U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos.	50-277/94-02, 50-278/94-02
Docket Nos.	50-277, 50-278
License Nos.	DPR-44, DPR-56
Licensee:	PECO Energy Nuclear Group Headquarters Correspondence Control Desk P. O. Box 195 Wayne, Pennsylvania 19087-0195
Facility Name:	Peach Bottom Atomic Power Station (PBAPS)
Inspection Period:	January 25-28, 1993

Inspector: J Noggle for — L. Eckert, Radiation Specialist — 3/23/94 Date

Approved By: J Noggle for — R. Bores, Chief, Facilities Radiation Protection Section — 3/23/94 Date

Areas Inspected: Contamination control, ALARA, and radiological discrepancy investigation.

Results: The ALARA and contamination control programs were well implemented. Improvement regarding development of more comprehensive corrective actions for radiological discrepancies was noted. No safety concerns or violations of NRC regulatory requirements were identified.

DETAILS

1.0 Personnel Contacted

H. Abendroth, Atlantic Electric Site Representative
* J. Armstrong, Senior Manager Plant Engineering
* S. Baker, Manager Radwaste
* J. Carey, Public Service Electric and Gas Site Representative
* D. DiCello, Manager Radiological Engineering
* G. Edwards, Plant Manager
* R. Farrell, Manager Support Health Physics
A. Fulvio, Nuclear Quality Assurance (NQA) Manager
* G. Gellrich, Senior Manager Operations
R. Knieriem, Site Representative, Delmarva Power
* S. Lee, Engineer, NQA
D. LeQuia, Maintenance Director
G. McCarty, Services Training Manager
* R. Moore, Manager Radiation Protection
* R. Smith, Regulatory Engineer
* B. Wargo, NQA
* T. Wasong, Experience Assessment Manager

Other licensee personnel were contacted during the inspection.

* Denotes attendance at the exit meeting.

2.0 Control of Radioactive Materials and Contamination, Surveys and Monitoring

No changes had been made regarding survey and monitoring equipment for emergency operations. At the time of the inspection, sufficient numbers of monitoring instruments were available for use. These instruments had been source checked in accordance with licensee procedures. The licensee has started using small article monitors. These instruments are described in greater detail in Section 5.0.

No personnel contaminations greater than (>) 100 mrem to the skin were noted in 1993. The licensee defines the need for a Personnel Contamination Report (PCR) as any contamination (including, for example, the bottom of a shoe) >100 cpm over background with a frisker. See Attachment 1 which shows the total PCRs, per year, since 1988. A significant reduction is indicated. Part of this reduction is attributable to lowering the acceptable contamination level of protective clothing to 13,000 dpm/100cm^2 by modifying the licensee's contract with the launderer. The inspector reviewed several PCRs and found that they had been handled in accordance with licensee Procedure HP-818, "Personnel Contamination Monitoring and Decontamination", Revision 7, 3/9/93. NQA concluded in Audit A0680047 that PCRs were being adequately identified and tracked but that investigation and trend analysis could be improved. Tracking of PCRs and how the PCR process relates to the

Performance Enhancement Program (PEP), a discrepancy resolution system used at both PECO Energy stations, will be reviewed in a future inspection.

The inspector conducted tours of selected portions of the reactor and turbine buildings during the course of the inspection. The licensee has held several "cleanup days" in which all station staff participate, including senior station management, to improve plant material conditions. There was noticeable improvement in housekeeping as a result.

3.0 Maintaining Occupational Exposures ALARA

To determine if 10 CFR 20 was being met and whether guidance was being implemented, the inspector conducted interviews, reviewed procedures, reviewed studies, observed work in progress, and reviewed relevant documentation.

3.1 Audits and Appraisals

Licensee Audit Report A0680047, "PBAPS Health Physics Program", issued July 31, 1993, was reviewed. The audit team was composed of six individuals with a mix of health physics experience. One of the individuals on the team was employed by the Pennsylvania Power and Light Company, another utility operating nuclear power plants. Considerable effort was expended on reviewing the ALARA program. The audit team focused on pre/post-job reviews, source term reduction, temporary shielding, modifications, ALARA committees, exposure goal/tracking, and the ALARA suggestion program.

The licensee's audit team concluded that pre and post job reviews were adequately performed with the exception of one deviation (the lowest level audit finding). The deviation was issued when the team found one instance in which a Work-in-Progress (WIP) review was not performed. The licensee audit team reviewed hot spot files and noted that 19 hot spots had been eliminated since the previous NQA audit and concluded that the hot spot reduction program had been effectively implemented. The audit team reviewed several temporary shielding packages and concluded that the temporary shielding program was being effectively implemented with the exception of another deviation due to minor administrative deficiencies found in the shielding packages.

As noted in NRC Inspection Report 50-277/93-19 and 50-278/93-19, the licensee's audit team commented that management prioritization of ALARA initiated modification was weak and cobalt reduction efforts had been slow. The audit report stated that the Station Vice President's response to this comment was that his primary focus was to improve station radiation worker practices and job planning as a means to reduce PCRs and cumulative exposure. This response was accepted by the audit team. In response to the second comment, licensee Procedure HP-C-120, "Cobalt Reduction Program", was developed to provide a more systematic approach with regard to source term reduction. The audit report also stated that, during the June 1993 Station ALARA Council (SAC) meeting, several

ALARA-related action items were assigned. See Section 3.6 for additional information on management controls over the ALARA program.

The licensee's audit team noted a decline in participation in the ALARA suggestion program and a less than aggressive pursuit by the Radiological Controls Department to improve the suggestion process. See Section 3.3 for a brief description of subsequent licensee efforts to improve participation in the ALARA suggestion program.

The licensee conducted surveillances and completed Technical Monitoring Reports in addition to the required audit. The reports were effective in augmenting the audit program. No significant ALARA program deficiencies were noted in Technical Monitoring Reports.

In summary, licensee auditing of the ALARA program was comprehensive and thorough.

3.2 ALARA Program Changes

3.2.1 Policy

The ALARA Manual was replaced by Nuclear Group Policy No. NP-RP-1, "Radiation Protection". No impact on the ALARA program was evident as a result of this change.

