RADIATION PROTECTION PROGRAM

FOR

RECIRCULATION AND RESIDUAL HEAT REMOVAL SYSTEM

PIPING REPLACEMENT

AT

PEACH BOTTOM UNIT 2

-1984-

DOCKET NO. 50-277

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1.0 BACKGROUND

In July 1983, Philadelphia Electric Company (PECo) shut down Peach Bottom Unit 2 to perform a mid-cycle examination of recirculation and RHR shutdown cooling system piping welds. Indications of Intergranular Stress Corrosion Cracking were detected at 26 weld locations, and fracture mechanics analyses indicated that 21 locations required weld overlay repair. Subsequently, a decision was made to replace the recirculation, RHR shutdown cooling, RHR head spray, and portions of the reactor water cleanup (RWCU) piping during the next refuel outage. While weld overlay and final inspections were underway, PECo selected General Electric Company (GECo) to design and procure the recirculation system piping and act as technical advisor for the installation; Bechtel Power Corporation was selected to design and procure the replacement RHR and RWCU piping; Chicago Bridge and Iron Company (CB&I) was selected as the installer. This outage was also used by GECo and CB&I to perform drywell surveys which form the basis of the ALARA program. CB&I used the surveys to identify interferences and to plan the removal and installation sequences.

2.0 ADMINISTRATIVE PROCEDURES AND CONTROL

2.1 ALARA Procedures and Work Instructions

Because replacement of recirculation RHR and RWCU system piping will involve collective radiation exposure beyond that experienced by PECo plant workers in other routine maintenance work, CB&I will implement ALARA Program Instructions (API) and controls for this piping replacement project. Key elements of the administrative portion of the program include:

API #1 - "General Program Instruction for Maintaining Occupational Exposure to Radiation As Low As Is Reasonably Achievable (ALARA)". This instruction specifies the parameters to be evaluated in the selection of methods, processes and techniques to be utilized. Administrative controls regarding pre-planning meetings and post-task ALARA review as well as the responsibilities of the CB&I ALARA Administrator and CB&I Radiological Engineers are specified. Administrative instructions in the following areas are also contained in API #1.

- Man-rem estimates
- worker training regarding radiation, specialized equipment and mockups
- radiation dose and contamination controls
- radiation material handling and packaging

A copy of API #1 is included as Attachment 1.

API #2, "Specific Program Instruction for Maintaining Occupational Exposure to Radiation As Low As Is Reasonably Achievable". This instruction specifies the organizational relationships and responsibilities required to implement the ALARA program during pipe replacement. Additionally, specific instructions, for performance of the ALARA group functions, in accordance with existing Peach Bottom Health Physics procedures, are contained in API #2 as listed below.

- review of work packages and instructions
- radiation work permits
- requirements for entry into the drywell
- exposure tracking and man-rem estimates
- mockup training
- dose extension request and administrative dose limits
- radiography operations
- records
- use of vacuum cleaners in control areas
- use of digital dosimeters
- handling of radioactive waste materials
- radiological discrepancy reporting

A copy of API #2 is included as Attachment 2.

In order to establish a systematic review of possible mitigating measures to be used to maintain personnel exposures ALARA, General Electric prepared a procedure entitled, "Procedure for Evaluating and Documenting Potential ALARA Mitigating Actions for Peach Bottom Atomic Power Station - Unit 2". A copy of this procedure is included as Attachment 3. This procedure specifies the parameters to be evaluated for implementation of a mitigating measure. An ALARA checklist is generated which requires acceptance by the following Philadelphia Electric Company staff personnel.

- Senior Health Physicist
- Station ALARA Coordinator
- Outage Planning Manager
- Construction Division Project Engineer

All instructions and/or procedures that have been prepared regarding ALARA and radiological controls are in compliance with existing Peach Bottom Administrative and Health Physics Procedures. They have been presented to and approved by the Plant Operations and Review Committee prior to their implementation.

