U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-454/84-33(DRSS); 50-455/84-26(DRSS); 30-17034/84-01(DRSS)

Docket Nos. 50-454; 50-455; 30-17034 Licenses No. CPPR-130; CPPR-131; 12-05650-18

Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, IL 60690

Facility Name: Byron Station, Units 1 and 2

Inspection At: Byron Site, Byron, IL

Inspection Conducted: May 21-23, 29-31, and June 1 and 5-6, 1984

Inspectors: L. J. Hueter for — 7/10/84 Date

C. F. Gill for — 7/10/84 Date

Approved By: L. R. Greger, Chief
Facilities Radiation Protection Section — 7/10/84 Date

Inspection Summary:

Inspection on May 21-23, 29-31, and June 1 and 5-6, 1984 (Reports No. 50-454/84-33[DRSS]; 50-455/84-26[DRSS]; 30-17034/84-01[DRSS])
Areas Inspected: Routine. unannounced inspection of preoperational radiation protection program for Units 1 and 2 and review of a material control problem under the byproduct material license. The inspection included organization, staffing, training, radiation protection procedures, facilities, instruments, equipment, status of certain preoperational systems demonstrations and tests, status of certain NUREG-0737 items, and a review of HEPA/Charcoal filter housing drain systems. The inspection involved 138 inspector-hours on site by two NRC inspectors.
Results: No items of noncompliance were identified.

DETAILS

1. Persons Contacted

J. Bartleman, System Test Engineer
*W. Burkamper, QA Supervisor, Operations
*R. Flahive, Assistant Technical Staff Supervisor
M. Graham, Technical Staff
*E. Grennan, Technical Staff
*R. Gruber, QA Engineer
D. Herrmann, Chemist
D. Lyon, System Test Engineer
P. Myrda, QA Supervisor
K. Passmore, Ventilation Group Leader
*R. Poche, Technical Staff
D.Prisby, Systems Test Engineer
*R. Querio, Station Superintendent
D. St. Clair, Technical Staff Supervisor
*A. Scott, Health Physicist
A. Selep, Systems Test Engineer
W. Smith, Systems Test Engineer
*L. Sues, Assistant Superintendent, Maintenance
J. VanLaere, Rad/Chem Supervisor
*R. Ward, Assistant Superintendent, Administrative and Support Services
*K. Weaver, Station Health Physicist
T. Weis, Project Engineer (Corporate)

G. Contrady, Construction Project Engineer (S&L)
T. Khemmani, Electrical Project Engineer (S&L)
G. Sensmeier, Control and Instrumentation Project Engineer (S&L)

*P. Brochman, NRC Resident Inspector
K. Connaughton, NRC Resident Inspector
J. Hinds, Jr., NRC Senior Resident Inspector

*Denotes those present at the exit meeting.

2. General

This preoperational inspection, which began about 1:00 pm on May 21, 1984, was conducted to examine the preoperational radiation protection program, radwaste systems, certain systems demonstrations and tests, and progress made on certain NUREG-0737 items. The inspection included tours of the turbine building, auxiliary building, and radwaste building.

3. Organization, Staffing, and Training

The inspectors reviewed the RCT certification program in radiation protection, the respiratory protection program, and the whole body counting program.

The RCT certification program is now complete in both chemistry and radiation protection. Respirator fit testing, training, and medical evaluations are now complete except for guard force personnel. The licensee plans to complete fit testing, training, and medical evaluation of the guard force by July 1st. When ready to implement the respiratory protection program, the licensee anticipates notifying the commission in writing pursuant to 10 CFR 20.103(g). Baseline whole body counting is now complete for plant personnel and applicable contractors. The inspector reviewed the problem, identified at other facilities, of inadequate sensitivities when attempting to use sodium chloride as an aerosol when fit testing rebreather type respiratory protection equipment. The licensee has neither rebreather type respiratory protection equipment nor does the licensee use sodium chloride as the aerosol when fit testing respiratory protection equipment.

Items remaining to be completed in this area include respiratory fit testing, training, and medical evaluations of the guard force. Open Item 50-454/84-10-03; 50-455/84-08-03 remains open.

4. Radiation Protection Procedures

The inspectors reviewed the status of radiation protection procedures needed by fuel load.

The remaining radiation protection procedures needed by fuel load have all been written, reviewed by applicable groups (including the onsite review organization), and approved for implementation. The inspectors also reviewed with the licensee two IE Information Notices and related radiation protection procedures. Licensee procedure BRP 1220-4, "Personnel Dosimetry Placement", was reviewed with regard to IE Information Notice No. 81-26, Part 3, "Placement of Personnel Monitoring Devices for External Radiation Exposure." The licensee procedure appears to adequately address this matter. Licensee procedure BRP 1620-1, "Radiological Precautions for Diving Activities in the Plant", was reviewed with regard to IE Information Notice No. 82-31, "Overexposure of Diver During Work in Fuel Storage Pool". Although the procedure addresses the concerns, the licensee is considering revising a portion of the procedure to better define underwater survey procedures.

Since the inspection conducted in early March 1984, NRR has reviewed the licensee submitted offsite dose calculation manual (ODCM). Following the review, NRR submitted to the licensee a list of comments and requests for additional information. The licensee plans to respond with additional information to NRR by June 30, 1984.

Items remaining to be completed in this area include NRR's final review of the ODCM. Open Item 50-454/84-10-04; 50-455/84-08-04 remains open.

