Docket File

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 28, 1993

Docket No. 50-245

LICENSEE: NORTHEAST NUCLEAR ENERGY COMPANY

FACILITY: MILLSTONE NUCLEAR POWER STATION, UNIT 1

SUBJECT: SUMMARY OF APRIL 22, 1993, MEETING REGARDING PROPOSED MODIFICATIONS TO THE COMBUSTIBLE GAS CONTROL SYSTEM AND IMPLEMENTATION OF THE HARDENED WETWELL VENT

On April 22, 1993, the NRC staff met with Northeast Nuclear Energy Company (NNECO) to discuss their proposed modifications to the combustible gas control system and implementation of the hardened wetwell vent at Millstone Unit 1. Enclosure 1 is the list of individuals who participated in the discussion. Enclosure 2 is NNECO's agenda and handout. The following is a summary of the significant items discussed.

NNECO presented a detailed description of the current nitrogen inerting system and each of its components. NNECO stressed the reliability of the system and discussed the location, maintenance, accessibility under postaccident conditions, and potential redundant backups for all the major components. NNECO also described the operation of the nitrogen inerting system under normal conditions and as it would be used during startup and shutdown.

NNECO then presented several upgrades which they are considering to the system. The upgrades would include an alternate nitrogen supply, an alternate pneumatic supply to some of the containment isolation valves within the nitrogen inerting system, and some minor modifications to the nitrogen skid piping. NNECO stated that these upgrades would improve the postaccident reliability of the nitrogen inerting system.

NNECO described the nitrogen inerting system vulnerability study which was conducted prior to the identification of the proposed modifications. The study concluded that most of the components could be repaired or that an alternate component could be used to achieve system success. Also, with the addition of the alternate nitrogen supply, nitrogen could be supplied to the inerting system, bypassing the storage tank, vaporizer, and the associated valves. By providing the alternate pneumatic supply to several containment isolation valves within the nitrogen inerting system, the reliability of the containment isolation valves would improve under postaccident conditions, in that they could be opened totally independent of electrical power.

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NNECO also presented an alternate design for the hardened wetwell vent. The alternate design is tied to the inerting supply system instead of the containment venting system. NNECO has committed to installing the hardened wetwell vent no later than the next refueling outage, which is scheduled for February 1994, or at an outage of sufficient duration (4-6 weeks). NNECO's alternate design could still be implemented in order to meet the February 1994 commitment date, but could not be installed during an outage of sufficient duration until the engineering design process is complete (should be completed by August 1993). The staff agreed with this new schedule, but recommended that NNECO update the docket to reflect the new installation schedule and design.

As a result of the discussion, the staff recommended that after NNECO has completed its review of the proposed modifications to the nitrogen inerting system, that they docket the information in order for the staff to conduct a formal review. This review of the modifications, if found to be acceptable, would then resolve the open TAC number on the combustible gas control issue. NNECO indicated that they would be able complete the engineering design process and docket the information presented at the meeting by approximately June 1993.

Original signed by

James W. Andersen, Acting Project Manager
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Office of Nuclear Reactor Regulation

Enclosures:
As stated

cc w/enclosures:
See next page

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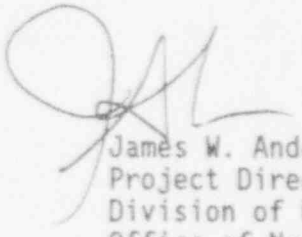

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As stated

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COMBUSTIBLE GAS CONTROL AND HARDENED VENT

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MILLSTONE UNIT NO.1
DOCKET NO. 50-245

NRC/NU MEETING
COMBUSTIBLE GAS CONTROL
HARDENED WETWELL VENT

APRIL 22, 1993

AGENDA

• INTRODUCTION	P. J. MINER
• PURPOSE OF MEETING	P. J. MINER
• SYSTEM DESCRIPTION	D. S. CLEARY
• PROPOSED PLANT IMPROVEMENTS	J. M. QUINN
• SYSTEM EVALUATION	N. K. JAIN
• POSTACCIDENT OPERATION	N. K. JAIN
• HARDENED WETWELL VENT PROJECT	G. E. CORNELIUS
• SUMMARY	P. J. MINER

