July 17, 2000

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
NORTHEAST NUCLEAR ENERGY COMPANY	)	Docket No. 50-423-LA-3
	)	
(Millstone Nuclear Power Station,	)	
Unit No. 3)	)	

NRC STAFF MOTION TO FILE AFFIDAVIT OF ANTONE CERNE REGARDING REFUELING OUTAGE 6

INTRODUCTION

For the reasons discussed below, the NRC staff (Staff) moves the Licensing Board to permit it to file the affidavit of Antone Cerne, Senior Resident Inspector at Millstone Unit 3, together with the documents on which Mr. Cerne relies, addressing that section of ConnecticutCoalition Against Millstone / Long Island Coalition Against Millstone's (Intervenors) filing of July 3, 4, and 6, 2000, concerning Millsstone Unit 3's refueling outage 6 (RFO6).

BACKGROUND

On May 26, 2000, the Licensing Board denied, in part, the licensee's motion for a protective order, dated May 22, 2000, concerning Intervenors' third set of interrogatories and requests for production of documents. Memorandum and Order (Discovery Rulings, 5/26/00 Telephone Conference), June 8, 2000. Thus, the Board permitted Intervenors to visit Millstone 3 on June 22, 2000, to identify and obtain documents responsive to their requests. The Board did not extend the date scheduled for the Subpart K simultaneous filings of the parties. Thus, the date for those filings continued to be June 30, 2000, as established in the Board's Memorandum and Order (Schedule for Proceeding), April 19, 2000.

On July 3, 2000, Intervenors filed their brief by E-mail. On July 4, 2000, they filed a "corrected" brief by E-mail and, on July 6, 2000, they filed a motion to supplement their filing together with the proposed supplement. The Board accepted all of Intervenors' filings. Memorandum and Order (Ruling on Various Motions and Procedure at Oral Argument), July 14, 2000.

ARGUMENT

The Staff was surprised by Intervenors' inclusion in their brief of material that Intervenors were obligated to provide to the Staff as an ongoing obligation to update their response to the Staff's interrogatories. Specifically, Intervenors' response of April 8, 2000 to Specific Interrogatory IV. -4, requesting Intervenors to "specify the basis, including all facts and circumstances, for [their] position that the licensee has a history of not being able to adhere to administrative controls with respect to spent fuel pool configuration" and to "make specific reference to all relevant incidents, documents, records, statements or other sources which support [their] position," failed to identify any basis related to RFO6. Intervenors' response to V.-2, concerning experts, made no reference to RFO6 and Intervenors made no effort to update that response, even though the Board compelled a further response.[1]

The Intervenors have made no attempt to tie the material related to RFO6 set forth in their Factual and Procedural Background statement to any of their contentions or to either of their declarants.

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[1]Their response of April 8, 2000, to the Staff's interrogatory V. 2 (d), requesting any authorities and/or treatises on which their experts relied, was, "The brief which will be filed by the Intervenors will provide this information"; their compelled response, filed May 30, 2000, was: 'Please refer to attachments provided in "Connecticut Coalition Against Millstone and Long Island Coalition Against Millstone Supplemental Response to Northeast Nuclear Energy Company's First Request for Production" dated May 30, 2000. Other authorities may be relied on as the brief preparation develops."

More importantly, Intervenors' presentation of the RFO6 materials fails to provide Millstone Unit 3 Fuel Handling Training document FHS034T, Revision 0, on which they rely.[2] As the Board has accepted Intervenors' brief, including the section that addresses RFO6, it should accept Mr. Cerne's affidavit, which discusses, and provides copies of, the documents needed to understand what Intervenors have filed regarding RFO6 and why their position is incorrect.

CONCLUSION

For the reasons discussed, the Staff requests the Board to grant its motion to file Antone Cerne's affidavit together with its supporting documents.

Respectfully submitted,

Ann P. Hodgdon

Ann P. Hodgdon
NRC Staff Counsel

Dated at Rockville, Maryland
this 17th day of July, 2000

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[2] The Staff has received an anonymous allegation dated June 29, 2000, based on the same material on which Intervenors rely. However, the allegation includes a copy of the training document, acknowledges that there was no fuel in the upender and references all four bypassable interlocks. The material that Intervenors have submitted cannot be understood apart from consideration of other material that provides a context for viewing these materials. Mr. Cerne's affidavit and its attachments provide that context.

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In the Matter of NORTHEAST NUCLEAR ENERGY COMPANY (Millstone Nuclear Power Station, Unit No. 3)	)))))))	Docket No. 50-423-LA-3

AFFIDAVIT OF ANTONE C. CERNE ADDRESSING
RFO6 AT MILLSTONE 3

Antone C. Cerne, being duly sworn, does hereby state as follows:

1. As stated in previously filed documents, I am the Senior Resident Inspector at Millstone Unit 3. I have more than twenty-two years of nuclear experience, including approximately twenty years in the U.S. Nuclear Regulatory Commission's resident inspector program, including the past four years at Millstone Unit 3. Prior assignments were at Seabrook Station and the Pilgrim Nuclear Power Station. At the NRC, I served, on a temporary basis, as Commissioner Kenneth Carr's technical assistant and I have been detailed to the agency's special review effort for Comanche Peak, the NRC Regulatory Review Group, the NRR South Texas Project Task Force, and the NRR group reviewing the Construction Inspection Program for Future Reactors. I have participated in more than thirty NRC team inspections at nuclear power plants around the country, with designation as team leader or assistant team leader on some of these inspections. I was senior resident inspector at Millstone 3 during the conduct of the Independent Corrective Action Verification Program, recovery and startup activities, and had the responsibility for managing the "significant items list" inspection and closure, as part of the U.S. Nuclear Regulatory Commission's Inspection Manual Chapter 0350 process. I am qualified as both a Construction and Operations (Pressurized Water Reactor) Senior Resident Inspector. My U.S. Nuclear Regulatory Commission

agency-level award recognitions include NRC Resident Inspector of the Year, 1985, the first time the award was given; NRC Meritorious Service Award for Resident Inspector Excellence, 1992; NRC Distinguished Service Award for Senior Resident Inspector Excellence, 1999. I hold a Bachelor of Science degree from the United States Military Academy (West Point), 1968, where I was in the top one per cent of my graduating class, and a Master of Science degree in Nuclear Engineering from the Massachusetts Institute of Technology (MIT), 1972. In 1989, I pursued the Program in Science, Technology, and Society at MIT on a Mellon(post-graduate) Fellowship.

2. The purpose of this affidavit is to address a section of the " Detailed Summary Of Facts, Data, And Arguments And Sworn Submission On Which Connecticut Coalition Against Millstone And Long Island Coalition Against Millstone Intend To Rely At Oral Argument To Demonstrate The Existence Of A Genuine And Substantial Dispute Of Fact With The Licensee Regarding The Proposed Expansion Of Spent Fuel Storage Capacity At The Millstone Unit No. 3 Nuclear Power Plant," July 3, 2000, specifically that section of the "Factual And Procedural Background" entitled "The Millstone Unit 3 Refueling Outage #6."

3. In "The Millstone Unit 3 Refueling Outage #6" section of their written presentation, Connecticut Coalition Against Millstone and Long Island Coalition Against Millstone (Intervenors) set forth excerpts from Millstone 3's Refueling Outage 6 (RFO6) Reactor Engineering refueling log book. In order to understand those excerpts, one needs to know how the equipment referenced in that log book functions. The fuel transfer system includes an underwater, electric motor-driven transfer car that runs on tracks extending from the containment side of the fuel transfer canal, through the transfer tube, and into the fuel building side of the fuel transfer canal; a hydraulically actuated lifting arm is at each end of the transfer tube. The fuel container in the containment side of the fuel transfer canal receives a fuel assembly in the vertical position from the manipulator crane. The fuel assembly is then pivoted to a horizontal position for passage through the transfer

tube. After passing through the tube, the fuel container is raised to a vertical position for removal of the fuel assembly by a tool suspended from a hoist mounted on a spent fuel bridge and hoist structure in the fuel building. The spent fuel bridge and hoist structure then moves over a storage position and places the spent fuel assembly in the spent fuel storage racks. *See:* Millstone Nuclear Power Station, Unit 3 FSAR Section 9.1, pp. 9.1-21, 9.1-22, Figures 9.1.10, 9.1.12; Figure FH- 1, NRC Technical Training Center, Westinghouse Training Manual (Attachment 1).

