APPENDIX 1

INSTRUCTION

NUMBER _____

ALARA PROGRAM DESCRIPTION
FOR REPLACEMENT OF RECIRCULATION
SAFE ENDS AT
NINE MILE POINT 1 NUCLEAR GENERATING PLANT

PRELIMINARY

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PREPARED BY C. T. Guastaferro

REVIEWED BY _____

APPROVED BY _____

AUTHORIZED BY _____

CUSTOMER APPROVAL _____

NNI Newport News Industrial Corporation
Subsidiary of Newport News Shipbuilding
A Tenneco Company

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I. INTRODUCTION

All efforts to perform a task in an ionizing radiation environment with a minimum total exposure to personnel can collectively be called ALARA efforts (As Low As Reasonably Achievable). The ALARA program, does not impose quantitative limits on exposure but rather establishes a philosophy to try to maintain exposures as low as possible by examining all possible alternatives and deciding upon the best solution.

However, the maximum reduction in radiation exposure cannot be the only criteria to establish the best ALARA Program. The "reasonably achievable" aspect of the ALARA Program must take into account other parameters such as cost, time, and final quality required of the finished product in order to make the ALARA Program realistic and workable.

The following description of the ALARA Program will describe planning, preparation, and implementation efforts which will be used for the modifications to the Niagara Mohawk Nine Mile Point 1 Recirculation System.

II. PLANNING AND PROCEDURES

PRELIMINARY

A. Selection of Methods, Processes and Techniques

Prior to establishing written procedures, a selection of various methods, processes and techniques will be discussed and evaluated for several factors, four of which are discussed below. The four groups responsible for review (Field Service, Design, Engineering, and Quality Assurance) will examine the various alternatives presented, point out the advantages and disadvantages of each alternative and decide the most desirable choice. Four parameters considered in deciding the most desirable choice are:

1. Radiation Exposure - Any technique being discussed should be evaluated on the basis of the collective radiation expended as well as individual exposure estimates. These estimates of radiation exposure should be compared to the other alternatives exposures estimates. A technique that causes excessive exposures compared to other equally acceptable alternatives will be discarded as not meeting ALARA objectives.

2. Cost - The cost of a particular choice must be considered in any analysis. Excessive costs to save a little exposure may not be a "reasonably achievable" alternative. Previous experience on major repair and maintenance outages at nuclear plants generally shows that reasonable radiological control procedures are cost effective in the final analysis.

3. Time - The time spent to complete a specific technique or method can be approached from two viewpoints. The first viewpoint looks at the length of time a particular technique will take overall (i.e. how long it will extend the outage as compared with other alternatives). The second viewpoint looks at the length of time a particular technique requires personnel to remain in high radiation areas. The more time a method or technique can save, the more attractive it may be from an ALARA standpoint.

4. Quality Control - The quality control aspects of a particular technique may be of utmost importance if there is a direct impact on plant safety or integrity. On the other hand, if items worked on will be scrapped, quality control may be of little or no significance.

B. Procedure Development

Once the techniques, methods, or processes have been decided upon, detailed procedures are written by the appropriate planning or technical group. Each procedure is intended to be a complete document in itself and should contain a minimum of references to other control procedures. Special precautions, prerequisites and radiological protection requirements will be as explicit as possible and clearly marked or identified.

Each completed procedure is then reviewed by the appropriate groups. Each review group shall be responsible for determining that the procedure contains adequate information in its field of responsibility. A final review of the procedures will be performed once all comments from review groups have been completed. Signoffs shall be done at this time as appropriate.

All procedures developed by the contractor will be submitted for review by the Site Operations Review Committee or SORC, which includes a Quality Assurance Review and ALARA Review.

III. ADMINISTRATIVE CONTROL

An NNI Radiation Protection Coordinator is assigned by the contractor to serve on the Project Manager's staff. One of his major functions is to discuss ALARA objectives with personnel.

A. The NNI Radiation Protection Coordinator will call pre-planning meetings at logical points during the outage to discuss ALARA objectives and radiological problems associated with the job. Meetings of this type will be called whenever:

1. A major task is about to be undertaken.
2. A recirculation line is about to be breeched.
3. Radiation Levels in the work areas have significantly changed.