3.2.2 Committees

At the time of this inspection, the Radiological Engineering Manager was evaluating the necessity of the Station ALARA Review Council (SARC). This committee was headed by the Radiological Engineering Manager. The Radiological Engineering Manager felt that time spent by this committee could be better spent elsewhere because the committee did not have sufficient authority to effect significant changes. In a March 9, 1994, telephone call to with the Radiological Engineering Manager, the inspector was informed that SARC had been disbanded. The licensee also holds Station ALARA Council (SAC) and Executive ALARA Council (EAC) meetings. The SAC is chaired by the Station Vice President and the EAC is composed of vice presidents and chaired by the Senior Vice President Nuclear.

In conclusion, the inspector expects no substantial degradation of the ALARA program as a result of disbanding the SARC even though the SARC did, at times, serve to improve job specific conditions. This change might make the ALARA suggestion program somewhat more important than it had been in the past. See Sections 3.1 and 3.3 for information regarding the licensee's ALARA suggestion program.

3.2.3 Personnel

Of those personnel having direct control over the success/failure of the ALARA program, the following personnel changes occurred shortly before or since November 1992.

- Station Vice President
- Plant Manager
- Radiation Protection Manager
- Radiological Engineering Manager
- most of the Radiological Engineers

As a result of these changes and licensee staff indications that job history files were in need of updating, the inspector remained alert for poor ALARA performance. However, review, particularly of 3R09 (Unit 3 refueling outage number nine) outage work indicated no readily discernible impact in ALARA performance due to these changes in any of the major jobs reviewed by the inspector. (See also Section 3.4).

The inspector observed an increase in the quality of ALARA review documentation. A digital video recording system was purchased. The video recording system will help increase the quality of ALARA review documentation. The licensee has also cross-trained some Radiological Engineers by temporarily assigning them to the other station for outage assistance.

In conclusion, no degradation as a result of personnel changes was discernible.

3.2.4 ALARA Program Changes Summary

No ALARA program degradation as a result of policy, committee or personnel changes was discernible.

3.3 Worker Awareness and Involvement

Radiological Controls management recognized a lack of worker participation in the ALARA suggestion program and was attempting to address this matter by establishing incentive awards such as a quarterly awarded parking space. A Radiological Engineer has been made responsible for this program.

While there has been a lack of participation in the suggestion program, the inspector found that workers were aware of their role in the ALARA program. This was evident from the level of worker participation in post-job reviews. (See NRC Inspection Report 50-277/93-27 and 50-278/93-28, Section 3.0). The licensee also implemented a new program which tasks management with spending 15 hours per month in the plant to coach workers and demonstrate "leadership by example". Since this program has been implemented, workers seem to be more aware of dose rates in their work areas.

In summary, the inspector found that there is worker participation in the ALARA program but that proactive participation could be improved. The licensee is taking action to obtain suggestions prior to the commencement of work in radiologically challenging areas. The ALARA suggestion process will be reviewed in future inspections.

3.4 ALARA Goals and Results

The ALARA goal for 1993 was 499 person-rem for both units. The established goal was not achieved. The cumulated exposure in 1993 was 552 person-rem, with 55 person-rem accumulated for work conducted during forced outages. The licensee had not budgeted for forced outage exposure. The inspector attended a SAC meeting in June 1993 in which a decision was reached by senior station management not to modify the goal to accommodate forced outage exposures.

The following table contains a summary of some of the more radiologically challenging jobs completed during refueling outage 3R09.

Job	Person-Hours (Estimated)	Person-Rem (Estimated)	Person-Hours (Actual)	Person-Rem (Actual)
CRD[1] Exchange	3461	43.7	2452	34.9
RWCU ISI[2]	224	10.8	147	3.3
Drywell ISI	1472	25.6	1796	36.1
RWCU Pump Modification	1632	27.7	2269	31.3
Torus Vent Modification	3374	18.7	2438	6.0
Inboard MSIV[3] seat replacements (4)	1780	10.7	2064	14.5

Cumulative exposure was higher than expected on the RWCU pump modification due to underestimation of pipe cut time. Removal of RWCU piping (included in this modification) took about twice as long because the pipe wall was thicker and made of harder material than expected. Five weld failures requiring re-work also contributed to doses being higher than expected. This matter was being addressed by a SAC action item. The licensee did not build re-work factors into projected dose estimates. Cumulative exposure was also higher than expected in replacing four inboard MSIV seats because the evolution took longer than expected and effective drywell dose rates were slightly higher than expected. The higher than expected drywell dose rates also led to greater cumulative exposure accrued on the drywell ISI job. Drywell ISI was also assigned a SAC action item.

---

[1]Control Rod Drive

[2]In-service Inspection

[3]Main Steam Isolation Valve

In summary, the 1993 established ALARA goal was not met. Considering the scope of 3R09 outage work, the station's age, and the source term, the 1993 goal was aggressive. Goals should be attainable for purposes of maintaining good worker morale. The inspector noted that if forced outage exposure was separated from the total accumulated exposure, the established 1993 goal would have been met. Jobs which exceeded their cumulative exposure estimates generally received appropriate attention from both the Radiological Controls Department and senior station management.

The SAC-approved 1994 ALARA goal was established at 545 person-rem; 257 person-rem for the operating cycle and 288 person-rem for the outage. The goal accounts for refueling outage 2R10 (the 10th refueling outage at Unit 2) and other non-typical work such as installation of the new reactor water cleanup (RWCU) pumps in Unit 3, RWCU piping removal in Unit 2, and a recirculation pump drive shaft and impeller replacement. The goal accommodates forced outage exposures by budgeting 46 person-rem for forced outage work.

A summary of the licensee's progress in the ALARA area is given in Section 3.8 of this report. Attachment 2 to this report provides the annual station cumulative exposure since 1975. Attachment 3 provides a summary of the cumulative exposure accrued in the last four refueling outages. Attachment 4 provides a graphical representation of the licensee's three-year rolling average cumulative exposure. It shows that the Peach Bottom Atomic Power Station (PBAPS) three-year rolling average per unit curve compares favorably to the United States boiling water reactor (BWR) average curve.

3.5 ALARA Program Controls/Guidance

As part of this inspection, the following policy statement and procedures controlling ALARA planning were reviewed.

- Nuclear Group Policy No. NP-RP-1, "Radiation Protection", Revision 0, 1/7/94
- HP-C-120, "Cobalt Reduction Program", Revision 0, 1/21/94
- HP-C-324, "ALARA Job Reviews", Revision 0, 5/10/93

The inspector reviewed Procedure MAG-CG-601, "Valve Internal Cleanliness During Maintenance", Revision 0, 7/3/92, which pertained to source term reduction. The inspector found that this procedure provided sufficient guidance for planning and minimizing the cobalt input from primary system valve maintenance. The Maintenance Department has prepared other Foreign Material Exclusion (FME) control procedures. These procedures will be reviewed during a future inspection.