These elements, combined with PECo's existing ALARA procedures such as detailed pre-work planning, radiation work permits and the authority to stop any work which is not consistent with the ALARA goals, will ensure an effective ALARA program for the piping replacement program. In addition, PECo is planning to decontaminate the piping prior to its removal and normal maintenance tasks during the refueling outage. Removal of the decontaminated pipe will further reduce the radiation exposure of personnel performing normal maintenance associated with the refueling outage.

2.2 ALARA Group Authority and Control of Work

In accordance with paragraph 4.1 of Peach Bottom Station Procedure A-83, "ALARA Program Administrative Procedure", the Station Support Health Physicist (ALARA coordinator) has designated to the CB&I Radiological Engineers, the responsibility for ALARA during the Unit 2 Recirculation and RHR piping replacement program.

All work planned to be performed in radiologically controlled areas shall be reviewed for ALARA considerations to minimize personnel exposure, the spread of contamination, and to prevent releases to the environment. The CB&I ALARA review requirements are as follows:

1. A preliminary ALARA review of draft work instructions is conducted by CB&I Radiological

Engineering to identify radiological considerations.

2. CB&I Radiological Engineering will perform a second ALARA review in accordance with Station Procedure A-83. This review shall be attached to the RWP as the ALARA package and Job Code Number.

3. Tasks will classified according to one of three exposure and ALARA categories.

Category 1	$\leq$ 1 man-rem
Category 2	$\geq$ 1 but $\leq$ 25 man-rem
Category 3	> 25 man-rem

Note:
Category 3 ALARA reviews require the approval of the PECo Support Health Physicist.

4. The CB&I Radiological Engineer performing the ALARA review will verify the CB&I job code number from the master work schedule for the specified tasks. Once identified, the job code number and the ALARA number are synonymous.

5. A log of ALARA reviewed and approved job code numbers will be maintained by CB&I Radiological Engineering.

6. Copies of all ALARA reviews will be maintained by CB&I Radiological Engineering.

7. Hold point requirements shall be added to ALARA packages for operations performed in radiologically controlled areas when necessary to assure the work is completed in a radiologically satisfactory manner.

8. Special training, mockup rehearsals, or job briefings shall be specified in the ALARA review when necessary to assure the radiological effectiveness/efficiency of workers. The extent of the training, rehearsals and briefings will be dictated by the potential radiological risks associated with the work.

9. Exposure tracking and Man-Rem estimates shall be performed for all tasks. Man-Rem estimates shall be performed by CB&I Radiological Engineering to determine the level of ALARA review required and assist in evaluating ALARA considerations. Exposure tracking shall be performed by CB&I to evaluate the effectiveness of the ALARA program. Program changes will be made if found necessary based on the evaluation of the tracked exposure.

10. Program assessment shall be performed by the CB&I Radiological Engineers. The following minimum assessments shall be performed:

    (1) Periodic assessment of ALARA reviews

    (2) Post-job evaluations of program effectiveness for jobs exceeding 5.0 Man-Rem

    (3) Post-job evaluations of any job where the actual exposure exceed the projected exposures by 25 percent or more.

The CB&I ALARA group is responsible for performing ALARA reviews prior to issuing draft Radiation Work Permits (RWP) for Category 1 and 2 jobs. Each Category 3 RWP drafted by a CB&I Radiological Engineer shall be reviewed by the Station Support Health Physicist prior to implementing the RWP.

It is the responsibility of the task engineer for initiation of Form A-83-A (Radiation Work Permit requests), and the responsibility of the Job Foreman and Health Physics Technicians to see that all radiological controls are enforced while work is in progress. In addition, it is the responsibility of the personnel signed into the RWP to adhere to the instructions listed. All personnel working in radiation ares are instructed in the proper use of RWP's.

Work will be performed only after the issuance of the appropriate Radiation Work Permits (RWP's) by a Philadelphia Electric Co. qualified health physics representative.

Radiation surveys required to support work in the Unit 2 Drywell will be conducted in accordance with Station Health Physics procedure HPO/CO-4, "Radiation Work Permits". CB&I Radiological Engineering will maintain copies of all RWP's, ALARA Reviews, and Attachment Sheets issued.