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P. J. MINER	NUCLEAR LICENSING
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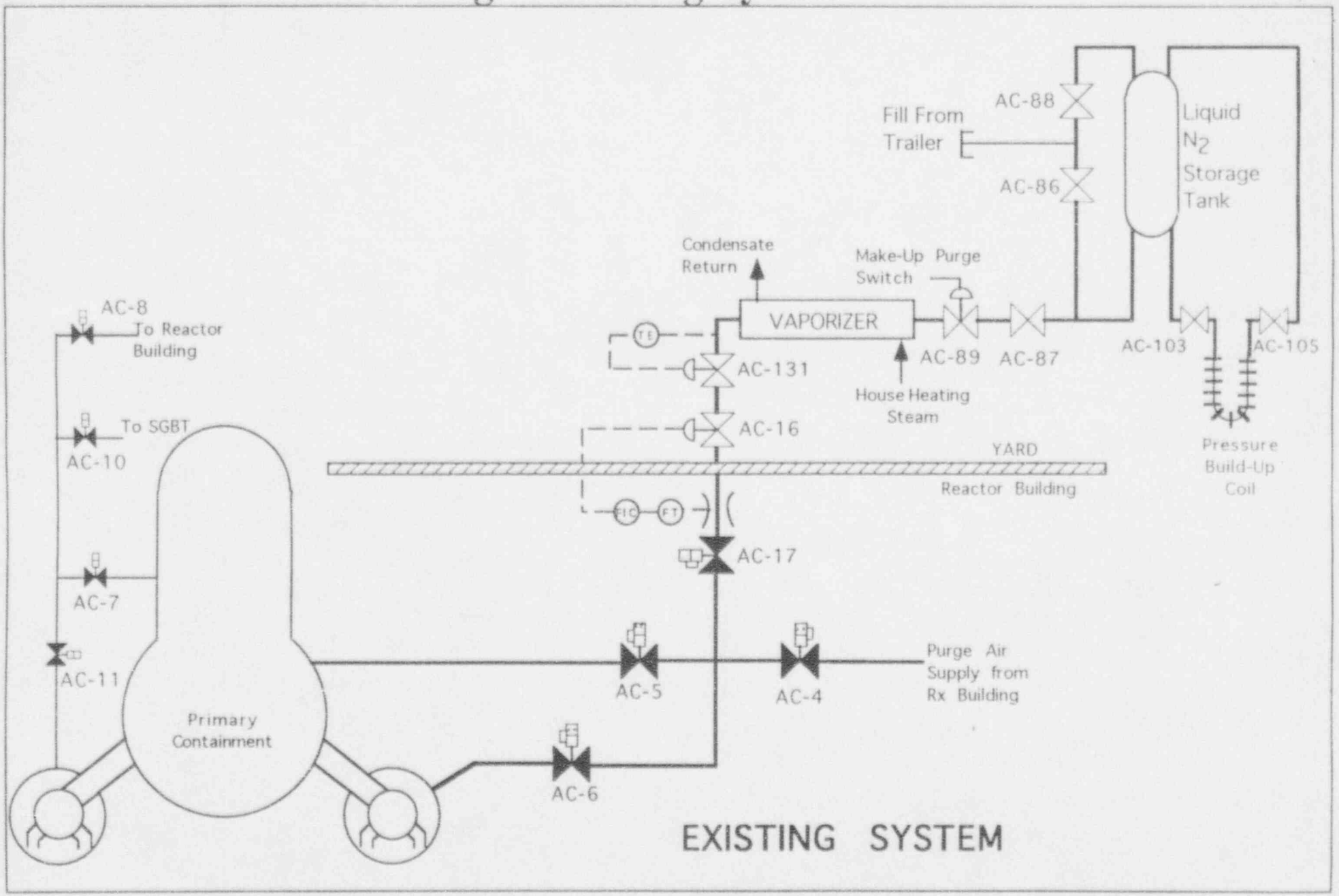
INTRODUCTION