The licensee maintains performance indicator graphs for each job package projected to be greater than 1 person-rem in cumulative exposure. All planned activities that require a Radiation Work Permit (RWP) are categorized by the Total Effective Dose Equivalent (TEDE). Adequate action levels have been established for the initiation of ALARA reviews. These criteria are as follows.

ALARA Category	Total Estimated Exposure	Pre-Job ALARA Review	Required Concurrence/Approvals
0	<1 person-rem	Health Physics	Health Physics
1	1 to 10 person-rem	Radiological Engineering	HP Supervision, Radiological Engineering Manager, Work Group Supervisor
2	10 to 25 person-rem	Radiological Engineering	As above, ALARA review, ALARA Coordinator approval, SAC review
3	>25 person-rem	Radiological Engineering	Formal documented ALARA review, ALARA Coordinator approval, SAC approval

Radiological Engineering is made aware of Category 0 jobs when:

- work area neutron dose rates are likely to exceed 0.1 rem/hour;
- work area combined dose rates (beta, gamma, neutron) equal or exceed 1 rem/hour;
- respiratory protection is required, and total exposure for the job is estimated to be $\geq$100 mrem;
- containments are required;
- special dosimetry is required;
- shielding will be used;
- irradiated core components are involved;
- portable HEPA ventilation is required; or
- jobs recur with total estimated exposure $\geq$1 person-rem.

At the time of the inspection, the Radiological Engineering Manager did not feel there was a need to establish contamination level ALARA review initiation criteria as this situation was covered under Category 0. Also, the Radiological Engineering Manager conveyed that all major work activities were captured by Plant Information Management System (PIMS). Other than direct communication from another station department, PIMS review is one of the key methods by which Radiological Engineering becomes aware of involvement in a job to ensure that proper radiological controls are implemented.

In summary, the inspector concluded that sufficient program controls were in place to help ensure ALARA program success.

3.6 Management Controls

NRC Inspection Report 50-277/93-19 and 50-278/93-19 noted that the licensee's action to remove fuel assemblies (in a recent unplanned Unit 3 mini-outage), which were thought to have degraded/leaking fuel pins, was considered a good source term reduction initiative.

The inspector reviewed the PBAPS Radiological Action Plan for 1994. This document contains departmental and station exposure goals for 1994. Each station department is tasked with developing an action plan that contains general means for exposure reduction and provides commitments towards supporting the Radiological Controls Department. This is one means by which senior station management makes the ALARA program a station program. Senior Station management has also taken action to improve work scheduling to enhance work efficiency. This might benefit in minimizing dose accrued as a result of preparing for work more than once. Additionally, if work is carefully scheduled to avoid cross-job impacts, a shorter and more efficiently conducted outage would result in less exposure.

There is considerable objective evidence of senior level management's support of the ALARA program. Section 3.7 of this report provides a basis for the conclusion that the ALARA program has received senior management support on a long-term basis. Objective evidence exists that communication flows freely up and down the chain of command. For example, several articles were promulgated in the station newspaper during the outage, detailing exposure reduction successes on job evolutions. Additionally, post-outage reports were prepared and distributed to station management. SAC meetings are another means by which senior station management becomes directly involved in the ALARA program. The inspector attended the October, 1993, SAC meeting and reviewed the January, 1994 meeting minutes. Twelve action items were assigned by the Station Vice President as a result of the January meeting. The results of these action items will be reviewed in a future inspection.

The inspector questioned the Radiological Engineering Manager as to which on-going committees would improve and monitor the source term reduction program. The Radiological Engineering Manager stated that it was his expectation that the SAC would fulfill this role. The cobalt reduction program has only recently been formalized (see Sections 3.1 and 3.5). This formalization should lead to a more systematic approach regarding source term reduction. Future inspections will assess the effectiveness of this program.

Senior level management also supported studies concerning the ALARA program. For example, an on-going, long-term study on primary system radiation buildup is being conducted for Unit 3. The Unit 3 primary system piping was replaced in 1988. Before installation, the replacement piping was electropolished and passivated. Two RWCU test spools were also installed at the time of the piping replacement and have been monitored during subsequent refueling outages. The test spools contain six different treatment zones; no treatment, flex-honed, electropolished, passivated, flex-honed passivated, and electropolished plus passivated. The study concluded that the passivation process is the most beneficial from a source term reduction standpoint.

Other studies were being conducted at the time of this inspection. The Chemistry Group was evaluating the appropriateness of injecting zinc at higher levels. The licensee injects zinc because the original brass condenser tubing was removed and replaced with titanium tubing. Zinc has been found to minimize plateout of activation products on piping. Corporate Health Physics was conducting a study to determine whether to use depleted zinc for injection and reevaluating low-stellite control rod blade (CRB) pins and rollers.

In summary, despite the lack of formal controls over some portions of the ALARA program, long-term management support of the program was evident. Licensee management has recognized the need to enhance communication flow to radiological controls/station management and is addressing this matter by adding incentives to the ALARA suggestion process (see Section 3.1, 3.2.2 and 3.3).

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

3.7.1 Past Projects/Modifications/Program Changes

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 decade. The list contains some of the more significant licensee actions and should not be considered all inclusive.

1981

- Formal ALARA program started with a staff of three dedicated individuals.
- The scram discharge volume was hydrolased and weld-o-lets were installed on the scram discharge vessel.
- The Unit 2 torus and Unit 3 torus were sandblasted and desludged.
- The RWCU system was chemically decontaminated.

1983

- A vendor was hired to provide a decontamination trailer.
- The ALARA staff was increased to five individuals.
- The Unit 2 recirculation, RWCU, and residual heat removal (RHR) systems piping were chemically decontaminated.

1984

- A piping replacement on the Unit 2 recirculation, RWCU, and RHR systems was conducted. Passivated electropolished piping was used.
- The recirculation, feedwater, and core spray nozzles were hydrolased from the refueling floor.

1985

- Motor operated valve (MOV) 68 was moved from the regenerative heat exchanger room to the outboard main steam isolation valve (MSIV) room.
- Control rod drive (CRD) flange shield cans were designed, fabricated and employed yielding a 63% reduction in dose under the reactor vessel.

