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Docket No. 50-244

MEMORANDUM FOR: Frank J. Miraglia, Assistant Director
for Safety Assessment, DL

FROM: Daniel R. Muller, Assistant Director
for Radiation Protection

SUBJECT: R. E. GINNA NUCLEAR POWER PLANT EFFLUENT RADIOACTIVITY MONITORING SYSTEM ALARM SETPOINTS AND SURVEILLANCE REQUIREMENTS (TAC NO. 49342)

In accordance with the subject TAC dated February 15, 1983, the Meteorology and Effluent Treatment Branch (METB) has completed the review and evaluation of the alarm setpoints and operational surveillance requirements for effluent radioactivity monitoring systems contained in the report (Item No. 3) titled "Responses to Long Term Commitments in Ginna Steam Generator Tube Rupture Incident Restart Safety Evaluation Report" submitted by Rochester Gas and Electric Corporation and dated November 22, 1982.

During our review, we visited Ginna Station and observed the effluent radioactivity monitoring systems in operation, and discussed with the licensee the basis for the monitor alarm setpoints, the monitor operational surveillance requirements and the plant procedures for operating and calibrating the monitoring systems. Based on our review of the report and discussion with the licensee, we find that the corrective actions taken by the licensee, subsequent to the incident, are acceptable and that monitoring systems in operation meet the requirements specified in NUREG-0737 (Item II.F.1, Attachment 1) and Standard Review Plan Section 11.5.

Our safety evaluation of effluent radioactivity monitoring systems is enclosed for inclusion in the supplemental issue to Ginna Restart SER (NUREG-0916) on implementation of long term commitment items.

This review was performed by Jay Lee (x27637), and any questions may be directed to him.

Original signed by
Daniel R. Muller

Daniel R. Muller, Assistant Director
for Radiation Protection
Division of Systems Integration

Enclosure:
As stated

cc: See next page

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SAFETY EVALUATION

EFFLUENT RADIOACTIVITY MONITORING SYSTEM ALARM SETPOINTS
AND OPERABILITY SURVEILLANCE REQUIREMENTS

GINNA STEAM GENERATOR TUBE RUPTURE INCIDENT
RESTART SER LONG TERM COMMITMENTS

1.0 INTRODUCTION

The unmonitored release pathway for airborne radioactive materials from the R. E. Ginna Nuclear Power Plant to the environment during the steam generator tube rupture incident involved two effluent radioactivity monitoring systems:

(1) The main steam radiation monitoring system, which is designed to detect, indicate, record, alarm, and quantify radioactive materials released from the steam generator PORVs and safety valves; and

(2) The air ejector radiation monitoring system, which is designed to detect, indicate, record, alarm, and quantify releases of radioactive materials in noncondensible gases from the secondary system steam via the air ejector and turbine gland seal exhaust.

During the incident, a high radiation alarm setting for main steam radiation monitoring system was not reached and this prevented the system from activating the recorders. Later attempts to retrieve the data from the monitoring data processing system also failed due to a malfunction of the monitor during the incident. The licensee stated in his incident evaluation report that the monitor malfunction is believed to have been due to a small smudge of dirt or residue which caused electrical leakage on a printed circuit board. In addition, the steam generator PORV and safety valve position monitoring function failed during the incident. The licensee states that inadequate adjustment

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1.0 of the new actuator rods installed on the safety valves, and open sliding links on terminal blocks in the relay room for the PORV, caused the inoperability of the valve position monitor.

For the air ejector radiation monitoring system, the SPING R-15A low range monitor actuated a high radiation alarm during the incident, and was suspected of having been off scale after activating the SPING R-15A middle range monitor. However, while the low range monitor was off scale, no 10-minute average radiation readouts or recordings were obtained from the SPING R-15A middle range monitor because its high alarm setpoint was not reached and this prevented the system from activating the recorder.

Subsequent to the incident, the licensee made corrections on alarm setpoints for both main steam and air ejector effluent radiation monitors. Therefore, the staff had no safety concerns prior to Ginna restart; however, the staff stated in the Ginna Restart SER (NUREG-0916) that we will review and evaluate the licensee's corrective actions for both main steam and air ejector radiation monitoring systems within three months subsequent to the plant restart.

2.0 EVALUATION

2.1 Main Steam Radiation Monitoring System

In our evaluation, we have reviewed (1) the adequacy and basis of the monitor high alarm setpoints, (2) the monitor operability surveillance program, (3) the monitor ranges and sensitivity with respect to their capability to cover accident conditions, and (4) procedures or calculative methods to be used for converting monitor readings to release rate per unit time.

2.1 Subsequent to the incident, the alarm setpoint has been lowered to 0.1 mR/hr from 1.0 mR/hr. The alarm setpoint of 0.1 mR/hr is just above ambient background radiation levels to provide maximum sensitivity while preventing spurious alarms.

The monitoring system consists of a collimated energy-compensated Geiger-Mueller detector (Eberline Model SA-11) on each main steam line, and the 0.1 mR/hr alarm setpoint is calibrated to a radioactivity concentration of 0.01 uCi/cc (Xe-133) in main steam. The monitor has a maximum range of 10^3 uCi/cc (10^4 mR/hr) which is consistent with the requirements specified in NUREG-0737 (Item II.F.1, Attachment 1). The monitor is capable of functioning both during and following design-bases accident.

