REACTOR CONTAINMENT BUILDING
INTEGRATED LEAKAGE RATE TESTS
TYPES A, B, AND C

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT
NUCLEAR POWER STATION
UNIT 2

APRIL 1986

Prepared by
STONE & WEBSTER ENGINEERING CORPORATION
BOSTON, MA

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LIST OF ATTACHMENTS

REFERENCES

1. 10CFR50, Appendix J, Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors, October 22, 1980.

2. N2-POT-201, Primary Containment Integrated Leakage Rate Test.

3. Stone & Webster's Nine Mile Point Unit 2 Project Calculation 12177-ES-218, Rev. 0, ILRT Weight Factors.

4. Stone & Webster's Nine Mile Point Unit 2 Project Calculation 12177-ES-180, Rev. 0, Maximum Allowable Primary Containment Leakage Rate for Full Pressure Type A Tests.

5. Bechtel Top 1 Report BN-TOP-1 Rev 1 1972

6. ANSI/ANS 56.8-1981 Containment System Leakage Testing Req.

SECTION 1

PURPOSE

The purpose of this report is to present a description and analysis of the April 1986, Type A Reactor Containment Building Integrated Leakage Rate Tests (ILRT's), and a summary of the Types B and C Local Leakage Rate Tests (LLRT's) conducted on Niagara Mohawk Power Corporation's Nine Mile Point Nuclear Station Unit 2.

Niagara Mohawk Power Corporation (NMPC) has the responsibility for licensing, design, procurement, construction, operation, and all related functions with respect to Unit 2. NMPC, along with four other utilities, own, as tenants in common, proportional interests in Unit 2.

NMPC performed the Type A with test engineering consultation services provided by Stone & Webster Engineering Corporation (SWEC).

This report is submitted as required by 10CFR50, Appendix J, Paragraph V.B. (Reference 1).

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SECTION 2

SUMMARY

2.0 Introduction - Type A Tests (Reduced Pressure Test)

The Structural Integrity Test (SIT) for the primary containment was completed on April 9, 1986. The valve lineups required for the ILRT had essentially been established for the SIT. Both the reduced pressure (Pt=20 psig), and the full pressure (Pa=40 psig) ILRT's were performed.

2.1 20 PSIG Type A Test ILRT was started at approximately 1318 hours on April 10, 1986. The compressors were secured at approximately 1618 hours with a peak instantaneous pressure of 35.30 psia. Temperature stabilization was satisfied at 2035 hours. Initial mass trends indicated and acceptable leakage rate, however, perturbations in the mass trend were observed.

Upon further investigation it was determined that the dew-point devices, which are optical chilled mirrors hygrometers, were undergoing an automatic self-standarization (balance) cycle.

The frequency of each dew-point sensor's balance cycle is adjustable based on the operating conditions of the sensor's environment. Each cycle consists of a period of time that the sensor's mirror is heated above 100^0F to remove any condensate from its surface, followed by cooling below 40^0F. Upon completion of this heatup and cooldown cycle, another adjustable time period is required to re-establish control of the actual dew-point temperature. This balance mode is required to allow the sensor to automatically and electronically compensate for any change of the mirror surface reflectivity due to a buildup of contaminants. During the balance cycle, the output of the sensor, based on the application, can be held at the previous level until the sensor has re-established control of the dew-point. This option, called Track and Hold, was not utilized at Nine Mile. Thus, if the ILRT Data Acquisition System computer scanned the sensors during a balance cycle, the "dew-point temperature" it captured was an artifical standardization temperature instead of the actual dew-point temperature.

Rather than use a fifteen minute scan interval for data collection which would capture some of the standardization temperature information, a thirty minute scan was selected. As the dew-point balance cycle times were not synchronized, a particular 30 minute scan time was selected to ensure a valid dew-point reading was captured (e.g. before or after standardization cycle) and that the scans were taken at the approximately equal intervals. Since a twenty-four hour test duration was planned, only hourly data was really necessary.

During this investigation, it was noted that the two suppression chamber dew-point sensors were showing near or, in fact. saturated conditions. For conservatism, these sensors were still monitored, however, the readings from adjacent temperature sensors were used as the dew-point temperature. This was done to prevent subtracting more moisture (e.g. a dew-point temperature greater than the drybulb temperature) than there actually was. The conditions of the supression chamber atmosphere is relatively stable due to the enormous quantity of pool water. A check on the Instrument Selection Guide (ISG) indicated that three dew-point sensors were more than adequate for a 24 hour test period.

The 20 PSIG test was started at 2213 hours on April 10, 1986 using data collected every 30 minutes. Based on a review of the 30 minute data, two observations were made:

1) A random interface problem existed between the manometer and computer input channels. Whenever this event occurred, one of the two pressure values would spike high (e.g. contact closure simulated by a high logic zero voltage level). The local manometer reading was verified not to change during one of the events. As an averaged pressure was used for the mass calculation, these events caused an artificial change in the calculated mass. This event was compensated for by interpolating between the computer trend before and after the spike. This was done on six occasions during the 24 hour test period.

2) The weighted average dew-point temperature readings calculated using the data collected at thirteen minutes past the hour were always slightly lower than those taken at forty three minutes past the hour. This is attributed to the time duration that dew-point sensor 2CMS*MIT72D was in the balance mode. Re-establishment of the dew-point temperature, after the balance mode, was just about complete when the thirteen minute data capture took place. This difference is judged to be in significant as far as its affect on the overall test results are concerned (See Attachment 3.3A for Dew-point and Vapor Pressure variations).

The 20 PSIG ILRT was successfully completed at 2213 hours on April 11, 1986. A superimposed leakage verification for the 20 PSIG ILRT was successfully completed at 0513 hours on April 12, 1986 (See Attachment 3.3G).

Since the data for the ILRT analysis was manually input into Niagara Mohawk's portable computer for ILRT analysis, a verification of all input data was performed. Verification was performed by first using all available data, and second by deleting the data sets where perturbations had caused an artificial change in the calculated mass.

Table 2.1 demonstrates the comparison of the reported leakage rate results as shown in Attachment 3.3B, 3.3C, and 3.3G to the leakage rates that are calculated from "clean" data. Clean data is defined as data that was not interpolated, as the average pressure was, or as data that was slightly low due to the balance mode frequency. When these data sets were deleted, and only the clean data sets analyzed, a very slight difference was noted. When these results are compared to the acceptance criteria, the difference is judged to be insignificant.

Table 2.1

COMPARISON OF TEST RESULTS

TYPE A TEST (20 psig)		ALL DATA %/day		CLEAN DATA %/day
1. Mass Point:	Leakage Rate	0.123594		0.118360
	Confidence	0.004426		0.006706
	W/UCL	0.128019	Total	0.125066
2. Total Time:	Leakage Rate	0.126684		0.107855
	Confidence	0.096852		0.107699
	W/UCL	0.22353	Total	0.21555

Similar results occur when the verification test data is analyzed in this manner. This analysis confirms the overall stability in the observed trends. Reference the stability in the Mass versus Time graph shown in Attachment 3.3D. It is this stability, in fact, that lead to the identification of the dew-point and pressure perturbations.

The containment was depressurized to replace the failed dew-point device in the drywell with one from the suppression chamber, to clean all mirror surfaces, and to synchronize the balance frequencies. all work was completed at 1120 hours on April 12, 1986.

2.2 40 PSIG TYPE A TEST (accident pressure test)

Containment pressureization for the 40 PSIG ILRT was started at 1340 hours and was completed at 1805 hours on April 12, 1986 with a peak pressure of 56.003 psia. A containment isolation valve on the suppression chamber manometer penetration failed closed due to an open coil. The drywell manometer was used as the pressure for the containment.

The dew-point sensor balance cycles were still not synchronized. A thirty minute interval was again chosen to avoid the balance mode cycling. An adjacent temperature sensor was used instead of the suppression chamber dew-point device as was done during the 20 PSIG ILRT.

AT 0425 hours on April 13, 1986, it was observed that dew-point sensor 2CMS*MIT72D did not recover from its balance cycle. It was reading approximately ten degrees highter than an adjacent dew-point sensor. Subsituted 2CMS*MIT72B's computer value for 2CMS*MIT72D until the next balance cycle. AT 0625 hours, 2CMS*MIT72D recovered from the balance cycle and trended favorably as before and as the adjacent sensor was trending. This same perturbation occurred later from 1625 to 1825 hours on April 13, 1986 and from 0025 to 0225 hours on April 14, 1986.

The 40 PSIG ILRT was successfully completed 2215 hours on April 13, 1986. A superimposed verification test for the 40 PSIG ILRT was successfully completed at 0414 hour April 14, 1986.

A verfication of all input data was performed. The reduced data, as corrected, is shown in Attachment 3.3H.

Table 2.2 demonstrates the comparison of the reported leakage rate results as shown in Attachments 3.3H, 3.3I, and 3.3J to the leakage rates that are calculated using "clean" data. Clean data, in this analysis, is defined as that based on three working dew-point devices. When only clean data is analyzed, a very slight difference was noted. When these results are compared to the acceptance criteria, the difference is judged to be insignificant.

Table 2.2

COMPARISON OF TEST RESULTS

TYPE A TEST			ALL DATA %/day	CLEAN DATA %/day
1. Mass Point:	Leakage rate		0.193510	0.193782
	Confidence		0.003279	0.003612
	W/UCL	Total	0.196788	0.197394
2. Total Time:	Leakage rate		0.210712	0.213188
	Confidence		0.070846	0.075958
	W/UCL	Total	0.28155	0.28914

Similar results occur when the verification test data is analyzed. This analysis again confirms the overall stability in the observed trends. Reference the stability in the Mass versus time graph as shown in Attachment 3.3K.

Effect of Temperature on Acceptance Criteria

As discussed in Section 3.3.4, the maximum allowable leakage rate is a function of the containment air temperature. For test preparation purposes, an estimated temperature of 80°F was used to determine the verification flows and to establish allowable mass rates of change.

Since the actual weighted average air temperature for both the 20 PSIG and 40 PSIG ILRT's was less than 80°F, an evaluation was made to determine the significance.

(La at 80°F) = 0.878 percent/day
(La at 70°F) = 0.870 percent/day
(La at 60°F) = 0.862 percent/day

As can be seen, small changes in the air temperature have little significance on the acceptance criteria. It could be assumed that air temp is constant.

Effect of the Volume on Test Results

As discussed in Section 3.2.4, the Niagara Mohawk ILRT Data Analysis Program uses the suppression pool water level to adjust the containment free volume. The water level remained essentially constant during the 20 PSIG ILRT and showed a slight but steady decrease during the 40 PSIG ILRT. The containment volume determined from the water level measurement is shown on Attachment 3.3A, 3.3G, 3.3H and 3.3N. The volume used to determine the superimposed leakage rate, Lo, does depend on the magnitude of the containment free volume (See Sections3.3.4 and 3.3.6). The volume used to convert the superimposed flow is 506,778 cubic feet which is smaller than the calculated volume during both the 20 and 40 PSIG ILRT's. The higher volume figure would lower the superimposed leakage test plus/minus limits. This would improve the composite leakage rate results comparison. Thus, it is conservative to use the lower volume for the superimposed leakage rate conversion. It could be assumed that volume was constant.

2.3 CONCLUSION

The April 1986 Nine Mile Point Unit 2 Type A Tests are considered successful tests in that they demonstrated the leak-tightness of the containment boundary. The measured leakage rates were well within the plant's maximum allowable leakage rate.

2.4 CORRECTIVE ACTION PROGRAM

The dew-point and pressure instrument loops shall be investigated to determine the causes of the perturbations experienced during these ILRT's in order to prevent their occurrance during future ILRT's.

2.5 LOCAL LEAKAGE RATE TESTS (TYPES B AND C)

The Local Leakage Rate Tests (LLRT's) of the containment isolation valves and other containment penetrations were performed by the methods described in the Nine Mile Point Unit 2 preliminary test procedures for the Type B and Type C tests.

In accordance with Appendix J to 10CFR50, Paragraph V.B., data for the Local Leakage Rate Tests are summarized in Section 4 of this report.

2.6 Correlation of Full Pressure Test with Reduced Pressure Test

SECTION 3

TYPE A TEST

3.1 EDITED LOG OF EVENTS

This log was edited from the information contained in the Official Log of Events (See Attachment 10.0 of Reference 2) except for the times of certain key events.

April 10, 1986

1318 - Started pressurization of the primary containment for the 20 PSIG Type A Test.

1618 - Secured containment pressurization with a peak instantaneous pressure of 35.30 psia.

- Commenced temperature stabilization period.

2035 - Satisfied temperature stabilization criteria. The 24 hour 20 PSIG Type A Test was started.

2300 - Determined that the optical Dew-point Hygrometers were cycling into their automatic standardization (balance) mode at different frequencies. During the balance mode, the mirror temperature, which is proportional to the dew-point temperature, is heated, then cooled. The computer trend logs that were used for the Type A data, observed these temperatures excursions.

2330 - Decided to use a 30 minute interval for Type A Leakage rate determination, as the 15 minute interval was impossible due to the various dew-point sensor balancing frequencies. Restarted the Type A test using data at 2213, and every half-hour thereafter.

- The suppression chamber dew-point sensors were showing saturated conditions. Replaced these dew-point readings with adjacent temperature sensor readings for the ILRT analysis. Computer point CMSMA09 was replaced by CMSTA08, and CMSMA10 by CMSTA16.

- ISG recalculated for 3 dew-point sensors and still acceptable for 24 hour Type A test.

April 11, 1986

0530 - 0.5 psig noted in the personnel airlock.

2200 - Due to an apparent absolute manometer Binary Coded Decimal (BCD) computer interface problem, certain data sets could not be used for Type A analysis. When the BCD interface malfunctioned, the computer reading spiked high. This problem was verified as an interface problem and not a manometer problem. Replaced the problem pressure sensor readings with adjusted readings based on a linear interpolation of the data before and after the perturbation.

2213 - Completed the 24 hour 20 PSIG Type A Test.

2311 - Started the superimposed flow of 6 standard cubic feet per minute (scfm) which is slightly above the scfm equivalent of the reduced pressure test acceptance criteria, Lt.

April 12, 1986

0013 - Started the superimposed verification test.

0513 - Completed the superimposed verification test.

