U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-219/93-18

Docket No. 50-219

License No. DPR-16

Licensee: GPU Nuclear Corporation
1 Upper Pond Road
Parsippany, New Jersey 07054

Facility Name: Oyster Creek Nuclear Generating Station (OCNGS)

Inspection Period: August 23-26, 1993 and October 18-20, 1993

Inspector: Lonny Eckert 10/28/93
Lonny Eckert, Radiation Specialist
Facilities Radiation Protection Section
Date

Approved By: for Robert Bores 10/28/93
Robert Bores, Chief
Facilities Radiation Protection Section
Date

Areas Inspected

ALARA, RIRs, QA audits, air and swipe sample counting facilities, and radiological controls organization staffing.

Results

Good efforts have been made concerning source term reduction. Improvements were noted concerning the air and swipe sample counting facilities and radiological controls organization professional staffing. The lack of timely corrective actions for some radiological discrepancies developed under the RIR process was considered a radiological controls program weakness. No violations of regulatory requirements were identified.

DETAILS

1.0 Personnel Contacted

1.1 Station Personnel

* F. Applegate, OQA Monitor
* J. Barton, Director OCNGS
W. Collier, GRWSS
* W. Cooper, Radiological Engineer
J. Derby, ALARA** Supervisor
* B. DeMerchant, OCNGS Licensing Engineer
* S. Levin, Director, Operations and Enforcement
T. Milligan, Radiological Engineer
D. Reppert, Radiological Engineer
* R. Shaw, Radiological Controls Director (RCD)
J. Stump, Radiological Engineer

Other licensee personnel were contacted during the inspection.

1.2 NRC Personnel

S. Pindale, Resident Inspector
D. Vito, Senior Resident Inspector

* Denotes attendance at the exit meeting.
** ALARA = As Low As is Reasonable Achievable

2.0 ALARA

2.1 ALARA audits/appraisals/surveillances

NRC Inspection Report No. 50-219/93-06 provided a brief review of licensee audit S-OC-92-11. The audit review covered a period of September 24, 1992 until January 14, 1993 (covering 14R {the fourteenth refueling outage}). No significant ALARA concerns were noted, but several minor discrepancies were noted by the licensee audit team. The licensee audit team noted the following strengths pertaining to the station ALARA program.

- actions by radiological controls staff to modify engineering controls to effectively minimize exposure
- actions taken by Radiological Controls Technicians (RCTs) to minimize exposure
- worker adherence to radiological work standards improved over the level of performance identified in previous audits

In summary, sufficient licensee audit team attention was placed on evaluating the ALARA program. Additional QA attention is warranted in this area to ensure effective new Part 20 implementation (a January 1, 1994 implementation date is planned).

2.2 ALARA program changes and Engineering Design Instructions

A memorandum addressing condenser bay power entries, dated June 16, 1993 was reviewed. This memorandum provides guidance in the form of a flow chart and directs that Radiological Engineering must become involved in the planning process when a job required "... more than minor maintenance or observation and inspection? OR Is the dose estimate for this job estimated to exceed 300 person-rem?" The memorandum also noted that Radiological Engineering was responsible for the determination on whether or not to reduce hydrogen injection. This guidance is important in that nitrogen-16 is present in main steam during reactor operation; nitrogen-16 emits gamma radiation of 6.13 and 7.11 MeV. Hydrogen injection helps reduce the amount of oxygen in reactor water which thereby helps to minimize Intra Granular Stress Corrosion Cracking (IGSCC) in the recirculation piping. Also, when power is reduced there are less neutrons available for activation of oxygen-16. The inspector will follow-up on whether the guidance contained in this memorandum was incorporated into maintenance, operations, and scheduling and planning guidance/procedures in a future inspection.

2.3 Worker Awareness and Involvement in the ALARA Program

A memorandum (6630-92-171), dated December 2, 1992, was initiated by the RCD and distributed to RCTs. This memorandum provided additional guidance concerning planned uptake(s) of radioactive materials. Several RCTs (including Group Radiological Controls Supervisor {GRCS} qualified individuals) were questioned on their views concerning field implementation of ALARA decisions (use/no-use of respiratory protection based on air sample results), the quality of their training in that regard, and the quality of guidance/procedures in that regard. RCTs expressed satisfaction with their training program, in general. RCTs did express concern over the lack of ALARA field guidance and lack of specific training in the area of risk balancing. RCTs have attended several new Part 20 training sessions, but at the time of the inspection, no specialized class on risk balancing had been provided to RCTs. This was recognized by the licensee who planned to provide a specific training session on risk balancing prior to their January 1, 1994 Part 20 implementation date.