5. Facilities, Instruments, and Equipment

The inspectors reviewed the status of installation of personal decontamination, laundry, and respiratory equipment facilities; installation of portal monitors; and review of area monitor calibration data.

The personal decontamination facility is complete. The laundry facility is not complete. The non-skid floor remains to be installed. Although most of the equipment is physically in the room, much of it is not connected to utilities. The licensee plans to complete installation of the laundry facility by July 1, 1984. The respiratory protection equipment cleaning, maintenance, inspection and issuance facility is now approximately 75% complete with completion expected by mid-June 1984. Seven portal monitors are on site (in storage) and an additional one is on order. The licensee still plans to have these portal monitors installed and operational three weeks before fuel load.

As noted during the last inspection, all area monitor detectors, both GM and ion chamber types, were calibrated with either a cesium-137 or cobalt-60 primary source (NBS traceable) at General Atomic before being delivered to the licensee. After installation at the plant, the response was verified to be within ±15% at two different exposure rates using a double ended cesium-137 source which has been cross calibrated to the primary source. The cross calibration data received by the licensee from General Atomic will be reviewed during a future inspection. Records of detector type calibration and individual detector electronic calibrations, permitted for upper ranges of the containment high range monitor, will also be reviewed during a future inspection. Correlation of the response of the high range containment monitors to containment gases is by a licensee developed computer code. Review of containment high range radiation monitors is discussed in Section 8.

Items remaining to be completed in this area include installation of laundry and respiratory protection equipment facilities, installation of portal monitors and review of area monitor calibration data. Open Item 50-454/84-10-05; 50-455/84-08-05 remains open.

6. Process and Radwaste Effluent Monitors

The inspectors reviewed calibration of selected liquid monitors; reviewed plans for fluid (gas and liquid) calibration/linearity checks of monitors during startup; determined the status of setpoints for monitors; and observed the status of installation and in-place testing of HEPA and charcoal filters in various filter trains.

During a previous review of liquid monitor initial calibration data, it was observed that the data did not include documentation of any comparison of the secondary source count rate with a reference count rate. During this inspection, selected liquid monitor calibration data were reviewed. It was observed that the calibration procedure, including the data record sheet, has been revised and is in use such that the comparison is now made and documented to demonstrate that the specified acceptance criteria is met. The licensee continues to plan the performance of fluid (gas and liquid) calibration/linearity checks of montitors during startup to correct the shortcomings of the interim calibration checks indentified in Inspection Report 50-455/84-10. The licensee now has two procedures written and approved for establishing set points for area monitors, process monitors, and radwaste effluent monitors, including functions such as trips and isolations. These procedures are BRP 1280-9, "Area Radiation Monitoring System Alert and High Alarm Setpoints" and BRP 1280-10, "Process Radiation

Monitoring Systems Alert and High Alarm Setpoints." Installation and in-place testing of HEPA and charcoal filters in various filter trains has not begun.

Items remaining to be completed in this area include fluid (gas and liquid) calibration/linearity checks of monitors during startup, and installation and in-place testing of HEPA and charcoal filters in various filter trains. Open Item 50-454/84-10-06; 50-455/84-08-06 remains open.

7. Preoperational Systems Demonstrations and Tests

a. Status of Previously Reviewed Demonstrations and Tests

(1) OG 2.55.20 Off Gas

Of the two significant deficiencies remaining open during the last inspection, one has been closed. Testing of the interlocks on process monitor PR 027 has now been completed, approved, and the deficiency closed. Deficiency OG 8865 regarding inplace filter testing of charcoal and HEPA filters in the off gas filter train remains open and is scheduled by the licensee for completion by inital criticality.

(2) GW 2.38.10 Radioactive Waste Gas

The only significant deficiency remaining open during the last inspection has been closed. Following repair of the pressure controller on the suction side of the waste gas compressor, the compressor was retested and now meets the test criteria. The retest was approved and the deficiency closed.

The unresolved item (50-454/84-10-02; 50-255/84-08-02) identified in this area during the last inspection remains open. This item concerns bypass of an isolation valve on the waste gas exhaust line. Followup of this matter has been assigned to the NRC resident inspectors. Resolution of the item is in progress and will be covered in a future inspection report by the resident inspectors.

(3) WX 2.106.20 Radwaste Reprocessing Tanks and Pumps

Of the five significant deficiencies remaining open from the last inspection, one has been closed. The installation of the check valve on the Unit 1 condensate storage system has been completed, approved, and the deficiency closed. The other four deficiencies, all involving the spent resin storage tank, remain open. Deficiencies WX 3344 and WX 3345, involving installation of level indicators on the spent resin storage tank, has been completed except for functional demonstration. Deficiencies WX 3341 and WX 3342, involving current load testing of pumps, are still open but the activity will be completed at the same time

as the functional demonstration of the level indicators. Licensee personnel stated that action on all four of these deficiencies should be completed and the deficiencies closed before fuel load. Tank curve data has been completed for the liquid release tank.

b. Status of Demonstrations and Tests not Previously Reviewed by Inspectors

(1) AR 2.06.10 Area Radiation Monitors

This test (to demonstrate proper operation of RM-11 software, to verify reflash capability, and to verify proper closure time for certain interlocks) has been completed and reviewed by the licensee. Of the four licensee identified deficiencies which remain open (all of which were verified as being tracked by the licensee), one appears to be of significance. It is designated as Deficiency AR 11356 (scheduled by the licensee for completion by fuel load) and involves problems encountered with the two RM-11 control modules (located in the reactor control room) which provide display and storage of data for area monitors. Each RM-11 is designed to handle all monitor data to prevent loss of data in the event one of the RM-11s is out-of-service. Further, when the out-of-service RM-11 is brought back on line (bootstrap), it is designed to recover all data from the other unit and do this within a specified time. The initial problem identified was the loss of some data in the transfer following a bootstrap. This initial problem has been solved by a modification in the RM-11 software. However, with a three or four fold increase in data collected with multi-detector monitors, the RM-11s can not now re-establish all communications with individual monitors in the currently allotted time following a bootstrap. This problem is under evaluation by the licensee.