0557 - Commenced depressurization of the primary containment.

0900 - Completed depressurization.

1120 - Work on the dew-point sensors was completed. The failed CMSMA05 sensor was replaced with CMSMA10 which was taken from the suppression chamber. All dew-point sensor mirror surfaces were cleaned and the balance frequencies were adjusted to obtain the same two hour cycle.

1340 - Commenced pressurization for the 40 PSIG Type A Test.

- Lost suppression chamber absolute manometer. Identified the containment isolation valve LMS*SOV156 (fail close) was closed. Valve later found to have open coil.

1805 - Secured compressors at 56.003 psia.

1815 - Started the temperature stabilization period.

2200 - Noted that the dew-point sensor balance cycles were not synchronized. Frequencies were scattered enough to prevent using a 15 minute interval for Type A leakage rate determination. Decided to run using a 30 minute interval. CMSMA09 was operating erratically. Replaced the CMSMA09 reading with an adjacent temperature sensor, CMSTA08.

2215 - Satisfied temperature stabilization.

2217 - Started the 24 hour 40 PSIG Type A Test was started.

April 13, 1986

0425 - CMSMA08 did not recover from its balance mode. It was substantially higher than the dry bulb temperature. Replaced the CMSMA08 reading with an adjacent moisture sensor, CMSMA06.

0625 - CMSMA08 recovered after the balance cycle was completed. Switched back to using CMSMA08.

1625 - CMSMA08 did not recover from its balance mode. Used CMSMA06 as replacement.

1825 - CMSMA08 recovered after its balance mode. Switched back to using CMSMA08.

2200 - ISG recalculated for 3 dew-point sensors and still acceptable for 24 hour Type A Test.

2215 - Completed the 40 PSIG Type A Test.

- Started the superimposed flow of 11.5 scfm which is equivalent to L_a at $80^{\circ}F$.

2314 - Started the superimposed verification test.

April 14, 1986

0025 - CMSMA08 failed to recover from its balance mode. Used CMSMA06 until it recovered.

0225 - CMSMA08 recovered. Switched back to using CMSMA08.

0345 - Compared electrical penetration purge pressure gauge readings taken during the 40 PSIG ILRT to those taken on 4-9-86 when the containment was depressurized. There were no significant differences in pressure.

0414 - Completed the superimposed verification test.

0539 - Commenced depressurization of the primary containment.

1045 - Completed depressurization.

3.2 GENERAL TEST DESCRIPTION

3.2.1 Prerequisites

In accordance with the Nine Mile Point Nuclear Power Station Unit 2 ILRT procedure, N2-POT-201 (Reference 2), the following is a listing of pertinent prerequisites that were completed and documented prior to each containment pressurization:

a) All Type B and C tests have been completed or evaluated for impact on the Type A Test.

b) All air accumulators inside the containment are depressurized.

c) The primary containment structural integrity test has been completed.

d) The Drywell Cooling Fan blades have been adjusted for operation at test pressure. To approx minimum flow rate (7^{o}?)

e) Water levels taken or provisions made for continuous monitoring throughout the Type A Test.

f) Data Acquisition and Analysis computers were operational and programmed for ILRT functions.

g) All required system valve line-ups completed.

h) Controlled access plan in effect.

i) Temporary air compressors, aftercooler and air dryer checked out and available for pressurization.

j) All equipment and instrumentation that could be damaged by the test pressure, had been removed or protected.

k) All test instrumentation functionally verified within 6 months of the test.

l) The Official Log of Events was established.

m) General inspection of the accessible interior and exterior surfaces of the containment was completed.

3.2.2 Equipment and Instrumentation

Pressurization of the containment was achieved by the utilization of four temporary air compressors.

Air was piped through an aftercooler and a refrigerated air dryer. The system included adequate instrumentation and valving to maintain proper monitoring and control of the compressed air quality throughout the pressurization sequence. The total capacity of the pressurization system, as installed, was rated at approximately 6,000 cubic feet per minute.

The various containment parameters required to calculate containment leakage during the tests were monitored using instrumentation which consisted of multiple resistance temperature detectors (RTD's), dew-point sensors (optical chilled mirror type), and absolute pressure quartz manometers. Pertinent data for the test instrumentation is listed in Attachment 3.2A, and the general locations of the temperature and moisture sensors are shown in Attachments 3.2B-1 and 3.2B-2.

A rotometer was used to perform the superimposed leakage verification test. All test instrumentation, with the exception of the rotometer, was monitored by the plant process computer system.

3.2.3 Data Acquisition System

The data acquisition system used for the Nine Mile Point Nuclear Power Station Unit 2 ILRT was the plant process computer.

For the ILRT, the plant process computer monitored the following instrumentation.

Type	No. of sensors
Temperature Detectors	18
Dew-point Sensors	6
Quartz Manometers	2

Instantaneous readings for each sensor were printed at least every 5 minutes. Input to the data analysis program was based on these readings taken at 30 minute intervals. In addition to these variables, the reactor water level and the suppression pool water level were also monitored throughout the Type A test period. Each collection of data, or data set, was time stamped.

3.2.4 Data Resolution System

After the appropriate data had been acquired using the plant process computer, the data was manually input into Niagara Mohawk's IBM-PC portable computer for data reduction and for leakage rate determination.

Data Reduction

The spatially-averaged drybulb temperature, T, used in computing the containment air mass, is determined by:

$$T = \sum WF_i \times T_i \qquad \text{(Eq. 1)}$$

where:

WF_i = the volume fraction associated with temperature element T_i

The spatially-averaged dew-point temperature, Tdp, used to determine the vapor pressure, Pv, is determined by:

$$Tdp = \sum WFj \times Tdpj \qquad \text{(Eq. 2)}$$

where:

WFj = the volume fraction associated with dew-point element Tdpj

Containment Free Volume Determination

The containment free volume was not treated as a program constant but was determined by monitoring the change in the suppression pool level. The calculated containment free volume used in the leakage rate calculations is shown as a reduced input variable in Attachments 3.3A, 3.3G, 3.3H and 3.3N.

Absolute Method of Mass Point Analysis

The Absolute Method of Mass Point Analysis consists of calculating the air mass within the containment structure, over the test period, using pressure, temperature, and dew-point observations made during the ILRT. The air mass is computed using the ideal gas law as follows:

$$M = \frac{144V\ (P-Pv)}{RT} \qquad \text{(Eq. 3)}$$

where:

M = air mass, lbm
P = total pressure, psia
Pv = average vapor pressure, psia
R = 53.35 ft-lbf/lbm ^{o}R (for air)
T = average containment temperature, ^{o}R
V = containment free volume, ft^3

The leakage rate is then determined by plotting the air mass as a function of time, using a least-squares fit to determine the slope, A = dM/dT. The leakage rate is expressed as a percentage of the air mass lost in 24 hours or symbolically:

$$\text{Leakage Rate} = (A/B)\ (-2400) \qquad \text{(Eq. 4)}$$

Where A is the slope of the least-squares curve and B is the y-intercept. The sign convention is such that the leakage out of the containment is positive and the units are in percent/day.

The air mass is calculated and the result is correlated as a function of time by means of a least-squares curve fit of the form:

$$M = At + B \qquad \text{(Eq. 5)}$$

The slope A and the y-intercept B are then used in Equation 4 to determine the leakage rate.

A 95 percent confidence interval is calculated using a Student's T distribution. The sum of the leakage rate and the 95 percent confidence interval is the upper confidence limit - mass point (UCL-MP). The measured leakage rate may be described as 95 percent accurate to within the value of the UCL-MP.

Absolute Method of Total Time Analysis

The Absolute Method of Total Time Analysis consists of calculating air lost from the containment, using pressure, temperature, and dew point observations made during the ILRT.

The containment air mass is computed using Equation 3. The measured leakage rate at any time (t) is then determined by subtracting the mass at that time (Mt) from the initial mass (Mi) and dividing by the initial mass. The measured leakage rate is expressed as a percentage of containment mass lost in 24 hours or symbolically:

$$\text{Measured Leakage Rate} = \frac{Mi - Mt}{Mi} \quad \frac{(2400)}{(\Delta t)} \qquad \text{(Eq. 6)}$$

The sign convention is such that leakage out of the containment is positive and the units are in percent/day.

The estimated leakage rate is then determined by plotting the measured leakage rate as a function of time and then performing a linear least-squares curve fit of the measured leakage rate values, as follows:

$$\text{Estimated Leakage Rate} = At + B \qquad \text{(Eq. 7)}$$

where A is the slope and B is the y-intercept of the least-squares curve.

The confidence interval is determined in accordance with the equations of BN-TOP-1, Revision 1, Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plants. The sum of the estimated leakage rate and the 95 percent confidence interval is the upper confidence limit - total time (UCL-TT).

This analysis method was used in conjunction with procedure N2-POT-201 (Reference 2).

ATTACHMENT 3.2A

INSTRUMENTATION

The following instrumentation was calibrated or functionally verfified within 6 months prior to the performance of these tests in accordance with Appendix J, 10CFR50.
NOTE: Instruments that were assigned a zero weight factor were not used in the leakage calculations.

Instrument	Computer Point ID	Zone	Approximate Elev/Azimuth	Weight Factors (1)
A. Drywell Temperatures				
2CMS*TE101	CMSTA01	I	306'9"/352°	0.040594
2CMS*TE116	CMSTA10	II	306'9"/180°	0.040594
2CMS*TE102	CMSTA02	II	294'5"/113°	0.049431
2CMS*TE117	CMSTA11	II	296'4"/326°	0.049431
2CMS*TE103	CMSTA03	III	283'/56°	0.049846
2CMS*TE104	CMSTA12	III	268'/203°	0.049845
2CMS*TE118	CMSTA04	III	282'6"/245°	0.049845
2CMS*TE119	CMSTA13	III	262'4"/30°	0.049845
2CMS*TE105	CMSTA05	IV	255'6"/326°	0.055986
2CMS*TE120	CMSTA14	IV	253'11"/167°	0.055985
2CMS*TE106	CMSTA06	V	244'/287°	0.059033
2CMS*TE121	CMSTA15	V	244'/111°	0.059033
B. Suppression Chamber Temperatures				
2CMS*TE107	CMSTA07	VI	227'/319°	0.065089
2CMS*TE108	CMSTA08	VI	227'/79°	0.065089
2CMS*TE109	CMSTA09	VI	227'/199°	0.065089
2CMS*TE122	CMSTA16	VI	227'/315°	0.065089
2CMS*TE123	CMSTA17	VI	227'/74°	0.065088
2CMS*TE124	CMSTA18	VI	227'/205°	0.065088

ATTACHMENT 3.2A (Con't)

INSTRUMENTATION

Instrument	Computer Point ID	Zone	Approximate Elev/Azimuth	Weight Factors (1)
C. Drywell Dew-point Temperatures				
2CMS*MIT72A	CMSMA05	A	295'/95°	0.0
2CMS*MIT72C	CMSMA07	A	290'/300°	0.180050
2CMS*MIT72B	CMSMA06	B	265'/100°	0.214709
2CMS*MIT72D	CMSMA08	B	265'/285°	0.214709 (2)
D. Suppression Chamber Dew-point Temperatures				
2CMS*MIT72E	CMSMA09	C	220'/95°	0.195266/0.390532 (3)
2CMS*MIT72F	CMSMA10	C	220'/300°	0.195266/0.0 (4)
E. Pressures				
2CMS*PIT123	LMSPU01	Drywell	311'2"/188°	0.5/1.0 (5)
2CMS*PIT125	LMSPU02	Suppression Chamber	244'8"/242°	0.5/0.0 (5)

F. FLOW DEVICE

250 mm rotometer 0-23.65 scfm was used for both the 20 PSIG and 40 PSIG Verification tests.

ATTACHMENT 3.2A (Con't)

INSTRUMENTATION

1) SEE REFERENCE 3 FOR A DERIVATION OF THE VOLUME WEIGHT FACTORS.

2) FOR THE 40 PSIG ILRT, REPLACED THE CMSMA08 COMPUTER VALVE WITH THAT OF AN ADJACENT MOISTURE SENSOR CMSMA06 DURING THREE SEPARATE 2 HOUR PERIODS.

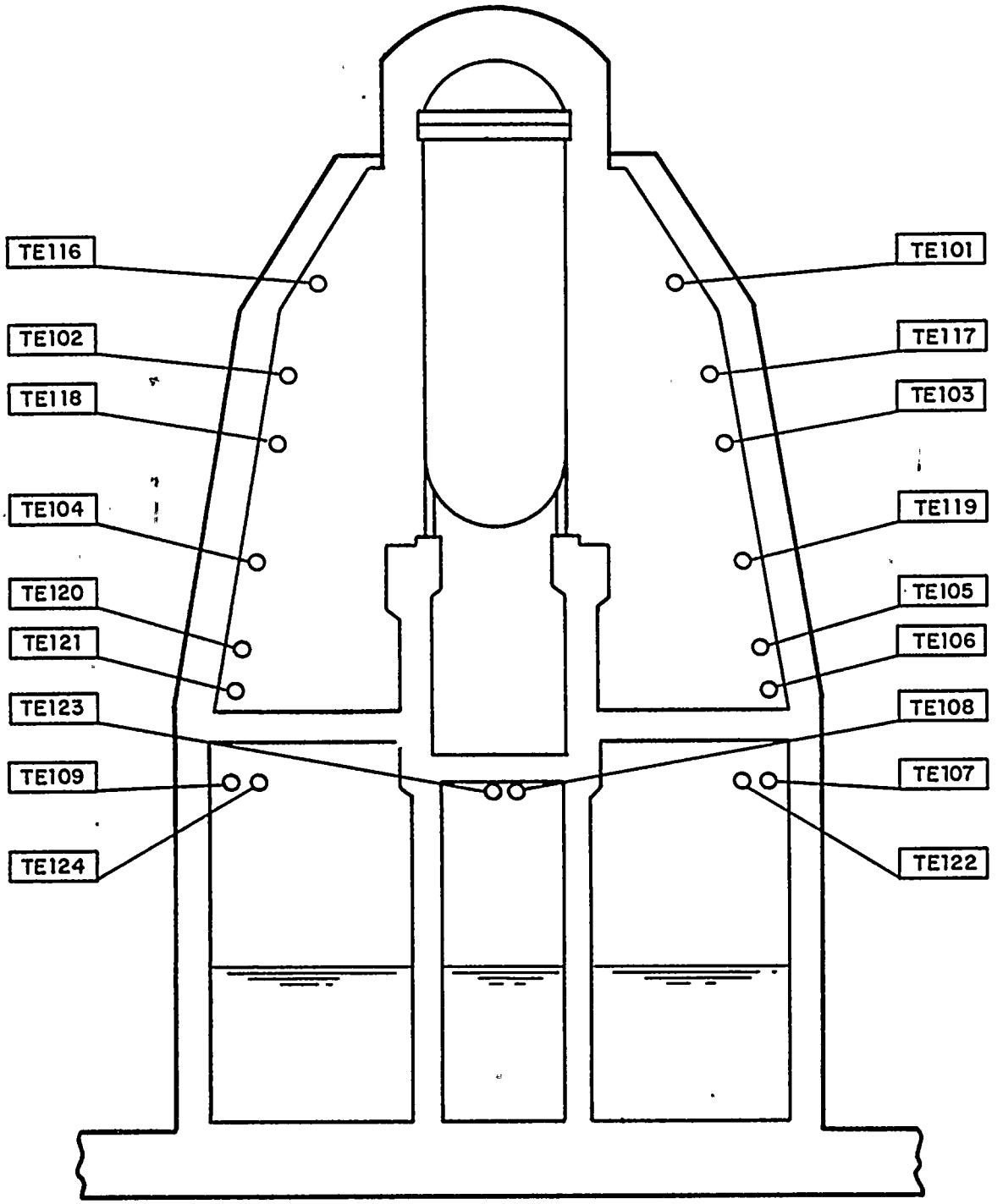
3) FOR THE 20 PSIG ILRT, REPLACED THE CMSMA09 COMPUTER VALVE WITH THAT OF AN ADJACENT TEMPERATURE SENSOR, CMSTA08, USING THE 0.195266 WEIGHT FACTOR. SEE SECTION 2.1.