- NU BELIEVES MILLSTONE UNIT NO. 1 COMPLIES WITH 10CFR50.44
  - WILLING TO EXPLORE COST-EFFECTIVE IMPROVEMENTS IN AN EFFORT TO BRING ISSUE TO CLOSURE
- NRC ISSUED SER TO OYSTER CREEK REGARDING NITROGEN INERTING SYSTEM (NIS) ENHANCEMENTS
- NU REQUESTED TO REVIEW SER RELATIVE TO MILLSTONE UNIT NO. 1
- NU IDENTIFIED THE IMPORTANT DESIGN CHARACTERISTICS OF NIS RELATIVE TO COMBUSTIBLE GAS CONTROL
- PERFORMED VULNERABILITY STUDY
- RESULTS OF EVALUATION INDICATE THAT SIMPLE DESIGN MODIFICATIONS COULD BE MADE TO FURTHER IMPROVE THE POSTACCIDENT RELIABILITY OF THE EXISTING NIS

PURPOSE OF MEETING

- TECHNICAL EXCHANGE OF INFORMATION WITH NRC STAFF
  - PROVIDE A DESCRIPTION OF THE EXISTING NIS
  - PRESENT PROPOSED IMPROVEMENTS TO THE EXISTING NIS TO INCREASE POSTACCIDENT RELIABILITY
  - PROVIDE THE STAFF WITH THE RESULTS OF OUR EVALUATION OF THE NIS AND POSTACCIDENT OPERATION OF NIS
  - DISCUSS THE SYNERGY WITH HARDENED WETWELL VENT PROJECT
- ESTABLISH CLOSURE PLAN

Millstone Unit 1 Nitrogen Inerting System



SYSTEM DESCRIPTION

- **NITROGEN SUPPLY**
  - LIQUID NITROGEN TANK (CAPACITY IS APPROXIMATELY 950,000 SCF)
    - MINIMUM INVENTORY IS 400,000 SCF
    - STANDING PURCHASE ORDER WITH VENDOR
    - MANUAL CONNECTION FOR TANKER HOOK-UP
    - LOCAL TANK LEVEL INDICATION
    - LOCAL TANK PRESSURE INDICATION
  - PRESSURE BUILD-UP COIL
  - COMPONENTS LOCATED IN YARD
    - WOULD BE ACCESSIBLE POSTACCIDENT

- **VAPORIZER**
  - STEAM VAPORIZER
    - SIMPLE HEAT EXCHANGER DESIGN
    - LOCATED IN YARD
  - HOUSE HEATING STEAM (HHS) UTILIZED AS HEAT SOURCE
    - 2 BOILERS POWERED BY MILLSTONE UNIT NO. 1
    - 1 BOILER POWERED BY MILLSTONE UNIT NO. 2
      - WOULD BE UTILIZED DURING LOSS-OF-NORMAL POWER (LNP) AT MILLSTONE UNIT NO. 1
    - BOILERS LOCATED IN TURBINE BUILDING
    - MILLSTONE UNIT NO. 2 REBOILER COULD BE UTILIZED AS BACKUP, IF AVAILABLE
    - CAPABILITY EXISTS FOR CONNECTION OF PORTABLE BOILER
      - PREVIOUSLY UTILIZED
  - WOULD BE ACCESSIBLE POSTACCIDENT

- **PROCESS CONTROL**
  - CONTAINMENT ISOLATION VALVES (CIVs)
    - AC-5, -6, -17
      - PROVIDE AUTOMATIC CONTAINMENT ISOLATION FUNCTION ON GROUP II SIGNAL
      - ELECTRICAL POWER TO SOLENOID OF AIR OPERATED VALVES FROM INSTRUMENT AC
      - PNEUMATIC SUPPLY FOR AIR OPERATED VALVES FROM INSTRUMENT AIR
      - CIVS FAIL CLOSED ON LOSS OF AIR OR ELECTRICAL POWER
      - INTERLOCKS MUST BE BYPASSED TO OPEN CIVS WHILE GROUP ISOLATION SIGNAL IS PRESENT
        - CAPABILITY TO BYPASS INTERLOCKS CURRENTLY EXISTS FROM CONTROL ROOM (CR)
      - CIV POSITION INDICATED IN CR
      - OPERATED FROM CR
      - CIVs LOCATED IN REACTOR BUILDING (RB)
      - CIV SOLENOIDS ENVIRONMENTALLY QUALIFIED
      - SURVEILLANCE/TESTING ADDRESSED IN TECHNICAL SPECIFICATIONS