The Job Code Number is the means for the identification of each task for dose tracking purposes; its appearance at the top right-hand corner of the Daily RWP Sign-In Sheets signifies that the supporting ALARA Review has been conducted and the task has been approved by CB&I Radiological Engineering.

Prior to scheduling an activity, a review by CB&I Field Engineering will be made to determine to the maximum extent possible the following:

a) What services must be available.

b) The in-containment time to perform the task.

c) The task does not conflict with any other task currently scheduled.

d) Personnel are available to do the task, i.e., the proper mix of trades, etc.

e) The equipment necessary to do the task is or will be available.

f) The extent of specialized training requirements.

Upon satisfactory review of these items, the activity will be placed on the schedule and tracked until completion.

Each task will be reviewed by Radiological Engineering to determine the level of training and mockup necessary.

The Radiological Controls Representative at the Unit 2 drywell shall be a CB&I Radiological Engineer or a responsible CB&I or Philadelphia Electric Company Health Physics Technician. The duties of the Radiological Controls Representative are as follows:

1. Monitor task progress.

2. Advise task personnel of potential radiological problems.

3. Recommend suitable actions relevant to radiological controls.

4. If, in the opinion of the radiological controls representative, proper radiological controls are not being exercised, he is to terminate the activity.

5. Enforce access and advise personnel of stay time(s) requirements.

The Task Supervisor will insure all prerequisites are complete and system status, services, etc., are as required in the work instruction. Prior to allowing entry, the following documents are required.

RWP, ALARA Review and Job Code Number assigned
Work Instruction(s)
Associated Procedures

All individuals entering the drywell will wear self-reading dosimeters for the purpose of dose tracking and digital dosimeters to alarm at stay time limits.

CB&I Radiological Engineering will terminate activities in accordance with station procedure A-83 when Radiological precautions are not adequate for the situation encountered.

All man-rem estimates will be entered into an IBM, PC/XT computer for overall job, Job Codes, and RWP's.

Information entered into the computer for the personnel file will be:

Name; Social Security Number; Craft; Respirator Qualifications; Daily dose (manipulated to relfect weekly, yearly and quarterly exposure).

Information entered into the computer for Radiation Work Permits (RWP's) will be: Description of permit, all associated job code numbers, date issued, date terminated, social security numbers of personnel signed in on that RWP, the man-rem estimate for the RWP, actual dose expended.

The RWP man-rem estimate will be a summation of the estimate for associated job codes for the RWP.

The Job Code Number will be assigned to a specific job, and will also serve as the ALARA tracking number. A man-rem estimate will be performed for each ALARA tracking number, and each craft.

Information entered into the computer for the Job Code Number will be: description of the job, associated RWP, the man-rem estimate for the job and the actual doses over time associated with each Job Code Number.

Daily input into the computer will consist of the social security number of the workers that signed an RWP, the corresponding RWP number, the job code number, time entered area, time exiting the area, the date, and the dose (pocket dosimeter) received for the job.

Daily input into the computer will also consist of changes in RWP information such as: Job Code Numbers, Dose, air activity respiratory requirements.

Additions, deletions, and corrections will be noted on Program Audit Sheets.

The computer will keep a running total of all exposures for the Job Code, RWP, and Craft.

3.0 PROGRAMMATIC AND PROCESS FEATURES

Substantial programmatic and process ALARA features are being implemented as a result of applying ALARA principles as an integral part of the design and pre-planning process. The approach assures that the intent of the ALARA philosophy is implemented throughout the piping replacement project.

3.1 Improved Design of Replacement Piping

The replacement piping has been designed to minimize the number and complexity of shop and field welds. This has been accomplished by the use of such features as long tangent elbows, induction bent risers, the use of forged fittings, the elimination of the header cross tie and valves and the pump discharge bypass valve connections, and extensive study of drywell interferences and rigging paths to optimize pipe spooling. As a result of this design effort, there are approximately forty-eight less welds requiring In-Service Inspection (ISI) in the replacement recirculation and RHR system piping than in the original piping. Welds have been designed to provide access for increased use of remote automatic welding and ISI equipment even though the access for installing the piping is much more restrictive than when the original piping was installed in an essentially empty drywell. It is planned to polish the replacement piping on the inside surface to minimize radiaiton buildup. Crud traps have been minimized by eliminating the header end caps, the header cross tie and valves, and the pump discharge bypass valve connections.

