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INDIANA & MICHIGAN ELECTRIC COMPANY

P.O. BOX 16631
COLUMBUS, OHIO 43216

March 30, 1987
AEP:NRC:0980A

Donald C. Cook Nuclear Plant Unit No. 2
Docket No. 50-316
License No. DPR-74
STEAM GENERATOR REPAIR REPORT, REVISION 1

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

ATTN: H. R. Denton

Dear Mr. Denton:

Please find attached to this letter Revision 1 to the Steam Generator Repair Report for the Donald C. Cook Nuclear Plant, Unit No. 2. Also included are the instructions for incorporating Revision 1 into the Steam Generator Repair Report.

This revision responds to questions asked by members of the NRC staff during the December 11, 1986 meeting between the NRC and AEPSC. Revision 1 also provides the Steam Generator Project Management Organization, a listing of the Industry Codes and Standards and NRC Regulatory Guides applicable to the Steam Generator Repair Project and a discussion of the handling of heavy loads associated with the Steam Generator Repair Project, including the use of single-failure-proof cranes.

For your convenience and pursuant to discussions with Mr. D. L. Wigginton of the NRC staff, an additional 20 copies of Revision 1 of the Steam Generator Repair Report are being sent to you under separate cover.

In compliance with the requirements of 10 CFR 50.91(b)(1), copies of this letter and its attachments have been transmitted to Mr. R. C. Callen of the Michigan Public Service Commission and Mr. G. Bruchmann of the Michigan Department of Public Health.

A001
1/1

This document has been prepared following corporate procedures which incorporate a reasonable set of controls to insure its accuracy and completeness prior to signature by the undersigned.

Very truly yours,

M. P. Alexich
Vice President

edg

Attachment

cc: John E. Dolan
W. G. Smith, Jr. - Bridgman
R. C. Callen
G. Bruchmann
G. Charnoff
NRC Resident Inspector - Bridgman
A. B. Davis - NRC Region III

H[illegible]. DENTON, DIRECTOR
NRC - NRR
WASHINGTON, D. C.
072

STEAM GENERATOR REPAIR REPORT
DOCUMENT CONTROL ACKNOWLEDGEMENT LETTER

Steam Generator Repair Report, Revision _____
Donald C. Cook Unit 2
Controlled Copy No. _____

Please acknowledge receipt of the above listed controlled copy of the Steam Generator Repair Report by providing your signature and date in the space below:

Signature_____

Date_____

Please return this letter within ten (10) days to:

Mr. Timothy G. Harshbarger
American Electric Power Service Corporation
1 Riverside Plaza. 20th Floor
Columbus, Ohio 43216

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February 6, 1987

DOCKET NO(S). 50-316/50-316
Mr. John D Dolan, Vice President
Indiana & Michigan Electric Company
c/o American Electric Power Service Corporation
1 Riverside Plaza
Columbus, Ohio 43216

SUBJECT: D.C. Cook Nuclear Plant, Units 1 and 2

The following documents concerning our review of the subject facility are transmitted for your information.

- ☐ Notice of Receipt of Application, dated _____.
- ☐ Draft/Final Environmental Statement, dated _____.
- ☐ Notice of Availability of Draft/Final Environmental Statement, dated _____.
- ☐ Safety Evaluation Report, or Supplement No. _____ dated _____.
- ☐ Environmental Assessment and Finding of No Significant Impact, dated _____.
- ☐ Notice of Consideration of Issuance of Facility Operating License or Amendment to Facility Operating License, dated _____.
- ☒ Bi-Weekly Notice; Applications and Amendments to Operating Licenses Involving No Significant Hazards Considerations, dated 1/28/87 [*see page(s)*] 2883.
- ☐ Exemption, dated _____.
- ☐ Construction Permit No. CPPR-_____, Amendment No. _____ dated _____.
- ☐ Facility Operating License No. _____, Amendment No. _____ dated _____.
- ☐ Order Extending Construction Completion Date, dated _____.
- ☐ Monthly Operating Report for _____ transmitted by letter dated _____.
- ☐ Annual/Semi-Annual Report- _____ _____ transmitted by letter dated _____.

Office of Nuclear Reactor Regulation

Enclosures:
As stated

cc: See next page

OFFICE	PWR#4/DPWR-A	PWR#4/DPWR-A					
SURNAME	MDuncan/rad	DWigginton					
DATE	02/5/87	02/6/87					

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50-315

D.C.H.

RECORD OF REVISIONS

REVISION NO.	REVISION DATE	DATE ISSUED	ISSUED BY
0	November 4, 1986	November 4, 1986	T. G. Harshbarger

LIST OF TABLES

LIST OF FIGURES

1.3.5 Identification of Principle Agents and Contractors

Indiana & Michigan Electric Company (I&MECo) is a corporation duly organized under the laws of the State of Indiana with its principal place of business at One Summit Square, Ft. Wayne, Indiana. I&MECo is the sole owner and operator of the Donald C. Cook Nuclear Plant, Bridgman, Michigan.

American Electric Power Service Corporation (AEPSC) is a corporation duly organized under the laws of the State of New York with its principal place of business at One Riverside Plaza, Columbus, Ohio. I&MECo and AEPSC are both subsidiaries of American Electric Power Company, Incorporated (AEP).

AEPSC, which will have overall responsibility for establishing the technical requirements for the repair project, has been actively engaged in nuclear power operations with the construction, operation, and maintenance of the Donald C. Cook Nuclear Plant Units 1 and 2. This involvement represents a total operating experience of approximately 19 years. AEPSC has developed the engineering and construction management capability to engineer and direct a project of this magnitude. Selected assistance from consultants may be employed as needed. The construction will be directed by AEPSC utilizing a composite work force of I&MECo and AEPSC personnel, construction craftsman, and selected specialty contractors who have proven expertise in certain phases of the work.

Westinghouse manufactured the existing steam generators and will provide the replacement steam generator lower assemblies. Westinghouse's expertise will be utilized as appropriate to assist in developing the engineering and construction procedures and in providing site support during the repair project.

SECTION 2 - REPLACEMENT COMPONENT DESIGN

2.1 General Description

The repaired steam generators are similar in design and are functionally the same as the original steam generators. The steam generators are vertical, shell and U-tube heat exchangers with integral moisture separating equipment as described in Section 4.2.2.4 of the FSAR. Certain design changes have been made in the repaired steam generators which address the operating experience of the original steam generators as described in sections 1.1 and 1.2 of this report, and which enhance the overall reliability and maintainability of the steam generators. The major changes are summarized below.

Only the lower assembly, up to and including the transition cone, will actually be replaced. The upper assembly, which includes the steam separating equipment, will be reused after refurbishing with a new feedring with Inconel 600 J-nozzles and upgrading the separators to enhance performance. Refurishment of the upper assembly will be performed in the field.

The tubes in the lower bundle are made of thermally treated Inconel 690, which has superior resistance to intergranular corrosion and cracking. Increased heat transfer area is provided by an increase in the number of tubes, achieved by reducing the pitch of the tubes. The entire length of each tube in the tubesheet is hydraulically expanded to minimize the crevice which might otherwise accumulate corrosive materials. The inside eight rows of tubes, because of their tight radius, are heat treated to relieve the residual stresses.

2.4 Codes and Standards

The original steam generators were designed, fabricated, inspected and tested as Class A component in conformance with the 1968 ASME Boiler and Pressure Vessel Code, Section III, plus Addenda through Winter 1968 and Code Cases 1401 and 1498. All pressure boundary materials and weld filler material welded conformed to specifications set forth by Section III of the ASME code. Non-pressure retaining parts on the secondary side were in accordance with applicable ASTM or ASME material specifications.

The design, material, fabrication, inspection, examination, and testing of replacement steam generator components or assemblies furnished by Westinghouse are in accordance with the codes and standards, including all applicable addenda, referenced herein.

The original "N" stamp will be maintained for the repaired steam generators. The replacement lower assemblies will be "NPT" stamped. Field closure welds will be "NA" stamped.

2.4.1 Industry Codes and Standards

- 1983 ASME Boiler and Pressure Vessel Code, Section III, "Nuclear Power Plant Components," plus Addenda through Summer 1984.

- 1983 ASME Boiler and Pressure Vessel Code, Section IX, "Qualification Standards for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operations," plus Addenda through Summer 1984.

- 1983 ASME Boiler and Pressure Vessel Code, Section II, "Material Specifications," plus Addenda through Summer 1984.

- 1983 ASME Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," plus Addenda through Summer 1983 and applicable Code cases and interpretations.

- Appendix A of 10 CFR 50, as amended and effective October 27, 1978.

- Appendix B of 10 CFR 50, as amended and effective January 20, 1975.

- Appendix G of 10 CFR 50, as amended and effective May 27, 1983.

- "State of Michigan Boiler Law and Rules & Regulations," as administered by Michigan Department of Labor, Bureau of Safety & Regulation.

- ASTM A262-84 "Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels."