The meeting will be held in order to discuss ways to reduce exposures. Major points covered will be:

1. Identifying targets where exposures could be reduced.
2. Dividing the job into smaller, easier to handle work packages.
3. Identification of High and Extremely High Radiation Areas around work areas.
4. Assigning responsibilities for actions to be taken.
5. Review of particular job assignments to insure everyone understands their job function.

After completion of work, a post-task ALARA review will be held. The radiation Protection Coordinator will schedule and chair this meeting. This meeting will discuss the success of the actions taken as a result of the pre-job meetings and suggests improvements that could have lowered exposures even further.

B. In addition, the NNI Radiation Protection Coordinator's other job functions are:

1. Maintain an overall knowledge of work in progress and the general radiological conditions associated with this work,
2. Attend Plan-Of-The-Day meetings and serve as liason between functional groups on matters of radiation safety.
3. Provide technical assistance on radiological safety problems.
4. Keep project manager informed of radiological safety problems and the action being taken to resolve these problems.
5. Review radiation surveys performed by plant personnel so that general exposure levels and local hot spots in the work area can be identified. At this time, shielding and other methods of reducing radiation levels can be discussed with plant Health Physics personnel.
6. Discuss most efficient ingress and egress routes for personnel at work sites.
7. Review work on a continuing basis. He shall work closely with plant Health Physics and craft foremen to be sure they are aware of Man-Rem budgets and actual totals for the various portions of the work being performed.
8. Keep track of individual and collective exposures on a daily basis. Work with craft foremen to utilize craft labor in order to equalize exposures as much as possible.

IV. TRAINING AND ORIENTATION

PRELIMINARY

A. Radiation Training

All personnel will be required to attend the Radiological Safety Class at the Nine Mile Point Training Center before being allowed to work on site.

B. Specialized Equipment

Pipefitters and welders will be given extensive training on specialized or unfamiliar equipment such as pipe cutting machines and automatic welding equipment. Training will concentrate on set-up and removal operations for the equipment. Since the set-up and removal times are usually very time consuming, significant radiation exposure savings can be achieved by performing these operations as efficiently as possible. Once personnel have become familiar with the machines and their operations, training will move to the mock-up facility.

C. Mock-up Training

A mock-up facility will be fabricated in order to simulate the work area around the recirculation pump suction and discharge nozzles as closely as possible. The training in the mock-up will include the use of anti-contamination and respiratory equipment which will be prescribed for work in the drywell depending on which operation is being performed.

In general, the mock-up training is intended to accomplish the following objectives:

1. Familiarize trade workers with the physical orientation and

restaints of the work area.

2. Confirm that tools and equipment will function as intended and no additional items are needed.
3. Identify possible ways of improving or simplyfying the task from the standpoint of job performance, quality control and radiological control.
4. Determine that temporary shielding or contamination control arrangements will function as intended and will not be counter productive with respect to ALARA objectives.

V. RADIATION EXPOSURE CONTROL

PRELIMINARY

A. Man-Rem Estimates and Applications

An estimate of the collective radiation exposure for the recirculation safe-end replacement will be made in order to establish manpower needs in crucial areas of high radiation levels where skilled personnel must work. This estimate will also assist management in determining areas of emphasis for the use of temporary shielding.

The collective estimated exposure will be measured in units of Man-Rem and will consist of a summation of all individual tasks. Man-Rem subtotals for each task will also be used as a guideline figure for comparing actual Man-Rem accumulations to the estimated Man-Rem during the course of the project. Variations will occur from the original job scope and these must also be considered when comparing actual and estimated Man-Rem totals. Periodic evaluations will be performed as a planning aid to determine the adequacy of craft manpower available to perform skilled work in high radiation areas.

B. Radiation exposures will be measured daily and added to previous accumulations in order to control individual exposures within established limits for each calendar quarter. Daily exposures will also be grouped under various job categories so that cumulative Man-Rem exposures can be measured against estimated Man-Rems. This will help to evaluate the effectiveness fo the ALARA Program.

C. Temporary Shielding will be used in those areas where it can be shown to be effective in minimizing radiation exposures. When temporary shielding is being considered, it must be shown that shielding installation, maintenance and removal will not exceed the projected Man-Rem savings. The decision in any particular area must include the following factors:

1. Detailed radiation surveys of the work areas are needed to identify general background radiation levels; radiation levels about 1 foot from the surface of the radioactive component and radioactive component surface radiation levels. "Hot Spot" accumulations of radioactivity should also be identified in these surveys.
2. An estimate must be made of the number of individuals who will occupy a particular work area and the length of time to be spent in these areas.
3. The number of skilled craftsmen needed to complete a job in certain areas deserves special considerations. Shielding may be required in certain locations in order to protect a limited number of skilled workers.