1986

- Shootout steel and CRD mockup were fabricated and utilized.
- The equipment and floor drain sumps were modified for easier decontamination.

- A teledose dosimetry system was purchased and utilized for the first time.
- Alarming electronic dosimeters were purchased and utilized.

1987
- The Unit 3 recirculation and RWCU systems were chemically decontaminated.
- Management mandated reactor water chemistry improvements were implemented.
- The ALARA staff was increased to eight individuals.
- A resin dewatering system was installed eliminating the need to use the drum capping isle, centrifuge hopper rooms, and the drum loading manipulator.
- A hot spot identification and reduction program was initiated.

1988
- High radiation drum storage and movement were eliminated in the plant.
- The engineering-based shielding program was initiated.
- Piping replacement on the Unit 3 recirculation and RWCU systems was conducted. Passivated electropolished piping was used.
- Permanent shielding was installed on the Unit 3 reactor bottom head drain line.
- A major effort to decontaminate drains and sumps was started.
- The Unit 3 low power range monitor (LPRM) cable modification was completed.
- Surveillance cameras were installed on the main turbine front standard and in RWCU pump rooms.
- Piping and valves were labelled.
- Major Unit 3 valves were decontaminated with glass beads.
- The Barbados facility was established for mockup training.

1989
- A CRD exchange machine was leased and used.
- Recirculation pipe dose rate trending was initiated.
- Unit 3 subpile room was painted for easier decontamination.
- The Nuclear Maintenance Department (NMD) was created for vessel servicing.
- Alnor electronic dosimeters were purchased.

1990
- Three CRD exchange machines were purchased.
- The Unit 2 LPRM cable modification was completed.
- Partial core off-loads started to help reduce outage duration.
- Engineering evaluated control rod blade (CRB) pin and roller replacement. Outright replacement was found not cost-effective; however, low cobalt alternative components are used as the existing pins and rollers wear and are replaced.

1991

- The Unit 2 and Unit 3 condenser modifications were completed to replace brass tubing with titanium tubing.
- Licensee management began a major effort to cover floors with paint that is easy to decontaminate.
- Zinc injection systems were installed on Units 2 and 3.
- On-site sorting and compacting of trash were eliminated.
- A large-scale drywell shielding package was installed and established as a routine refueling outage job.
- Eleven Unit 2 and eleven Unit 3 condensate and feedwater valve seats were replaced with hardened 410 stainless (low stellite) steel. These were valves identified by Engineering as prime candidates for such action.

1992

- Maintenance Procedure MAG-CG-601, "Valve Internal Cleanliness During Maintenance", was developed.
- Engineering identified and ranked Target valves for cobalt reduction at PBAPS and Limerick Generating Station. Major cobalt contributing components were identified in PIMS and the Component Reference List (CRL).
- The practice of filtering and cleaning up torus water with a portable demineralizer skid was established as a routine outage job.
- Strippable paint was used to decontaminate the reactor cavity.
- A surveillance robot was purchased.
- Condensate demineralizer was changed to improve the removal of copper and iron.
- Fission chamber transverse incore probes (TIPs) were replaced with gamma sensitive TIPs.
- Fifteen color surveillance cameras were purchased.

1993

- The services of a vendor was used to provide a remote monitoring system for the drywell.
- A digital video recording system was purchased.
- Strippable paint was used to decontaminate areas of the station.
- Significant reduction (66% over previous outages) in respirator use was achieved during the Unit 3 refueling outage by increased use of engineering controls.
- The RWCU pump replacement modification was initiated in Unit 3.
- A training video to minimize undervessel cable damage was created. This video was required instructional material to be viewed prior to any undervessel work in 3R09 (the ninth refueling outage for Unit 3).
- A spare RWCU pump was obtained and is now used to swap non-functioning pumps. This minimizes rebuild work in the RWCU rooms.
- Outage planning applied effective drywell access controls during forced outages. A planning initiative led to realistic five-day planning job schedules.

- Several ALARA program reviews were initiated. Outright replacement of CRB pins and rollers was re-evaluated, use of depleted zinc in the zinc injection systems was evaluated, and an evaluation of whether to conduct chemical decontamination of the RWCU, fuel pool cooling, and recirculation systems was initiated.

1994

- Cobalt reduction program Procedure (HP-C-120) was developed.

In conclusion, these changes are indicative of substantive long-term senior management support for the ALARA program.

3.7.2 Outage Shielding

A dedicated outage shielding window was provided by Outage Planning in 3R09. The following table provides the total amount of shielding placed during the past several outages. The licensee's Radiological Engineering staff has recommended that efforts continue to be made to incorporate shielding packages as recurring tasks. Also, Radiological Engineering staff conducted a study which led them to conclude that it would be beneficial to provide drywell recirculation loop and riser shielding in future outages. Ten packages were scheduled for nozzle shielding in 3R09, but they were not employed as successful hot spot flushing yielded comparable dose savings.

OUTAGE SHIELDING PACKAGES

Outage Number	Number of Packages	Total Amount (lbs.)
3R08 / 1991	39	57,426
2R09 / 1992	29	51,872
3R09 / 1993	37	62,262

The following provides examples of the achievements of some of the temporary shielding packages placed during 3R09.

- The licensee estimated that about 99 person-rem were saved by shielding in the drywell.
- Dose rates on the drywell 135' elevation were reduced by 54%.
- General area dose rates were reduced by 47% percent for the MSIV work which saved 15 person-rem by the licensee's estimation.

In conclusion, good efforts with resulting substantial dose savings were noted in the licensee's shielding program.

3.7.3 Hot Spot Reduction

Radiological Engineering maintains a hot spot database. This database provides a mechanism which helps to prioritize hot spots and assists in the decision of whether it is ALARA to attempt to eliminate a hot spot. Attachment 5 provides an example printout of the information contained in this database; the example also provides a listing of hotspots that were eliminated in 1993.

In conclusion, an effective mechanism for tracking hot spots has been established and actions were taken to eliminate hot spots when it was ALARA to take that action.

3.7.4 Job Comparisons

The following two job comparisons help demonstrate the licensee's efforts to continually improve work from an ALARA standpoint. There is little variance in scope of work for these two activities which makes them good examples for comparison in this regard. These tables were generated from raw data provided by the licensee.

