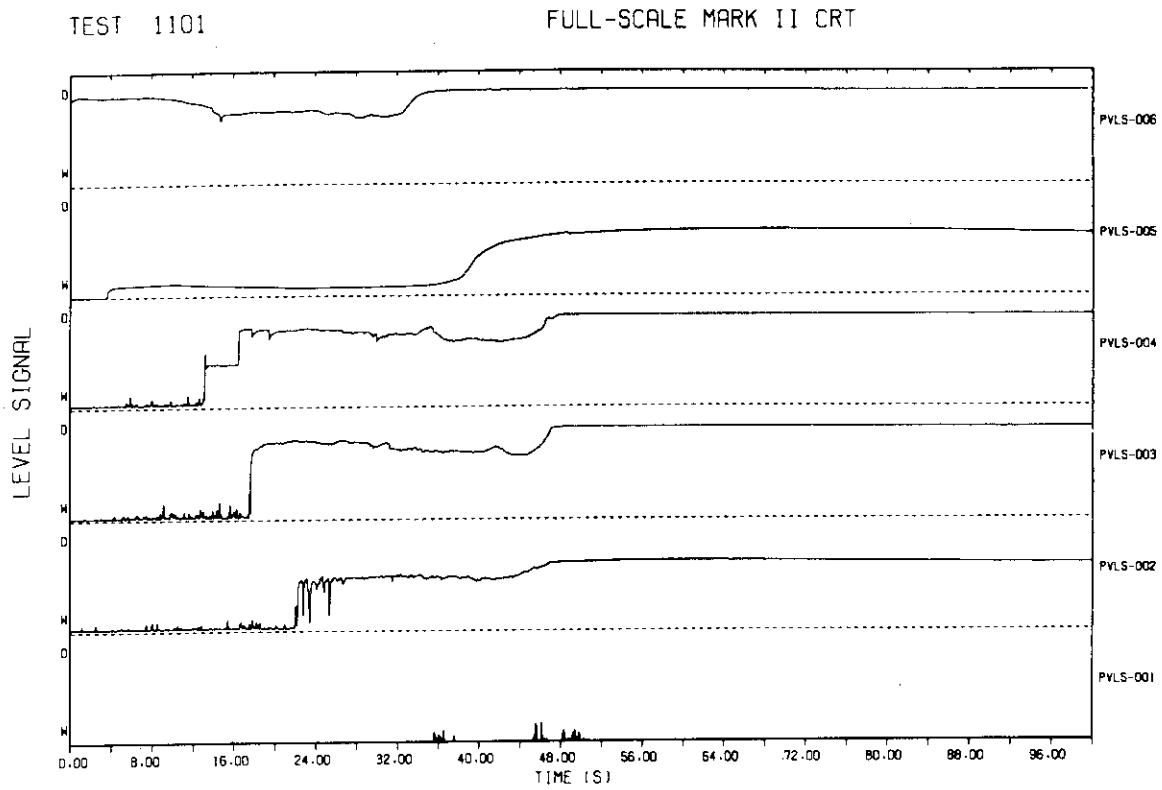

Plot L-0-20 Temperatures in Wetwell



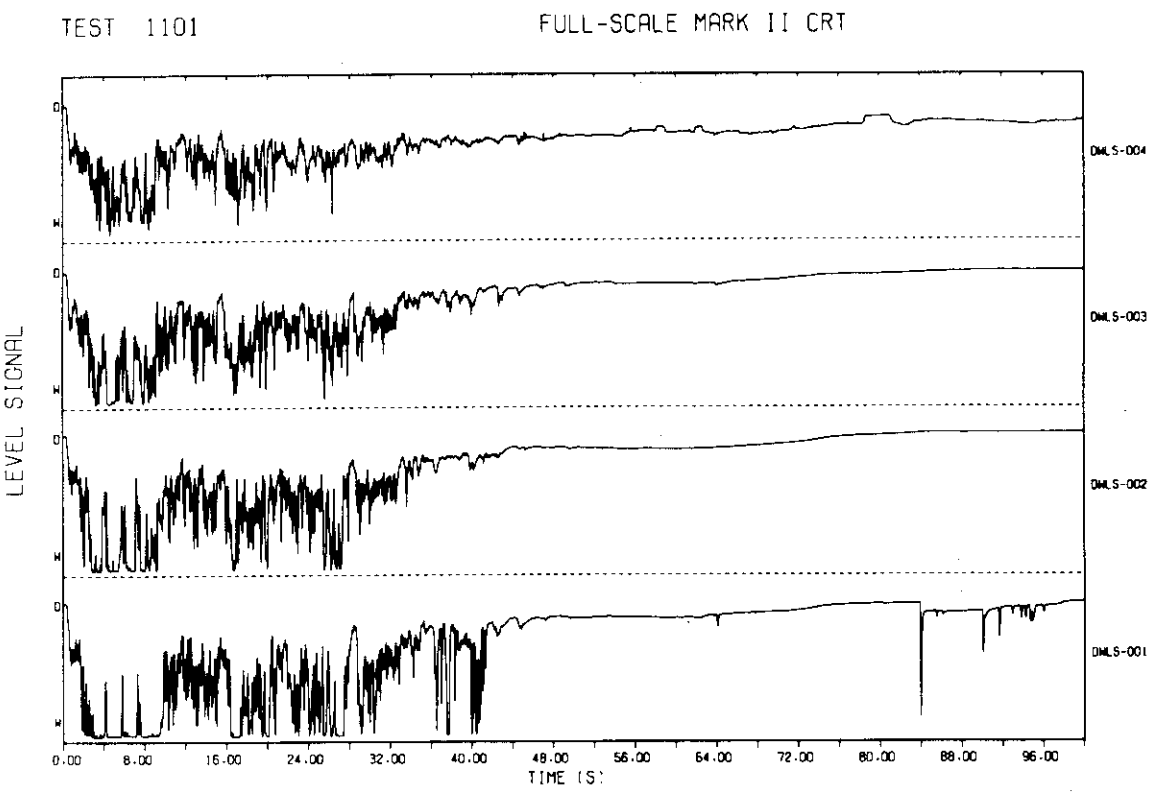

Plot L-0-21 Temperatures in Wetwell



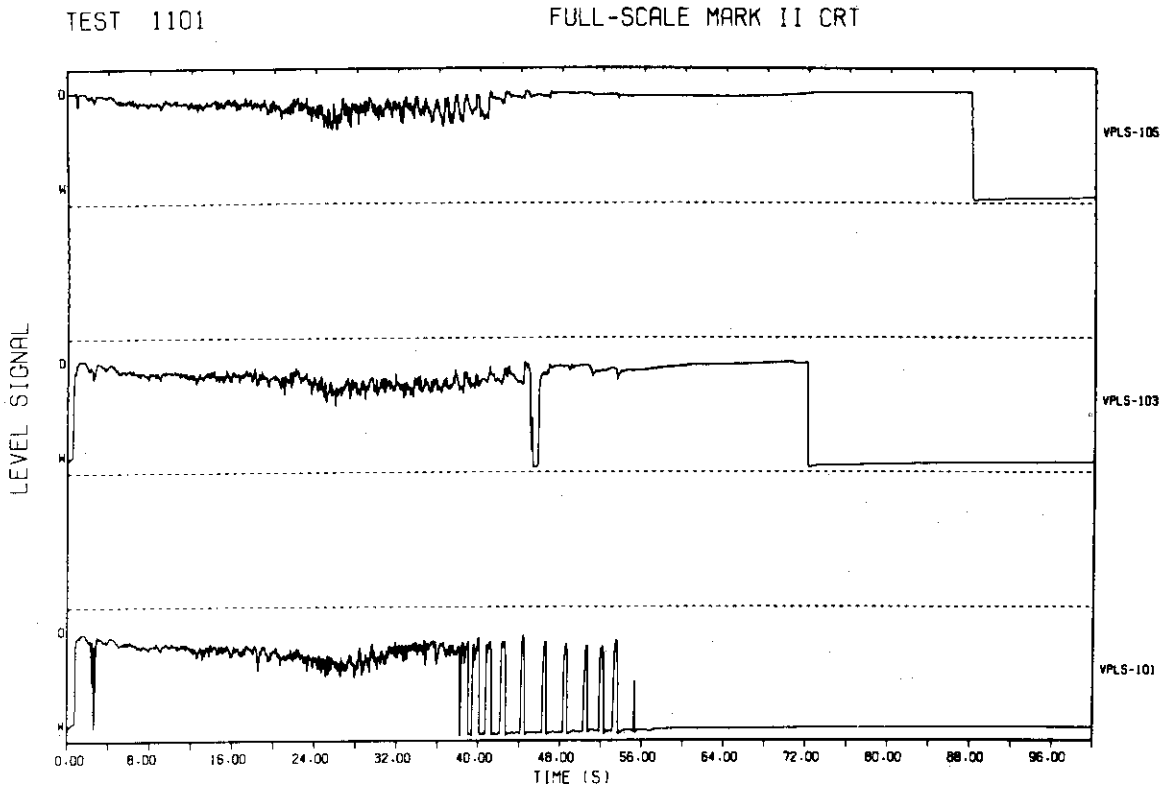

Plot L-0-22 Temperatures in Wetwell



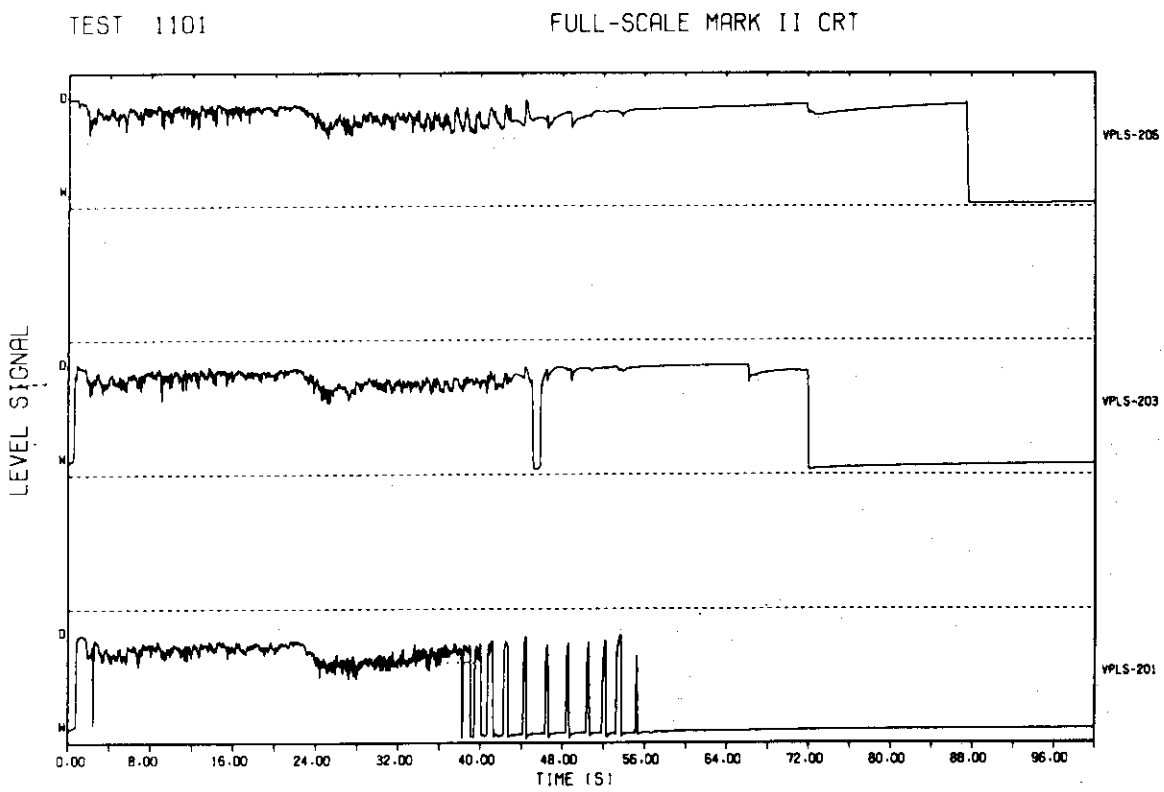

Plot L-0-23 Water Level in Vessel



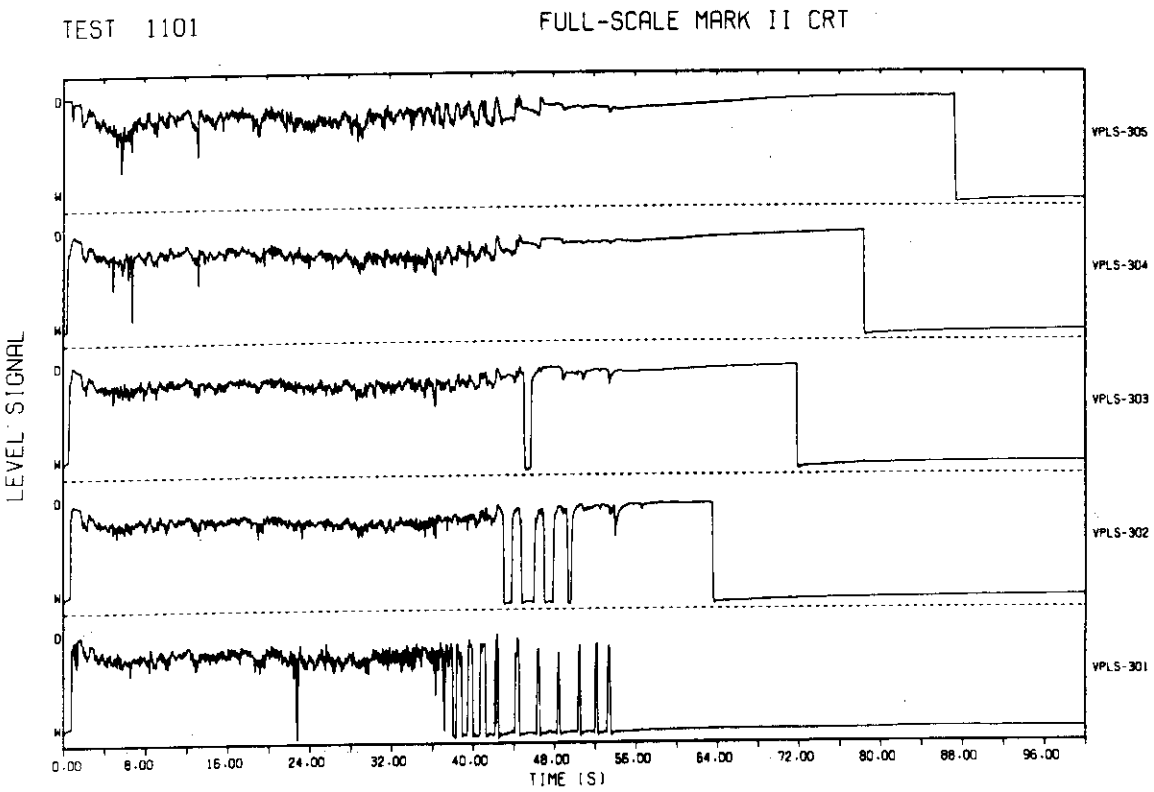

Plot L-0-24 Water Level in Drywell



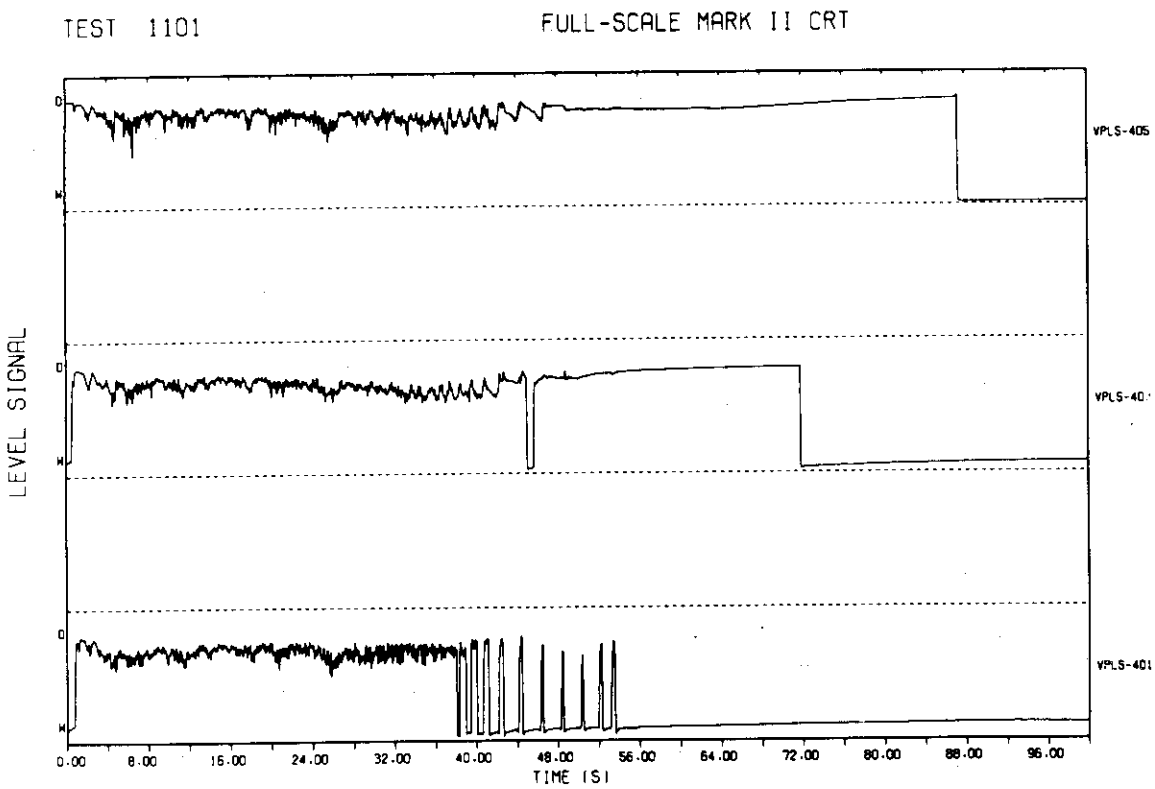

Plot L-0-25 Water Level in Vent Pipe



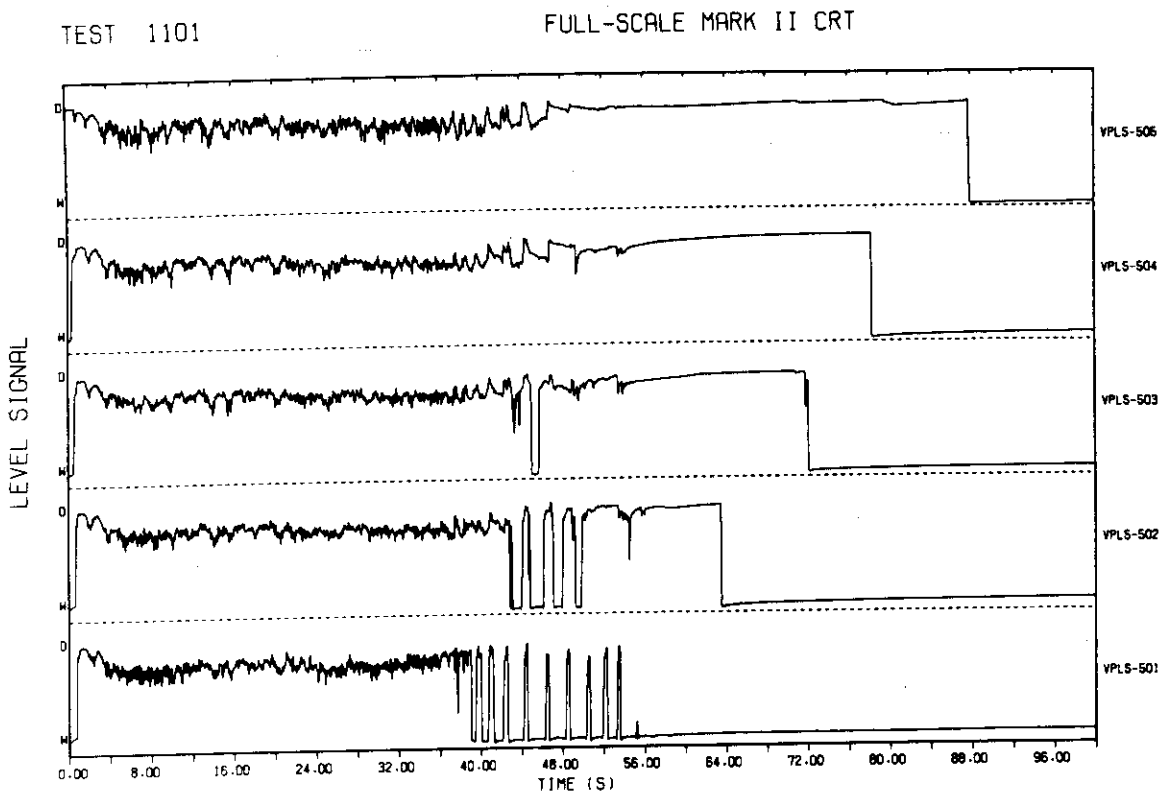

Plot L-0-26 Water Level in Vent Pipe



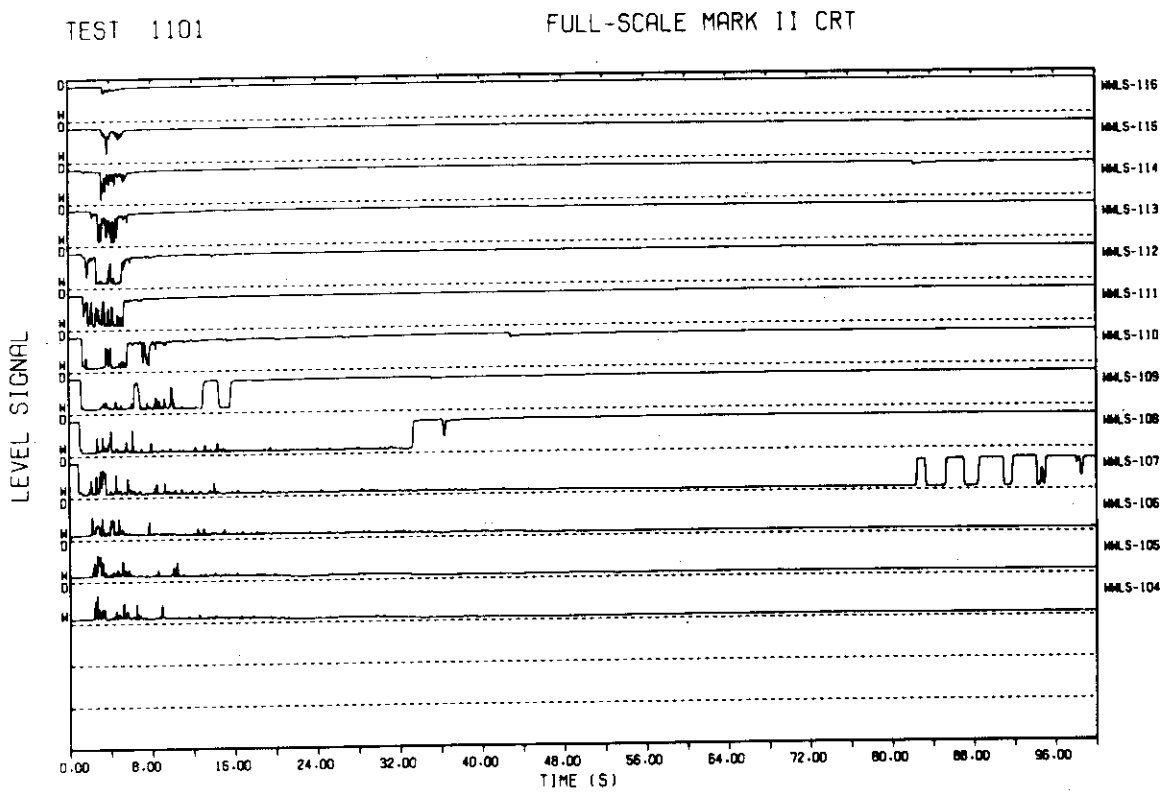

Plot L-0-27 Water Level in Vent Pipe



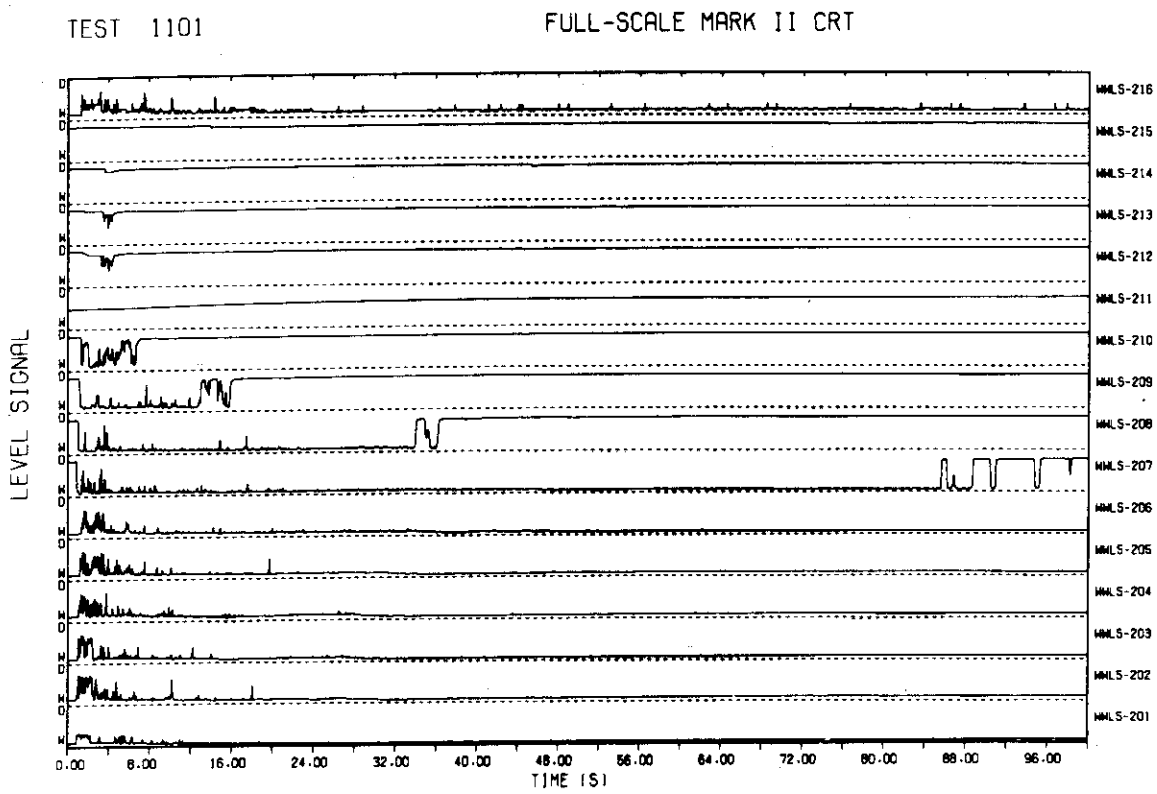

Plot L-0-28 Water Level in Vent Pipe



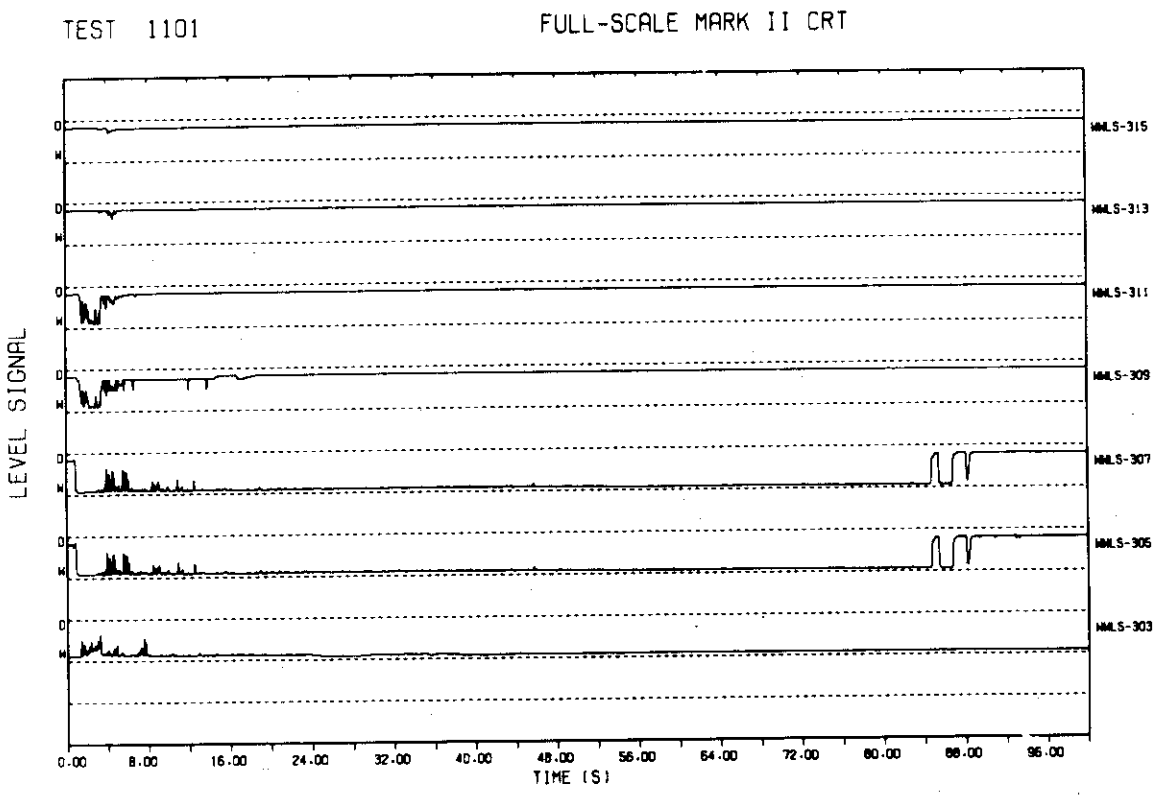

Plot L-0-29 Water Level in Vent Pipe



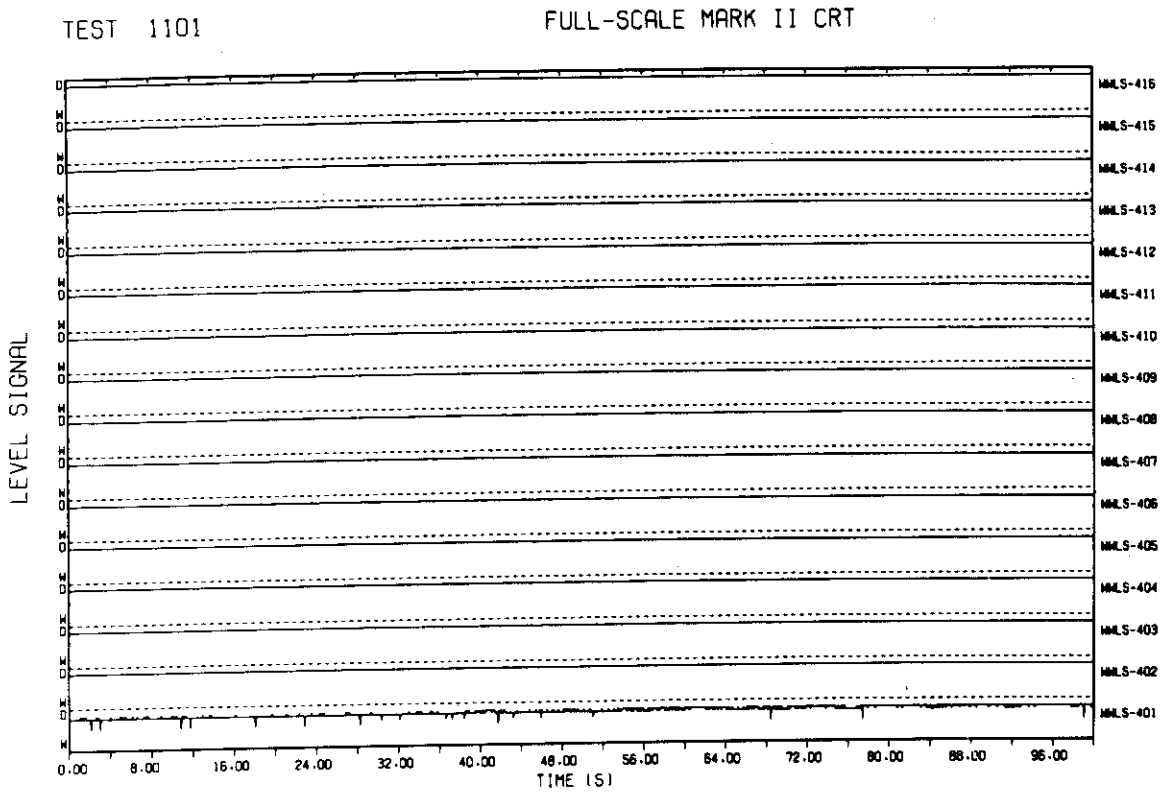

Plot L-0-30 Water Level in Wetwell



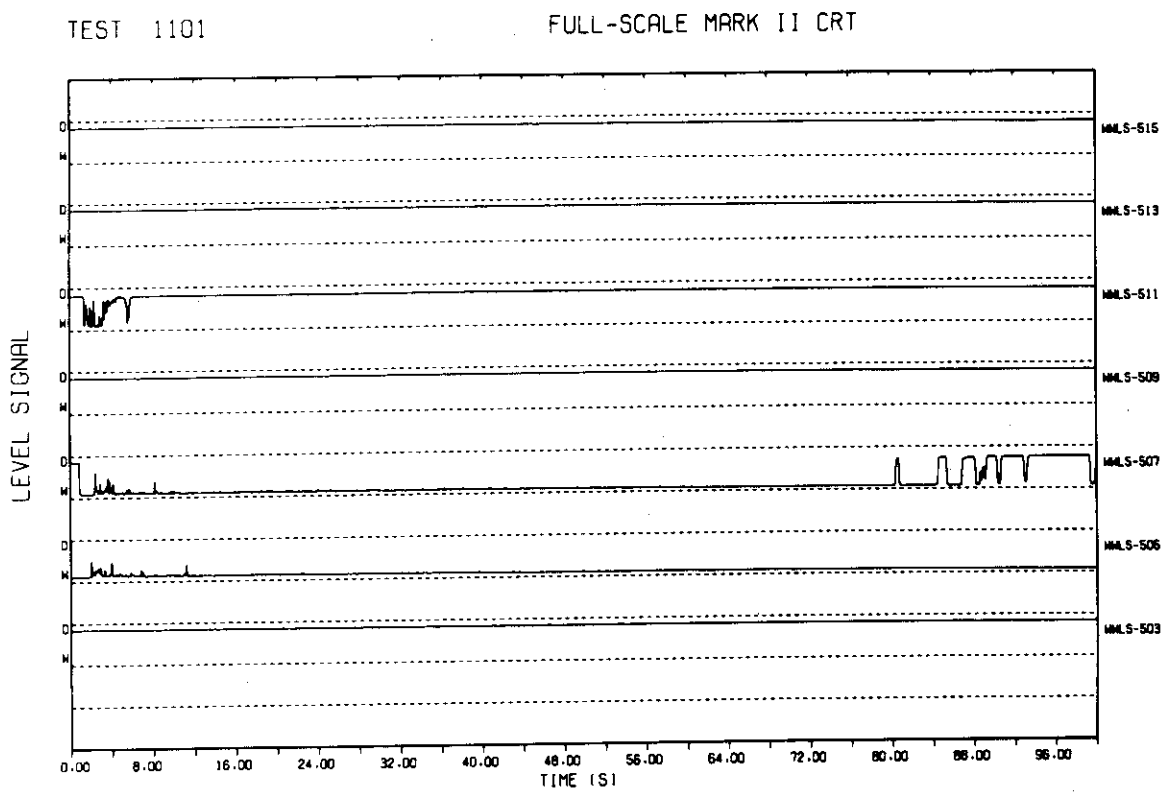

Plot L-0-31 Water Level in Wetwell



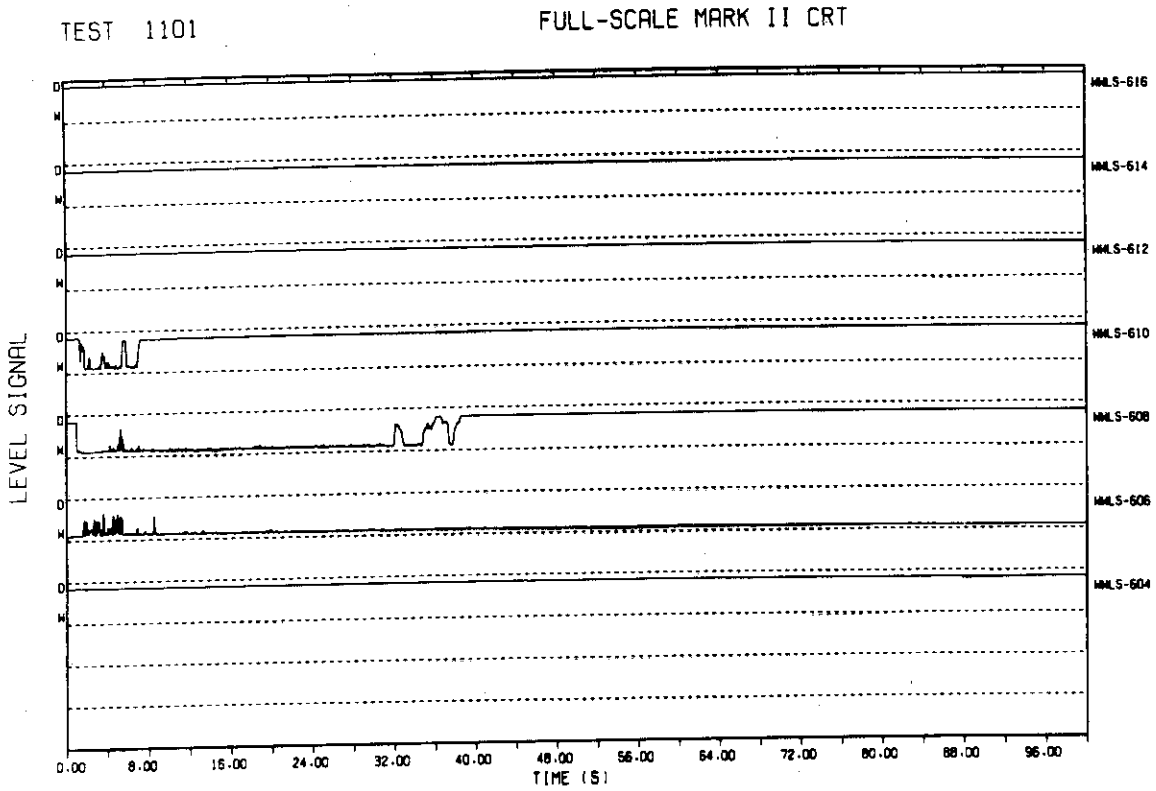

Plot L-0-32 Water Level in Wetwell



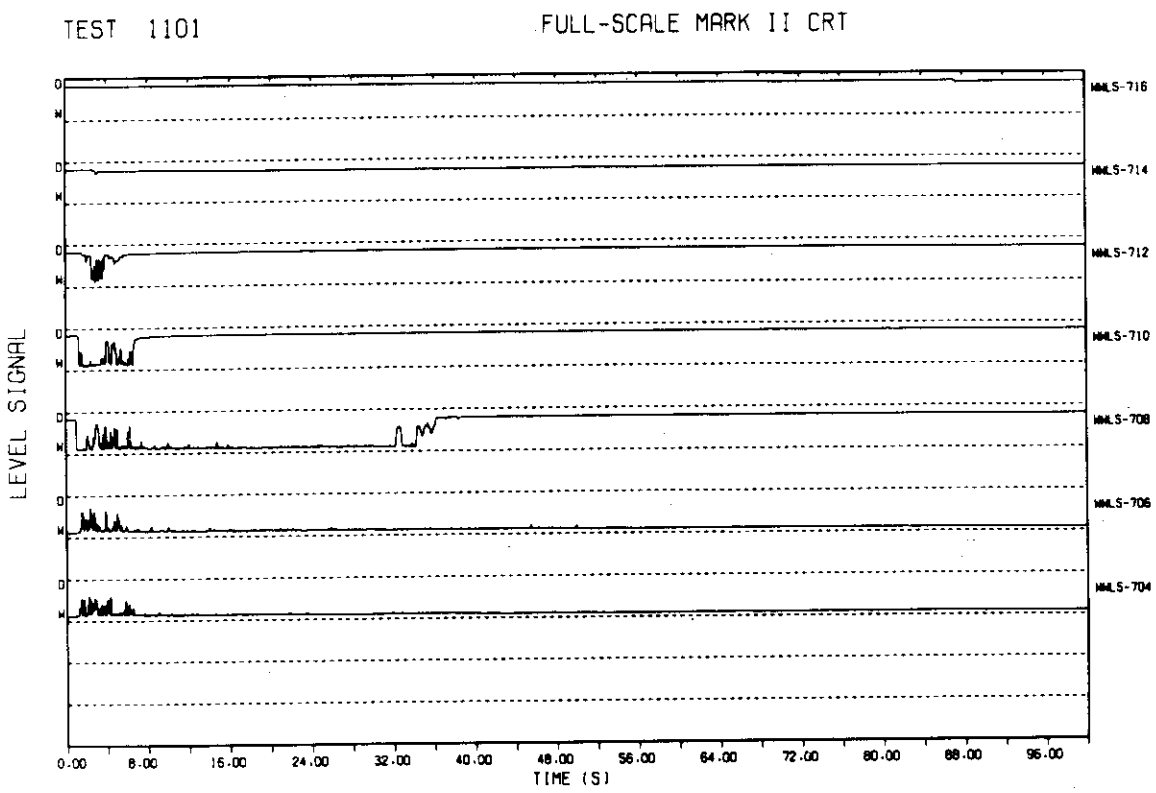

Plot L-0-33 Water Level in Wetwell



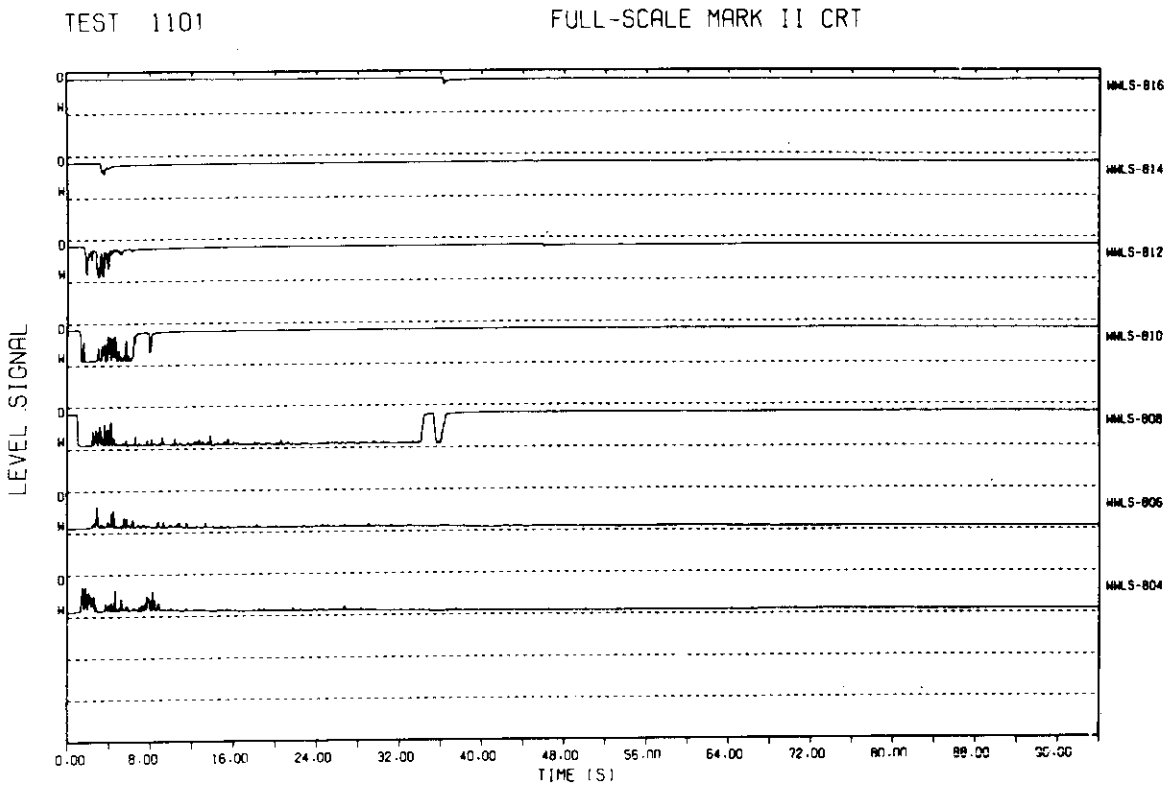

Plot L-0-34 Water Level in Wetwell



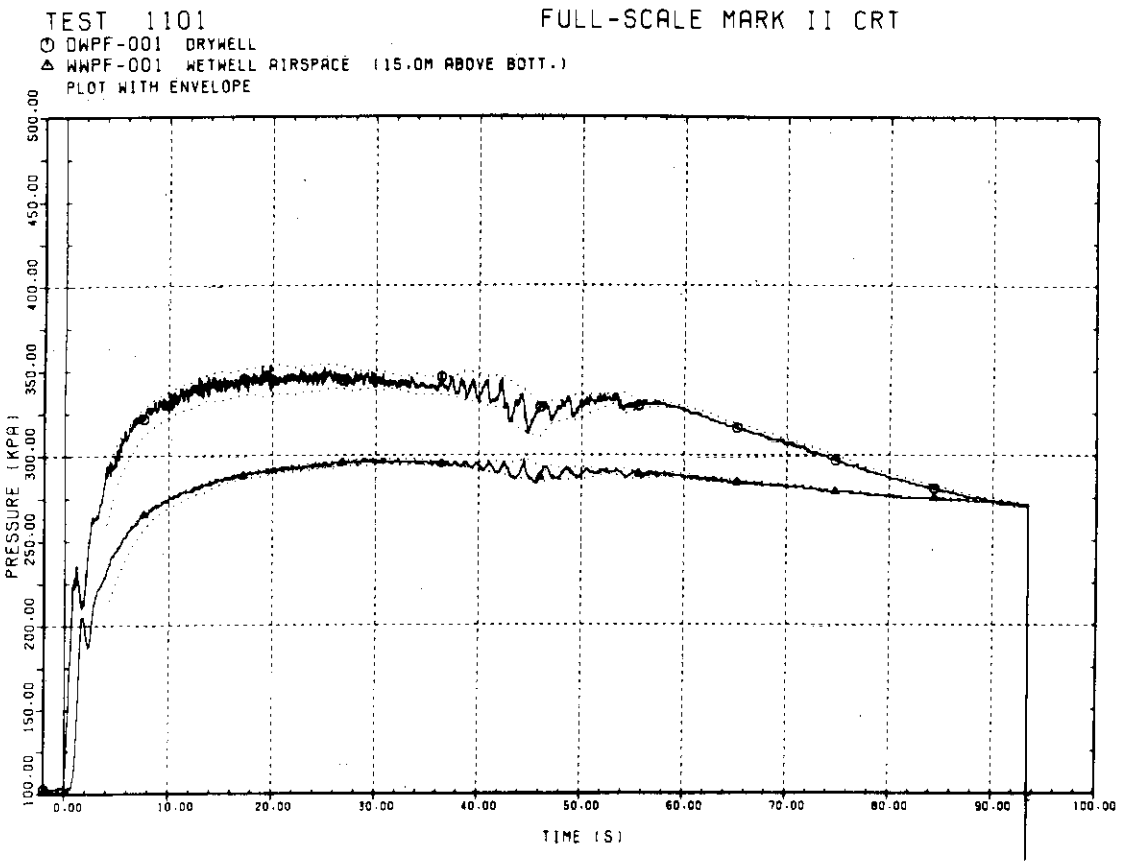

Plot L-0-35 Water Level in Wetwell



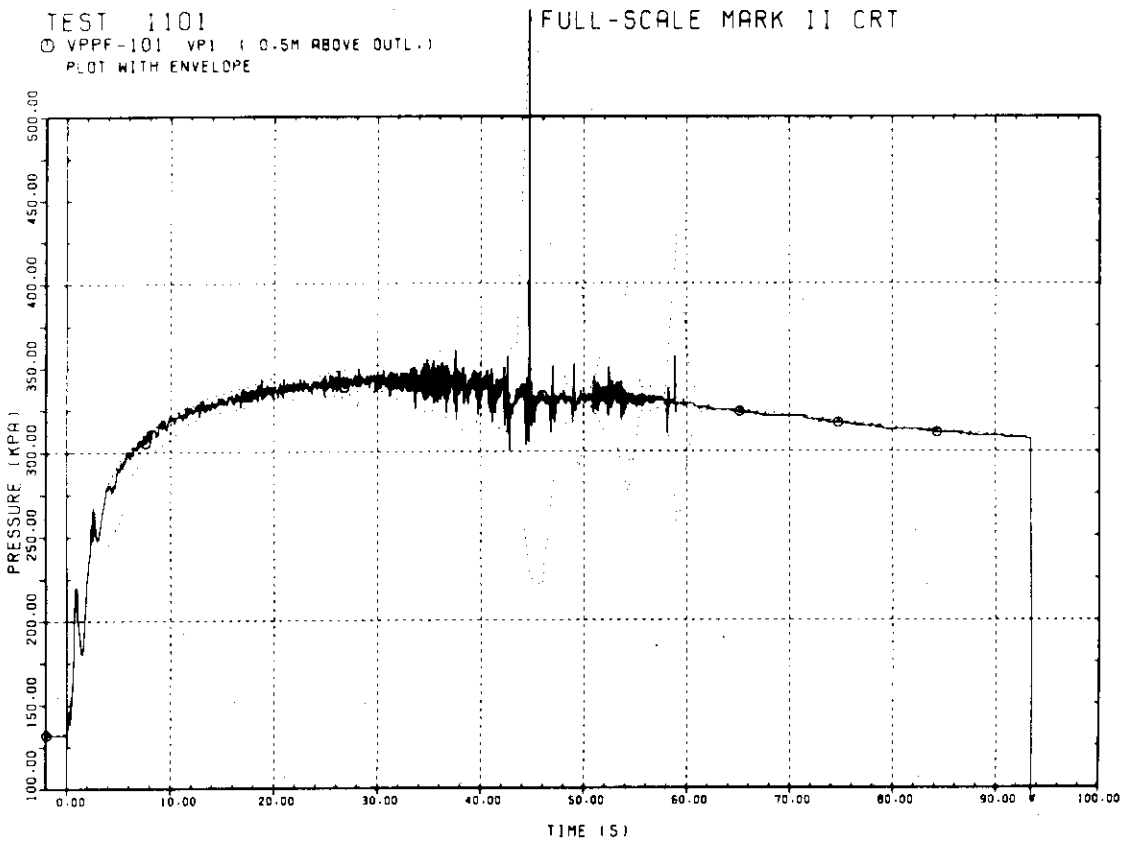

Plot L-0-36 Water Level in Wetwell




Plot L-0-37 Water Level in Wetwell

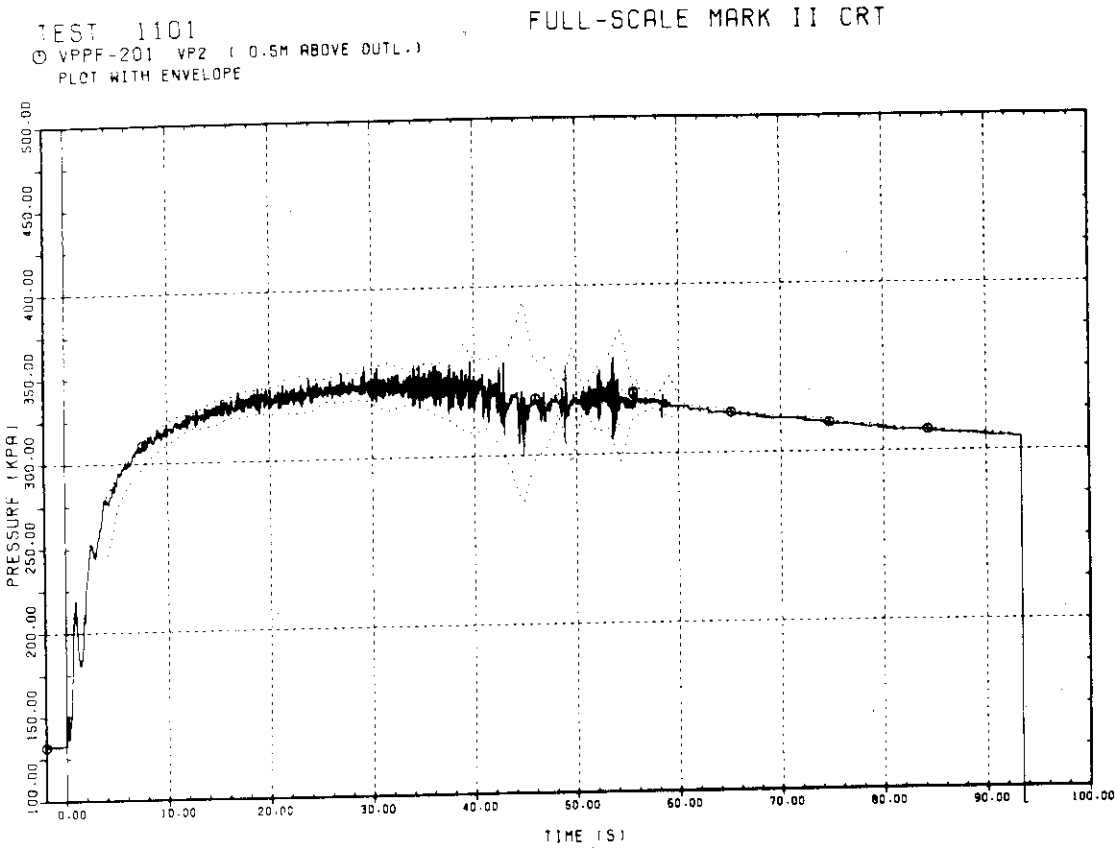



**Plot L-1-1 Pressures in Drywell and Wetwell Airspace**

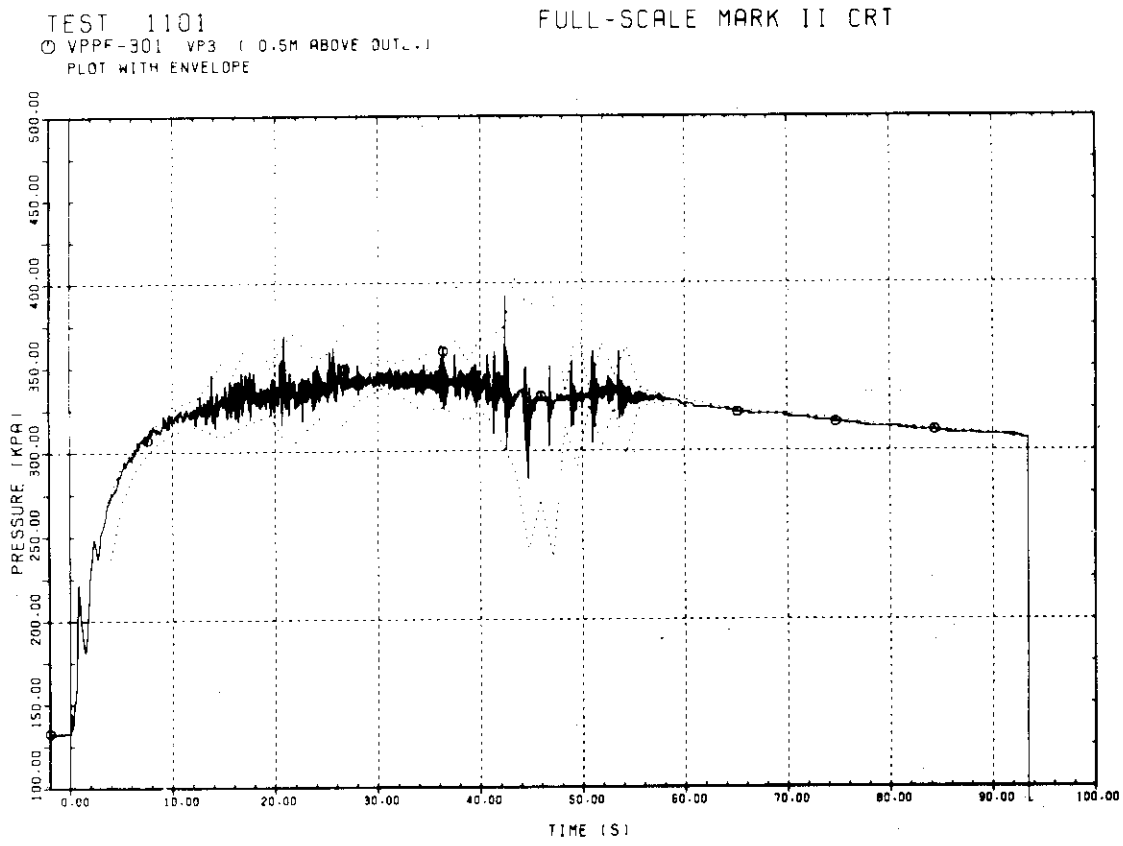



**Plot L-1-2 Pressure in Vent pipe**

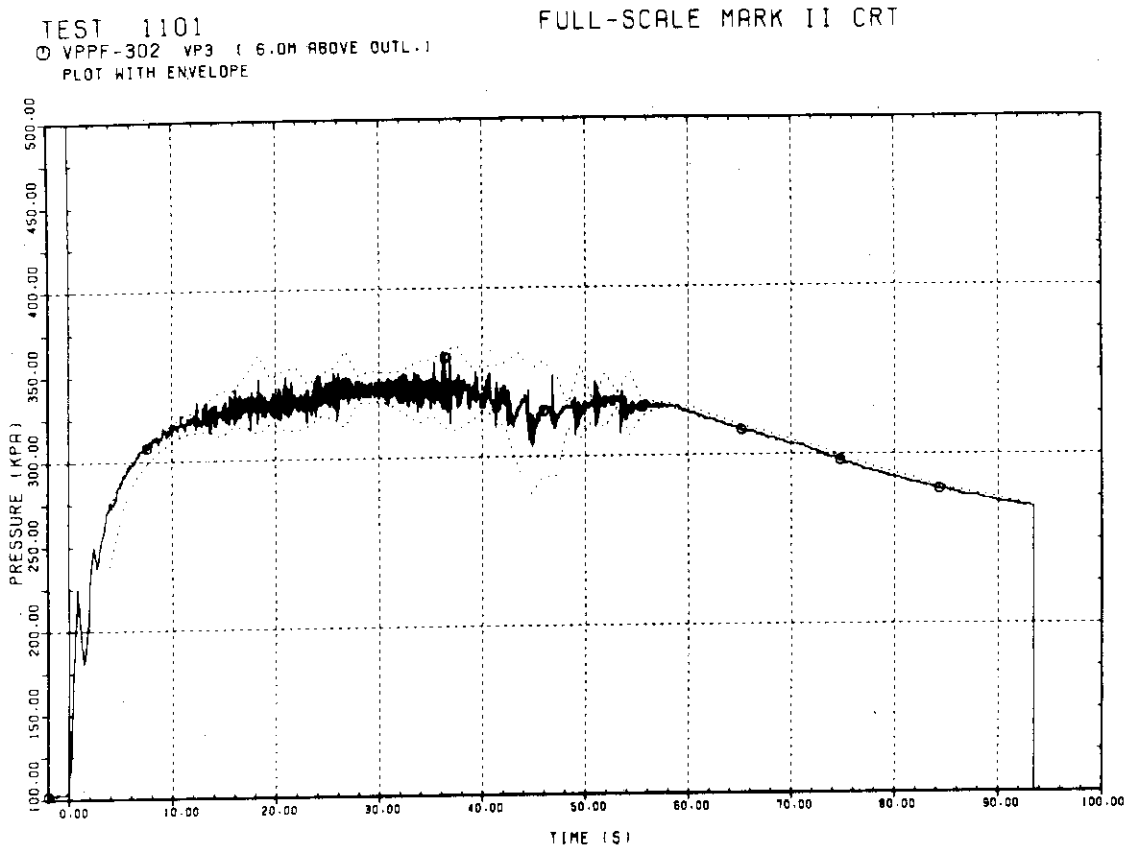
Pressure in Vent pipe



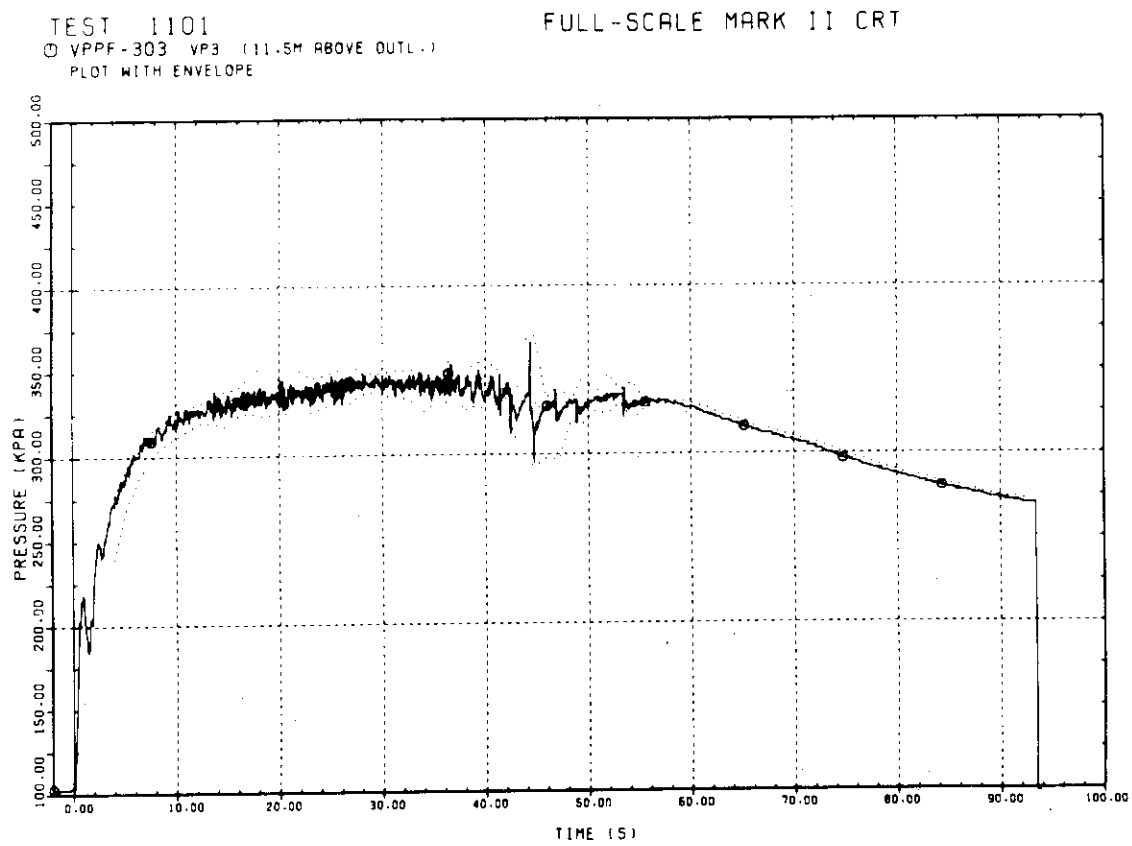

Plot L-1-3 Pressure in Vent pipe



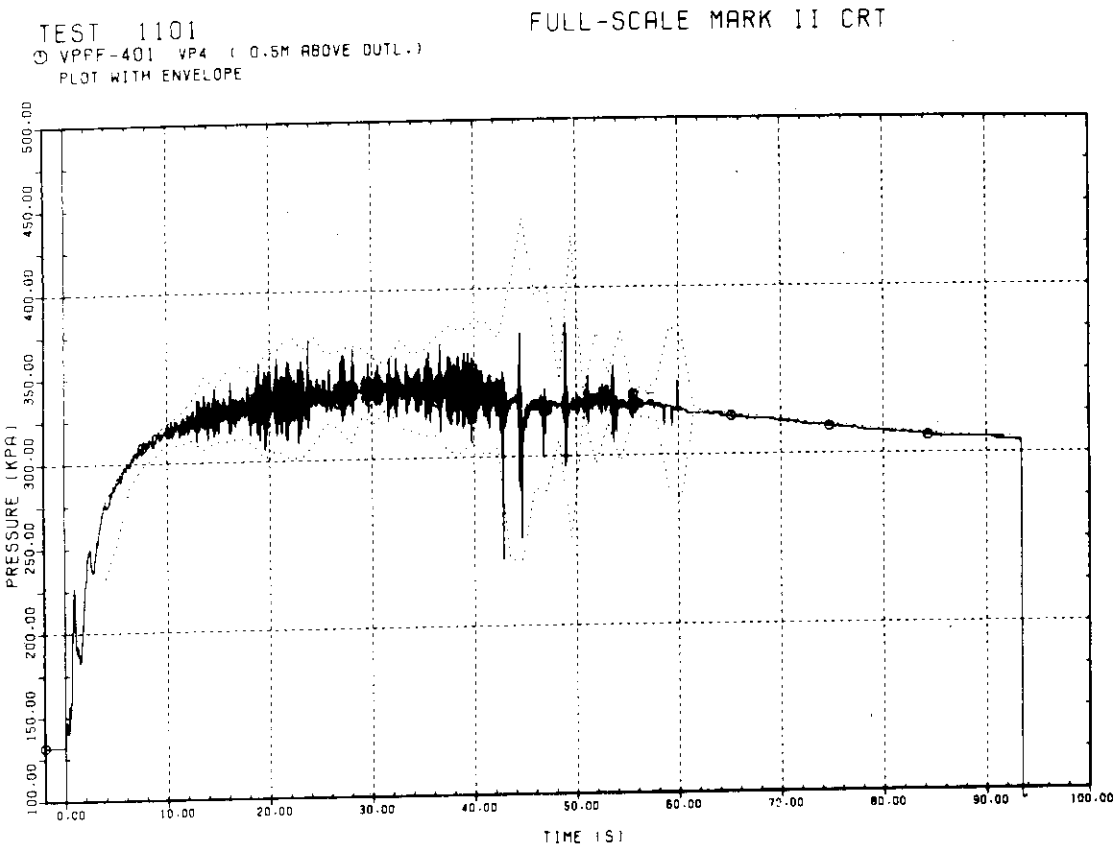