2.4 14R ALARA Goals and Performance

In order to provide a complete overview of the licensee's ALARA program, information contained in NRC Inspection Report 50-219/93-06 is repeated here to avoid referencing.

In general, the licensee's ALARA planning program was successful during 14R. Dose savings accrued from early installation of drywell shielding prior to commencing any insulation removal (a window was provided to radiological controls for shielding emplacement), additional drywell shielding (compared to previous refueling outages), prestaging of tools and equipment for high dose rate jobs, and system mock-up training. For example, significant dose savings were realized by placing additional temporary shielding on the recirculation piping, valves, and elbows around the area of the drywell 10' elevation. This additional shielding was estimated to save an additional 30.5 person-rem. The most important aspect of the ALARA performance was the extensive pre-outage planning conducted by all working groups, including early freezing of work scope.

The inspectors reviewed several radiologically significant jobs that were completed during 14R. The inspectors selected jobs and reviewed post job reviews. The post job evaluations noted good practices and problems and areas for improvement for use in future job planning. A brief summary of these jobs is given as follows.

Job	Person-Hours (estimated)	Person-Rem (estimated)	Person-Hours (actual)	Person-Rem (actual)
Drywell In-Service Inspection	203.5	14.225	377.4	7.41
Replace 16 CRDs	299.5	16.05	536.5	14.78
Drywell IRM and SRM detector repair/replace	25.0	12.0	30.0	0.517
Recirculation Pump "D" seal replacement	576.0	7.5	358.0	4.2
Drywell 46-6 Fans 1-1 through 1-5	200.0	1.75	280.4	4.51
Reactor Safety Valve repair (9)	170.0	12.0	838.0	17.0
PASS isolation valve repair	20.0	0.75	53.0	1.3

Good success was noted during Control Rod Drive (CRD) replacement as the licensee was able to reduce respirator usage by 25% over 13R (estimated dose savings of 4.8 Person-Rem) and brought in the services of a vendor with extensive experience in replacing/repairing CRDs (General Electric). The person-hour estimate was off, in part, due to the fact that the estimate assumed that 15 CRDs needed to be replaced and the estimate had not reflected dress-out time (actual person-hours being the same as RWP-hours).

Good success was noted for the Intermediate Range Monitor (IRM) and Source Range Monitor (SRM) repairs as Instrumentation and Controls (I&C) developed a method of performing work on these instruments without damaging their associated cabling.

The inspectors reviewed the ALARA evaluation generated for work on drywell fans to inspect, lubricate, change filters, and replace fan belts. Radiation Work Permit (RWP) 92-1196 was generated to support this work. Also, surveys taken to support this RWP were reviewed. A formal ALARA committee review was not required as the planned collective exposure was less than five rem. Work scope increased to resolve deficiencies found during system inspection; there has been a history of vibrational problems associated with these drywell fans. At the time of the inspection, the licensee was evaluating the feasibility of using fan belts made of an alternative material (e.g., Kevlar was under evaluation). No discrepancies were noted with existing station procedures.

The inspectors reviewed station ALARA Review Number (ARN) 92-046E generated for work in the drywell to install and remove temporary shielding on miscellaneous systems. RWP 92-1291 was generated to support this work. Those general area air sampies reviewed by the inspector noted airborne activity ranging from 1E-8 microCuries/cc to 1E-11 microCuries/cc . As no airborne activity generating work was expected by the radiological controls staff, no job-specific HEPA usage was prescribed by the ALARA review. Licensee lower elevation drywell (13' and 23' elevations) skin contamination dose assessment reports were reviewed. No significant skin contaminations were noted with the most significant exposure noted as 120 millirem to the skin. Licensee whole body counting records for individuals conducting work on RWP 92-1291 (these individuals may have signed on other RWPs as well) from November 28, 1992 until February 16, 1993 were reviewed. No internal exposures greater than 10 MPC-hours were noted by licensee whole body counting. In summary, although such work had been conducted with respiratory protection devices in the past no discrepancies concerning the use of respiratory protection devices were noted with existing station procedures.

As of August 1993, according to licensee ThermoLuminescent Dosimeter (TLD) data, four of the ten lowest dose months (since TLD data has been accumulated as of January 1975) occurred in the current refueling cycle. At the time of the inspection, the TLD low dose month on record is June 1993 with 10.1 person-rem accrued.