2.5 Shop Tests and Inspections

The tests and inspections required by the ASME Code, Section III will be conducted during the fabrication of the replacement steam generator lower assemblies. In addition to these ASME requirements, further

tests and inspections will be conducted at the fabrication facility. After the tubing installation is completed a gas leak test will be performed to demonstrate the integrity of the tube-to-tubesheet welds. The primary side of the steam generator will be hydrotested at the shop in accordance with approved procedures. I&MECo will arrange to perform audit functions related to fabrication and shop testing.

- The requirements of 10 CFR 20, "Standards for Protection Against Radiation," and the guidelines contained in Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposure at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable", will be followed as applicable to the Steam Generator Repair Project. The repair project will be preplanned to the extent necessary. Mockup training and project specific training will be used as appropriate to minimize outage time and radiation exposures. Decontamination and other exposure saving techniques will be used where the benefit in achieving a level of protection equals or exceeds the cost of implementation. Scaffolding and other components will be prefabricated to the extent possible to minimize radiation exposure and outage time.

- The repair project will be completed in accordance with the Donald C. Cook FSAR Chapter 1.7, "Quality Assurance of the Donald C. Cook Nuclear Plant," also referred to as the "Updated Quality Assurance Program Description" as supplemented with a "Steam Generator Repair Project Quality Assurance Program Description Supplement."

- The existing plant facilities will be augmented as necessary to accommodate the additional personnel who will participate in the repair project or to facilitate the actual repair work.

3.4.1.5 Steam Generator Transfer Platforms

A transport deck will be built at elevation 654'-9 3/4" over the refueling cavity in the containment building, through the equipment hatch and into the auxiliary building. The deck inside the containment will be designed as a seismic Class III structure.

3.4.1.6 Containment Ventilation

The containment ventilation system to be used during Steam Generator Repair Project will consist of a combination of existing and temporary systems. The existing containment purge supply and exhaust system will be used continually during construction to keep dust and contamination levels down and to provide heating for the containment during the winter. Mechanical cooling will be added to the purge supply system.

3.4.1.7 Electrical Power

Power for repair activities within containment will be provided by using the Donald C. Cook Unit 2 Reactor Coolant Pumps Motor power circuit(s). Each motor (Quads 1, 2, 3 and 4) has an electrical power circuit rated approximately 6MVA (3 phase, 60 hertz, 4kV). One or all of these 4 circuits may be used depending on a detailed plan of actual construction loads and power distribution requirements.

3.4.2 Removal of Concrete, Structural and Equipment Interferences

3.4.2.1 Mechanical Equipment

Steam generator snubber removal is covered under Section 3.4.2.9.

Some circuits of the following systems will be temporarily disconnected and/or removed:

- o Fire Detection
- o Communication
- o Steam Generator Process Instrumentation
- o Containment Ventilation
- o Fuel Handling
- o Hydrogen Recombiner
- o 600 V Non-Ess Dist. & 120/208 V Lighting
- o Seismic Instrumentation

Equipment determined to be essential during the Steam Generator Repair Project will be relocated, and/or its cable, conduit, and cable trays will be re-routed as required to maintain the equipment in proper operating condition.

3.4.2.7 Heating, Ventilation and Air Conditioning Ductwork

Ductwork in the removal pathway will be removed or temporary relocated. Duct pieces removed will be cleaned, marked and placed in temporary storage outside containment until needed for reinstallation.

3.4.2.8 Steam Generator Insulation

The existing steam generator metallic insulation will be reused. The outer dimensions of the replacement steam generators duplicates the original steam generators, although some insulation sections will require modifications to accommodate the additional hand holds and inspection ports. Sections of insulation shall be removed, cleaned, wrapped in plastic bags and stored in wooden crates. Storage crates will be stored outside containment off the

will be developed by the contractor and subject to approval by AEPSC. Standard industry practice and equipment will be employed to perform the pipe cuts. Cut locations are illustrated in Figure 3.5-1.

3.5.1.2 Reactor Coolant Inlet and Outlet Piping Cuts

The reactor coolant inlet and outlet piping will be disconnected from the steam generator by a single cut on each steam generator primary nozzle. Cut location, equipment and methodology will be developed by the contractor and subject to approval by AEPSC. Standard industry practice and equipment will be employed to perform the pipe cuts. Cut locations are illustrated in Figure 3.5-1. After cutting, a circular steel plate will be welded on each steam generator primary nozzle.

3.5.1.3 Steam Generator Shell Cut

An oxy-fuel or plasma arc cut, located approximately as shown in Figure 3.5-1, will be used to remove the upper shell assembly from the lower assembly. Cut location, equipment and methodology for cutting will be developed by the contractor and subject to approval by AEPSC. Technical advice will be provided by the original equipment manufacturer, Westinghouse.

3.5.1.4 Steam Generator Wrapper Cut

An oxy-fuel or plasma arc cut of the tube bundle wrapper plate will be made after cutting the exterior shell. Cut location, equipment and methodology for cutting will be developed by the contractor subject to AEPSC approval. Technical advice will be provided by the original equipment manufacturer, Westinghouse.

3.5.1.5 Cleanliness Requirements During Pipe Cuts

Approved procedures and/or specifications will be followed by the contractor during all cutting operations to prevent debris or cutting chips from entering piping systems or the reusable pipe sections and to maintain overall cleanliness. Where possible, dams will be employed in piping systems to minimize ingress of cutting chips or slag. Where dams cannot be used, cutting methods which will minimize chips on the final parting cuts will be considered. After all cutting operations, the system piping and removed sections will be cleaned and capped.

Approved procedures and/or specifications will incorporate the requirements of N45.2.1-1973 and Regulatory Guide 1.37, March 1973.

3.5.2 Removal and Handling of the Steam Generator Upper Assemblies (Upper Assembly)

A temporary lateral support will be attached to the top of the lower assembly, and the existing belly band supporting the upper assembly will be removed.

After the piping attached to the upper assembly has been restrained and cut, and the welds attaching the lifting lugs to the upper assembly have undergone NDE, a lifting beam attached to the main hook of the polar crane will be lowered into position above the upper assembly lifting lugs. The lifting beam will be connected to the lifting lugs with slings, and the slack removed from the slings so that the polar crane will bear a portion of the steam generator weight.

The upper assembly will then be cut from the lower assembly approximately two inches above the centerline of the existing transition cone girth weld. After completion of the cut, the polar crane will support the entire weight of the upper assembly. The upper assembly will be raised vertically until its bottom is approximately six inches above the steam generator enclosure horizontal wall cut and then moved horizontally through the opening in the enclosure wall.

The support saddles upon which the upper assembly will be transported will be in position at the refueling cavity end of the transfer platform described in Section 3.4.1.5. A second sling supported by the polar crane auxiliary hook shall be rigged around the lower section of the upper assembly; lowering the main hooks while holding steady on the auxiliary hook will allow the upper assembly to be lowered into a horizontal position and then maneuvered over its support saddle. The upper assembly will then be lowered onto the support saddle and secured; the lift beam and slings will be removed. The saddle support skid will sit upon rollers which will roll and turn under the weight of the upper assembly. The skid shall be connected by a steel rope extending through the equipment hatch to a winch system anchored outside the containment in the auxiliary building.

The transport platform at elevation 654'-9 3/4" will be built over the refueling cavity, through the equipment hatch into the auxiliary building between the Donald C. Cook Unit 1 and Unit 2 equipment hatches.

The upper assembly will be winched through the equipment hatch into the area between the Donald C. Cook Unit 1 and Unit 2 equipment hatches where the steel rope will be detached. The upper assembly, including its saddle support skid, will be rotated and moved in a southeast direction until it has passed the edge of the spent fuel pool. After the southwest corner of the spent fuel pool has been cleared by the upper assembly, the upper assembly will be positioned with the top pointing east and rolled to the eastern edge of the elevation 650' floor. The upper assembly will be rotated to a north-south orientation and then lowered to elevation 609', where it will be loaded onto a railroad flat car to be transported into the Donald C. Cook Unit 2 turbine room for refurbishing. The movement of an upper assembly from a doghouse enclosure to the auxiliary building crane bay is illustrated in Figures 3.5-2, 3.5-3, and 3.5-4. These figures illustrate the planned pathway and one of the lifting options currently under evaluation.

3.5.3 Removal and Handling of the Steam Generator Lower Assemblies (Lower Assembly)

Upon removal of the upper assembly from the steam generator doghouse enclosure a circular steel plate shall be welded to the top of the lower assembly as a contamination barrier.

A lifting assembly connecting the main polar crane hook to the lower assembly will be installed.

After the lifting assembly is installed, the crane shall take the weight of the lower assembly while the lower assembly is still supported by the temporary lateral support and the steam generator support columns. The lower assembly will then be cut free of all pipes. The temporary lateral support will be removed and the lower assembly then lifted slightly off its support columns.