Plot L-1-4 Pressure in Vent pipe



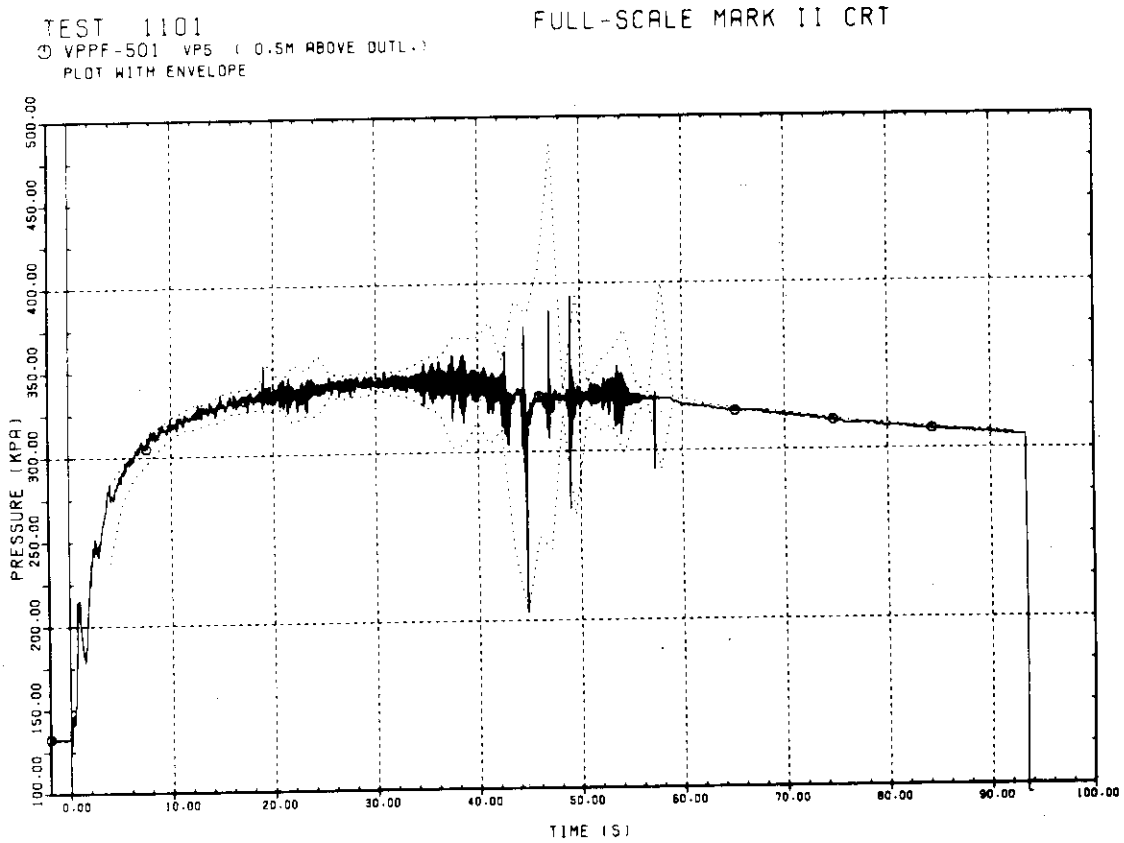

Plot L-1-5 Pressure in Vent pipe



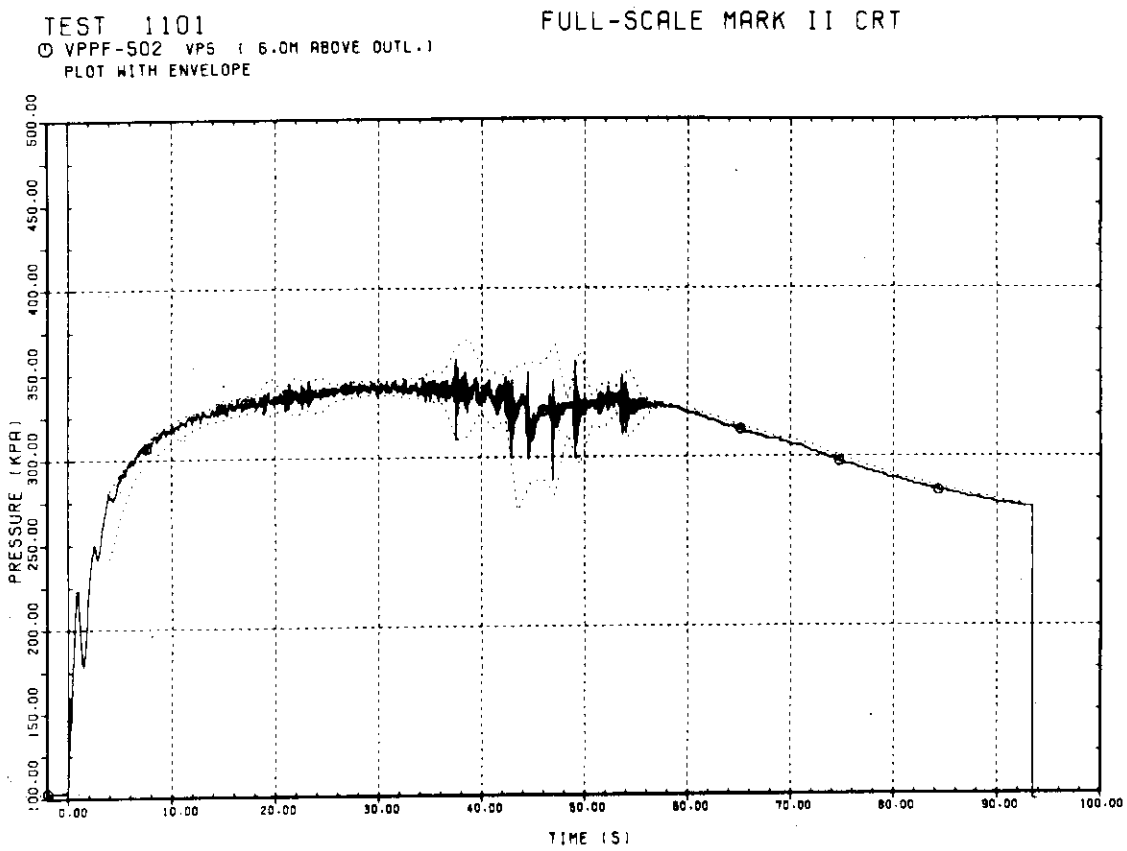

Plot L-1-6 Pressure in Vent pipe



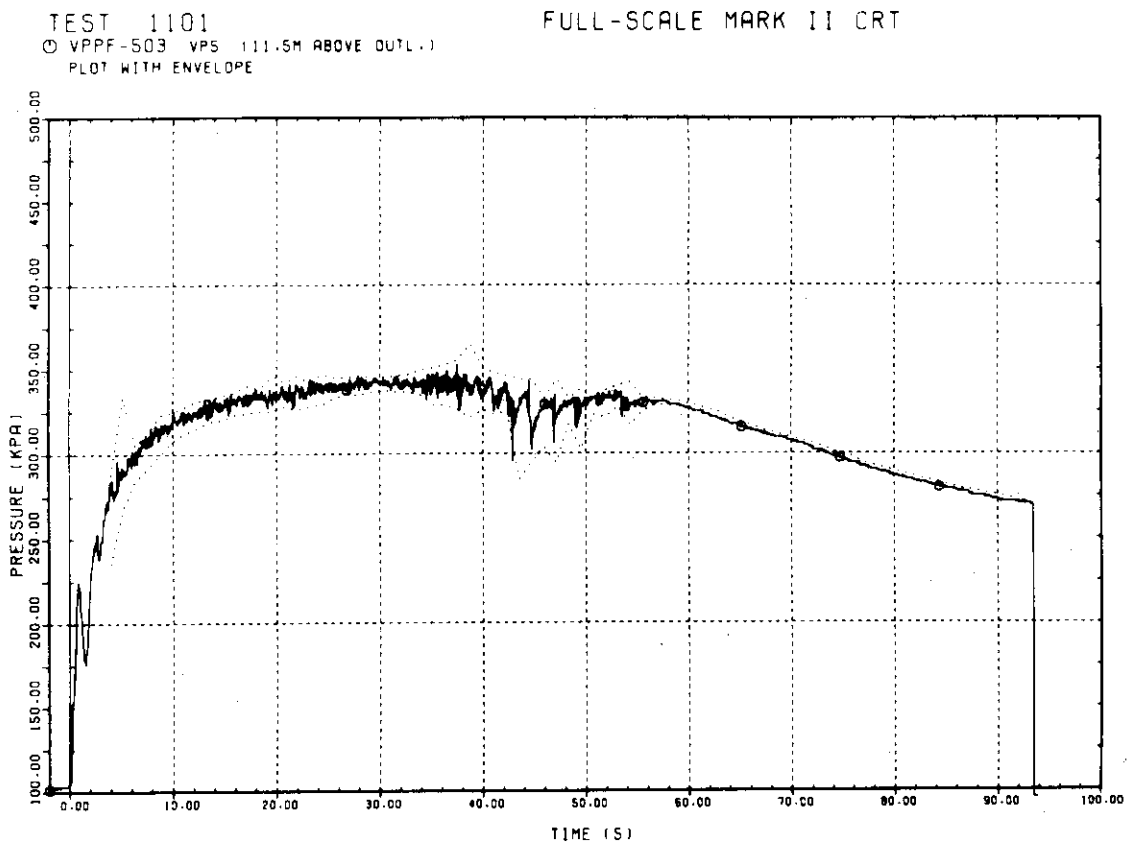

Plot L-1-7 Pressure in Vent pipe



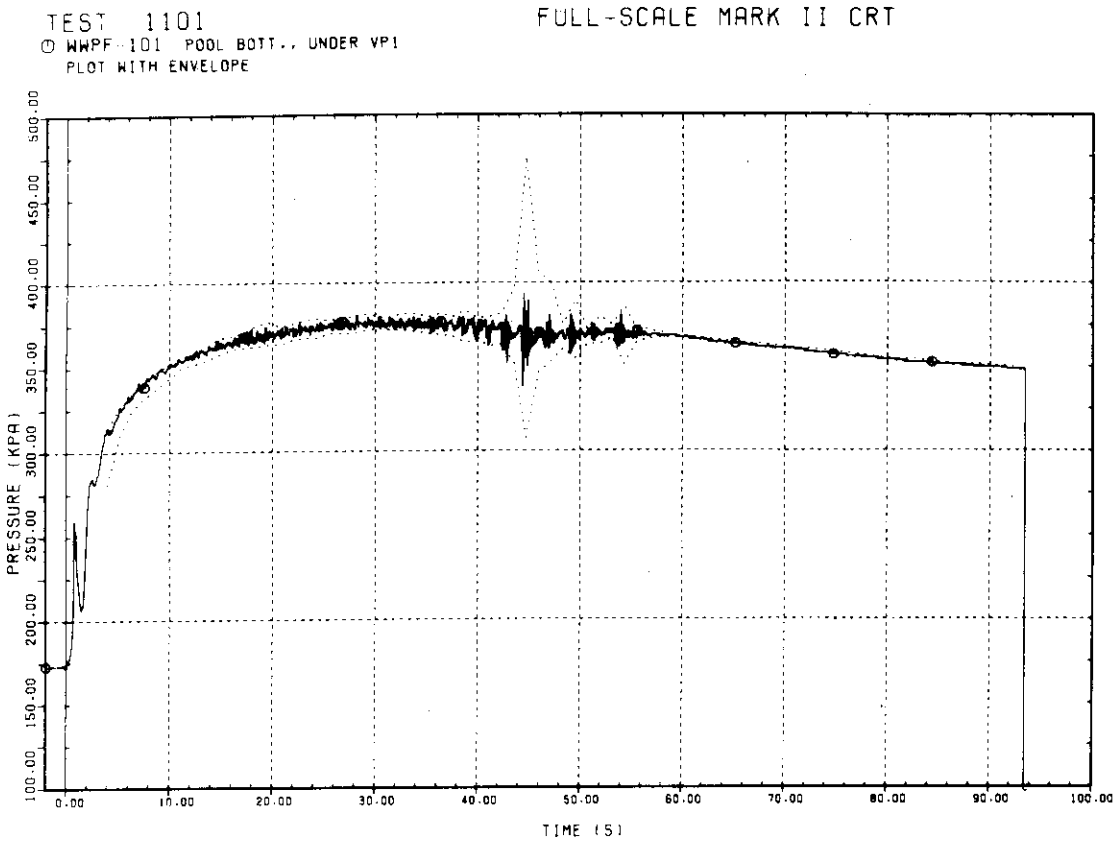

Plot L-1-8 Pressure in Vent pipe



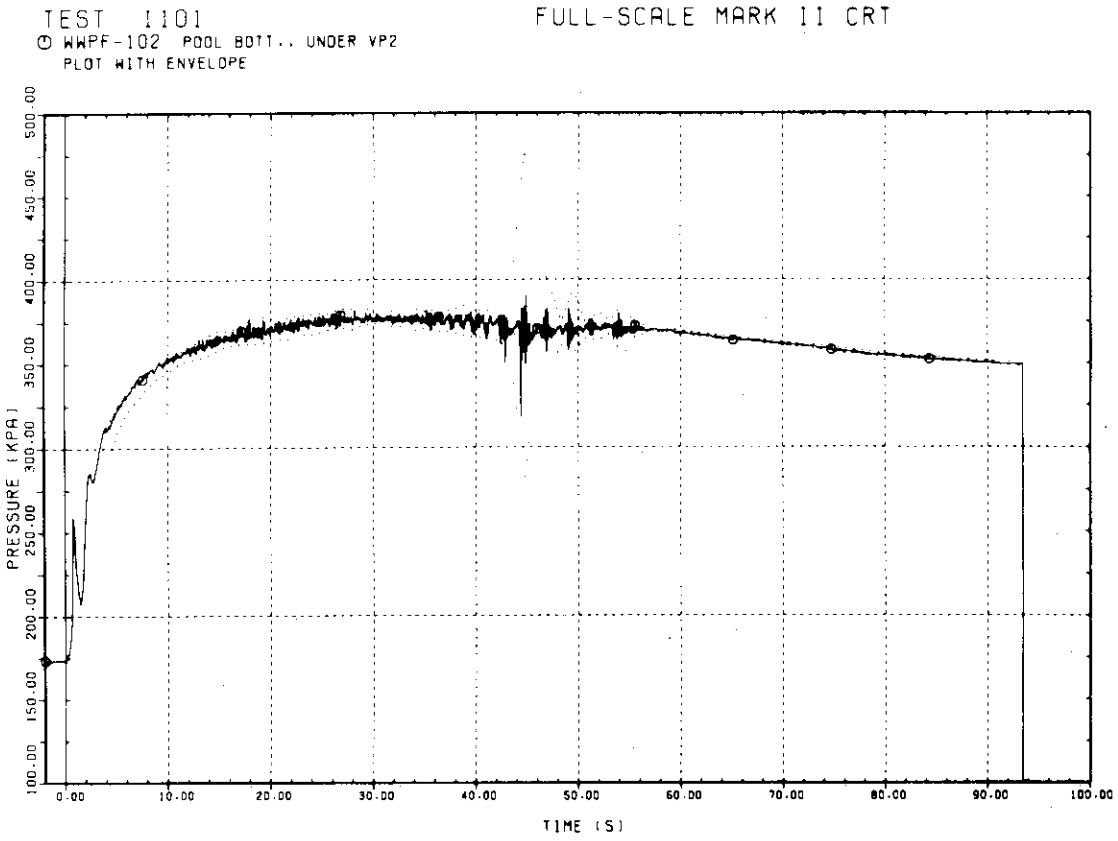

Plot L-1-9 Pressure in Vent pipe



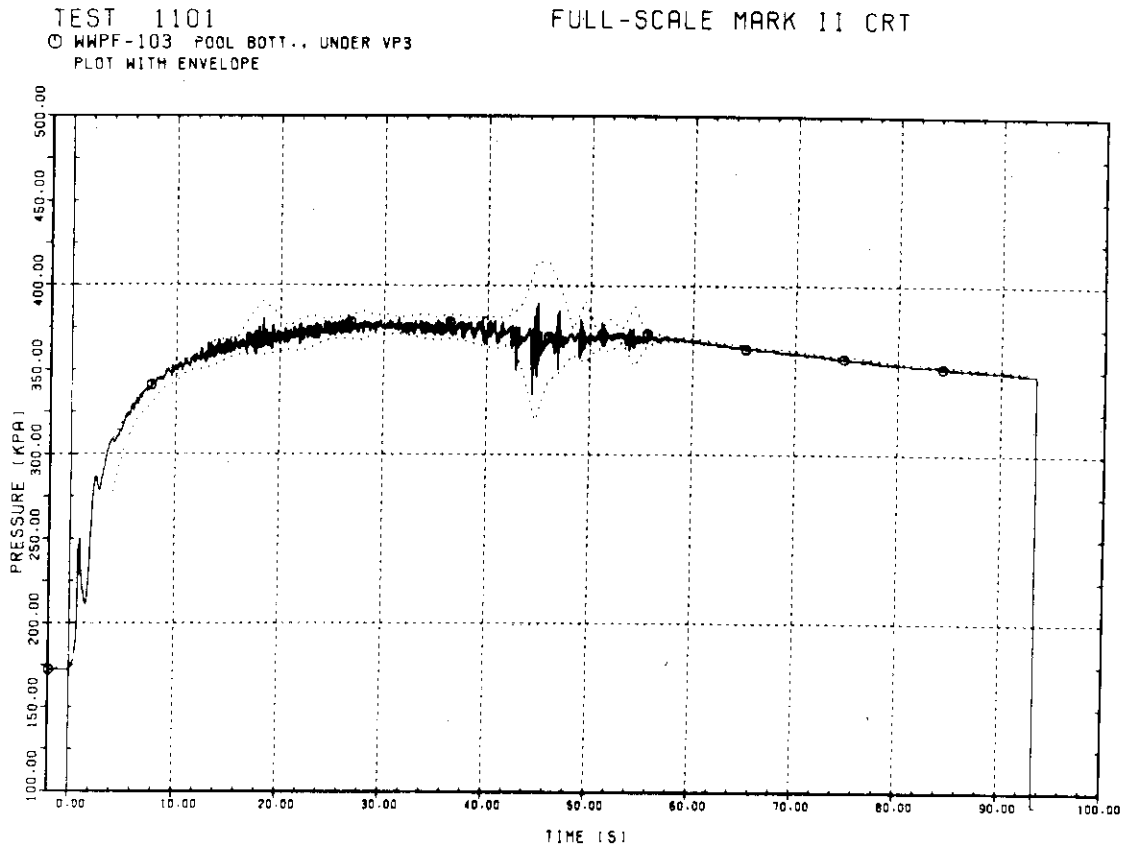

Plot L-1-10 Pressure in Vent pipe



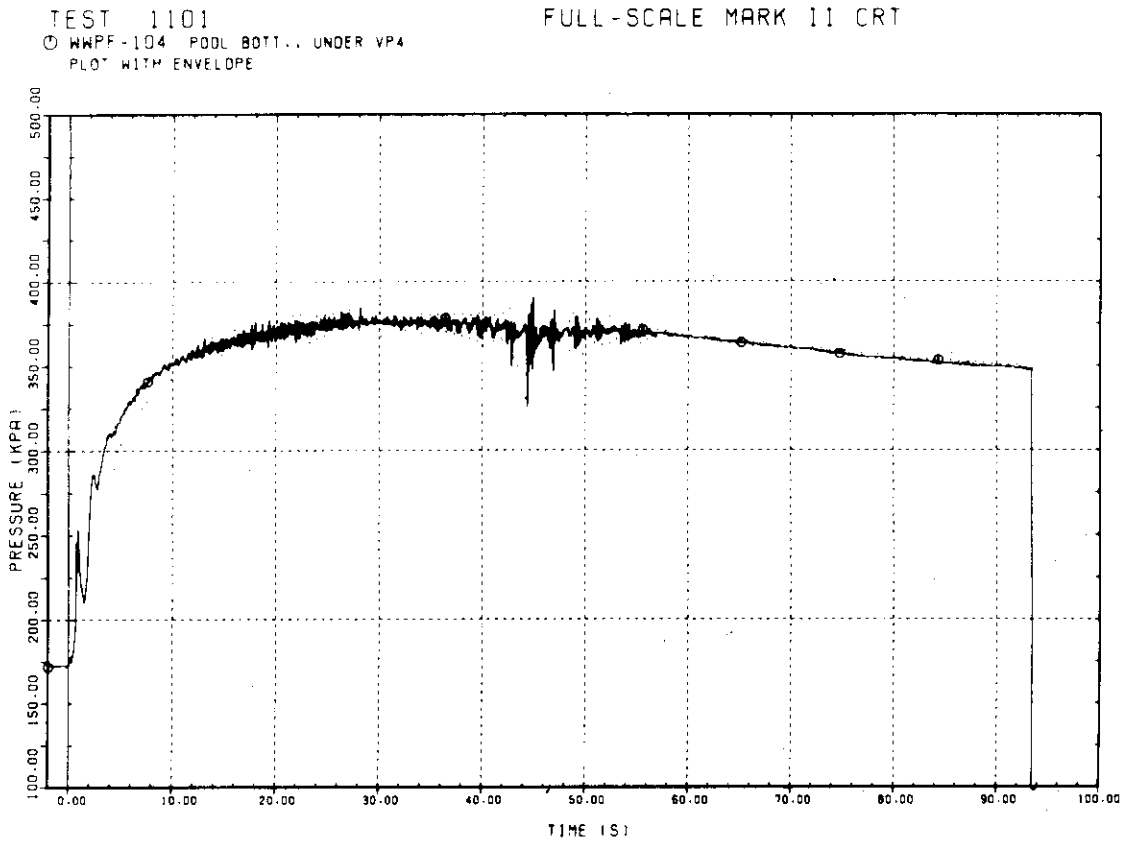

Plot L-1-11 Pressure in Wetwell



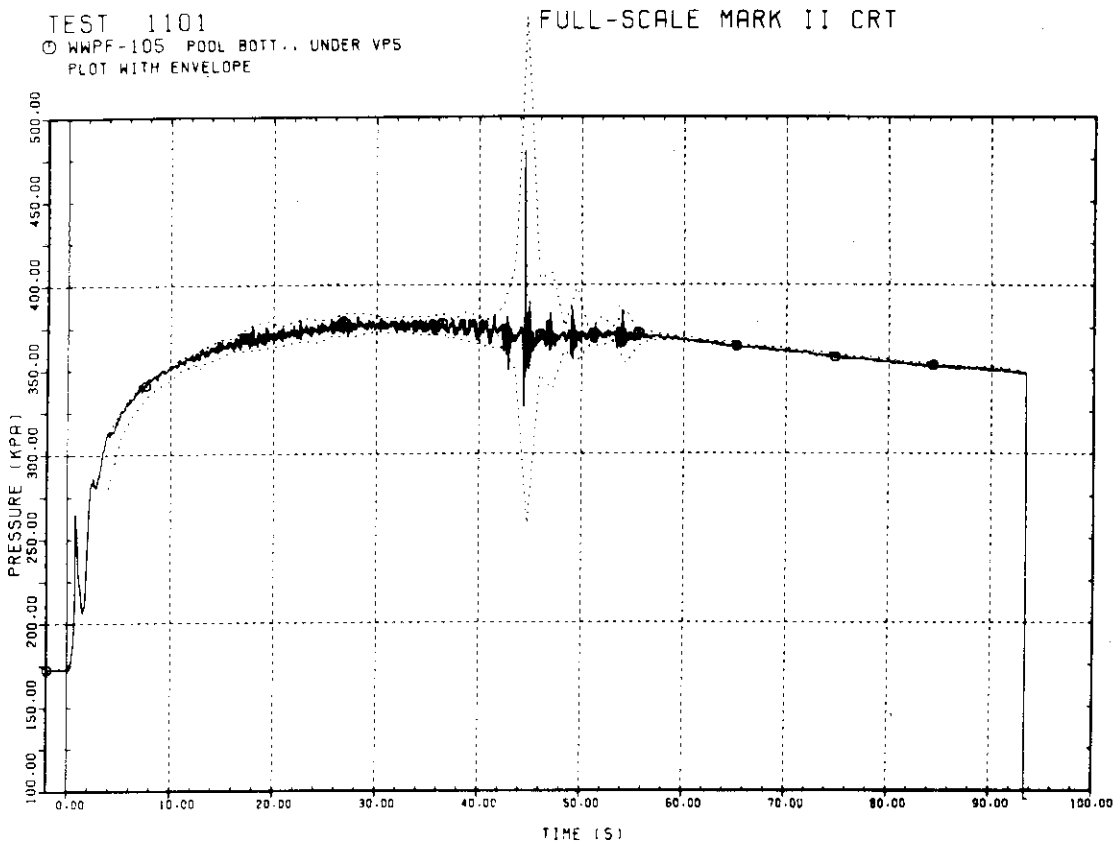

Plot L-1-12 Pressure in Wetwell



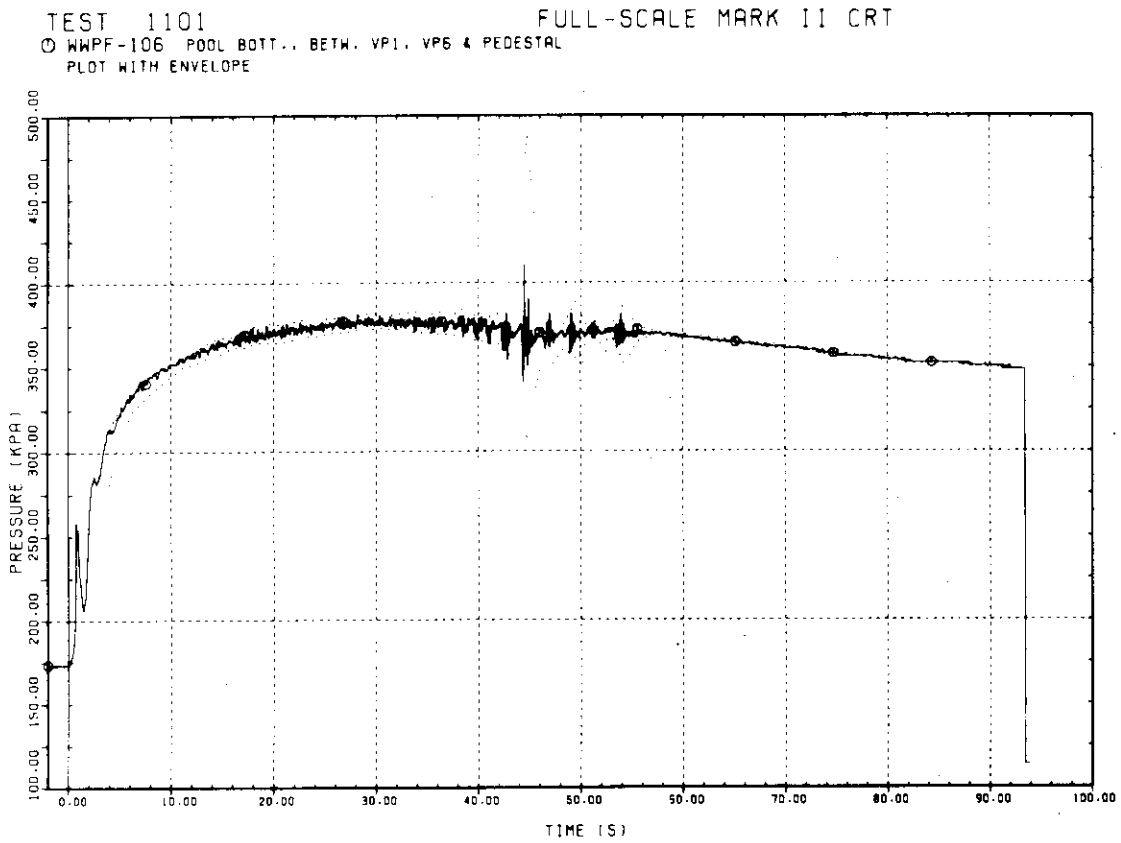

Plot L-1-13 Pressure in Wetwell



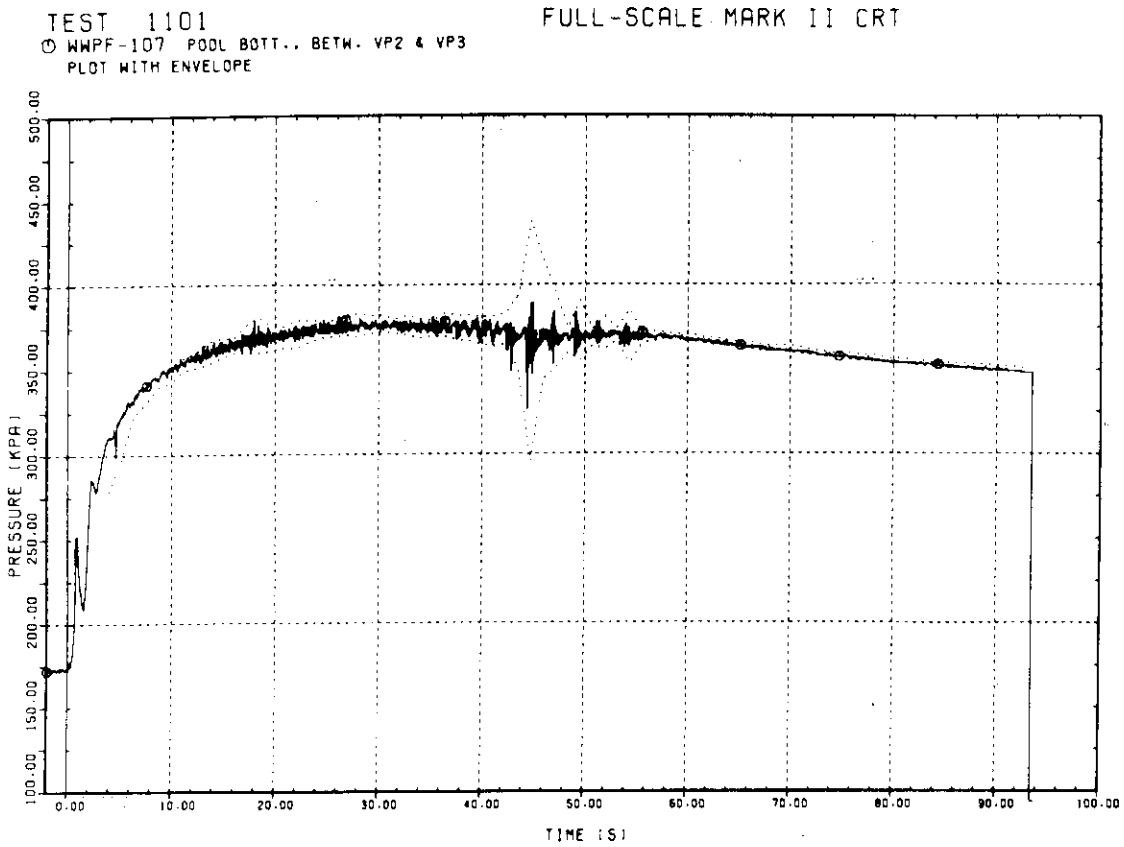

Plot L-1-14 Pressure in Wetwell



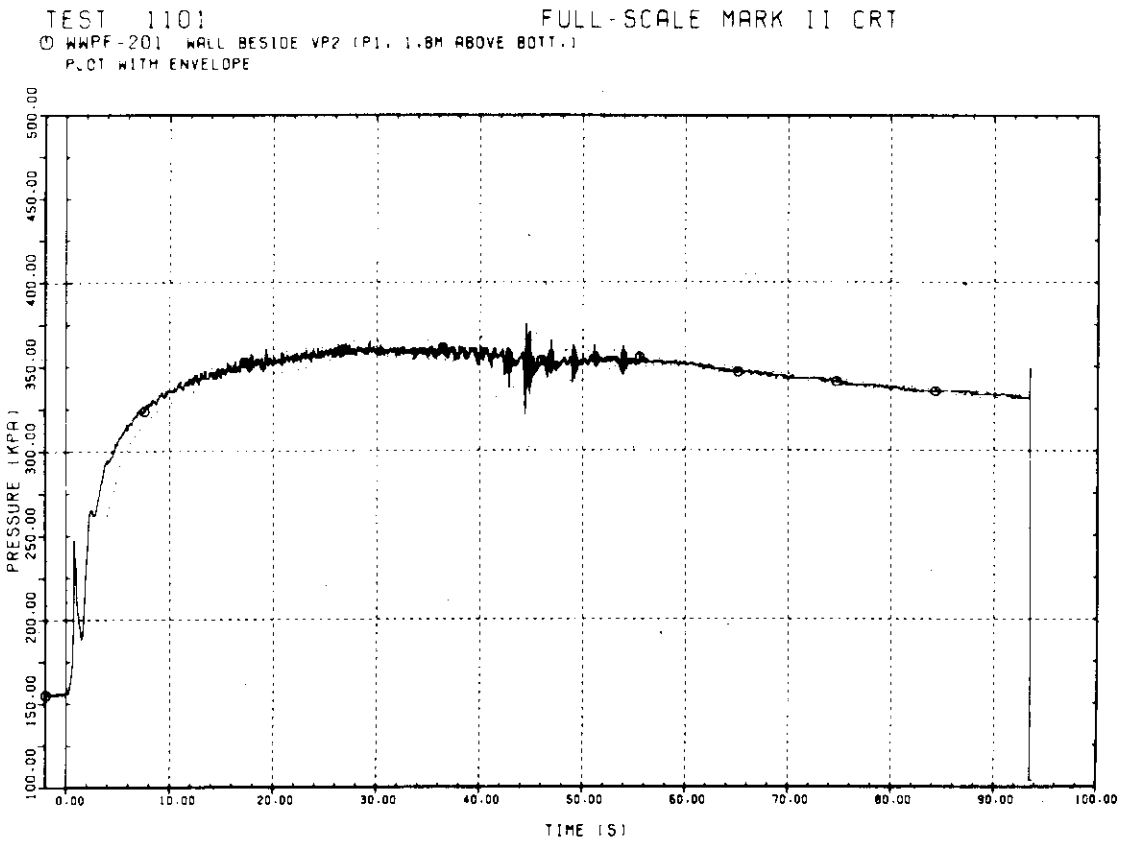

Plot L-1-15 Pressure in Wetwell



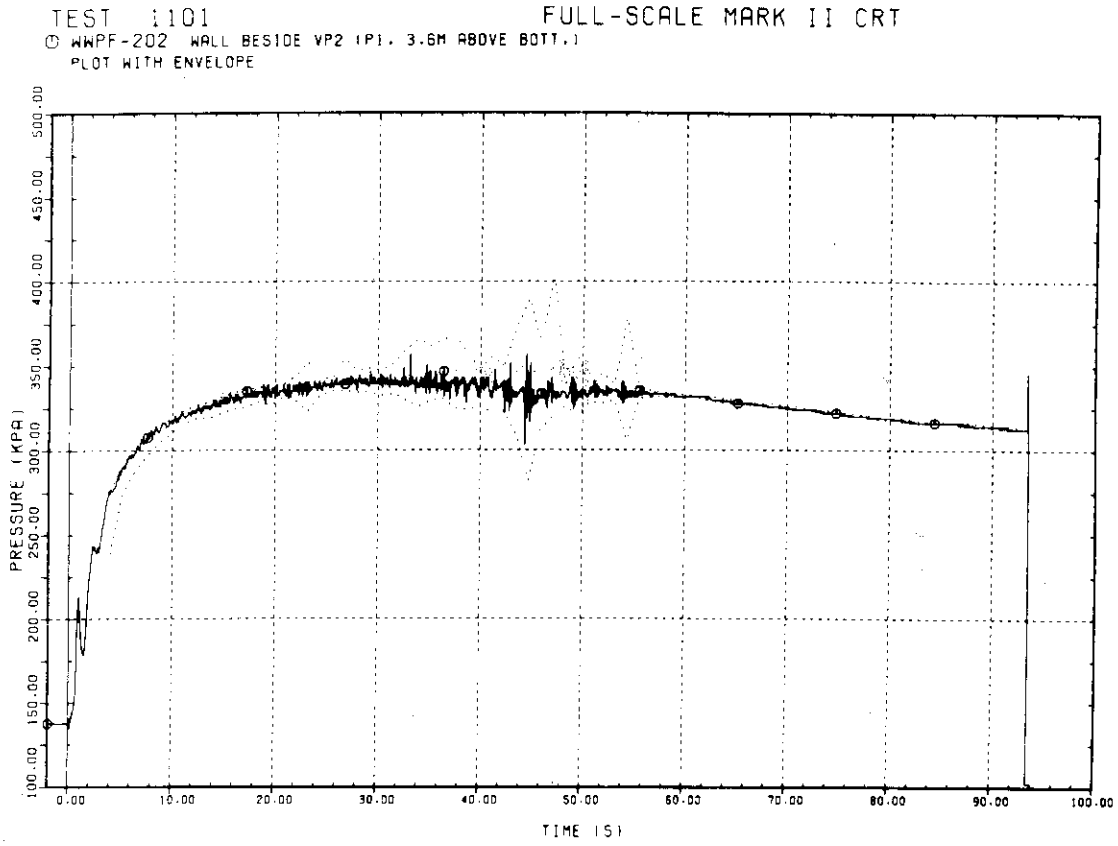

Plot L-1-16 Pressure in Wetwell



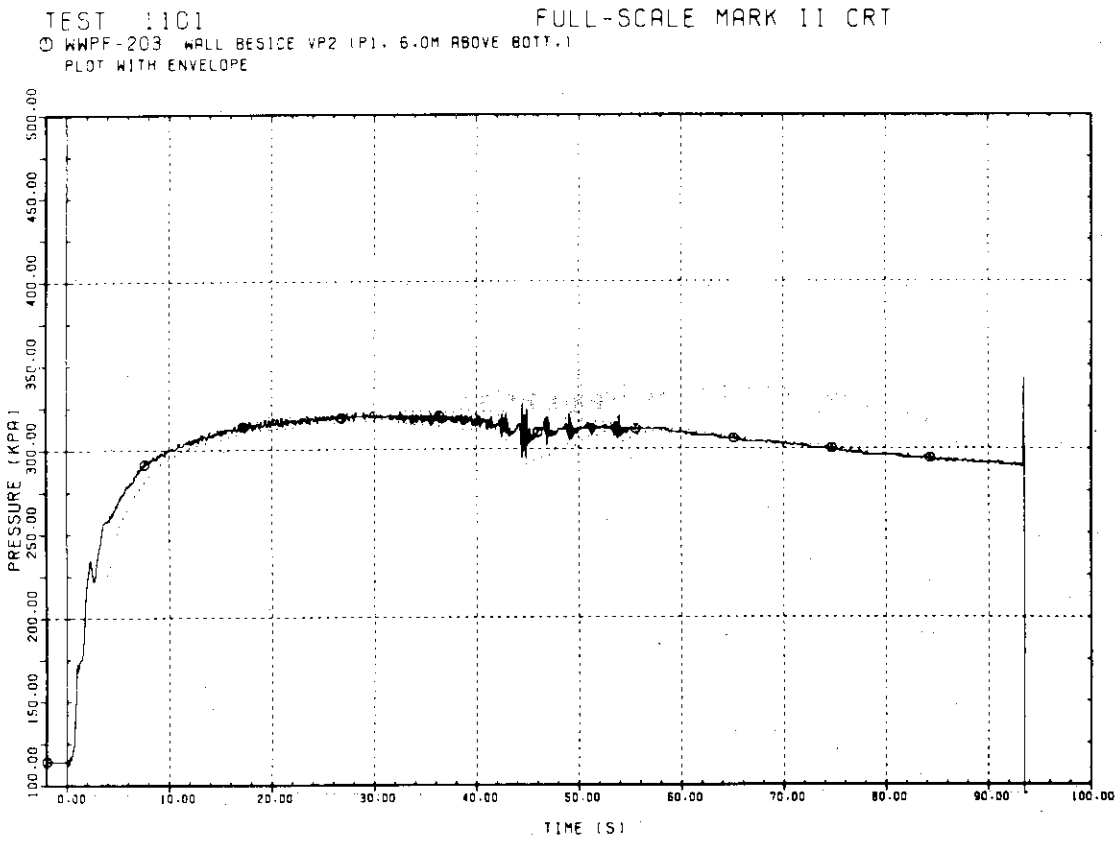

**Plot L-1-17 Pressure in Wetwell**



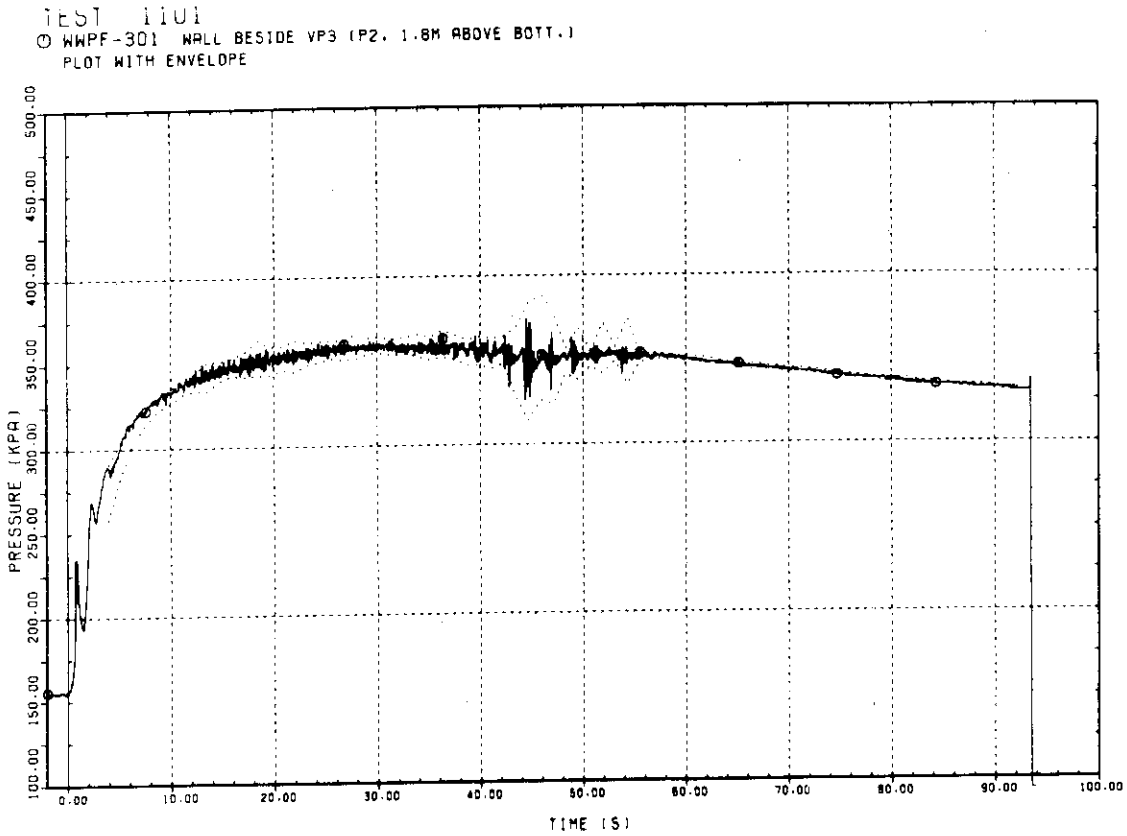

**Plot L-1-18 Pressure in Wetwell**



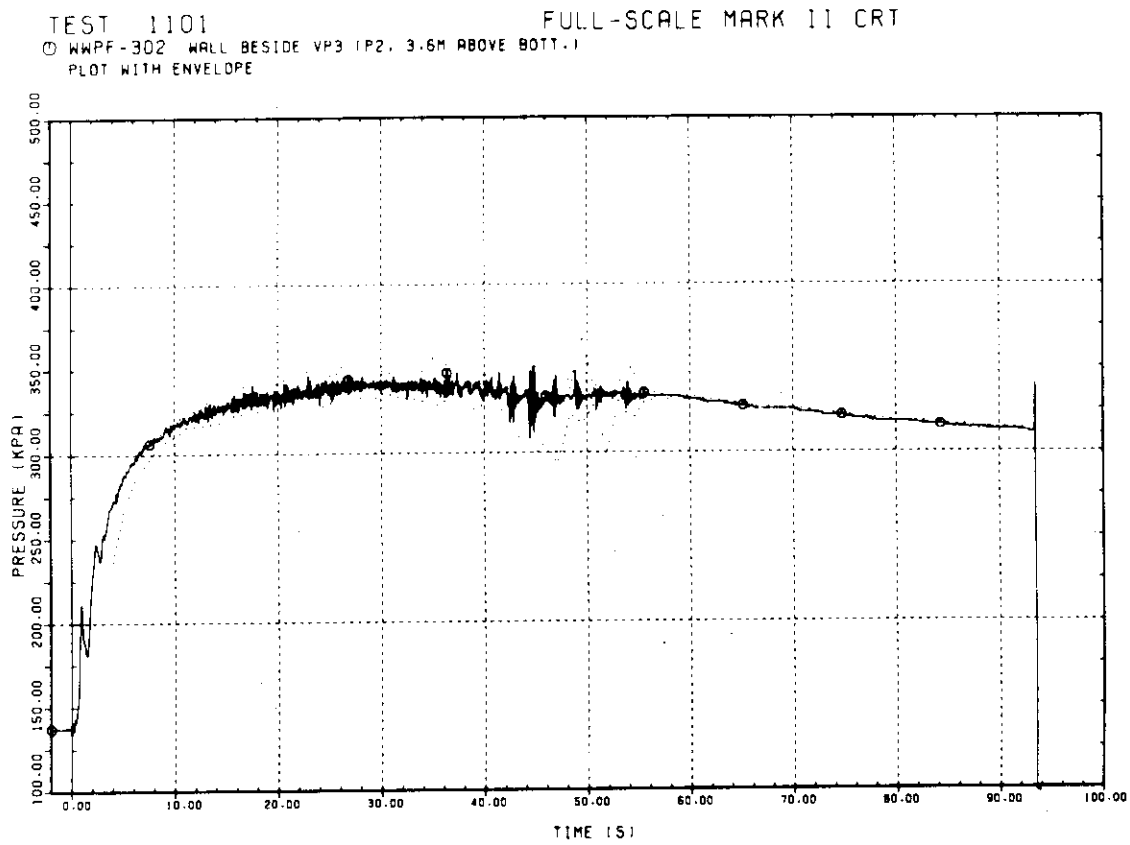

Plot L-1-19 Pressure in Wetwell



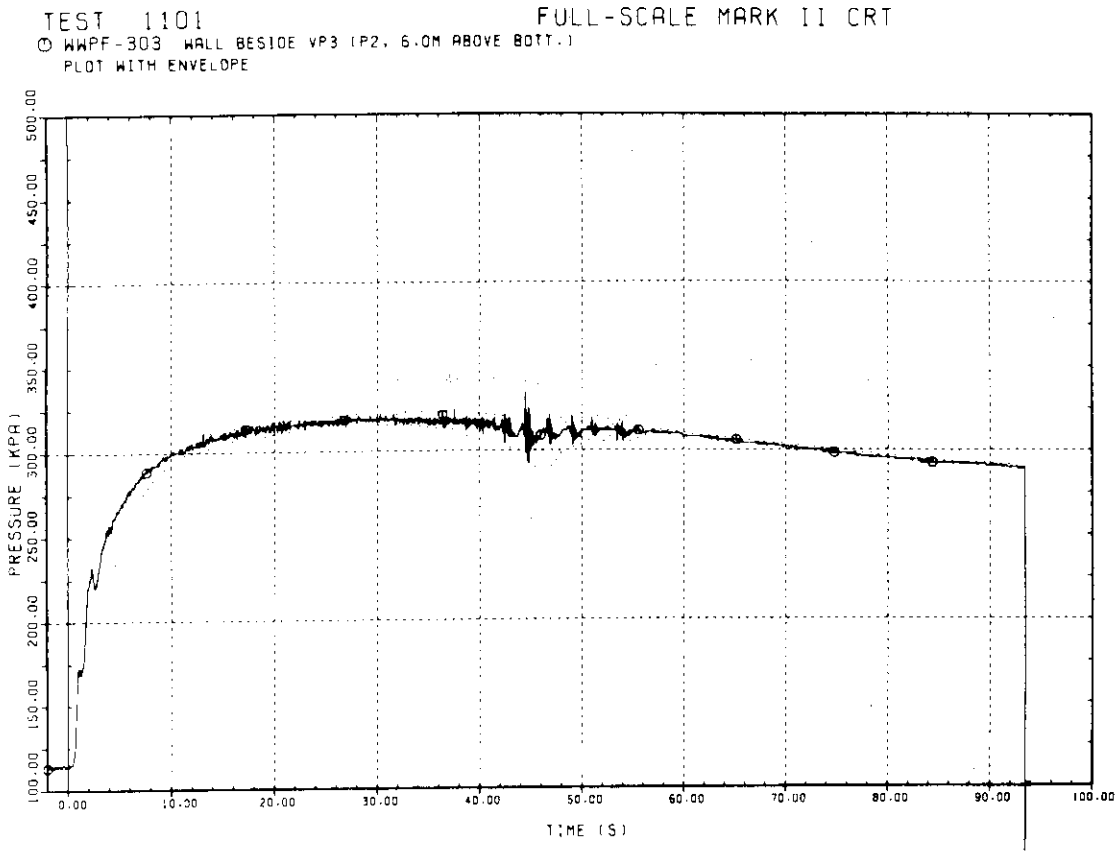

Plot L-1-20 Pressure in Wetwell



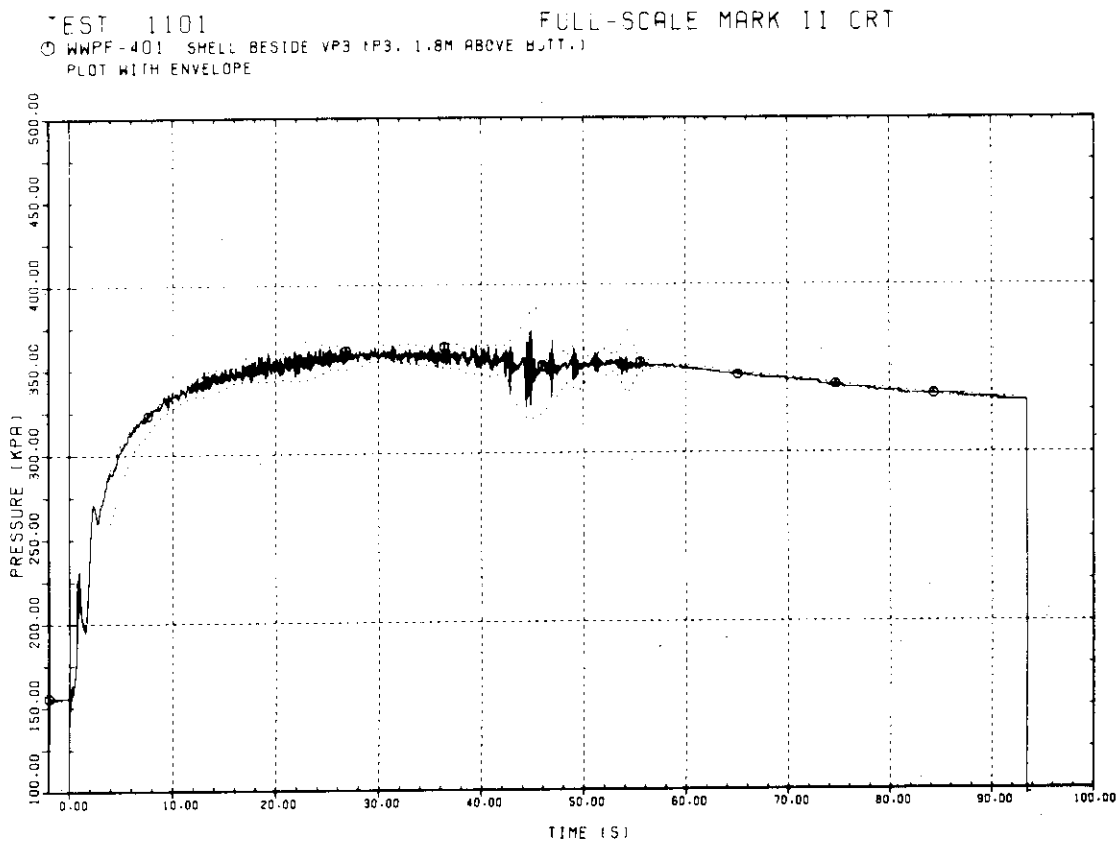

Plot L-1-21 Pressure in Wetwell



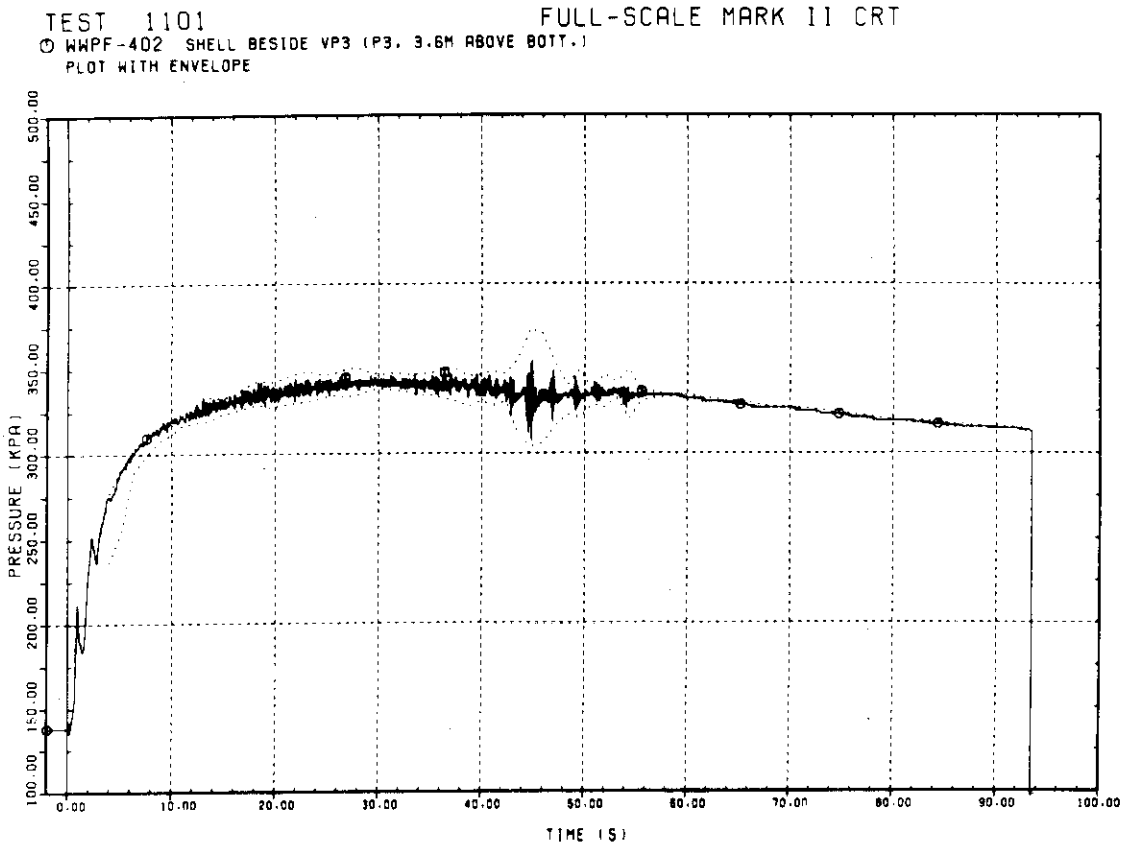

Plot L-1-22 Pressure in Wetwell



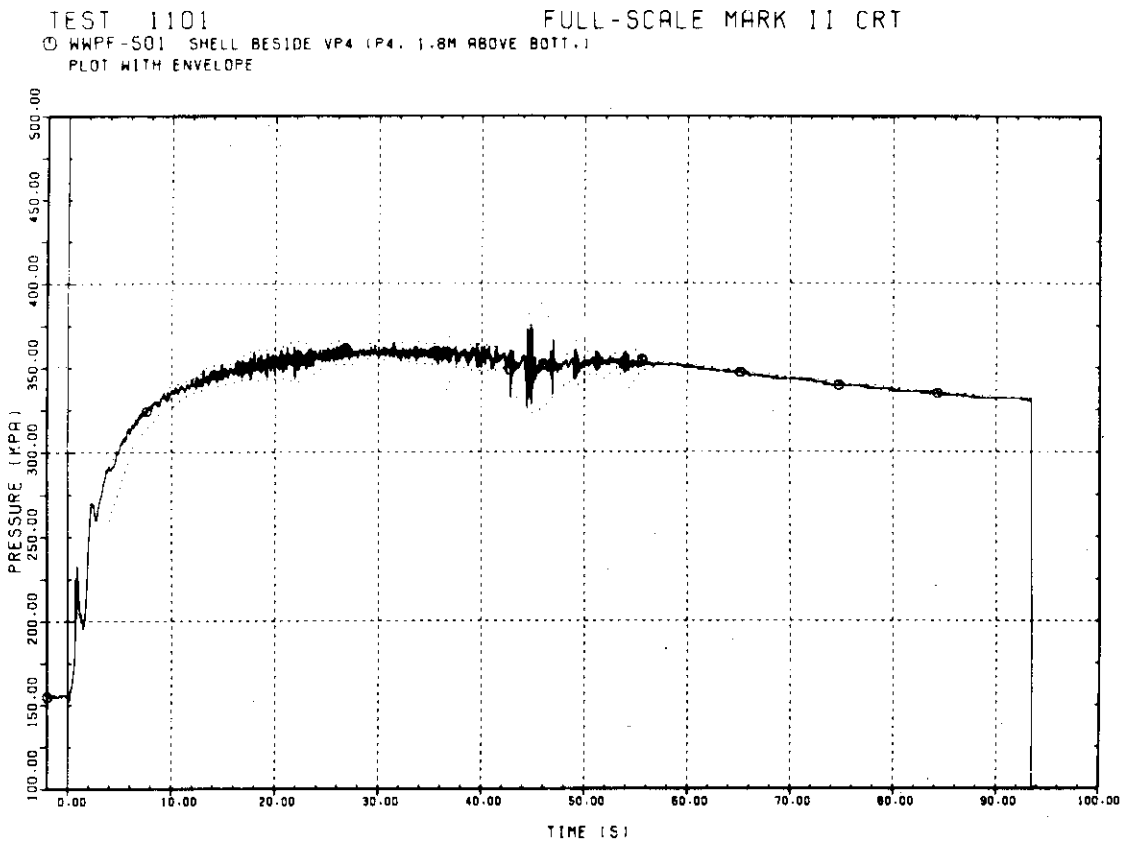

Plot L-1-23 Pressure in Wetwell



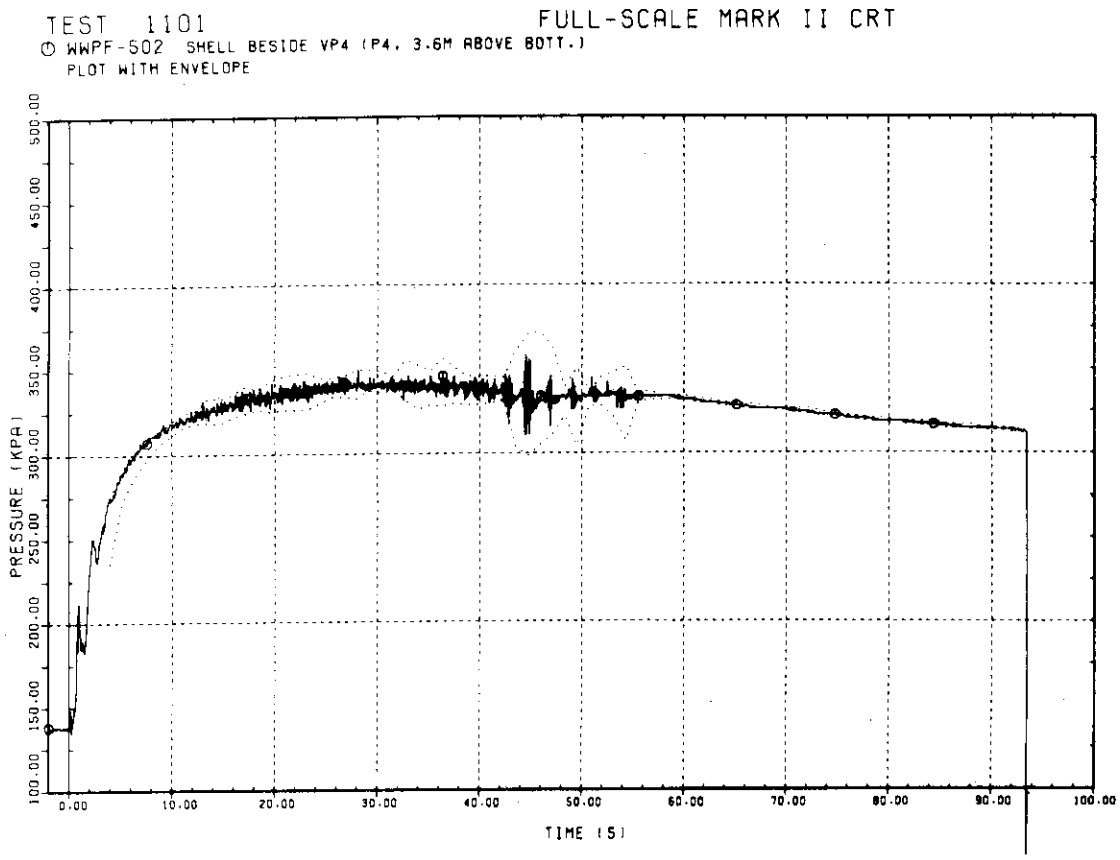

Plot L-1-24 Pressure in Wetwell



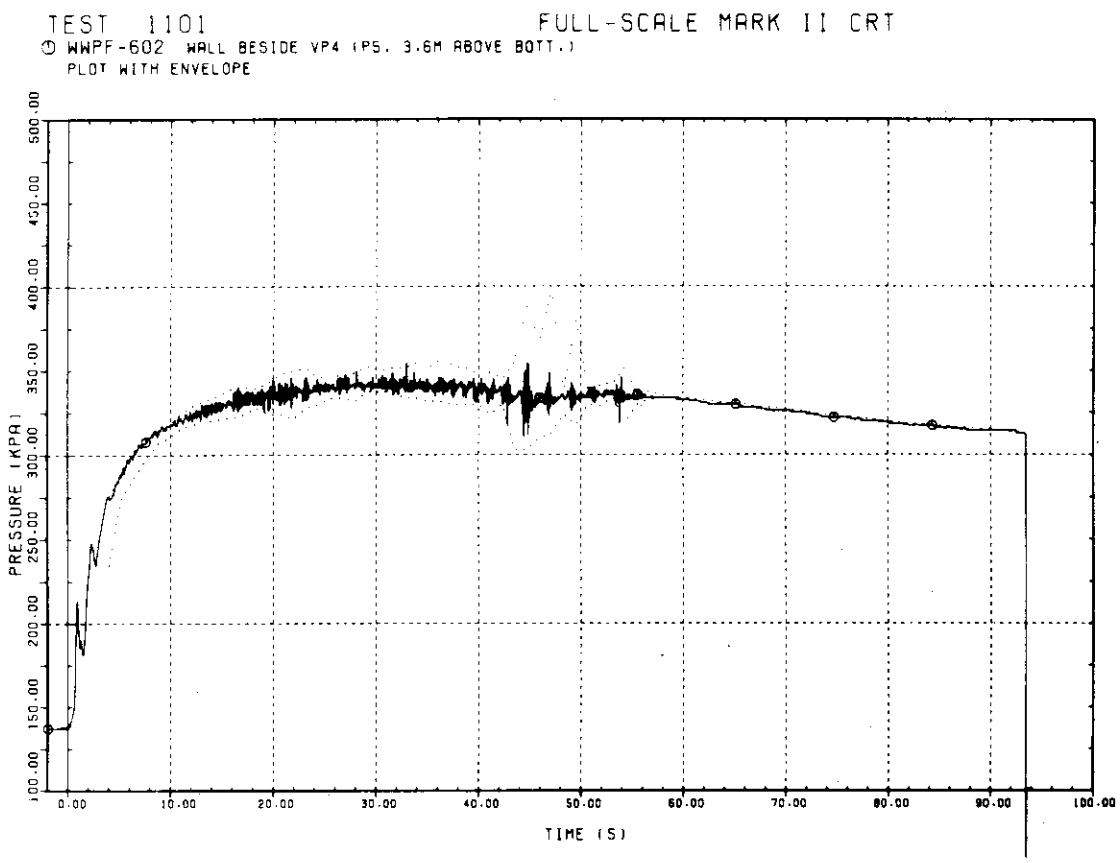

Plot L-1-25 Pressure in Wetwell



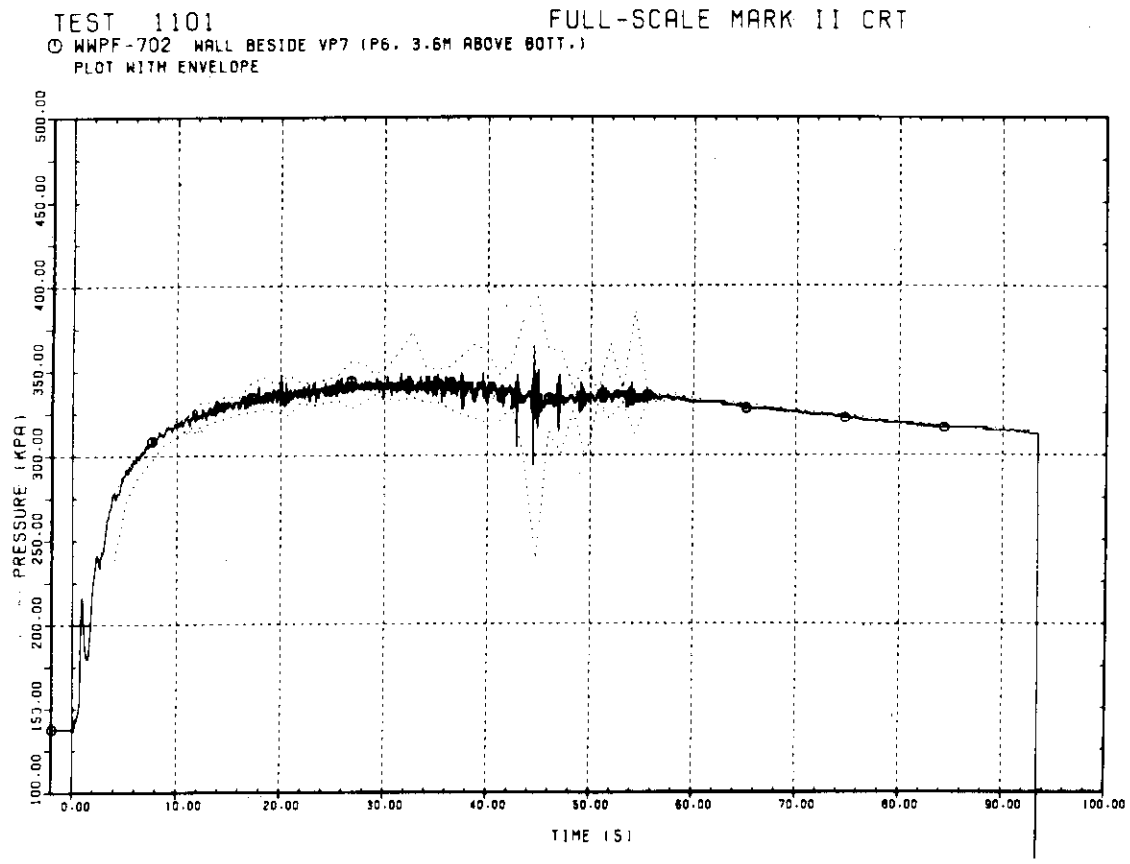

Plot L-1-26 Pressure in Wetwell



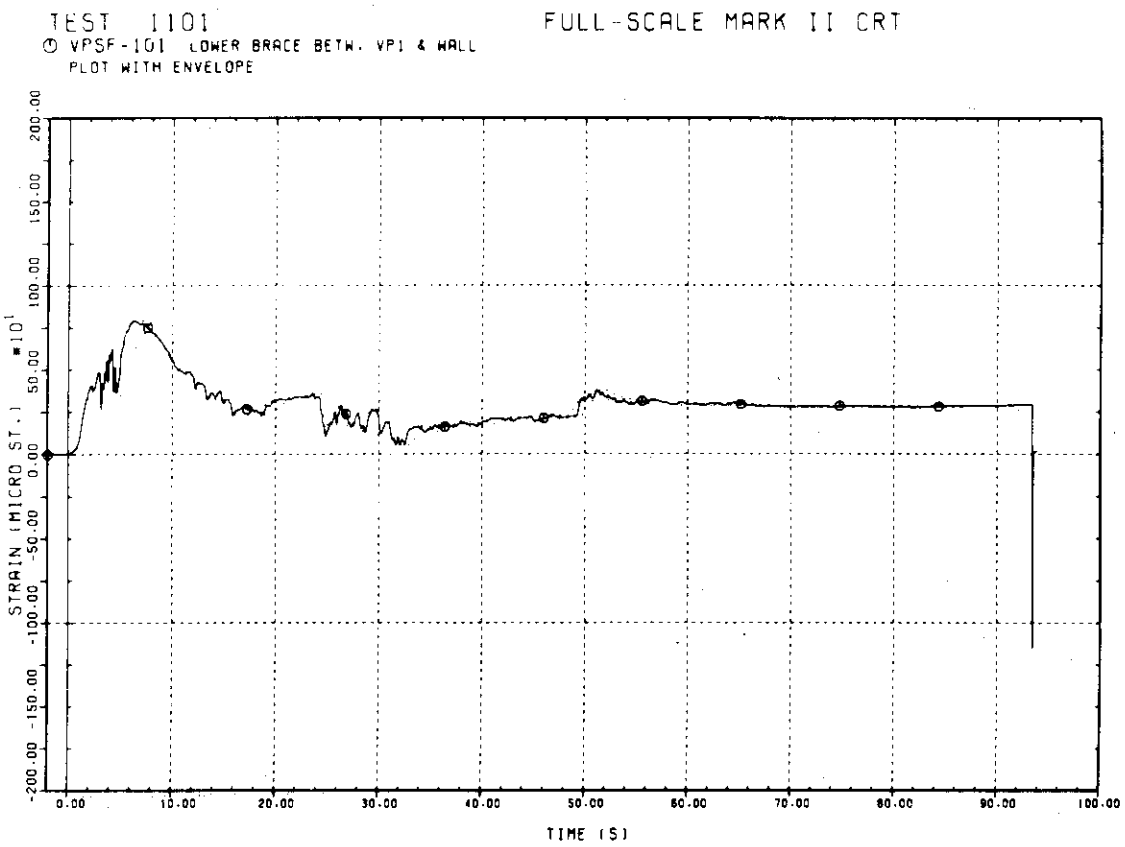