2.5 Source Term Reduction

Technical Data Report (TDR) 941, "Exposure Reduction," 3/31/89, was reviewed. The study was initiated to provide a prioritization of exposure reduction options in terms of cost/benefit considerations. The study concluded that drywell occupancy was a disproportionately large factor affecting plant exposures and that productivity improvements could lead to significant reduction in total drywell exposure. The study also concluded that chemical decontamination would provide the greatest short-term benefit.

TDR 1109, "Cobalt Reduction Plan," 2/23/93, was reviewed. This document provided information on Cobalt inputs and provided prioritization of components for replacement. The licensee's study concluded that a significant reduction in exposure was achievable through the replacement of cobalt alloy components without adversely affecting component performance. Design Standard 37210, "ALARA Design Considerations," was revised to include guidelines for cobalt reduction of in-plant components during the design process.

A memorandum, dated June 9, 1993, was initiated by the Radiological Engineering Manager to the Radiological Engineers to provide direction concerning cobalt reduction through the use of low-cobalt replacement components. Also, a memorandum providing similar guidance, dated June 15, 1993, was initiated by the ALARA Supervisor to planning and scheduling. Standing Order (SO) and Instruction SO 93-007, Revision 0, June 21, 1993, "Cobalt Valve Hardened Facing," was reviewed. This instruction directed the selection of non-cobalt hardening materials for valves and other components when it is reasonable to do so. General Maintenance System Two (GMSII) helped facilitate procurement in this regard as this system contains information on valve stellite surface area.

Licensee progress in this area is given in Section 2.6 of this report. See Attachment 1 for a graphical representation of the licensee's three-year rolling average cumulative exposure. While the graph shows OCNGS as being a high exposure BWR, it also shows that source reduction efforts have achieved significant results (the slope of the OCNGS curve is greater than that of the BWR average curve).

In summary, good efforts have been made by the licensee in this area. This area will be reviewed in future inspections.

2.6 A Historical Perspective on Licensee ALARA/Source Term Reduction Projects

2.6.1 Past Projects/Modifications

The following information is intended to provide perspective on the extent of the licensee's actions in regard to source term reduction and maintaining exposures ALARA over the past three outages. The lists contain some of the more significant licensee actions and should not be considered comprehensive.

12R

- The licensee began BWR 6 CRD replacement. Previously, the licensee had rebuilt drives rather than replace them. BWR 6 CRDs contain less cobalt and require less maintenance than previous CRD designs.
- The licensee replaced control rod blade guides which allowed quicker refueling.
- The licensee replaced all 5 Electromagnetic Relief Valves (EMRVs). The upgraded valves were selected as they require less maintenance.
- The licensee began replacement of control cell blades with longer life, low cobalt blades.
- The licensee started to use Low Power Range Monitor (LPRM) replacements with a new design with increased flexibility and quick disconnects (to minimize damage from other under-vessel work).
- The licensee fabricated and installed shield plates for the reactor cavity. The shield plates were not used in 14R due to inadequate projected dose savings (a chemical decontamination had been performed in 13R and it takes about 8 hours to emplace this shield). The licensee was evaluating alternate rigging methods to reduce the time needed to safely emplace this shielding.
- A new reactor water sampling system was installed.
- The licensee used a new CRD changeout handling machine for the first time.

- A drywell fan design modification was implemented in order to reduce maintenance activities conducted on these fans. At the time of this inspection, alternative fan belt materials (such as kevlar) were under evaluation.
- Scram Dump Volume (SDV) hydrolase taps were installed.

13R

- The Hydrogen Water Chemistry (HWC) system became operational.
- A charcoal High Efficiency Particulate Air (HEPA) filter was installed on the reactor building refueling floor to control iodine. This allowed the licensee to ventilate the reactor head prior to removal.
- A standpipe was installed on the Equipment Storage Pool (ESP) drain in order to minimize sludge into the drain line and Reactor Building Equipment Drain Tank (RBEDT).
- Eight control rod blades were replaced; the replacements contained less cobalt.
- Seven Safety Relief Valves (SRVs) were eliminated.
- Reactor Water Cleanup (RWCU) and recirculation piping Low Oxidation State Metal Ion (LOMI) decontamination took place.
- The licensee replaced isolation condenser piping.
- The licensee started to conduct CRD exchanges with two individuals rather than three, thereby decreasing collective exposure for this task.
- A new drywell access facility was opened facilitating better RWP tracking and access control by radiological controls staff.
- The respiratory protection-risk balancing program was initiated (see NRC Inspection Report No. 50-219/93-01 for a description in this regard).
- The licensee replaced the filter septum on RWCU filter "B". This change was initiated to enhance reliability and minimize precoat breakthrough.