The lower assembly shall be raised until it is approximately 2'-0" below the underside of the steam generator doghouse enclosure roof and then moved horizontally toward the opening until it is within 6" of the steam generator doghouse enclosure wall. It will be lifted again until the bottom of the lower assembly is at elevation 663'-6", at which point it can be moved horizontally out of the steam generator enclosure. Once clear of the steam generator doghouse enclosure, the lower assembly will be brought to a horizontal position. It will then be lowered onto a set of support saddles situated on the temporary steel frame deck over the refueling cavity. The centerline of the saddles will coincide with the centerline of the equipment hatch extended into the containment. Rollers shall be installed underneath the saddles. The lower assembly will then be winched through the equipment hatch into the auxiliary building.

The lower assembly will be re-oriented so that it is aligned in a southeast-northwest direction, and moved in a southeast direction avoiding the southwest corner of the spent fuel pool as much as possible. The lower assembly orientation shall gradually be shifted until it is in an east-west orientation and moving east along the south side of the spent fuel pool. It will be moved until it is at the eastern end of the elevation 650', where it will be moved out into the railroad bay and re-oriented to a north-south direction and then lowered and secured to a wheeled transporter which will

remove it through the roll-up door in the east end of the auxiliary building. It shall then be transported to the temporary on-site steam generator storage facility. It will be moved via the plant access road and the existing haul road. There, the lower assembly will be off-loaded from the transporter and placed in the temporary on-site steam generator storage facility. The removal of the lower assemblies from the doghouse enclosure to the auxiliary building railroad bay is illustrated in Figures 3.5-5, 3.5-6, 3.5-7 and 3.5-8. These figures illustrate the planned pathway and one of the lifting options currently under evaluation.

3.6 Installation Activities

3.6.1 Handling and Installation of the Replacement Lower Assemblies (Lower Assembly)

The replacement lower assembly will be moved from the storage area to the auxiliary building railroad bay at elevation 609'-0" on a wheeled transporter. The replacement lower assembly will be lifted off the transporter and onto its support saddles which will be positioned on the temporary deck adjacent to the railroad track and above the elevation 609'-0" floor. The replacement lower assembly will be securely fastened to the support saddles. The support saddles will sit on rollers. The replacement lower assembly lifting frame will be attached to the replacement lower assembly.

The replacement lower assembly will be raised to the elevation 650'-0" floor. The replacement lower assembly shall be rotated 90° to an east-west orientation, and then positioned to the south of the spent fuel pool. The replacement lower assembly will be moved west. When it has reached the western edge of the spent fuel pool, it will be rotated approximately 45°

until it is in a northwest-southeast orientation and moved northwest to clear the Donald C. Cook Unit 2 equipment hatch. Then, it will be maneuvered until it is lined up with the centerline of the equipment hatch with its rounded end toward the containment. It will then be winched through the equipment hatch into the Donald C. Cook Unit 2 containment where it will be attached to the containment polar crane. It will then be raised off the temporary deck over the refueling cavity and brought to a vertical position utilizing a J skid and/or rigging system. If a J skid is used and the upending is done over the reactor missile shields, the missile shields will be protected to prevent damage to the concrete. The support saddles will be removed prior to upending the replacement lower assembly.

Once the replacement lower assembly is vertical, it will be moved to the doghouse enclosure. It will be moved into the doghouse enclosure through the opening in the doghouse enclosure walls. The replacement lower assembly will be lowered onto the original support columns, four per steam generator. The support columns are bolted to the four support pad locations on the steam generator channel head using six bolts at each support column location. Once the steam generator lower assembly has been aligned and bolted to the supports, the steam generator will be aligned to the reactor coolant piping in preparation for fit-up and welding. The lower assembly will be secured in place by temporary restraints located on the upper part of the shell to prevent movement during subsequent operations involving welding of reactor coolant pipe and attachment of the upper assembly. Weld preparation on the steam generator lower assembly will be performed in the shop.

3.6.2 Handling and Installation of the Upper Assemblies (Upper Assembly)

The upper assembly shall be transported into the auxiliary building railroad bay from the Donald C. Cook Unit 2 turbine room on a railroad car. The upper assembly will be placed horizontally on the railroad car with the dome end to the north. It will be raised off the rail car and placed into its support saddles which will be positioned on the temporary deck adjacent to the railroad track and above the elevation 609'-0" floor. The support saddles will be securely fastened to the upper assembly. Then the upper assembly will be lifted just above the elevation 650'-0" floor. It will be moved south away from the spent fuel pool and turned to an east-west orientation with the dome end pointing east. It will then be moved west until it is blocked by the Donald C. Cook Unit 2 east radiation shield wall. It will be moved around the Donald C. Cook Unit 2 equipment hatch as far away from the southwest edge of the spent fuel pool as possible and maneuvered so that its centerline will be aligned with the centerline of the Donald C. Cook Unit 2 equipment hatch with the dome end pointing away from the containment. It will then be attached to a winch system and pulled through the equipment hatch until it is on the temporary deck over the Donald C. Cook Unit 2 refueling cavity, where it will be attached to the polar crane main hook and lifted from its support saddles. It will be raised in a horizontal position until there is enough room below it to allow it to be moved to a vertical position while still supported by the crane. Then the girth weld end of the upper assembly will be lowered using the auxiliary hook of the polar crane until the upper assembly is vertical with the main steam nozzle on top.

The lower end of the upper assembly shall be brought to elevation 663'-6" and moved through the enclosure wall opening and positioned over the replacement lower assembly.

The upper assembly will be positioned to align with the lower assembly transition cone and the feedwater pipe elbow. Reattachment of the upper assembly and wrapper plate will be based upon procedures and methods developed by the contractor and approved by AEPSC. The shell weld will be ASME Code stamped.

Prior to installing the upper assembly, some rework will have to be performed on the internals and shell. The work scope is as follows for each upper assembly, some of which is shown in Figure 2.2-1 and 2.2-2:

- o Install new top hat assemblies on each of the three existing swirl vane primary moisture separators.
- o Install additional drain piping from the secondary moisture separators.
- o Install new feedwater ring with Inconel J-nozzles.
- o Weld prep the wrapper plate.
- o Weld prep the edge of the upper assembly shell plate to be joined to the lower steam generator assemblies.
- o Weld prep the feedwater nozzle and steam outlet nozzle.
- o Weld prep instrumentation taps.

All work will be performed by the field contractor utilizing Westinghouse instructions, procedures, drawings and technical direction. Work will be performed on the upper assemblies in the turbine room crane bay.

3.6.3 Installation of Major Piping Components

The reattachment of all major piping i.e., main steam, feedwater and reactor coolant, will be performed based upon procedures and methods developed by the contractor and approved by AEPSC. The sequence of piping installation will be done in a manner that insures proper alignment and that reduces the possibility of damaging the feedwater elbow thermal sleeve.

TABLE 3.6-1

STEAM GENERATOR REPAIR WELDS

WELD	MATERIAL	OUTSIDE Dia.[1]	WALL in.	JOINT	PROCESS[2]	FILLER[3]	MINIMUM PREHEAT °F	POSTHEAT °F	WELD FINISH	NDE[4]
Feedwater Reducer to Pipe[5] or	SA-105 to SA-106,Gr-B	16"	.843"	Single V 35-40° with backing ring	SMAW with GTAW Cap	E7018 E70S-2	50	1100-1200 1 hour Above 600 heat & cool 400/hr	As welded	RT,MT
Pipe to Pipe[5]	SA-106,Gr-B	14"	.705"	As above	As above	E7018	50	Not req.		RT,MT
Feedwater Nozzle to pipe[5]	SA508,Cl-2 to SA106,Gr-B	16"	.843"	Single V 35-40° without backing ring (flat root)	GTAW root SMAW fill GTAW cap	E70S-2 E7018 E70S-2	175	1100-1200 1 hour Above 600 heat & cool 400/hr.	Grind to remove weld ripple	RT root RT final MT
Level Inst. Tap to Inst. Pipe	SA508,Cl-1a to SA106,Gr-B	2" or less	varies	Socket	SMAW or GTAW	E7018 or E70S-2	50	Not req.	As welded	MT
Pressure Inst. Tap to Inst. Pipe	SA508,Cl-1a to SA106,Gr-B	2" or less	varies	Socket	SMAW or GTAW	E7018 or E70S-2	50	Not req.	As welded	MT
Blowdown/Drain Nozzle to Pipe	SA508,Cl-1a to SA106,Gr-B	2" or less	varies	Socket	SMAW or GTAW	E7018 or E70S-2	50	Not req.	As welded	MT
Blowdown Pipe to Pipe	SA-106,Gr-B									
Main Steam Pipe to Pipe	SA-155,Cl-1 Gr KC70 (SA691,Cl-32 Gr CMSH)	32"	1 1/8"	Single V 35-40" with backing ring	SMAW with GTAW cap	E7018	50	1100-1200 2 hours Above 600 heat & cool 350/hr.	As welded	RT,MT

TABLE 3.6-1 (cont.)