4. The excerpts from the Reactor Engineering refueling log book from Millstone Unit 3 RFO6 that Intervenors set forth in their "Factual and Procedural Background" represent not the failure of administrative controls, but rather how such administrative controls (i.e., approved procedures) may be used to cope with emergent equipment problems. In the first place, the log book from which the referenced excerpts are quoted is itself controlled by Millstone Nuclear Power Station Engineering Procedure, EN 31007, "Refueling Operations." (Attachment 2). Section 4.1.2 of EN 31007 requires that the licensee:

> MONITOR the following items AND RECORD status of refueling activities in refueling log book: (including, in part)
>
> - Equipment breakdowns and return to service.
> - Any interruptions to refueling sequence....
> - Erratic equipment operation.

It should not be surprising that the log book entries document equipment problems, because such annotation is procedurally required.

5. Secondly, operations procedure OP 3303C, Revision 6, "Fuel Transfer System," in Section 3.2 specifies that:

> Key bypass interlocks provide an emergency override of safety interlocks and must be controlled with a PORC- [Plant Operations Review Committee] approved bypass jumper unless performing one of the following actions: (including, in part) 3.2.2 No fuel is loaded in cart.

Relevant parts ofOP 3303C constitute Attachment 3 to this affidavit.

6. In all of the situations quoted from the refueling log book where the spent fuel pool (SFP) upender would not lower and the Shift Manager (SM) granted permission to bypass, *there was no fuel loaded in the cart.* One quoted log entry indicates that the SM "has given permission to the lead RE to allow bypass of SFP upender (IAW OP 3303C Step 3.2.2) without checking in with him each time." This log entry not only demonstrates that the operations personnel understood the procedural requirements but also indicates the rigor with which equipment anomalies were communicated and addressed during RFO 6; i.e., even though OP 3303C allowed use of the interlock bypasses with no fuel loaded in the cart, the field personnel routinely checked with the operations shift manger for permission. Intervenors correctly state that the shift manager authorization is an administrative control. As evidenced by the log entries, it is an administrative control that worked properly.

7. With respect to the argument that the routine use of an "emergency override" on the fuel transfer system, which is equipped with such an interlock bypass capability, equates to "recurring emergency conditions at Millstone Unit 3," the argument is supported neither by logic nor by the documented equipment controls. Just as an automobile's "emergency" brake may be used by a driver when routinely parking in a non-emergency situation, the use of the interlock bypass capability, when controlled as required, may be considered a non-routine, but otherwise approved and allowed, operational mode of the equipment. This is supported also by the Millstone Unit 3 Fuel Handling System training document, FHS034T, Revision 0, which indicates that the Fuel Handling System interlocks are "bypassable" and further includes the statement that, "Some of the interlocks can be safely bypassed in certain situations, but bypassing an interlock should only be done under strict administrative control." (Sections of FHS034T constitute Attachment 4 to this affidavit.) Both the procedural requirements of OP 3303C and the log entries of the requested "permission to bypass" provide evidence of strict administrative control.

8. Furthermore, training document FHS034T includes a section for "Abnormal Operations" of the fuel transfer system. The interlock bypasses, even though described elsewhere in this document as emergency overrides, are not discussed as abnormal operations. Also, FHS034T describes the "LIFT INTERLOCK BYPASS" as the key operated switch that "provides an emergency override of the safety interlock for raising or lowering the fuel container at other than the extreme limits of travel of the transfer cart." In all of the situations where the SFP upender would not lower and the interlock bypass was used, the transfer car was, in fact, at its extreme limit of travel in the SFP building. Therefore, in these cases, the use of the bypass switch was not a specific application of the "emergency override," as functionally described in FHS034T.

9. In footnote 20 of their brief, Intervenors reference three interlocks, none of which is applicable to the bypass that is the subject of the multiple log entries. It is the Lift Interlock Bypass that is the subject of those entries.

10. Finally, with respect to other refueling log book entries regarding such issues as key controls, communications, shuffleworks (a computer-based fuel movement tracking system), and foreign material in the spent fuel pool, engineering procedure EN 31007 requires that equipment problems be documented in the log book. Given that the log book covered RFO6 refueling activities from April 17 to June 8, 1999, including refueling preparations, a full-core offload, spent fuel pool operations, a full-core reload, and post-refueling verification activities, it is not surprising that there are entries in the log book documenting problems. As stated above, one purpose of the refueling log book is to record such problems. In this regard, the NRC inspection report 50-423/99-06, dated July 9,1999 and covering the commencement of RFO6 activities through core reload, documented in the cover letter transmitting the inspection report the following:

> Refueling outage activities were in progress at Unit 3 during most of this inspection period. We observed that the challenges that were encountered during RFO6 were methodically evaluated and appropriately dispositioned by your staff using a team approach. This is generally reflected in the conclusions documented in the enclosed inspection report and in

> the fact that no new inspection items have been opened. However, we also noted that a number of problems in configuration and work control were either self-identified or self-revealed during this period. Your increased management focus on such concerns addressed the need for more rigorous process controls on certain tagging and system restoration activities. We understand that your staff is developing longer-term corrective actions to reinforce station management's configuration control expectations and ensure that such events are not repetitive and do not result in more severe consequences.

This inspection report is included in Exhibit 11 of the NRC staff's brief filed on June 30, 2000.

11. This NRC view of the licensee's conduct of RFO6 activities through June 14,1999 is entirely consistent with the licensee's Nuclear Oversight summary audit of RFO6 activities, as reflected in the following excerpt from NRC inspection report 50-423/99-08, dated September 20,1999:

> The inspector also reviewed selected Nuclear Oversight reports covering Nuclear Oversight Verification Plan (NOVP) reviews of RFO6 and engineering activities during June 1999. ... This NOVP evaluation is based upon several Nuclear Oversight inspector/auditor field observations of numerous RFO6 work activities. Functional areas within the unit that Nuclear Oversight has determined to merit further tracking for progress are consistent with NRC inspection results.

This inspection report is included as a part of Exhibit 11 of the Staff's brief.

12. The NRC and Nuclear Oversight evaluations are not inconsistent with the RFO6 equipment problems that were experienced, for example, as cited in Condition Report, CR M3-99-2236, "Adverse Trend in Performance of Refueling Equipment," which was provided by Intervenors as Exhibit 9 to the brief they filed on July 3, 2000. Few outages at any plant are problem free. The NRC looks at the actions taken by the licensee to prevent such problems from adversely affecting safe operations and the corrective measures implemented to preclude such problems from recurring. In fact, because of the problems experienced with the refueling equipment during RFO6, the licensee is currently proceeding with corrective action plans to replace both the Unit 3 fuel transfer system and SIGMA refueling machine prior to the start of the next refueling outage, scheduled for 2001.

13. It is my opinion, consistent with what is documented in the above referenced NRC inspection reports covering RFO6 activities, that the equipment problems that occurred were adequately handled by the licensee, without adverse impact upon nuclear fuel or public safety, and that this resulted, in major part, from the proper use of administrative controls by the licensee. On those occasions where a specific control may have been violated (e.g., where condition reports document human error resulting in a procedural noncompliance), the licensee implemented the appropriate corrective measures. Further, the entire body of administrative controls employed in refueling operations has sufficient rigor and redundancy to preclude a single human error from presenting a challenge to nuclear safety at Millstone Unit 3.

I hereby certify that the foregoing is true and correct to the best of my knowledge, information and belief.

Antone C Cerne

Antone C. Cerne

Subscribed and sworn to before me
this 17 day of July, 2000.