(2) AR 2.06.11 Area Radiation Monitors (Loop 1)

This test has been completed and reviewed by the licensee. No deficiencies remain open; however, one deficiency was transferred to an Action Item Record (AIR) and is being tracked by the licensee under that system. AIR 6-84-011 involves preoperational testing of area radiation monitor IRT-AR025, IRT-AR026, and IRT-AR027 and associated equipment after equipment and monitors are installed and calibrated. These supplemental monitors are high range area monitors considered necessary following issuance of Regulatory Guide 1.97, Revision 2 (issued December 1980), in order to satisiy post accident considerations. These monitors, which will be installed near containment penetration areas, have been ordered and are expected to arrive about September or October 1984. Following receipt of equipment, installation and calibration, preoperational testing will take place and is expected by the licensee to be completed after Unit 1 fuel load but before the first refueling. No problems were identified during the inspectors' review.

(3) AR 2.06.15 Area Radiation Monitors (Loop 5)

This test has been completed and reviewed by the licensee. No deficiencies remain open. No problems were identified during the inspectors' review of this preoperational test package.

(4) PR 2.60.11 Process Monitors (Loop 1)

This test has been completed and reviewed by the licensee. Of the three licensee identified deficiencies which remained open at the time of this inspection, none appeared to be of significance. Verification was made that all three deficiencies are being tracked by the licensee. No problems, other than those noted by the licensee, were identified during the inspectors' review.

(5) PR 2.60.12 Process Monitors (Loop 2)

This test has been completed and reviewed by the licensee. Of the four licensee identified deficiencies which remained open at the time of this inspection, all four appear to be of significance. Two of the deficiencies, Deficiency PR 8857 (AIR 6-84-038) and Deficiency PR 10754 (scheduled by the licensee for completion by operational Mode 4) involve a problem whereby operation of certain PR skids will cause the normal sample panel to be isolated from Unit 1 steam generator blowdown and then will not permit de-isolation. The licensee is considering a design change to resolve this problem. The other two deficiencies, Deficiency 10656 and Deficiency 11219 (also scheduled by the licensee for completion by operational Mode 4) are both expected to be corrected by an RM-80 software change being prepared by General Atomics (GA) for installation by late June 1984. Deficiency 10656 involves PR detectors with background channels which, under certain combinations of failures and conditions, may cause rapid toggling of interlock status, resulting in multiple alarms. Deficiency 11219 involves PR integrating channels (iodine and particulate detectors) for which radiation levels will change by a factor of about three when the pump is first turned on and off which may result in spurious high radiation alarms and/or interlock alarms. This problem is believed caused by the way certain calculations are made in the RM-80 software. Verification was made that all four deficiencies are being tracked by the licensee. No problems other than those noted by the licensee were identified during the inspectors' review.

(6) PR 2.60-13 Process Monitors (Loop 3)

This test has been completed and reviewed by the licensee. Of the six deficiencies which remained open at the time of this inspection, (all of which were verified as being tracked by the licensee), one appears to be of significance. Deficiency 10071 (scheduled by the licensee for completion by fuel load) involves spurious noise signals above alarm/interlock set points of PR

detectors immediately following the startup of PR skid pump motors. Deficiency 10071 is also expected to be corrected by the RM-80 software change being prepared by GA for installation by late June 1984. No problems other than those noted by the licensee were identified during the inspectors' review.

(7) PR 2.60.14 Process Monitors (Loop 4)

This test has been completed and reviewed by the licensee. Of the five licensee identified deficiencies which remained open at the time of this inspection, none appeared to be of significance. Verification was made that all five deficiencies are being tracked by the licensee. No problems, other than those noted by the licensee, were identified during the inspectors' review.

(8) PR 2.60.16 Process Monitors (Wide Range Gas Monitors)

This test has been completed and reviewed by the licensee. Of the nine licensee identified deficiencies which remained open at the time of this inspection (all of which were verified as being tracked by the licensee and scheduled for completion by operational Mode 5), six appear to be of significance. Three of the deficiencies are expected to be corrected by the RM-80 software change being prepared by GA for installation by late June 1984. These three are Deficiency 12381, involving failure of a pump to restart following a power failure; Deficiency 12665, involving a loss of counts after a power failure; and Deficiency 12666, involving a problem with software cycling on "instrument failure alarm." Deficiency 10866 involves a possible nonconservative release rate calculation due to the off gas exhaust system entering the vent system down stream of the flow transducer from which data is used to calculate release rate. Deficiency 10865 involves piping installed with long horizontal runs and upward slopes (contrary to vendor recommendations) which may cause particulate deposition (plate out) and nonrepresentative samples at the skid. Deficiency 10872 involves sharp bends in the inlet piping for low range samples which may result in particulate deposition (plate out) and nonrepresentative samples at the filter and grab sample container. Some additional problems, other than those noted by the licensee, were identified with the wide range gas monitor system during the inspectors' review, and are discussed in Section 8.