Plot L-1-27 Pressure in Wetwell



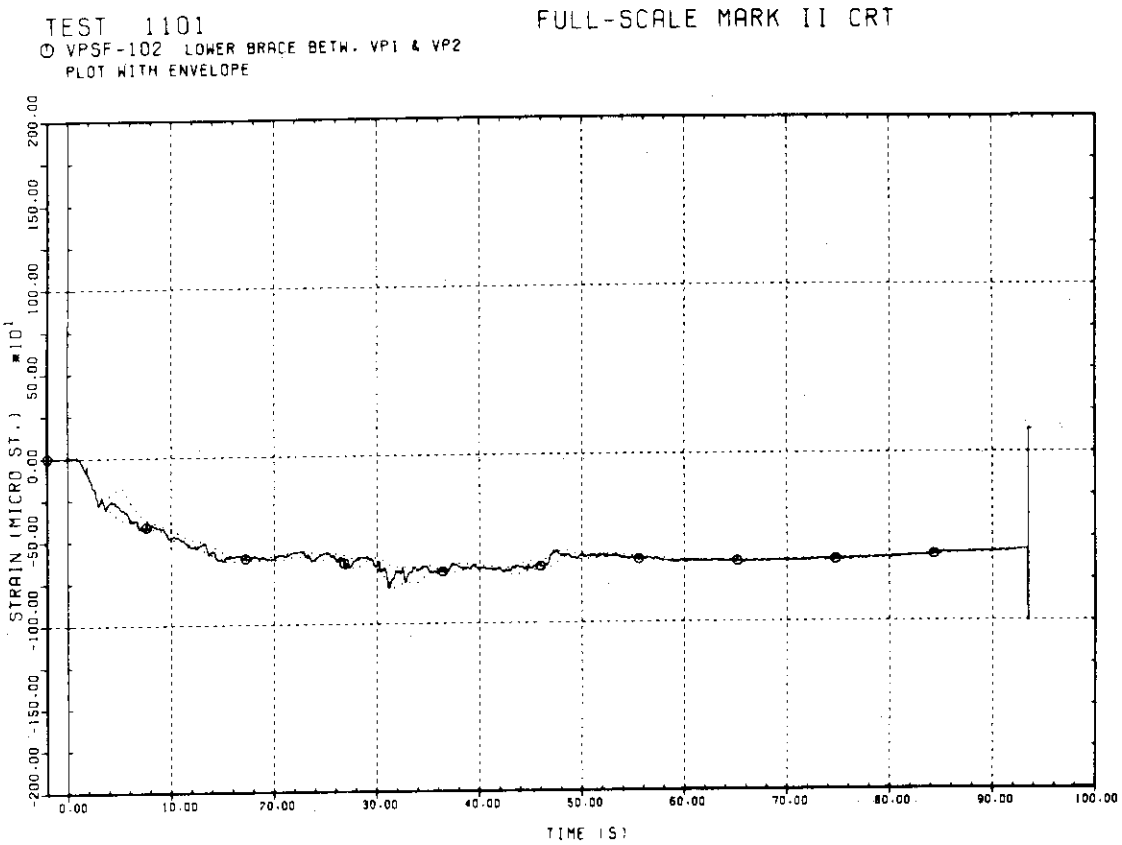

Plot L-1-28 Pressure in Wetwell



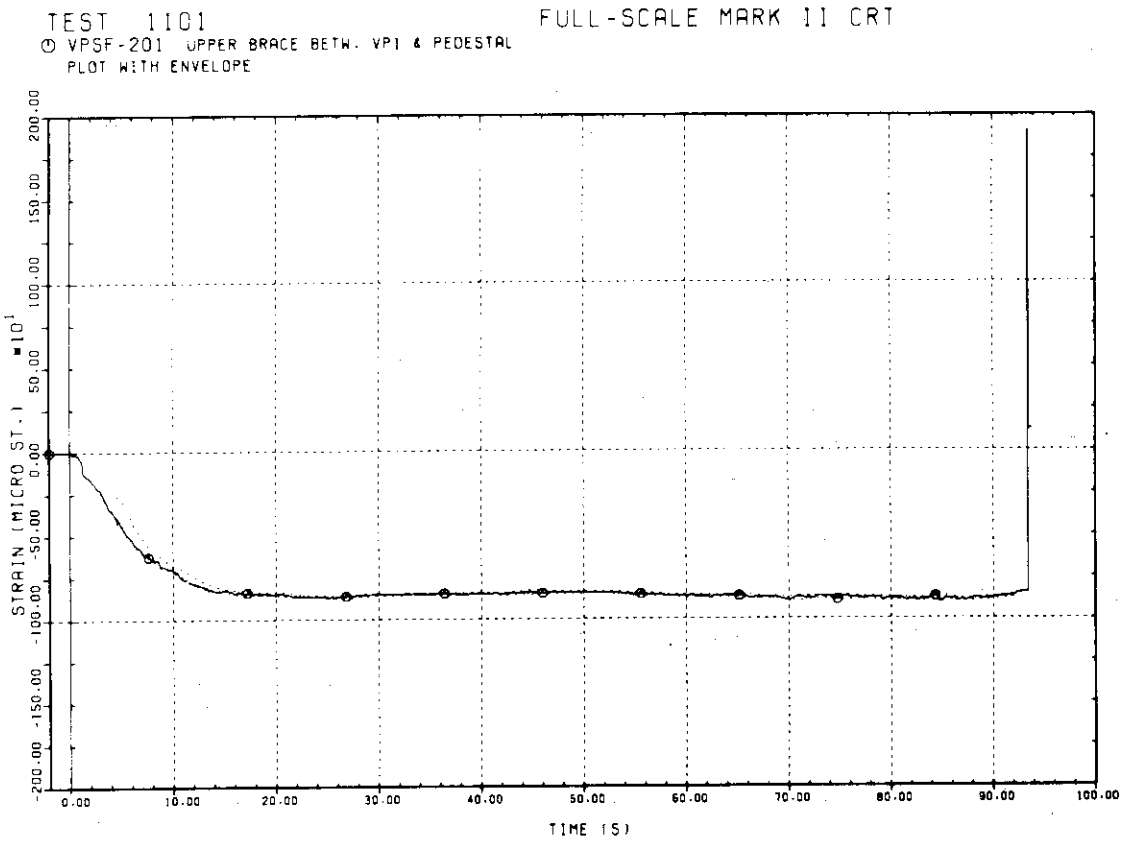

**Plot L-1-29 Pressure in Wetwell**



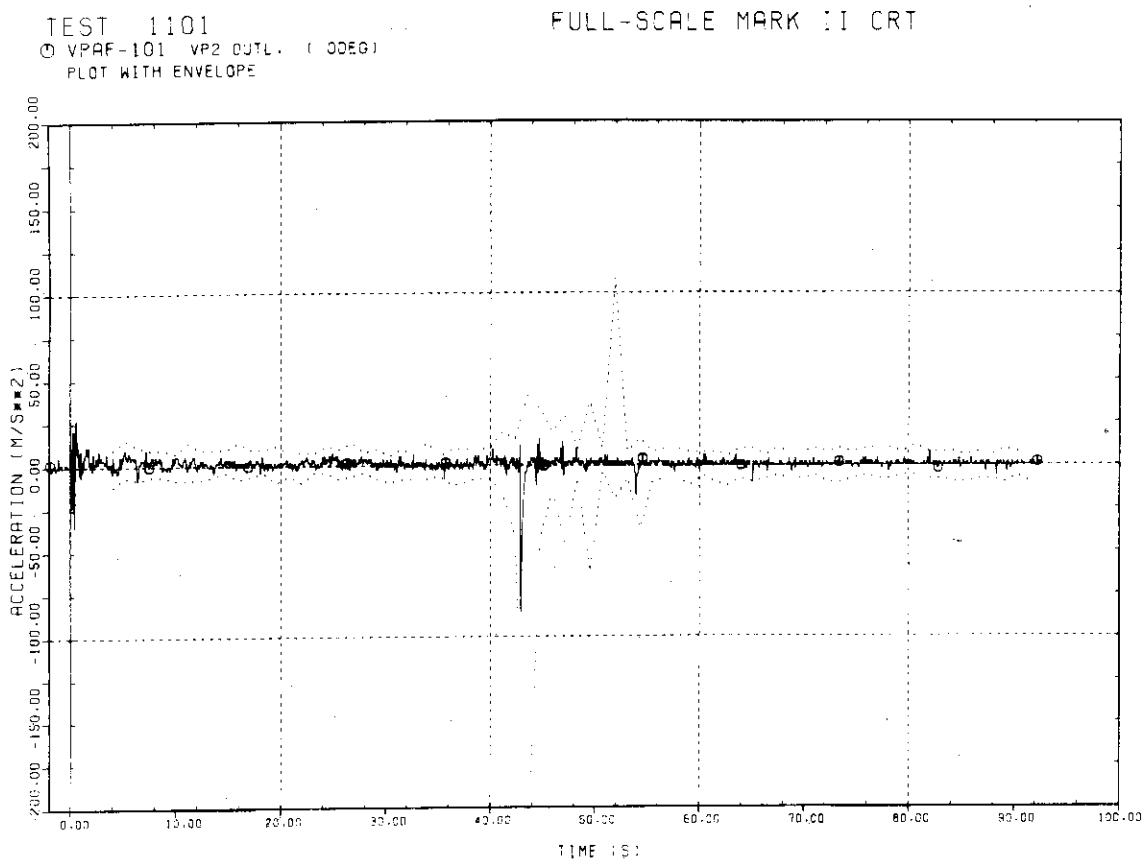

**Plot L-1-30 Strain of Vent pipe Brace**



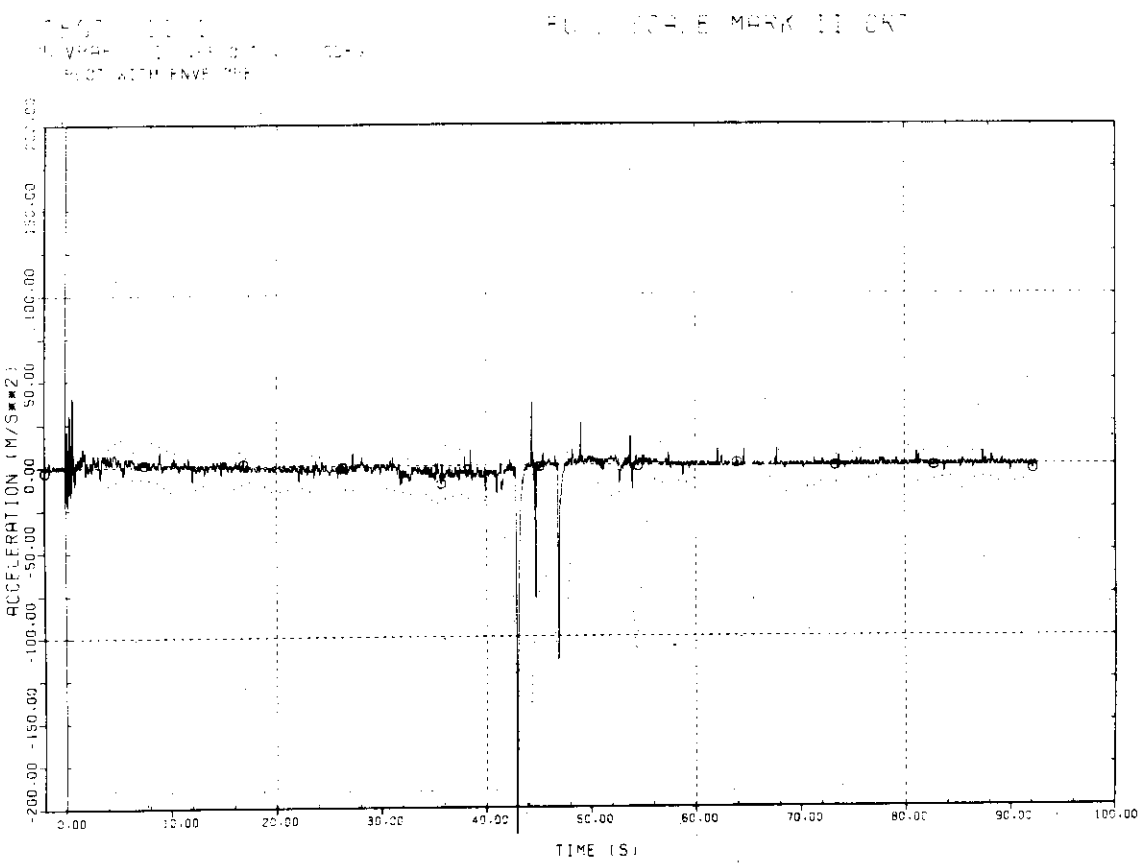

Plot L-1-31 Strain of Vent pipe Brace



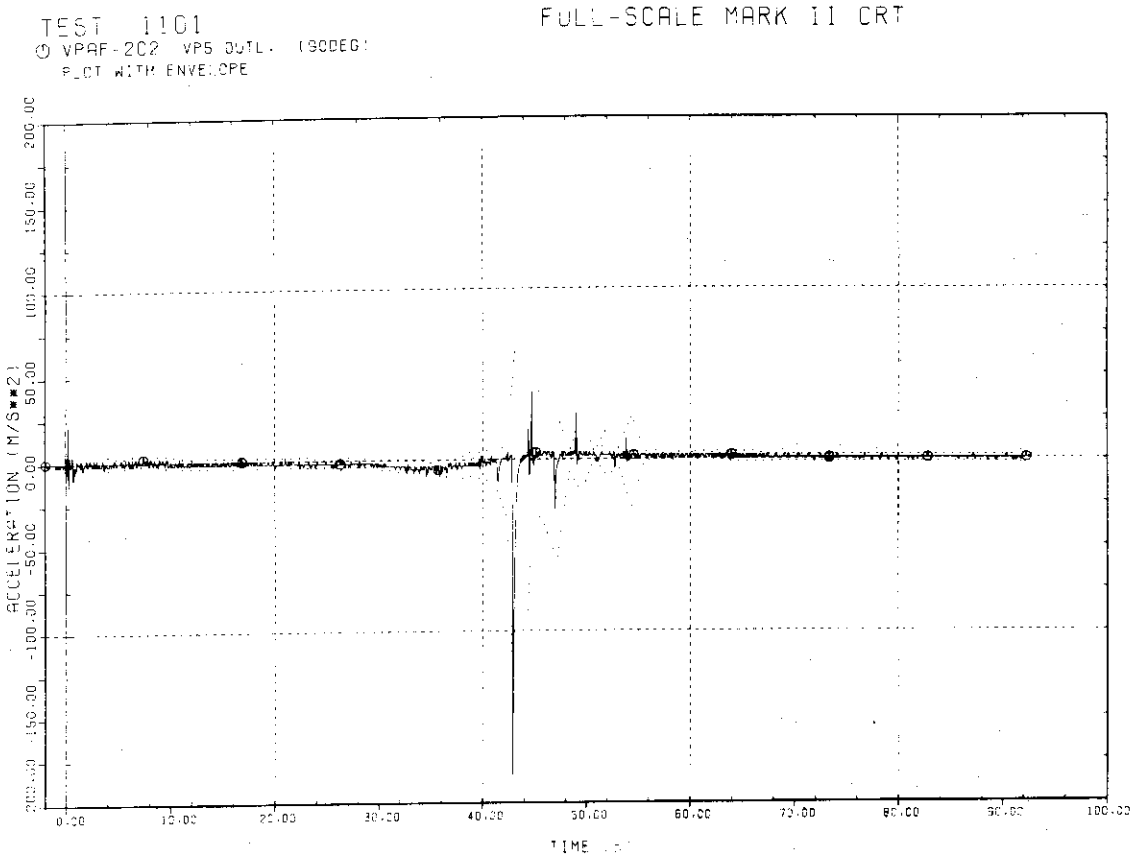

Plot L-1-32 Strain of Vent pipe Brace



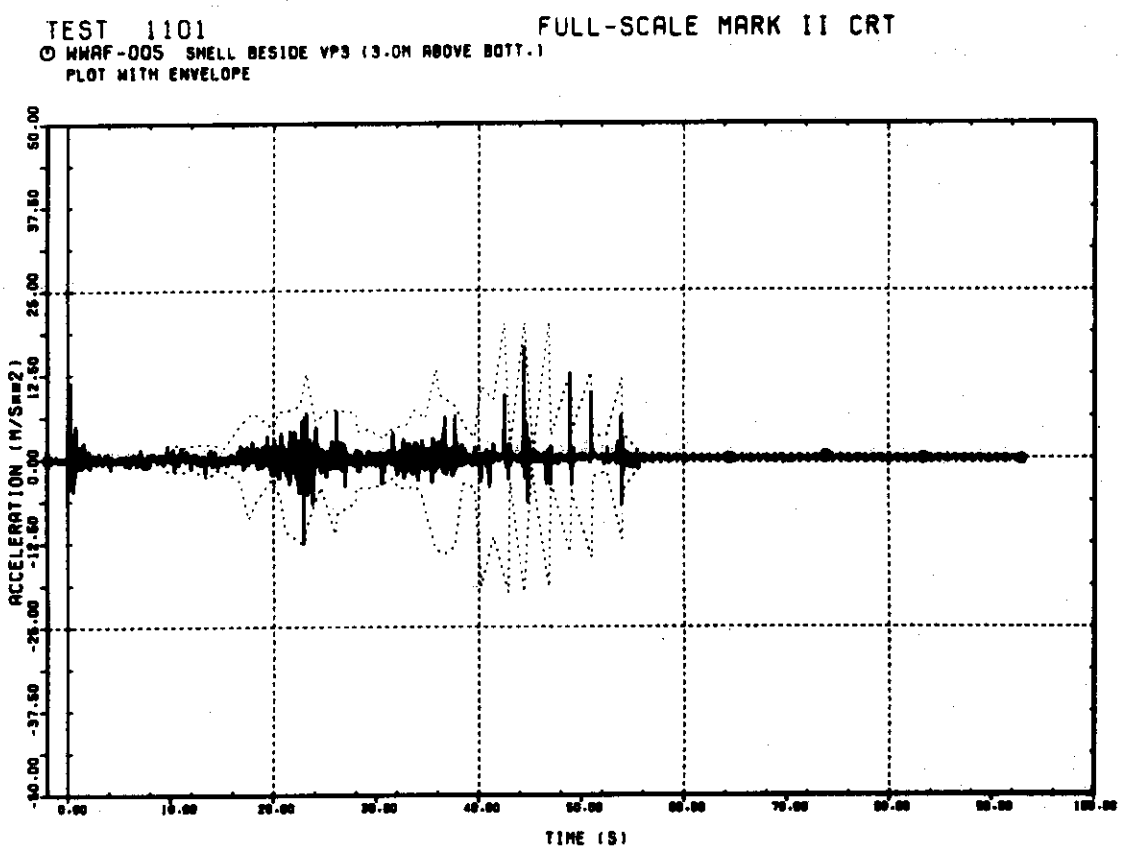

**Plot L-2-1 Acceleration of Vent pipe Outlet**



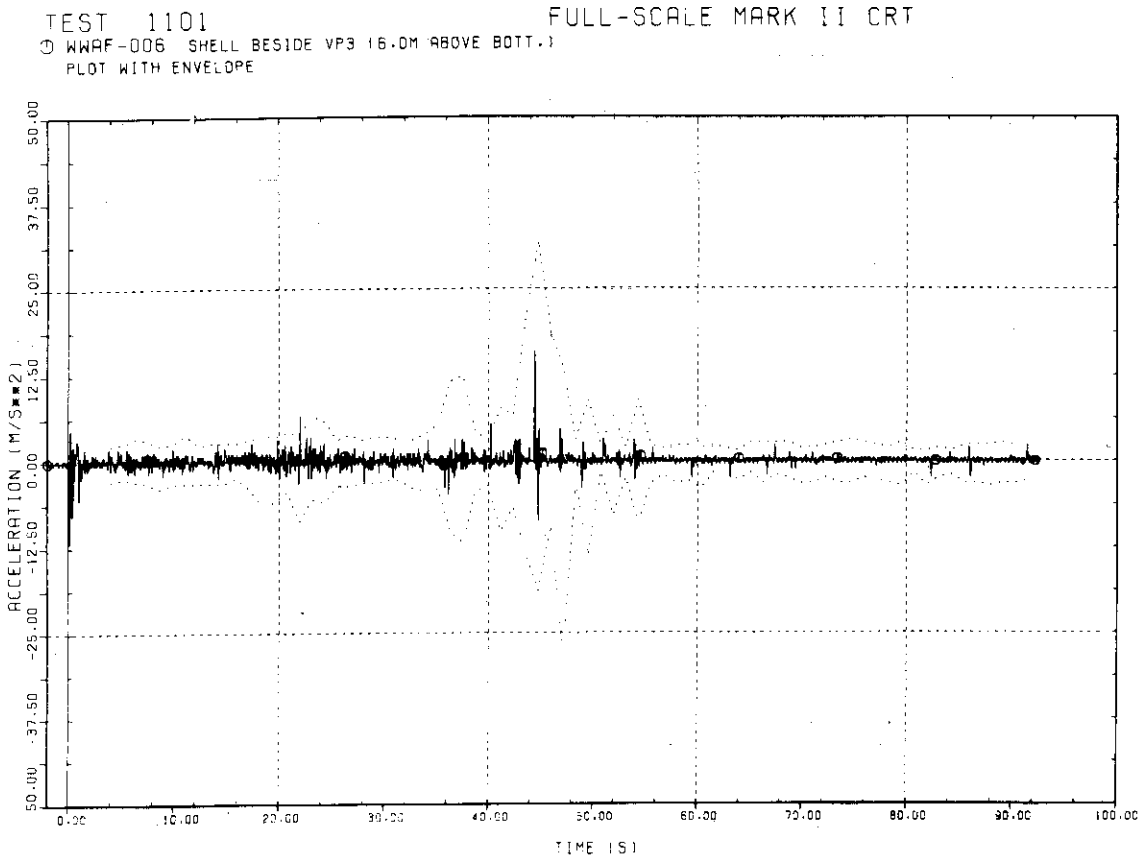

**Plot L-2-2 Acceleration of Vent pipe Outlet**



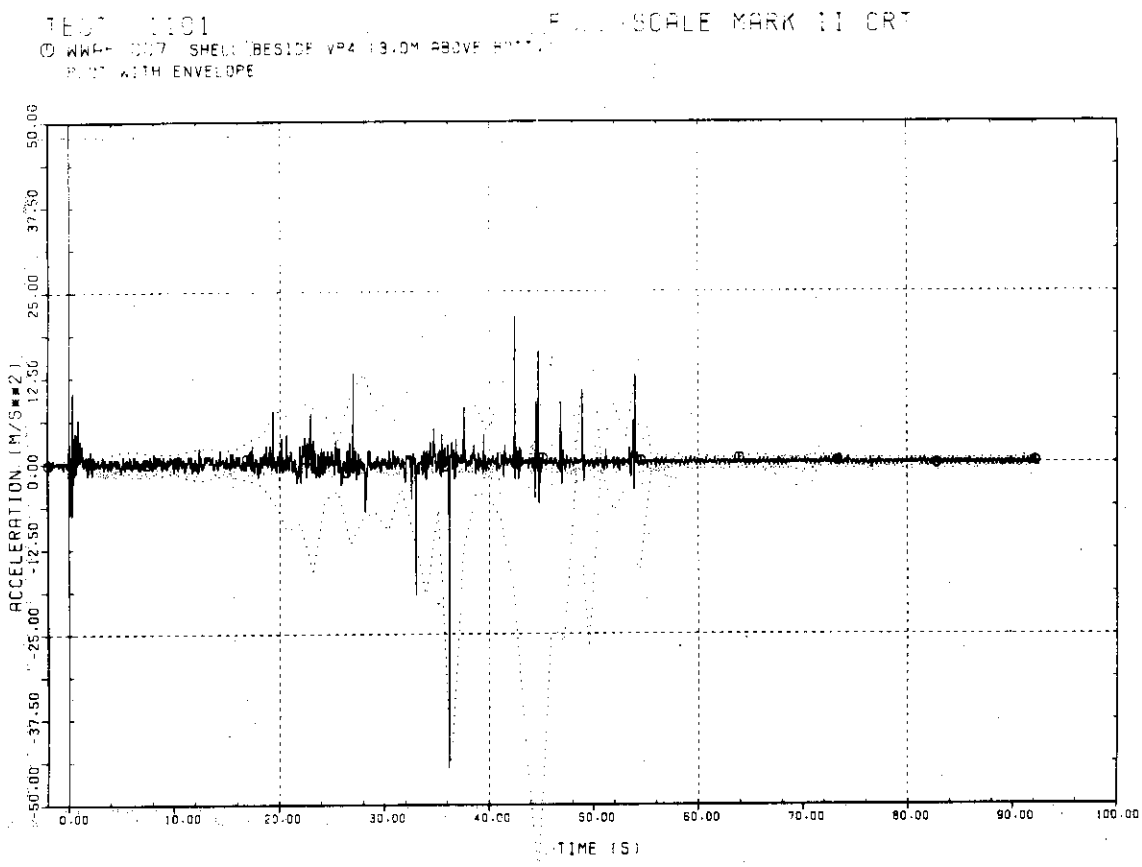

Plot L-2-3 Acceleration of Vent pipe Outlet



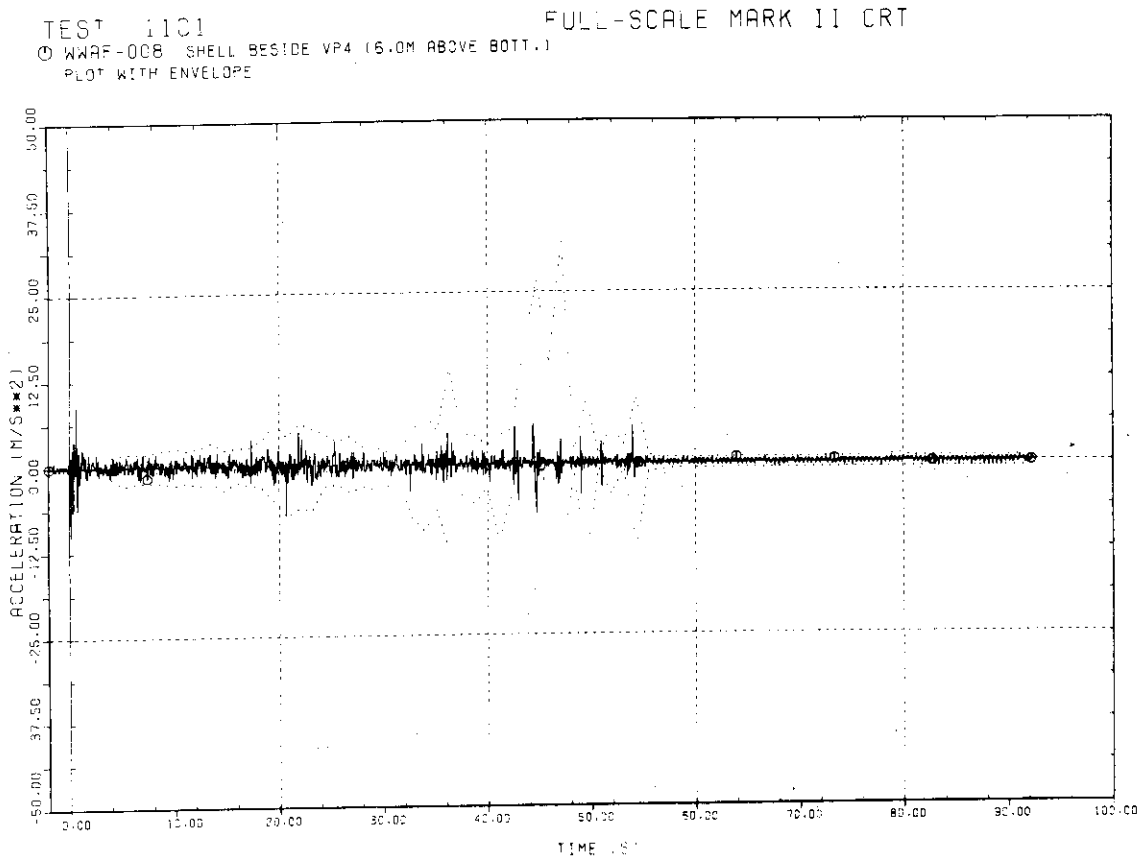

Plot L-2-4 Acceleration of Containment Structure



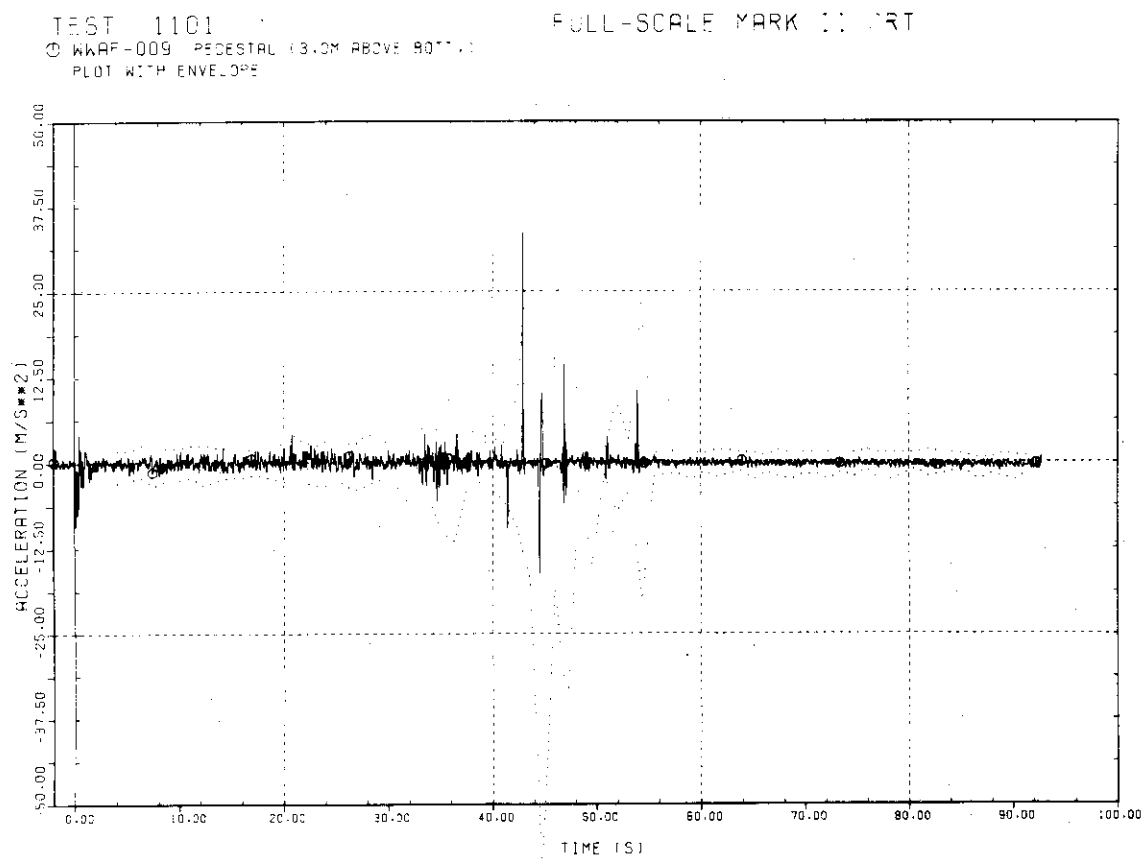

**Plot L-2-5 Acceleration of Containment Structure**



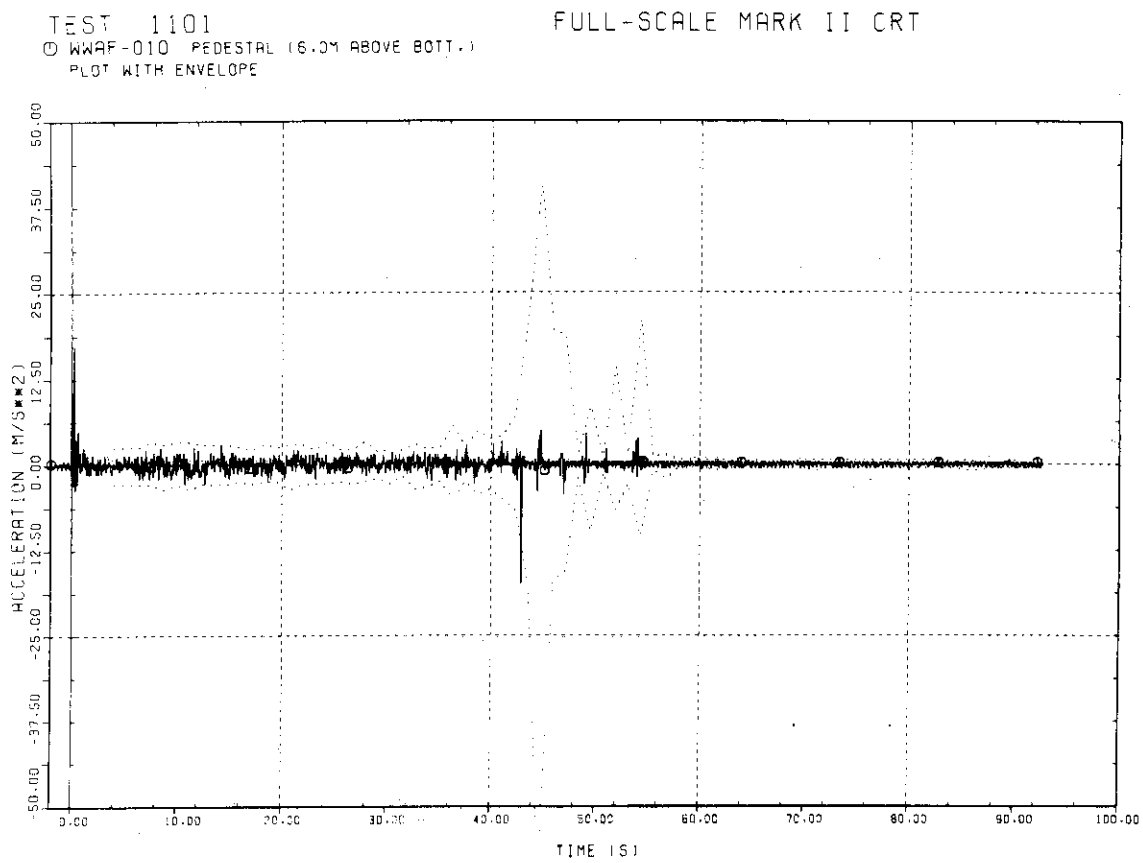

**Plot L-2-6 Acceleration of Containment Structure**



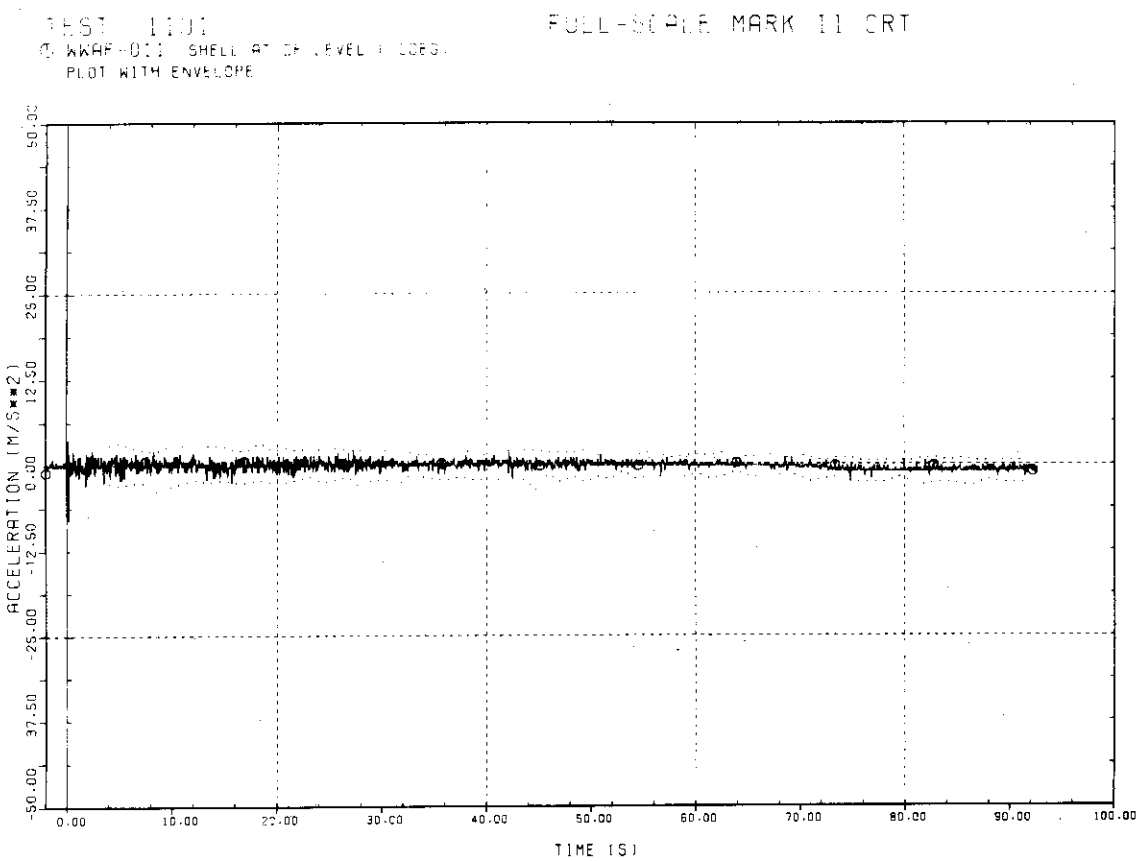

Plot L-2-7 Acceleration of Containment Structure



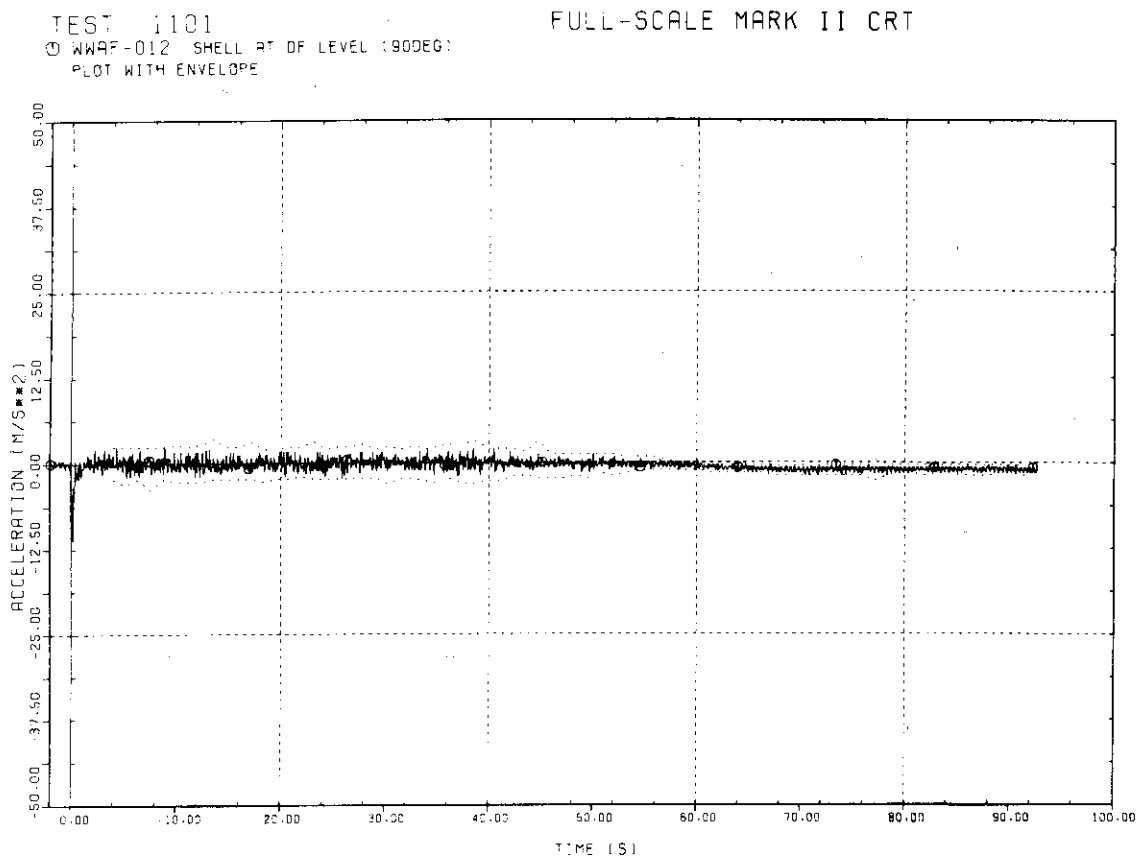

Plot L-2-8 Acceleration of Containment Structure



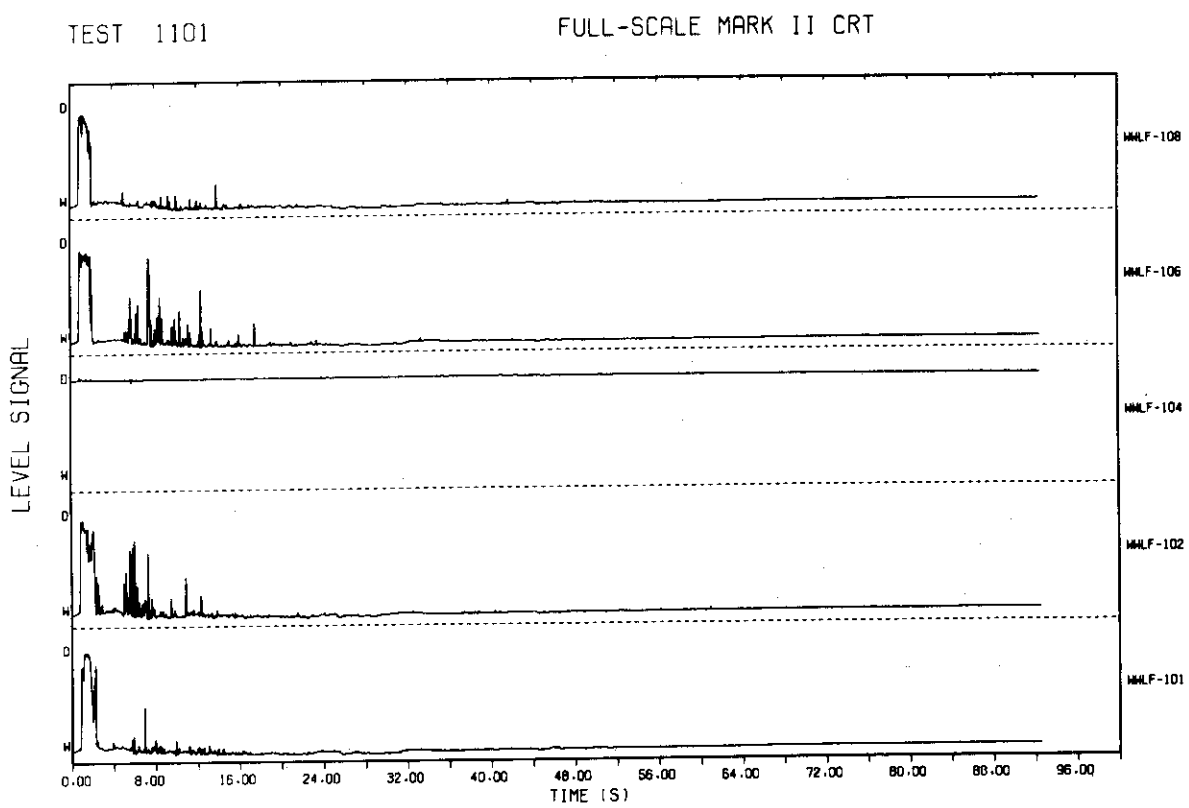

**Plot L-2-9 Acceleration of Containment Structure**



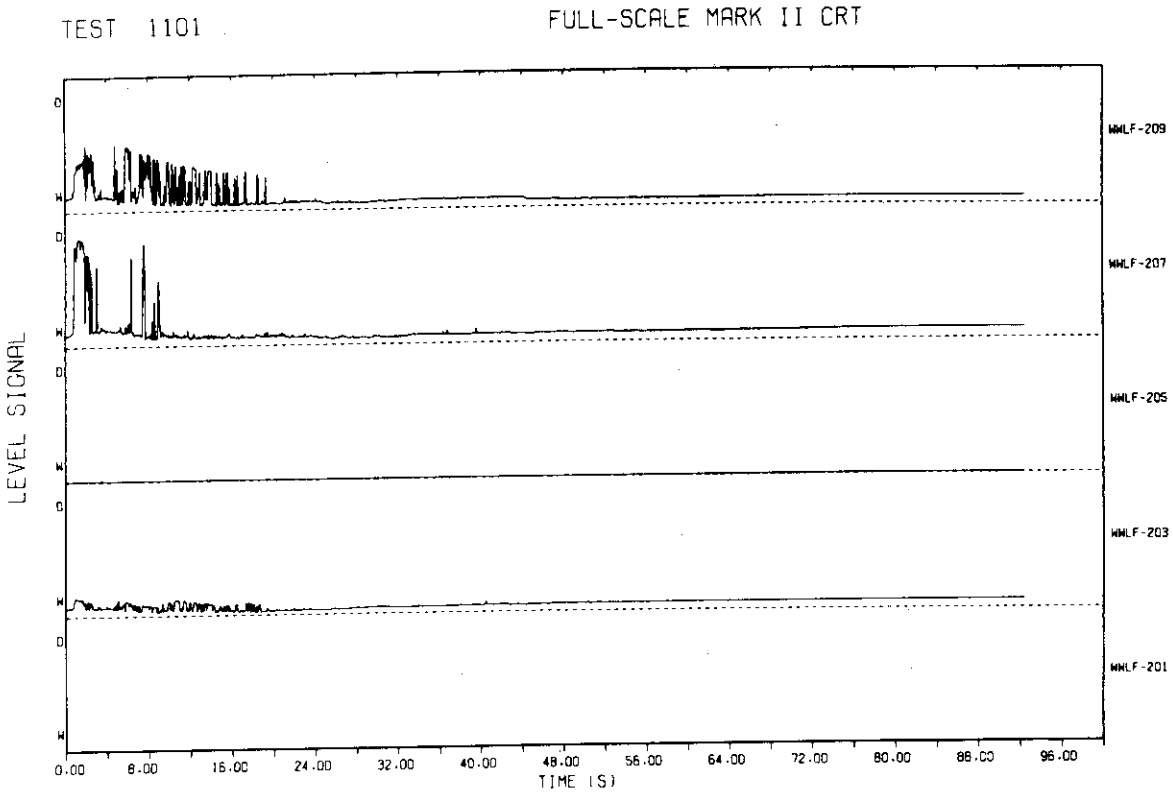

**Plot L-2-10 Acceleration of Containment Structure**



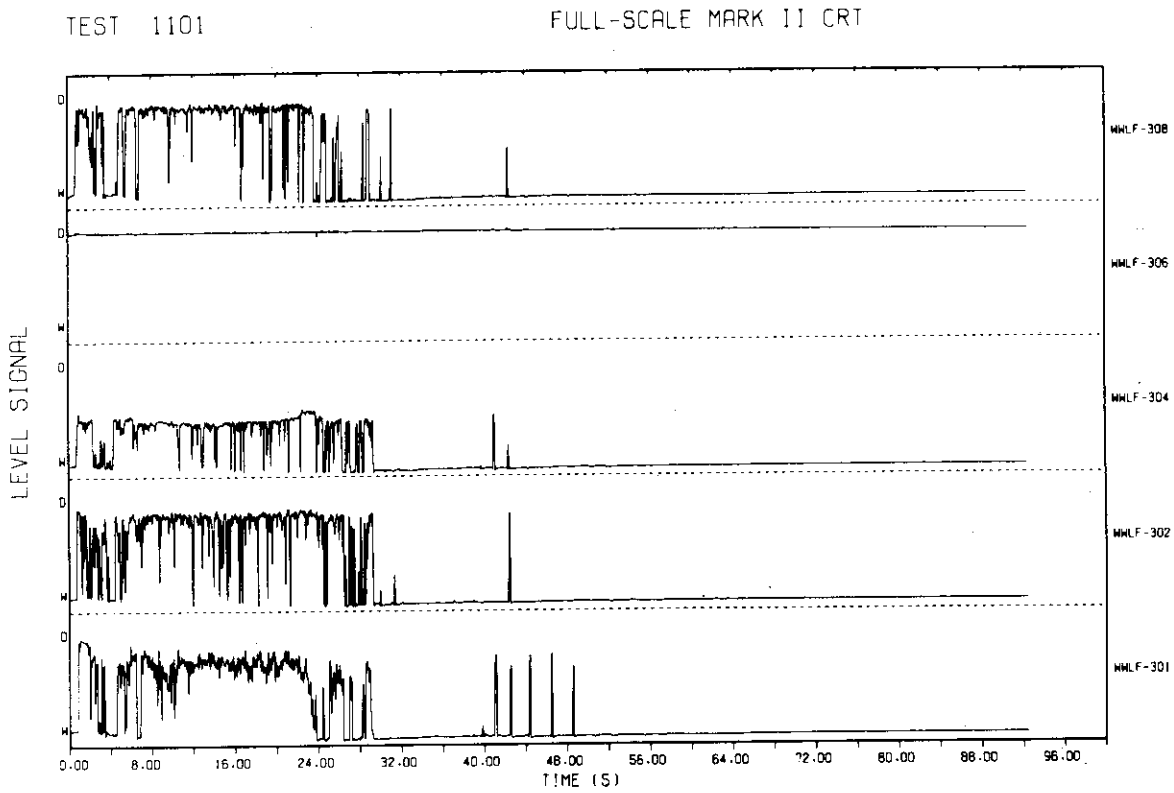

**Plot L-2-11 Acceleration of Containment Structure**




**Plot L-2-12 Phase Boundary Signals**




Plot L-2-13 Phase Boundary Signals




Plot L-2-14 Phase Boundary Signals

Short Term Plots of Data

Short Term Plot Specification

Period 0 − 5 s

Objective : Detailed Presentation of [×] Pool Swell.

[ ] High and Medium Steam Flux Condensation Oscillation.