Diane M Phillipo

Notary Public

My commission expires:________

DIANE M. PHILLIPO
Notary Public
My Commission Expires Dec. 31, 2000

ATTACHMENT 1

of the bridge and trolley at all times. The position indicators receive the position information from encoders on the bridge and trolley tracks for the automatic mode.

In addition to the automatic controls, completely separate manual controls are provided for nonautomatic operation. Position indication for this mode may be from either the position encoders from the automatic mode or from standard pointers to rail markings.

The maximum speed (approximate) for the bridge is 60 fpm and for the trolley and hoist is 20 fpm. The auxiliary monorail hoist on the SIGMA refueling machine has a two-step magnetic controller to give hoisting speeds of approximately 7 and 20 fpm.

Electrical interlocks and limit switches on the bridge and trolley drives prevent damage to the fuel assemblies. The winch is also provided with limit switches which prevent a fuel assembly from being raised above a safe shielding depth. In an emergency, the bridge, trolley, and winch can be operated manually by using a hand-wheel on the motor shaft.

<u>Spent Fuel Bridge and Hoist</u>

The spent fuel bridge and hoist structure (Figure 9.1-10) is a wheel- mounted walkway spanning the spent fuel pool and carries a trolley mounted electric hoist on an overhead structure. This machine is used for handling fuel assemblies within the spent fuel pool, cask pit, and fuel transfer canal by means of a long-handled tool suspended from the hoist. A load monitoring device is attached between the hoist hook and the fuel handling tool for monitoring fuel assembly loads. The hoist travel and tool length are designed to limit the maximum lift of a fuel assembly to a safe shielding depth.

The bridge and hoist speeds are variable. The maximum speed (approximate) for the bridge is 33 fpm and for the hoist is 20 fpm.

The hoist trolley is motor-driven.

<u>New Fuel Elevator</u>

The new fuel elevator (Figure 9.1-11) consists of a box-shaped elevator assembly with its top end open and sized to house one fuel assembly. It is used normally to lower a new fuel assembly to the bottom of the fuel storage area where it is transported to the storage racks by the spent fuel bridge and hoist structure.

The new fuel elevator can also be used for installing storage baskets, or new fuel inserts such as control rods, burnable poisons, source assemblies or thimble plugs into new fuel assemblies or a dummy fuel assembly for transfer of components into the fuel pool. The new fuel elevator is also used to store fuel for fuel repair and inspection activities. When the new fuel elevator is used for fuel repair or inspection activities, specific procedures are written to control the raising and lowering of the elevator with spent fuel in the elevator.

<u>Fuel Transfer System</u>

The FTS (Figures 9.1-12 and 9.1.4-13) includes an underwater, electric motor-driven transfer car that runs on tracks extending from the containment side of the fuel transfer canal, through the transfer tube, and into the fuel building side of the fuel transfer canal; a