(9) WX 2.106.22 Radwaste Demineralizers and Filters

This test has been completed and reviewed by the licensee. One licensee identified deficiency appearing to be of significance remains open. Deficiency 11051 involves acid feed pump AC04P which has insufficient head for regenerating resins. This deficiency was verified as being tracked by the licensee and is scheduled by the licensee for completion by Operational Mode 2. No problems other than those noted by the licensee were identified during the inspectors' review.

(10) WX 2.106.21 Radwaste Evaporators

This test has been completed and reviewed by the licensee. Numerous (about 40) licensee identified deficiencies remained open at the time of this inspection and are scheduled by the licensee for completion by initial criticality. However, the licensee's goal is to complete the corrective actions and close all of these deficiencies by early July 1984. For many of the problems, corrective work has been completed with only the functional tests remaining to be completed. The inspectors verified that the deficiencies are being tracked by the licensee. No problems other than those noted by the licensee were identified during the inspectors' review.

(11) WX 2.106.23 Stock Equipment

This test has been completed and reviewed by the licensee. Numerous (about 27) licensee identified deficiencies remained open at the time of this inspection and are scheduled by the licensee for completion by low power testing. However, the licensee's goal is to complete the corrective actions and close all of these deficiencies by early July 1984. For many of the deficiencies, corrective work has been completed with only functional tests remaining to be completed. The inspectors verified that the deficiencies are being tracked by the licensee. No problems other than those noted by the licensee were identified during the inspectors' review.

(12) PS 2.61.10 Post-Accident Sampling System

This test has been completed and reviewed by the licensee. Numerous (about 45) licensee identified deficiencies remained uncorrected at the time of this inspection. However, many of these deficiencies have been closed out to Action Item Records or Contruction Work Records. For many of the deficiencies, corrective work has been completed with only functional tests remaining to be completed. The inspectors verified that the deficiencies are being tracked by the licensee. Several problems other than those noted by the licensee were identified during the inspectors' review of this system, and are discussed in Section 8.

According to licensee personnel, the following systems demonstrations and tests are at the percentage completion indicated:

PR 2.60.10	Process Monitors	0%
PR 2.60.15	Process Monitors	100%

Although the latter system test has been completed, the test package is not through all stages of final review and approval by the licensee and therefore was not available as a complete package for the inspectors' review.

The licensee no longer plans to conduct the integrated performance test of the radwaste (WX) system but does plan to verify proper operability by running the whole system after all deficiencies have been resolved and closed.

The licensee has recently increased the priority on the completion and operation of the volume reduction (VR) facility designed by Aerojet. Although not considered necessary by the licensee, the licensee has established a goal of having the VR facility operational by fuel load. Aerojet plans to start-up the unit about mid-July for "fine tuning" which is estimated to take four to six weeks following which the facility will be turned over to the licensee for systems demonstration testing. Thirty-three tests are planned for the demonstration, all of which have been written except the final one involving the integrated test of the VR facility.

Related to the VR system, Stock Equipment Co has designed a system for solidifying ashes and salts from the VR facility into 55-gallon drums using a Dow Chemical Company polymer as the solidifying agent. The control panel for this unit is not onsite yet but some components are now being installed. A later completion date is expected for this system as some problems with the system remain to be resolved by Stock Equipment. No procedures or tests have been written yet for this system. As an interim measure, the licensee is considering using a vendor to solidify this waste source.

Items to be completed in this area include preoperational testing of some systems; post-test evaluations of some systems; and resolutions of deficiencies identified by the licensee during preoperational testing of area monitors, process and radwaste effluent monitors, and gaseous, liquid, and solid radwaste systems. Open Item 50-454/84-10/10; 50-455/84-08-10 remains open.

8. Status of Certain NUREG-0737 Action Items

The description of licensee actions in response to TMI action items are provided in the FSAR, Appendix E.

a. NUREG-0737 Item II.B.3, Post-Accident Sampling System

Section E-21 of Appendix E describes the post-accident sampling system for reactor coolant and containment atmosphere. The system is a modified Sentry high radiation sampling system (HRSS) consisting of three subsystems: the liquid sample panel (LSP), the chemical analysis panel (CAP) which is attached to the LSP, and the containment atmosphere sample panel (CASP).

The preoperational test (PS 2.61.10) of this system is discussed in Section 7 of this report. In addition to the deficiencies found by the licensee during preoperational testing, the inspectors noted several potential problem areas during a tour of the system; they are discussed below.

A method of calibrating the dilution system on the LSP was discussed with a licensee representative. He indicated the dilution system on the LSP would be tested while collecting the boron sample during the

hot functional test. If the boron test for the dilution system does not seem to be feasible upon detailed evaluation, present plans are to verify the proper calibration of the system by some other as yet undetermined method.

During the demonstration of the method of flushing the liquid sample line, it was noted that the HRSS demineralized water to volume control tank valve 1PS201 position lights did not give a closed indication when that valve was placed in the closed position. This contradiction will need to be resolved in order to ascertain if there is a mechanical valve problem, a control circuitry problem, an interlock between optional discharge pathways, or some other mechanical or electrical reason for the discrepancy. A licensee representative conducting the tour stated that this item would be included in the system discrepancy tracking system.

During the tour of the CASP system, it was noted that the heat tracing for the sample line stopped at the system housing. The licensee representative stated that the heat tracing would be extended to the sample collection location. The licensee had not yet empirically determined sample line loss correction factors for iodine and particulates. The licensee may have to conduct a thermal analysis to determine if a spiral winding heat trace design may be needed rather than the existing single strip running along one side of the line and whether the line should be thermally insulated to assure a uniform sample line temperature.