In summary, ALARA considerations have been an integral part of the design of the replacement piping and components, and this will result in a significant reduction, relative to the original design, in the man-rem exposure for piping replacement, for future in-service inspections of the recirculation system piping and other activities in the drywell.

3.2 Mitigating Measures to Maintain Personnel Exposures ALARA

To reduce occupational exposure to those involved with the drywell piping modifications and other concurrent maintenance tasks, the following measures will be taken in the drywell and reactor pressure vessel.

3.2.1 Core Removal

Prior to initiation of work, the entire core will be off-loaded and stored in the fuel racks in the fuel pool.

3.2.2 Primary Coolant Radioactivity Reductions

After core off-load, the reactor water clean-up system will be operated to reduce, to the extent practical, the bulk reactor water activity level.

3.2.3 Optimally Positioned Control Blades

All control blades will remain in the vessel during the piping replacement. Control blade placement is based on General Electric experience and studies of in-vessel surveys. The control blades will be placed in the fully inserted position, the optimum position for work in and around the nozzles.

3.2.4 Vessel Flooding

Water in the annulus and inside the shroud serves as an effective shield for radiation emanating from the vessel internals. Water in the annulus is an especially efficient shield for the shroud, core plate, and peripheral control rods. Optimum water level in the annulus and inside the shroud is the top of the shroud. Utilization of jet pump slip joint plugs will allow flooding of the annulus to the level of the jet pump nozzles and flooding the shroud to the top of the shroud, while work is performed on the N-2 nozzles. Use of the slip joint plugs will also allow work to be performed on the N-1 nozzle with the annulus empty and water inside the shroud to the top of the shroud, because the slip joint plugs break the hydraulic connection between the annulus and the shroud.

3.2.5 Shielding

Shielding considerations have been broken down into various segments as follows:

- Inside the biological shield doors, outside the recirculation suction (N1) and recirculation discharge (N2) nozzles
- Inside the N1 and N2 nozzles
- Shielding of recirculation suction and discharge valves and pumps
- Shielding of drywell hot spots
- In-Vessel Shielding

The area inside the biological shield doors around the N1 and N2 nozzles will be shielded utilizing "soft" lead brick designed by Nuclear Power Outfitters (NPO). This method of shielding is a configuration of materials and construction that has the flexibility to mold into irregular shapes. A stainless steel watertight container will be used to contain the soft brick.

The inside of the N1 nozzles will be shielded also using the "soft" lead bricks designed by NPO. A stainless steel watertight container will be utilized to contain the "soft" lead brick in the nozzles.

The inside of the N2 nozzles will be shielded using lead discs. This method of shielding requires the use of a stainless steel container placed inside the N2 nozzles. The lead discs, which are 0.50 inch thick, are cut to the inside diameter of the container and will be stacked to achieve the desired shielding factor.

Actual amounts of shielding required for the recirculation system valves and pumps will be determined from post decontamination surveys. Three types of shielding used in conjunction with each other will be utilized to reduce the general area dose and the dose for individuals working on these components. The types of shielding to be used are "soft" lead brick, lead blanket belly wraps and lead containment structures.

Shielding of known drywell hotspots will be accomplished using Peach Bottom's supply of lead sheets. Other methods of shielding hotspots will evaluated following decontamination if drywell surveys reveal additional hotspots requiring shielding.

In-vessel shielding is being used to minimize exposure during piping decontamination removal and new pipe installation. Lead shield curtain walls will be used inside the vessel annulus behind the N1 nozzle. Three lead blanket slab shields 2' x 6' x 4" will be placed in a bracket adjacent to each other, forming a blanket, 6' x 6' x 4", which completely covers the nozzle. Two additional lead blanket slab shields will be placed over the cracks between the slabs to effectively prevent streaming between the slabs.