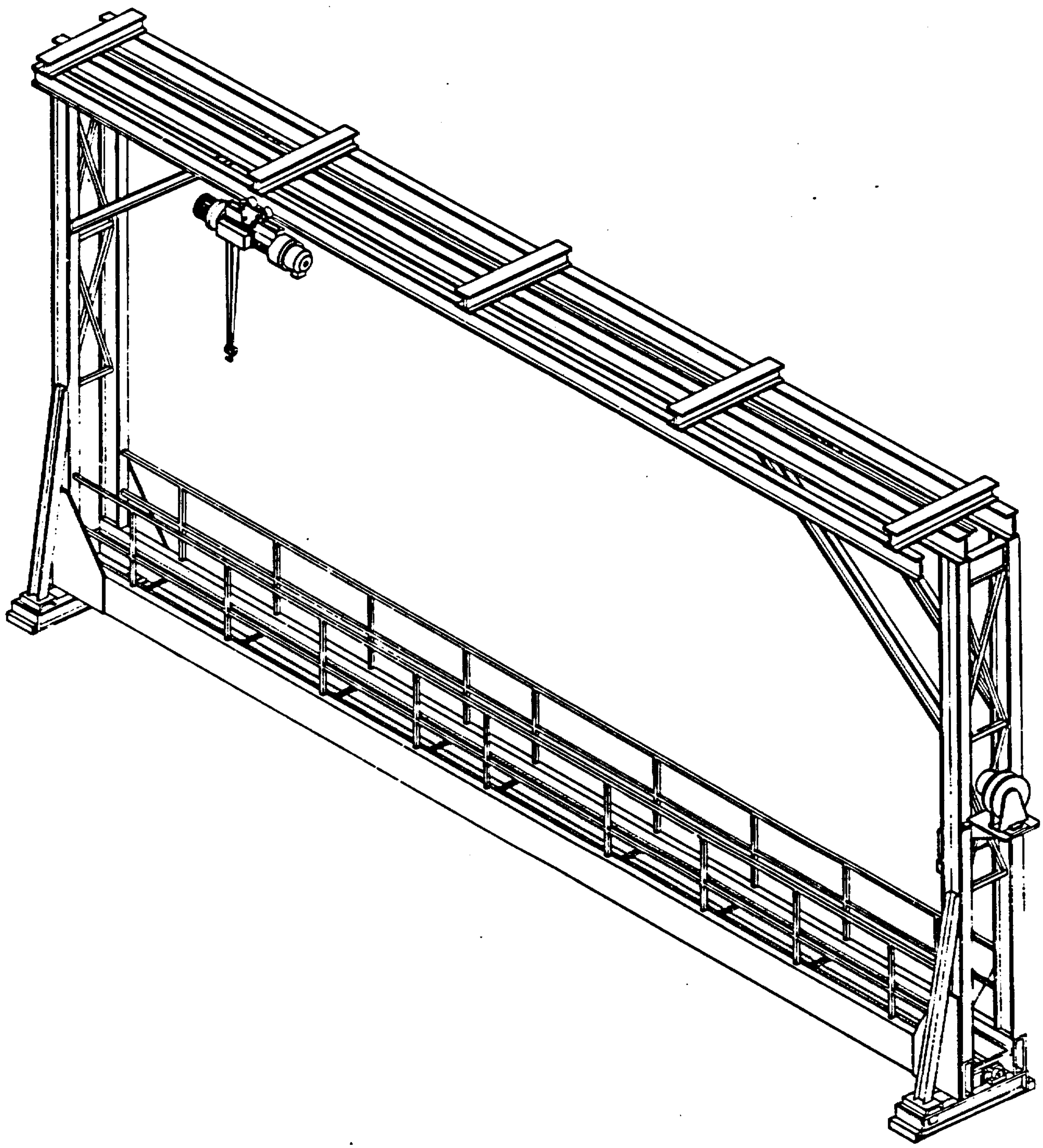

FIGURE 9.1-10
SPENT FUEL BRIDGE
& HOISTING STRUCTURE
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT

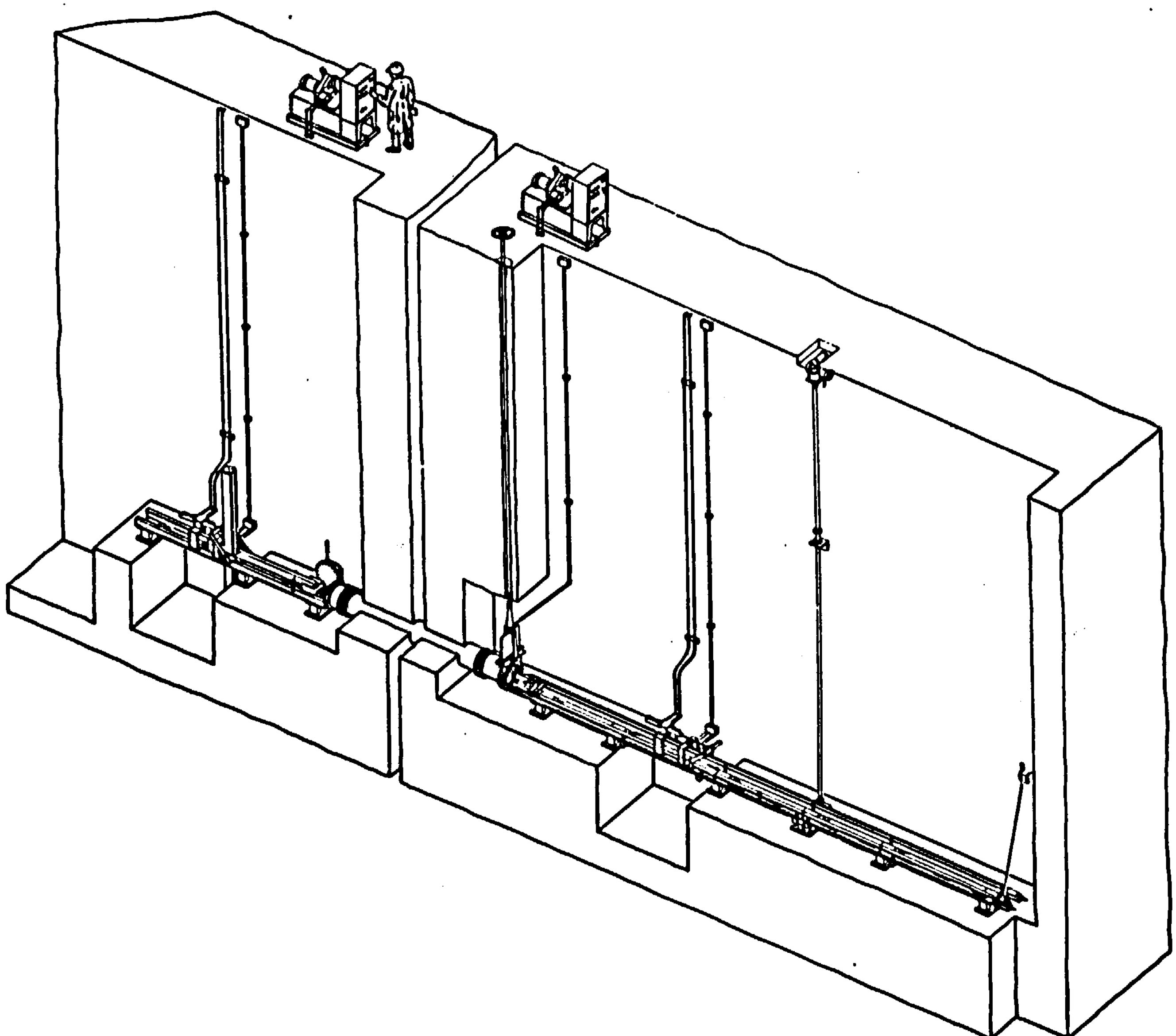

FIGURE 9.1-12
FUEL TRANSFER SYSTEM
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT

PLANT LAYOUT

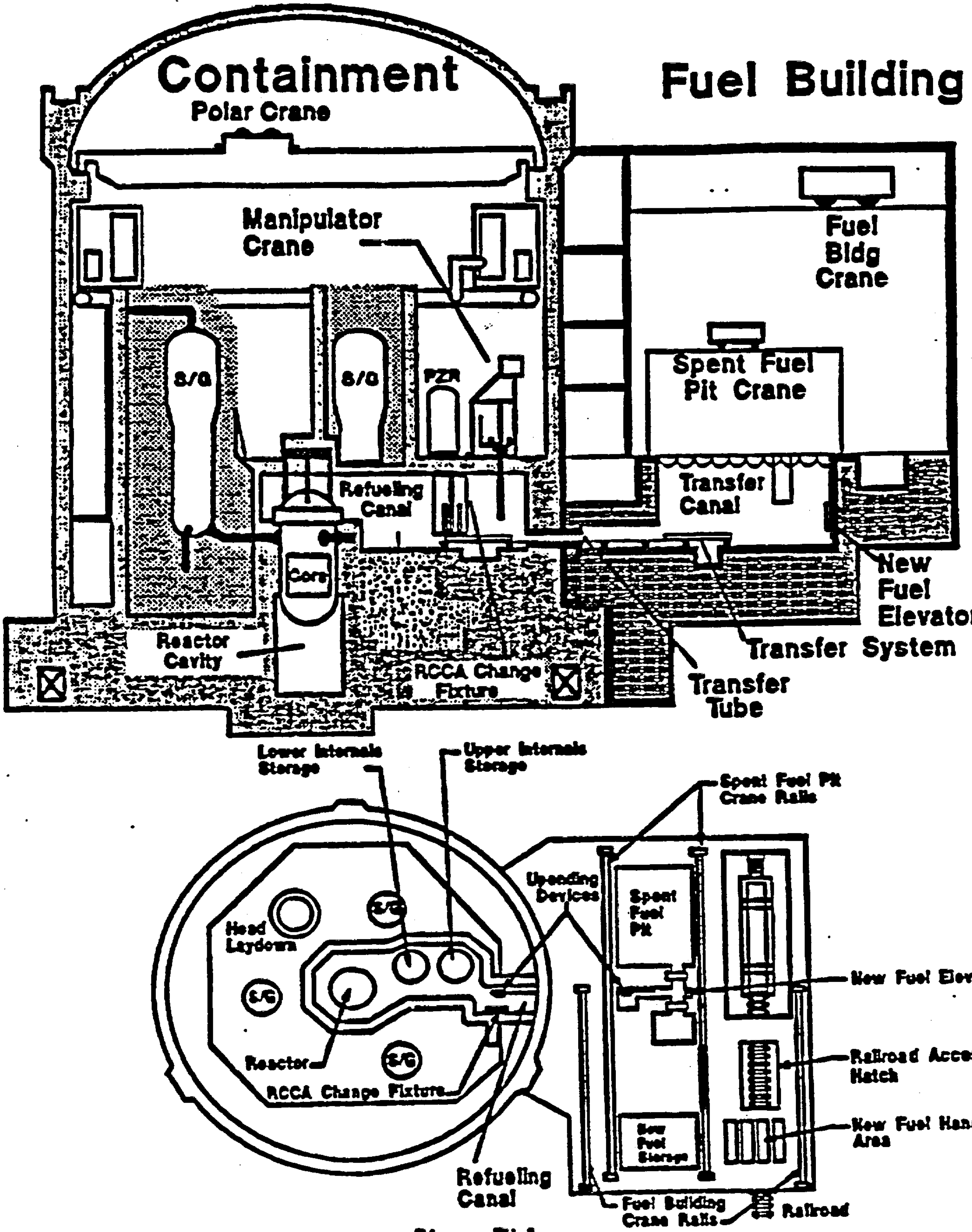

Figure FH-1

ATTACHMENT 2

MILLSTONE NUCLEAR POWER STATION
ENGINEERING PROCEDURE

Refueling Operations

EN 31007
Rev. 5

Approval Date: 4-21-99

Effective Date: 4-23-99

Level of Use
General

Millstone Unit 3
Engineering Procedure

Refueling Operations

TABLE OF CONTENTS

1. PURPOSE

1.1 **Objective**

Provide a safe method for unloading, reloading and shuffling of fuel to, from or within the Reactor Vessel, Fuel Transfer System or the Spent Fuel Pool.

Specify monitoring requirements during fuel movement.

1.2 **Discussion**

This procedure is used while performing movement of fuel (new fuel or spent fuel) or core components within the Spent Fuel Pool, Fuel Transfer System or Reactor Vessel, during refueling.

The general procedure for refueling the reactor is to offload the core to the Spent Fuel Pool, shuffle inserts and perform any necessary inspections of fuel or fuel inserts, and then reload the core. A fuel shuffle may be performed in lieu of a full core offload and reload.

This procedure has been reviewed with respect to the IPTE requirements of DC 8. It has been concluded that this evolution does not constitute an IPTE.

Equivalent computer generated spreadsheets may be used in lieu of Attachments 2 through 7.

1.3 **Applicability**

Applicable in Mode 6.