- PROCESS VALVES
  - AC-16, -89
    - AC-16 PROVIDES FLOW CONTROL
    - AC-89 PROVIDES LOW TEMPERATURE/LOW STEAM PRESSURE PROTECTION
    - ELECTRICAL POWER TO SOLENOID OF AIR OPERATED VALVES FROM INSTRUMENT AC
    - PNEUMATIC SUPPLY FOR AIR OPERATED VALVES FROM INSTRUMENT AIR
    - VALVES FAIL CLOSED ON LOSS OF AIR OR ELECTRICAL POWER
    - POSITION INDICATED IN CR
    - OPERATED FROM CR
    - VALVES LOCATED IN YARD
      - WOULD BE ACCESSIBLE POSTACCIDENT

- AC-131
  - PROVIDES BACKUP LOW TEMPERATURE PROTECTION TO AC-89
  - MAY BE OPERATED LOCALLY
  - VALVE LOCATED IN YARD
    - WOULD BE ACCESSIBLE POSTACCIDENT
  - REMAINING VALVES ARE MANUAL VALVES
    - OPERATED LOCALLY
    - VALVES LOCATED IN YARD
      - WOULD BE ACCESSIBLE POSTACCIDENT
- TEMPERATURE INDICATED LOCALLY
- FLOW INDICATED IN CR