A gross gamma detector was denoted on the CASP process monitoring panel display diagram. This instrument does not exist for the system purchased; its function has been incorporated into continuous air monitor (CAM) 1PR11J. The licensee representatives on the tour agreed to correct the process diagram display. Special effort is required to assure that CAM 1PR11J will not be a significant source in the post-accident environment. CAM 1PR11J may have to be automatically isolated after it has performed its switching function or shutdown manually by administrative procedure. Other continuous air monitors in the vicinty of the CASP station should also be precluded from constituting post-accident sources. Post-accident radiation survey procedures should consider the CAMs as potential sources.

A number of valves will be moved in the CASP system to reduce ALARA concerns expressed in previous inspections. The heat tracing presently extends to these valves. The inspectors were assured that the heat tracing would be extended to at least the present location on the sample lines even though the valves will be moved away from the sample panel.

Procedures should take note of the possible existence of noble gas in the vapor space of liquid samples when the pressurized primary coolant has not been vented before sampling. The radiation protection aspects of handling a sample of this type should be an integral part of the sample handling procedures.

The LSP system failure to obtain flow from three of the radwaste sample locations and indicated flow below what was expected from four of the demineralizer sample locations was described in NRC Inspection Reports 50-454/84-10 and 50-455/84-08. New system components have been installed in an effort to correct these deficiencies. These new throttle valves and flow meters have yet to be component tested.

Training and procedures for use of the HRSS are still incomplete.

Items to be completed in this area include: (1) LSP dilution system calibration; (2) HRSS demineralizer water to volume control tank valve 1PS201 position indication correction; (3) CASP heat tracing modifications; (4) determination of CASP sample line loss correction factors for iodine and particulates; (5) correction of the CASP process diagram display; (6) elimination by design or procedure of potentially significant post-accident source terms represented by CASP sample station area CAMs including the CASP system CAM, 1PR11J (and 2PR11J); (7) procedures incorporating the radiation protection aspects of handling significant airborne activity in a liquid sample vial post-accident; (8) correction of the LSP system to obtain design basis sample flow; and (9) HRSS training and procedures.

b. NUREG-0737 Item II.F.1.1, High Range Noble Gas Effluent Monitors

The inspectors reviewed the status of the accident range noble gas effluent monitoring system (NUREG-0737 Item II.F.1.1).

The accident range noble gas effluent monitoring system consists of a General Atomic wide range gas monitor for the auxiliary building vent, and area monitors (compensated for loss of low energy gamma radiation) mounted external to each of the four main steam lines upstream of the safety and relief valves. Installation is complete for both systems. The preoperational tests for the area monitors on the main steam lines (Preoperational Test AR 2.6.11) and the wide range gas monitors (Preoperational Test PR 2.60.16) are completed and are discussed in Section 7.

The licensee has not yet developed station procedures to correct for the low energy gammas that the externally mounted main steam line monitors would not detect. The inspectors were supplied by the licensee with a copy of a Sargent & Lundy preliminary procedure to convert the main steam line monitor reading to the specific activity of the steam. This procedure, dated October 21, 1983, has not been modified for use as a formal station procedure with associated personnel training. Justification is needed for extending the conversion factor curve to only 188 hours post-shutdown. The current display for these monitors is not continuous and recording as equivalent Xe-133 concentrations or uCi/cc of actual noble gases as required by NUREG-0737. The licensee does not yet have station procedures for converting instrument readings to release rates based on exhaust air flow and considering radionuclide spectrum distribution as a function of time after shutdown.

A number of concerns were identified by the inspectors on the ability of the installed General Atomic Wide Range Gas Monitor (GA WRGM) to adequately meet the requirements of Item II.F.1, Attachement 1, NUREG-0737. These concerns were discussed with the licensee, who subsequently assigned internal responsibility to review the matter for future resolution with the inspectors. Some of those concerns are discussed below.

Several commitments for the GA WRGM are given in Section E.30 of Appendix E to the FSAR, including: (1) the monitor will receive power from ESF buses, is designed to meet the 1E requirements, and is qualified to IEEE 323-1974; (2) the isotopic analysis of the gaseous grab sample will establish the correlation between effluent monitor reading and plant release rate; (3) the calibration techniques and procedures including the energy dependence of the detectors will be provided to meet the requirements of NUREG-0737. The following information was obtained concerning the above commitments: (1) although the monitor is connected to ESF buses, it is not listed on the IEEE 323-1974 Equipment Qualification status list (Status Report) in either the harsh or mild environment category; (2) the licensee representative was not aware of gaseous grab sample capability of the monitoring system nor of procedures related to using the isotopic analysis of the gaseous grab sample to determine the plant release rate from the effluent monitor reading; and (3) calibration techniques and procedures have not bee developed to meet the energy dependence criterion of Clarification (4)(b); Item II.F.1, Attachment 1, NUREG-0737.