   FOR THE 40 PSIG ILRT, REPLACED THE CMSMA09 COMPUTER VALVE WITH THAT OF AN ADJACENT TEMPERATURE, CMSTA08, USING THE 0.390532 WEIGHT FACTOR. SEE SECTION 2.2.

4) FOR THE 20 PSIG ILRT, REPLACED THE CMSMA10 COMPUTER VALVE WITH THAT OF AN ADJACENT TEMPERATURE SENSOR, CMSTA16, USING THE 0.195266 WEIGHT FACTOR. SEE SECTION 2.1.

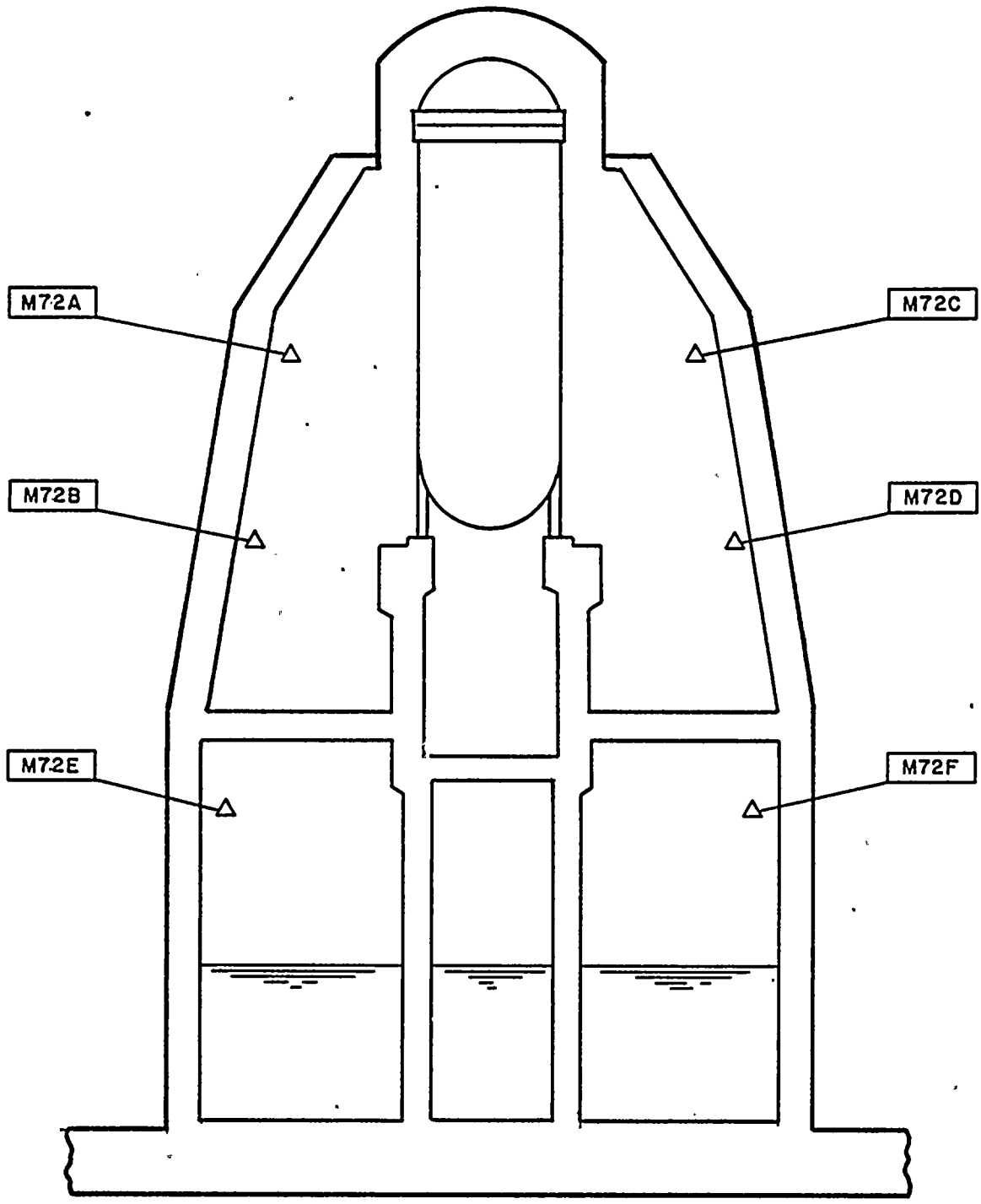
   FOR THE 40 PSIG ILRT, THE SENSOR WAS MOVED TO THE DRYWELL IN AN ATTEMPT TO RECOVER CMSMA05, THUS THE WEIGHT FACTOR WAS 0.

5) FOR THE 20 PSIG ILRT, BOTH MANOMETERS WERE USED. FOR THE 40 PSIG TEST A FAIL CLOSE VALVE ISOLATED THE 2CMS*PIT125 TRANSMITTER SO THIS MANOMETER WAS NOT USED.



NOTE:
TE101 = 2CMS*TE101

ATTACHMENT 3.2B-1
TEMPERATURE DETECTOR LOCATIONS
NINE MILE POINT-UNIT 2
INTEGRATED LEAKAGE RATE TEST



NOTE:
M72A= 2CMS*MIT72A

ATTACHMENT 3.2B-2
MOISTURE DETECTOR LOCATIONS
NINE MILE POINT-UNIT 2
INTEGRATED LEAKAGE RATE TEST

3.3 TEST RESULTS

3.3.1 Presentation of Test Results

20 PSIG ILRT

The test data for the 20 PSIG ILRT is based on a 24 hour period starting at 2213 hours on April 10, 1986. The final test results were determined using Niagara Mohawk's ILRT Data Analysis Program. The reduced input data, the Mass Point Analysis test results, the Total Time test results, and representative graphs are contained in Attachments 3.3A through 3.3G.

Both the Mass Point and Total Time Analysis test results satisfied the 0.75 of the Design Basis Leakage Rate translated to the reduced pressure and test temperature conditions (Lt at Pt, $\overline{T}$).

The 20 PSIG ILRT instrumentation was verified by performing a superimposed leakage verification test. Both the Mass Point and Total Time test results satisfied the 0.25 (Lt at Pt, $\overline{T}$) acceptance criteria.

40 PSIG ILRT

The test data for the 40 PSIG ILRT is based on a 24 hour period starting at 2217 hours on April 12, 1986. The reduced input data, the Mass Point Analysis test results, the Total Time test results, and representative graphs are contained in Attachments 3.3H through 3.3N.

Both the Mass Point and Total Time Analysis test results satisfied the 0.75 of the Design Basis Leakage Rate translated to the reduced test temperature conditions (La at $\overline{T}$).

The 40 PSIG ILRT instrumentation was verified by performing a superimposed leakage verification test. Both the Mass Point and Total Time test results satisfied the 0.25 (La at $\overline{T}$) acceptance criteria.

3.3.2 20 PSIG ILRT Results

The 20 PSIG ILRT was conducted in accordance with Nine Mile Point Unit 2 test procedure N2-POT-201. The results for the 20 PSIG ILRT and for the superimposed leakage verification test are shown below.

3.3.2.1 Mass Point Analysis

	Item	(Percent/day)
1.	Ltm, leakage rate	0.123594
2.	Confidence Level	0.004426
3.	Type B and C Penalties (See Section 3.3.5)	0.014558
4.	UCL-MP, (1+2+3)	0.142578

Results were within the acceptable limit of 0.75 (Lt at Pt, $\overline{T}$), or 0.525 percent/day. Reference Section 3.3.4.

3.3.2.2 Total Time Analysis

Item		(Percent/day)
1.	Ltm, leakage rate	0.126684
2.	Confidence Level	0.096852
3.	Type B and C Penalties (See Section 3.3.5)	0.014558
4.	UCL-TT, (1+2+3)	0.238094

Results were within the acceptable limit of 0.75 (Lt at Pt, $\bar{T}$), or 0.525 percent/day. Reference Section 3.3.4.

3.3.2.3 20 PSIG Supplemental Test Results

The supplemental verification test was performed using the superimposed leakage test method. The results for the verification test are shown below.

1. The Superimposed Leakage Verification Test is acceptable provided L_c falls within the following range:

$$(Ltm + Lo - 0.25\ Lt) \leq Lc \leq (Ltm + Lo + 0.25\ Lt)$$

where Ltm = Type A leakage rate
(Ltm - MP = 0.123594 percent/day)
(Ltm - TT = 0.126684 percent/day)

Lo = Superimposed leakage rate developed from rotometer.
See Section 3.3.6.
(Lo = 0.722146 percent/day)

Lt = Design basis leakage rate at 20 psig and at 80°F.
See Section 3.3.4.
(Lt = 0.7 percent/day)

Lc = Composite leakage rate
(Lc - MP = 0.803367 percent/day)
(Lc - TT = 0.797924 percent/day)

a. Mass Point Analysis

$$(.123594 + .722146 - .175000) \leq 0.803367 \leq (.123594 + .722146 + .175000)$$

$$0.670740 \leq 0.803367 \leq 1.020740$$

b. Total Time Analysis

$$(.126684 + .722146 - .175000) \leq 0.797924 \leq (.126684 + .722146 + .175000)$$

$$0.673830 \leq 0.797924 \leq 1.023830$$

The Superimposed Leakage Verification Test satisfied the acceptance criteria.

3.3.3 40 PSIG ILRT Results

The 40 PSIG ILRT was conducted in accordance with the Nine Mile 2 test procedure N2-POT-201. The results for the 40 PSIG ILRT and for the superimposed leakage verfication test are shown below.

3.3.3.1 Mass Point Analysis

	Item	(Percent/day)
1.	Lam, leakage rate	0.193510
2.	Confidence level	0.003279
3.	Type B and C Penalties (See Section 3.3.5)	0.008701
4.	UCL-MP (1+2+3)	0.205490

Results were within the acceptable limit of 0.75 (La at $\overline{T}$), or 0.6585 percent/day. Reference Section 3.3.4.

3.3.3.2 Total Time Analysis

	Item	(Percent/day)
1.	Lam, leakage rate	0.210712
2.	Confidence level	0.070846
3.	Type B and C Penalties (See Section 3.3.5)	0.008701
4.	UCL-TT (1+2+3)	0.290259

Results were within the acceptable limit of 0.75 (La at $\overline{T}$), or 0.6585 percent/day. Reference Section 3.3.4.

3.3.3.3 40 PSIG Supplemental Test Results

The Supplemental Verification Test was performed using the superimposed leakage test method. The results for the verification test are shown below.

1. The Superimposed Leakage Verification Test is acceptable provided L_c falls within the following range:

   $(Lam + Lo - 0.25\ La) \leq Lc \leq (Lam + Lo + 0.25\ La)$

   where Lam = Type A leakage rate
   (Lam - MP = 0.193510 percent/day)
   (Lam - TT = 0.210712 percent/day)

   Lo = Superimposed leakage rate developed from rotometer. See Section 3.3.6.
   (Lo = 0.878 percent/day)

   La = Design basis leakage rate at 40 psig and at 80°F. See Section 3.3.4.
   (La = 0.878 percent/day)

   Lc = Composite leakage rate
   (Lc - MP = 0.924705 percent/day)
   (Lc - TT = 0.946294 percent/day)

a. Mass Point Analysis

$$(.193510 + .878 - .219500) \leqq .924705 \leqq (.193510 + .878 + .219500)$$

$$.852010 \leqq .924705 \leqq 1.291010$$

The Superimposed Leakage Verification Test satisfied the acceptance criteria.

3.3.4 Determination of Design Basis Leakage Rates

As discussed in Reference 4, the Design Basis Leakage Rate (La at T) is:

$$(\text{La at } \bar{T}) = (1.1\%/\text{day})(0.9396066)\frac{(\bar{T})^{\frac{1}{2}}}{(747)^{\frac{1}{2}}}$$

where $\bar{T}$ is the weighted averaged containment air temperature in ^{o}R.