3.2.6 Mechanical Decontamination of the N2 Nozzle

The annular space between the thermal sleeve and the N2 nozzle is a major crud trap in the vessel. Mechanical decontamination using a hydrolance will be used to dislodge trapped material and wash it away from the working area.

3.2.7 Drywell Wash

The drywell will be decontaminated by low pressure water flushing (exterior surfaces of pipes, floor, etc.) to reduce airborne concentrations and limit removable contamination levels. The washdown will be performed prior to internal pipe decontamination. A second drywell wash following removal from the drywell of old piping will be performed.

3.2.8 Piping Decontamination

To significantly reduce occupational exposure to those involved with drywell piping modifications and other concurrent maintenance tasks, chemical decontamination performed by London Nuclear Ltd., utilizing their CAN/DECON solution will be performed to remove contaminated corrosion film buildup on the piping I.D. The primary objective of the process is to dissolve activated corrosion product film and concentrate the dissolved material for off-site disposal.

Successful decontamination involves the removal of corrosion oxide film without harmful effects to material which will remain in service after

decontamination. In order to perform the decontamination, PECo will cut and cap all recirculation risers and the RHR piping lines at (or near) the penetrations and all auxiliary lines. Chemical decontamination will be limited to the recirculation piping, portions of the RHR shutdown cooling piping and the RWCU containment penetration and associated piping to be replaced in accordance with the recommendations contained in General Electric Service Information Letter No. 396, Supplement 1, "Qualification of Chemical Decontamination Solutions and Procedures for Reactor Primary and Auxiliary Systems", dated April 2, 1984.

A specific London Nuclear decontamination procedure has been prepared for use at Peach Bottom Unit 2. The procedure provides a set of operating procedures and guidelines for the operation of the decontamination equipment and outlines the various setups required to decontaminate these systems. A copy of this procedure is included as Attachment 4.

3.3 Radwaste Handling and Storage

Performance of the chemical piping decontamination will result in the generation of radioactive resin from each of the ion exchange columns on the decontamination equipment skid. The resin will be solidified using a cement solidification process permitting disposal of waste in accordance with 10 CFR 61.

To process the removed piping, a solid Radwaste Staging Facility is being provided by CB&I. This facility, located just outside the Unit 2 reactor building, will provide a radiologically controlled area to prepare removed piping for shipment and disposal from Peach Bottom.

ALARA Program Instruction, API #4, "Specific Instruction for Controls and Use of CB&I Solid Radwaste Staging Facility", provides a description of the facility and procedural controls governing the processing of the old pipe for shipment. API #4 is included as Attachment 5.

3.4 Equipment

Air sampling will be performed to determine concentrations of airborne contaminants in areas where maintenance work or other operations will be conducted.

A Bendix Model BDX-55 HD Breathing Zone Sampler will be used as a room air sampler or attached to a sampler harness for personal use.

For detection and measurement of beta/gamma emitting airborne particulate matter an Eberline Beta/Gamma Air Monitor, Model AMS-3 will be used.

For continuous area radiation monitoring, the Victoreen Vamp, Model 808 C/O, self-contained radiation monitor will be used. This detector measures gamma radiation level over a three-decade range and gives an audible and visual alarm at a predetermined setpoint.

In order to locate sources of radiation with a minimum of personal exposure, an Eberline Geiger Counter, Model E-530N, with the Model HP-220 hand probe, will be used. This instrument, designed for use in gamma fields producing a maximum exposure rate of 20 R/hr., identifies source direction and intensity.

An Eberline RO-7, Special Beta Unit, ion chamber will be used for performing beta/gamma surveys in high range beta/gamma fields. It consists of a digital readout instrument, three detectors and various interconnecting devices. For gamma, the ion chamber detectors extend from 1 in R/hr. to 20K R/Hr. in three overlapping ranges. For beta, the range is 100m R/hr. to 20K R/hr. in two overlapping ranges. Detectors are connected to the RO-7 by flexible cables, rigid extensions or mounted directly on the instrument.