Torus Hard Vent Modification

Unit	Person-Rem
2	12.6
3	6.0

The primary changes made that resulted in lower collective TEDE when installing the torus hard vent in Unit 3 were shielding an RHR line and prefabricating certain sections of pipe.

CRD Exchange

Year/Outage	Collective Exposure (Person-Rems)	No. of Drive Exchanges	Collective Exposure (person-rem) per CRD Changeout
1993 / 3R09	34.950	33	1.1
1992 / 2R09	40.019	33 and 2 thermal sleeves	1.2
1991 / 3R08	33.904	32	1.1
1991 / 2R08	35.755	32	1.1
1989 / 3R07	55.840	69	0.8
1987 / 2R07	164.900	91	1.8
1985 / 3R06	51.734	40	1.3
1985 / 2R06	62.824	45	1.4
1983 / 3R05	66.796	31	2.2
1982 / 2R05	106.032	24	4.4
1981 / 3R04	58.588	31	1.9
1980 / 2R04	95.246	43	2.2
1979 / 3R03	56.440	22	2.5
1978 / 2R03	33.186	23	1.4

Note that a new CRD handling tool was acquired and utilized during 3R07. This lowered the manpower needed from 3 to 2 individuals when conducting CRD exchanges.

In summary, these two job comparisons illustrate that lessons learned yielding ALARA improvements were incorporated into subsequent work plans.

3.7.5 Respiratory Protection

In accordance with new 10 CFR 20, the licensee has implemented a risk balancing methodology with respect to maintaining TEDE ALARA. In preparation for this change, the Radiological Engineering Manager prepared a document which discusses management sponsorship and preparation for change, training, procedures, implementation, results, and challenges.

The following table gives a perspective on the extent of the licensee's effort in this regard. In summary, the use of respiratory protection devices declined significantly in the past outage. Less than eighty MPC-hours were assigned in 1993 with less than 50 assigned in 3R09. The Radiological Engineering staff estimated that TEDE was reduced by at least 10 person-rem due to efficiency gains on work in the subpile room, drywell and RWCU ISI, and the RWCU pipe replacement modification.

Respirator Device Usage	2R09	3R09	Reduction
Total	3000	1133	62%
Drywell	-	-	68%
Reactor Building	-	-	78%

In summary, the licensee has achieved ALARA improvements by reducing respirator use and compensating through the use of engineering controls. This improvement was attained at comparatively little cost in cumulative effective dose equivalent (internal exposure).

3.8 ALARA Program Summary

Licensee auditing of the ALARA program was comprehensive and thorough. No ALARA program degradation as a result of policy, committee or personnel changes was discernible. Worker participation in the ALARA program is evident, but encouragement is needed to ensure that participation is more proactive. Established goals were aggressive but need to be attainable for purposes of maintaining good worker morale. Jobs which exceeded their cumulative exposure estimates generally received appropriate attention from both radiological controls and senior station management. Management control of the program was evident. Although the source term reduction program had only recently been formalized, good results were noted. Good results were achieved by the licensee's temporary shielding program. Dedicated outage shielding windows were provided by outage planning. Lessons learned yielding ALARA improvements were incorporated into subsequent work plans. Use of engineering controls rather than respirators led to a reduction in total effective dose equivalent for some work activities.

This program area was assessed as being effectively implemented.

4.0 Radiological Discrepancy Investigation

Radiological Performance Enhancement Program (PEP) issues identified by the licensee since the last radiological controls program inspection (50-277/93-27 and 50-278/93-27) were reviewed. That inspection detailed three incidents in which poor radiation worker practices were exhibited. Additional examples of poor radiation worker practices have been identified by the licensee since that inspection. This matter is receiving considerable senior level management attention. As noted in Section 3.3, licensee management is now required to spend a significant amount of time in the plant.

The inspector noted improvement regarding broader application of corrective actions. For example, three instances were noted in which operator action led to a change in the ambient radiation fields. This led the licensee to initiate a review of operations procedures to ensure that the procedures contain steps to notify the Radiological Controls Department prior to system startup. At the time of this inspection, the licensee planned to incorporate this expectation into the Operations Manual.

5.0 Instrumentation

At the time of this inspection, several notable initiatives pertaining to the licensee's instrumentation program were completed, underway or under evaluation.

- A new Canberra Fastscan whole body counter was acquired and placed in the access building dosimetry office. This unit was operational at the time of this inspection.
- New Canberra Genie workstations were acquired. These workstations control the whole body counting equipment located in the access building.
- Two additional PM-7 portal monitors were purchased.
- A SAIC hand-held surface barrier detector (used for detecting alpha particles) was purchased. This instrument will provide the licensee with the ability to discriminate radon progeny. At the time of this inspection, procedures for this instrument had not been developed.
- Forty Eberline RO-20 ionization chambers were purchased.
- A new High Purity Germanium (HPGe) crystal with a relative efficiency of 50% was purchased for use in the whole body counter.
- Small Article Monitors (SAMs) were made operational since November 1992.
- At the time of this inspection, the licensee was evaluating real-time, automated air sampling equipment to be used for job coverage on general area air sampling.
- At the time of this inspection, the licensee completed an evaluation that suggested changes in order to enhance administrative controls over the instrumentation program and reduce documentation requirements. For example, the report recommended that instruments and security badges be bar coded, that a calibration rotation schedule be developed to equalize time spent on instrument maintenance throughout the year, and to develop criteria as to when an instrument should be replaced rather than repaired.
- At the time of this inspection, corporate radiological controls staff were evaluating a new electronic dosimetry system.