The shortcomings of the FSAR NUREG-0737, II.F.1.1 commitment implementation were discussed with licensee representatives. The GA WRGM system components will be on the next CQD status report. The equipment qualification reports for that system are presently unreviewed and unapproved. Licensee representatives were informed that their tentative plans to use a single isotope at three different strengths for each of the systems' three noble gas detector assemblies may not be an adequate calibration to meet the requirements of Clarification (4)(b), Item II.F.1, Attachment 1, NUREG-0737. Energy and concentration dependency of the three detector assemblies are required in order to develop procedures or calculational methods to be used for converting instrument readings to release rates, based on exhaust air flow and considering radionuclide spectrum distribution as a function of time after shutdown. The licensee representative was informed that a letter from J. H. Winso (GA Techologies, Inc.) to J. E. Wigginton (NRC, IE) dated July 22, 1983, stated that: (1) due to the unique characteristics of the GA WRGM detectors, they require a direct calibration of each unit to reach an optimum accuracy figure; (2) GA is in the process of recalibrating all detectors in the field to insure an optimum accuracy, and all customers of the system have been notified of this policy. It does not appear that the generic primary calibration documentations supplied by GA will be adequate for determining the energy and concentration dependency required ' develop the procedures or calculational methods needed to satisfy Clarification (4)(b), Item II.F.1, Attachment 1, NUREG-0737 for the Byron GA WRGM noble gas detectors.

Design features, or lack thereof, of the installed GA WRGM which may adversely effect the accuracy of the noble gas measurements include: (1) the isokinetic maintenance feature; (2) reduced pressure compensation; and (3) heat tracing of the sample lines. The GA WRGM maintains the isokinetic sample line flow over varying stack flow rates within ± 25% of nominal stack flow. Beyond that range the sample line flow rate reverts back to the nominal value independent of actual stack flow. The sampler flow rate does not now display or record on the GA RM-11 system (a licensee representative plans to contact GA to see if that parameter may be added to the system). To calculate the noble gas release rate from the monitor reading, the associated procedure will need to accommodate recorded data on stack flow, sampler flow, and monitor sensitivity as a function of time post-shutdown. A licensee representative plans to contact GA to see if the RM-11 system is capable of storing and processing the time dependent monitor sensitivity curves.

The measurement of the radioactivity of the gas flowing through the detection chamber may have to be compensated to reflect the reduced pressure of the chamber relative to the pressure at the point of sample intake.

The contacted licensee representative indicated that the GA WRGM system, as far as he knew, did not automatically correct for this pressure drop and that no station procedures existed to make manual corrections. Nuclear power facilities holding an operating license or construction permit were informed of this problem by IE Information Notice No. 82-49, "Correction For Sample Conditions For Air and Gas Monitoring," dated December 16, 1982.

The Byron Station GA WRGM auxiliary building vent stack high range sampling lines have an initial vertical run of approximately 75 feet in the stack, a horizontal run of several feet, an upward vertical run of about two feet, then a number of horizontal and vertical sections which eventually lead to the detector assemblies. The longest sample line is about 130 feet with a diameter of 1/4 inch and a nominal flow rate of .06 cfm. The high range sample lines have a large number of right angle bends, lack heat tracing, and are not thermally-insulated. (The low range sample lines [1.67 cfm system] have the same basic design flaws.) The low horizontal section between the two vertical sections of the Byron Station high range sampling line constitutes a potential water trap, due to condensation in the two adjacent vertical segments, unless the line is heat traced. If the condensed water fills the low horizontal sample line section, the air flow in the sample line would be blocked.

The readout for all three GS WRGM noble gas channels is currently expressed as Xe-133 concentrations, determined by calibration of the detectors with Xe-133 gases. The NUREG-0737 requirement is to have a display which is continuous and recording as equivalent Xe-133 concentrations or uCi/cc of actual noble gases. This display and all associated technical parameters are required by NUREG-0737, Clarification II.F.1.1.(4)(b) to consider radionuclide spectrum distribution as a function of time after shutdown. Among the technical parameters

which need to be modified to accomodate this requirement are (1) detector assembly range including amount of range overlap between individual detector assemblies; (2) the setpoints for switching between the low range sampling system and the high range sampling system and the calculated associated iodine concentrations; (3) noble gas concentration; and (4) noble gas release rates.

The inspectors were supplied with copies of two GA WRGM documents; (1) GA Report No. E-115-647 (Rev. 4), "Calibration Report for Model RD-52 Offsite Beta Detector," January 1983; and (2) GA Report No. E-255-961 (Rev. 2), "Calibration Report RD-72 Wide-Range Gas Monitor High and Mid-Range Detectors," January 1983. A licensee representative also agreed to obtain two more documents for the inspectors: (1) GA Report No. E-115-865 (Rev. 2), "Wide Range Gas Monitor Equipment Manual," September 1982; (2) Byron Transfer Calibration Procedure 0366-9010.

Station procedures and personnel training will be required to accomodate the technical aspects discussed in this inspection report for the GA WRGM system.

Items to be completed in this area include: (1) MSL monitor display modification, procedures, and training; (2) wide range gas monitor (WRGM) equipment qualification review, FSAR Appendix E commitment review, calibration, sample chamber pressure compensation review, heat tracing, sample line design review, setpoint review, NUREG-0737 II.F.1.1.(4)(b) detector assembly response curve development, detector assembly range re-evaluation, document acquisition, display modification, procedures, and training. Open Item 50-454/84-10-08; 50-455/84-08-08 remains open.

c. NUREG-0737 Item II.F.1.2, Sampling and Analysis of Iodine and Particulate Effluents

The inspectors reviewed the status of the accident range iodine and particulate effluent sampling system. The iodine and particulate sampling system is a part of the General Atomic system described above for Item II.F.1.1 and provides for obtaining grab samples from the auxiliary building vent and subsequent analysis of samples using facilities in the counting room or in an auxiliary counting set-up in the turbine building.