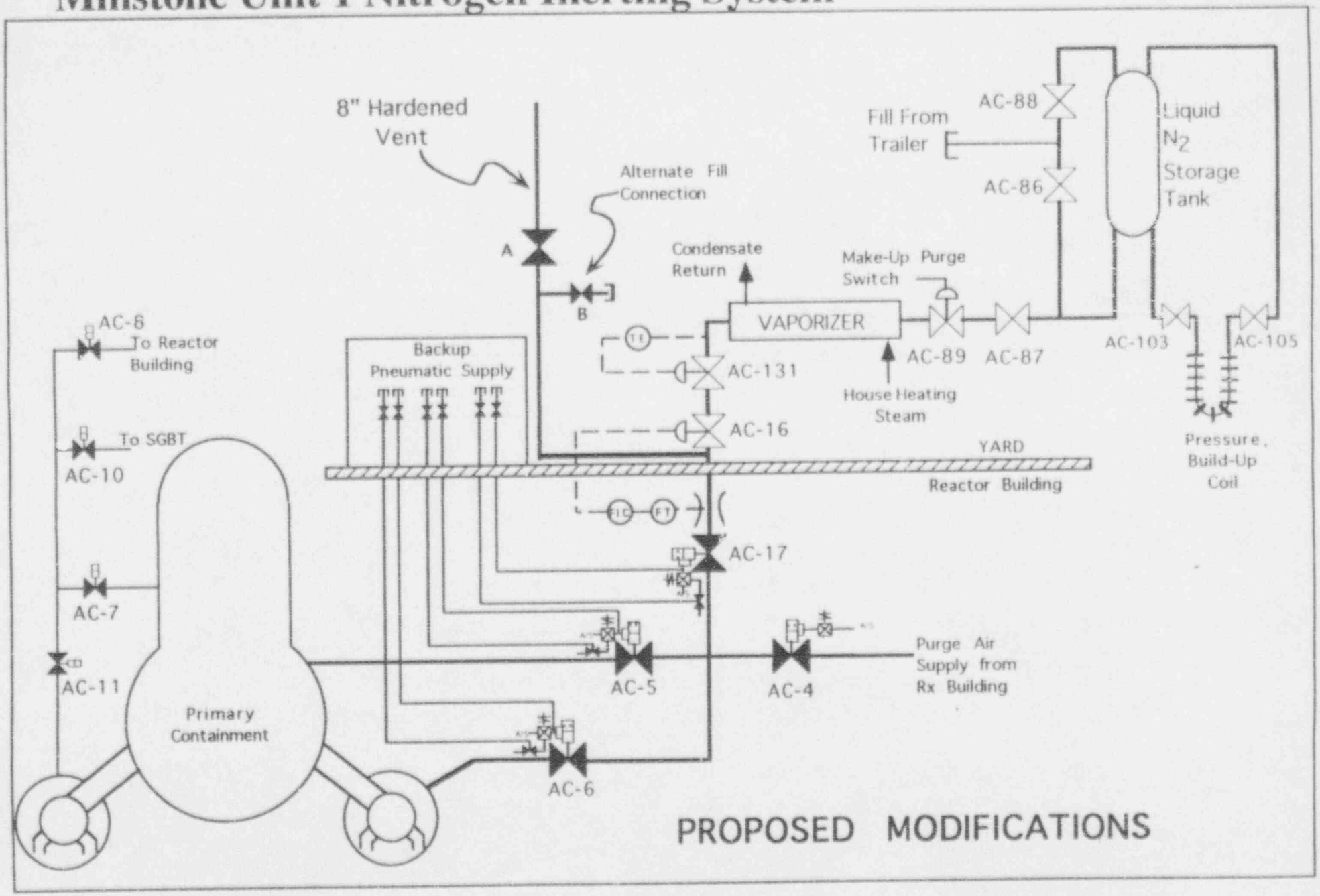
- **INSTRUMENT AC**
  - REQUIRED FOR NORMAL PLANT OPERATION
  - NORMAL AND BACKUP POWER SUPPLIES
  - AUTOMATICALLY LOADED ONTO EMERGENCY POWER SUPPLY
    - MAY BE LOADED ONTO EITHER DIESEL GENERATOR (DG) OR GAS TURBINE GENERATOR (GTG)
  - AC POWER MAY BE OBTAINED FROM MILLSTONE UNIT NO. 2 CROSSTIE

- **INSTRUMENT AIR**
  - 2 AIR COMPRESSORS (RECENTLY UPGRADED)
  - 1 COMPRESSOR AUTOMATICALLY LOADED ONTO GTG
    - OTHER CAN BE MANUALLY LOADED ONTO DG
  - RECENT MODIFICATIONS TO INCREASE AIR RESERVOIR SIZE
  - STATION AIR COMPRESSOR MAY BE UTILIZED AS BACKUP
  - MILLSTONE UNIT NO. 2 AIR SYSTEM MAY BE CONNECTED AS BACKUP
  - AIR MAY BE MANUALLY SUPPLIED FROM PORTABLE BOTTLES

- **INSPECTION AND TESTING**
  - SYSTEM WALKDOWN BY PLANT EQUIPMENT OPERATOR EACH SHIFT
    - INCLUDES TANK LEVEL AND PRESSURE
  - CIV SURVEILLANCE TESTING
    - IN-SERVICE TESTING
      - STROKE TIME TESTING
    - APPENDIX J LEAKRATE TESTING
  - SYSTEM OPERATIONAL TESTING
    - TESTED BY ROUTINE OPERATION OF THE SYSTEM
    - TESTED BY INERTING THE PRIMARY CONTAINMENT DURING STARTUP OR FOLLOWING DRYWELL ENTRY

- **MAINTENANCE**
  - UNIT PERSONNEL PERFORM MAINTENANCE ON SYSTEM
    - FAMILIAR WITH SYSTEM
  - ROUTINE PREVENTIVE MAINTENANCE ON CIVs
  - CORRECTIVE MAINTENANCE INITIATED BY TROUBLE REPORT
  - NO AREAS OF CONCERN WITH PERFORMANCE OF COMPONENTS
  - INSTRUMENTS CALIBRATED
    - NITROGEN FLOW TRANSMITTER - ANNUALLY
    - VAPORIZER LOW TEMPERATURE CUTOFF SWITCH - EVERY TWO YEARS