STEAM GENERATOR REPAIR WELDS

WELD	MATERIAL	OUTSIDE Dia.[1]	WALL in.	JOINT	PROCESS[2]	FILLER[3]	MINIMUM PREHEAT °F	POSTHEAT °F	WELD FINISH	NDE[4]
Main Steam Nozzle to pipe[5]	SA508,Cl-2 to SA155,Cl-1 Gr KC70 (SA691,Cl-32 Gr CMSH)	32"	1 1/8"	Single V 35-40° & 10-15°	SMAW with GTAW cap	E7018 E70S-2	175	1100-1200 2 hours Above 600 heat & cool 350/hr.	As welded	RT,MT
Reactor Coolant Pipe to Steam generator nozzle	SA-451,CPF8M (316) to 308 weld overlay	31 ID	2.88	Single U flat root	GTAW root SMAW	ER316 & E316	50	Not req.	Grind&polish with 360 grit or finer	RT,UT,PT
Shell Transition cone to plate[6]	SA508,Cl-3 to SA533,Gr-A Cl-1	175 3/4"	3.62"	Single U backgouge or Single U with backing Remove backing backgouge	SMAW or SAW	E9018 B3 Erector's Choice for SAW	250	1100-1200 2 hr 30 min Above 800 heat & cool 110/hr	Grind for UT exam	RT,UT,PT or MT
Wrapper Plate and Misc. Internal None Pressure Components	SA-285,Gr-C	124.25"	3/8"	Single V flat root	SMAW	E7018	50	Not req.	Grind, Repair imperfections	MT

1 Outside diameter except as noted.
2 Weld qualifications to be in accordance with Section IX plus impact requirements in Section III.
3 Weld filler metals and electrodes to be ordered in accordance with Section II, Part C. Austenitic stainless steel to meet delta ferrite requirements in Section III,NB-2433. Covered electrodes to meet analysis tests Section III, NB-2420.
4 NDE to be in accordance with Section V with acceptance standards in accordance with Section III-83 and S84.
5 Welds required will depend on where main steam and feedwater lines are cut.
6 Welds may be either SAW or SMAW.

3.8.1.3 Project Radiological Protection Organization

The Project Radiological Protection/ALARA Group (see Figure 3.8-1) will be formed to provide ALARA engineering support and radiological controls for the steam generator repair project. The Project Radiological Protection/ALARA Group will be staffed by AEPSC, I&MECo and experienced contractor personnel and will report to the AEPSC Project Health Physicist, who will have overall responsibility for the ALARA and radiological protection coverage for the Steam Generator Repair Project.

The Radiological Protection/ALARA Group will be comprised of four support groups which report to the Project Health Physicist. The Project Health Physicist has overall responsibility for the implementation and documentation of the project Radiological Protection Program and reports directly to the Project Construction Manager. The support groups include:

- The Radiation Protection Group, which will be responsible for implementing the Project Radiation Protection Plan once the outage begins. This group will supply radiological protection technician coverage including task surveillance and monitoring in radiologically controlled work areas.

- The ALARA Group, which will be responsible for radiological engineering and evaluations required to maintain the project radiation exposure consistent with ALARA principles. The group will review, evaluate, and approve the contractor's procedures, policies, training programs, and work packages.

- The Dosimetry and Records Group, which will coordinate dosimetry functions, including TLD issue and reading, whole body badging, extremity monitoring, electronic dosimetry, telemetric dosimetry, and self-reading dosimetry issue, as appropriate. In addition, they will be responsible for maintaining up-to-date exposure information for both personnel and tasks involved with the project. This group will organize the record system, input data, correlate and distribute reports, and provide documentation to support the Project Radiological Protection/ALARA Group.

- The Training Group, which will be responsible for the evaluation of present training facilities and programs, preparation, implementation, and supervision of the project training program.

The Project ALARA Committee will be used during the project. Its function will be to provide a forum for discussion and evaluation of project related ALARA and Radiation Protection concerns.

The general contractor for the Steam Generator Repair Project will be an important participant in the Project Radiological Protection/ALARA Program. Pre-job planning, mockup training, worker dose control, scheduling, ALARA method implementation, and radiological material control are some of the areas in which the general contractor will work closely with the Project Radiological Protection/ALARA Group.

3.8.1.4 Radiation Exposure Control - Monitoring and Tracking

Health Physics practices and procedures for the Steam Generator Repair Project will involve methods of both internal and external exposure control, monitoring, and tracking.

o Principal methods of external exposure control are designed to lower individual as well as collective radiation dose and provide accurate monitoring. These methods include:

- Radiation Work Permit System (RWP) - All work performed in a radiation area will be governed by the RWP program. A computerized RWP system will be used.

- Containment Access Control - A separate building for containment access will be provided to control the flow of project personnel into and out of the containment work areas.

- Shielding - Shielding in the containment will be designed by the general contractor based on his special requirements (i.e., machine and equipment interferences), man-rem and cost benefit analysis, and Project Radiological Protection/ALARA Group requirements. All shielding designs will be reviewed and approved by the Project Radiological Protection/ALARA Group for radiological considerations and by AEPSC Project Engineers for engineering and code acceptability. Installation and removal of shielding will be performed by a contractor using Project Radiological Protection/ALARA Group approved procedures. Whenever

shielding is put in place or removed, a new radiation survey of the area will be performed before personnel are allowed to resume work in the area. Specially engineered shielding will be designed, constructed and installed in certain high radiation areas where standard shielding would prove to be ineffective or inefficient.

- Worker Surveillance - Health physics technicians will provide continuous work surveillance in the containment and other work areas by on-the-job dedicated technician coverage and/or remote monitoring by closed circuit audio/video systems. They will keep workers informed of any changes to radiological conditions, provide RWP updates, and ensure that workers are using good health physics work practices. They will monitor workers to ensure that they are in compliance with RWP requirements and are following appropriate radiation protection procedures.

- Area postings - The containment as well as other work areas will be posted by the Radiation Protection Group in accordance with regulations set forth in 10 CFR 20, "Standards For Protection Against Radiation." In addition, low dose rate areas will be conspicuously marked as approved ALARA waiting areas.

- Core Configuration - The core will be unloaded and the fuel stored in the spent fuel pool to help maintain doses ALARA.

- Steam Generator Secondary Side Water Level - Water level in the secondary side of the steam generator will be kept as high as possible as long as possible to provide additional shielding.

- Decontamination - A program of decontamination will begin with an initial containment decontamination and will continue with an on-going program stressing good housekeeping practices and, as necessary, an area decontamination effort. The respiratory and clothing requirements will be kept as low as possible by providing a decontamination program which will keep contamination to a minimum, thus allowing more efficient working conditions.

- Special ALARA Considerations - Evaluations of different work methods, including tools and equipment, will be performed prior to commencement of work. Additional evaluations will be performed during and after the work to compare similar jobs.

- Dosimetry - Whole body badging, electronic dosimetry (remote and self-reading), extremity badging and/or standard self-reading pocket dosimetry will be used to monitor doses during the project. TLDs will provide the official dose record.

- Exposure Tracking and Trending - A computerized system will be used to track individual tasks, personnel, groups, and activities. This data will be used to evaluate the success of the ALARA methods used and to recommend improvements. The principle function of the system will be to provide up-to-date man-rem and man-hour expenditure data.

Figure 3.3-3

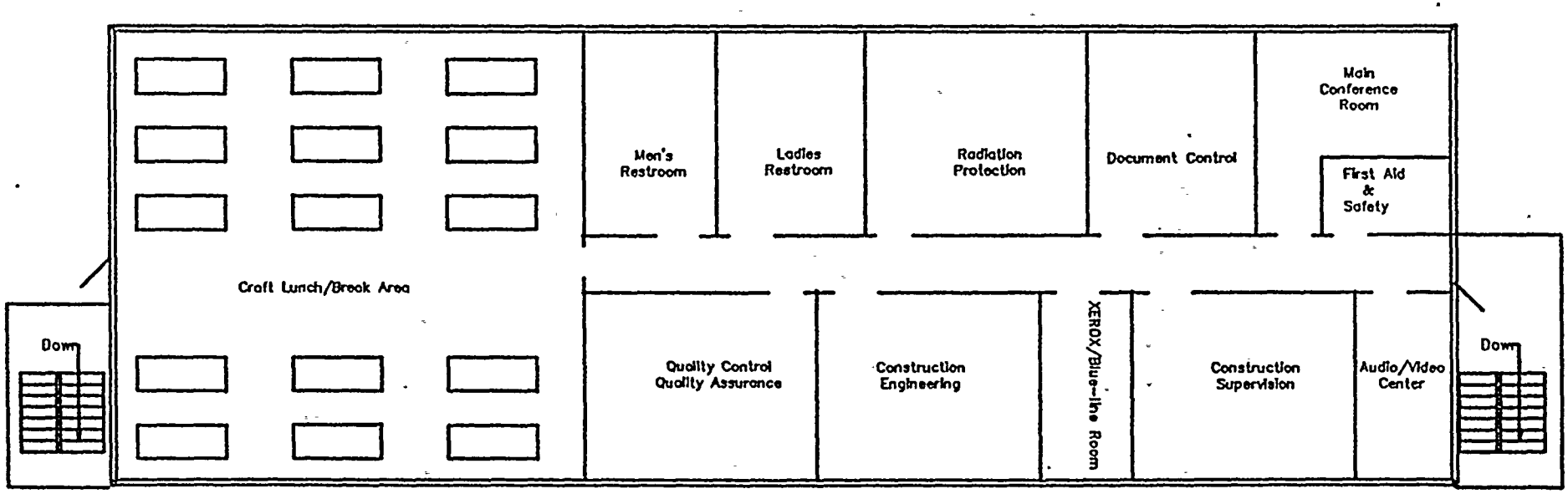
Containment Access Building
Conceptual Design
Radiation Protection Layout

