To: Lee Bettenhausen Halpita 11/17/86 From: D. Florek Subject: NMP-2 MSIV

M. Evans phoned from site indicating that the NMP-2 inboard value installed after fuel looding was finished, (Fuel loading progressed with 3 inboord values and one outboard value in the steam lines) failed the LLRT. Indications existed that the tongest tongstencarbide coating has smeared. Value ball was sent back to Gosby. Additional details will de provided when avoilable. CC. J. Strosneider 5. Ebneter W. Johnston. 5. Johnston. FOIH-87-438

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- To tele

8/18/86

Information from Larry Wink, obtained from a GE SU Engineer who was at Reibstatt. Leibstatt utilized tall tovalves not as MSIV but as to Man stam stop value (MSSV) similiar to the third value in the Hope Creek steam line. Due to problems with MSIVAT Lebstudt the Swiss NRC agreed to utility the MSSV to, a requeling cycle. When The MSSV'S were toted after well was yever, one closed on demand filoweter. open mot available, two mover closed and one closed in ~ 6 minutes.

Don Flack

ce. Join Anville Fam Cullini

looks had FOI A- 87 -438

NAP:2 Stadus: • MSIV mtg hild where e:20 NO decision -> NAPC to evaluate impact on license NRP position is exemption needed, at least

LER estimate of licensing => end of 1st or 2nd w/k sept. T/s changes

FOIA-87-438

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++/2

. 315 342 3464 20 '86 16:46 USNRC 9 MI PT 2 P06 Ed Killin, Mgr Gugact Engineering. MSIV update meeting 8/20/66 - 9AM = 9:30 A.M. Bearer Valley - had roller bearing problem aler. Bearing 9310 - Surgace handoned only. 53100 - tempened all the way through 1 failure in server hundred latchings Fora with tim 80 lbc porce at Solonoid after imitial to Tig walne -after & days 280 lbs was required. n 42 ak gette unlitched- Time afte Edays onknown. > three options -Neur cam opetion living Thates today I meaning force only - hus not been cocked. (verdow) Planning with NRR next Thursday. Current Hyd, cylinder bleed port bing chucked to eliminito rectriction and recture time & dicke to 3/2 secondo. 2. arlonoil. - each start at Balle precand diaman & 40 lb at end of satiske.

MSIV Reven NMPZ wh of 9/22/86 1. Onaite O determine who was responsible for the procurement and Appreciations for the volves -5+W GE NM @ Runein the procument spicification + Signaining Spice for the values and determine : · performance requiriments · qualification requiriments " tisting and acceptance culice gub require 3 Review the site QA/4C records for · Purchase Order Receipt propertion A place or bench testing dene meite - All and the second second second Determine the extent of GA/GC inortwenent including · selection + qualification of worker orright (a) abserve the current Status of Values · possess value damage its mechanism + cause assess this france proposed fifes tooddress known problems ( kinege, golling, white to timing, cylinder & FoIA-87-438

· · ·

2. Determine the eftent of NRC acturity regarding the · FSAR revuer (SER) · Anaputiona during plant construction onsite · Andor inspections of Crosby or its subsidiarie. · treop testing inspections

in .

3. Determine historical lackground: Value history at 1/192 - When croked, when received, storage time + location in Statlate. Volve BV-2 BV-2

· monfacturing processos proction processos Opabrication of balls O Tugsten Carbide conting of volver bolls 3 Manufacture of Seat rings + its mating singure in volve lody & Trunnie

Onsite worke NHP. 2 - Crocky - ukgeg/22 Belance of review plus report - draft ly 1/3/8 Schedule: OT if needed well be authorized. Toke photos of meded.