For the 40 PSIG ILRT, a $\bar{T}$ of $80^{o}F$ or $539.67^{o}R$ was used to determine an acceptance criteria, and to scale the superimposed leakage rates.

$$(\text{La at } 80^{o}F) = 0.878\%/\text{day}$$

Using the volume developed for the volume weight fractions, V = 506,778 ft^3, volumetric rates can be determined as follows:

$$(\text{La at } 80^{o}F) = \frac{(0.878)}{100}(506,778)\frac{(40 + 14.696)}{14.696}$$

$$= 11.50 \text{ scfm}$$

For the 20 PSIG ILRT, the (Lt at Pt, $\bar{T}$) is as follows:

$$(\text{La at 20 psig and } 80^{o}F) = (\text{La at } 80^{o}F)\frac{(20 + 14.696)^{\frac{1}{2}}}{(40 + 14.696)^{\frac{1}{2}}}$$

$$= 0.7\%/\text{day (approximate)}$$

$$(\text{Lt at 20 psig and } 80^{o}F) = \frac{(0.7)}{100}(506,778)\frac{(20 + 14.696)}{14.696}$$

$$= 5.816 \text{ scfm}$$

3.3.5 Types B and C Penetration Leakage

The following penetrations were not exposed to their post-accident differential pressure. These leakages are from tests performed at 40 psig. The penalties added to the 20 psig Type A test results will not be adjusted for the test pressure.

Pen. No.	Leakage Rate (scfh)	Pen. No.	Leakage Rate (scfh)
Z-4A	0.386	Z-89A	0.006
Z-4B	1.88	Z-89C	0.045
Z-46A	0.054	Z-46C	0.002
Z-47	0.055	Relief Valves	1.881
Z-38A	0.047	Scram Disch (Vent & Drain)	2.20
Z-38B	0.248	Z-34B	0.1*
Z-23	0.034	Z-41	0.312*

* These penetrations were vented for the 40 PSIG ILRT.

1. Total leakage - 40 PSIG ILRT 6.838 scfh
   Convert to percent/day 0.008701 %/day

$$\frac{6.838/60}{11.50} = \frac{X}{0.878}$$

$$X = 0.008701 \text{ \%/day}$$

2. Total leakage - 20 PSIG ILRT 7.250 scfh
   Convert to percent/day 0.014558 %/day

$$\frac{7.250/60}{5.81} = \frac{X}{0.7}$$

$$X = 0.014558 \text{ \%/day}$$

3.3.6 Determination of Lo, in percent/day

1. 20 PSIG Verification Test

$L_o = 6$ scfm

$$\frac{6}{5.816} = \frac{X}{0.7}$$

L_o at 20 psig at $80^oF = 0.722146$ %/day

2. 40 PSIG Verification Test

$$L_o = \frac{11.5}{11.5} = \frac{X}{.878}$$

L_o at 40 PSIG at $80^oF = 0.878$ %/day

ATTACHMENT 3.3A

INTEGRATED LEAKAGE RATE TEST

FROM 2213 ON 4-10-86 TO 2213 ON 4-11-86

20 PSIG REDUCED INPUT VARIABLES

Time (hrmn)	Absolute Pressure (psia)	Dew-point (^{o}F)	Vapor Pressure (psia)	Absolute Temperature (^{o}F)	Containment Volume (ft^3)
2213	35.0965	68.700	0.3471	71.812	517195.812
2243	35.0985	68.850	.3489	71.846	517195.812
2313	35.1000	68.759	.3478	71.826	517195.812
2343	35.1020	68.871	.3492	71.872	517195.812
0013	35.1040	68.850	.3489	71.912	517195.812
0043	35.1055	68.965	.3503	71.943	517195.812
0113	35.1090	68.910	.3496	71.982	517195.812
0143	35.1100	68.979	.3505	72.006	517195.812
0213	35.1120	68.940	.3500	72.046	517195.812
0243	35.1150	69.061	.3515	72.086	517195.812
0313	35.1160	68.973	.3504	72.104	517195.812
0343	35.1195	69.125	.3522	72.156	517195.812
0413	35.1205	69.099	.3519	72.199	517195.812
0443	35.1225	69.214	.3533	72.252	517195.812
0513	35.1245	69.118	.3521	72.291	517195.812
0543	35.1265	69.287	.3542	72.331	517195.812
0613	35.1285	69.225	.3534	72.348	517195.812
0643	35.1300	69.370	.3552	72.408	517195.812
0713	35.1321	69.325	.3547	72.447	517195.812
0743	35.1340	69.422	.3558	72.475	517195.812
0813	35.1355	69.359	.3551	72.524	517195.812
0843	35.1380	69.435	.3560	72.528	517195.812
0913	*	*	*	*	517195.812
0943	35.1420	69.501	.3568	72.601	517195.812
1013	35.1445	69.459	.3563	72.651	517260.844
1043	35.1465	69.563	.3575	72.671	517195.812
1113	35.1480	69.529	.3571	72.727	517195.812
1143	35.1505	69.636	.3584	72.760	517195.812
1213	35.1520	69.576	.3577	72.811	517195.812
1243	35.1535	69.709	.3593	72.856	517195.812
1313	35.1570	69.640	.3585	72.880	517195.812
1343	35.1570	69.741	.3597	72.914	517195.812

* COULD NOT VERIFY INDIVIDUAL DATA INPUTS FROM COPIES OF ORIGINAL COMPUTER TREND DATA SHEETS.

ATTACHMENT 3.3A

INTEGRATED LEAKAGE RATE TEST

FROM 2213 ON 4-10-86 TO 2213 ON 4-11-86

20 PSIG REDUCED INPUT VARIABLES

Time (hrmn)	Absolute Pressure (psia)	Dew-point (°F)	Vapor Pressure (psia)	Absolute Temperature (°F)	Containment Volume (ft^3)
1413	35.1585	69.722	0.3595	72.916	517195.812
1443	35.1565	69.763	.3600	72.899	517195.812
1513	*	*	*	*	*
1543	35.1515	69.705	.3593	72.856	517195.812
1613	35.1510	69.677	.3589	72.863	517184.187
1643	35.1485	69.739	.3597	72.856	517184.187
1713	35.1480	69.663	.3588	72.848	517184.187
1743	35.1475	69.745	.3598	72.869	517184.187
1813	35.1470	69.670	.3589	72.872	517173.125
1843	35.1470	69.751	.3599	72.877	517184.187
1913	35.1470	69.707	.3593	72.880	517173.125
1953	35.1465	69.819	.3607	72.896	517151.062
2033	35.1475	69.913	.3618	72.943	517173.125
2043	35.1495	70.052	.3636	72.964	517173.125
2133	35.15175	70.039	.3634	73.009	517173.125
2143	35.1545	70.119	.3644	73.047	517173.125
2213	35.1565	70.005	.3630	73.091	517173.125

* COULD NOT VERIFY INDIVIDUAL DATA INPUTS FROM COPIES OF ORIGINAL COMPUTER TREND DATA SHEETS.

ATTACHMENT 3.3B

INTEGRATED LEAKAGE RATE TEST

10 Apr 1986 22:13 HRS

NINE MILE POINT UNIT 2

ABSOLUTE TEST METHOD, MASS POINT ANALYSIS

Set	Time Hrs	Mass lbm	Leakage pct/day	Leakage pct/day	Leakage pct/day
1	0.000	91272.87	0.000000	0.000000	0.000000
2	.500	91267.60	0.000000	0.000000	0.000000
3	1.000	91277.81	-.129952	2.010968	1.881015
4	1.500	91271.51	-.032217	.351011	.318794
5	2.000	91270.54	.003913	.169451	.173363
6	2.500	91265.55	.051172	.116064	.167236
7	3.000	91269.93	.037900	.079094	.116994
8	3.500	91266.18	.045646	.057512	.103158
9	4.000	91265.86	.047318	.043474	.090792
10	4.500	91263.03	.053718	.034725	.088443
11	5.000	91265.25	.049453	.028312	.077765
12	5.500	91260.84	.054024	.023778	.077802
13	6.000	91256.84	.061927	.021532	.083459
14	6.500	91249.41	.076293	.023525	.099817
15	7.000	91250.95	.081704	.020985	.102689
16	7.500	91243.93	.091667	.020875	.112542
17	8.000	91248.26	.092238	.018333	.110571
18	8.500	91237.28	.101154	.018546	.119700
19	9.000	91237.48	.105766	.017165	.122931
20	9.500	91234.69	.109716	.015895	.125611
21	10.000	91232.24	.112890	.014683	.127572
22	10.500	91235.54	.111871	.013349	.125221
23	11.500	91231.48	.110932	.012053	.122985
24	12.000	91232.83	.108354	.011192	.119546
25	12.500	91229.32	.107130	.010276	.117407
26	13.000	91224.74	.107345	.009427	.116772
27	13.500	91222.20	.107717	.008692	.116409
28	14.000	91219.32	.108330	.008060	.116391
29	14.500	91211.41	.110891	.007880	.118771
30	15.000	91218.60	.109887	.007401	.117288
31	15.500	91209.59	.111200	.007028	.118228
32	16.000	91213.62	.110507	.006613	.117121
33	16.500	91210.07	.110326	.006208	.116533
34	17.500	91204.50	.110535	.005812	.116347

ATTACHMENT 3.3B (Con't)

INTEGRATED LEAKAGE RATE TEST

10 Apr 1986 22:13 HRS

NINE MILE POINT UNIT 2

ABSOLUTE TEST METHOD, MASS POINT ANALYSIS

Set	Time Hrs	Mass lbm	Leakage pct/day	Leakage pct/day	Leakage pct/day
35	18.000	91202.61	.110652	.005455	.116107
36	18.500	91195.21	.111981	.005283	.117264
37	19.000	91197.72	.112078	.004983	.117060
38	19.500	91190.09	.113288	.004848	.118136
39	20.000	91188.73	.114156	.004665	.118822
40	20.500	91187.34	.114752	.004462	.119215
41	21.000	91186.15	.115090	.004252	.119342
42	21.667	91174.68	.116816	.004364	.121180
43	22.334	91170.03	.118589	.004476	.123066
44	22.500	91167.25	.120381	.004617	.124998
45	23.000	91165.84	.121818	.004630	.126448
46	23.500	91163.19	.123026	.004585	.127610
47	24.000	91165.32	.123594	.004426	.128019

ATTACHMENT 3.3C

INTEGRATED LEAKAGE RATE TEST

10 Apr 1986 22:13 HRS

NINE MILE POINT UNIT 2

ABSOLUTE TEST METHOD, TOTAL TIME ANALYSIS

SET	TIME HRS	MASS LBM	MEAS LEAKAGE PCT/DAY	MEAN OF MEAS PCT/DAY	CALC LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
1	0.000	91272.86	0.000000	0.000000	0.000000	0.000000	0.00000
2	.500	91267.60	.277147	0.000000	0.000000	0.000000	0.00000
3	1.000	91277.81	-.129949	0.000000	0.000000	0.000000	0.00000
4	1.500	91271.51	.023876	0.000000	-.069611	2.218395	2.14878
5	2.000	91270.54	.030581	0.000000	-.037467	.925155	.88768
6	2.500	91265.55	.076960	0.000000	.007754	.632360	.64011
7	3.000	91269.93	.025760	0.000000	.005764	.478530	.48429
8	3.500	91266.18	.050253	0.000000	.016785	.396613	.41339
9	4.000	91265.86	.046036	0.000000	.022385	.342208	.36459
10	4.500	91263.03	.057480	0.000000	.030720	.304595	.33531
11	5.000	91265.25	.040042	0.000000	.030637	.275104	.30574
12	5.500	91260.84	.057519	0.000000	.036284	.252997	.28928
13	6.000	91256.84	.070220	0.000000	.044283	.235710	.27999
14	6.500	91249.41	.094888	0.000000	.057147	.222817	.27996
15	7.000	91250.95	.082340	0.000000	.063836	.210309	.27414
16	7.500	91243.93	.101470	0.000000	.073685	.200276	.27396
17	8.000	91248.26	.080879	0.000000	.076800	.190581	.25738
18	8.500	91237.28	.110104	0.000000	.085574	.182847	.26842
19	9.000	91237.48	.103379	0.000000	.091318	.175471	.26678
20	9.500	91234.69	.105680	.065233	.096456	.168827	.26528
21	10.000	91232.24	.106841	.070575	.100899	.162806	.26370
22	10.500	91235.54	.093467	.061391	.102205	.157405	.25961
23	11.500	91231.48	.094631	.072620	.105713	.153846	.25955
24	12.000	91232.83	.087737	.075813	.104884	.149210	.25409
25	12.500	91229.32	.091598	.078864	.104859	.144912	.24977
26	13.000	91224.74	.097355	.079884	.105756	.140902	.24665
27	13.500	91222.20	.098687	.083530	.106718	.137219	.24393
28	14.000	91219.32	.100581	.086047	.107809	.133812	.24162
29	14.500	91211.41	.111450	.089317	.110248	.130614	.24088
30	15.000	91218.60	.095126	.091200	.110195	.127817	.23081
31	15.500	91209.59	.107342	.094565	.111695	.125046	.23674
32	16.000	91213.62	.097366	.096557	.111775	.122592	.23436
33	16.500	91210.07	.100068	.098050	.112152	.120243	.23239
34	17.500	91204.50	.102728	.098442	.114370	.118511	.23288
35	18.000	91202.61	.102627	.099456	.114611	.116330	.23094