(Based on Blow-Out Panel Access)

Second Elevation

Notes:

1. Craft lunch/break area size is based on 200 craft.



Not To Scale

Containment Access Building
Conceptual Design
Radiation Protection Layout

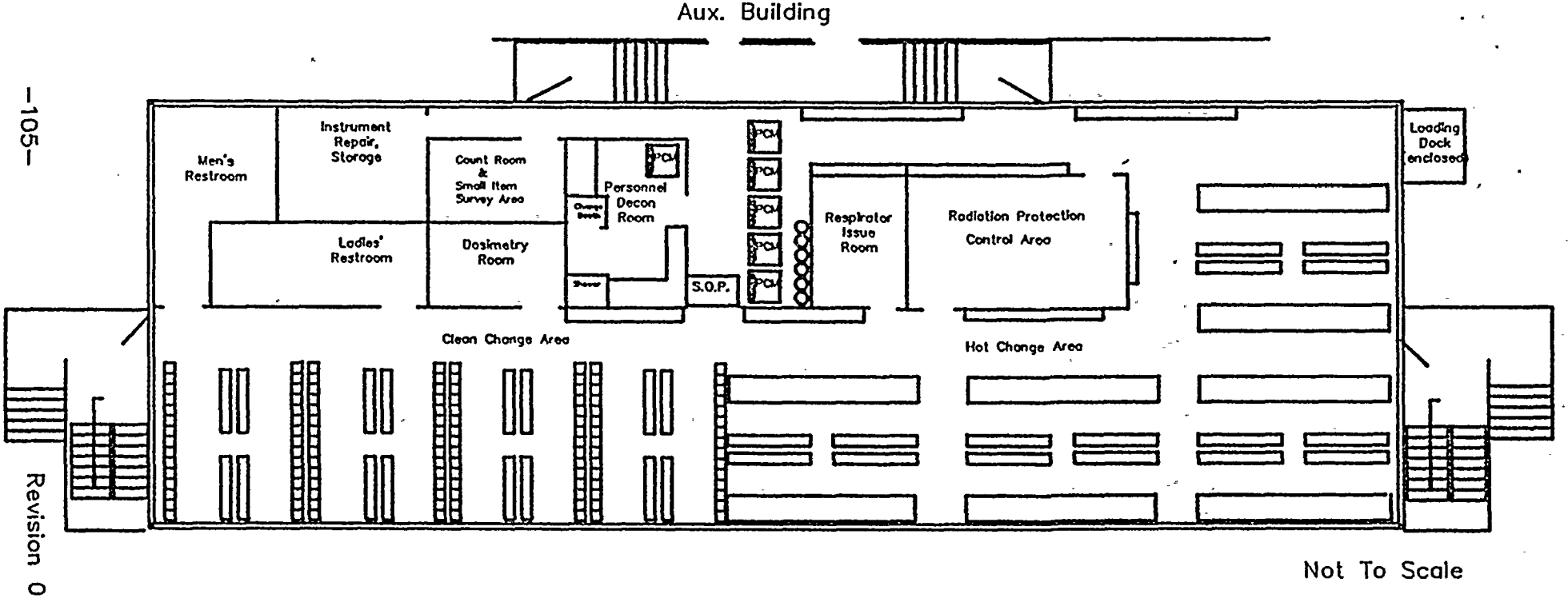
(Based on Blow-Out Panel Access)

First Elevation

Figure 3.3-2

Special Requirements

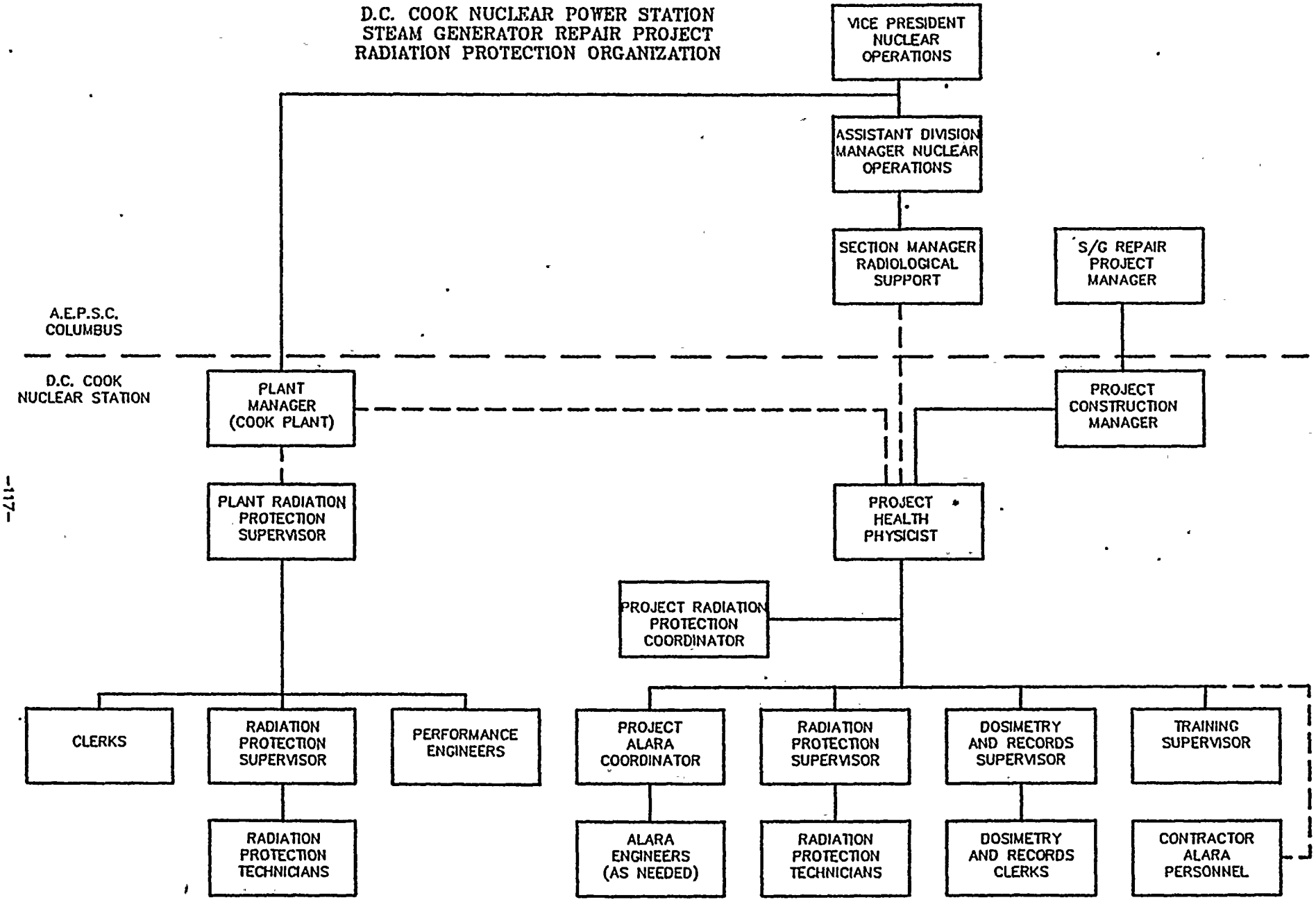
1. Segregated Ventilation System
2. Radioactive liquid drains in Decon Room (2).
3. Shielding capabilities around PCM and count room.
4. Design based on 65-75 people in clean change area and 70-80 people in hot change area at once.