2. PREREQUISITES

2.1 **General**

2.1.1 Material Exclusion Areas are set up around the refueling cavity and the Spent Fuel Pool.

2.1.2 An AWO has been written to refuel the reactor.

2.1.3 Operations has red tagged closed the three roll–up doors in the Fuel Building. [♣ Comm 6.18]

2.1.4 Reactor Engineering has verified that the Fuel Building Integrity Boundary doors are correctly labeled and closed prior to fuel movement in the Fuel Building when the fuel has been in the pool for less than 60 days [decay time]. [♣ Comm 6.18]

2.1.5 I&C has completed testing and alignment of the SIGMA refueling machine if fuel is to be moved in the reactor core.

2.1.6 A portable frisker capable of detecting beta radiation has been placed in a secure manner such that it will remain in place during all movements of spent fuel on the 52'4" elevation of Containment, inside the crane wall and facing the refueling cavity.

2.1.7 Fuel assemblies in the reactor have been qualified for Region II storage as indicated by their inclusion on SP 31022, Attachment 2.

2.1.8 All prerequisites and Initial Conditions of OP 3210B are complete.

2.1.9 Exclusion Zones have been established in areas which may be radiologically affected by the movement of spent fuel through the fuel transfer tube.

2.1.10 Prior to any fuel movement, both executor and the checker shall have copies of the refueling worklist.

2.1.11 Personnel involved with fuel movement must review OP 3260 for effective communications.

2.2 Documents

2.2.1 MC 5, "SNM Inventory and Control."

2.2.2 EN 31001, "Supplemental SNM Inventory Control."

2.2.3 EN 31013, "Spent Fuel Pool Operations."

2.2.4 SP 3672.2 Attachment 1, "Initial Refueling Requirements."

2.3 Responsibilities

2.3.1 QC shall assist in the performance of the core verification map.

2.4 **Definitions**

2.4.1 FREE STANDING FUEL ASSEMBLY – A fuel assembly that does not have at least one side adjacent to another assembly, fixture or core structure.

2.4.2 INTERMEDIATE LOADING LOCATION – A fuel assembly unlatched in the reactor vessel that is not in its final loading location.

2.4.3 SEQUENCE DEVIATION – Placing of a fuel assembly or insert in a location other than that specified by the refueling work list.

2.4.4 SOURCE – Includes only primary sources or activated secondary sources, not unactivated secondary sources.

3. PRECAUTIONS

3.1 To minimize relative grid to grid interaction and the potential for fuel damage, fuel movement should occur in open water whenever possible.

NOTE

It is typically more difficult to seat a bottom nozzle on core pins when the bow (mid–point outward projection) faces another assembly or baffle face surface adjacent to core location to be loaded.

3.2 If fuel envelope conditions, such as bow, show directional tendencies during unload or loading, then core loading sequence should be planned or altered so the observed tendency may assist in the positioning of the bottom nozzle onto the lower core plate pins.

3.3 Exercise caution when loading fuel into 3 sided openings, closing (inserting the last assembly into) or opening (removing the first assembly from) a row, particularly if the assembly being moved does not have snag resistant grids. Side loads on assemblies are the greatest during these moves, increasing the potential for excess grid interaction and damage.

3.4 Source bearing assemblies should be loaded in the baffle location closest to the source range detector prior to loading any other assemblies. Nuclear coupling must be maintained between the source bearing assembly and the detector except when moving the source assembly to its final location or moving an assembly between the source and the detector. [♣ Comm 6.16]

3.5 When moving an assembly between the source and the detector or when moving the source assembly to its final location, the following guidelines should be followed: [♣ Comm 6.16]

- Only one open location is permitted to exist between the source assembly and its corresponding detector at any time.
- Any open location between the source assembly and its detector must be filled before any additional assemblies can be added to the core configuration.

3.6 Nuclear coupling must be maintained between either or both source bearing assemblies and any assembly in the core which is face adjacent to any other assembly. Temporary storage of an assembly or assemblies in baffle locations is permissible if no stored assembly is face adjacent to any other assembly and there are at least two open locations between the stored assembly and the core assemblies. At the core periphery, at least one open location must be maintained between the core and any stored baffle assembly. [♣ Comm 6.16]

3.7 After establishment of the baseline count rate from both source range detectors, assemblies that are added should bridge the source range detectors. Assemblies that are added after the bridge is formed should be added adjacent to the bridge. [♣ Comm 6.16]

3.8 A fuel assembly shall be preferentially placed in its location in the final fuel loading configuration except when temporarily stored along the baffle or when used to construct temporary "boxes" which may be required to load a difficult assembly. When used in boxes, the following three criteria are to be followed: [♣ Comm 6.16]

- Whenever possible, a boxing configuration shall be made up of assemblies in their final configuration location. There are no restrictions on such configurations.
- If any boxing configuration uses an assembly which is not in its final configuration location, then one of the assemblies making up the box must have a face adjacent to an open location or the baffle.
- Any fresh assembly not in its final configuration which is loaded face adjacent to another fresh assembly must have at least one of its faces adjacent to an open core location or the baffle.

3.9 At all times the source range counts must be monitored for any "unexpected" increase to preclude an inadvertent criticality. [♣ Comm 6.16]

3.10 Boron concentration analysis of refueling water shall be performed in accordance with Technical Specification requirements to assure no inadvertent dilution occurs.

3.11 If fuel pool temperature exceeds 140°F (bulk temperature), contact Design Engineering to determine if any fuel pool design limits have been exceeded.

3.12 Fuel movement must be stopped under any of the following conditions:

- An unexpected count rate multiplication is indicated on any of the responding channels.
- The 1/M extrapolating to zero with the loading of the next 4 assemblies.

3.13 When planning or performing an offload, shuffle or reload, fuel movements over other fuel assemblies should be avoided.

3.14 Do not latch onto a fuel assembly in the core until the fuel assembly in the transfer cart has been placed in the horizontal position.

3.14.1 During fuel movement, the following guidelines for fuel movement stop work criteria should be adhered to:

EVENT	CORRECTIVE ACTION	NOTIFY SHIFT MANAGER	CR
Wrong bundle grappled in core or SFP (no movement takes place).	Release bundle	Prior to corrective action	Yes
Wrong bundle taken off seat in core (not removed from core).	Notify Control Room RE	Prior to corrective action	Yes
Wrong bundle removed from core.	Notify Control Room RE move bundle to designated SFP location or alternative SFP designated by RE (alternate core location requires MTF or Refuel WL).	Prior to corrective action	Yes
Wrong bundle taken off seat or removed from SFP rack.	Revise MTF/Refuel WL Move to correct location.	Prior to corrective action	Yes
Bundle in wrong core location (Inserted beyond core upper grid).	Move to correct location.	Prior to corrective action	Yes
Bundle in wrong SFP location.	Prepare MTF/Refuel WL Move to correct location.	Prior to corrective action	Yes
Material dropped in cavity/vessel.	Stop refueling activities. Follow management guidance for method/schedule for recovery.	Prior to corrective action	Yes
FA makes unplanned contact with other objects.	Stop fuel movement. Contact RE	Prior to corrective action	Yes

4. INSTRUCTIONS

NOTE

Sections 4.2 through 4.6 are stand alone sections. Sections may be performed in any order at the discretion of the Reactor Engineering Shift Leader.

It is permissible to change the sequence of steps within the offload–shuffle– or reload–refueling work list, provided the precautions of Section 3.8 and Attachment 1 are met. A sequence deviation is NOT required when performing steps out of order.

Attachment 8 provides an individual checklist as a guide for Reactor Engineering Shift Leaders.

4.1 General Instructions

Reactor Engineering

4.1.1 During performance of this procedure, DOCUMENT completion of each step by initialing and recording the date on Control Room master copy of Attachment 2, "Refueling Work List."

4.1.2 MONITOR the following items AND RECORD status of refueling activities in refueling log book:

NOTE

All log book entries must include the date and time of the entry.

- Overloads or underloads experienced in SIGMA, including assembly ID number and magnitude of overload or underload.
- Equipment breakdowns and return to service.
- Any interruptions to refueling sequence (e.g., ESF or LOP testing, Diesel Generator or RHR inoperability, etc.) including the time refueling stops and refueling resumes.
- Any information that succeeding shifts will need in order to proceed with refueling.
- Erratic equipment operation.