ATTACHMENT 3.3C

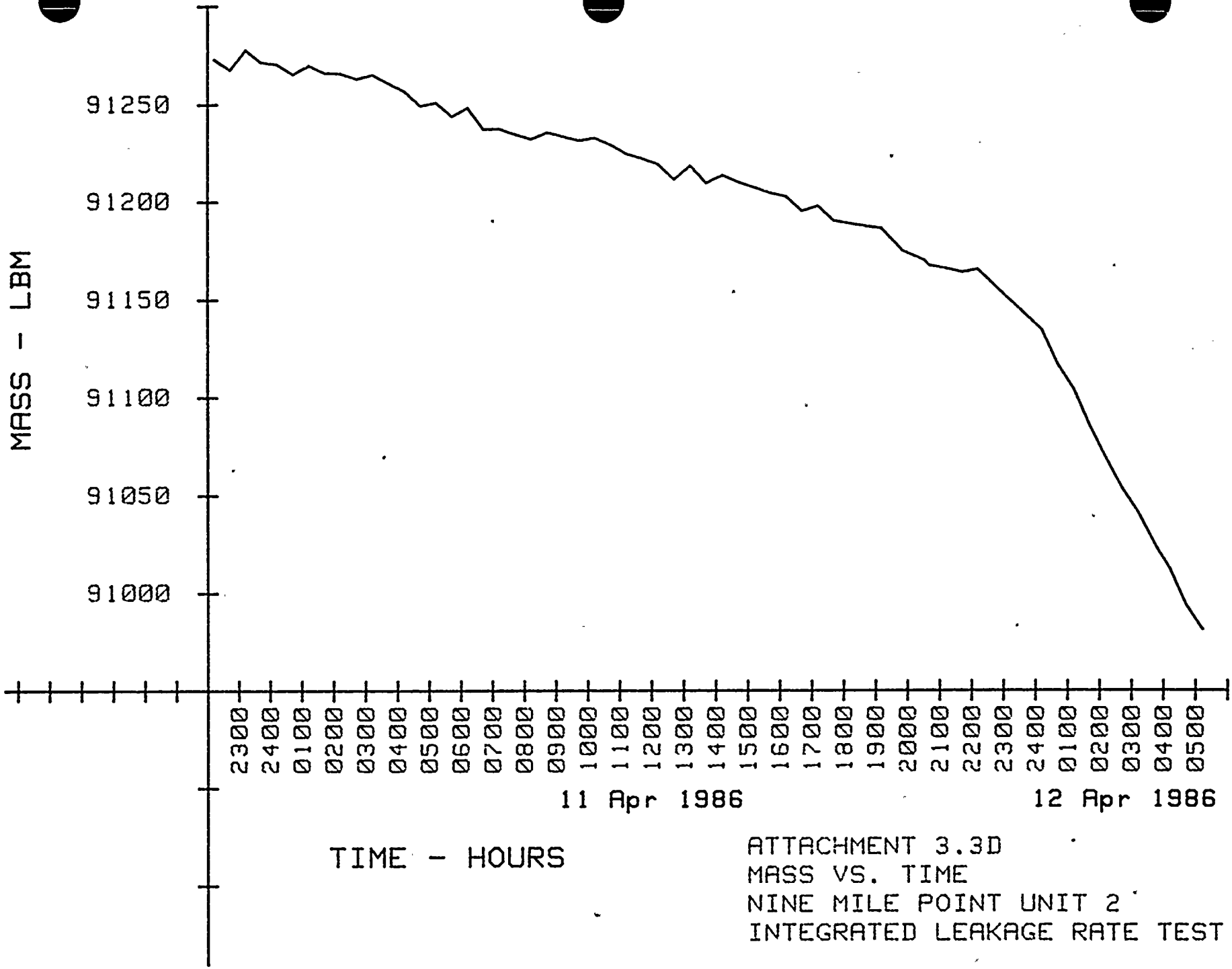
INTEGRATED LEAKAGE RATE TEST

10 Apr 1986 22:13 HRS

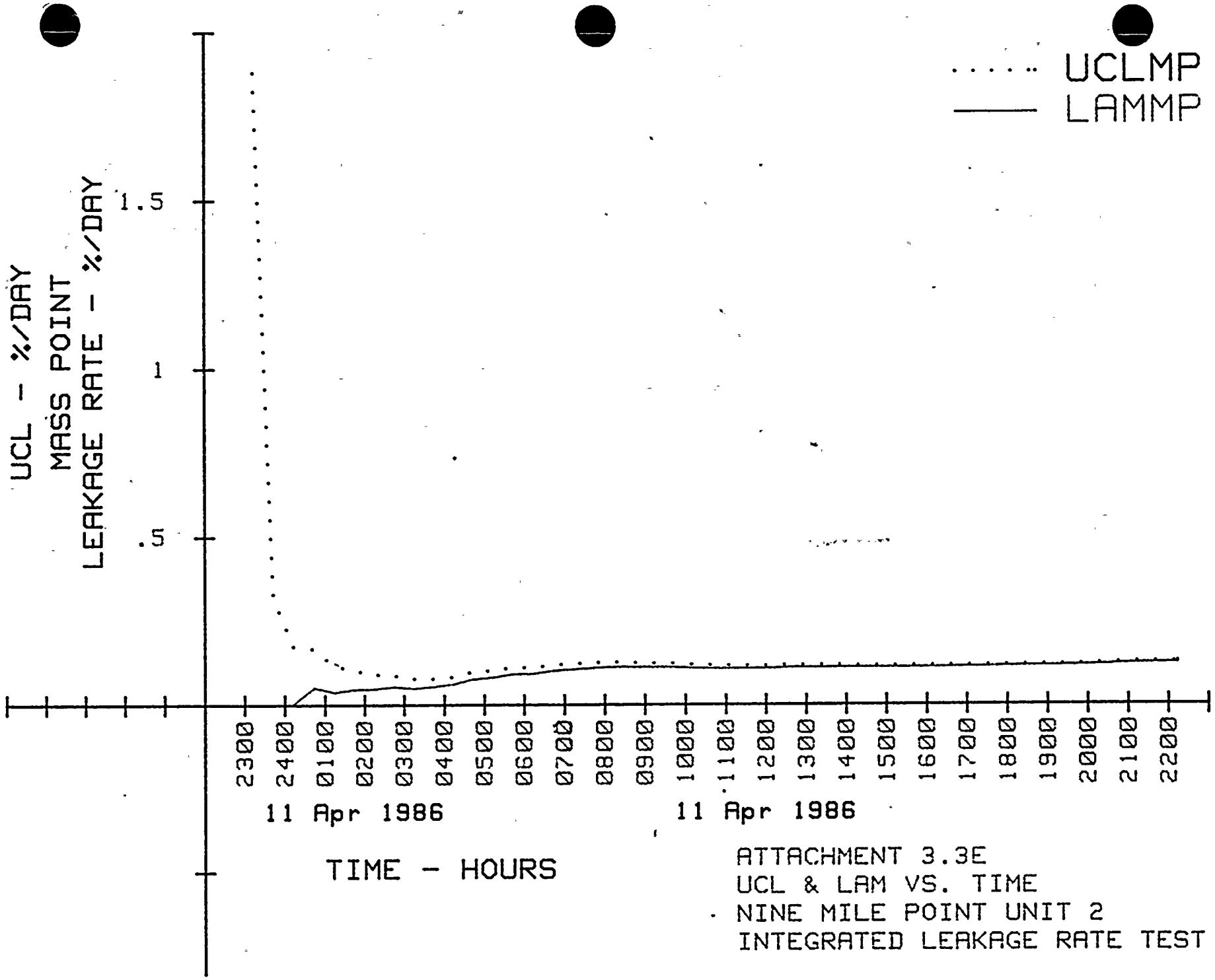
NINE MILE POINT UNIT 2

ABSOLUTE TEST METHOD, TOTAL TIME ANALYSIS

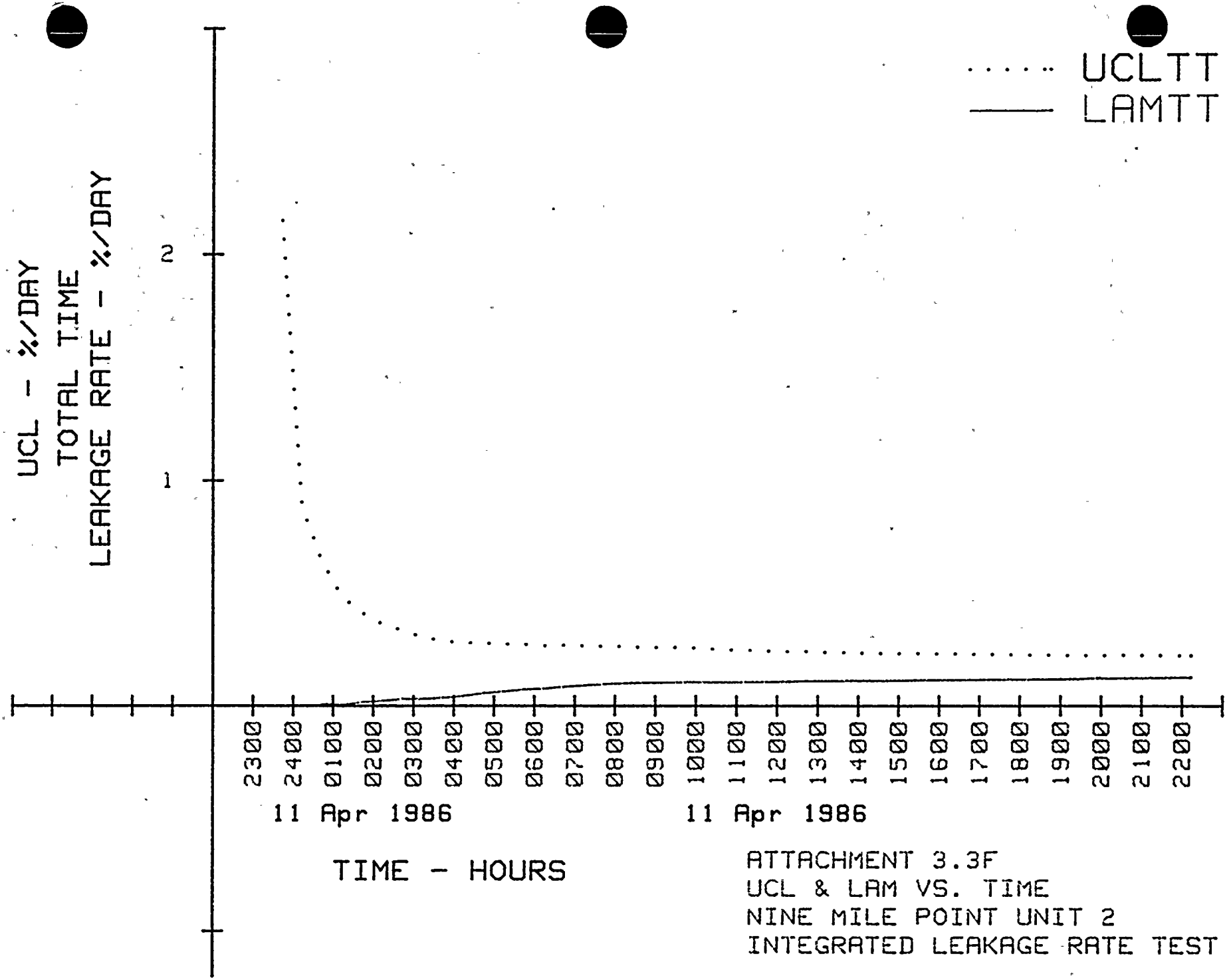
SET	TIME HRS	MASS LBM	MEAS LEAKAGE PCT/DAY	MEAN OF MEAS PCT/DAY	CALC LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
36	18.500	91195.21	.110381	.099902	.115718	.114201	.22991
37	19.000	91197.72	.104004	.101058	.115997	.112269	.22826
38	19.500	91190.09	.111625	.101134	.117059	.110368	.22742
39	20.000	91188.73	.110617	.101496	.117906	.108579	.22648
40	20.500	91187.34	.109703	.101697	.118575	.106896	.22547
41	21.000	91186.15	.108584	.101784	.119066	.105313	.22437
42	21.667	91174.68	.119162	.103069	.120979	.103834	.22481
43	22.334	91170.03	.121077	.104391	.122885	.102405	.22529
44	22.500	91167.25	.123431	.106176	.123408	.100770	.22417
45	23.000	91165.84	.122360	.107714	.124747	.099394	.22414
46	23.500	91163.89	.121938	.108943	.125936	.098080	.22401
47	24.000	91165.32	.117826	.109900	.126684	.096852	.22353



ATTACHMENT 3.3D
MASS VS. TIME
NINE MILE POINT UNIT 2
INTEGRATED LEAKAGE RATE TEST



ATTACHMENT 3.3E
UCL & LAM VS. TIME
NINE MILE POINT UNIT 2
INTEGRATED LEAKAGE RATE TEST



ATTACHMENT 3.3F
UCL & LAM VS. TIME
NINE MILE POINT UNIT 2
INTEGRATED LEAKAGE RATE TEST

ATTACHMENT 3.3G

INTEGRATED LEAKAGE RATE TEST

20 PSIG SUPERIMPOSED LEAKAGE VERIFICATION TEST

FROM 0013 TO 0513 ON 4-12-86

Time (hrmn)	Absolute Pressure (psia)	Dew-point (°F)	Vapor Pressure (psia)	Absolute Temperature (°F)	Containment Volume (ft^3)
0013	35.1535	70.047	0.3635	73.219	517173.125
0043	35.1505	70.197	.3654	73.236	517161.531
0113	35.1465	70.131	.3646	73.263	517161.531
0143	35.1430	70.304	.3655	73.304	517161.531
0213	35.1390	70.172	.3651	73.345	517161.531
0243	35.1355	70.234	.3658	73.369	517161.531
0313	35.1315	70.196	.3654	73.387	517161.531
0348	35.1275	70.289	.3665	73.414	517161.531
0413	35.1240	70.220	.3656	73.437	517161.531
0443	35.1200	70.314	.3668	73.466	517161.531
0513	35.1165	70.247	.3660	73.497	517161.531

ATTACHMENT 3.3G

INTEGRATED LEAKACE RATE TEST

12 Apr 1986 00:13 HRS

NINE MILE POINT UNIT 2

ABSOLUTE TEST METHOD, MASS POINT ANALYSIS

SUPPLEMENTAL TEST

SET	TIME HRS	MASS LBM	LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
48	0.000	91134.32	0.000000	0.000000	0.000000
49	.500	91116.50	0.000000	0.000000	0.000000
50	1.000	91103.69	.806615	.652380	1.458994
51	1.500	91084.82	.849551	.124045	.973596
52	2.000	91068.55	.859646	.058933	.918579
53	2.500	91053.27	.854688	.035460	.890149
54	3.000	91041.06	.830254	.037017	.867270
55	3.583	91022.92	.818880	.028961	.847840
56	4.000	91012.05	.806697	.025848	.832545
57	4.500	90993.54	.809407	.020518	.829925
58	5.000	90981.35	.803367	.017760	.821127