Not To Scale

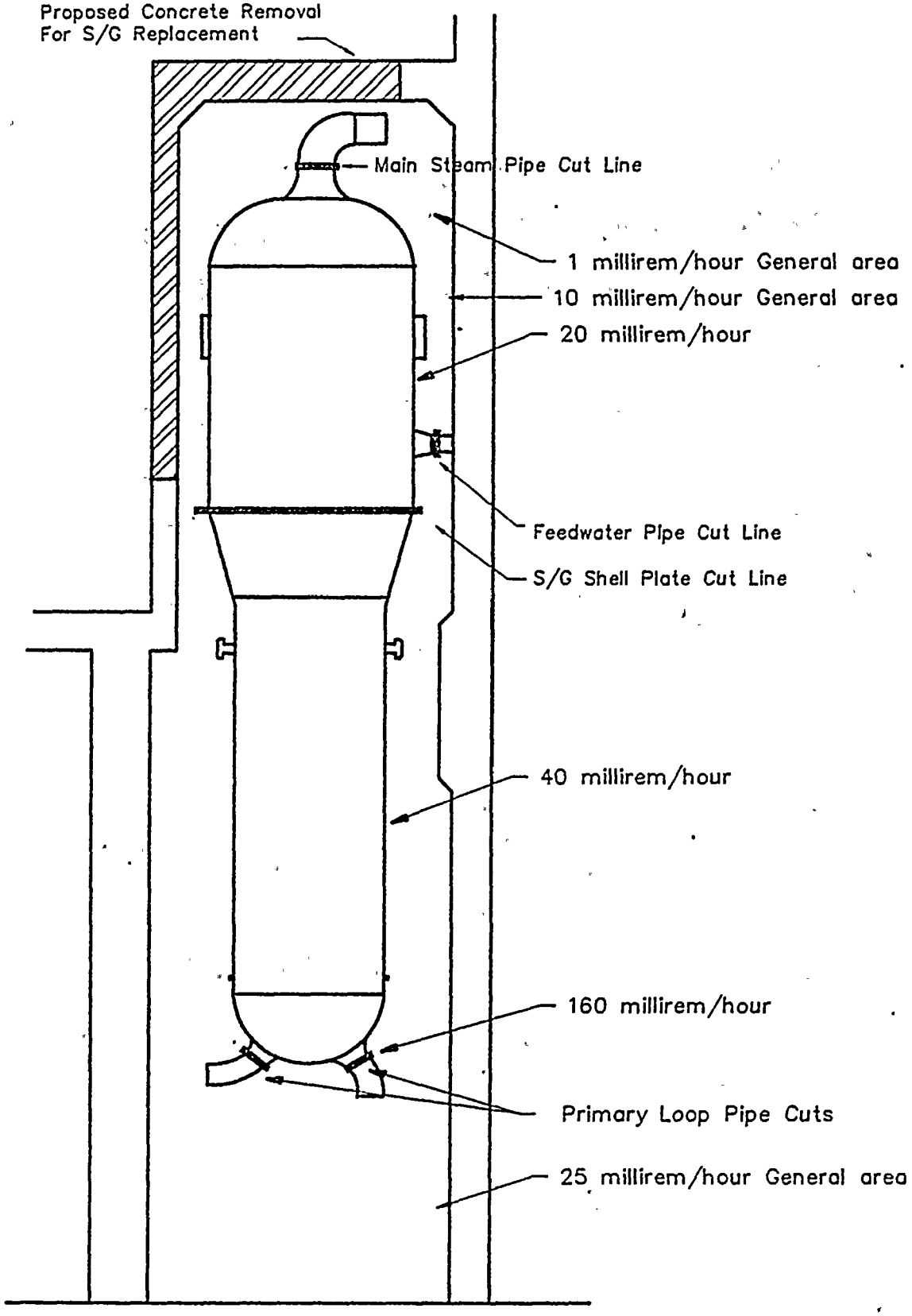
Figure 3.8.1

D.C. COOK NUCLEAR POWER STATION
STEAM GENERATOR REPAIR PROJECT
RADIATION PROTECTION ORGANIZATION



* In routine matters, the Project Health Physicist reports directly to the Project Construction Manager. In matters of plant radiation policy determination the Project Health Physicist may report directly to the Plant Manager.

Figure 3.8–2
Unit 2 Steam Generator
Enclosure, Piping, and Shell Plate
Cut Locations and Dose Rates



SECTION 5 - QUALITY ASSURANCE

5.1 Introduction

The Donald C. Cook Unit 2 Steam Generator Repair Project will have a quality assurance program that ensures compliance with the applicable regulatory requirements. The Donald C. Cook FSAR Chapter 1.7, "Quality Assurance of the D. C. Cook Plant" also referred to as the "Updated Quality Assurance Program Description" (QAPD) supplemented with a Steam Generator Repair - Quality Assurance Program Description Supplement (SGR Supplement) will administer the requirements. Topics in this report that will be expanded in the SGR Supplement are:

- o Organization
- o Quality Assurance
- o Design Control
- o Procurement Document Control
- o Audit and Surveillance
- o Document and Record Control
- o Nonconformance and Corrective Action Control

The details as to how the QA program will be expanded in these topics will be described in the SGR Supplement.

5.2 Organization

5.2.1 AEPSC

AEPSC will retain complete organizational control and delegate responsibilities to members of the Steam Generator Repair Project. Contractors, suppliers and agents will be integrated into the Steam Generator Repair Project organization with responsibilities commensurate with their scope of work.

AEPSC QA will ensure that organizations are defined and responsibilities are delineated among the project members. The responsibilities of the Manager of QA will be delegated to the Steam Generator Repair Project Quality Assurance Supervisor for site activities. The other QA Department sections will support the Steam Generator Repair Project QA Section when activities require additional manpower or expertise.

5.2.2 Site Contractors

Site contractors will have an organizational structure described in their approved QA program. Lines of authority and responsibilities shall be described to control safety related activities delegated by AEPSC.

The QA program will describe the personnel responsible for performing QA functions, location, and degree of independence those persons will have to administer the QA program. The program will assure proper implementation of the QA program at all levels of the contractor's scope of work. Site contractors will perform safety-related activities according to their QA program and procedures that have been reviewed and approved by AEPSC QA.

Subcontractors will be identified in the general contractor's QA program and requirements will exist to ensure the adequacy of the subcontractor's QA program in fulfilling the requirements of the subcontractor's scope of work.

Specialty contractors working directly for AEPSC will have an organizational structure described in their approved QA program that provides lines of authority and responsibilities delegated by AEPSC. Interfacing requirements between the general contractor and specialty contractor shall be defined to ensure continuity between quality programs.

5.2.3 Suppliers and Agents

Suppliers and agents will administer an organizational structure within their approved QA program. Suppliers and agents will have responsibilities, interfacing relationships and QA program implementation plans described in their QA program description. Subtier suppliers will be included in the organizational description to ensure lines of authority and QA program implementation to such suppliers.

5.3 **Quality Assurance Program**

5.3.1 Present Quality Assurance Program Description

The AEPSC QA program is currently administered by the "Updated Quality Assurance Description for the D. C. Cook Nuclear Plant" (QAPD). This document describes the implementation of quality assurance requirements set forth in 10 CFR 50, Appendix B, and applicable regulatory guides. The QAPD is updated annually for the D. C. Cook FSAR. Steam Generator Repair Project activities initiated on and after July 1, 1988 will be implemented using the July 1988 updated QAPD as the "base" document, and the SGR Supplement.

5.3.2 SGR Supplement to the QAPD

The SGR Supplement to the QAPD expands topics that involve Steam Generator Repair Project safety related aspect. The SGR Supplement shall be implemented by the use of color-coded full page inserts denoting the differences from the "base" July, 1988 updated QAPD. The QAPD and SGR Supplement will be implemented by a QA Manual. Procedures required by the QA Manual will implement quality-related activities.

5.3.3 SGR Project Turnover Control

The release and turnover of project systems, structures, components and items will be controlled to maintain quality and integrity. Measures will be taken to ensure that AEPSC Steam Generator Repair Project management, contractors and subcontractors, and I&MECo plant personnel, control the status and conditions of plant components assigned as their responsibility.

Procedures will describe responsibilities and controls of safety related activities when plant components are transferred from one project member to another. The controlled activities are:

- the turnover of Donald C. Cook Unit 2 components required by the SGR project, from I&MECo plant personnel to AEPSC Steam Generator Repair Project management;

- retention and control by I&MECo plant personnel of components shared by both units, to ensure components are not operated in a manner that will endanger either unit, or personnel;

- AEPSC Steam Generator Repair Project management turnover of plant components to SGR contractors and subcontractors;

- Steam Generator Repair Projects contractors and subcontractors release and turnover plant components under their responsibility to AEPSC Steam Generator Repair Project management;

- AEPSC Steam Generator Repair Project management release and turnover of plant components, after coordinated Steam Generator Repair Project activities are complete, to I&MECo plant personnel;

- I&MECo plant personnel release and turnover of plant components to other plant departments to coordinate component activities required to attain an operable status.

5.3.4 Indoctrination, Training and Qualifications.

The Steam Generator Repair Project will have means to indoctrinate, train and, as appropriate, qualify personnel performing safety related activities. The Training and Indoctrination Program described in the QAPD and SGR Supplement defines the implementation of training and indoctrination. All Steam Generator Repair Project employees will receive introductory training in the description of the SGR-QA program, use of instructions and procedures, personnel requirements for procedure compliance and the systems and components controlled by the SGR-QA program.

AEPSC Steam Generator Repair Project and contractor personnel responsible for performing activities that affect quality and require skills beyond those "skills of the trade or profession" will be instructed as to the purpose, scope, and implementing materials, procedures and instruction. A lesson plan will document training objectives, program content, attendees and instruction date.