4. Some areas with low radiation levels may be shielded if it can be shown that this area will be occupied by large number of people for unusually long periods of time.
5. Shielded work spaces may be more desirable in some instances when the background radiation is coming from all directions rather than trying to shield an entire work area.
6. The flushing of "Hot Spots" will be considered as an alternative to shielding. If flushing is a feasible operation, it will be attempted before shielding is erected.

Nozzle Shield Plugs will be inserted in the recirculation nozzles (pump suction and pump discharge) as soon as the elbows are severed and removed from the area. The plugs will reduce the "beam" of radiation eminating from the lower core support plate at the pump suction nozzles and from the activated core structure at the pump discharge nozzles. These plugs will be removed just prior to fitting up of the new recirculation elbows.

D. Designated "Stand-by" areas should be established for the purpose of minimizing radiation exposures for people who are "on-call". These stand-by areas will be selected primarily on the basis of the lowest backgound radiation levels. Personnel on-call will remain in these stand-by areas dressed in anti-contamination clothing until they are needed in the work area. This will reduce delay in the job due to a change in shifts or personnel requirements.

E. Special controls will be applied to all areas which are classified as high radiation areas (greater than 100 millrem per hour). Access to such areas will be restricted to keep personnel from receiving inadvertent exposures.

F. As much pre-installation work as possible on the recirculation loop will take place in non-radioactive areas.

1. Weld preps and other machining on the safe ends, spool pieces and elbows will be done outside radiation areas.
2. A template will be used to measure for the spool piece between the riser pipe and safe end. The template will be removed from the drywell following templating and will be used to machine the spool piece in a non-radiation area. This practice will minimize the pipe fitting time spent in the radiation area.

VI. CONTAMINATION CONTROL

PRELIMINARY

A. Anti-contamination clothing and equipment will be worn routinely for entry into the containment and other areas designated as contaminated. Additional protective equipment will be prescribed on the Radiation Work Permits for unusual contamination conditions which may be encountered.

B. The recirculation loop will be chemically decontaminated at the beginning of the outage in order to reduce radiation and contamination levels. Since the recirculation loop is a major contributor to general background levels in the drywell, the chemical decontamination is expected to contribute to the ~~radiation~~ reduction of these levels.

C. Portable filtered exhaust ventilation will be used as a control measure to reduce the possibility of airborne contamination from any operation which could cause particulates to become airborne.

D. A general policy of wrapping contaminated materials, items, components or tools in plastic bags or sheets will be followed. This practice is effective in minimizing the spread of radioactive particulates when these contaminated items are being transported from one area to another.

Clean items brought into the vessel and removed again shall also be wrapped while in the contaminated area to prevent uneccessary contamination of the item.

E. Emphasis will be placed on good housekeeping practices throughout the project to maintain a reasonable state of cleanliness. This will help to keep contamination from spreading and also assist in keeping background radiation as low as possible.

VII. TOOLS AND EQUIPMENT

Tools and equipment used in the drywell were all designed and/or selected to function simply and efficiently with a minimum of difficulty. Some examples of the specialized equipment and tools include:

A. Automatic Welding Equipment will be used in the drywell to help reduce exposures. The welding equipment used is intended to minimize operator exposure and produce a high quality weld which should need little or no repair effort.

B. Pipe cutting machines will be used to cut the recirculation pipe in the drywell. Cutting machines are designed to cut, weld prep and counterbore from the same basic set-up. This eliminates the set-up and disassembly times for separate machines plus produces an accurate weld prep and counterbore since all operations are made from the same set-up. The cutting machine feeds automatically which allows the operator to move to a lower radiation area while the machine is running.

C. Pump Discharge Shield Plug Installation Tool - Used to install shield plug automatically in the pump discharge nozzles. Enables workers to move away from the radiation beam coming from the core.

VIII. REFERENCE

A. "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations will be As Low As Reasonably Achievable (ALARA)", U. S. Nuclear Regulatory Commission, Office of Standards Development, Regualtory Guide 8.8