NMP-2 1. Review the procurement Eigneering specification and determine : the performance requirements the testing & accept criteria

2. Observe the current status of the values damage to balls Proposed field Leakage testing

3. NRC involvement: SER impectives

4. Historica background Value history at NHP-2 other plants (gavalable) nife processes ( non standard)

· · · · · · · - Description of the From grate Carbide Coating The Tungolen Caricide Coating is applied by the controlled detonation of through a specially designed gun with a five foot banelf. Je Mungsten Carbide Material is loaded into the Frins champer the poto and the gun is simeaultaneously charged with as mixture of Oxygen and Acetelene. The charge is ignited and the resultant explosion melts the powdered Tungsten Carbide and accelerates the material to the value ball. The mited velocity of the Tungaten Combine Coating is H14

26000 ft/sec and it inpacts the bull at ~ 2800 ft/sec. He gun fires at 8cx/es/sec. and the Tunpten contricte is deposited in .cco2.mi stickness marement. He deford D-Gun is in a fixed position within a sound proof chamber. The ball is mounted in a fixture which is indexed in front of the gun. The essential Physical control variables of this process are the distance from the gun barrel to the value ball and the speed of the value ball with respect to the gun barrel. Jug Ragers 4289 TC 73 Re Mot Hard Editoria 20 Re GTAW Deport 42 Rc work Hardened Cobot Dato ZGRC SMAW 45 WH. 37RC SAW 48 WH

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SUPPLEMENTAL INFO

RB 100 ~ Rc 23

Ave hardness - that averaged over the area of the hardness machine indentor. The Stellite & carbide matrix is on a much smaller scale than the indenti area.

The Haynes 25 should be of a one-phase microstructure. The tongsten should be essentially all in solution (i.e., not in the form of tangeten carbide.

Tungoten Carbid has a N: Cr matrix binder specified to eliminate cobalt from the coating system per Don Cathcart Plant Manager Union Carbide 1-412-658-6678. The Nominal Composition of the Tungton Carbie Coating:

Tungoten Chrome Nizkle Carbon Karbides

68% J Formo binder for 5% Tungoten Carbide. 5% Tungoten Carbide

3. Type of Stellite on the seat

The latest issue of EPG's drawing (now Crosky), E24-900-15, indicates that the seat is hardfaced with Stellife 6. This is supported by the welding procedures submitted by EPG.

4. Description of Stellite 6 and Haynes 25

Haynes 25

Haynes Alloy No. 25 is a cobalt-based superalloy with a nominal chemical composition of approximately 50% cobalt, 10% Nickel, 20% chromium and 15% tungsten. It has excellent corrosion resistence.

It was deposited on the 316L MSIV botts using the submerged are welding process. The hardness of this as-deposited. alley is approximately 80 to 90 on the Rockwell B scale.

Stellite 6

As used on the MSIV seats, Stillite 6 is a cobalt-based weld deposited hardfacing alloy with a nominal chemical composition of 1.17. carbon, 28% chromium, 4% tungsten and balance cobalt. Its microstructure consists of a network of chromium and tungsten carbides in a cobalt-chromium matrix.

It was deposited on the starnless steel spool seat using the gas tungsten are welding process. The average hardness of this as-deposited alloy is approximately 35 on the Rockwell C scale. However, the average hardness may not be completely indicative of the alloy's behavior in wear situations since the carbide microconstituents are extremely hard.

PITTEBURGH DISTRICT B50 PDFLAR STREET P 1158 JRCH PENNEYLVATVA 15220 F11 412 922 4000 F41 412 922 4014

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REPORT

Laboratory No. 876757 Client No. NMP2-FP0-27671

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PTL - INSPECTORATE INC.

DADERNO PCH-1762 DATE September 19, 1986

Client: Stone and Webster Engineering Corporation Agents for Niagra Mohawk Power Corporation Nine Mile Point Nuclear Station - Unit 2 Lycoming, NY 13093

Sample Description: Four (4) Samples of Reference Materials Four (4) Paste-like Samples - Unknown Six (6) Fine Solid Samples - Unknown

Submitted By: Client

Submitted To: PTL-Inspectorate Inc., Chemical Department

Service Requested: Comparison Reference Samples verses Paste-like Unknowns Examination, Identification of Unknowns

Method of Test: Infrared Spectrophotometry Energy Dispersive X-ray Analysis Scanning Electron Microscopy X-ray Diffraction Direct Current Plasma Emission Spectroscopy

Reported To: Stone and Webster Engineering Corporation Attn: John Montaro and Greg Rodgers

The above identified reference and unknown materials were submitted to this laboratory for examination on September 9, 1986.