- Presence of any foreign objects in reactor vessel.

- Damage to any fuel assemblies or inserts.

4.1.3 Refer To Attachment 2, "Refueling Worklist," and COORDINATE movement of all fuel and core components with licensed Control Room operators.

4.1.4 MAINTAIN communications between Control Room and fuel handling areas.

NOTE

Maintaining the tag board in the Control Room satisfies the requirement for keeping the Control Room operators informed.

4.1.5 INFORM licensed Control Room operators of all fuel and core components movement.

4.1.6 IF any problems arise that could impact fuel movement in the Spent Fuel Pool, DIRECT resolution of problems.

4.1.7 IF any changes occur or are planned that could affect outage critical path, NOTIFY Management Representative.

4.1.8 IF offload must be suspended, PERFORM the following, as applicable:

- Go To Section 4.4, INSERT shuffle portion of refueling sequence.

- PERFORM insert shuffles and inspections of fuel and inserts that are in Spent Fuel Pool.

- WHEN equipment or plant conditions allow, CONTINUE offload as directed by Reactor Engineering.

Reactor Engineering Shift Leader

4.1.9 At the end of each shift, COMPLETE Attachment 7, "Shift Turnover Sheet," AND REVIEW with incoming Shift Leader.

NOTE

Sequence deviations are the expected method of handling normal evolutions associated with refueling. In situations where a PORC approved version of the "Refueling Worklist" must be changed, a procedure change must be processed in accordance with Master Manual MM05.

Reactor Engineering

4.1.10 IF a step cannot be executed as specified on Attachment 2, "Refueling Worklist" (e.g., a fuel assembly must be placed in a temporary location in the core until it can be boxed), INITIATE a sequence deviation using the following guidelines:

- Sequence deviations are allowed to place a fuel assembly in the core provided its final location has not been changed. Precautions 3.6 and 3.8 apply when placing fuel assemblies in temporary locations in the core.
- IF sequence deviation is to be used to change Spent Fuel Pool location of an assembly to be reloaded, MARK restoration section of Attachment 6, "N/A" AND CHANGE reload on Attachment 2, "Refueling Worklist," to reflect new location.
- Sequence deviations are allowed on thimble plugs and control rods for inserts being discharged. Final location in the Spent Fuel Pool may be determined as necessary.
- Sequence deviations are allowed on thimble plugs and control rods being reloaded in the core provided the type of insert in a fuel assembly does not change.

NOTE

Attachment 6 is maintained by on–shift Reactor Engineering personnel in the Control Room. Attachment 6 is NOT required to be distributed to the field.

4.1.11 IF a sequence deviation is necessary, PERFORM the following:

a. Refer To Attachment 1, "Guidelines," and Section 3, "Precautions," AND RESTORE fuel assembly or insert as soon as possible.

b. ENSURE final loading pattern is not changed from that bound by Attachment 2, "Refueling Worklist."

c. DOCUMENT sequence deviations on Attachment 6, "Sequence Deviation Log."

4.1.12 PERFORM the following as directed by the Reactor Engineering Shift Leader:

- Incore shuffle – Section 4.2
- Core offload – Section 4.3
- Insert shuffle and fuel inspection – Section 4.4
- Core reload – Section 4.5
- Spent fuel verification – Section 4.6
- Post refueling – Section 4.7

– End of Section 4.1 –

4.2 Incore Shuffle

Reactor Engineering →

4.2.1 IF fuel movement is not currently in progress, OBTAIN permission from Shift Supervisor to move fuel in vessel.

4.2.2 WHEN shuffling assemblies in vessel, OBSERVE Attachment 1 guidelines and Section 3, "Precautions."

4.2.3 IF a reference count rate has not been determined, DETERMINE Reference Count Rate as follows:

a. Using a counting time of 100 seconds, OBTAIN 5 trials on at least 2 source range detectors.

b. ENSURE total number of counts on each detector is greater than 200 AND INCREASE counting time, as necessary.

c. ENTER data AND PERFORM calculations on Attachment 4 or a computer based equivalent.

4.2.4 Prior to lowering any bundle in the core, ENSURE 1/M calculation for previous assembly has been completed.

4.2.5 After lowering a fuel assembly in the core AND before unlatching the assembly, PERFORM the following:

a. WAIT until counts have stabilized.

Fuel Handlers →

b. OBTAIN permission from Reactor Engineering to unlatch newly loaded assembly from SIGMA refueling machine.

4.2.6 UNLATCH fuel assembly from SIGMA.

Reactor Engineering →

4.2.7 INITIAL AND RECORD date and time on Control Room master copy of Attachment 2, "Refueling Worklist."

4.2.8 OBTAIN 1/M data AND PERFORM the following:

a. WHEN count rate has stabilized, OBTAIN two counting trials from at least 2 source range detectors.

b. RECORD data AND PERFORM calculations on Attachment 5 or a computer based equivalent.

c. From at least two independent source range detectors, PLOT 1/M versus the number of fuel assemblies in core.

Reactor Engineer or Fuel Handlers

4.2.9 <u>WHEN</u> fuel assembly is unlatched, CHECK alignment of fuel assembly as follows:

a. CHECK for unusually large gaps between assembly and adjacent assemblies.

b. CHECK for unusually large gaps between fuel assembly and core baffle.

c. CHECK for abnormal top nozzle corner–to–corner offsets.

Reactor Engineering

4.2.10 <u>WHEN</u> shuffling assemblies in vessel, UPDATE Control Room tag board to reflect current status of fuel assemblies being moved.

a. COMPARE tag board to master copy of the "Refueling Worklist" for correctness.

– End of Section 4.2 –

4.3 Core Offload

> **CAUTION**
>
> The core must not be off loaded at an average rate that exceeds 3 assemblies per hour.

Reactor Engineering

4.3.1 WHEN all prerequisites have been met, and permission has been obtained from SM/US, Refer To Attachment 2, "Refueling Worklist," AND BEGIN core offload.

4.3.2 As fuel assemblies are transferred to Spent Fuel Pool, UPDATE Control Room tag board to reflect the following:

- Latched on SIGMA
- Unlatched in upender on Containment side
- Upender on Fuel Building side
- Latched on Spent Fuel Bridge
- Unlatched in Spent Fuel Pool storage location

> **NOTE**
>
> The average discharge rate of fuel is defined as the total number of fuel assemblies placed in the spent fuel divided by the total elapsed time from the point where the reactor has been shut down for 11 days or a specific 50.59 evaluation has been performed for less than 11 days. Safety Evaluation SE-EV-99-0055 has been performed to reduce the 11 days to 8 days for RF06 only.

chg #1

4.3.3 ENSURE core is off–loaded at a rate not to exceed an average rate of 3 assemblies per hour.

4.3.4 COMPARE tag board to master copy of Attachment 2, "Refueling Worklist," for correctness.

4.3.5 WHEN core offload is complete, ADJUST plant process computer core burn–up value "CVRXBU" to 0 MWD/MTU. [♣ Comm 6.17]

– End of Section 4.3 –

4.4 Insert Shuffle and Fuel Inspections

Reactor Engineer / Fuel Handlers

4.4.1 Refer To Attachment 2, "Refueling Worklist," AND PERFORM the following:

a. SHUFFLE control rods, thimble plugs, secondary sources, and any other inserts.

b. MOVE fuel or inserts to and from inspection stations.

4.4.2 IF any fuel assembly has experienced an overload or underload in excess of 250 pounds during offload, visually INSPECT fuel assembly for damage.

– End of Section 4.4 –

ATTACHMENT 3

MILLSTONE NUCLEAR POWER STATION

Fuel Transfer System

OP 3303C

Rev. 6

STOP THINK ACT REVIEW

Approval Date: APR 14 1999

Effective Date: 4-19-95

Level of Use
General

Millstone Unit 3
General Operating Procedure

Fuel Transfer System

TABLE OF CONTENTS

1. PURPOSE

1.1 Objective

This procedure provides instructions for start up, normal operation, shutdown, emergency operations and interlock testing.