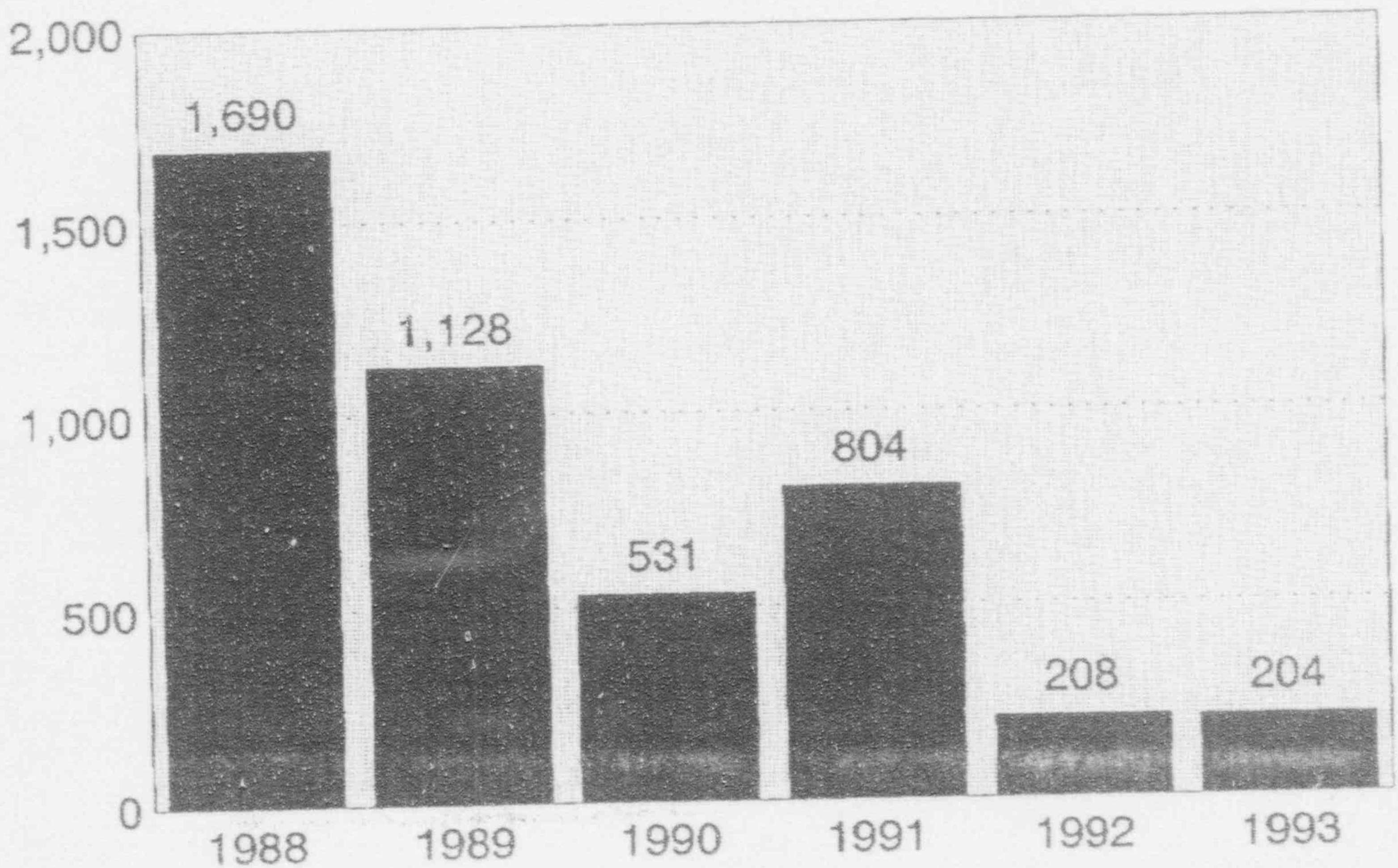
The inspector reviewed licensee study, "Technical Evaluation of the NEA Small Articles Monitor". The study provides the technical basis for the Nuclear Enterprises of America SAM setpoints. The low count alarm was chosen to remove the SAM from service if a detector malfunctions. The study recommends a Co-60 calibration source and a set point of 3,500 dpm to account for the radionuclide mix (10 CFR 61 analysis for Dry Active Waste {DAW} is assumed to be representative of this mix). This instrument uses four large area (12" by 15.5") plastic scintillators which are sensitive to gamma radiation of energies from about 100 KeV to 1.5 MeV (but relatively insensitive to beta particles). The scintillators are shielded by 0.75" of lead shielding. Background levels are continuously monitored in ten-second intervals. Significant changes in background levels cause the unit to cease counting operations until background stabilizes. No discrepancies in this study were noted.

In summary, licensee changes in the radiological instrument program represent a commitment towards overall improvement of the radiological controls program. The instrumentation program was well implemented.

6.0 Exit Meeting

The inspectors met with licensee representatives at the end of the inspection, on January 28, 1994. The inspectors reviewed the purpose and scope of the inspection and discussed the findings. The licensee acknowledged the findings.