Since the last inspection, the licensee has modified procedures and attached labels to various filter trains to properly identify the grab sample filter trains. Also, preoperational testing of this system (a part of Preoperational Test PR 2.60.16) has been completed. As noted in Section 7, the licensee identified two deficencies during the preoperational test concerning sample line losses. These deficiencies , which remain open, are discussed in further detail in this section.

A number of concerns were identified by the inspectors on the ability of installed equipment to adequately meet the requirements of Item

II.F.1, Attachment 2, NUREG-0737. Certain of these concerns were forwarded to the Office of Nuclear Reactor Regulation (NRR) for resolution: GA WRGM sample line loss correction factors, design basis shielding envelope, and heat tracing requirements. Line loss correction factors have not been empirically determined by the licensee. These losses may be quite high for the design sample line size and flow rate. The design basis shielding envelope used by the licensee yields a source term which is approximately seven orders of magnitude less than the shielding source term given in NUREG-0737, Table II.F.1.2. Heat tracing appears necessary to preclude water traps as discussed above for Item II.F.1.1, to minimize deposition of iodine vapor and particulates on the inner surfaces of sampling lines, and to prevent excessive moisture on the collector which may destroy filter media usefulness either by blocking the air passageways or by weakening the filter media to a point that it tears or breaks easily.

Several additional concerns, noted below, were also identified.

Potential difficulties associated with the sampler include: (1) either the grab sample time must be long compared to the time it takes to pull the uncontaminated air from the connecting sample tubing through the sample media and long compared to the sample isolation valve's operating time or the effective sampling time must be verified; (2) labels should be placed on the grab sample timer control panel to clarify which timer controls the low range sampling system and which timer controls the high range sampling system; (3) care must be taken to reverse blow the silver zeolite with uncontaminated (bottled) air before analysis; (4) the design of the sampler cask should be analyzed to ensure that no pathway for radiation streaming exists; (5) the configuration of the sampling system should reflect a design such that airborne contamination leakage from the sample lines and sampler are precluded, or at least controlled by a ventilation system drawing the activity away from the operators, while the grab sample is being removed; (6) the weight of the transfer shielding cask should be within the capacity of the associated dumb waiter; (7) the transport vehicle design for the sample cask should make practicable use of separation distance to reduce the radiation exposure; (8) if the activity loading on the sample media is quite high, it may be necessary to analyze only a fraction of the sample in order to remain within the analysis ability of the station GeLi detectors; and (9) the sample media qualifications need to be considered as to whether the silver zeolite will accommodate the iodine mass loading associated with the II.F.1.2 source term, whether the collection efficiencies of the sample media are adequate given the residence times for the low and high range systems and whether the face velocity over the sample media is within acceptable limits. The progress on addressing these issues will be reviewed during a future inspection.

The contacted licensee representative was unable to provide evidence that a time and motion dose study had been performed to determine if the GA WRGM high range sampling system iodine and particulate filters

could be collected without exceeding the GDC-19 dose criteria (5 rem whole body and 75 rem extremity). Access to the skid area for the purpose of collecting the iodine cartridge and particulate filters is required to satisfy the criteria of NUREG-0737, Item II.F.1, Attachment 2. The licensee representative had done an approximate shielding dose evaluation of the exposure rate due to a design basis accident sampler source. The source strength was many orders of magnitude less than that required by NUREG-0737. As discussed above, Region III has asked NRR for specific guidance in determining an acceptable source term for use by the licensee. Upon resolution of this matter, the licensee will need to accurately model the sample shielding and transportation casks as part of the required time and motion dose study. Also as part of this study, the licensee should determine the exposure contribution of all background shine sources, including: (1) the routine vent sampling system skids which are located in the same room as the GA WRGM skids; (2) the source activity in the adjacent auxiliary building vent plenum; (3) the low range sampling system source based on iodine and particulate loading calculated from the setpoints used to automatically switch between the low and high range sampling system; and (4) all the NUREG-0737, Item II.B.2. design basis accident source terms along the ingress and egress routes as well as in the vicinity of the WRGM sampling skid. The routine vent sampling system should be shutdown automatically when the WRGM switches on the high range sampling system or manually by administrative procedure. The post-accident survey procedure needs to specifically consider the filters on the routine vent sampling system skids as a potential source. The licensee time and motion dose study will be reviewed during a future inspection.

Station procedures and personnel training will be required to accommodate the technical aspects discussed in this inspection report for the GA WRGM system.

Items to be completed in this area include: (1) sample line loss correction factors determination; (2) shielding source term criteria development; (3) sample line heat tracing and installation detail design work; (4) adequacy analyses of sampler design specifics; (5) time and motion dose study; (6) station procedures; and (7) personnel training. Open Item 50-454/84-10-01; 50-455/84-08-01 remains open.

d. NUREG-0737 Item II.F.1.3, Containment High Range Radiation Monitors

The containment high range monitors have been installed, calibrated and preoperationlly tested (Preoperational Test AR 2.6.11). As noted in Section 5, review of electronic calibration data, source calibration data, and cross calibration data remains to be completed. The review of the preoperational test is presented in Section 7.

Items remaining to be completed in this area include review of calibration data for the containment high range radiation monitors.