14R

- A modification allowing the condensate resin system to be backwashed was initiated to improve iron and cobalt removal in feedwater.
- Fourteen snubbers were replaced with rigid support thereby reducing future ISI requirements.
- A new rigging crane was acquired for the removal of EMRVs and SRVs. Previously removal of these components necessitated an in-air swap to another crane (drywell 51' to drywell 23' to the drywell exit). This eliminated the need for one rigging crew.
- Condenser bay thermocouples were added to determine leakby status of numerous valves to eliminate manual measurements which thereby reduced the need for condenser bay power entries.
- Permanent scaffolding supports were installed in the condenser water box.
- Platforms which improved access and movement in the condenser bay were installed.
- Reactor vessel head removal was accelerated by modification of stud detensioners to latch themselves onto studs, acquisition of a new carrousel for stud detensioner handling, and development of a new detensioning sequence.
- New steam line plugs which required less installation time were used.

- Fuel bundles (100%) were sipped prior to placement in the reactor core.
- Lighter cavity seal covers were used for the first time.
- The cavity grating was disposed. The grating was a large source in the cavity.
- A new method (tubes were pressurized with air rather than water) of testing steam reheater tubes reduced the time needed to conduct this activity by about half.

See Section 2.5 for a conclusion on the licensee's source term efforts.

2.6.2 Outage Shielding

The following table provides the total amount of shielding emplaced within the drywell for the past several outages. To keep this data in perspective, chemical decontamination was performed during 13R. This action reduced the amount of shielding used in 13R. At the time of the inspection, it had been decided not to perform chemical decontamination of the recirculation loops. In lieu of this action, the licensee's Radiological Engineering staff will attempt to use more shielding dependant on weight loading restrictions.

OUTAGE SHIELDING PACKAGES

Outage Number	Outage Dates	Number of Packages	Total Amount (lbs. of lead)
12R	9/30/88 - 5/11/89	36	80,346
13R	2/16/91 - 6/28/91	24	73,001
14R	11/28/92 - 2/16/93	34	98,926

In conclusion, good efforts were noted in the licensee's shielding program as a dedicated outage shielding window was provided by outage planning in 14R (Section 2.4) and seismically qualified shielding scaffolds have been emplaced (the drywell being particularly noteworthy) to minimize dose accrued as a result of emplacing shielding.

2.6.3 Hot Spot Reduction

During an interview with the Radiological Engineering Manager, the inspector was informed that there was no mechanism by which failed flush attempts were documented. The inspector suggested that with the advent of the revised Part 20 ALARA requirement (implementation date of January 1, 1994) it would be beneficial to document such a failed system flush attempt.

2.6.4 Job Comparisons

Recirculation Seal Replacement

Year	Person-rem/Seal	Comments
1993	4.2	
1992	6.1	
1991	4.9	3 seals, 14.6 person-rem total, performed after chemical decontamination
1990	9	
1990	16	
1989	7.5	
1989	12.3	
1987	6.5	150 days of operation after chemical decontamination

Refueling Floor Doses

Outage	Person-rem
14R	44
13R	72
12R	127
11R	123

LPRM Changeout

Outage	Person-rem	Comments
14R	1.7 drywell, .4 refuel floor	9 LPRMs
13R	4.3 drywell, .6 refuel floor	5 LPRMs

2.6.5 Respiratory Protection

As noted in NRC Inspection Report 50-219/93-01, the licensee has implemented a risk balancing methodology with respect to use/no-use of respiratory protection equipment in accordance with the existing Part 20 regulations. Internal exposures are accounted for as MPC-hours in accordance with 10 CFR 20.103. The following table gives perspective of the extent of the licensee's effort in this regard. In summary, the use of respiratory protection devices has declined significantly in the past several outages.

RESPIRATOR USAGE IN THE DRYWELL

Outage Number	RWP Hours	Respirator Hours	Respirator Usage
12R	86,873	12,575	14.5%
13R	70,534	6,073	8.6%
14R	44,320	1,390	3.1%

2.7 ALARA Program Summary

The licensee's source term reduction program has been commensurate with the source term and good results have been noted (Sections 2.5 and 2.6). Continued licensee attention to this radiological controls program area is warranted. In general, ALARA planning has been good. Good efforts were noted in the licensee's shielding program as dedicated outage shielding windows were provided by outage planning (Section 2.4) and seismically qualified shielding scaffolds have been emplaced (the drywell being particularly noteworthy) to minimize dose accrued in shielding emplacement (Section 2.6.2).