Additional training and indoctrination will be provided to:

- qualify personnel assigned to duties such as special cleaning processes, welding, NDE, heat treating and coating operations in accordance with applicable codes, standards and regulatory guides;

- qualify personnel who perform inspection and examination functions defined in Regulatory Guide 1.58, ANSI N45.2.6, SNT-TC-1A, or the ASME Code, as applicable and with the exceptions defined in the QAPD;

- qualify personnel who participate in QA audits and surveillances in accordance with Regulatory Guide 1.146 and ANSI N45.2.23, as applicable and with the exceptions defined in the QAPD.

The training program will have provisions for retraining, reexamination, and recertification to maintain proficiency.

5.3.5 Stop Work Authority

AEPSC QA is responsible for ensuring that safety related activities are performed in a manner that meets the requirements of the QAPD and

SGR Supplement. The AEPSC Vice Chairman - Engineering and Construction has given the AEPSC Manager of Quality Assurance the authority to stop work on any safety related activity that does not meet the applicable requirements. Stop work authority is further delegated by the AEPSC Manager of Quality Assurance to the Steam Generator Repair Project Quality Assurance Supervisor.

Steam Generator Repair Project Quality Assurance Supervisor shall notify AEPSC SGR project management when conditions prompt the issuance of a stop work order. The AEPSC Steam Generator Repair Project management shall immediately ensure that all nonconforming processes are stopped until implementation of corrective actions. Procedures describing authority, responsibilities, processing and release of stop work orders shall administer the controls of this authority.

5.4 Design Control

The design control of the Steam Generator Repair Project shall be administered by AEPSC as defined in the QAPD and SGR Supplement. The controls apply to preparation and review of design documents, including the correct translation of applicable regulatory requirements and design basis into the design, procurement, and procedural documents.

Organization design responsibilities for development, review, potential 10 CFR 50.59 unreviewed safety questions, and approval of design changes are delegated to AEPSC and plant management. Lines of

communication are established for controlling the flow of design interfaces, including changes to the information as work progresses.

Quality Assurance will review safety-related design changes for release to the Steam Generator Repair Project. Design change implementation shall be administered by AEPSC Steam Generator Repair Project management. The scope of work will be broken down by the contractor into work packages for installation under the contractor's quality program. AEPSC-SGR QA will maintain surveillance on the scope of work implementation and review the completed design change package for documentation close-out.

Changes to design documents are reviewed, approved and controlled in a manner commensurate with that used for the approved document.

5.5 Procurement Document Control

Procurement documents for the Steam Generator Repair Project will be controlled to implement the applicable regulatory requirements, technical specifications and QA program commitments. Procedures will establish the review and approval of procurement documents to ensure the maintenance of these controls. Procurement documents for items or services will contain the applicable requirements of the Donald C. Cook Plant list of nuclear safety-related items and Qualified Suppliers List (QSL) to ensure correct component classification and quality of the supplier.

Changes to a procurement document will be reviewed, approved and controlled in a manner commensurate with that used for the original document.

Contractors, suppliers and agents will implement procurement document control for activities under their Steam Generator Repair Project scope of work. These procurement activities will be controlled and implemented in a manner commensurate with AEPSC procurement commitments in the QAPD and SGR Supplement.

AEPSC QA Department performs off-line reviews of procurement documents to assure that procurement documents have been prepared, reviewed and approved in accordance with QA program requirements.

5.6 Audit and Surveillance Program

The audit and surveillance of Steam Generator Repair Project members will provide a comprehensive independent verification and evaluation of safety-related procedures and activities. Audits and surveillances will be performed in all areas applicable to the requirements of the QAPD and SGR Supplement. Emphasis will be placed on activities based on the individual Steam Generator Repair Project member's scope of work.

5.6.1 AEPSC QA

AEPSC QA will verify and evaluate the QA programs, procedures and activities of Steam Generator Repair Project members. The quality activity plan administers the performance, frequencies and schedule of audits and surveillance. Audits and surveillances will be scheduled based upon the status and safety importance of the activity, and initiated to assure effective quality controls during design, procurement, manufacturing, construction, installation, inspection and testing.

Audits and surveillances will be performed using written procedures and checklists, and conducted by trained personnel not having direct responsibilities in the areas being audited. Audits and surveillances will include an objective evaluation of quality-related activities, procedures, instructions; activities and items; and review of documents and records to ensure technical acceptability, workability and management support of the QA program.

Associated areas to be addressed in applicable audit and surveillance activities are:

- Site features which are unique to the Steam Generator Repair Program

- Preparation, review and approval, and control of early procurements

- Indoctrination and training programs

- Steam Generator Repair Project interface controls

- Nonconformance and corrective action control

- Activities associated with computer codes

- Security

- Radiological safety

AEPSC QA will analyze audit and surveillance information, and indicate quality problems, the effectiveness of the QA program, the need to reaudit deficient areas, and report to management for review and assessment.

Site and specialty contractors, suppliers and agents will be subject to a pre-award audit to verify acceptance to the applicable AEPSC specification requirements. The acceptance of subcontractors will be the responsibility of the general contractor.

Prior to the start of work, site and specialty contractors will have a prework audit performed to ensure that their QA program is technically acceptable, workable and endorsed by management support.

A post-work, or demobilization audit will be performed to ensure that all deviations, open items and problems are resolved prior to site and specialty contractors leaving the job site.

5.6.2 Site Contractors

Steam Generator Repair Project contractors will be responsible for maintaining an audit and surveillance process to ensure compliance to their approved QA program. Contractors will perform audits and surveillances on all activities and procedures under their scope of work, and the work of their subcontractors to ensure compliance to the contractor's quality requirements.

Audits and surveillances will be performed with written procedures and checklists, and conducted by trained personnel not having direct responsibilities in the areas being audited. Audits and surveillances shall include an objective evaluation of quality-related activities, procedures, and a review of documents and records to ensure technical acceptability, workability and management support of the QA program.

Contractors will analyze audit and surveillance information, and indicate quality problems, the effectiveness of the QA program, the need to reaudit deficient areas, and report to management for review and assessment. Significant problems in quality shall be reported to AEPSC QA.

5.6.3 Suppliers and Agents

Steam Generator Repair Project suppliers and agents shall be responsible for maintaining audit and surveillance processes to ensure compliance to their approved QA program. Suppliers and agents shall perform audits and surveillances on all activities and procedures under their scope of work, and the work of their subtier suppliers or agents.

Steam Generator Repair Project suppliers and agents will be subject to an AEPSC QA pre-award audit to verify acceptance on the AEPSC QSL. Significant problems in quality will be reported to AEPSC QA.

5.7 Document and Records Control

The control of documentation and records will be established for the approval, issue and change of documents categorized as design documents, drawings and related documents, procurement documents, instructions and procedures, as-built documents, quality assurance and quality control manuals and nonconformance reports. Documents will establish criteria to ensure adequate technical and quality requirements are incorporated and responsible organizations are identified for the review, approval, issue and document maintenance.

The review of changes to documents will be performed by the organization that performed the original review, or by an organization designated in accordance with the procedure governing the review and approval of the specific documents.

Master lists or indices will be used to identify current document revisions. These control documents are updated and distributed to designated personnel who are responsible for maintaining current copies of the applicable document. Measures will be established to assure that obsolete or superseded documents are removed and replaced by current revisions in a timely manner.

Documents that furnish evidence of Steam Generator Repair Project activities affecting quality shall upon completion become records. Instructions and procedures shall establish the requirements for the identification and preparation of records, and provide the retention controls of these records.

The individual Steam Generator Repair Project members are responsible for establishing procedures for the identification, collection, maintenance and storage or records generated under their scope of work. These procedures will ensure that the maintenance of records is sufficient to furnish objective evidence that activities affecting quality are in compliance with the established QA program. When an Steam Generator Repair Project member demobilizes, the records of his scope of work will be turned over to AEPSC Steam Generator Repair Project management for processing to the Donald C. Cook Plant Records and Information Center.

Except for records that can only be stored as originals, such as radiographs, magnetic recording devices and strip charts, records are stored in dual facilities to prevent damage, deterioration or loss. When the single original can only be retained, special fire-rated facilities are used.

5.8 Nonconformance and Corrective Action Control

Nonconformances and corrective actions of the Steam Generator Repair Project will be identified and controlled to ensure measures are implemented for prompt correction of conditions adverse to quality.

The nonconformance and corrective action requirements of the QAPD and SGR Supplement will be applied to the safety-related scope of work for all Steam Generator Repair Project members.

The individual Steam Generator Repair Project member will establish procedures for the identification, documentation, segregation or administrative control, disposition, review and notification of nonconformances and corrective actions. A Steam Generator Repair Project member who discovers a problem will notify AEPSC QA.

The procedure for nonconformance and corrective action will define and describe the organizational responsibilities in implementing nonconformance and corrective action control, and individuals or groups with authority for disposition of nonconforming items. The lines of authority and responsibility will be in accordance with the Steam Generator Repair Project member's QA program.