Containment devices such as glove bags, tents, etc. will be utilized as decided by the ALARA group with the inspection and approval responsibilities for a device being the CB&I Radiological Engineering Group. Specific instructions for use of containment devices are in API #3, "Specific Program Instruction for Use

of Specialized Health Physics Equipment", (Attachment 6).

Remotely operated machining and welding equipment will be used. This equipment has been designed to minimize setup time, and hence, worker exposure. Setup of mounting fixtures on the nozzles will be done under vessel water level conditions that will minimize exposure. The equipment utilizes video cameras and monitors and is operated from outside the drywell. Remote welding equipment does not eliminate the need for direct visual observation, but reduces the need for continuous visual observation. Use of this equipment will significantly reduce worker radiation exposure.

3.5 Safety

CB&I has developed a job specific safety program for recirculation pipe replacement on Peach Bottom Unit 2. The program was developed in accordance with the procedures, rules and requirements of Philadelphia Electric Company and Peach Bottom Atomic Power Station and encompasses all activities which will take place in the Unit 2 drywell. The "Job Specific Safety Plan' is included as Attachment 7 and covers the following areas:

- Security
- Pre-Job Safety and ALARA briefings for new hires
- Dedicated Firewatch and Firewatch Training
- Responsibilities of CB&I ALARA staff in conjunction with the CB&I Safety Supervisor
- Housekeeping
- Radiation Safety and Dosimetry
- Radiographic Operations
- Control of Combustibles

Access routes and work areas will be well marked. Auxiliary services (e.g. communications, ventilation and lighting systems) will be provided to speed work. Waiting and change-out areas will be located in low background areas. Video camera and monitors will be used to allow observation and supervision of work from outside the drywell. This will allow the worker performing the next operation and the supervisor to observe the preceding operation.

3.6 Housekeeping

The CB&I shift safety supervisor is responsible for insuring that jobsite housekeeping is in good order in accordance with Peach Bottom procedure A-30, "Plant Housekeeping Controls", and the CB&I "Job Specific Safety Plan". CB&I supervision will insure that work areas in the plant, as well as materials, tools and equipment, are maintained in a safe and orderly configuration by limiting the amount of unnecessary material in the work areas. To limit the amount of trash in the work areas, trash receptacles will be placed at the equipment and personnel hatches. Additionally, clean-up crews will be utilized daily in the work areas to maintain cleanliness. A daily inspection of the work areas will be performed by the shift safety supervisor to insure good housekeeping. Attachment C, "Safety Questionnaire", of the Job Specific Safety Plan (Attachment 6) is a weekly safety report prepared for CB&I management. Item 6 of the Safety Questionnaire refers to the maintenance of good housekeeping and if NO is checked off, further description is required in the REMARKS section so that appropriate corrective action can be taken.

3.7 Mockups

Mockups are being utilized to assist in tooling design, welding and machining procedure development, and welding and machining operator training. The mockup will demonstrate successful performance of procedures, equipment and personnel prior to performing the actual operation in the plant. This will subsequently reduce exposure and critical path times.

The mockup demonstrations identified by CB&I as being necessary are:

Temporary Supports for Pipe Removal - The installation of supports at the recirculation isolation valves. (MO53-A or B and MO43-A or B).

Cutting operation for Pipe Removal - Mechanical cutting will be demonstrated on mockups of the

suction lines to the N1 nozzle and the discharge line to the N2 nozzle. Plasma-arc cutting will be demonstrated on a mockup of a horizontal cut (2G) and a mockup of a vertical cut (5G).

Method of monitoring nozzle loading during pipe removal - The correct application of supports and rigging, required for removal of spools for decontamination operations, will eliminate any potential for excessive nozzle loadings.

Weld preparation made in place - the machining of weld edge preparation on the N1 nozzle, the N2 nozzle and the Recirculation Pump Inlet Nozzle.

Pipe Joint Fit-up - Butt weld joints at the N1 nozzle, the N2 nozzle, and the Recirculation Pump Inlet Nozzle.