Millstone Unit 1 Nitrogen Inerting System



PROPOSED PLANT IMPROVEMENTS

- ALTERNATE NITROGEN SUPPLY
  - ALTERNATE FILL CONNECTION WOULD BE PROVIDED OUTSIDE OF RB
  - DISCUSSIONS WITH CURRENT NITROGEN SUPPLIER INDICATE ADDITIONAL NITROGEN COULD BE PROVIDED WITHIN 8 HOURS
    - NITROGEN GAS CURRENTLY PREFERRED CHOICE DUE TO AVAILABILITY
- ALTERNATE PNEUMATIC SUPPLY TO CIV ACTUATORS
  - INSTRUMENT TUBING WOULD BE PROVIDED TO ACTUATE AIR OPERATED VALVES WITH PNEUMATIC SUPPLY FROM OUTSIDE OF RB
- MINOR MODIFICATION TO NITROGEN SKID PIPING
  - THREADED FITTINGS WOULD BE INSTALLED TO ADDRESS VULNERABILITY STUDY FINDINGS

SYSTEM EVALUATION

- IDENTIFIED IMPORTANT DESIGN CHARACTERISTICS
- REVIEWED APPROPRIATE PROCEDURES
- EVALUATED POSTACCIDENT SYSTEM PERFORMANCE
- PERFORMED VULNERABILITY STUDY

- **NIS VULNERABILITY STUDY**
  - ASSUMPTIONS
    - RB IS INACCESSIBLE
      - NO REPAIR IN THE RB IS CREDITED
    - REPAIR OR REPLACEMENT OF COMPONENTS OUTSIDE RB IS CREDITED IF COMPONENT IS:
      - ACCESSIBLE, AND
      - SCREWED OR FLANGED, AND
      - MAY BE ISOLATED FROM NITROGEN TANK
    - NO REPAIR OF WELDED COMPONENTS IS CREDITED

- CONCLUSIONS
  - MOST COMPONENTS OUTSIDE THE RB CAN BE REPAIRED OR REPLACED
  - FOR SOME COMPONENT FAILURES, EASY ALTERNATIVES ARE AVAILABLE
    - UTILIZE ONSITE EQUIPMENT
  - SOME COMPONENT FAILURES WOULD REQUIRE ALTERNATE NITROGEN SUPPLY
  - RELATIVELY SIMPLE MODIFICATIONS COULD SIGNIFICANTLY IMPROVE THE RELIABILITY OF NIS

•RESULTS OF VULNERABILITY STUDY

VULNERABILITY	ACTION
FAILURE OF PRESSURE BUILD-UP CIRCUIT FOR LIQUID NITROGEN TANK	REPAIR, REPLACE, OR UTILIZE NITROGEN BOTTLE WITH A REGULATOR (FOR PRESSURIZATION); OR PROVIDE ALTERNATE NITROGEN SUPPLY
FAILURE OF PRESSURE, TEMPERATURE, OR MANUAL VALVES IN NITROGEN SUPPLY LINE	REPAIR, REPLACE, OR UTILIZE MANUAL OPERATION WITH ACTUATOR(S) BYPASSED; OR PROVIDE ALTERNATE NITROGEN SUPPLY
LOSS OF HHS	PROVIDE ALTERNATIVE NITROGEN SUPPLY; OR UTILIZE BACKUP STEAM SUPPLY

VULNERABILITY	ACTION
FAILURE OF VALVES IN HHS SUPPLY	REPAIR, REPLACE, OR BYPASS ; OR PROVIDE ALTERNATE NITROGEN SUPPLY
FLOW, TEMPERATURE, AND PRESSURE CONTROL INSTRUMENTATION	REPAIR, REPLACE, OR BYPASS
FAILURE OF AC-5 OR -6	ALTERNATE INJECTION LOCATION WOULD BE SELECTED
FAILURE OF SOLENOIDS ON AC-5 OR -6	ALTERNATE INJECTION LOCATION WOULD BE SELECTED; OR UTILIZE ALTERNATE PNEUMATIC SUPPLY TO ACTUATOR