Specific identifications of the materials were as follows:

Reference Materials:

Neolube, Hyprez Compound, Molykote 505 and Lapping Compound, Blue 15 LMA

Unknown Paste-like Materials

Spool Seat 6B, Thurst Washer 6B, Molykote? 6B and Northwall Valve, Body, and Base

Unknown Fine Solids:

Ball ID 6B, Inboard below Spool, Bore 6B, Outboard below Spool, N. Body Wall and Ball OD6B

Stone and Webster Engineering Corporation Order No. PCH-1762 September 19, 1986

Laboratory No. 76757

Examination of the Reference Materials was conducted by Infrared Spectrophotometry for identification of major components. The purpose was to then, upon examination of other samples by the same technique, to determine if similar components and associated compounds were present in the unknown materials.

The "Unknown Paste-like Materials" and "Ball ID 6B" Samples, upon examiantion, resulted in the following:

Composition
Inorganic silicates and a hydrocarbon component
Petroleum hydrocarbon similar to a type of petrolatum
Ethylene oxide condensation product (major component)
Ethylene oxide condensation product
Ethylene oxide condensation product (predominant component)
Ethylene oxide condensation product
Scattering of infrared beam suggests presence of graphitic carbon. Solvent was identified as isopropanol
Scattering of infrared beam suggests presence of graphitic carbon (fine carbon particles passed through filter paper)
Similar to Molycote Reference, as received
Similar to Molycote Reference, chloroform solubles
Scattering of infrared beam suggests presence of graphitic carbon
Trace amount of unidentifiable material recovered - possibly an ester

Stone and Webster Engineering Corporation September 19, 1986 Order NO. PCH-1762 Laboratory No. 876757

DETETENCE/ MEMBAR + ********
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II. Sample Identification (con't.) 6B-3 - Spool Seat, as received

6B-3 - Spool Seat, chloroform solubles

North Wall Valve Body and Base, as received

North Wall Valve Body and Base, chloroform solubles

6B - Ball Rust ID chloroform solubles

> No Di In B

Composition

Similar to Molycote Reference, as received

Similar to Molycote Reference, chloroform solubles

Scattering of inflared beam suggests presence of graphitic carbon

Observed hydrocarbon and ester absorptions

Observed hydrocarbon, amine ester and ether linkage absorptions possibly including an alkyl substituted amine and/or amide

Examination of samples was also conducted by Energy Dispersive X-ray Analysis. This technique detects the elemental constituents of samples on a semi-quantitative basis. Fourteen (14) such examinations were conducted and the findings are presented as Attachment I.

The inorganic (chloroform insoluble fraction) portion of the References were examined in addition to the unknown materials.

Four (4) samples were examined under electron microscope for particle size. The original photographs were returned by Client's representative. The following summary of the samples and findings is provided.

Sample	Particle Size Photographed
orth Body Wall	141 um
utboard below Spool	263 um
nboard below Spool	158 um
all OD	238 um

Stone and Webster Engineering Corporation September 19, 1986 Order No. PCH-1762 Laboratory No. 876757

The "Unknown Fine Solids" were found to be composed predominantly of Iron (Fe). Thus, one sample was selected for examination by X-ray Diffraction. The sample chosen was "North Body Wall". The output from this examination was returned with client's representative. The major findings were as follows:

Major	Component	Fe304	Magnetite	>70 %
Minor	Component	Fe203	Hematite	1-10 %

The following information on these two compounds was taken from The Condensed Dictionary 10th Edition Van Nostrand Reinhold Company.

Magnetite: (Lodestone, Iron Ore, Magnetic) often with Titanium or Magnesium 72.4 % Iron content Hardness 5.5 to 6.5 (Mho's scale) Hematite: (Red Iron Ore Bloodstone) Hardness (Mho's scale) 6

Quantitative Chemical Analysis conducted on the North Body Wall by Direct Current Plasma Emission Spectroscopy was conducted to confirm and quantify major components and to identify and quantify minor components. Halides (Chloride and Fluoride) were evaluated on a water leach of the sample and a loss by ignition was conducted as well.