Welding Equipment Set-up and Welding Procedure Implementation - Butt weld joints at the N1 nozzle, the N2 nozzle and setup of equipment at the Recirculation Pump Inlet Nozzle.

Closure - Spool Templating and Fit-up - Mockup of closure pipes at the N1 nozzle and the N2 nozzles.

Special Access or Special Method Non-Destructive Examination (NDE) - Required and In-house NDE examination will be performed on the welded mockups at N1 and N2 nozzle. In addition, mockups may be made on an as-needed basis for specific activities as construction progresses and when the use of a mockup will be considered an asset during the actual performance of the activity in the plant.

CB&I Special Instruction #8 (Attachment 8) covers the operations required, responsibilities and acceptance criteria and documentation of mockup demonstrations.

3.8 Preliminary Exposure Estimates

Preliminary estimates of radiation exposure during recirculation piping removal and replacement have

been completed and form the bases of the ALARA program. The accuracy of the estimates is dependent upon the following uncertainties:

- o Actual exposure levels at the work location based on current survey.
- o Variable time spent on each task at specific exposure levels.
- o Exposure hours in the drywell before recirculation pipe decontamination.
- o Actual decontamination factors achieved in the principal work locations and the reduction in the average exposure in the drywell.
- o Extent of the replacement: replacement currently includes recirculation and RHR piping, head spray and RWCU penetration; inspections will be performed to determine the soundness of recirculation suction safe ends (10 - 12" nozzles) and the jet pump instrument safe ends and seals.
- o Reduction in the average drywell exposure levels after removal of the piping.

The estimated overall radiation exposure is expected to the less than 2000 man-rem. This estimate was prepared based on the estimated manhours for 370 individual tasks and an estimated exposure level for each of these tasks. The ALARA aspects of the work have been reviewed and will continue to be reviewed as the work progresses. For example, a review of the 370 tasks have identified 27 tasks encompassing approximately ten percent of the estimated exposure manhours but more than 50 percent of the radiation exposure. Mitigating measures applied to these tasks are expected to provide significant exposure savings during the implementation of the work.

Specific overall ALARA reviews will be performed after the following milestones.

- first 2000 drywell manhours expended -
- installation of mitigating measures -

decontamination of piping - removal of piping

After each milestone review, the exposure estimate will be modified to reflect the actual exposure and elimination of the uncertainties described above.

Because durations required for extensive in-core work and preparation for decontamination, which is on the critical path, are expected to require 5 weeks, Philadelphia Electric, after a detailed ALARA review, has scheduled work which total approximately 13,000 pre-decontamination hours in the drywell, (7000 hours more than that needed for decontamination). ALARA engineering will closely monitor the predecontamination hours to limit exposure during this phase of the work.

3.9 Quality Assurance/Quality Control (QA/QC)

QA/QC coverage of piping replacement activities will be performed by the Electric Production Department, Quality Assurance Division and the Engineering and Research Department, Quality Assurance Section.

All job specific procedures, guidances, instructions and plans developed by the vendors are approved by Philadelphia Electric Company in accordance with the existing Peach Bottom and Engineering and Research Department procedures.

The Electric Production, QA Division, will audit the following tasks to insure that vendor performance is in accordance with Peach Bottom plant procedures:

- decontamination
- ALARA
- housekeeping
- plant restoration
- operations verification
- plant restart

The Electric Production QA Division will also perform QC monitoring activities throughout the work in the following areas:

- decontamination
- ALARA
- fire prevention and ignition source control
- housekeeping
- radiation protection (RWP's)
- baseline ISI
- preoperatonal testing

The Engineering and Research (E&R) Department, QA Section, is responsible for monitoring vendor performance in accordance with the procedures that have been prepared for pipe replacement.

Construction Division QC personnel in the E&R Department are responsible for all materials receipt inspection (other than CB&I material) and will monitor the installation and contractor activities to insure that procedural controls are adequate and adhered to.

CB&I QC personnel are responsible for materials receipt inspection for CB&I purchased material.