The system indicates radioactivity readouts locally, and in the main control room and Technical Support Center (TSC). An audible alarm sounds locally and in the main control room. The monitor system can be programmed to automatically print radioactivity concentrations in main steam for the last 24 hourly averages once a day and the last 23 ten minute averages every four hours. In the demand mode, the last 24 daily averages, the last 24 hourly averages, and last 23 ten minute averages, and the current value for radioactivity concentration (uCi/cc) and/or release rate (uCi/sec) can be printed.

The system is functionally tested quarterly in accordance with Ginna Test Procedure TP-17.3, Rev. 10, dated September 9, 1982. Activation of recorders for radiation level, as well as safety valve and atmospheric steam dump valve

2.1 positions, are verified on receipt of a high alarm signal by the portable source. Subsequent to the incident, the licensee has (1) lowered alarm setpoint, (2) inspected and replaced affected monitor printed circuit boards which caused monitor malfunction, (3) readjusted actuator rods installed on the safety valves which caused the inoperability of the valve position monitoring, and (4) implemented operational surveillance test procedures. Based on our observation of the monitors in operation, our review of the licensee's calibration and test procedures, consistency with the requirements specified in NUREG-0737, and corrective actions taken by the licensee subsequent to the incident, we find the main steam radiation monitoring system to be acceptable.

2.2 Air Ejector Radiation Monitoring System

In our evaluation, we have reviewed (1) the adequacy of readouts and recording capability, (2) the adequacy of all monitor alarm setpoints, (3) the monitor operabilty surveillance program, (4) the procedures or calculative methods to be used for converting the monitor readouts to release rate per unit time, and (5) the need to provide a continuous and instantaneous indicator-recorder (strip chart), in addition to the 10-minute average readouts in the computer to indicate release rate of airborne radioactive materials from the air ejector exhaust to the environment.

The system consists of two radiation monitors: the R-15 monitor and the SPING R-15A monitor. The R-15 monitor is a sodium iodine detector (Victoreen Model No. 843-03) mounted on the outside of the 8-inch diamenter exhaust pipe and

2.2 has a range of 10^2 to 10^6 cpm gamma radiation (equivalent to 0 to 0.1 uCi/cc). The response of this monitor is recorded on a strip chart and also fed to a computer. During the incident, the strip chart recorder for the R-15 monitor went off scale.

The SPING R-15A monitor (Eberline Model SPING-4) is a high range monitor and has three sensitivity ranges with a separate detector for each range.

Range	Detector	Range, uCi/cc	Alarm Setpoint, uCi/cc
Low	beta scintillation	10^{-6} to 0.05	2×10^{-4}
Middle	compensated GM tube	2.8×10^{-5} to 10	2×10^{-2}
High	compensated GM tube	0.03 to 10^5	2

Subsequent to the incident, the high range monitor (R-15A) alert and high alarms for low, middle and high range channels have been reset to correspond to a percentage of the plant release rate limit and have been specified in Ginna Operating Procedure P-9, Rev. 33, 'Radiation Monitoring System' dated January 18, 1983. Setpoints are preset so that an alarm is activated by a higher range monitor before the lower range monitor goes offscale. In addition, the lowest range monitor of R-15A will alarm before R-15 reaches full scale.

The high range monitor (R-15A) readout, recording and alarm capabilities and programmabilities are identical to those of the main steam radiation monitors. In addition, the monitor readouts are automatically printed every 10 minutes in the control room and TSC, if any R-15A channel reaches a high alarm condition

2.2 while the alarm condition exists. Both monitor operability surveillance programs require (1) daily channel check, (2) monthly source check, (3) quarterly functional test, and (4) annual channel calibration.

The monitor operating procedures and calculative methods to be used for converting the monitor readouts to release rates are described in Ginna Operating Procedure PC-23.5, Rev. 1, dated March 2, 1983. Since neither instantaneous meteorology parameters nor release rates are used for accident dose calculations, a strip chart recorder, in addition to the 10 minute average readouts in the computer, is not needed for the high range monitor.

Based on our observation of the monitors in operation; our review of the licensee's operational, calibration, and test procedures; consistency with the requirements specified in NUREG-0737 and Standard Review Plan Section 11.5; and corrective actions taken by the licensee subsequent to the incident, we find the air ejector radiation monitors (R-15 and R-15A) to be acceptable.

3.0 CONCLUSIONS

Based on the foregoing evaluation, we conclude that the corrective actions taken by the licensee subsequent to the steam generator tube rupture incident are adequate and, therefore, we find that the main steam and air ejector radiation monitoring systems in operation are acceptable. The basis for acceptance in our review has been (1) conformance of the systems to the

3.0 requirements specified in NUREG-0737 (Item 11.F.1, Attachment 1) and Standard Review Plan Section 11.5, (2) our observation of the monitoring systems in operation, (3) our satisfactory review of Ginna operating and calibration procedures for the monitoring systems, and (4) adequate monitor alarm setpoints and satisfactory operational surveillance requirements.