ATTACHMENT 3.3G

INTEGRATED LEAKAGE RATE TEST

12 Apr 1986 00:13 HRS

NINE MILE POINT UNIT 2

ABSOLUTE TEST METHOD, TOTAL TIME ANALYSIS

SET	TIME HRS	MASS LBM	MEAS LEAKAGE PCT/DAY	MEAN OF MEAS PCT/DAY	CALC LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
48	0.000	91134.32	0.000000	0.000000	0.000000	0.000000	0.00000
49	.500	91116.50	.938676	0.000000	0.000000	0.000000	0.00000
50	1.000	91103.69	.806607	0.000000	0.000000	0.000000	0.00000
51	1.500	91084.82	.868994	0.000000	.836585	.769057	1.60564
52	2.000	91068.55	.866018	0.000000	.846736	.308385	1.15512
53	2.500	91053.27	.853762	0.000000	.844728	.196952	1.04168
54	3.000	91041.06	.818651	0.000000	.825811	.149290	.97510
55	3.583	91022.92	.818781	0.000000	.814465	.123226	.93269
56	4.000	91012.05	.805001	0.000000	.804538	.104700	.90923
57	4.500	90993.54	.823845	0.000000	.804055	.096271	.90032
58	5.000	90981.35	.805659	0.000000	.797924	.087408	.8 ,533

ATTACHMENT 3.3H

INTEGRATED LEAKAGE RATE TEST

FROM 2217 ON 4-12-86 TO 2214 ON 4-13-86

40 PSIG REDUCED INPUT VARIABLES

Time (hrmn)	Absolute Pressure (psia)	Dew-point (°F)	Vapor Pressure (psia)	Absolute Temperature (°F)	Containment Volume (ft^3)
2217	55.740	71.357	0.3801	75.255	519126.02
2247	55.733	71.304	.3794	75.211	519126.02
2314	55.730	71.252	.3787	75.153	519114.98
2344	55.727	71.248	.3787	75.149	519103.35
0014	55.724	71.181	.3778	75.129	519103.35
0044	55.719	70.950	.3749	75.099	519092.31
0114	55.715	71.168	.3776	75.091	519080.86
0144	55.713	71.216	.3783	75.087	519080.68
0214	55.711	71.199	.3780	75.078	519080.68
0244	55.708	71.028	.3758	75.055	519080.68
0314	55.706	71.113	.3769	75.069	519069.05
0344	55.704	71.164	.3776	75.050	519058.01
0414	55.703	71.183	.3778	75.062	519058.01
0444	55.701	71.024	.3758	75.060	519058.01
0514	55.699	71.197	.3780	75.074	519046.38
0544	55.698	71.193	.3780	75.073	519046.38
0614	55.696	71.210	.3782	75.095	519035.34
0644	55.695	70.970	.3751	75.089	519035.34
0714	55.693	71.187	.3779	75.099	519035.34
0744	55.692	71.191	.3779	75.110	519035.34
0814	55.691	71.240	.3786	75.129	519035.34
0844	55.689	70.944	.3748	75.134	519035.34
0914	55.689	71.168	.3776	75.159	519035.34
0944	55.689	71.214	.3782	75.154	519035.34
1014	55.688	71.244	.3786	75.161	519035.34
1044	55.684	71.929	.3746	75.152	519023.71
1114	55.676	71.097	.3767	75.089	519012.67
1144	55.669	71.106	.3769	75.068	519001.04
1214	55.664	71.070	.3746	75.015	519001.04
1244	55.659	70.793	.3729	75.016	519001.04
1314	55.655	70.946	.3748	74.984	519001.04
1344	55.652	70.973	.3752	74.979	518990.00

ATTACHMENNT 3.3H

INTEGRATED LEAKAGE RATE TEST

FROM 2217 ON 4-12-86 TO 2214 ON 4-13-86

40 PSIG REDUCED INPUT VARIABLES

Time (hrmn)	Absolute Pressure (psia)	Dew-point (^{o}F)	Vapor Pressure (psia)	Absolute Temperature (^{o}F)	Containment Volume (ft^3)
1414	55.649	71.004	0.3755	74.957	518990.00
1444	55.648	70.610	0.3705	74.950	518978.37
1514	55.647	70.989	0.3754	74.956	518978.37
1544	55.646	71.046	0.3761	74.945	518990.00
1614	55.645	71.075	0.3765	74.952	518978.37
1644	55.643	70.951	0.3749	74.965	518978.37
1714	55.641	71.120	0.3770	74.968	518978.37
1744	55.640	71.189	0.3779	74.987	518978.37
1814	55.637	71.171	0.3777	74.956	518978.37
1844	55.633	70.724	0.3720	74.948	518967.33
1914	55.631	71.068	0.3764	74.956	518967.33
1944	55.629	71.089	0.3766	74.951	518955.70
2014	55.627	71.070	0.3764	74.939	518967.33
2044	55.625	70.876	0.3739	74.935	518955.70
2114	55.623	71.044	0.3761	74.948	518955.70
2144	55.621	71.025	0.3758	74.946	518955.70
2214	55.619	71.082	0.3765	74.944	518955.70

ATTACHMENT 3.3I

INTEGRATED LEAKAGE RATE TEST

12 Apr 1986 22:17 HRS

NINE MILE POINT UNIT 2

ABSOLUTE TEST METHOD, MASS POINT ANALYSIS

SET	TIME HRS	MASS LBM	LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
1	0.000	145011.75	0.000000	0.000000	0.000000
2	.500	145007.11	0.000000	0.000000	0.000000
3	.950	145013.79	-.031981	.982479	.950498
4	1.450	145003.85	.060724	.215270	.275994
5	1.950	145003.76	.066712	.098764	.165476
6	2.450	145003.24	.061094	.058510	.119604
7	2.950	144984.47	.120732	.078740	.199471
8	3.450	144978.75	.151039	.065664	.216704
9	3.950	144976.53	.159782	.050362	.210144
10	4.450	144980.72	.147666	.041420	.189086
11	4.950	144965.63	.157302	.034797	.192098
12	5.450	144960.57	.163220	.029249	.192469
13	5.950	144954.00	.168597	.025092	.193689
14	6.450	144954.77	.166369	.021430	.187800
15	6.950	144936.80	.175719	.020747	.196466
16	7.450	144934.52	.179736	.018489	.198225
17	7.950	144919.47	.188766	.018608	.207375
18	8.450	144926.70	.187542	.016506	.204048
19	8.950	144911.33	.191762	.015302	.207064
20	9.450	144905.72	.194747	.014041	.208788
21	9.950	144896.20	.198521	.013208	.211780
22	10.450	144899.53	.197681	.012001	.209682
23	10.950	144885.45	.199969	.011161	.211130
24	11.450	144885.19	.199810	.010208	.210018
25	11.950	144879.59	.199554	.009374	.208928
26	12.450	144878.77	.197874	.008793	.206668
27	12.950	144866.28	.198256	.008136	.206391
28	13.450	144850.04	.201072	.008035	.209107
29	13.950	144852.50	.201392	.007476	.208868
30	14.450	144848.29	.201251	.006969	.208220
31	14.950	144841.53	.201274	.006511	.207784
32	15.450	144830.93	.202143	.006155	.208298
33	15.950	144828.07	.202288	.005777	.208065
34	16.450	144837.09	.199880	.005920	.205800
35	16.950	144820.47	.199531	.005586	.205118

ATTACHMENT 3.3I

INTEGRATED LEAKAGE RATE TEST

12 Apr 1986 22:17 HRS

NINE MILE POINT UNIT 2

ABSOLUTE TEST METHOD, MASS POINT ANALYSIS

SET	TIME HRS	MASS LBM	LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
36	17.450	144821.86	.198131	.005446	.203576
37	17.950	144813.46	.197287	.005212	.202499
38	18.450	144808.77	.196400	.005009	.201408
39	18.950	144796.97	.196389	.004848	.201138
40	19.450	144796.92	.195668	.004562	.200230
41	19.950	144788.17	.195374	.004346	.199720
42	20.450	144792.50	.193994	.004348	.198342
43	20.950	144772.72	.194261	.004151	.198412
44	21.450	144764.88	.194690	.003982	.198672
45	21.950	144766.80	.194316	.003820	.198186
46	22.450	144765.79	.193541	.003729	.197270
47	22.950	144751.28	.193624	.003560	.197193
48	23.450	144747.40	.193531	.003420	.196951
49	23.950	144740.80	.193510	.003279	.196788

ATTACHMENT 3.3J

INTEGRATED LEAKAGE RATE TEST

12 Apr 1986 22:17 HRS

NINE MILE POINT UNIT 2

ABSOLUTE TEST METHOD, TOTAL TIME ANALYSIS

SET	TIME HRS	MASS LBM	MEAS LEAKAGE PCT/DAY	MEAN OF MEAS PCT/DAY	CALC LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
1	0.000	145011.75	0.000000	0.000000	0.000000	0.000000	0.00000
2	.500	145007.11	.153654	0.000000	0.000000	0.000000	0.00000
3	.950	145013.79	-.035470	0.000000	0.000000	0.000000	0.00000
4	1.450	145003.85	.090228	0.000000	.040039	1.263611	1.00364
5	1.950	145003.76	.067823	0.000000	.051062	.475888	.52694
6	2.450	145003.24	.057528	0.000000	.050211	.300727	.35093
7	2.950	144984.47	.153060	0.000000	.100711	.260300	.36101
8	3.450	144978.75	.158298	0.000000	.131860	.218697	.35055
9	3.950	144976.53	.147592	0.000000	.146178	.187566	.33374
10	4.450	144980.72	.115410	0.000000	.142865	.169742	.31260
11	4.950	144965.63	.154226	0.000000	.153677	.157162	.30683
12	5.450	144960.57	.155422	0.000000	.161425	.149434	.30185
13	5.950	144954.00	.160656	0.000000	.168353	.130312	.29866
14	6.450	144954.77	.146210	0.000000	.169308	.123486	.29279
15	6.950	144936.80	.178501	0.000000	.178122	.116246	.29436
16	7.450	144934.52	.171584	0.000000	.183130	.110424	.29355
17	7.950	144919.47	.192124	0.000000	.191600	.105063	.29666
18	8.450	144926.70	.166581	0.000000	.192724	.101956	.29468
19	8.950	144911.33	.185701	0.000000	.197385	.098040	.29542
20	9.450	144905.72	.185704	.130242	.201076	.094757	.29583
21	9.950	144896.20	.192201	.139852	.205216	.091685	.29690
22	10.450	144899.53	.177732	.141056	.205993	.090072	.29606
23	10.950	144885.45	.190902	.152374	.208767	.087776	.29664
24	11.450	144885.19	.182943	.157010	.209724	.086345	.29606
25	11.950	144879.59	.183044	.162771	.210458	.085089	.29554
26	12.450	144878.77	.176782	.168734	.210053	.084467	.29452
27	12.950	144866.28	.185915	.170376	.210939	.083203	.29414
28	13.450	144850.04	.198986	.172411	.213469	.081459	.29492
29	13.950	144852.50	.188933	.174478	.214258	.080412	.29467
30	14.450	144848.29	.187222	.178069	.214661	.079579	.29424
31	14.950	144841.53	.188450	.179780	.215109	.078749	.29885
32	15.450	144830.93	.193704	.181694	.216095	.077724	.29382
33	15.950	144828.07	.190601	.183191	.216551	.076960	.29351
34	16.450	144837.09	.175731	.184667	.215184	.077216	.29240