PEACH BOTTOM ATOMIC POWER STATION
PCR HISTORY

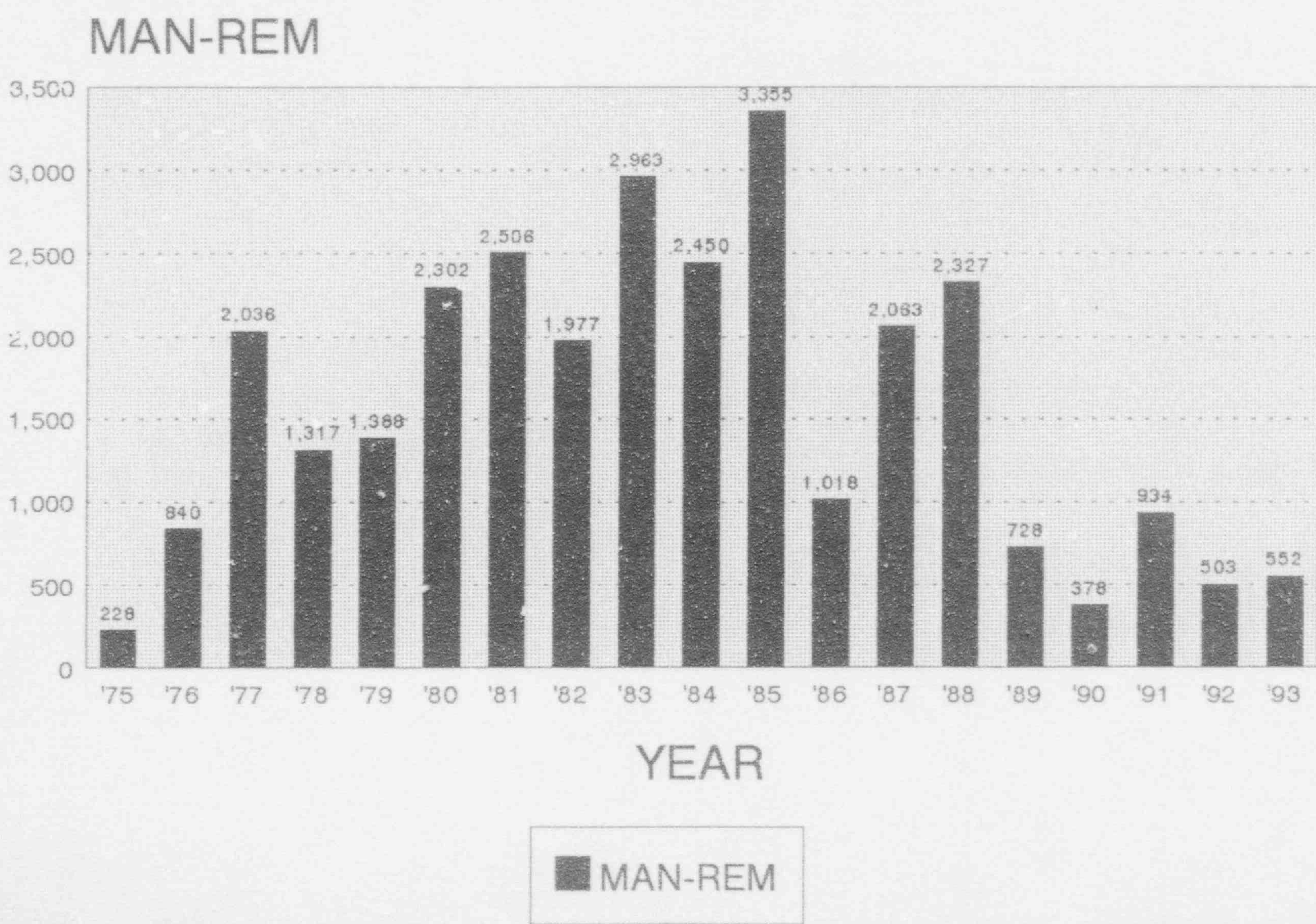


DATA AS OF 01/01/94
pcrhisto

ATTACHMENT 1

PEACH BOTTOM ATOMIC POWER STATION

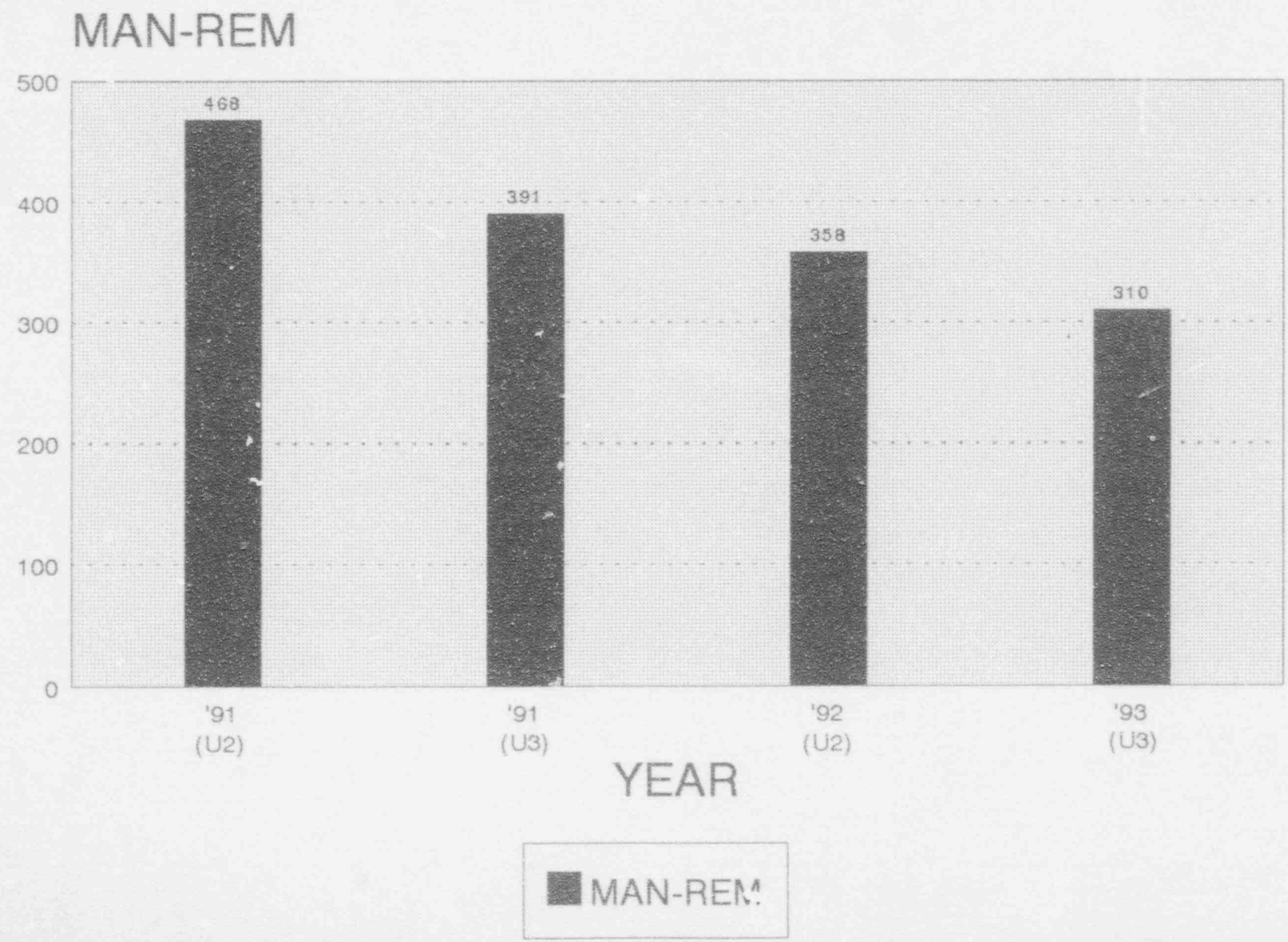
ANNUAL DOSE HISTORY BY TLD



ATTACHMENT 2

PEACH BOTTOM ATOMIC POWER STATION

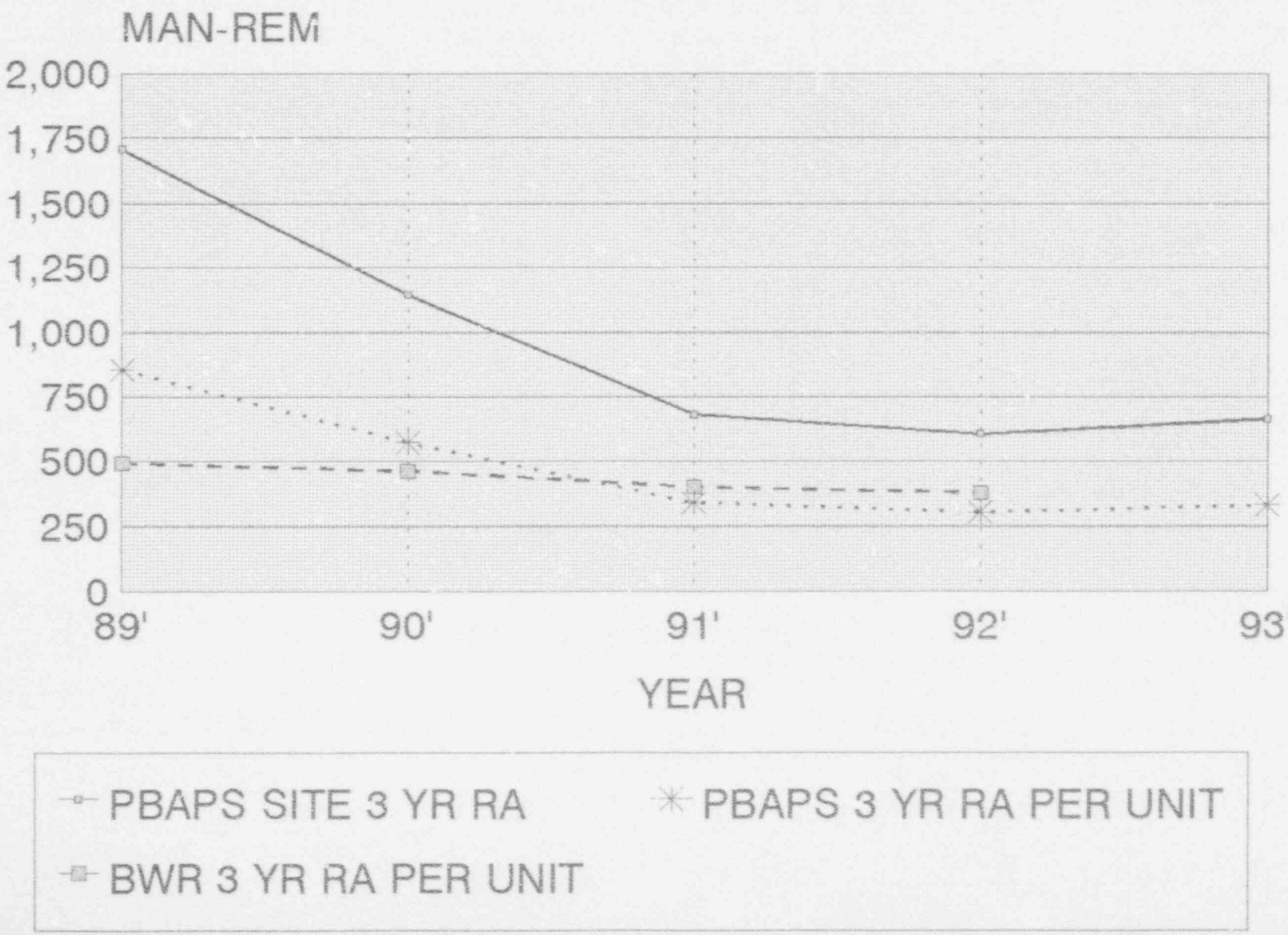
REFUEL OUTAGE EXPOSURE HISTORY BY DRD



ATTACHMENT 3

PBAPS DOSE- 3 YEAR ROLLING AVERAGE

1989 THROUGH 1993



ATTACHMENT 4

HOTSPOT ID
for ESTIMATED MAN-REM
by RAD. ENGINEERING

HOT SPOT NO.	ROOM NUMBER	ELEV.	AREA DESCRIPTION	PRI-MARY SYS.	COMPONENT	CONTACT (mR/Hr)	18 INCH (mR/Hr)	MANREM ESTIMATE / MONTH	ROOT CAUSE	STATUS	MRF NUMBER	PRIORITY
0055	R3-114	165.0	Corner of stairs up to 180'	02	Recirc. Discharge to RWCU (CAV) VLV AO 3-02-040	80	30	0.060	CRUD trap in the bottom of the valve. Due to throttling????	CLOSED	A0033134	4
0076	R2-25	135.0	South Isolation Valve Room (overhead)	20	Floor Drain piping	48	6	0.018	Low flow w/hi h potential for settle-out	CLOSED		4
0207	R3-39	165.0	General area behind Fuel Pool Cooling pumps	19	Surge Tank to RST 3" piping	1400	120	0.200	%Weld CRUD trap. Low/no flow in piping.	CLOSED		5