Nonconformance and corrective action documentation will describe the nonconformance, disposition of the nonconformance, corrective action to preclude reoccurrence and inspection or test requirements to correct the problem or deficiency. Items that are dispositioned as repair or use-as-is require AEPSC QA concurrence to document acceptability. Items that have been repaired or reworked will be inspected and tested in accordance with the original inspection and test requirements, or will be acceptable in accordance with documented alternative methods.

Nonconformance and corrective action reports are periodically analyzed by AEPSC QA to reveal quality-related trends and the implementation of timely corrective action. Results that demonstrate a breakdown in quality will be reported to appropriate AEPSC project managment for review, assessment and correction of the situation.

flow or the amount of steam released from the ruptured steam generator, and the iodine partitioning will not be affected. Comparing the repaired design to the original design there will be slightly less water in the steam generator secondary side at the beginning of the accident. This reduction in secondary side water volume would result in a somewhat lessened dilution of the incoming primary coolant during a steam generator tube rupture accident. This minor reduction in dilution would result in an insignificant increase in the thyroid doses; doses due to the release of noble gases are not affected. Thus it can be stated that the steam generator repair will have no adverse impact on the steam generator tube rupture transient and negligible impact on the radiological consequences of the accident.

6.2 Construction Related Evaluations

6.2.1 Handling of Heavy Loads

6.2.1.1 Introduction

This section presents the preliminary safety evaluation associated with control of heavy loads for the Steam Generator Repair Project. This preliminary evaluation addresses the options that may be implemented to handle heavy loads associated with the Steam Generator Repair Project. The final safety evaluation for heavy loads will be based on the actual method implemented to handle heavy loads during the repair activities.

As discussed in Section 3, the steam generators will be removed and reinstalled in two sections (lower assembly and upper assembly). There are additional other heavy loads currently being considered as part of the Steam Generator Repair Project (i.e., upending devices, lift beams, and special handling tools). A final evaluation will be performed to assure that a safe method of transporting the heavy loads will be established.

The final evaluation will assure that a substantial safety hazard will not be created, that safe shutdown capabilities will be maintained, and that sufficient cooling capabilities to the spent fuel assemblies stored in the spent fuel pool will be maintained.

6.2.1.2 Precautions for Handling Heavy Loads

In order to minimize the potential for dropping heavy loads, the following precautions will be considered in the final safety evaluation:

- Special handling fixtures and equipment, designed and fabricated to facilitate removal and transport of heavy loads.
- Detailed procedures covering the movement of all heavy loads, including rigging sketches.
- Load tests of major lifting equipment, as required.
- A thorough inspection and refurbishment program of the polar crane and the existing auxiliary building crane, as needed.
- Appropriate communications between crane operators and floor leaders.
- The use of personnel experienced in rigging and heavy lifts.
- Transport of heavy loads in accordance with a predetermined route.
- Lift capacities of major lifting equipment being clearly identified on the equipment.
- Accepted industry practices.

6.2.1.3 Handling of Heavy Loads in Containment, Auxiliary Building, and Outside the Auxiliary Building

The safe load path for transporting heavy loads was evaluated inside the containment building, inside the auxiliary building and outside the auxiliary building.

o Handling of Heavy Loads In Containment

This subsection presents the preliminary safety evaluation concerning the handling of heavy loads inside the containment building.

- Background Information

As discussed in Section 3, before commencement of the steam generator repair activities, all fuel in the Donald C. Cook Unit 2 reactor vessel will be removed and stored in the spent fuel pool in the auxiliary building. A deck will be built on the operating floor over the refueling cavity through the equipment hatch such that the hatch barrel will not be subjected to heavy loads during transportation. Sufficient precautions and rigging equipment will be considered in the safety evaluation for the safe handling of heavy loads so that other safety-related equipment or structures will not be damaged.

The load path of the steam generator lower assemblies and other heavy loads will not interact with the fuel transfer canal. Therefore, the integrity of the transport tube and drainage of the spent fuel pool will not be a concern. Since all fuel will have been taken out of the containment building, any inadvertent drop or swing of the heavy loads inside containment during the Steam Generator Repair Project will not result in an unsafe condition.

- Safety Evaluation

  The requirements of NUREG-0612 are not applicable inside the containment building, since there is no fuel in the core, and safe shutdown and decay heat removal scenarios are not applicable.

  The environmental consequences of dropping a steam generator lower assembly are addressed in Section 7.5. While such a drop could result in economic and schedular losses, there would be no significant safety implications. Precautions are planned to ensure that a steam generator drop does not occur. Based on the above, it is believed that the final safety evaluation will conclude that movement of heavy loads inside the containment will not constitute an unreviewed safety question as defined in 10 CFR 50.59 nor adversely affect the public health and safety.

o Handling of Heavy Loads in the Auxiliary Building

This subsection presents the preliminary safety evaluation concerning the handling of heavy loads in the auxiliary building.

- Background Information

  Sections 3.5.2 and 3.5.3 describe the movement of the steam generator upper and lower assemblies through the auxiliary building. Additional heavy loads will be moved along the same pathway.

Currently, two options are being evaluated to move heavy loads through the auxiliary building. The first option is upgrade the existing 150 ton auxiliary building bridge crane to meet the single failure proof criteria of NUREG-0554 and to procure a second 150 ton single failure proof bridge crane. Both cranes would then be used in tandem to move heavy loads in the auxiliary building.

The second option, if the existing auxiliary building crane cannot be upgraded to meet the single failure proof criteria of NUREG-0554, is to procure a second 150 ton bridge crane similar to the existing auxiliary building bridge crane. Both cranes would then be used in tandem to move heavy loads in the auxiliary building. This option would also involve load drop analysis to ensure that the drop of a heavy load would not affect the structural integrity or the cooling capabilities of the spent fuel pool.

We are currently conducting detailed evaluations to determine the final resolution of these options. In performing these evaluations both NUREG-0612 and NUREG-0554 will be used as guidance. As a result of these activities, it may be necessary to request certain exemptions from the above regulatory guidance. If this is the case, we will notify the NRC as appropriate.

- Safety Evaluation

  Each of the above three options are currently undergoing engineering evaluation to determine feasibility and cost effectiveness. Upon completion of the engineering evaluation the option chosen to be used in the auxiliary building will undergo a final safety evaluation. However, it is believed that any of the three options could successfully transport heavy loads in the auxiliary building and will not create a substantial safety hazard. Furthermore, it is believed that the final safety evaluation will conclude that the transport of heavy loads through the auxiliary building will not involve an unreviewed safety question as defined by 10 CFR 50.59.

o Handling of Heavy Loads Outside the Auxiliary Building

This subsection presents the preliminary safety evaluation concerning the handling of heavy loads outside the auxiliary building.

- Background Information

  Before transporting the heavy loads outside the auxiliary building the pathways will be examined. The potential for interaction with safety-related components and the use of a boom crane will be evaluated. Sufficient administrative control and/or temporary safety barriers will be in place in order to prevent the potential interaction with equipment important to safety. The following is a list of some of the equipment that is located in the proximity of the load path:

1. Refueling Water Storage Tank
2. Condensate Storage Tank
3. Primary Water Storage Tank
4. Start-up Transformer
5. Overhead 345kv cables
6. Buried diesel oil storage tank

Some of the variables involved in handling heavy loads in the proximity of the above-listed equipment are:

1. The grade of the route
2. Maximum traveling speed
3. Soil bearing capacity
4. Protection of underground utilities
5. Transporter structure failure/overturn
6. Runaway transporter

The equipment and the design variables listed above (not an all-inclusive list) will be evaluated, and a safe pathway will be finalized for moving the steam generator upper and lower assemblies from auxiliary building to the temporary on-site steam generator storage facility. The potential interaction with Donald C. Cook Unit 1 will be evaluated, and necessary modifications and/or administrative controls will be implemented to address any interface problems.

- Safety Evaluations

  NUREG-0612 does not cover the requirements for transporting heavy loads outside the auxiliary building. However, potential interaction with other safety-related systems will be evaluated as noted above. It is believed that the final safety evaluation will conclude that the transport of heavy loads outside the auxiliary building will not involve an unreviewed safety question as defined in 10 CFR 50.59.

6.2.1.4 Conclusions

Based on the preliminary safety evaluation, it is anticipated that the steam generator upper and lower assembly transport program, including the other construction-related heavy loads, will have no significant affect on the operating unit and that the repair activities can be completed in a safe manner. Ongoing evaluations, which are being conducted while detailed engineering is being completed, are not expected to alter this basic conclusion, that is, that the entire process can be performed without constituting an unreviewed safety question as defined in 10 CFR 50.59.

6.2.2 Shared System Analysis

Walkdowns and reviews of the load path were performed to identify potential interactions with equipment considered important to safety in the operating unit. These walkdowns and reviews determined that the Steam Generator Repair Project should not require movement or alteration of any equipment important to safety for the operating unit.