ATTACHMENT 3.3J

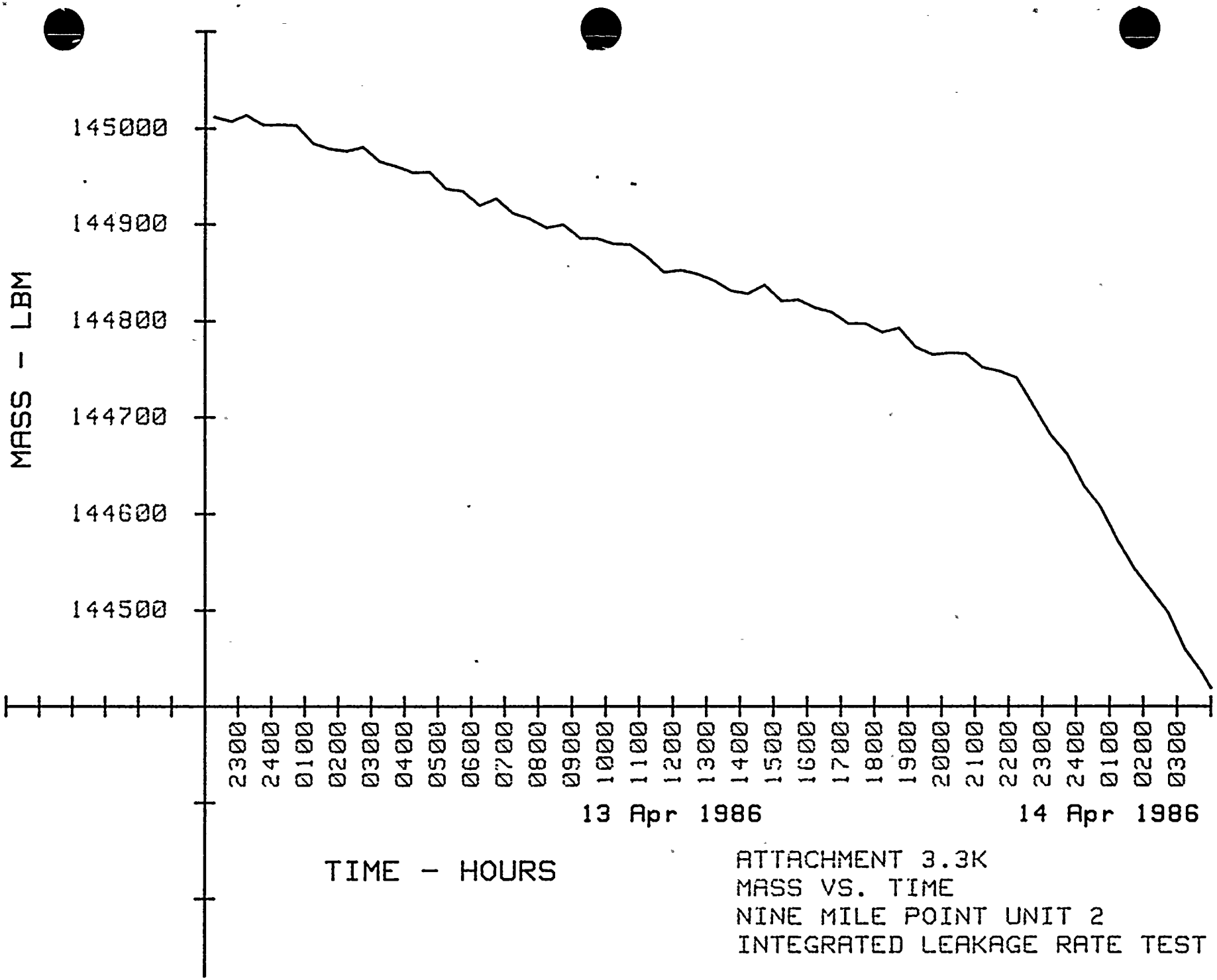
INTEGRATED LEAKAGE RATE TEST

12 Apr 1986 22:17 HRS

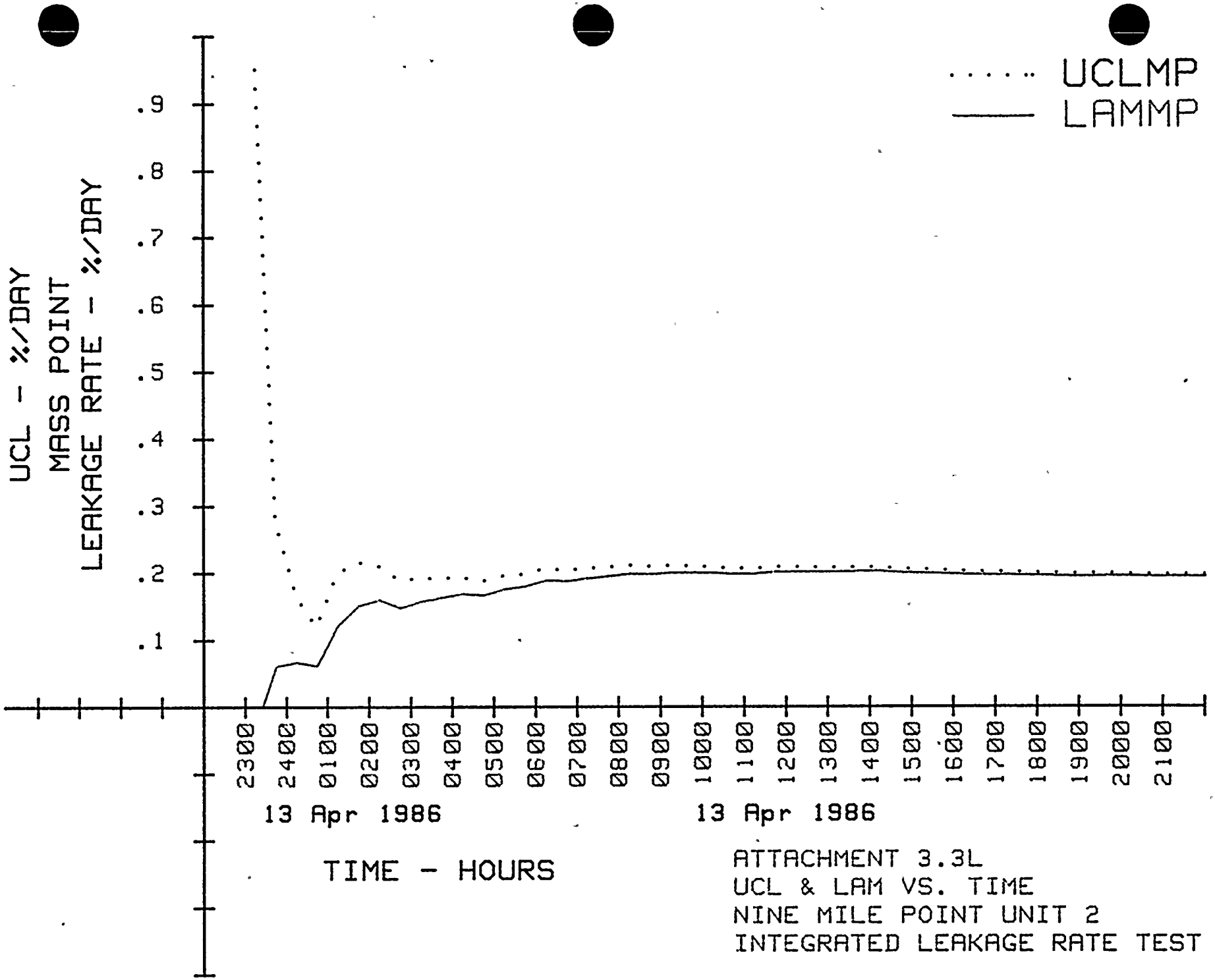
NINE MILE POINT UNIT 2

ABSOLUTE TEST METHOD, TOTAL TIME ANALYSIS

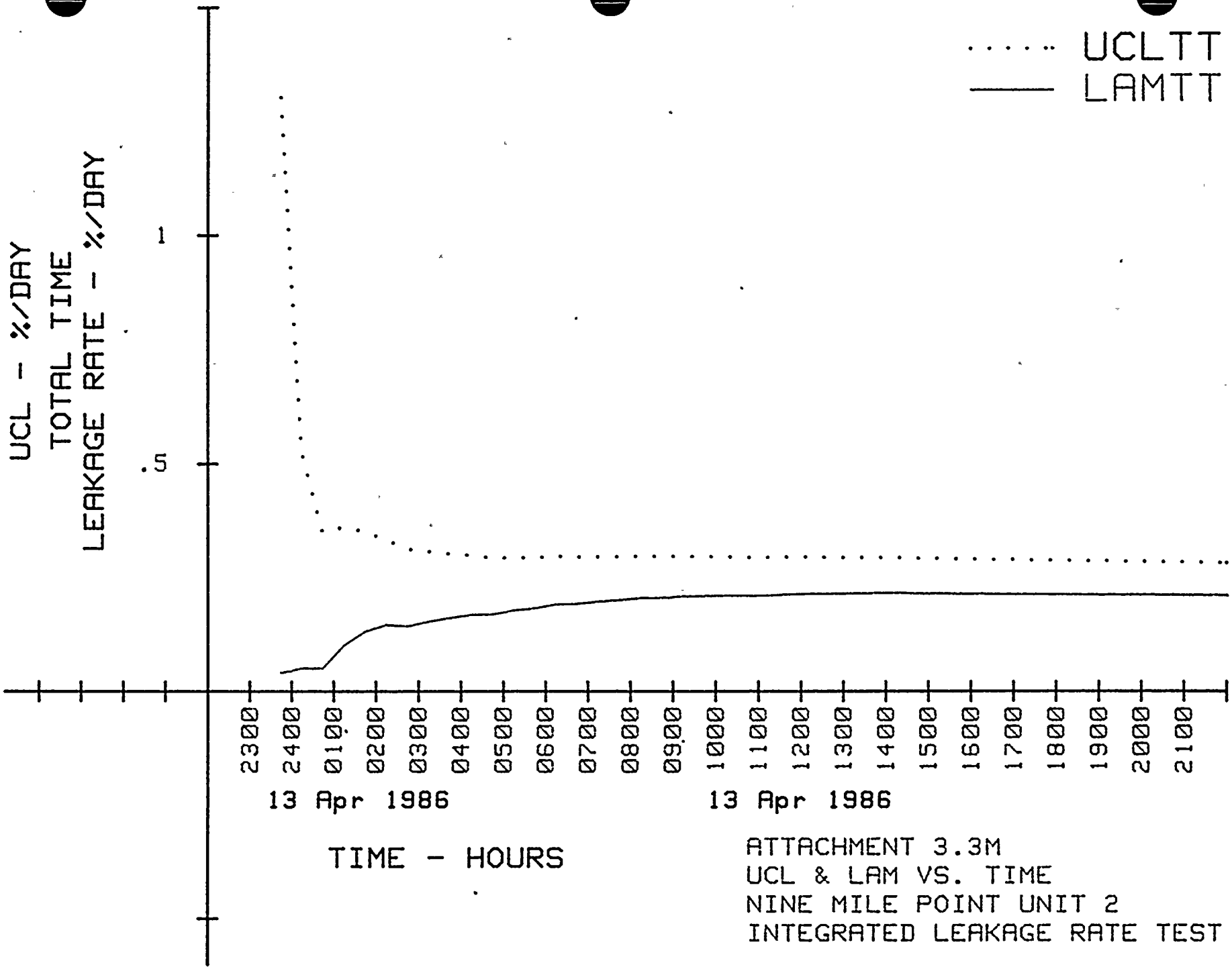
SET	TIME HRS	MASS LBM	MEAS LEAKAGE PCT/DAY	MEAN OF MEAS PCT/DAY	CALC LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
36	17.450	144821.86	.180100	.185506	.214340	.076494	.29083
37	17.950	144813.46	.182831	.185042	.213858	.076135	.28999
38	18.450	144808.77	.182086	.185817	.213305	.075806	.28911
39	18.950	144796.97	.187587	.185911	.213323	.075201	.28852
40	19.450	144796.92	.182808	.185766	.212834	.074844	.28767
41	19.950	144788.17	.185483	.185431	.212613	.074358	.28697
42	20.450	144792.50	.177440	.185416	.211625	.074264	.28588
43	20.950	144772.72	.188838	.185313	.211738	.073638	.28537
44	21.450	144764.88	.190484	.185690	.211964	.072988	.28495
45	21.950	144766.80	.184695	.185772	.211640	.072577	.28421
46	22.450	144765.79	.181328	.186000	.211028	.072305	.28333
47	22.950	144751.28	.187837	.186096	.210988	.071782	.28277
48	23.450	144747.40	.186570	.185475	.210827	.071318	.28214
49	23.950	144740.80	.187237	.185390	.210712	.070846	.28155



ATTACHMENT 3.3K
MASS VS. TIME
NINE MILE POINT UNIT 2
INTEGRATED LEAKAGE RATE TEST



ATTACHMENT 3.3L
UCL & LAM VS. TIME
NINE MILE POINT UNIT 2
INTEGRATED LEAKAGE RATE TEST



ATTACHMENT 3.3M
UCL & LAM VS. TIME
NINE MILE POINT UNIT 2
INTEGRATED LEAKAGE RATE TEST

ATTACHMENT 3.3N

INTEGRATED LEAKAGE RATE TEST

40 PSIG SUPERIMPOSED LEAKAGE VERFICATION TEST

FROM 2314 ON 4-13-86 TO 0414 ON 4-14-86

REDUCED INPUT DATA

Time (hrmn)	Absolute Pressure (psia)	Dew-point (^{o}F)	Vapor Pressure (psia)	Absolute Temperature (^{o}F)	Containment Volume (ft^3)
2314	55.599	71.108	0.3769	74.953	518944.65
2344	55.593	71.207	.3781	74.959	518944.65
0014	55.584	71.246	.3786	74.988	518944.65
0044	55.575	71.943	.3748	75.021	518944.65
0114	55.566	71.267	.3789	75.019	518944.65
0144	55.557	71.312	.3795	75.035	518944.65
0214	55.550	71.330	.3797	75.037	518933.03
0244	55.543	70.983	.3753	75.098	518933.03
0314	55.535	71.334	.3798	75.117	518933.03
0344	55.527	71.290	.3792	75.122	518921.98
0414	55.517	71.311	.3795	75.134	518921.97

ATTACHMENT 3.3N

INTEGRATED LEAKAGE RATE TEST

13 Apr 1986 23:14 HRS

NINE MILE POINT UNIT 2

ABSOLUTE TEST METHOD, MASS POINT ANALYSIS

SUPPLEMENTAL TEST

SET	TIME HRS	MASS LBM	LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
50	0.000	144681.95	0.000000	0.000000	0.000000
51	.500	144661.33	0.000000	0.000000	0.000000
52	1.000	144628.76	.882359	.979737	1.862096
53	1.500	144606.41	.859922	.155423	1.015345
54	2.000	144572.30	.909739	.098714	1.008454
55	2.500	144542.85	.933609	.065475	.999084
56	3.000	144520.27	.922353	.045679	.968032
57	3.500	144497.21	.904546	.038438	.942984
58	4.000	144459.33	.919705	.033435	.953140
59	4.500	144435.43	.920514	.026193	.946707
60	5.000	144405.20	.924705	.021545	.946250

ATTACHMENT 3.3N

INTEGRATED LEAKAGE RATE TEST

13 Apr 1986 23:14 HRS

NINE MILE POINT UNIT 2

ABSOLUTE TEST METHOD, TOTAL TIME ANALYSIS

SET	TIME HRS	MASS LBM	MEAS LEAKAGE PCT/DAY	MEAN OF MEAS PCT/DAY	CALC LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
50	0.000	144681.95	0.000000	0.000000	0.000000	0.000000	0.00000
51	.500	144661.33	.684027	0.000000	0.000000	0.000000	0.00000
52	1.000	144628.76	.882371	0.000000	0.000000	0.000000	0.00000
53	1.500	144606.41	.835399	0.000000	.876285	.970205	1.84649
54	2.000	144572.30	.909427	0.000000	.922190	.365143	1.28733
55	2.500	144542.85	.922989	0.000000	.947838	.246336	1.18417
56	3.000	144520.27	.893983	0.000000	.943675	.221595	1.16527
57	3.500	144497.21	.875544	0.000000	.931109	.209359	1.14046
58	4.000	144459.33	.923195	0.000000	.942090	.181970	1.12406
59	4.500	144435.43	.908730	0.000000	.943038	.167170	1.11020
60	5.000	144405.20	.918165	0.000000	.946294	.154390	1.10068

SECTION 4

LOCAL LEAKAGE RATE TESTS (TYPES B AND C)

Attachment 4A summarizes the results of the Local Leakage Rate Tests (LLRT's) that were performed as part of the preliminary test program at Niagara Mohawk's Nine Mile Point Unit 2. These LLRT's were performed by pressurizing the listed penetrations with air or nitrogen and either measuring leakage across the containment isolation valves (Type C) or across the resilient seals (Type B). The test package for each penetration leakage rate is available in the site test records.

The acceptance criteria for Types B and C leakage rate testing is in accordance with 10CFR50, Appendix J. The combined leakage rate for all penetrations, subject to Types B and C tests, is well below the acceptable leakage rate of 0.60 L_a.