[ ] Chugging.

| Plot No. | Recording System | Recording Rate (data/s) | Sampling Rate for Plots | Remarks |
|---|---|---|---|---|
| S-0-1 to 24 | Computer | 50.00 | 1/1 | |
| S-1-1 to 14 | PCM Track-1 | 455.56 | 1/1 | |
| S-2-1 to 14 | PCM Track-2 | 455.56 | 1/1 | |

List of Short Term Plots

Computer Recorded Channels

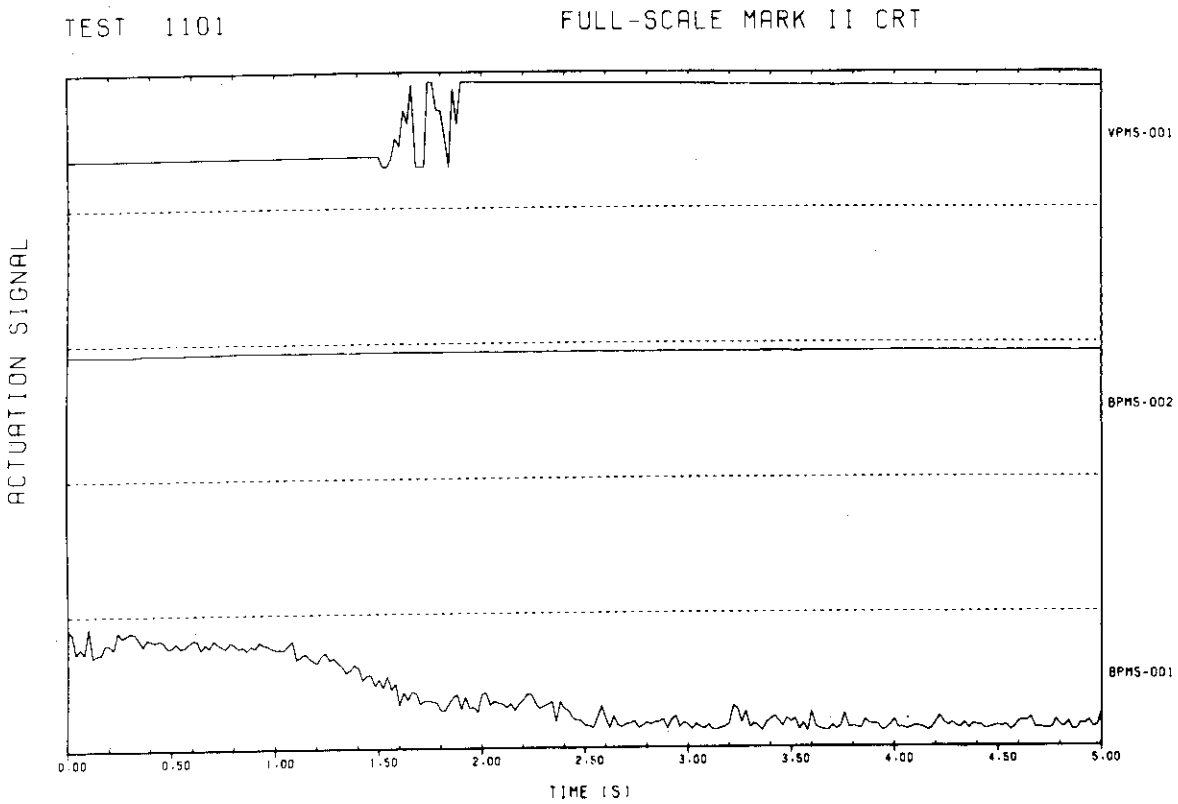
| | | | |
|---|---|---|---|
| Plot | S-0-1 | Actuation Signals | |
| | S-0-2 | Pressures in Pressure Vessel and Blowdown Pipe | |
| | S-0-3 | Pressures in Drywell and Wetwell Airspace | |
| | S-0-4 | DP over Pressure Vessel | |
| | S-0-5 | Temperatures in Pressure Vessel | |
| | S-0-6 | Temperatures in Blowdown Pipe | |
| | S-0-7 | Temperatures in Drywell | (DWTS-101-103) |
| | S-0-8 | Temperatures in Drywell | (DWTS-201-203) |
| | S-0-9 | Temperatures in Drywell | (DWTS-301-302) |
| | S-0-10 | Temperatures in Vent Pipe | (VPTS-101-102) |
| | S-0-11 | Temperatures in Vent Pipe | (VPTS-201-202) |
| | S-0-12 | Temperatures in Vent Pipe | (VPTS-301-302) |
| | S-0-13 | Temperatures in Wetwell | (WWTS-101-104) |
| | S-0-14 | Temperatures in Wetwell | (WWTS-105-108) |
| | S-0-15 | Temperatures in Wetwell | (WWTS-201-204) |
| | S-0-16 | Temperatures in Wetwell | (WWTS-205-208) |
| | S-0-17 | Temperatures in Wetwell | (WWTS-301-304) |
| | S-0-18 | Temperatures in Wetwell | (WWTS-305-308) |
| | S-0-19 | Temperatures in Wetwell | (WWTS-401-404) |
| | S-0-20 | Temperatures in Wetwell | (WWTS-405-408) |
| | S-0-21 | Water Level in Drywell | (DWLS-001-004) |
| | S-0-22 | Water Level in Vent Pipe | (VPLS-101-205) |
| | S-0-23 | Water Level in Vent Pipe | (VPLS-301-405) |
| | S-0-24 | Water Level in Vent Pipe | (VPLS-501-505) |

PCM Track-1 Channels

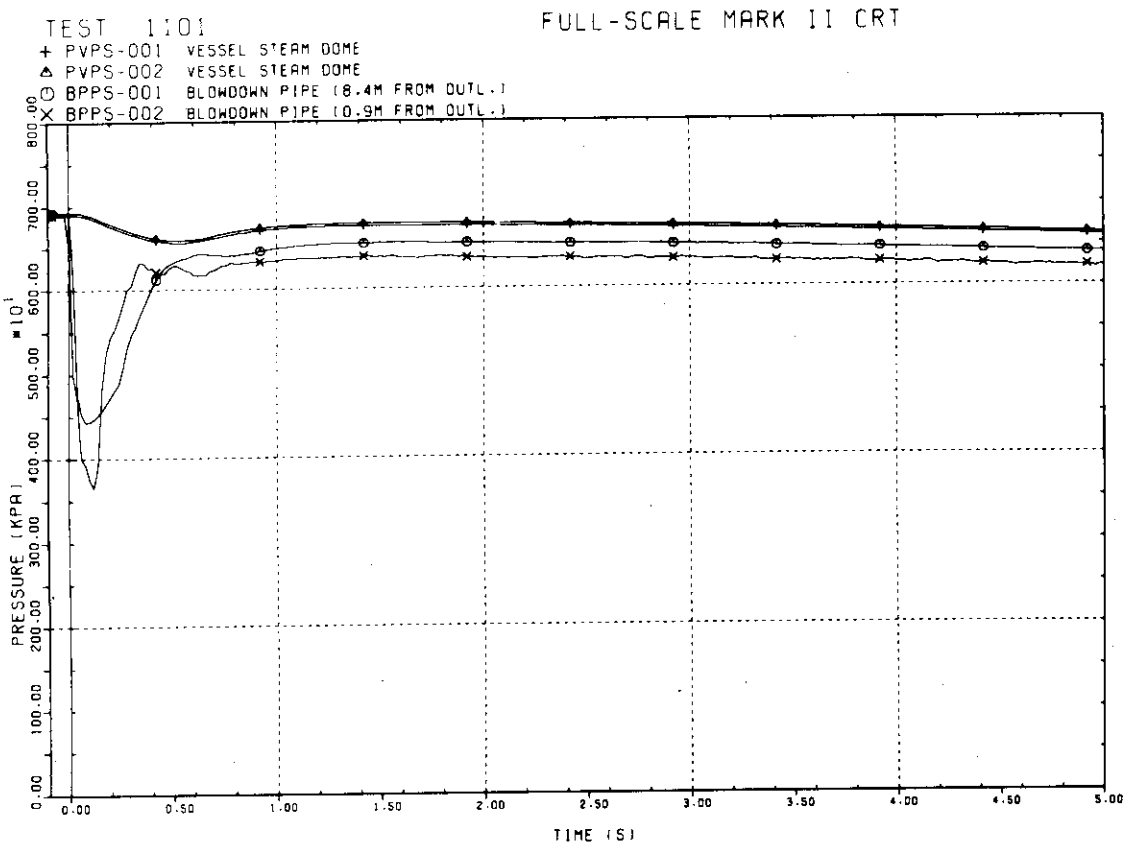
| | | | |