1.2 Discussion

Section 4.1 gives direction on System Startup. This section or parts of the section (as specified in Note preceding Section 4.1) must be performed prior to performing subsequent sections.

Section 4.2 through 4.7 give instructions on normal operation of Fuel Transfer System.

Section 4.8 gives instructions on shifting down the system following a refueling outage.

Section 4.9 was written to perform maintenance and testing on the Fuel Transfer System with the unit at power and/or with the transfer tube valve closed. The bypass interlock key for "Valve Interlock," allows the cart to be traversed with the transfer tube valve not full open. The bypass interlock key for "Traverse Interlock," allows the cart to be traversed with no power to containment side control panel and/or the "Traverse Control," switch in the "OFF" position on the containment side control panel.

Attachment 1 applies only to emergency retrieval of the transfer car to the fuel building side for isolation and repairs.

1.3 Applicability

As required when using Fuel Transfer System.

2. PREREQUISITES

> **NOTE**
>
> If performing Section 4.9, Prerequisites 2.1.2, 2.1.3, 2.3 and 2.5 are required.

2.1 Electrical

2.1.1 Power is available to the Containment Fuel Transfer System Control Console 3FNT–CONT R as follows:

a. Operating power from BUS 32–4H breaker 2KT via 3RCP–PNL3A breaker R2F.

> **NOTE**
>
> Cabinet heater power not required for performance of this procedure.

2.1.2 Fuel Building Fuel Transfer System control console 3FNT–CONT P as follows:

a. Operating power from Bus 32–4H breaker 3KB.

2.1.3 The manual handwheel for the traversing drive train is securely stowed at 3FNT–CONTL P in order to make up the handwheel interlock switch of the traversing control power circuit.

2.2 Fuel Transfer Tube required prior to moving cart into containment

2.2.1 The blind flange is removed.

2.2.2 The fuel transfer tube gate valve 3FNT–TFT1 is 108 turns open.

2.3 Lubrication

2.3.1 As a minimum, either the transfer car tracks are flooded over with water or, a lubricating spray has been established to ensure that the bevel gears and chain drive are water lubricated.

2.4 Preoperational Checks

2.4.1 Prior to refueling operations as specified in OP 3210B, "Refueling Operations," check the proper operation of the Fuel Transfer System by completion of OPS Form 3303C−1.

2.5 Visibility

2.5.1 Ensure adequate lighting and water clarity.

2.6 Communications

2.6.1 When traversing the cart two people should be stationed with one at each central console (with the exception of Section 4.9).

2.7 Keys

2.7.1 If performing Section 4.9, two interlock bypass switch keys (bypass key die stamped D55) are needed.

2.7.2 Shift Supervisor's Office Key Locker:

- Key No. 50, fuel transfer cabinet interlock, (D55)
- Key No. 59, MHS−CRN2 spent fuel bridge bypass enable, (ILLINOIS T100)
- Key No. 60, MHS−CRN1 spent fuel bridge hoist power interrupt bypass, (D54)

2.8 Definitions

2.8.1 FTS − Fuel Transfer System

3. PRECAUTIONS

3.1 The hydraulic pump is to be left in "START" anytime the transfer carriage frame is in any other position than "DOWN."

3.2 Key bypass interlocks provide an emergency override of safety interlocks and must be controlled with a PORC approved bypass jumper unless performing one of the following actions:

3.2.1 Performance of OPS Form 3303C-1.

or

3.2.2 No fuel is loaded in cart.

or

3.2.3 Performing Section 4.9 of this procedure.

or

3.2.4 The dummy fuel assembly is the cart.

3.3 All bypassable interlocks provide a status lamp when bypassed except the following:

- When the Traverse Interlock switch at 3FNT-CONT P console is selected to bypass, the 3FNT-CONT R panel will not exhibit an illuminated Interlock Bypass Status lamp to warn Operator that he has lost both traverse control function and frame down interlock to the traverse control power circuit.

3.4 Do not operate FTS chain drive with the transfer canal and upender pit dry unless periodically lubricated with aerated sprays of demineralized water (to prevent binding).

3.5 Using magnets may destroy limits switches, if a proximity switch must be "TRIPPED" artificially, as when troubleshooting, then use only ferrous metallic objects.

3.6 Do not allow loads to be set on the FTS trackway.

3.7 If a cable chain separates or breaks, deenergize FTS.

3.8 At the end of refueling operations, the transfer car should be jogged away from the hard stop in the Fuel Building.

3.9 When tagging out one control console for electrical work, also tag off the main power supply for the other console to remove all power.

3.10 When using Transfer System for irradiated fuel, the transfer canal must be filled to normal level (36–44% fuel pool level).

ATTACHMENT 4

INSTRUCTIONAL MATERIAL APPROVAL SHEET Beaupre.

I. Lesson Title: Fuel Handling System

ID Number: FHS034T Revision: 0

Classroom _ Simulator _ Laboratory _
Structured Self Study _ Student Text X

II. Initiated:

James G. Lahti [signature] 1/29/97
Developer Date

III. Reviewed:

James F. Beaupre [signature] 02/04/97
Technical Reviewer Date

Grady A. Tait [signature] 02/01/97
Instructional Reviewer Date

IV. Released for use:

N/A
Nuclear Training Supervisor Date

V. Approved: [signature]
Nuclear Training Supervisor 2/12/97
Date

TRAINING SUMMARY OF CHANGES

Title of Document: Fuel Handling System
ID Number: FHS034T
Revision: 0

Commitment Number	Description of Change	Affected Page (s)
SOT3-920438	REVISED TO REFLECT LATEST CHANGE TO REFERENCES	ALL

TEXT	COMMENTS
The bottom opening of these gates is located above the spent fuel racks, so that even if the spent fuel pool drained to the level of the gates, the fuel would remain covered. The gate to the cask pit is normally removed and the cask pit flooded. The gate to the fuel transfer canal is normally removed and the transfer canal flooded. The fuel transfer canal gate is only put in place when the fuel transfer canal is drained for maintenance on the fuel transfer cart, upender, or new fuel elevator.	
2.7 FUEL TRANSFER SYSTEM	
The fuel transfer system (Figures FHS-006A/B/C) is an underwater conveying system for nuclear fuel assemblies. It operates between the containment building and the fuel building and is powered from MCC 32-4H.	Objective FHS02C
To transport fuel between the containment and the fuel building, the fuel assembly is inserted vertically into the system's fuel container by the SIGMA refueling machine; the container is then tilted down to a horizontal position, driven through the transfer tube into the transfer canal of the fuel building and tilted back up to the vertical position. The fuel assembly is removed from the upender with long handled tool attached to the spent fuel bridge. The procedure is reversed to transport fuel from the fuel building to the containment.	Objective FHS03C
The transfer system is remotely operated from two control consoles. One console is on the operating floor of the containment, the other on the operating floor of the fuel building. Sealed underwater proximity switches operate	Objective FHS04C

<u>*TEXT*</u>	<u>*COMMENTS*</u>

lamps on the control consoles so that the operators can identify the positions of the various components as they proceed through the sequence of operations. The switches are remotely removable for servicing.

Control console - reactor side -- The main controls on the control console's reactor side (Figure FHS-029) are as follows:

- "PUMP STOP/START" selector switch operates the pump for the upending cylinder which raises or lowers the fuel. The pump may be started or stopped at any time when the fuel container is in position for upending. The selector switch should be in "START" when the fuel container is in the fully vertical position. The selector switch should be in the "STOP" when the fuel container is traversing. Turning the pump selector switch to "START" does not automatically start the pump motor. The hydraulic system is equipped with pressure switches that turn the pump on and off, as required, to maintain adequate system pressure.

- "RAISE FRAME" pushbutton (yellow) energizes a valve that channels the pump flow into the upending cylinder, causing the fuel container to pivot into a vertical position.

- "LOWER FRAME" pushbutton (blue) energizes a valve solenoid which channels the pump flow into the upending cylinder, causing the fuel container

TEXT | COMMENTS

to pivot down to the horizonal position.