0210	R2-51	195.0	"B" RWCU Demin Hold Pump Room	12	AO 2-12-028B drain nipple	200	15	0.006	Drain nipple CRUD trap.	CLOSED	A0039129	5
0231	R2-41	165.0	Southeast next to the hatch	12	Tubing @ the RWCU Constant Temperature Bath	130	8	0.020	CRUD build-up @ step down in pipe size.	CLOSED	A0160106	5
0247	R3-41	165.0	Corner of stairs up to 180'	02	Pipe tee east of HV 3-2E-33120 approx. 7' above floor	60	24	0.135	Low/no flow in piping dead leg.	CLOSED		4
0266	R2-39	169.0	General area behind Fuel Pool Cooling pumps	19	Surge Tank to RST 3" piping	600	60	0.300	Low/no flow in piping.	CLOSED		5
0271	R3-98	126.0	Torus Bay 12 (overhead)	20	Floor Drain piping	40000	2000	0.012	Low flow w/high potential for settle-out.	CLOSED		5
0272	R3-20	113.0	Reactor Building Stairwell btwn 116' & 91.6'	20	Floor Drain piping	3000	60	0.150	CRUD build-up from the Flush Cage.	CLOSED	DEDRICH	5
0273	R3-53	195.0	Reactor Building Hallway	19	Reactor Well to FPC pipe	6000	200	0.700	Low flow w/high potential for settle-out.	CLOSED		3
0275	R3-48	180.0	"A" RWCU Valve Room	12	Piping elbow downstream of 22A valve	16000	1400	0.600	Dirt and crud collect at elbow	CLOSED		3
*** Total ***								2.201				

= 26.412/yr. = SAVINGS

ATTACHMENT 5