|---|---|---|---|
| Plot | S-1-1 | Pressures in Drywell and Wetwell Airspace | |
| | S-1-2 | Pressure in Vent Pipe | (VPPF-101, 201, 401) |
| | S-1-3 | Pressure in Vent Pipe | (VPPF-301, 302, 303) |
| | S-1-4 | Pressure in Vent Pipe | (VPPF-501, 502, 503) |
| | S-1-5 | Pressure in Wetwell | (VPPF-102, 201, 202, 203) |
| | S-1-6 | Pressure in Wetwell | (WWPF-103, 301, 302, 303) |
| | S-1-7 | Pressure in Wetwell | (WWPF-103, 401, 402) |
| | S-1-8 | Pressure in Wetwell | (WWPF-104, 501, 502) |
| | S-1-9 | Pressure in Wetwell | (WWPF-101, 106) |
| | S-1-10 | Pressure in Wetwell | (WWPF-105, 107) |
| | S-1-11 | Pressure in Wetwell | (WWPF-602, 702) |
| | S-1-12 | Strain of Vent Pipe Brace | (VPSF-101) |
| | S-1-13 | Strain of Vent Pipe Brace | (VPSF-102) |
| | S-1-14 | Strain of Vent Pipe Brace | (VPSF-201) |

PCM Track-2 Channels

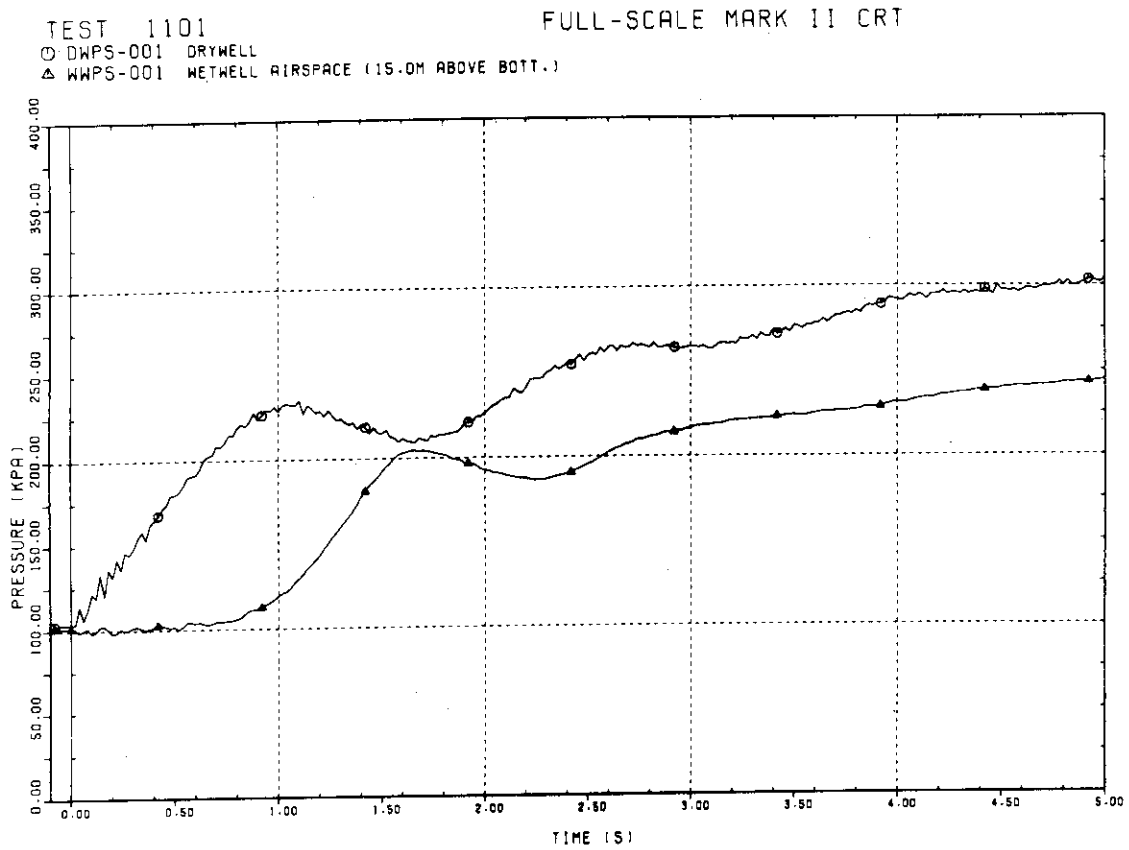
| | | | |
|---|---|---|---|
| Plot | S-2-1 | Acceleration of Vent Pipe Outlet | (VPAF-101) |
| | S-2-2 | Acceleration of Vent Pipe Outlet | (VPAF-201) |
| | S-2-3 | Acceleration of Vent Pipe Outlet | (VPAF-202) |
| | S-2-4 | Acceleration of Containment Structure | (WWAF-005) |
| | S-2-5 | Acceleration of Containment Structure | (WWAF-006) |
| | S-2-6 | Acceleration of Containment Structure | (WWAF-007) |
| | S-2-7 | Acceleration of Containment Structure | (WWAF-008) |
| | S-2-8 | Acceleration of Containment Structure | (WWAF-009) |
| | S-2-9 | Acceleration of Containment Structure | (WWAF-010) |
| | S-2-10 | Acceleration of Containment Structure | (WWAF-011) |
| | S-2-11 | Acceleration of Containment Structure | (WWAF-012) |
| | S-2-12 | Phase Boundary Signals | (WWLF-101-108) |
| | S-2-13 | Phase Boundary Signals | (WWLF-201-209) |
| | S-2-14 | Phase Boundary Signals | (WWLF-301-308) |