Significant concerns have been noted (NRC Inspection Report 50-219/93-07) about the mechanisms by which ALARA reviews are initiated. At the time of this inspection, the licensee was still taking corrective actions in this regard. The adequacy of these actions will be reviewed in a future inspection.

3.0 Radiological Incidence Reports (RIRs)

The RIR process is the system by which radiological discrepancies are evaluated by the radiological controls staff. A station-wide human performance evaluation process provides the system by which the licensee investigates discrepancies resulting from human error and human factors engineering.

For the RIRs reviewed, event investigation was, in general, well performed. Causal analysis was adequate. However, the inspector concluded that additional focus/emphasis should be placed on issues identified during the RIR process that relate to areas of regulatory non-compliance. In several cases, the licensee's process for resolution of RIRs appeared to result in corrective actions of limited scope. While some of the RIRs were completed in an expeditious manner, other RIRs were not completed in a timely manner (see Attachment 2). For example, it took three months to finish causal analysis and seven months to receive final RCD approval on RIR Number 93002. Licensee personnel were not able to provide a reason why it took this amount of time to resolve and approve the actions taken in regards to this discrepancy. In another case, it took four months to finish causal analysis on RIR 93009. Also, the Radiological Engineering Manager and RCD had not completed their review of the actions taken to resolve a February 3, 1993 event (RIR Number 93007) by August 24, 1993. The responsible manager assigned to RIR Number 93007 had completed their actions on February 26, 1993.

The lack of timeliness noted for some RIRs was assessed as a radiological controls program weakness. RIRs will be reviewed in a subsequent inspection.

4.0 Staffing/Organization

The licensee added another Radiological Engineering position and filled this position. Several GRCS positions were not filled at the time of the inspection. As many of the GPU Nuclear technicians were ANSI 3.1 qualified technicians and had been task qualified to serve as GRCSs, no programmatic deficiencies were noted due to these positions remaining unfilled. At the time of the inspection, the licensee was taking actions to fill these positions.

5.0 Air and Swipe Counting Laboratory Facilities

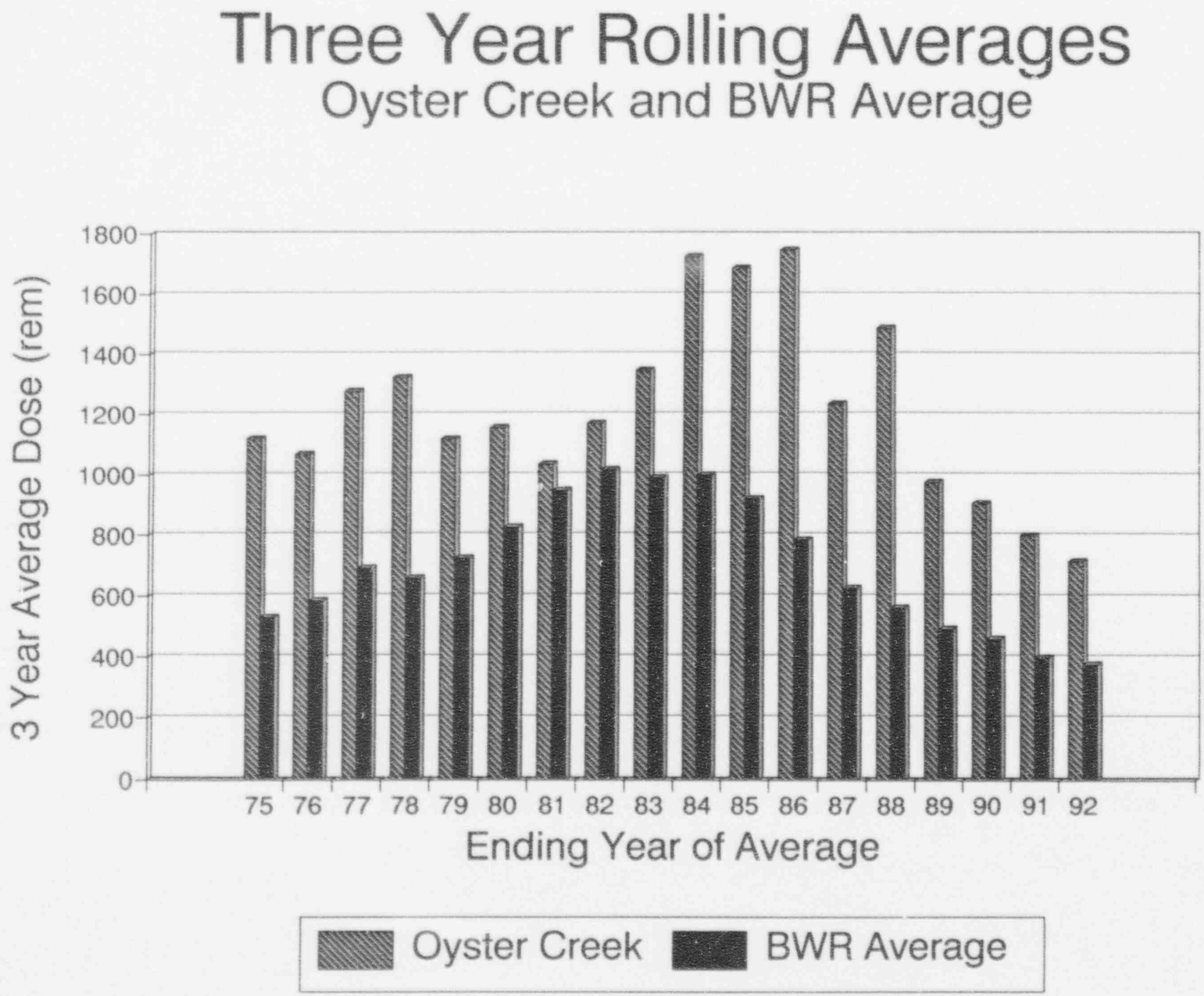
A review of the licensee's counting laboratory was conducted during this inspection. A Radiological Engineer was responsible for this program area. The licensee has implemented the following changes in this area.