VULNERABILITY	ACTION
LOSS OF INSTRUMENT AIR TO AC-5, -6	REPAIR; OR UTILIZE BACKUP AIR SUPPLY; OR UTILIZE ALTERNATIVE PNEUMATIC SUPPLY TO ACTUATOR
LOSS OF INSTRUMENT AC TO AC-5, -6	REPAIR OR BYPASS; OR UTILIZE ALTERNATE PNEUMATIC SUPPLY TO ACTUATOR

- **DESIGN AND OPERATIONAL CHARACTERISTICS OF AC-17**
  - VALVE IS A QUARTER TURN BUTTERFLY VALVE
    - RUGGED VALVE
    - VALVE IS USED ROUTINELY
    - ALWAYS NITROGEN INERTED
    - NORMALLY OPERATED WITH LITTLE OR NO ΔP
    - EXCELLENT OPERATIONAL HISTORY
      - NO RECORDED FAILURES TO OPEN
        - REVIEW ENCOMPASSED LAST 9 YEARS
      - SURVEILLANCE/TESTING ADDRESSED IN TECHNICAL SPECIFICATIONS
    - PREVENTIVE MAINTENANCE IS PERFORMED ON THE VALVE

- ACTUATOR IS SPRING-RETURN AIR-OPERATED
  - RUGGED DESIGN
  - NO RECORDED FAILURES IN RECORDS ATTRIBUTED TO ACTUATOR ASSEMBLY
    - REVIEW ENCOMPASSED LAST 9 YEARS
- SOLENOID ENVIRONMENTALLY QUALIFIED
  - POWER SUPPLY IS INSTRUMENT AC
    - SOLENOID COULD BE BYPASSED BY SUPPLYING AIR DIRECTLY TO THE ACTUATOR
- CONCLUSION
  - A NON-CORRECTIBLE FAILURE OF AC-17 IS VERY UNLIKELY
  - NEED NOT BE POSTULATED

- **RESULTS OF SYSTEM EVALUATION**
  - NIS IS USED ROUTINELY
  - PROCEDURES EXIST FOR NIS OPERATION
  - NIS CAN BE USED IN AN LNP
  - CAPABILITY TO BYPASS CIV INTERLOCKS CURRENTLY EXISTS FROM CR
  - PRELIMINARY RESULTS INDICATE NIS CAPABLE OF PRESSURIZING CONTAINMENT TO 50% OF DESIGN (31 PSIG)
  - PRELIMINARY RESULTS INDICATE POSTACCIDENT NITROGEN FLOW RATES ARE:
    - >1,100 SCFM AT LOW DRYWELL (DW) PRESSURE
    - ABOUT 500 SCFM AT 50% DESIGN PRESSURE
  - PROBABILISTIC RISK ASSESSMENT EVALUATION SHOWS ONLY MINIMAL BENEFIT OF UPGRADING NIS
    - BENEFIT < O.5 MAN-REM/YEAR

POSTACCIDENT OPERATION

- **CURRENT EOPs**
  - CONSISTENT WITH REV. 4 EMERGENCY PROCEDURE GUIDELINES
  - CONTAINMENT IS NOT PRESSURIZED TO CONTROL H_2/O_2 CONCENTRATION
  - CONTAINMENT IS VENTED THROUGH THE VENT VALVES
    - NIS IS USED TO SWEEP GASES IN CONTAINMENT AND DILUTE VENT FLOW
    - VENTING FLOW PATH
      - IF DW RADIATION < 40,000 R/HR
        - TO THE STACK THROUGH SOFT DUCTS WITH RB FANS OPERATING
      - IF DW RADIATION > 40,000 R/HR
        - TO THE RB
        - SBGT IS ALIGNED TO TAKE SUCTION FROM THE RB