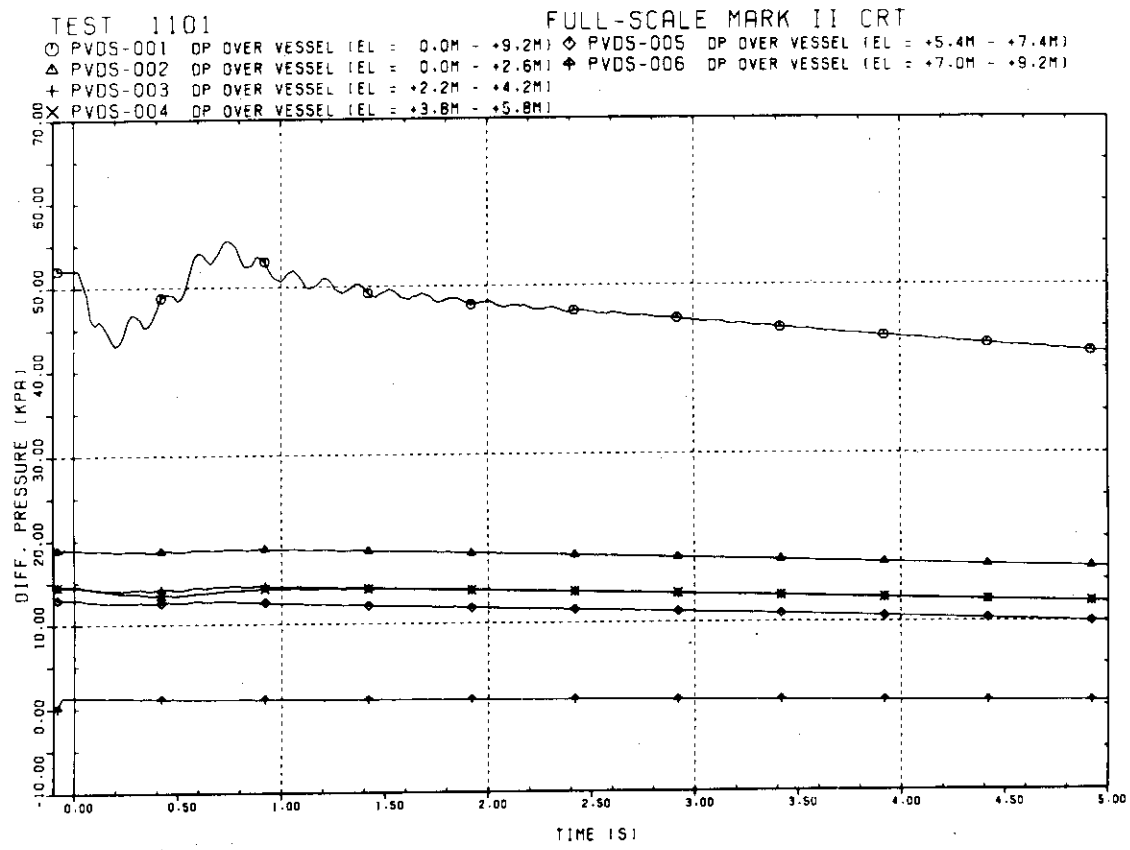

**Plot S-0-1 Actuation Signals**



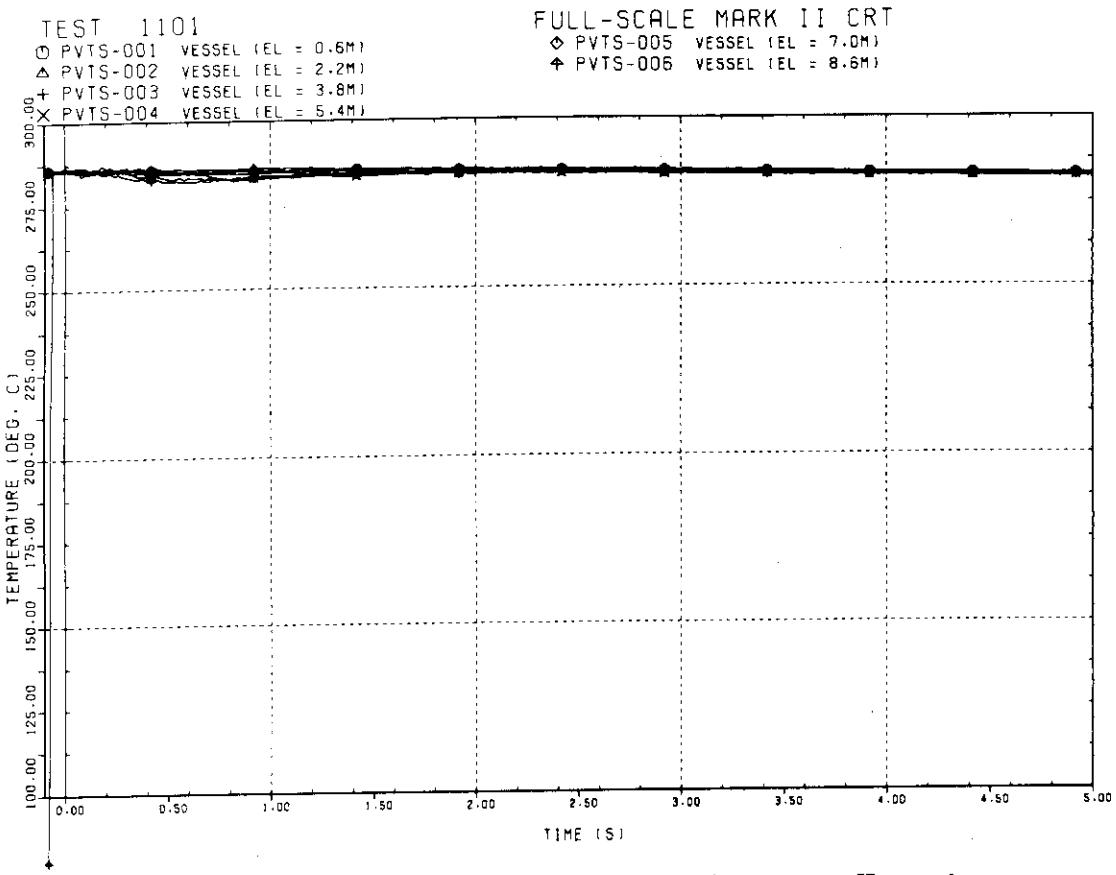

**Plot S-0-2 Pressures in Pressure Vessel and Blowdown Pipe**



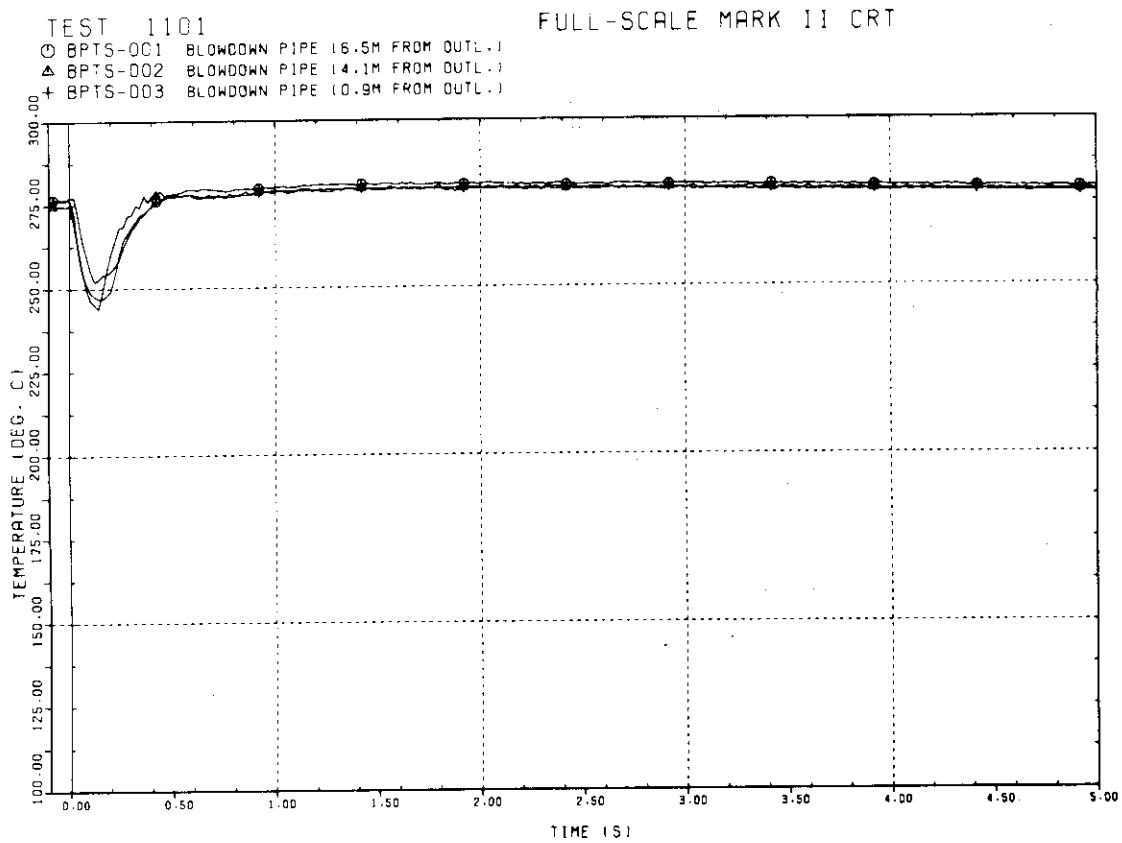

Plot S-0-3 Pressures in Drywell and Wetwell Airspace



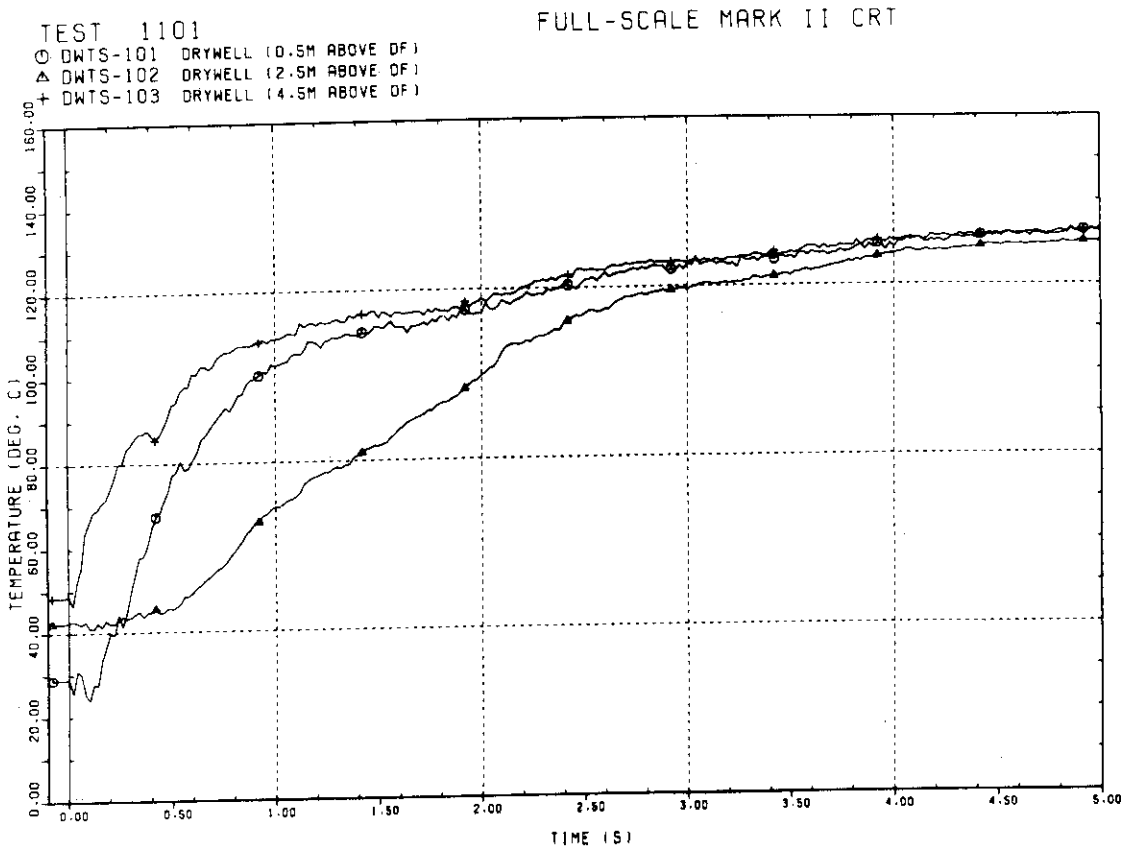

Plot S-0-4 DP over Pressure Vessel



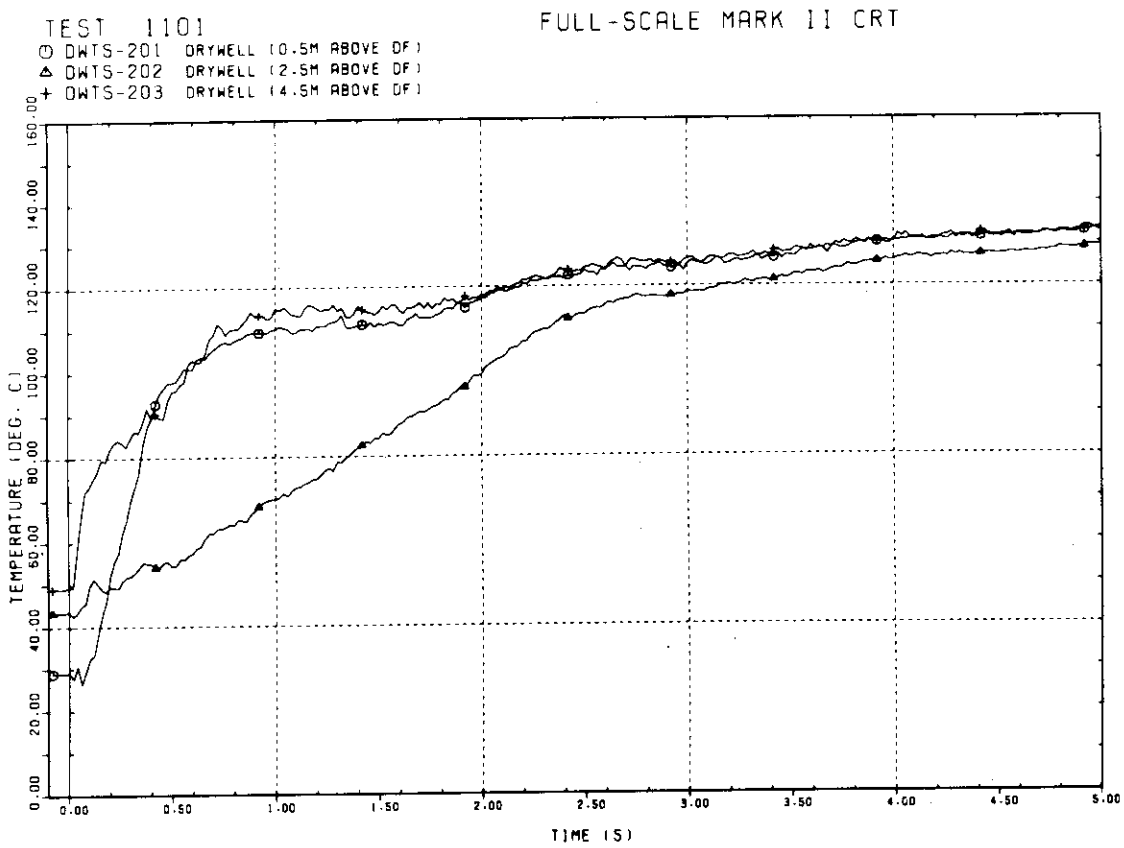

Plot S-0-5 Temperatures in Pressure Vessel



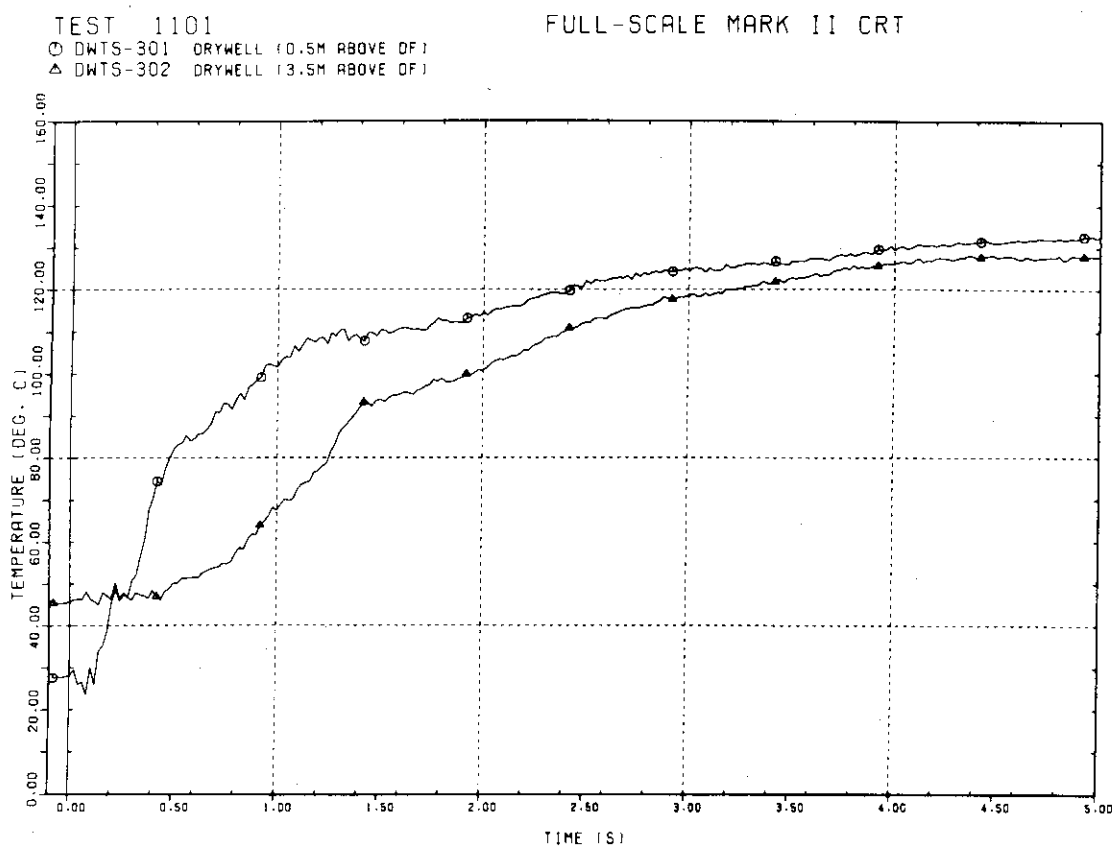

Plot S-0-6 Temperatures in Blowdown Pipe



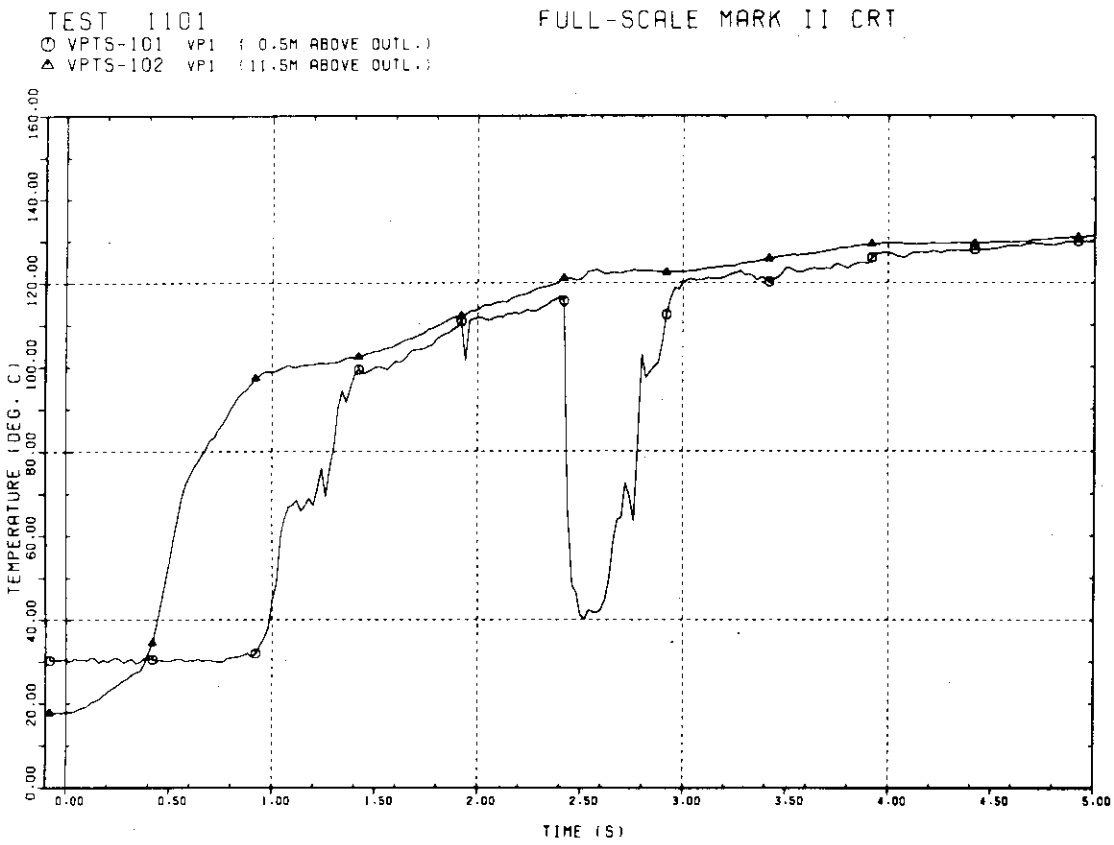

Plot S-0-7 Temperatures in Drywell



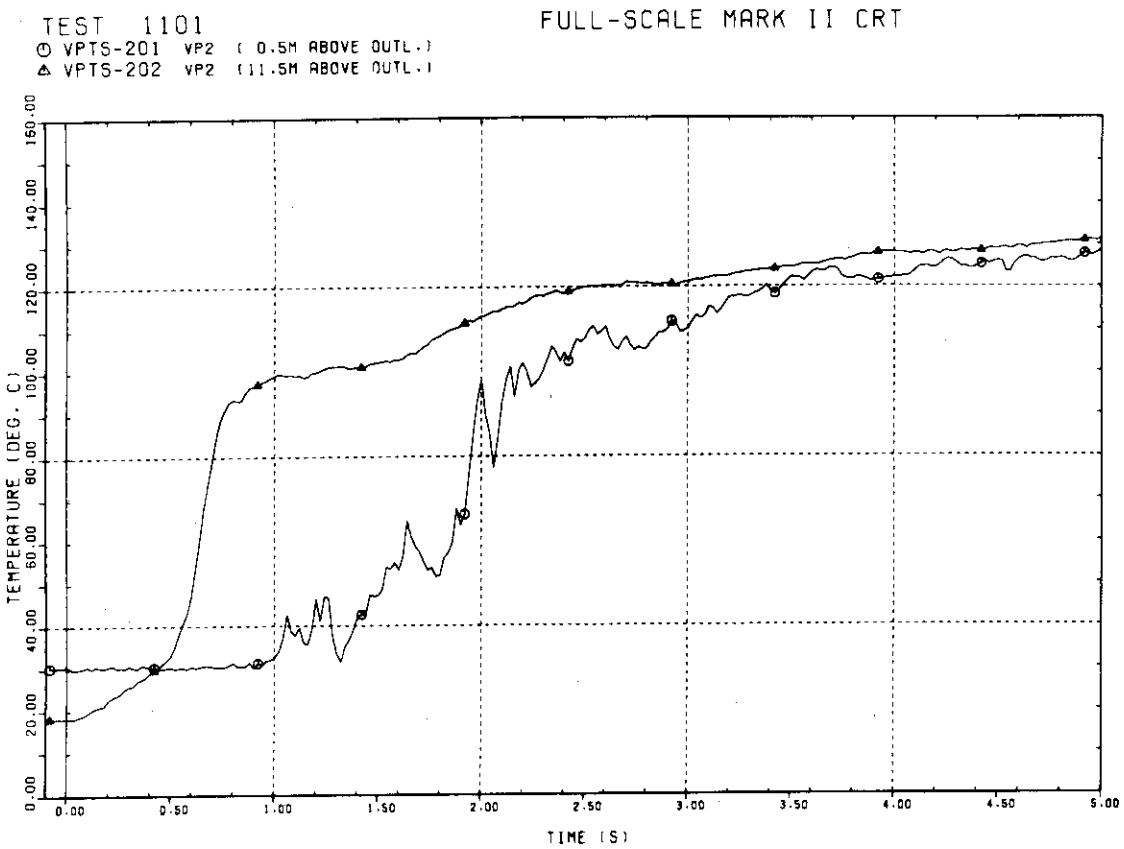

Plot S-0-8 Temperatures in Drywell



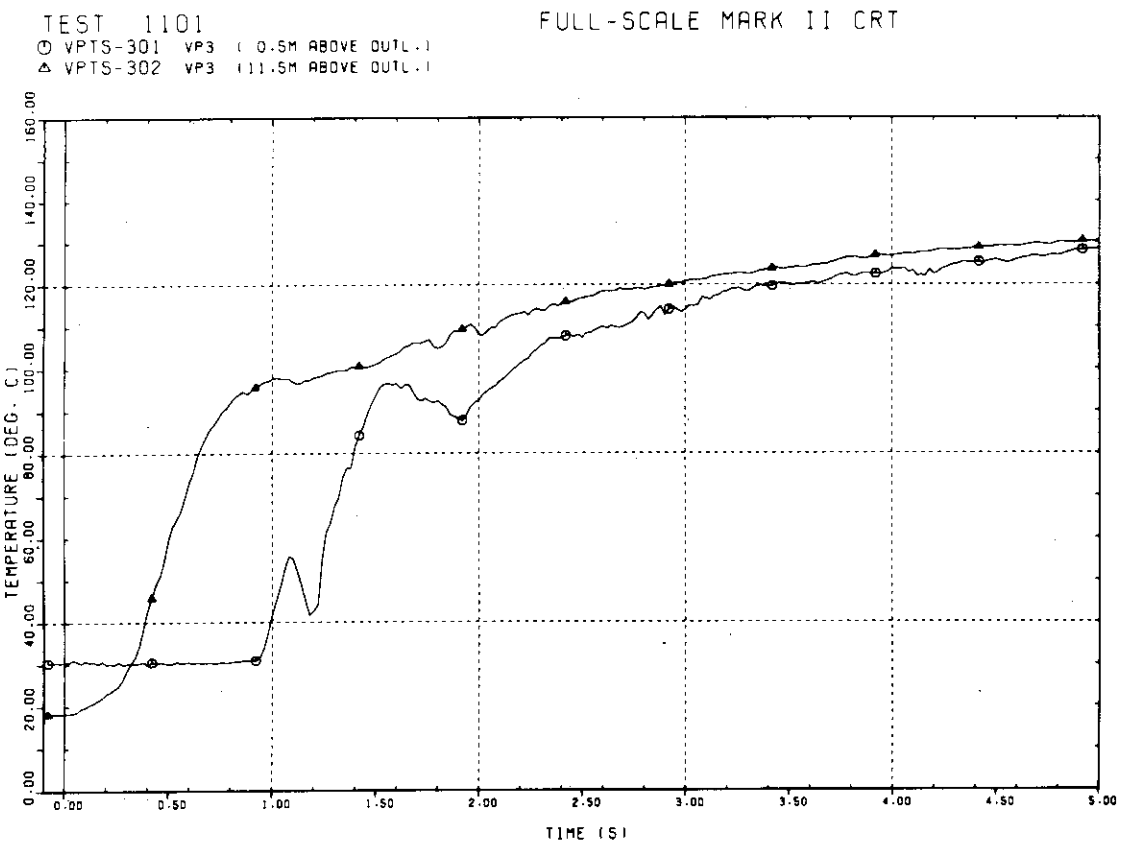

**Plot S-0-9 Temperatures in Drywell**



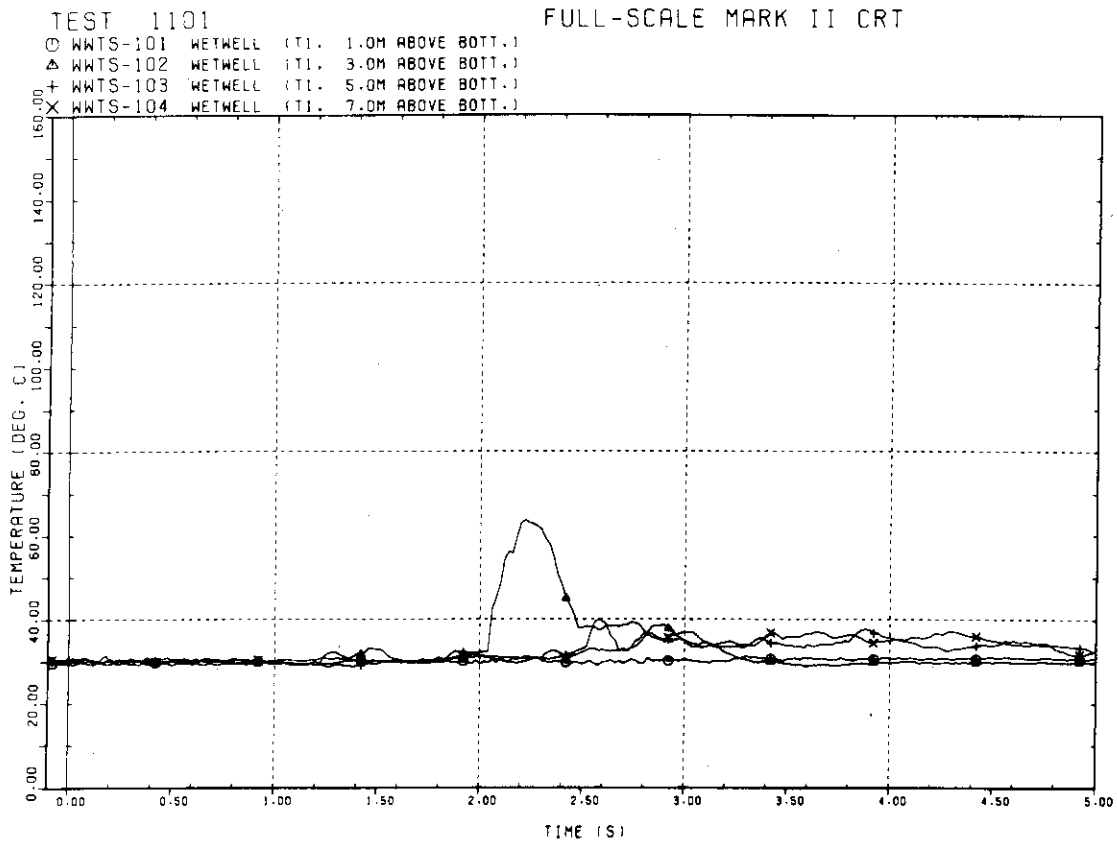

**Plot S-0-10 Temperatures in Vent Pipe**



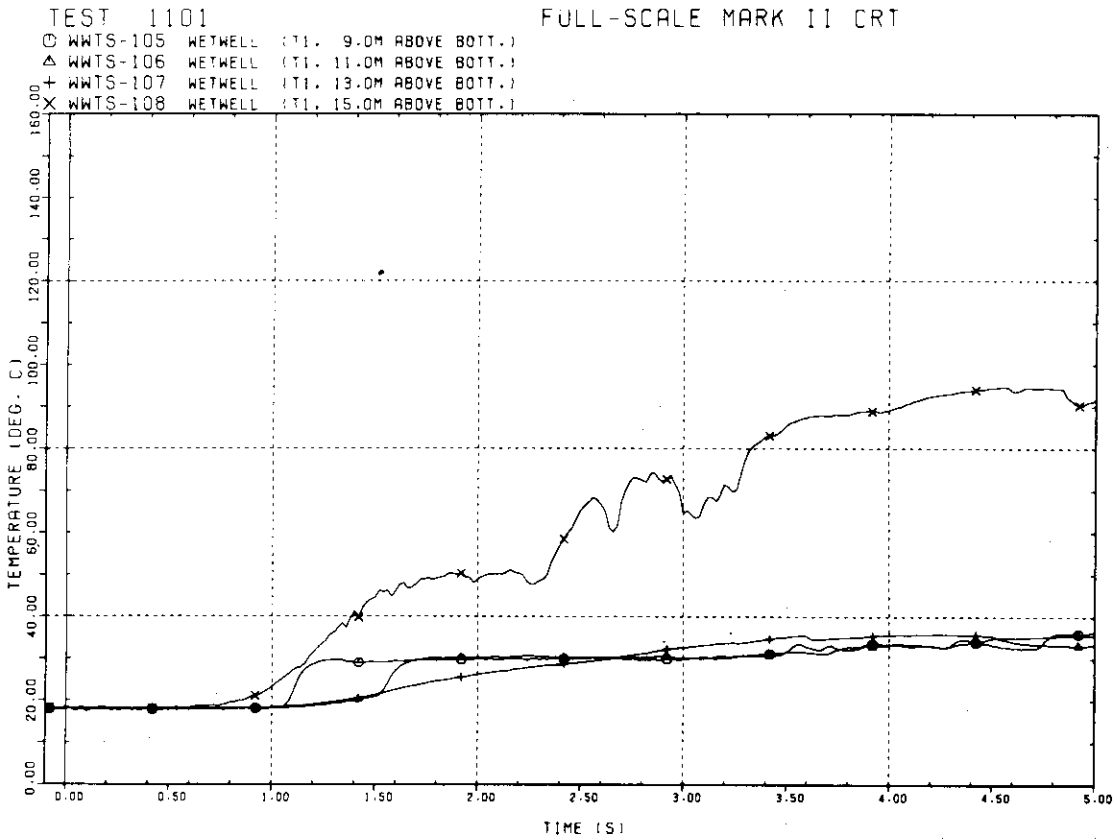

Plot S-0-11 Temperatures in Vent Pipe



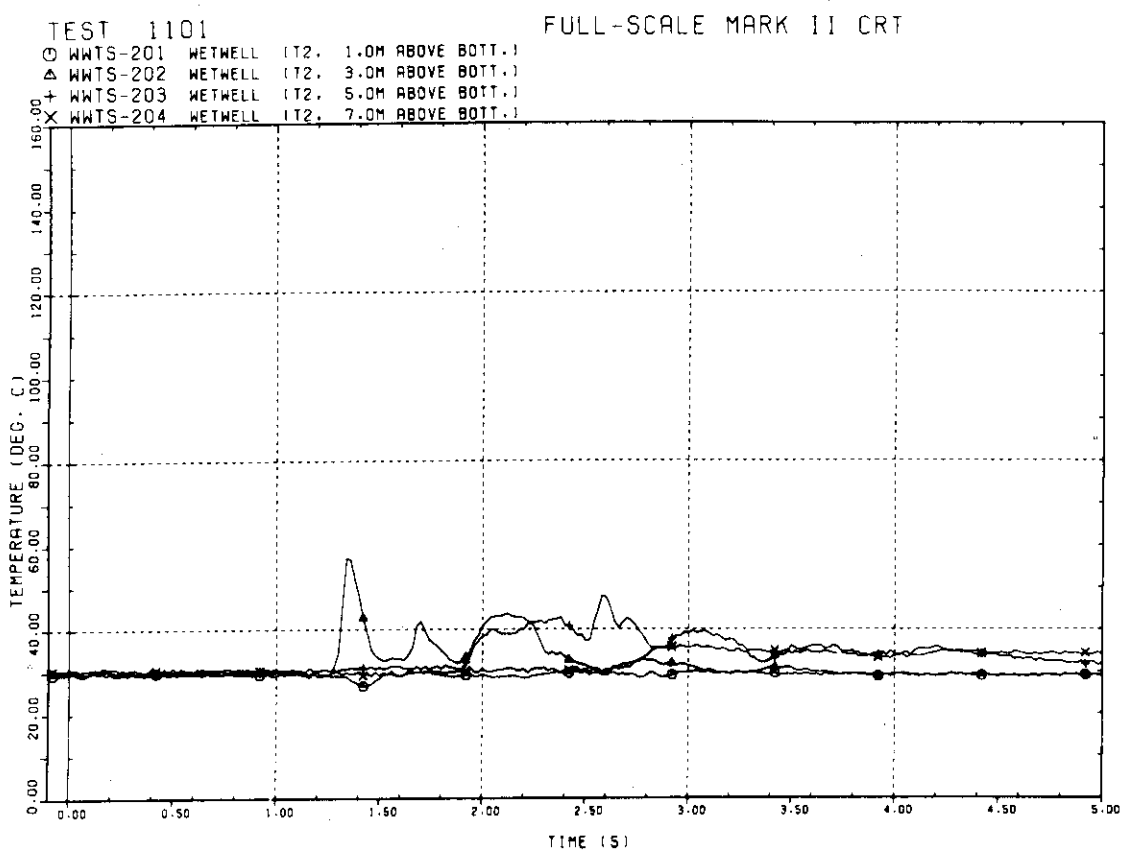

Plot S-0-12 Temperatures in Vent Pipe



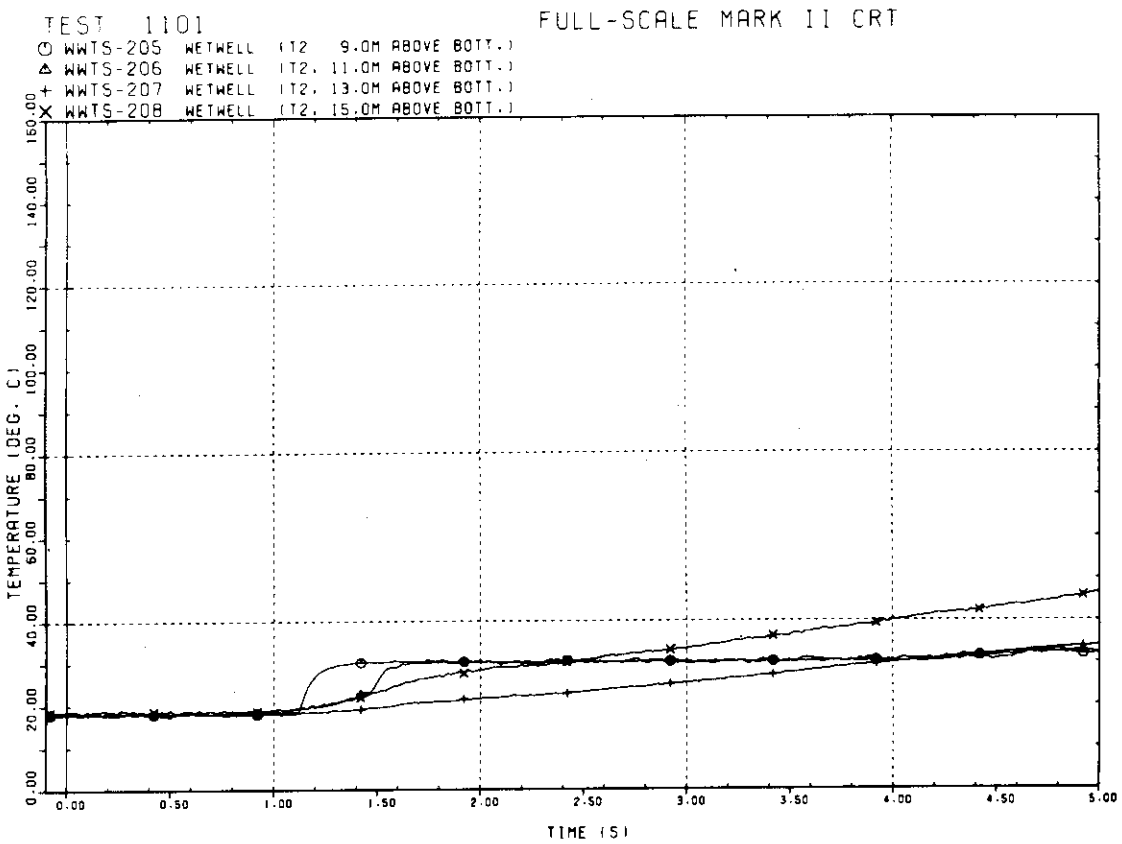

**Plot S-0-13 Temperatures in Wetwell**



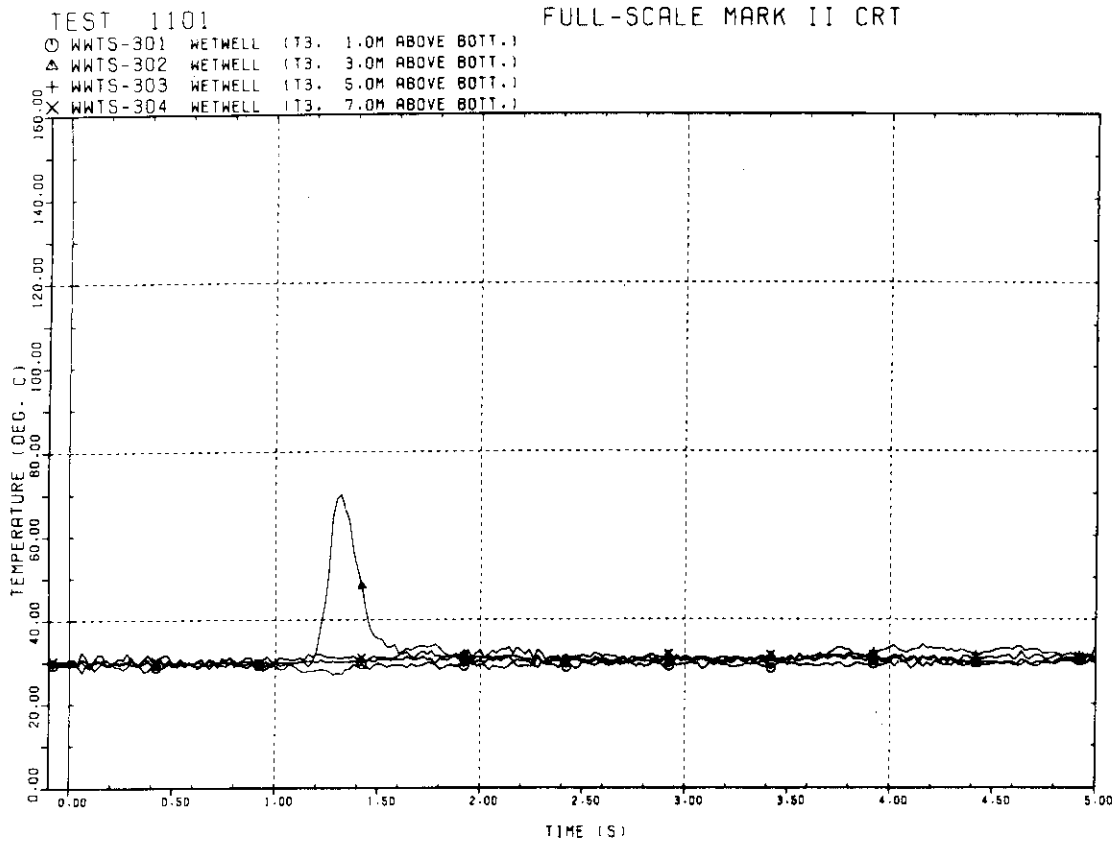

**Plot S-0-14 Temperatures in Wetwell**



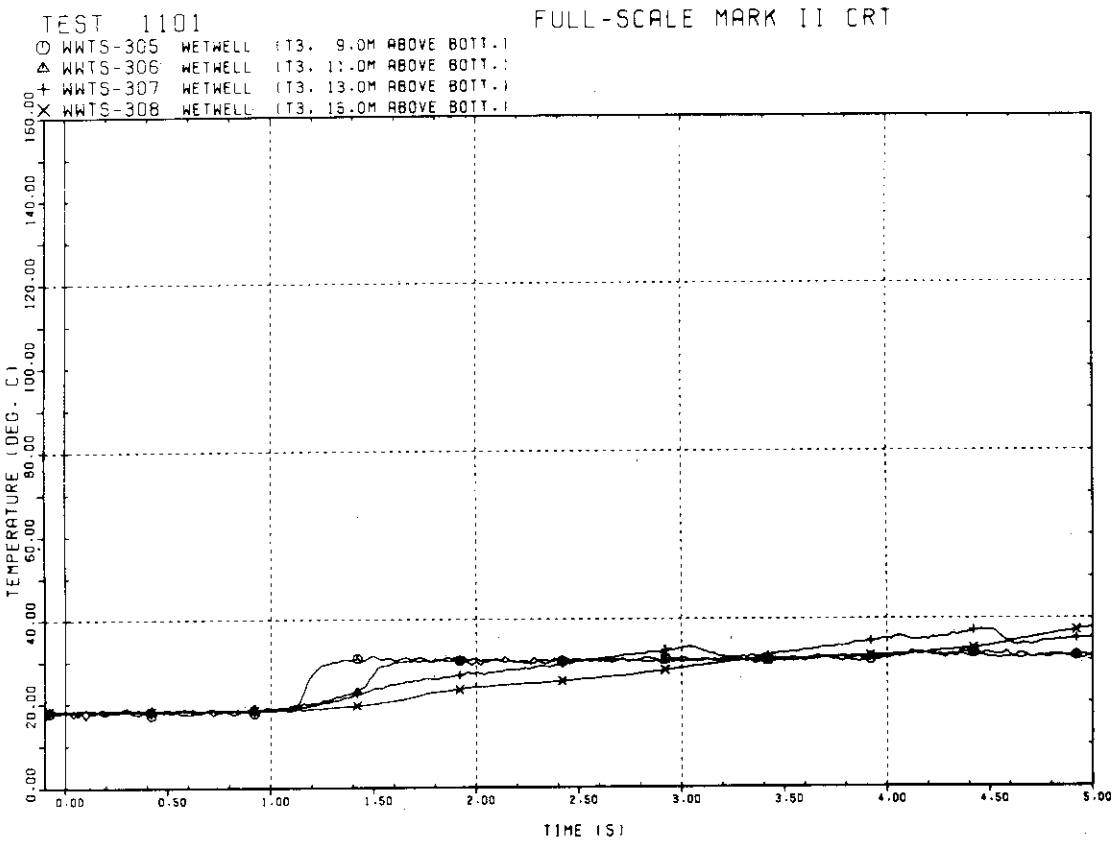

Plot S-0-15 Temperatures in Wetwell



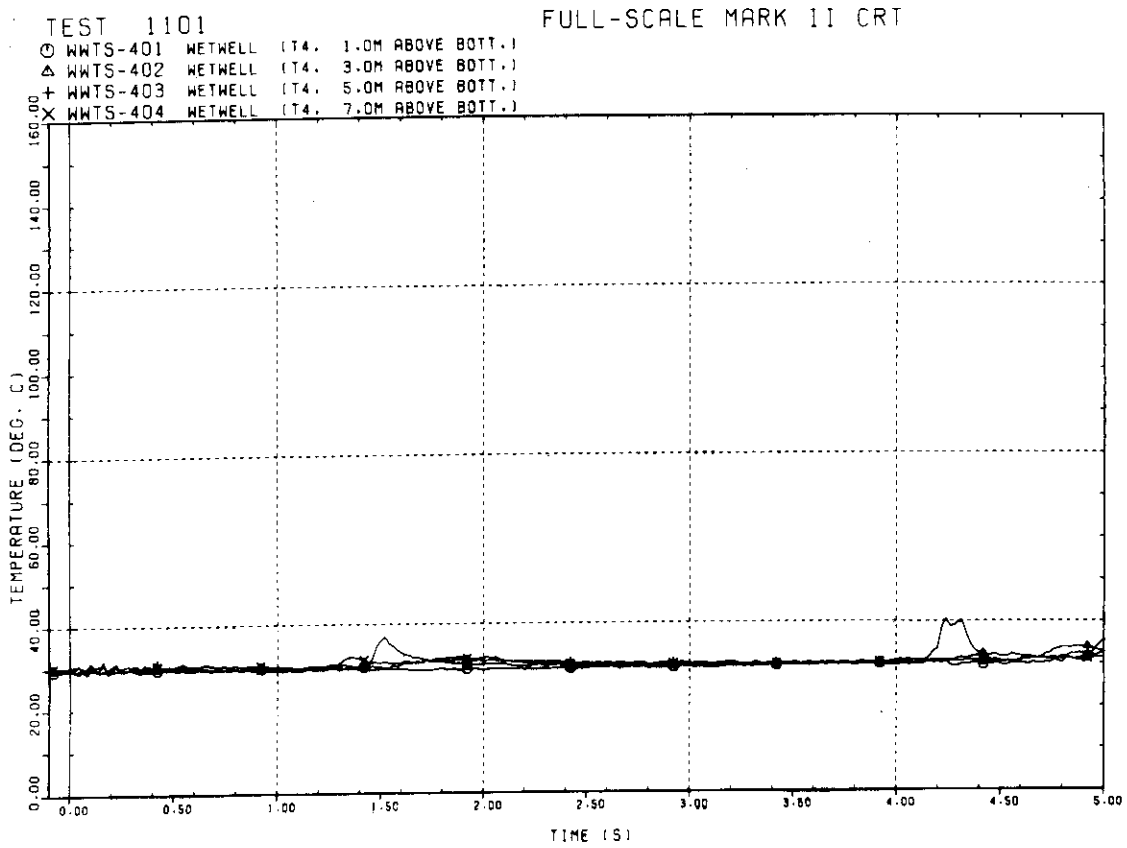

Plot S-0-16 Temperatures in Wetwell



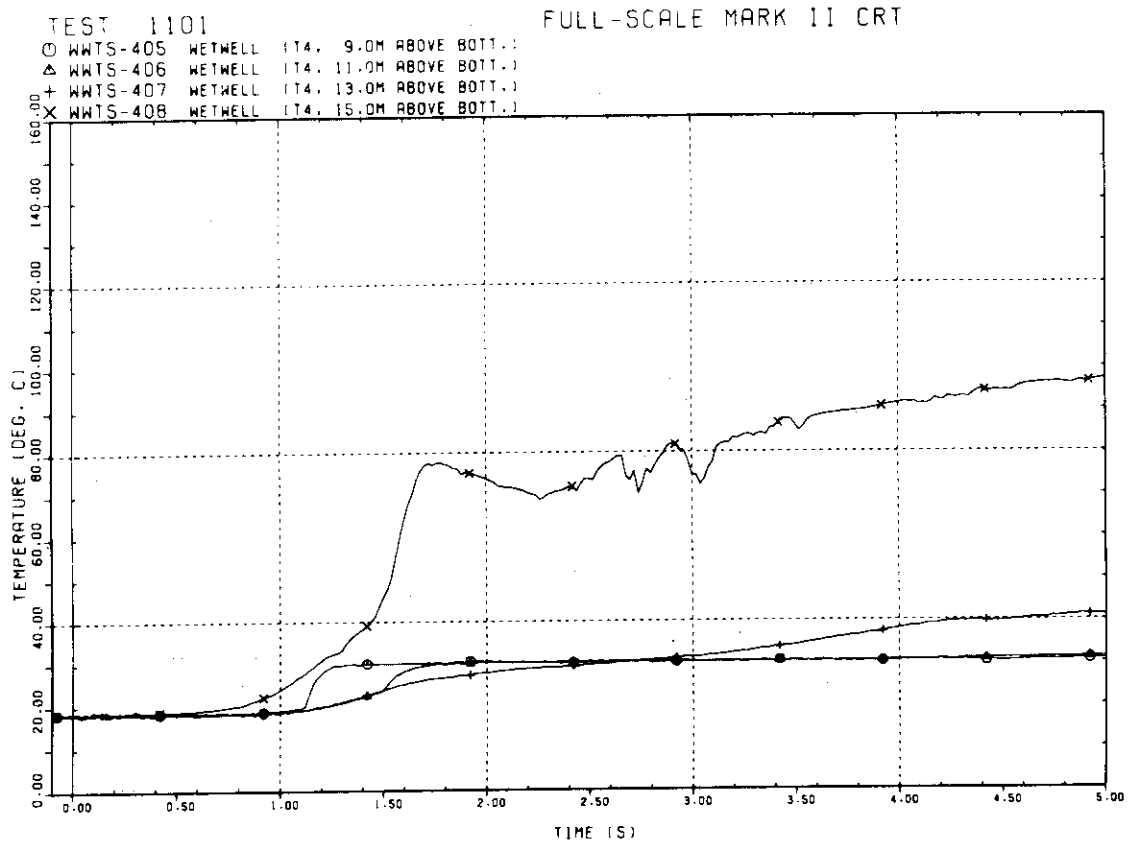

**Plot S-0-17 Temperatures in Wetwell**



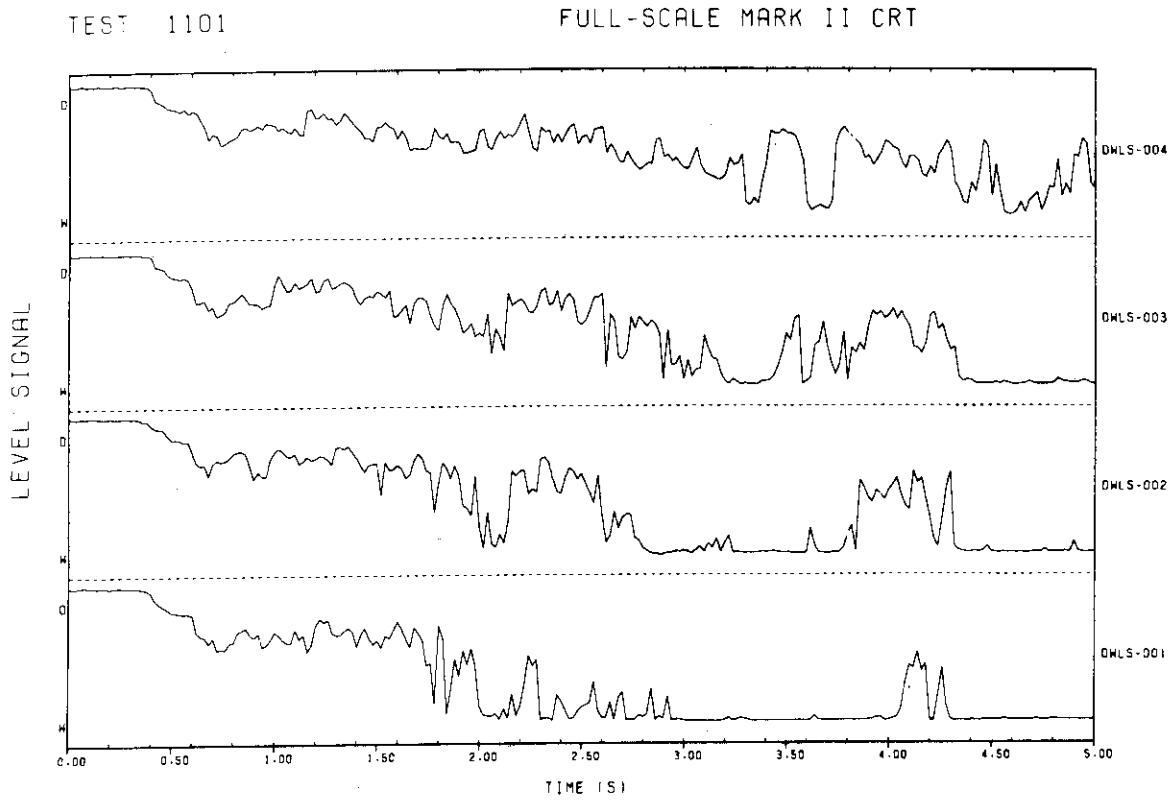