The findings were as follows:

Major	Iron (Fe) Carbon	63 % 1.80 %	(64.17 % hy we	et chemistry)
	Loss on Ignition 1000°	3.8 %		
Minor	Silicon	0.49 %	Chromium	0.17 %
	Manganese	0.59 %	Zinc	0.13 %
	Nickel	0.19 %		
Trace	Phosphorus	0.019 %	Barium	0.01 %
	Molybdenum	0.060 %	Cadmium	0.02 %
	Titanium	0.043 %	Tin	0.04 %
	Cobalt	0.075 %	Lead	0.04 %
	Copper	0.080 %	Vanadium	0.002 %
Water ext	ractable Fluoride 60 m	8/8		

Chloride 98 mg/g

Stone- and Webster Engineering Corporation September 19, 1986

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Order No. PCH-1762 Laboratory No. 876757

Client inquiry concerning Tungsten content resulted in quantitative analysis of three samples for Tungsten as well as Iron, Silicon, and Manganese.

	Inboard Below spool	Outboard Below spool	North Wall Body
Tungsten	0.075 %	0.045 %	0.050 %
Iron	60.8 %	60.4 %	62.8 %
Silicon	0.28 %	0.20 %	0.24 %
Manganese	0.46 %	0.42 %	0.58 %

All of the information provided above was submitted to client via telefax over the period of September 9 - September 10, 1986.

Components present in the "Unknown Paste-like Materials" examined by Infrared Spectrophometry, we found to be similar to and probably originating from the "Reference Materials".

A possible source of the "unknown Fine Solids" was not found among the "Reference Materials". However, these samples exhibit commonality in their high content of iron (oxides).

lanager ian

Chemical Department

bmm

Nine Mile Bont 2 10/15/56 Meeting Summary · NHPC position is that they undustand the word cause of both problems and have demonstrated and acceptable fix for one cycle. · actuator - mechanical latel won't release quick enough to permit closere in Secondo so it has been removed and hydraulic system will be modified to hold value open continuoridy. · Leakage - turgoter carticle coating flaking off due to high friction fore as value starts to open has been fifed by charging the seat very oping forces and restoring the balls to original code acceptable. condition " Stonen 10 CFR 50, 55(0) report will be submitted by 10/24/1952 . In addition to having four leak tested values in place before licence issuance per their exemption request and having all values fully operable prior to heat-up the licence made the following additional commitments which will be included as a license condition FOIA-87-438

### 1/5 NMP2 MEETING IN BETHESDA

OPTIONS

- REPAIR BALL VALVES PREFERRED BY LICENSEE AND NRC STAFF PRESENT (Vollmer, Bernero, Lanais et. al.) EXCEPT PM
  - REPAIR ONLY THE ONE BALL AND JUSTIFY THE USE OF THE OTHERS WHICH SHOWED SOME EVIDENCE OF DEGRADATION BY SOME COMBINATION OF ANALYSIS AND TESTING FOR N STROKES WHERE N GREATER THAN THE NUMBER EXPECTED DURING FIST CYCLE. APPROACH IS TO JUSTIFY WORST CASE DEGRADATION TAKING INTO ACCOUNT MITIGATING FACTORS NOT CONSIDERED IN SAFETY ANALYSIS PER GENERIC LETTER 86-17 AND NUREG 1169, MSIV LEAKAGE AND LCS FAILURES.
  - MAJOR REMAINING TECHNICAL ISSUE IS MIXING DIVISIONS WITHIN RPS CHANNELS TO PREVENT INADVERTANT CLOSURES AND PERMIT TESTING. SERIES SOLENDID OPTION TO CORRECT THIS WOULD TAKE ONE MONTH. PREFERRED APPROACH BY NRC STAFF PER 1/16 MEETING AND SER WILL BE ISSUED INDICATING CURRENT TRANSFER CIRCUIT UNACCEPTABLE.
  - NO LICENSE OR TS CHANGES EXPECTED WITH THIS OPTION.
    WILL MEET TS WHILE PERFORMING MODIFICATIONS.
    PROTOTYPE PROGRAM WILL REMAIN AS SPECIFIED IN LICENSE.
  - ALARA ISSUE SHOULD BE ADDRESSED IF INTENT IS TO OPERATE FOR ONLY ONE CYCLE WITH BALL VALVES.
- 2. REPLACE BALL VALVES WITH Y PATTERN GLOBE VALVES
  - LICENSEE HAS VALVES AVAILABLE AND HAS COMPLETED DESIGN. CONSULTANTS CURRENTLY REVIEWING IT. MODIFICATION WOULD TAKE 3-4 MONTHS.
  - LICENSE AND TS CHANGES WOULD BE REQUIRED. NO SIGNIFICANT HAZARDS. CONCLUSION WOULD HAVE TO BE JUSTIFIED. PROBABLE BUT NOT ASSURED.
  - NRC STAFF CONCERNED ABOUT UNCERTAINTIES AND POTENTIAL PROBLEMS ASSOCIATED WITH JUMPING INTO MODIFICATIONS OF THIS MAGNITUDE WITHOUT ADEQUATE TIME TO PLAN AND REVIEW IT BEFOREHAND.
  - PROBABLY CAN JUSTIFY NOT INSTALLING LEAKAGE CONTROL SYSTEM (NOWEVER, IT IS INCLUDED IN DESIGN PACKAGE).
- 3. STRIP OFF COATING ON BALLS DEMONSTRATED NOT FEASIBLE BY TESTING OVER WEEKEND.
- 4. RECOAT ALL BALLS AGAIN NOT DESIRABLE AND NOT SERIOUSLY DISCUSSED.