- **EOPS FOLLOWING INSTALLATION OF HARDENED VENT**
  - CURRENTLY PLANNED TO BE USED FOR VENTING DUE TO HIGH DW PRESSURE
  - VENTING PATH TO CONTROL H2/O2 WOULD REMAIN THROUGH VENT VALVES
    - NIS WOULD CONTINUE TO BE USED TO SWEEP GASES IN CONTAINMENT
  - PLAN TO REVISIT VENTING STRATEGY
  - USE OF NIS TO PRESSURIZE CONTAINMENT WOULD BE DEFERRED UNTIL RESOLUTION OF GENERIC ISSUE WITH BWROG

HARDENED WETWELL VENT PROJECT

- AS A RESULT OF REVIEW OF NIS, AN ALTERNATE HARDENED WETWELL VENT DESIGN WAS IDENTIFIED
- INITIATIVE TO INVESTIGATE FEASIBILITY OF ALTERNATE DESIGN ONGOING
- PRELIMINARY INDICATIONS ARE THAT ALTERNATE DESIGN COULD RESOLVE BOTH THE COMBUSTIBLE GAS CONTROL AND HARDENED WETWELL VENT ISSUES WITH CONSIDERABLE COST SAVINGS
- MODIFICATIONS WOULD REMAIN SCHEDULED FOR INSTALLATION DURING CYCLE 14
    - PURSUIT OF ALTERNATE LEAST-COST DESIGN WOULD RESULT IN DELAY OF PREVIOUS COMMITMENT TO IMPLEMENT MODIFICATION DURING SCHEDULED OUTAGE OF SUFFICIENT DURATION
    - EXPECT THAT DESIGN COULD BE FINALIZED BY AUGUST 1993

- ADVANTAGES OF ALTERNATE DESIGN
  - COST OF COMBUSTIBLE GAS CONTROL ALTERNATE PNEUMATIC SUPPLY TO AC-5, -6, -17 INTEGRAL TO MAKING HARDENED WETWELL VENT AC-INDEPENDENT
  - ALTERNATE NITROGEN SUPPLY CONNECTION WOULD BE INSTALLED ON VERTICAL SECTION OF HARDENED WETWELL VENT PIPING
  - SIMPLIFIED DESIGN
    - ELIMINATES ADDITION OF DC MOTOR-OPERATED CIV AND ASSOCIATED CONTROLS
    - ELIMINATES ADDITION OF RUPTURE DISK
    - INSTALLATION OF LARGE REACTOR BUILDING PENETRATION NOT REQUIRED
    - SIGNIFICANT PORTIONS OF MODIFICATION COULD BE INSTALLED DURING PLANT OPERATION

- CHARACTERISTICS OF ALTERNATE DESIGN
  - MEETS BWROG/NRC DESIGN CRITERIA FOR TW SEQUENCE
    - VENT FLOWRATE IS APPROXIMATELY 50,800 SCFM
  - AC-INDEPENDENT
  - DISCHARGE ON SIDE OF RB
  - UTILIZES EXISTING RADIATION MONITOR

SUMMARY

- THE EXISTING NIS IS A RELIABLE SYSTEM AND COULD FUNCTION UNDER CERTAIN ACCIDENT CONDITIONS
- A THOROUGH EVALUATION HAS BEEN CONDUCTED AND VULNERABILITIES OF THE EXISTING NIS HAVE BEEN IDENTIFIED
- PROPOSED IMPROVEMENTS WOULD RESULT IN ONLY MINIMAL BENEFIT TO SAFETY
- PROPOSED IMPROVEMENTS WOULD INCREASE POSTACCIDENT SYSTEM RELIABILITY AND CAPABILITY BY ADDRESSING VULNERABILITIES
- PROPOSED IMPROVEMENTS TO THE NIS SHOULD BRING THIS LONG STANDING ISSUE TO CLOSURE
- SYNERGY BETWEEN COMBUSTIBLE GAS CONTROL ISSUE AND HARDENED WETWELL VENT INSTALLATION COULD RESULT IN CONSIDERABLE SAVINGS