**Plot S-0-18 Temperatures in Wetwell**



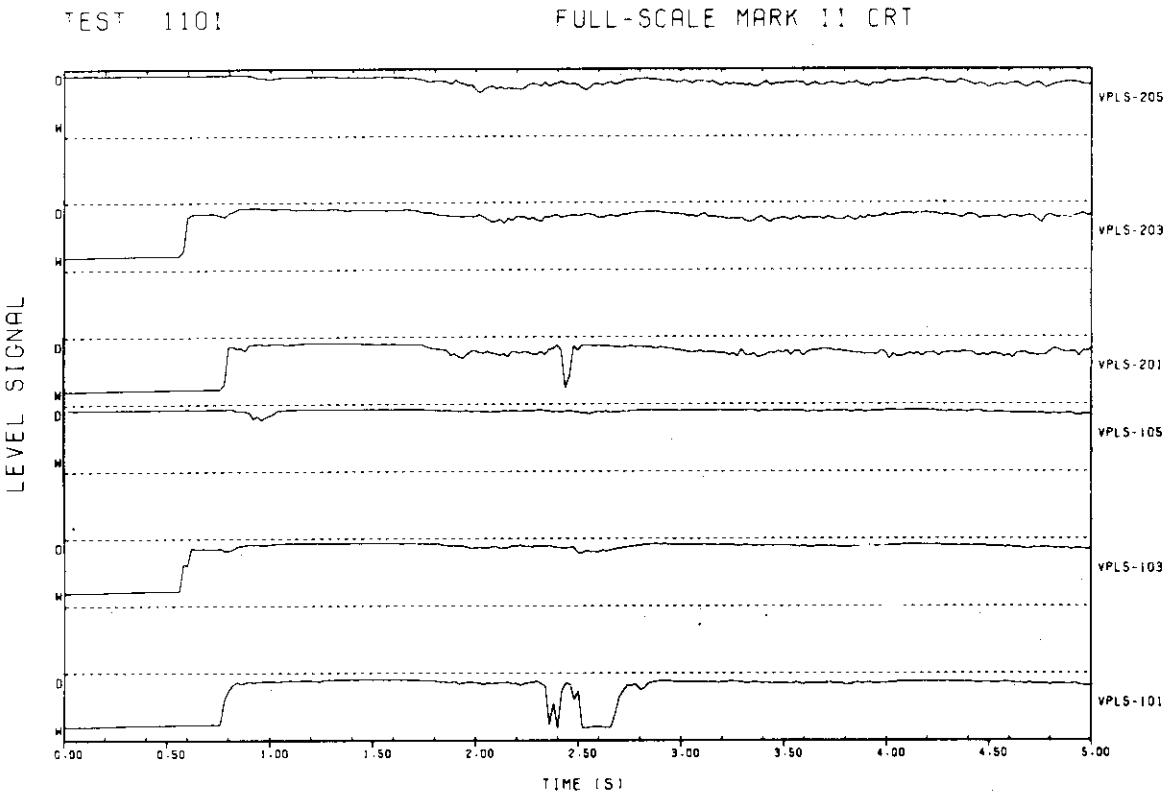

Plot S-0-19 Temperatures in Wetwell



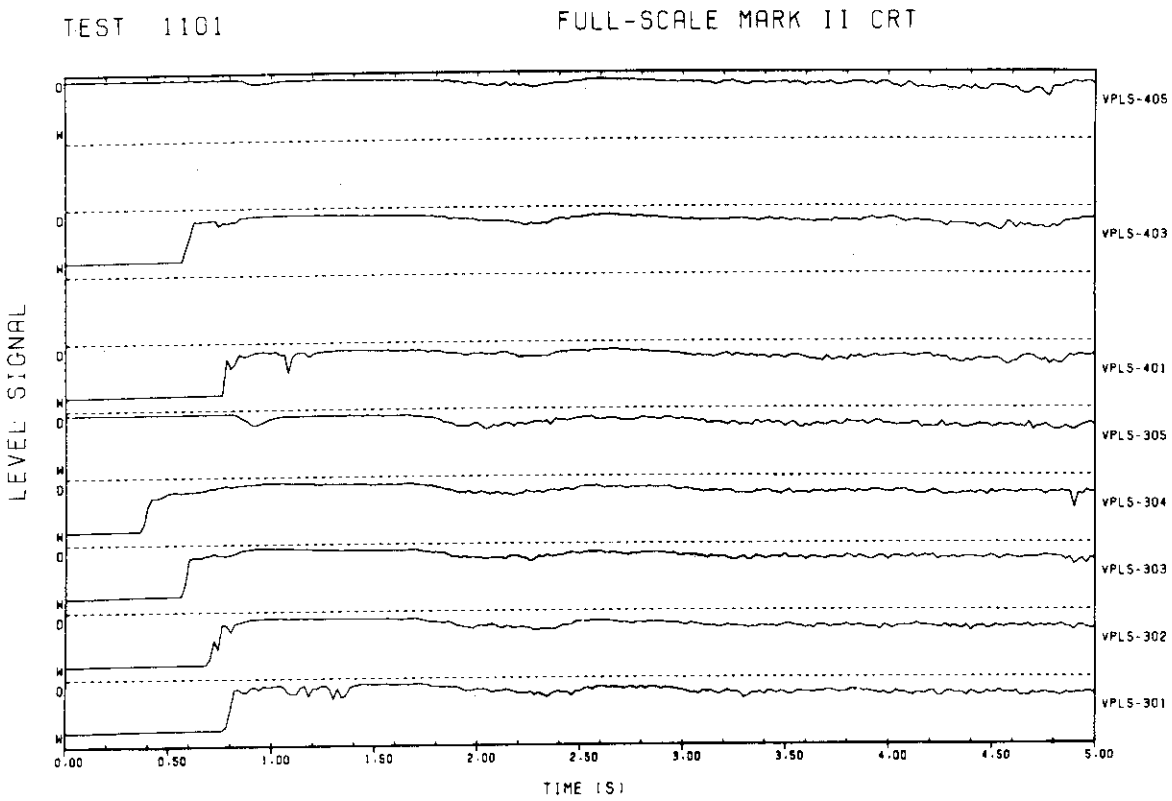

Plot S-0-20 Temperatures in Wetwell



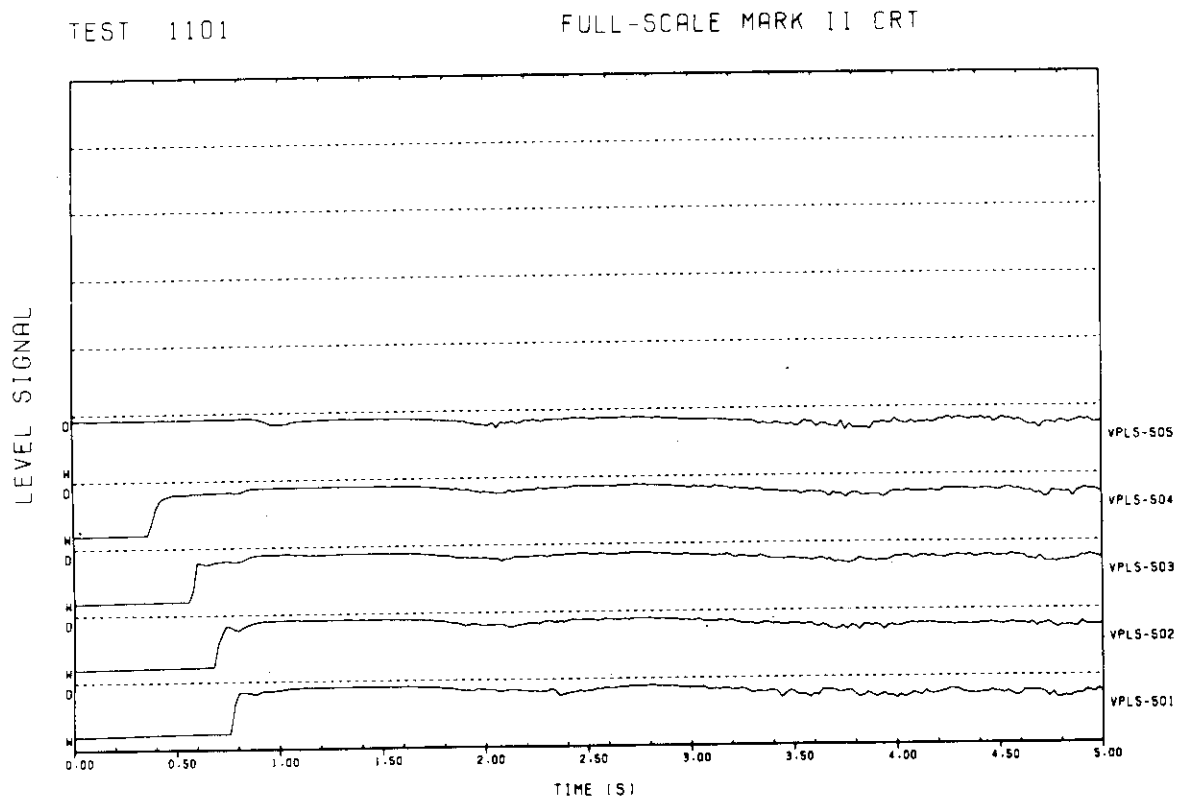

**Plot S-0-21 Water Level in Drywell**



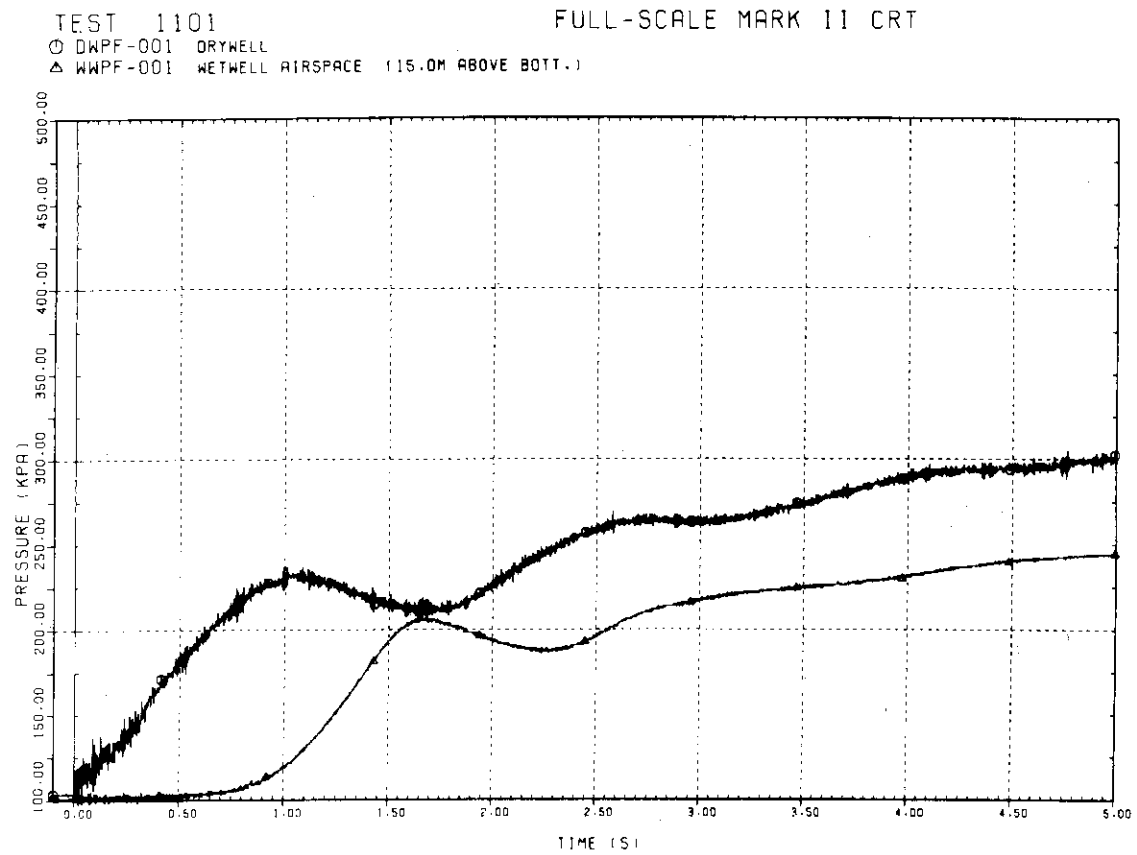

**Plot S-0-22 Water Level in Vent Pipe**



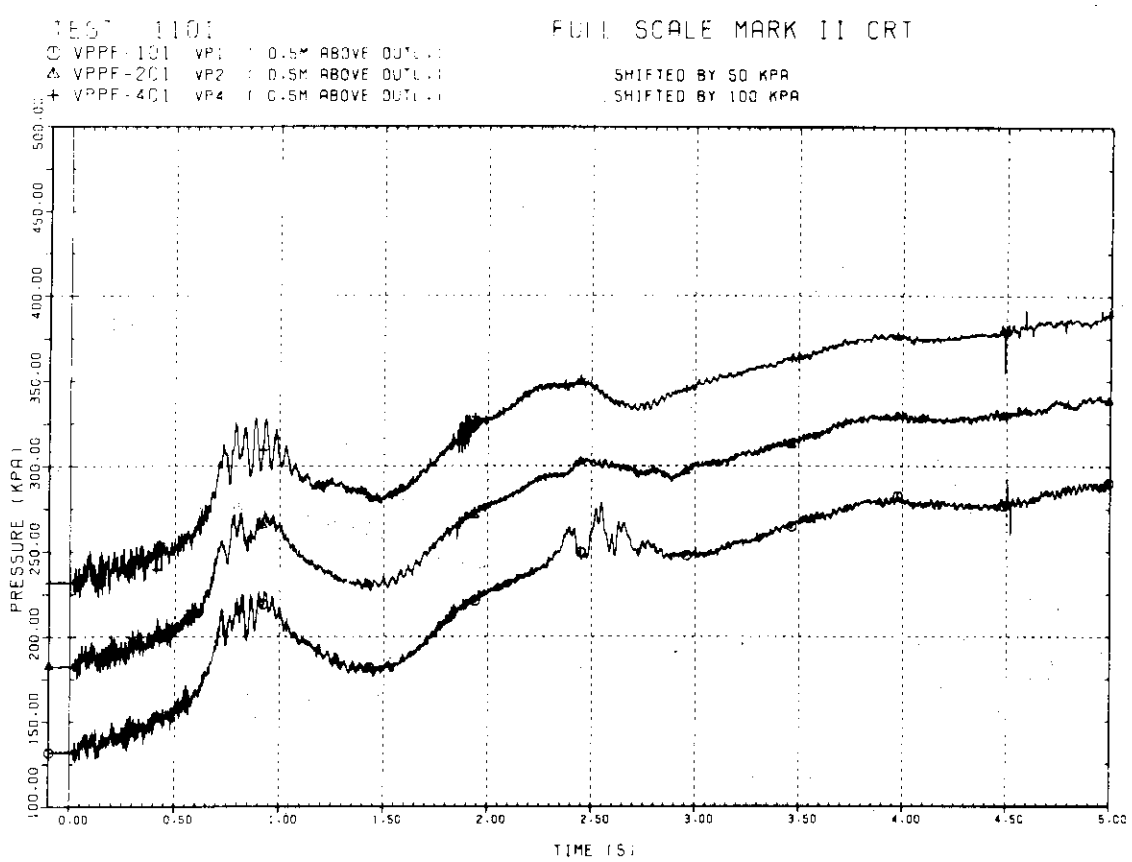

**Plot S-0-23 Water Level in Vent Pipe**



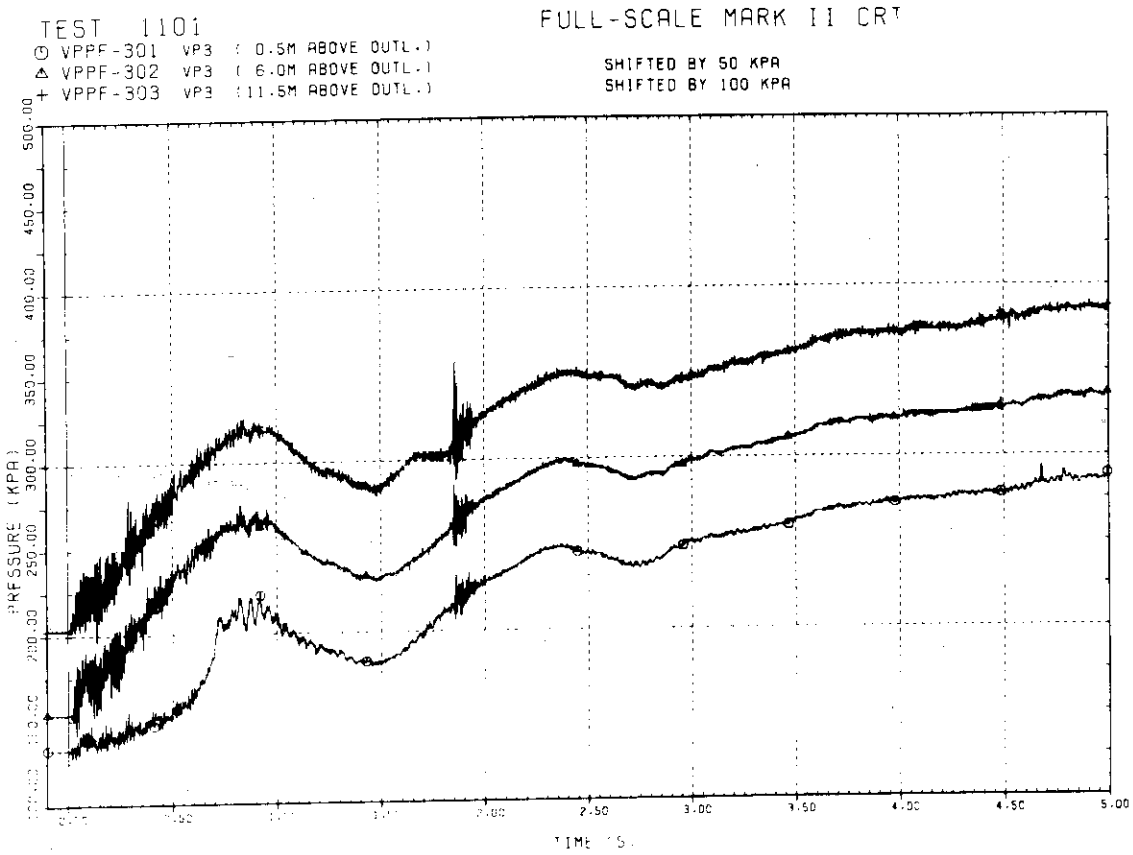

**Plot S-0-24 Water Level in Vent Pipe**



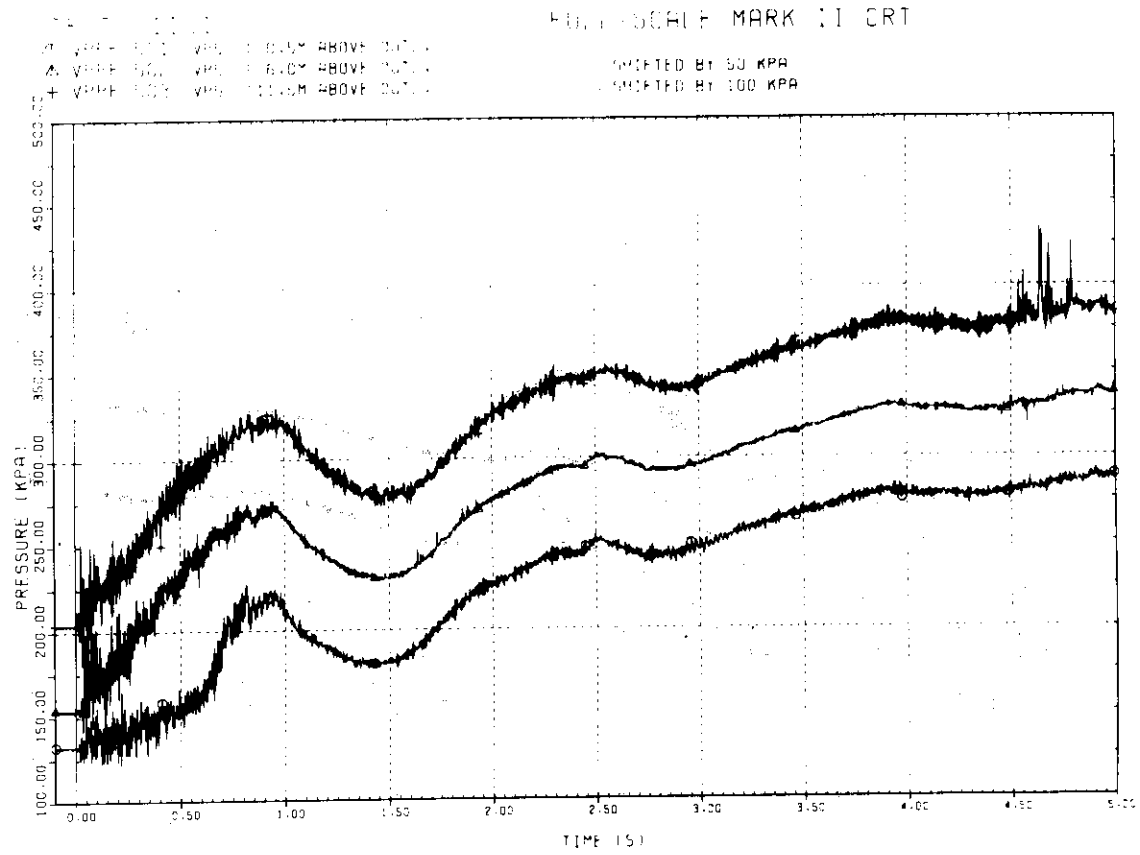

**Plot S-1-1 Pressures in Drywell and Wetwell Airspace**



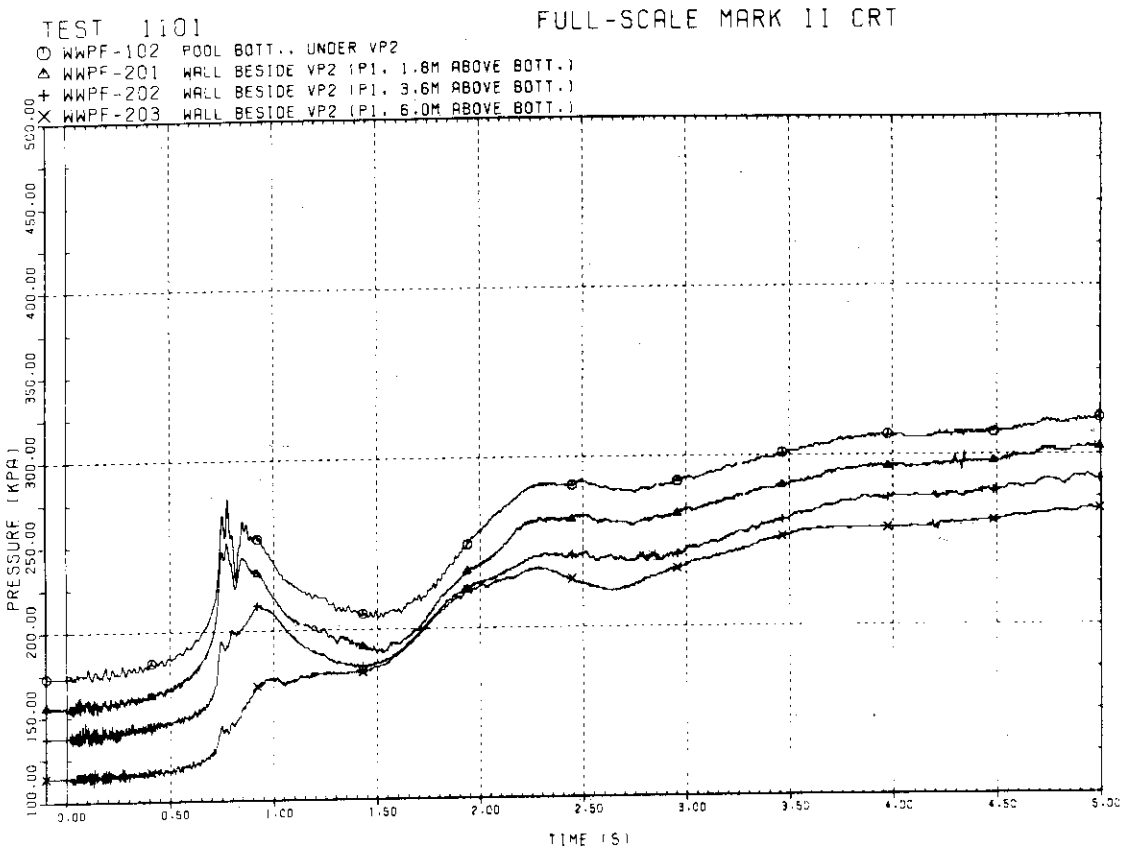

**Plot S-1-2 Pressure in Vent Pipe**



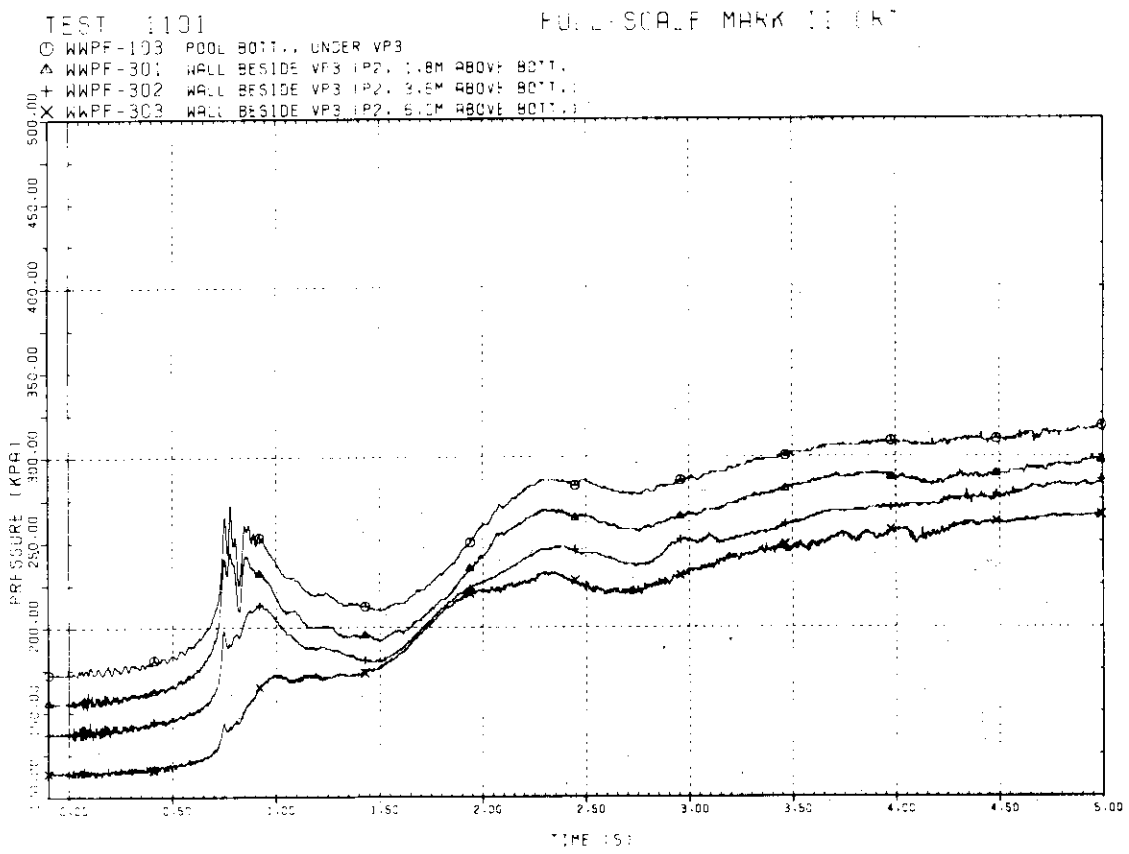

Plot S-1-3 Pressure in Vent Pipe



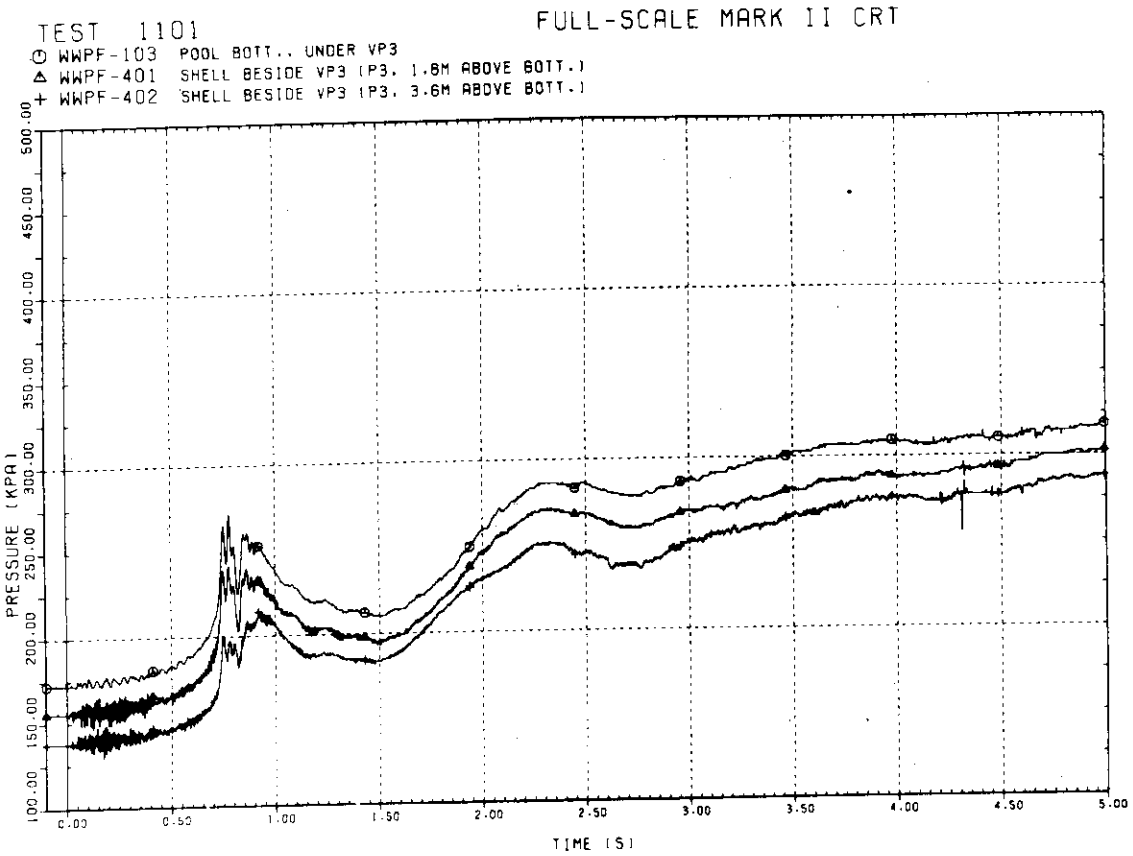

Plot S-1-4 Pressure in Vent Pipe



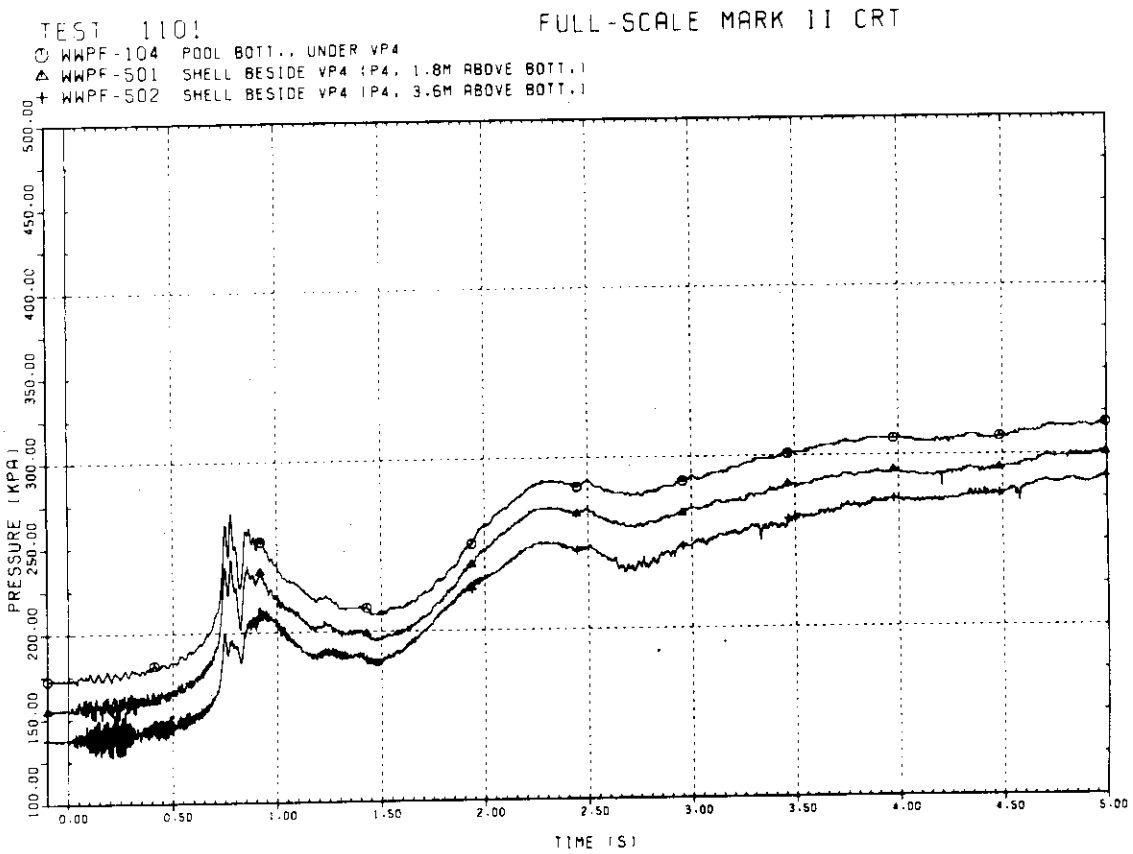

**Plot S-1-5 Pressure in Wetwell**



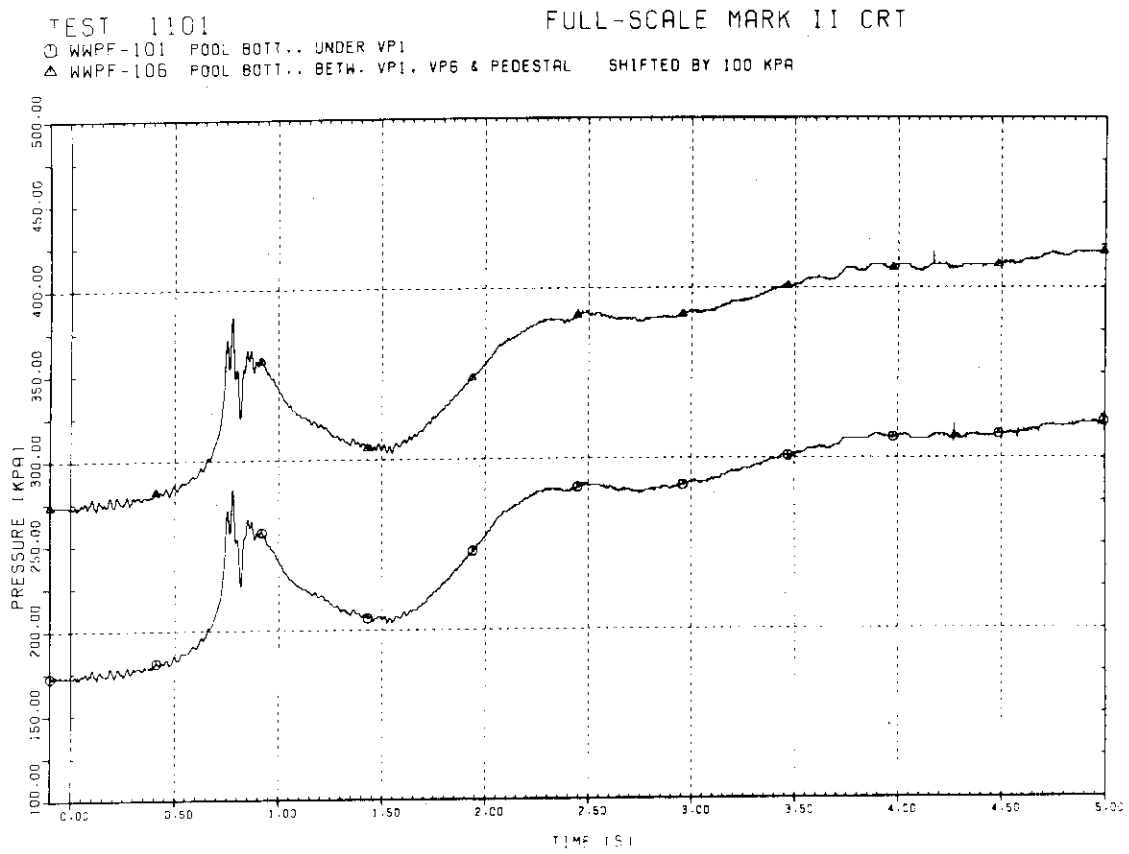

**Plot S-1-6 Pressure in Wetwell**



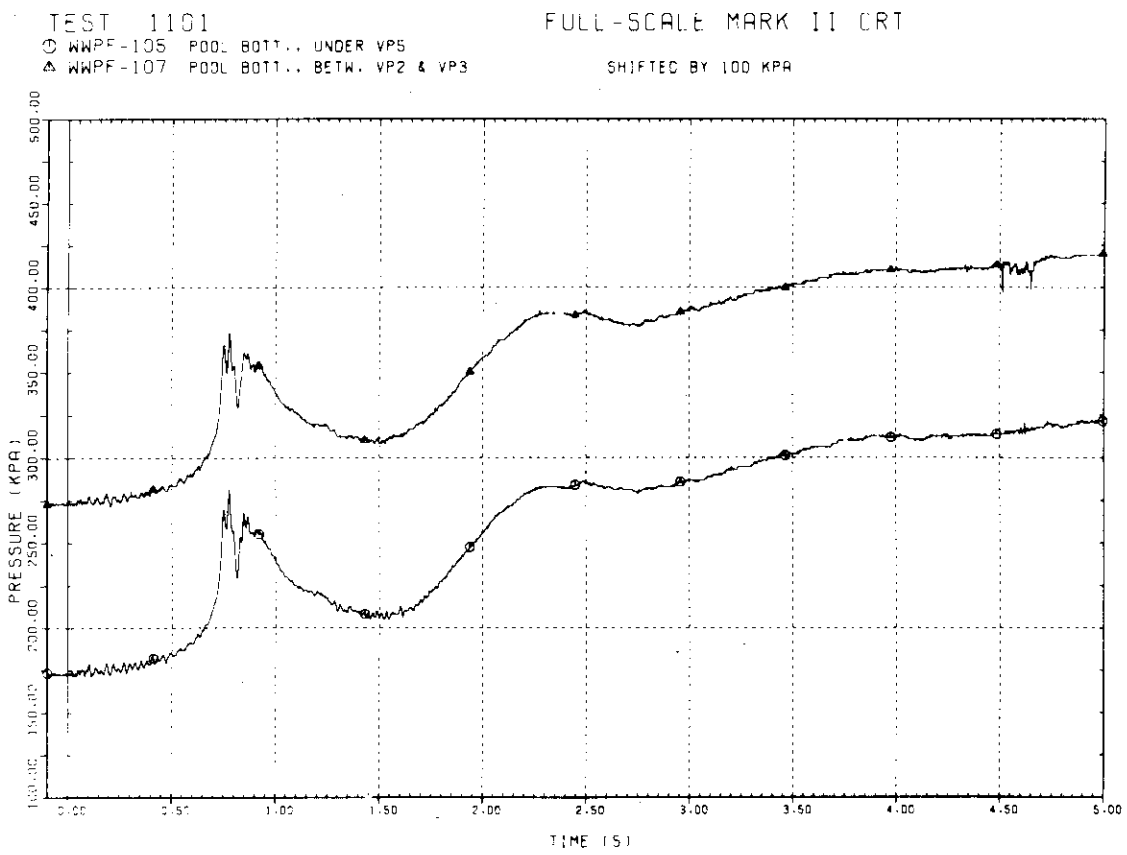

**Plot S-1-7 Pressure in Wetwell**



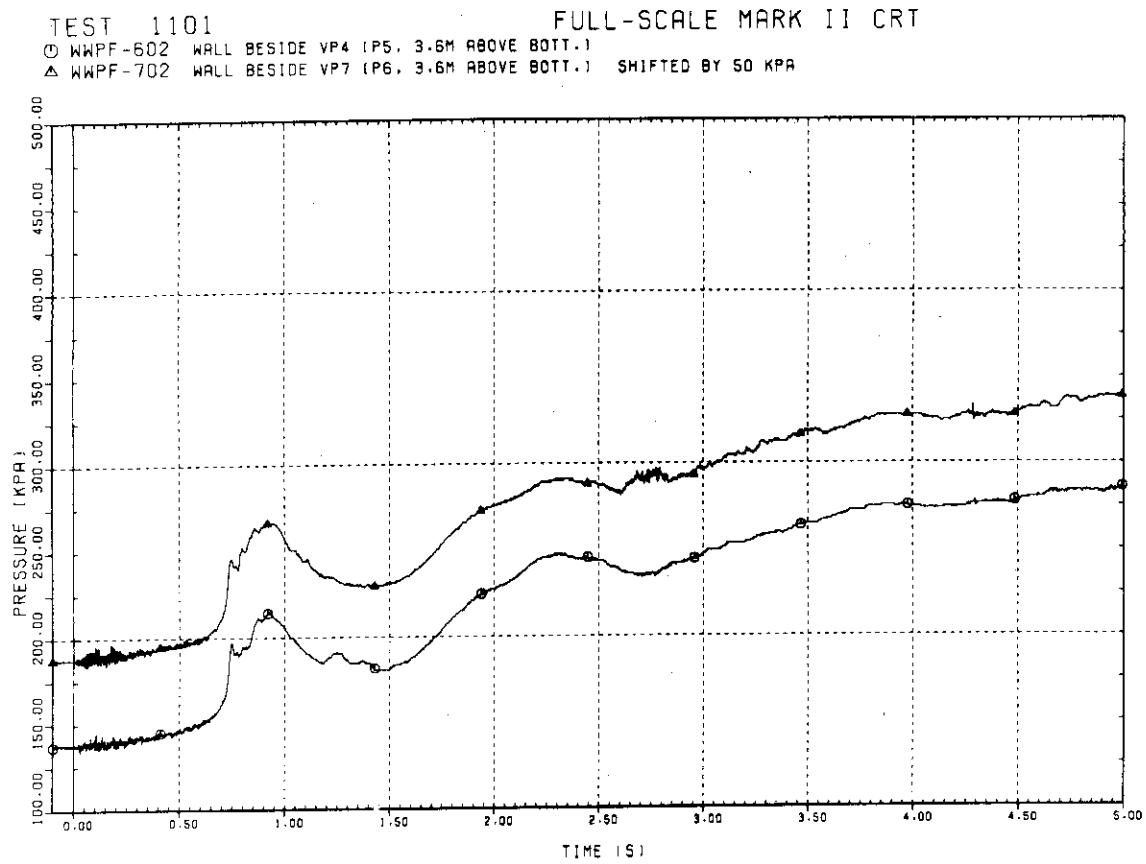

**Plot S-1-8 Pressure in Wetwell**



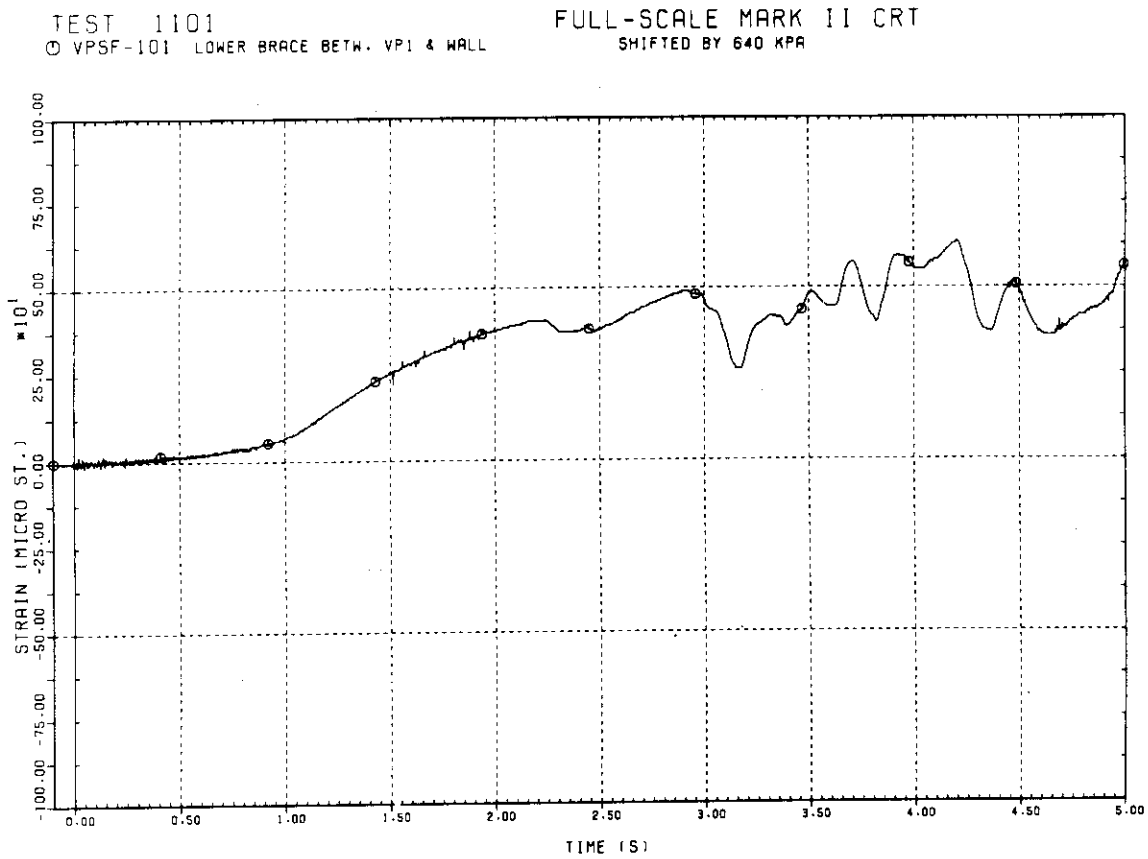

**Plot S-1-9 Pressure in Wetwell**



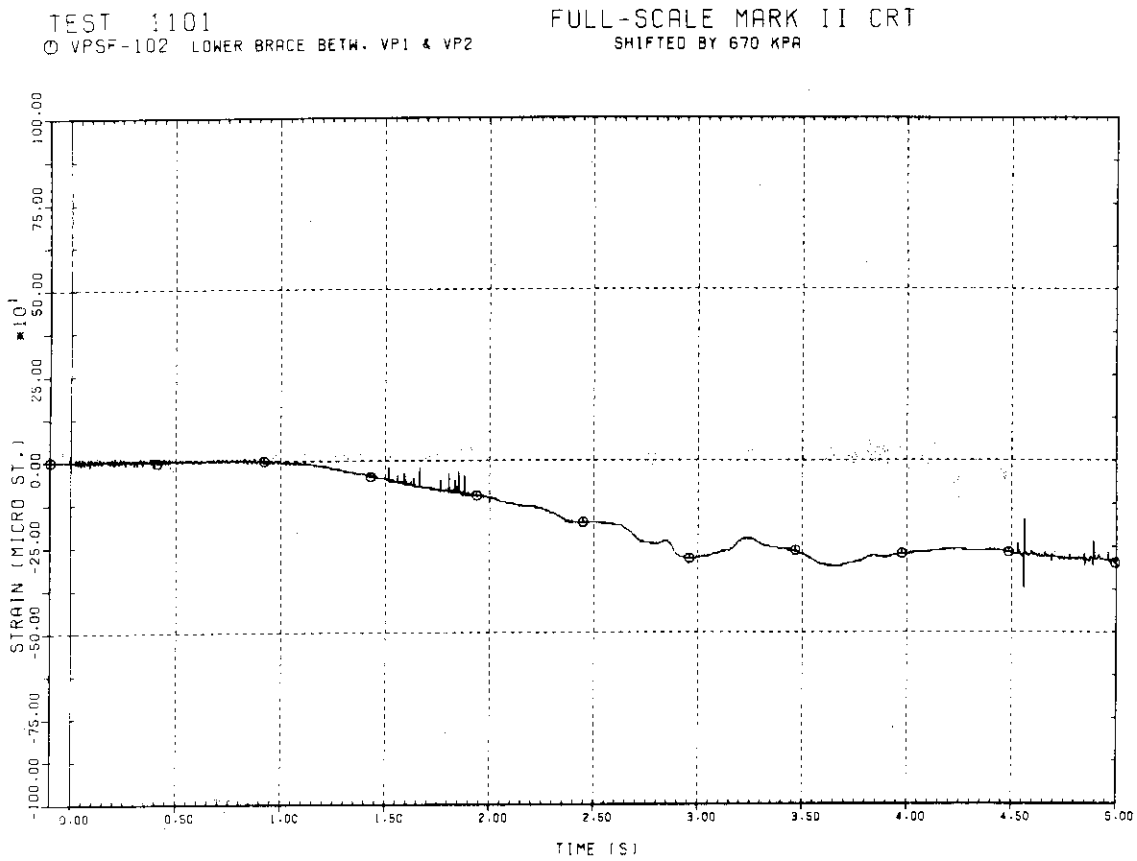

**Plot S-1-10 Pressure in Wetwell**



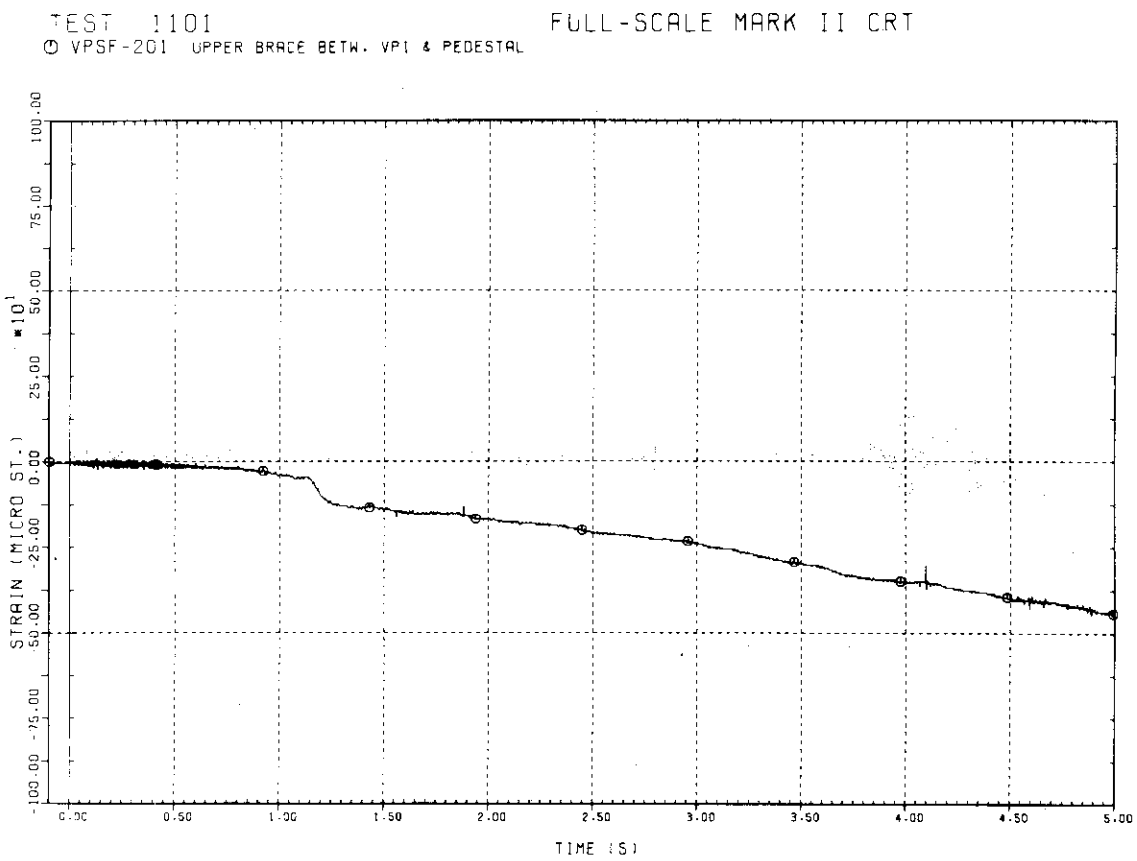