The Attachment for this section is:

Attachment No.	Title
4A	Local Leakage Rate Test Data

ATTACHMENT 4A

LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM		TYPE TEST	VALVES/EQUIPMENT TESTED (NOTE 1)	LEAKAGE (SCFH) (NOTE 2)	REMARKS
Z-01A	Main Steam, Main Steam Drain	C	2MSS*HYV6A	1.09	
			2MSS*HYV7A	0.084	
			2MSS*MOV208	0.3	
			2MSS*SOV97A	0.3	
Z-01B	Main Steam, Main Steam Drain	C	2MSS*HYV6B	0.547	
			2MSS*HYV7B	1.183	
			2MSS*MOV208	0.3	
			2MSS*SOV97B	0.3	
Z-01C	Main Steam, Main Steam Drain	C	2MSS*HYV6C	0.158	
			2MSS*HYV7C	0.199	
			2MSS*MOV208	0.3	
			2MSS*SOV97C	0.3	
Z-01D	Main Steam, Main Steam Drain	C	2MSS*HYV6D	0.215	
			2MSS*HYV7D	0.088	
			2MSS*MOV208	0.3	
			2MSS*SOV97D	0.3	
Z-02	Main Steam Drain	C	2MSS*MOV111	1.4	
			2MSS*MOV112	0.0	
Z-04A	Feedwater	C	2FWS*AOV23A	0.386	
			2FWS*MOV21A	2.19	
			2FWS*V12A	4.18	
			2WCS*MOV200	2.18	

ATTACHMENT 4A (Con't)

LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM		TYPE TEST	VALVES/EQUIPMENT TESTED (NOTE 1)	LEAKAGE (SCFH) (NOTE 2)	REMARKS
Z-04B	Feedwater	C	2FWS*AOV23B	1.88	
			2FWS*MOV21B	2.19	
			2FWS*V12B	19.5	
			2WCS*MOV200	2.19	
Z-05A	RHS Pump Suction	C	2RHS*MOV1A	3.31	
Z-05B	RHS Pump Suction	C	2RHS*MOV1B	0.0	
Z-05C	RHS Pump Suction	C	2RHS*MOV1C	0.0	
Z-06A	RHS Test Line	C	2RHS*MOV30B	4.5	
Z-06B	RHS Test Line	C	2RHS*MOV30A	0.7	
Z-07A	RHS Pool Spray	C	2RHS*MOV33A	0.051	
Z-07B	RHS Pool Spray	C	2RHS*MOV33B	0.041	
Z-08A	RHS Drywell Spray	C	2RHS*MOV15A	0.147	
			2RHS*MOV25A	0.91	
Z-08B	RHS Drywell Spray	C	2RHS*MOV15B	2.51	
			2RHS*MOV25B	0.107	
Z-09A	RHS LPCI Injection	C	2RHS*AOV16A	1.35	
			2RHS*MOV24A	1.23	
Z-09B	RHS LPCI Injection	C	2RSH*AOV16B	1.047	
			2RHS*MOV24B	0.066	
Z-09C	RHS LPCI Injection	C	2RHS*AOV16C	18.7	
			2RHS*MOV24C	0.287	

ATTACHMENT 4A (Con't)

LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	TYPE TEST	VALVES/EQUIPMENT TESTED (NOTE 1)	LEAKAGE (SCFH) (NOTE 2)	REMARKS
Z-10A RHS Shutdown Return	C	2RHS*AOV39A 2RHS*MOV67A	3.87	Combination
		2RHS*MOV40A	5.60	
Z-10B RHS Shutdown Return	C	2RHS*AOV39B 2RHS*MOV67B	5.5	Combination
		2RHS*MOV40B	3.75	
Z-11 RHS Shutdown Supply	C	2RHS*MOV112	1.19	
		2RHS*MOV113	2.143	
Z-12 CSH Suction	C	2CSH*MOV118	0.95	
Z-13 CSH Test Return	C	2CSH*MOV105	0.045	
		2SCH*MOV111	2.44	
Z-14 CSH Injection	C	2CSH*AOV108	0.006	
		2CSH*MOV107	1.03	
Z-15 CSL Suction	C	2CSL*MOV112	1.44	
Z-16 CSL Injection	C	2CSL*AOV101	1.93	
		2CSL*MOV104	0.10	
Z-17 ICS Suction	C	2ICS*MOV136	0.312	
Z-18 ICS Min Flow	C	2ICS*MOV143	0.006	
Z-19 ICS Turb. Exhaust	C	2ICS*MOV122	0.283	

ATTACHMENT 4A (Con't)

LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	TYPE TEST	VALVES/EQUIPMENT TESTED (NOTE 1)	LEAKAGE (SCFH) (NOTE 2)	REMARKS
Z-21 ICS Steam Supply	C	2ICS*MOV121	0.008	
		2ICS*MOV128	0.222	
		2ICS*MOV170	0.146	
Z-22 ICS Injection	C	2ICS*AOV156	0.6	
		2ICS*AOV157	5.1	
		2ICS*MOV126	1.74	
RHS Head Spray	C	2RHS*MOV104	0.184	
Z-23 WCS Supply	C	2WCS*MOV102	0.034	
		2WCS*MOV112	0.103	
Z-29 SLS Injection	C	2SLS*MOV5A	0.303	
		2SLS*MOV5B	0.303	
		2SLS*V10	0.337	
Z-31A Tip	C	Ball Valve	0.001	
Z-31B Tip	C	Ball Valve	0.001	
Z-31C Tip	C	Ball Valve	0.0	
Z-31D Tip	C	Ball Valve	0.0	
Z-31E Tip	C	Ball Valve	0.0	

ATTACHMENT 4A (Con't)

LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	TYPE TEST	VALVES/EQUIPMENT TESTED (NOTE 1)	LEAKAGE (SCFH) (NOTE 2)	REMARKS
Z-32 TIP Purge	C	2GSN*SOV166	0.0645	
		2GSN*V170	0.7036	
Z-33A CCP to RCP	C	2CCP*MOV17A	0.1	
		2CCP*MOV94A	0.028	
Z-33B CCP from RCP	C	2CCP*MOV17B	0.043	
		2CCP*MOV94B	0.008	
Z-34A CCP from RCP	C	2CCP*MOV15A	0.004	
		2CCP*MOV16A	0.012	
Z-34B CCP from RCP	C	2CCP*MOV15B	0.198	
		2CCP*MOV16B	0.253	
Z-36 Service Air	C	2SAS*HCV161	0.013	
		2SAS*HCV163	0.012	
Z-37 Breathing Air	C	2AAS*HCV134	0.152	
		2AAS*HCV136	0.111	
Z-38A RDS to RCP Seals	C	2RCS*V59A	0.041	
		2RCS*V60A	0.57	
		2RCS*V90A	10.2	
Z-38B RDS to RCP Seals	C	2RCS*V59B	0.248	
		2RCS*V60B	0.45	
		2RCS*V90B	8.6	

ATTACHMENT 4A (Con't)

LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	TYPE TEST	VALVES/EQUIPMENT TESTED (NOTE 1)	LEAKAGE (SCFH) (NOTE 2)	REMARKS
Z-39 Floor Drains	C	2DFR*MOV120	1.06	
		2DFR*MOV121	0.009	
Z-40 Equipment Drains	C	2DER*MOV119	0.82	
		2DER*MOV120	0.40	
Z-41 RCS Sample	C	2RCS*SOV104	0.372	
		2RCS*SOV105	0.109	
Z-42A Fire Protection	C	2FPW*SOV218	0.014	
		2FPW*SOV219	0.001	
Z-42B Fire Protection	C	2FPW*SOV220	0.0	
		2FPW*SOV221	0.003	
Z-43 Floor Drain - Tank Vent	C	2DFR*MOV139	0.355	
		2DFR*MOV140	1.98	
Z-44E Service Air	C	2SAS*HCV160	0.027	
		2SAS*HCV162	0.023	
Z-44F Breathing Air	C	2AAS*HCV135	0.122	
		2AAS*HCV137	0.007	
Z-45 Equipment Drain - Tank Vent	C	2DER*MOV130	0.366	
		2DER*MOV131	0.261	
Z-46A CCP to Drywell Cooler	C	2CCP*MOV265	0.054	
		2CCP*MOV273	0.186	

ATTACHMENT 4A (Con't)

LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM		TYPE TEST	VALVES/EQUIPMENT TESTED (NOTE 1)	LEAKAGE (SCFH) (NOTE 2)	REMARKS
Z-47	CCP from Drywell Cooler	C	2CCP*MOV122 2CCP*MOV124	0.055 1.77	
Z-48	Purge Exhaust - Drywell	C	2CPS*AOV108 2CPS*AOV110	3.34	Combination
Z-49	Purge Supply - Drywell	C	2CPS*AOV104 2CPS*AOV106	9.2	Combination
Z-50	Purge Supply - Wetwell	C	2CPS*AOV105 2CPS*AOV107	1.25	Combination
Z-51	Purge Supply - Wetwell	C	2CPS*AOV109 2CPS*AOV111	2.2	Combination
Z-53A	Instrument Air - ADS	C	2IAS*SOV164 2IAS*SOV448	0.062 2.22	
Z-53B	Instrument Air - ADS	C	2IAS*SOV165 2IAS*V449	0.0 0.62	
Z-53C	Instrument Air - MSRV	C	2IAS*SOV166 2IAS*SOV184	0.259 0.179	
Z-55A	Hydrogen Recombiner Wetwell Supply	C	2HCS*MOV1A 2HCS*MOV4A	2.24	Combination
Z-55B	Hydrogen Recombiner Wetwell Supply	C	2HCS*MOV1B 2HCS*MOV4B	2.33	Combination

ATTACHMENT 4A (Con't)

LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	TYPE TEST	VALVES/EQUIPMENT TESTED (NOTE 1)	LEAKAGE (SCFH) (NOTE 2)	REMARKS
Z-56A Hydrogen Recombiner Drywell Return	C	2HCS*MOV3A 2HCS*MOV6A	0.021	Combination
Z-56B Hydrogen Recombiner Drywell Return	C	2HCS*MOV3B 2HCS*MOV6B	0.015	Combination
Z-57A Hydrogen Recombiner Wetwell Return	C	2HCS*MOV2A 2HCS*MOV5A	0.094	Combination
Z-57B Hydrogen Recombiner Wetwell Return	C	2HCS*MOV2B 2HCS*MOV5B	0.029	Combination
Z-58 Purge to Drywell	C	2CPS*SOV120 2CPS*SOV122	0.024	Combination
Z-59 Purge to Wetwell	C	2CPS*SOV119 2CPS*SOV121	0.178	Combination
Z-60A CMS from Drywell	C	2CMS*SOV60A 2CMS*SOV61A	0.0	Combination
Z-60B CMS from Drywell	C	2CMS*SOV24A 2CMS*SOV24C	0.008 0.006	
Z-60C CMS to Drywell	C	2CMS*SOV62A 2CMS*SOV63A	0.008	Combination
Z-60D CMS to Drywell	C	2CMS*SOV32A 2CMS*SOV33A	0.026 0.009	

ATTACHMENT 'A (Con't)

LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	TYPE TEST	VALVES/EQUIPMENT TESTED (NOTE 1)	LEAKAGE (SCFH) (NOTE 2)	REMARKS
Z-60E CMS from Drywell	C	2CMS*SOV60B 2CMS*SOV61B	0.004	Combination
Z-60F CMS from Drywell	C	2CMS*SOV24B 2CMS*SOV24D	0.022 0.187	
Z-60G CMS to Drywell	C	2CMS*SOV62B 2CMS*SOV63B	0.001	Combination
Z-60H CMS to Drywell	C	2CMS*SOV32B 2CMS*SOV33B	0.002	Combination
Z-61B CMS from Wetwell	C	2CMS*SOV26A 2CMS*SOV26C	0.018 0.147	
Z-61C CMS to Wetwell	C	2CMS*SOV34A 2CMS*SOV35A	0.092	Combination
Z-61E CMS from Wetwell	C	2CMS*SOV26B 2CMS*SOV26D	0.0149 0.0173	
Z-61F CMS to Wetwell	C	2CMS*SOV34B 2CMS*SOV35B	0.104 0.131	
Z-80 Spent Fuel Pool Cooling	C	2SFC*V203 2SFC*V204	0.374 0.312	
Z-88A RHS	C	2RHS*MOV26A 2RHS*MOV27A	0.079 0.011	

ATTACHMENT 4A (Con't)

LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	TYPE TEST	VALVES/EQUIPMENT TESTED (NOTE 1)	LEAKAGE (SCFH) (NOTE 2)	REMARKS
Z-88B RHS	C	2RHS*MOV26B	0.035	
		2RHS*MOV27B	0.023	
Z-89A LMS from Drywell	C	2LMS*SOV152	0.006	
		2LMS*SOV153	0.013	
Z-89C LMS from Wetwell	C	2LMS*SOV156	0.002	Combination
		2LMS*SOV157		
Z-90 ICS Vac Bkr	C	2ICS*MOV148	0.089	
		2ICS*MOV164	0.08	
		2RHS*V192	0.08	
Z-91A Instrument Air to Drywell	C	2IAS*SOV167	0.270	
		2IAS*SOV185	0.048	
Z-91B Instrument Air to Drywell	C	2IAS*SOV168	0.62	
		2IAS*SOV180	0.374	
Z-92	C	2CPS*SOV133	0.008	
		2CPS*V51	0.10	
Z-96	C	2CPS*SOV132	0.206	
		2CPS*V50	0.65	

ATTACHMENT 4A (Con't)

LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	TYPE TEST	VALVES/EQUIPMENT TESTED (NOTE 1)	LEAKAGE (SCFH) (NOTE 2)	REMARKS
	B	Electrical Penetrations (60) CRD Hatch Drywell Head Emergency Airlock Personnel Airlock Equipment Hatches (2) TIP Flanges (5) Fire Protection Flange Pool Access Hatches (2) Blank Flange TIP Nitrogen Supply	3.6 total	

Notes:

1) The local leakage rate test program started approximately 9 months prior to the start of the Type A Test.

2) The leakage rates that are listed are valve leakage rates, not penetration leakage rates. Units are standard cubic feet per hour.