9. Filter Housing Drain Systems

Several ESF and non-ESF HVAC filter housings were inspected to ascertain if the design and construction commitments made in Appendix A to the FSAR for filter housing drain systems have been met. The systems reviewed were the Technical Support Center (TSC) emergency makeup air system, the Control Room emergency makeup air system and the offgas system. Regulatory Guide 1.52, Revision 2, March 1978 (Regulatory Position 3.h) and Regulatory Guide 1.140, Revision 0, October 1978 (Regulatory Position 3.e) state that the filter housing water drains should be designed and constructed in accordance with the recommendations of Section 4.5.8 of ERDA 76-21 and Section 5.6 of ANSI N509-1976. These recommendations include piping all unplugged drains to the radwaste system and individually valving, sealing, or otherwise protecting drain lines from individual chambers of the housing to prevent bypassing of contaminated air around filters or adsorbers through the drain system.

The TSC emergency makup air system filter housing has six drains. Three drains are capped and three are individually piped to the floor drain. The three drain lines are primarily designed to accommodate the deluge system runoff and contain water check valves to preclude water backing up the floor drain system into the filter housing. The drain lines represent a potential bypass pathway around the filters.

The floor drain system apparently goes to the low conductivity waste sump and eventually, unmonitored, to the environment via the settling ponds or the cooling towers rather than to the radwaste system in accordance with the licensee's FSAR commitment. It was also noticed that the three filter housing drain lines were not hard piped to the floor drain, thereby creating the potential for contaminated water to flood the floor of the HVAC equipment room.

The Control Room emergency makeup air system filter housing also has three drain lines which have water check valves and which individually lead to floor drains. These drain lines represent a potential bypass pathway around the filters also. It was also noted that the drain lines were not hard piped to the floor drains. The inspectors did not check to see if the control room HVAC equipment room floor drains lead to the radwaste system. A licensee representative stated that he would do this at a later date.

The offgas filter housing has three drain lines which tie into a common header with a water check valve before each cross-tie. This design violates the criterion of individual line valving and thus features ready-made pathways by which air flow can bypass a filter then re-enter the housing as well as the means by which all the filters may be bypassed at once. The inspectors did not check to see if the drains lead to the radwaste system. A licensee representative stated that he would do this at a later date.

The above findings were discussed with licensee representatives. The inspectors requested that the licensee representatives check the other station filter housings to see if they also failed to meet FSAR design and

construction commitments and to take action to correct any deficiencies. The licensee representatives were reminded that filter bypass concerns exist for: (1) ESF and non-ESF systems (normal and accident operational conditions); (2) positive and negative pressured housings (both in leakage and outleakage); (3) systems with and without charcoal adsorbers; and (4) all types of HVAC systems (effluent, makeup, and recirculation). The progress on addressing this issue will be reviewed during a future inspection.

Items to be completed in this area include: (1) elimination of potential filter bypass due to improper filter housing drain line configurations of the TSC emergency makeup air, Control Room emergency makeup air, and offgas systems; (2) rerouting the TSC emergency makeup air system filter housing drain discharge to the radwaste system; (3) hardpiping the filter housing drain lines to the floor drains for the TSC emergency makeup air, Control Room emergency makeup air, and offgas systems; (4) conducting a trace of the filter housing drain line discharge pathways for the Control Room emergency makeup and offgas systems; and (5) conducting an FSAR commitment survey of the station filter housing drain system design and construction, and taking corrective action as applicable. This matter remains unresolved pending the results of the licensee commitment survey. (50-454/84-33-01; 50-455/84-26-01).

10. Control of Material Received Under Byproduct Material License 12-05550-18

The inspectors reviewed the licensee's actions in response to a licensee identified problem regarding receipt of several small non-sealed americium-241 sources for laboratory counting purposes which contained more activity per source than permitted in the license.

Three sources each contained 0.032 microcuries of americium-241 whereas the license only permitted 0.01 microcuries of americium 241 in a non-sealed form per source. A radiation protection procedure, BRP-1530-1, which requires personnel ordering radioactive material to inform the Station Health Physicist or the Rad/Chem Supervisor, who are to assure that the material, form, and quantity complies with license conditions, was not followed. The Chemist and Engineering Assistant who ordered the material did not inform the required supervisory personnel, although training had been received by the individuals regarding the procedure. Upon learning of the problem, the sources were promptly returned to the supplier. NRC Region III was promptly notified and the matter, was reviewed with the entire Rad/Chem group.

11. Exit Meeting

The inspectors met with licensee representatives (denoted in Section 1) at the conclusion of the inspection on June 6, 1984. In response to certain items discussed by the inspectors, the licensee:

a. Acknowledged the inspector's comments regarding licensee progress in completing preoperational tests/demonstrations of area, process, and effluent monitors as well as gaseous, liquid, and solid radwaste systems and licensee progress in the followup and closeout of deficiencies identified during these tests/demonstrations. It was noted

that although the licensee has recently placed a higher priority on completion of the radwaste volume reduction system, no preoperational testing has begun nor is any scheduled for a number of weeks. (Section 7)

b. Acknowledged inspector identified potential problem areas associated with the Post-Accident Sampling System. (Section 8.a)

c. Acknowledged the inspectors' concerns regarding the ability of the high range noble gas effluent monitors, on the auxiliary building vents and on the main steam lines, to meet the criteria of NUREG-0737, Item II.F.1, Attachment 1. (Section 8.b)

d. Acknowledged the inspectors' concerns regarding the ability of the post-accident iodine and particulate effluent sampling system on the auxiliary building vents to meet the criteria of NUREG-0737, Item II.F.1, Attachment 2. (Section 8.c)

e. Acknowledged the inspector's observation that the reviewed HVAC filter housing drain systems did not appear to meet the FSAR, Appendix E design and contruction commitments. (Section 9)