**Plot S-1-11 Pressure in Wetwell**



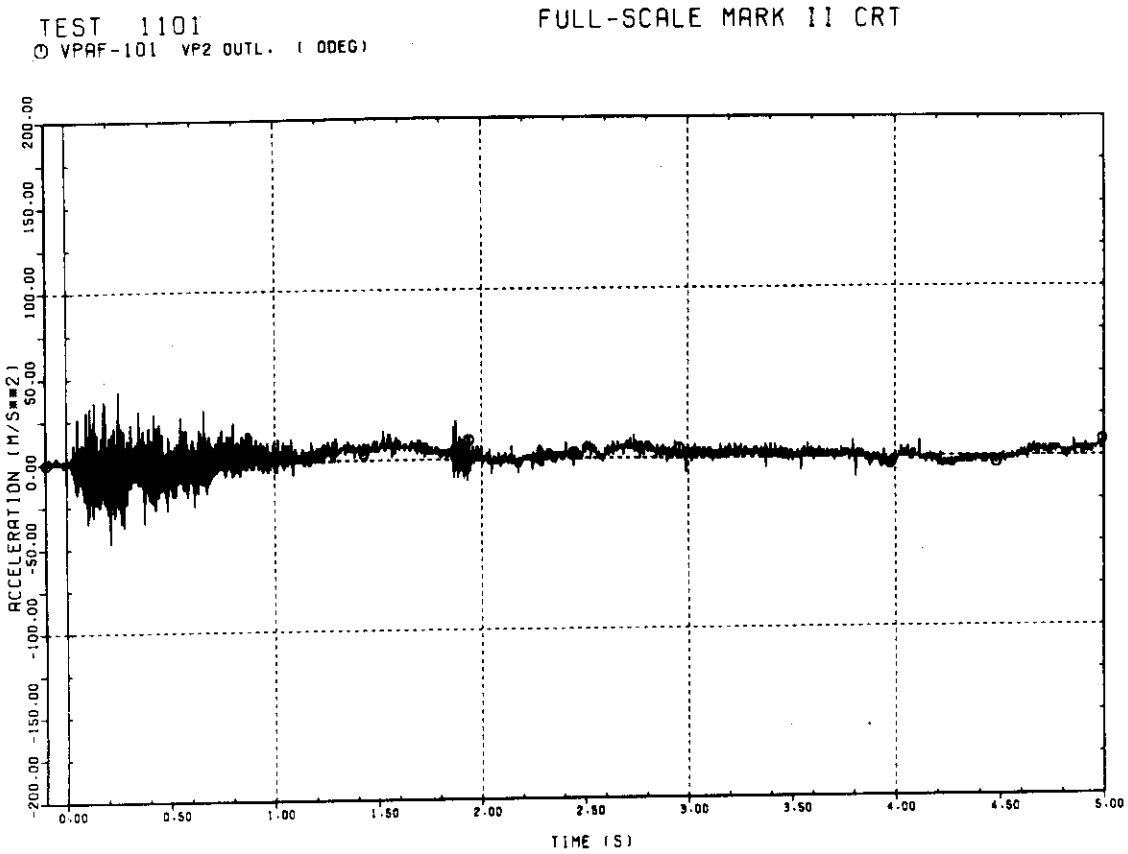

**Plot S-1-12 Strain of Vent pipe Brace**



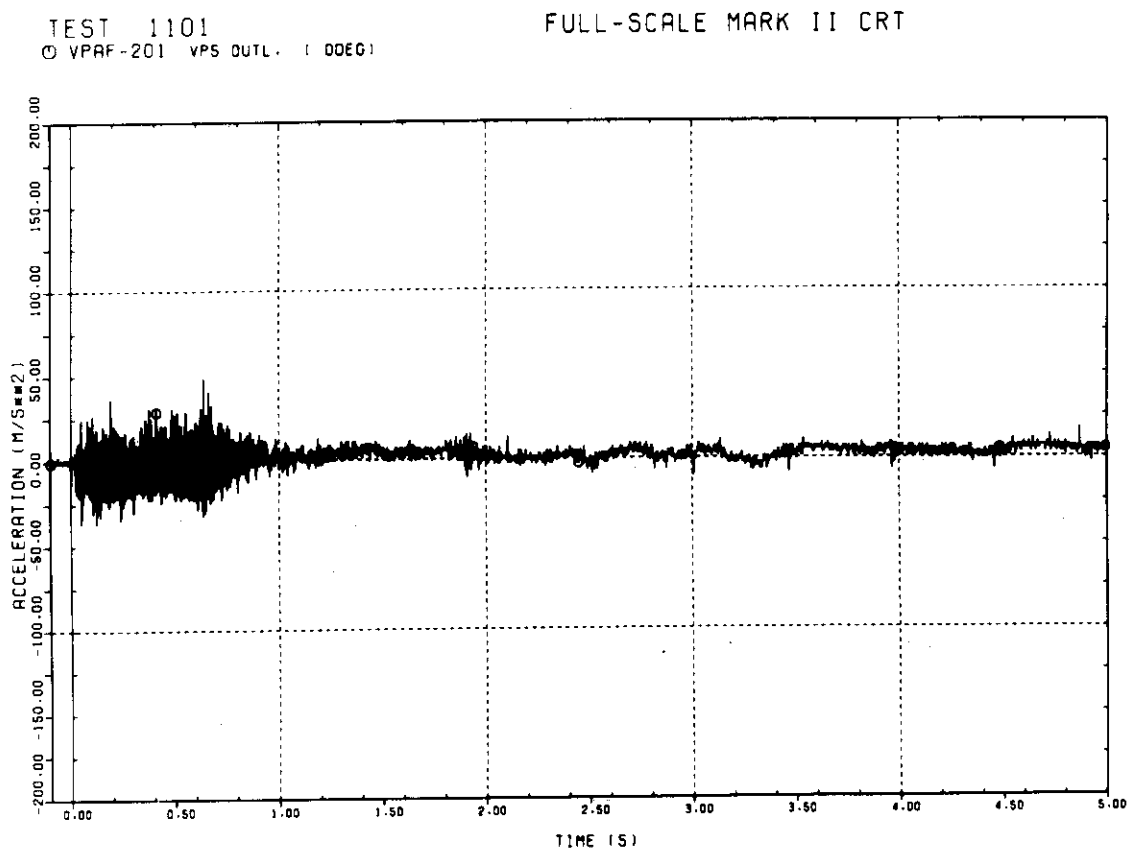

**Plot S-1-13 Strain of Vent pipe Brace**



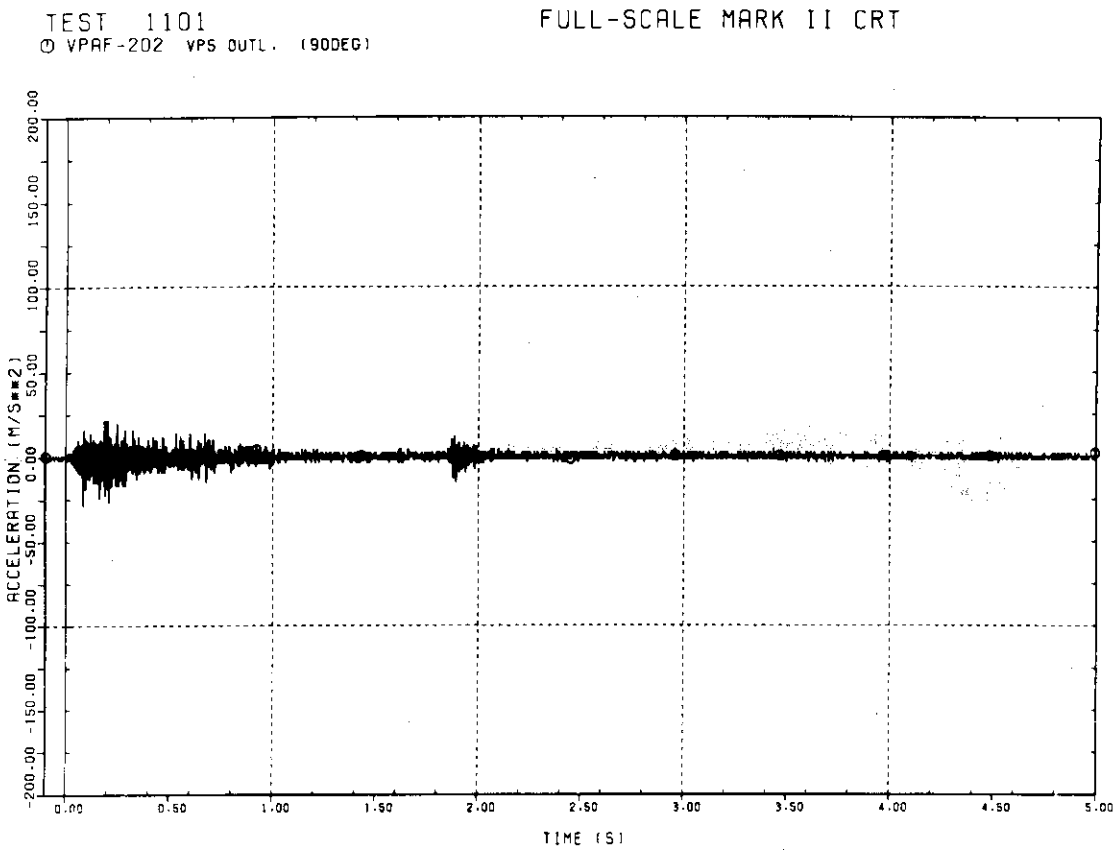

**Plot S-1-14 Strain of Vent pipe Brace**



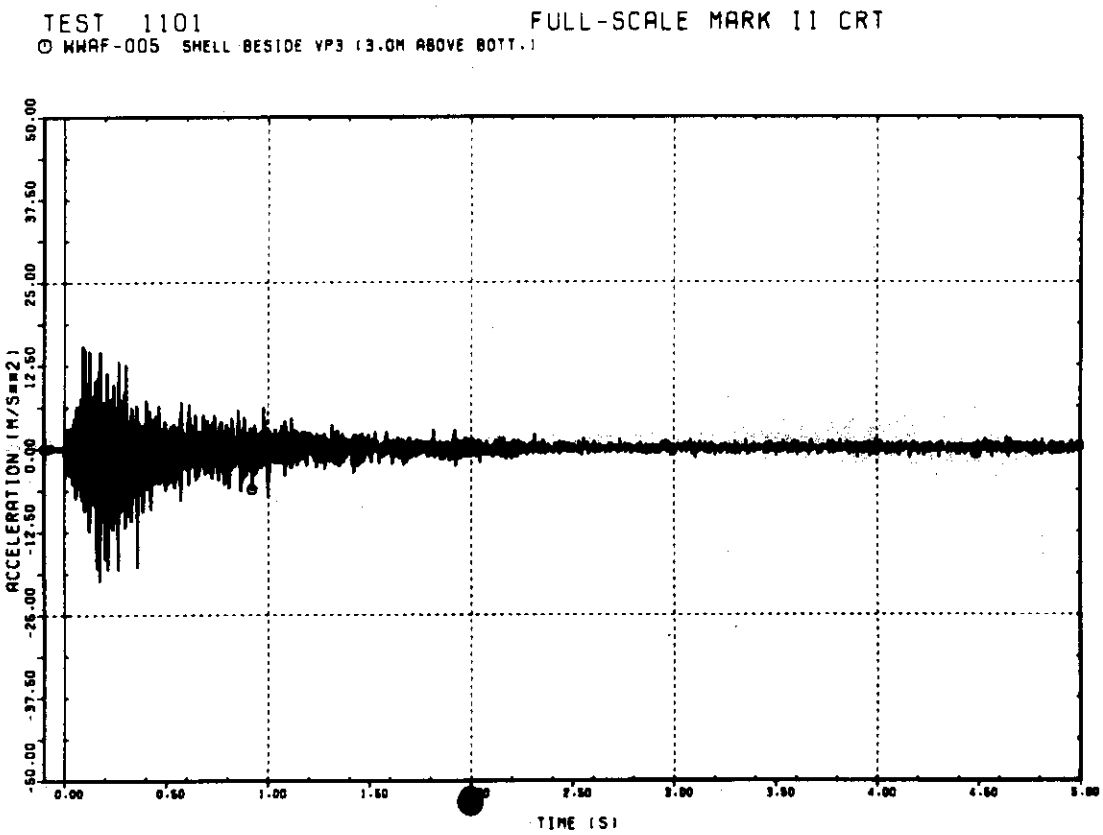

**Plot S-2-1 Acceleration of Vent pipe Outlet**



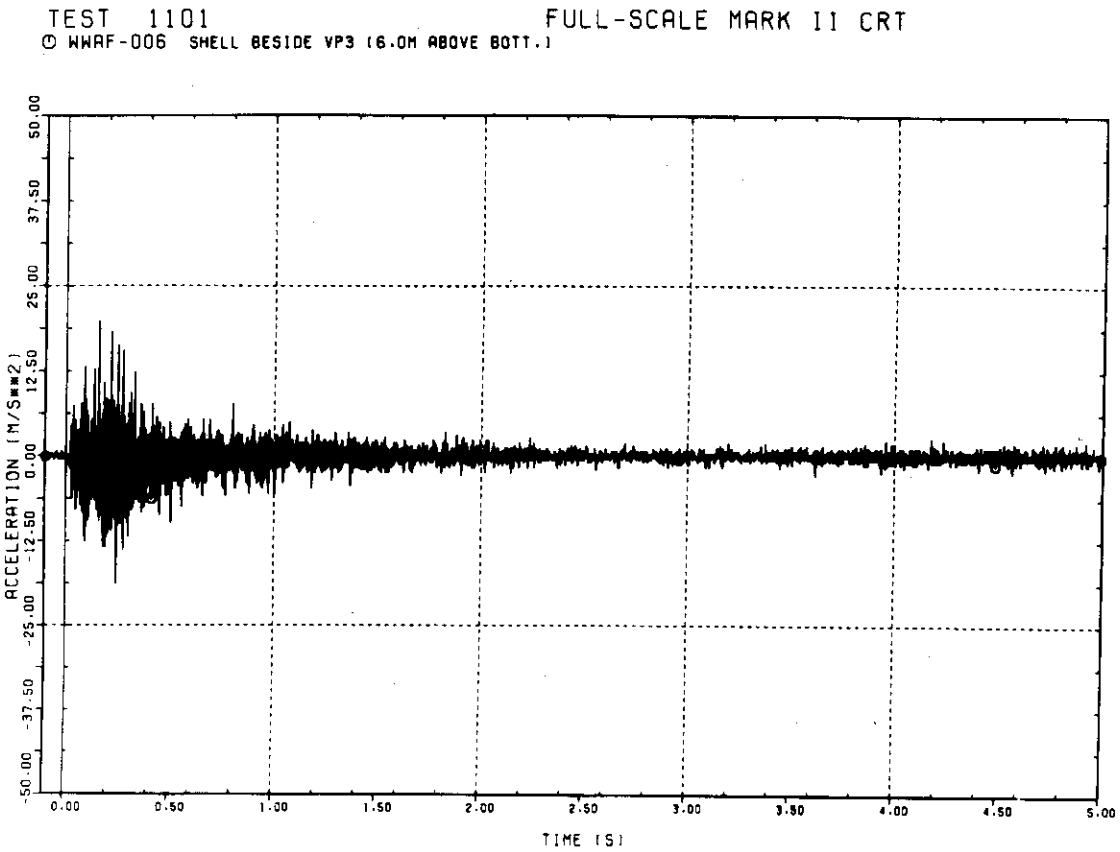

**Plot S-2-2 Acceleration of Vent pipe Outlet**



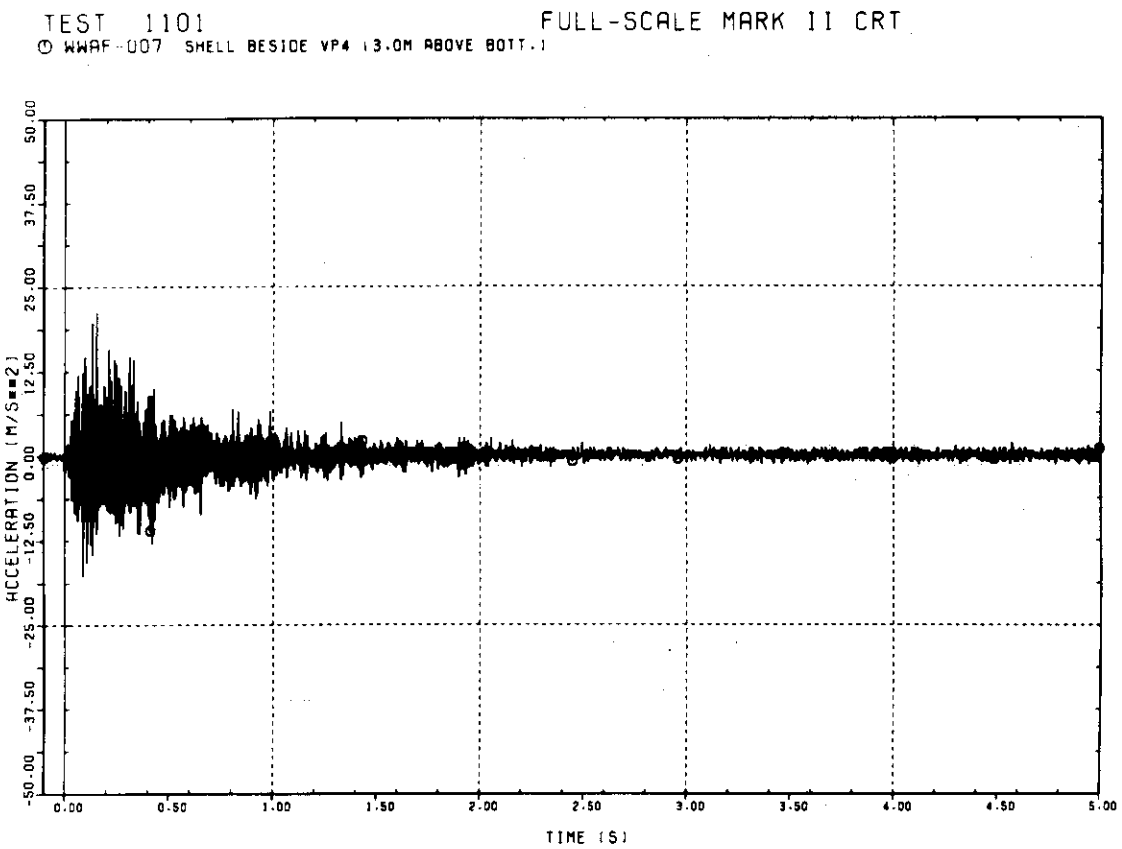

Plot S-2-3 Acceleration of Vent pipe Outlet



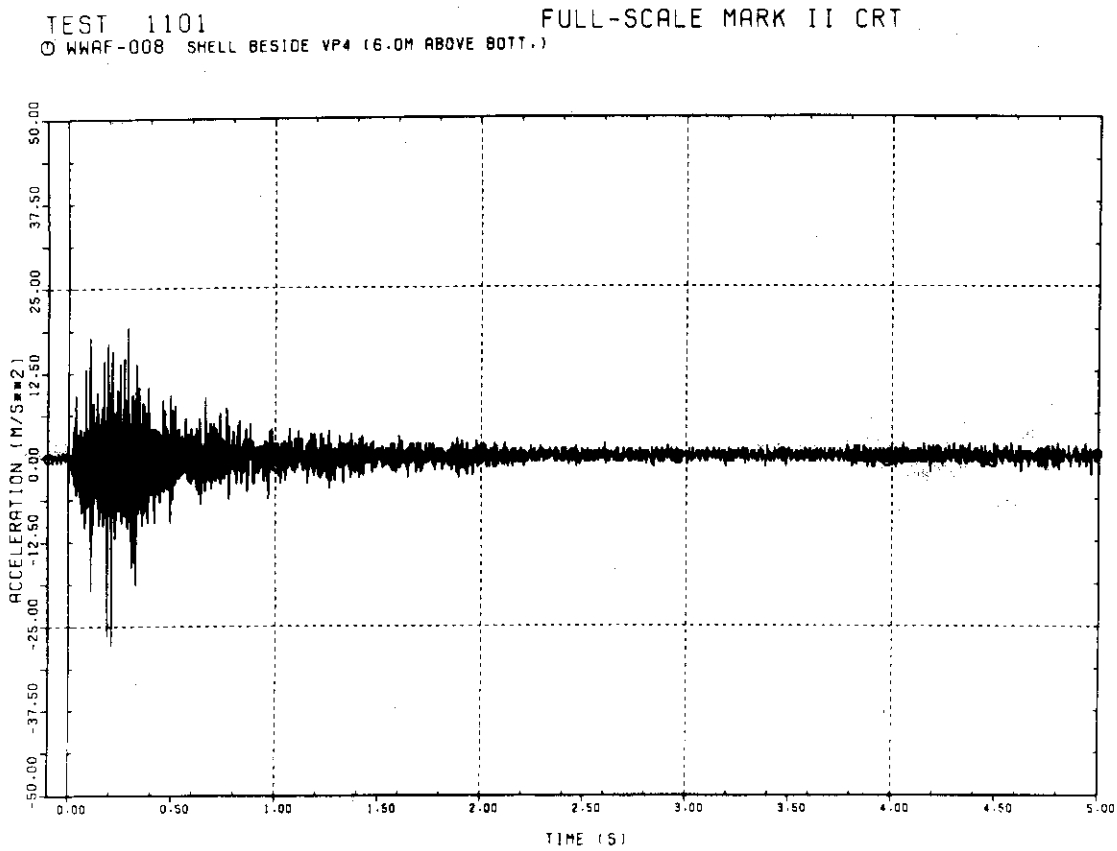

Plot S-2-4 Acceleration of Containment Structure



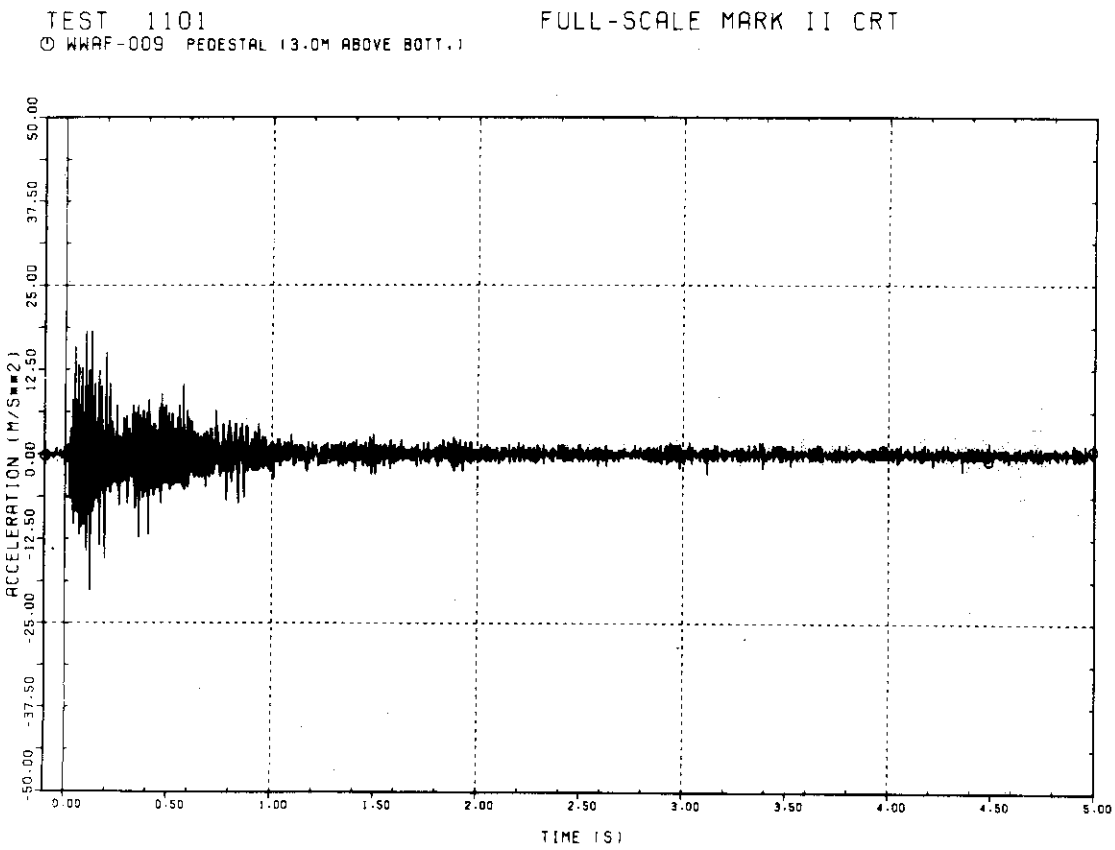

**Plot S-2-5 Acceleration of Containment Structure**



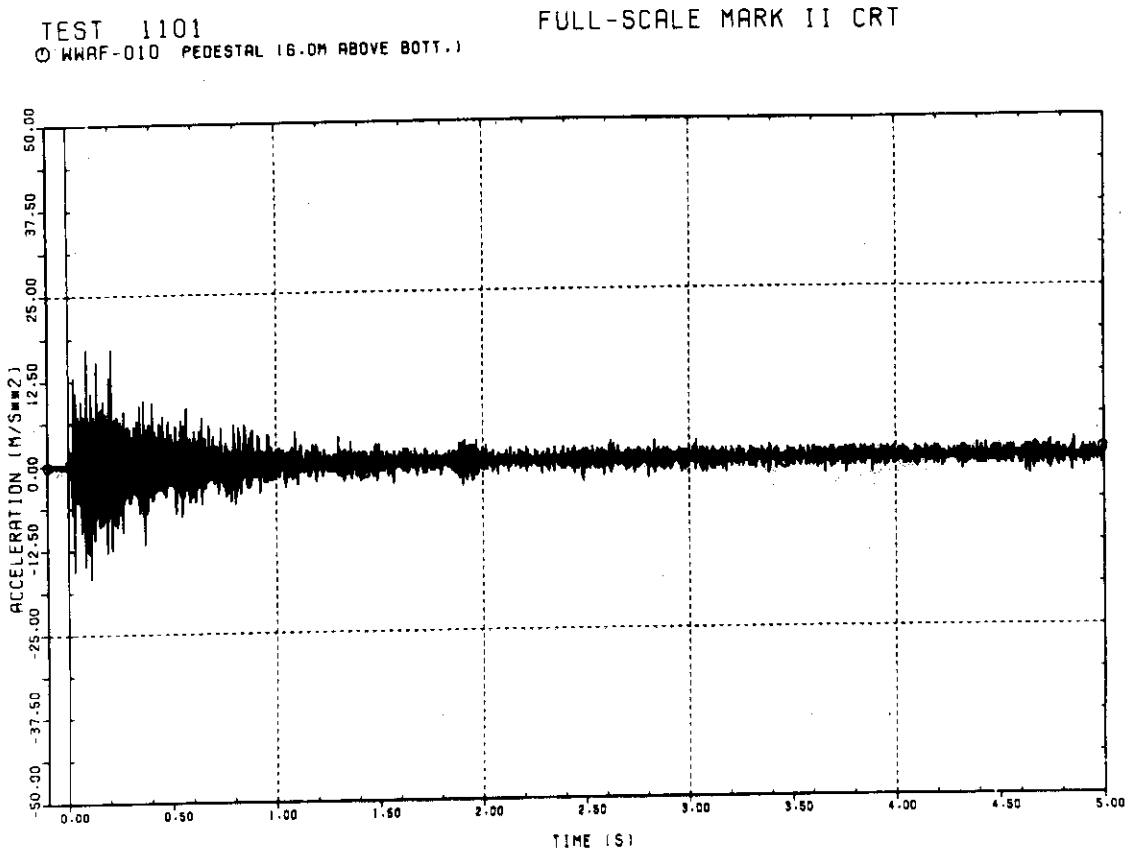

**Plot S-2-6 Acceleration of Containment Structure**



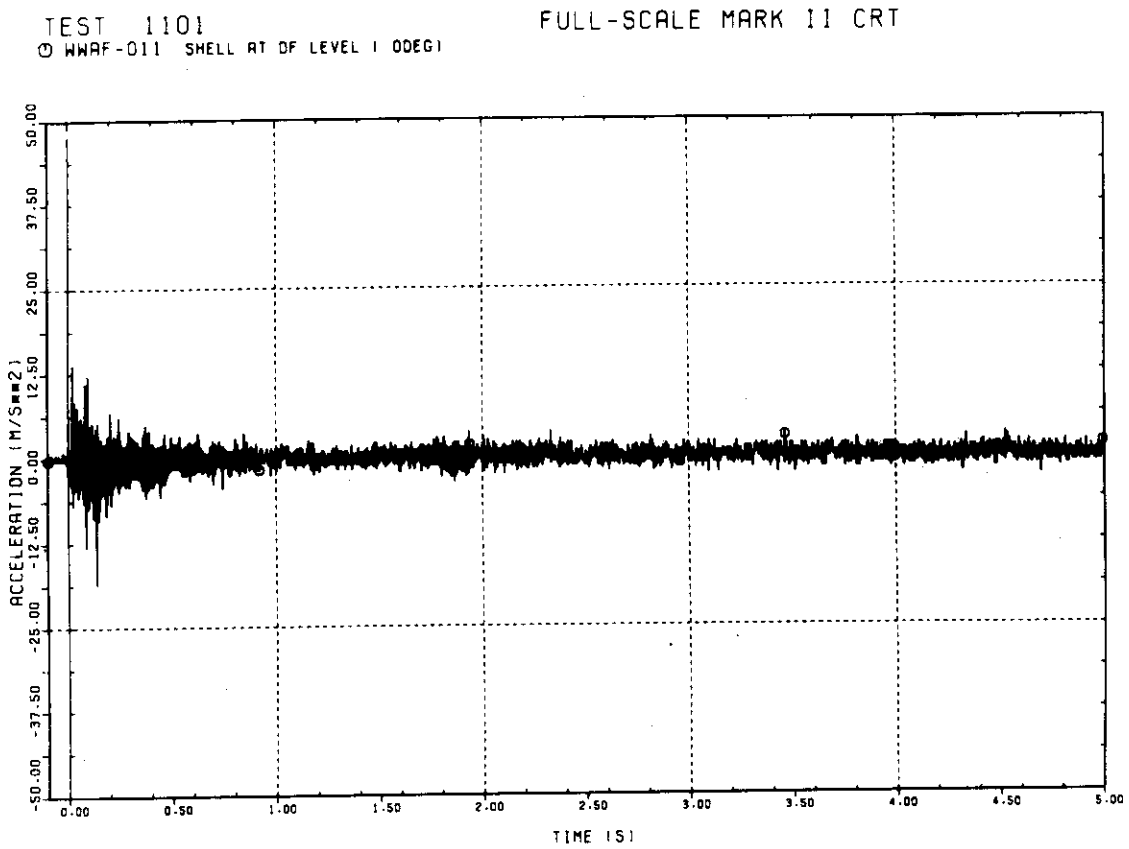

**Plot S-2-7 Acceleration of Containment Structure**



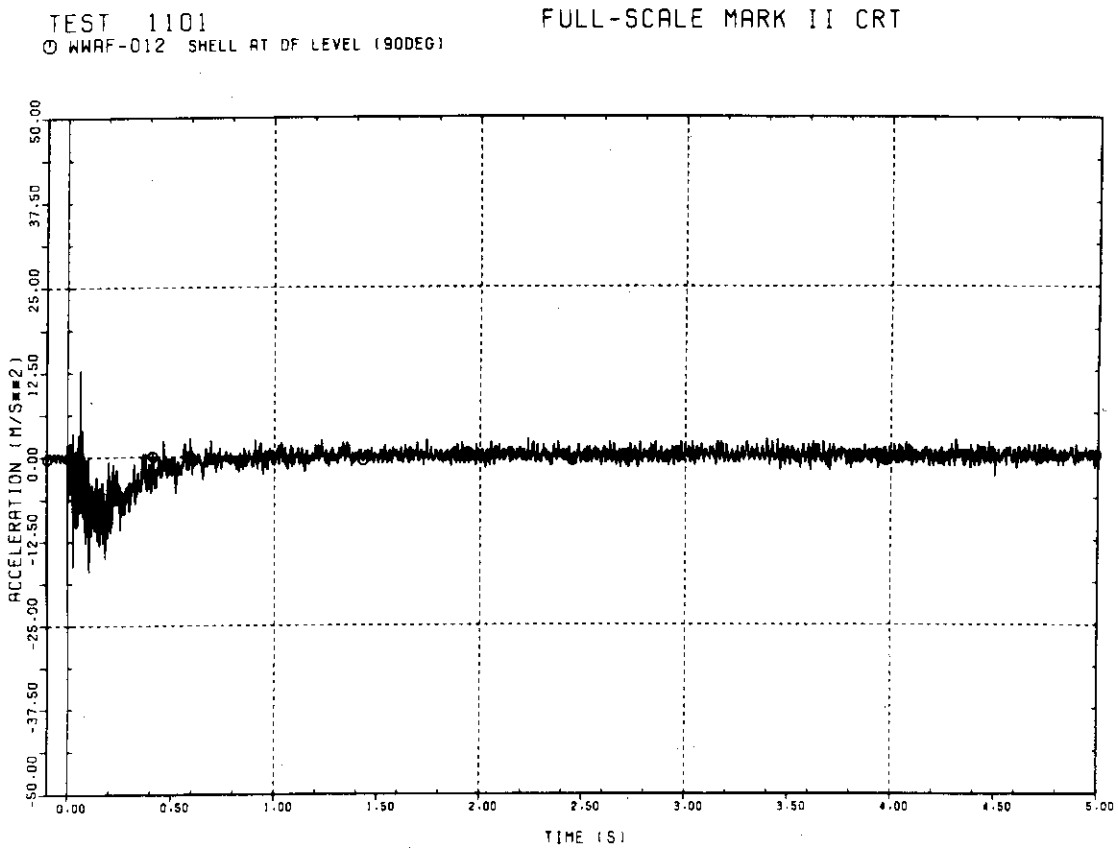

**Plot S-2-8 Acceleration of Containment Structure**



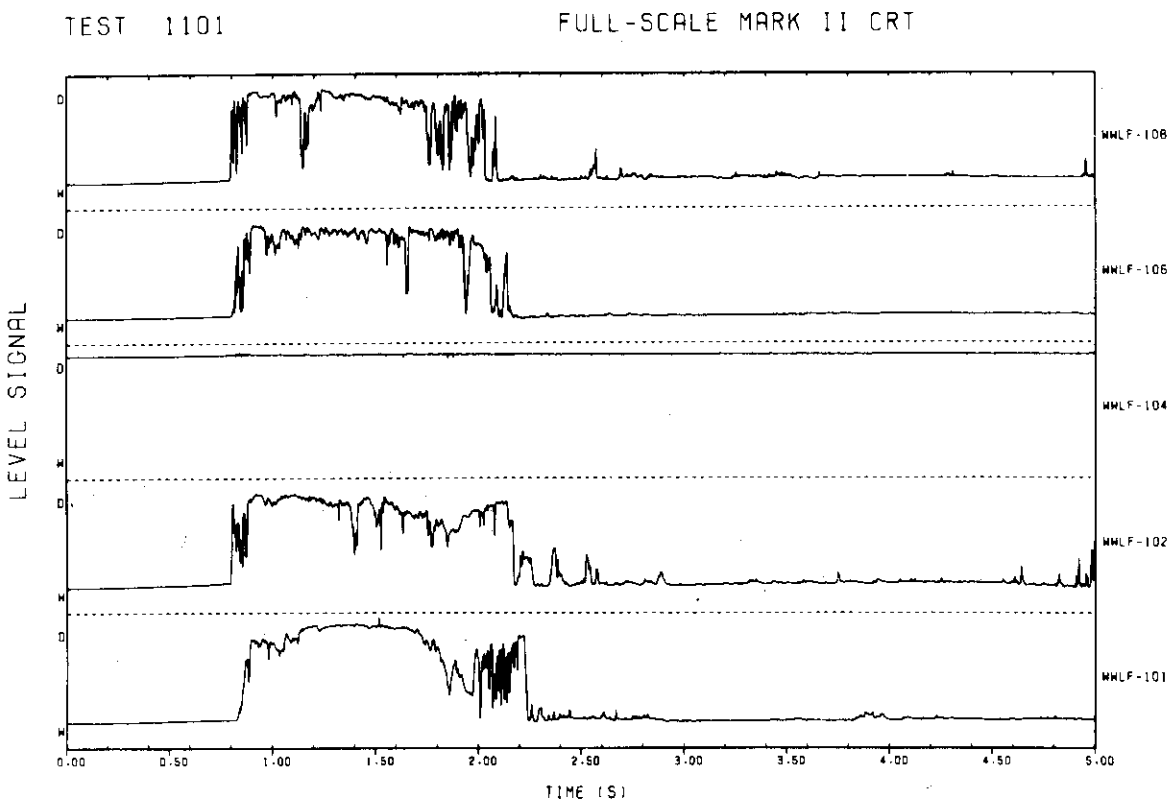

Plot S-2-9 Acceleration of Containment Structure



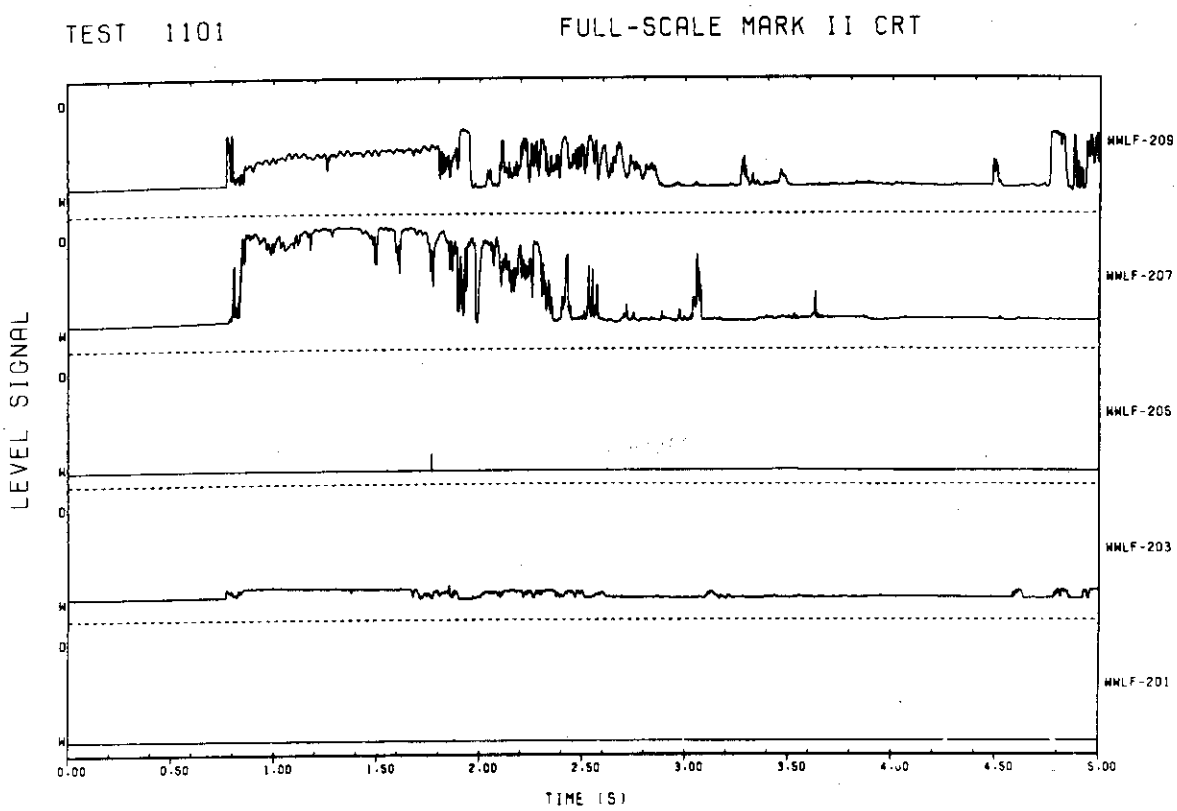

Plot S-2-10 Acceleration of Containment Structure



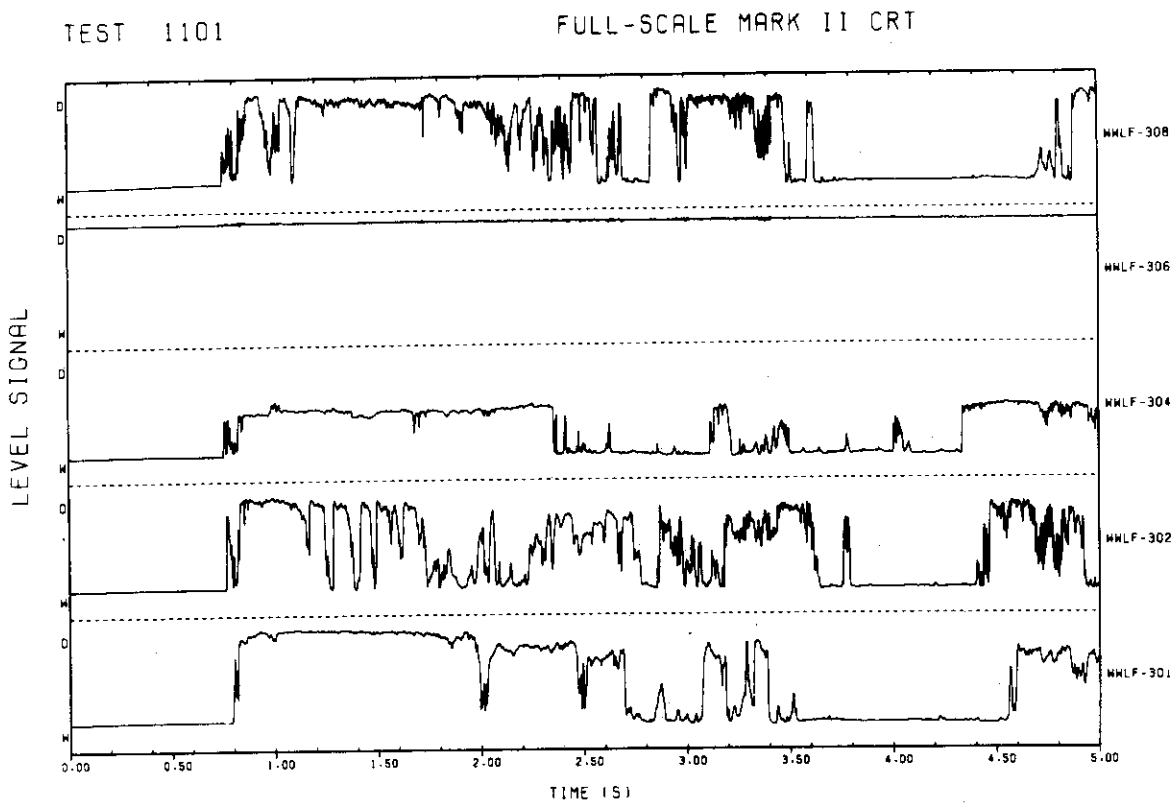

**Plot S-2-11 Acceleration of Containment Structure**




**Plot S-2-12 Phase Boundary Signals**




**Plot S-2-13 Phase Boundary Signals**




**Plot S-2-14 Phase Boundary Signals**