FOIA-87-438

H/7

El 17 Genera Lettin (Lex I Currile)

1/5 NMP2 MSIV MEETING IN BETHESDA

OPTIONS

1. REPAIR BALL VALVES - PREFERRED BY LICENSEE AND MRC STRIFF PRESENT VOLLMER, BERNERO LANAIS et al.)

> - REPAIR ONLY THE ONE BALL AND JUSTIFY THE USE OF THE OTHERS WHICH SHOWED SOME EVIDENCE OF DEGRADATION BY SOME COMBINATION OF AWALYSUS AND TESTING, FOR N STROKES WHERE NO NUMBER EXPECTED AUGUS FIRST CYCLE. APPROACH IS, TO JUSTIFY WORST CASE DEGRADATION TAKING INTO ACCOUNT MITIGATING FACTORS NOT CONSIDERED IN SAFETY ANALYSUS

- " MAJON REMAINING TECHNICAL ISJUE IS MIXING DIVISIONS WITHIN RPS CHANNELS TO PREVENT INADVERTANT CLORURES AND PERMIT TESTING. SERIES SCLENDID OPTION TO CORRECT THIS WALLO TRKE ONE MONTH. PREFEGARED FAMILIAN BY NEC STAFF. PER I/G MEETING AN SER WILL BE ISSUE INDICATING CURRENT TRANSFER CIRCUIT UNACCEPTIBLE.
- NO LICENSE OR TS CHANGES EXPECTED WITH THIS DOTION WILL MEET TS WHILE PERFORMING MODIFICATIONS PROTOTYPE PROGRAM WILL REMAIN AS SPECIFICD IN LICENSE
- TO OPERATE FOR ONLY ONE CYCLE WITH BALL VALVES

# 2 REMALE BALL VALVES WITH Y PATTERN GLUBE VALVES

.....

- LICENSEE WAS VALVES AVAILABLE AND HAS COMPLETED DESIGN. CONSULTANTS CURRENTLY REVIEWING IT. MODIFICATION WILL TAKE 3-4 MONTHS.
- LICENSE AND TJ CHANGES WOULD BE REQUIRED. NO SIGNIFICANT HAZARDS CONCLUSION WOULD HAVE TO BE JUSTIFIED. PROBABLE BUT NOT ASSURED.
- -NRC STAFF CONCERNED ABOUT UNCERTAINTIES AND POTENTIAL PROBLEMS ASSOCIATED WITH JUMPING INTO MODIFICATIONS OF THIS MAGNITHE WITHOUT ADEQUATE TIME TO PLAN AND REVIEW IT BEFOREHAND.
  - DROBABLY CAN JUSTIFY NOT INSTALLING LEARAGE CONTROL SYSTEM (HOWEVER IT IS INCLUDED IN DESIGN PACKAGE)

3. STRIP OFF CONTING UN BALLS - DEMONSTRATED NOT FENSIBLE BY TESTING OVER WEEKEDD

4. RECOAT ALL BALLS AGAIN - NOT DESIREABLE AND NOT SERIPHOLY OWSCUSSED.

#### PRIORITY ATTENTION REQUIRED

MORNING REPORT - REGION I

FEBRUARY 10, 1987

James Blaha, Director, Program Support and Analysis Staff TO: Thomas E. Murley, Regional Administrator, Region I FROM:

Licensee/Facility	Notification/Subject	
Beaver Valley Unit 2	2/10 SRI Fax	
DN 50-412	Structural Integrity Test	

#### Event

At approximately 3:30 a.m., the licensee began pressurizing the containment for the Structual Integrity Test (SIT). As of 8:00 a.m., the containment was at 13 psig and the licensee was conducting outside wall surface examinations and documenting identified indications. The licensee plans to continue raising containment pressure in stages to a maximum of 52 psig. The estimated test completion date is 2/12. The licensee plans to conduct the Integrated Leak Rate Test shortly after SIT completion. Resident and specialist inspectors are following the licensee's testing activities.

Licensee/Facility	Notification/Subjec	
Nine Mile Point 2	2/10 Resident PC	
DN 50-410	MSIV Update	

#### Event

On 2/8 during a newly developed surveillance test, the Main Steam Isolation Valves (MSIVs) did not perform as expected. The test procedure attempted to measure the closure times of the 8 MSIVs with only one solenoid dump valve in the hydraulic control system being deenergized (two solenoid valves are installed on each MSIV). Two MSIVs did not close, five MSIVs did not meet the 5 second maximum closure time limit, and one MSIV met the 3 to 5 second limit but appeared to have both solenoids deenergized. NMPC is reevaluating the test procedure, verifying the installed circuits visually and electrically, and reviewing the logic design.

A prototype MSIV recently completed the first phase of hot testing at the manufacturer (Crosby). The valve had been cycled through approximately one half of expected usage in one plant operating cycle at operating temperature and pressure. Leakage testing was performed when the valve was just below 200 degrees F, and results were approximately 50 SCFH (acceptance criteria is 6 SCFH). At ambient temperature gross leakage occurred, and the valve could not be pressurized. Based on disassembly and examination, the packing between the seat ring and the piping is suspected to be the leakage path. The ball and seats showed no signs of previous failure modes but had some wear marks. The seating surfaces were bubble tested, and only minor leakage was observed. However, the seat to piping packing was observed to be loose. It appeared that the packing remained compressed following the thermal cycles and was no longer resilient. The valve was packed with the Lattytex packing used in six of the eight installed valves. The valve is being reassembled and will be retested to verify the failure mechanisms.

FOIA-87-438 H/8

REGION I MORNING REPORT

Licensee/Facility

Notification/Subject

Nine Mile Point 2 DN 50-410 2/24 Resident PC MSIV Update

# Event

#### MSIV UPDATE

As reported on 2/10, MSIVs 6A and 6B failed to close during a containment isolation surveillance test, which attempted to close each MSIV using one of the two solenoid valves installed on each MSIV. The licensee disassembled the sclenoid valves on the four inside containment MSIVs and found that a spacer in the valve spring assembly was missing from six of the solenoids (both solenoids on MSIVs 6A, 6B, and 6C). These spacers had been added by a design modification to increase the spring force in the valve. Documentation reviews and the successful testing of the outside containment MSIVs indicate all the spacers are installed in these valves.

# Licensee/Facility

# Notification/Subject

Nine Mile Point 2 DN 50-410 2/22 ENS, 2/24 RI PC Missed Fire Watch

# Event

On 2/22 at 4:00 a.m., the licensee on-shift fire chief discovered that two hourly fire watch patrols had been missed. The missed patrols were at 12:34 a.m. and 1:34 a.m. for an inoperable fire detection zone in the North Auxiliary Bay. The fire detection zone was returned to service at 2:35 a.m.. The apparent cause of the missed patrols was miscommunication between the fire watch and his supervisor.

#### Licensee/Facility

Notification/Subject

Nine Mile Point 2	2/24 ENS, 2/24 RI PC
DN 50-410	Inadvertent ESF Actuation

#### Event

At 12:41 a.m. on 2/24, an automatic Engineered Safety Feature actuation occurred as a result of personnel error. While performing Main Steam Line Isolation response time testing, an operator misunderstood directions given him and mistakenly opened the supply breaker to the containment isolation logic circuit. This caused a containment isolation, reactor water cleanup system isolation, shutdown cooling isolation, reactor building ventilation isolation, and automatic start of both trains of the Standby Gas Treatment System. All systems responded as designed.

FOI4- 87-438