- Three desktop computers were acquired to control the High Purity Germanium (HPGe) spectral analysis equipment. Data was backed up on Bernoulli drives.
- New software was implemented for the HPGe spectral analysis systems; this software will help minimize deterministic errors (e.g. improper geometry selection or other calculational errors).
- Air and swipe sample analysis was automated with few user data inputs which will help minimize deterministic errors.

In summary, these changes significantly improved the licensee's air and swipe sample counting facilities.

6.0 Exit Meeting

The inspectors met with licensee representatives at the end of the inspection, on August 26, 1993. The inspectors reviewed the purpose and scope of the inspection and discussed the findings. The RCD acknowledged the weakness noted in Section 3.0 of this report and stated that actions would be taken to resolve it.



ATTACHMENT 1

ATTACHMENT 2

As of 8/24/93,

RIR #	Event Date	Immediate CA	RC Completion Date	CA Analysis Completion Date	RM Completion Date	REM Approval Date	RCD Approval Date
93001	1/13/93	1/14/93	1/26/93	1/25/93	1/25/93	1/27/93	1/29/93
93002	1/21/93	1/21/93	4/12/93	4/12/93	8/17/93	8/19/93	8/23/93
93003	1/25/93	1/26/93	2/5/93	2/5/93	2/17/93	2/19/93	2/19/93
93004	1/26/93	1/29/93	6/22/93	6/23/93	6/23/93	6/30/93	7/20/93
93005	1/30/93	1/30/93	8/17/93	8/17/93	8/12/93	8/19/23	8/23/93
93006	2/6/93	2/6/93	2/11/93	2/22/93	3/22/93	3/25/93	3/26/93
93007	2/3/93	2/8/93	2/25/93	2/25/93	2/26/93	NC	NC
93008	3/11/93	3/11/93	5/20/93	5/20/93	5/20/93	5/21/93	5/25/93
93009	3/16/93	3/17/93	7/20/93	7/20/93	7/20/93	8/6/93	8/6/93
93010	5/7/93	5/15/93	6/22/93	6/22/93	NC#	NC#	NC#
93011	5/11/93	5/11/93	6/22/93	6/22/93	NC#	NC#	NC#

* CA additional corrective actions required
NC not completed
RC root cause determination
RCD Radiological Controls Director
REM Radiological Engineering Manager
RM Responsible Manager

These events were investigated by NRC and were detailed in Inspection Report 50-219/93-07. As of 8/24/93, the licensee and NRC had not completed actions taken in regards to 50-219/93-07, the Notice of Violations and the proposed imposition of civil penalty.