- "TRAVERSE CONTROL" selector switch is a permissive switch that gives the operator in the containment control over the traverse operation, which is powered from the fuel building side. When the switch is "ON", the operator on the fuel building side can conduct traversing operations. When the switch is "OFF", the fuel building side operator is prevented from conducting traversing operations. The traverse control switch can be used as an emergency traverse stop by the operator on the containment side. Turning the switch to "OFF" stops all traversing functions. This switch should be turned to "OFF" before the fuel upender on either side is operated. When the switch is "ON", a clear lamp on the fuel building side control panel is lit to alert the operator at that panel.

- "HEATER" selector switch (on side of console) controls the 120 VAC power to the panel heater. This switch should be "OFF" during operations and "ON" during long idle periods. A thermostat will shut off the switch if the temperature in the console rises beyond a set limit.

- "CRANE INTERLOCK BYPASS" switch (key operated) provides an emergency override of the safety interlock that prevents operation of the upender when the crane gripper tube is in other than its top limit position or in the "GUD" (Gripper

<u>TEXT</u> | <u>COMMENTS</u>

Up-Disengaged) position with SIGMA in the vicinity of the upender.

- "LIFT INTERLOCK BYPASS" switch (key operated) provides an emergency override of the safety interlock for raising or lowering the fuel container at other than the extreme limits of travel of the transfer car.

- "FRAME DOWN" lamp (blue) indicates when the lifting frame is in the down position.

- "FRAME UP" lamp (yellow) indicates when the lifting frame is fully up.

- "CAR AT REACTOR" lamp (green) indicates when the transfer car is in position for upending in the containment building.

- "HEATER ON" lamp (red, on side of console) indicates when panel heater switch is on.

- "INTERLOCK BYPASSED" lamp (red) indicates when any key operated bypass switch on the reactor side control console has been activated. When the lamp is lit, the system is operating in an unsafe mode.

- "VALVE OPEN" lamp (green) indicates when the valve on the fuel building end of the transfer tube is open.

TEXT	COMMENTS

Control console - pit side -- The main controls on the control console's pit side (Figure FHS-030) are as follows:

- "PUMP START/STOP" selector switch - same as reactor side.
- "RAISE FRAME" pushbutton (yellow) - same as reactor side.
- "LOWER FRAME" pushbutton (blue) - same as reactor side.
- "TRAVERSE TO PIT/REACTOR" selector switch selects the direction of travel of the transfer car.
- "TRAVERSE STOP" pushbutton (red) stops the transfer car drive. This switch is mainly for emergency stops; the drive stops automatically at the end of travel.
- "TRAVERSE START" pushbutton (green) energizes the traverse drive system that moves the transfer car between the fuel building and the containment building. The traverse drive system is equipped with interlocks and permissive switches that prohibit motion of the fuel transfer car if an unsafe condition exists.
- "VALVE INTERLOCK BYPASS" selector switch (key operated) is an emergency override of the safety interlock that prevents traversing before the pit side valve is fully open.

<u>TEXT</u>	<u>COMMENTS</u>

- "LIFT INTERLOCK BYPASS" selector switch (key operated) - same as reactor side.

- "TRAVERSE INTERLOCK" bypass selector switch (key operated) is an emergency override of the safety interlock in which both lifting arms must be down before any traverse can begin.

- "HEATER" selector switch (on the side of the console) - same as reactor side.

- "HEATER ON" lamp (red, on the side of the console) - same as reactor side.

- "INTERLOCK BYPASSED" lamp (red) - same as reactor side.

- "FRAME DOWN" lamp (blue) - same as reactor side.

- "FRAME UP" lamp (yellow) - same as reactor side.

- "TRAVERSE CONTROL" lamp (clear) indicates when the operator at the reactor side console switches his traverse control switch to "ON". This switch is described in the control console - reactor side section.

- "CAR AT PIT" lamp (green) indicates when the transfer car is in position for upending in the fuel

TEXT	***COMMENTS***

building.

- "CAR AT REACTOR" lamp (yellow) indicates when the transfer car is in position for upending in the containment building.

- "VALVE OPEN" lamp (green) indicates when the valve on the fuel building end of the transfer tube is open.

One additional interlock exists for which there is no bypass. To prevent a collision of the upender and a fuel assembly being transported by the spent fuel bridge crane, an interlock prevents the upender from raising or lowering if the spent fuel bridge is in the vicinity and the hoist is not full up. The position of the spent fuel bridge is determined from its position indication system. In the vicinity is defined as South of an imaginary line just North of the upender when it is in the horizontal position. With the hoist full up, sufficient clearance exists between the upender and the bottom of the fuel assembly suspended from the long handled tool attached to the spent fuel bridge crane to allow upender movement.

The system is designed for operation while completely submerged in water and makes use of the water in lubricating its moving parts. Bushings on its moving parts are graphite impregnated and require no additional lubrication.

The system consists of a fuel container mounted on a transfer car. The transfer car is moved back and forth on

Objective FHS02C

TEXT | COMMENTS

tracks through the transfer tube by a pusher arm, which is driven by roller chains connected to a traverse drive mechanism. The drive is powered by an electric motor on the operating deck. The fuel container is pivoted at each end of the transfer tube by upending mechanisms that operated with demineralized water filled hydraulic cylinders.

The transfer car and the fuel container are assembled in one unit. The container is attached to the car near its center by a trunnion pivot. The pivot is slightly below the midpoint so that the weight of the fuel assembly maintains itself horizontal. The transfer car remains in place on the tracks when the fuel container pivots. In between upenders, the fuel container is held down by a latch, which releases when the fuel container is positioned and ready to be pivoted to the vertical position. This latch keeps the fuel container from pivoting while it is in the transfer tube. The latch is a backup that prevents the fuel container from being raised unless the fuel transfer cart is at its end of travel, either in the fuel building or containment. When the fuel container is pivoted upward a few inches from the horizontal, a latch engages the transfer car with the track. This latch keeps the transfer car from moving while the fuel container is vertical. The latch disengages when the fuel container is lowered back to the horizontal position. The fuel container has a T-slot in its top surface, which engages a T-lug on the upending mechanism when the mechanism lifts the fuel container. The T-slot mates with the T-lug when the container is in the horizontal position.

TEXT	COMMENTS

The transfer car has guide rollers which keep it centered on the tracks. The tracks are shaped to retain the rollers so that the car cannot leave the tracks. A pusher arm is attached to the fuel building end of the car.

The pusher arm is a long tubular car with wheels and guide rollers retained by rails like the transfer car rollers. One end of the pusher arm is connected to the transfer car, while the other end connects to the roller chains that move the pusher arm and attached transfer car through the transfer tube. The pusher arm enables the traverse drive to reach through the transfer tube and push the transfer car into position in the containment building. The pusher arm is attached to the transfer car because the roller chain drive cannot extend past the transfer tube valve in the fuel building. One end of the pusher arm connects to two roller chains by means of equalizing yoke that distributes the chain load evenly. The system is designed to be operable with only one chain, should the other chain need to be removed. The roller chain end of the pusher arm comes solidly against a hard stop at both ends of the travel.

Two continuous roller chains run along the length of the tracks on the fuel building side of the system. The ends of the chains are connected to the pusher arm. The chains are driven through gears in a miter box near the center of the track sections on the fuel building side. The miter box gears are exposed to the water in the fuel transfer canal.

The miter box is connected to a gear motor drive at the

TEXT	COMMENTS

operating floor level via a vertical lineshaft. The lineshaft connects to the gear motor and miter box by a mechanical torque release coupling and a chain coupling.

The gearbox motor contains a torque switch, which trips when the pusher arm comes solidly against the stops at the extreme limits of its travel. The switch shuts off power when the fuel container is in position for upending. A dead-man brake on the gear motor prevents the motor's backing off when its power is cut off. A mechanical torque release coupling is employed as a backup system in case a malfunction of the torque switch occurs.

When the fuel container approaches its full travel position, a T-slot on its top engages a T-lug on the lifting arm. The pivots of the lifting arm and the fuel container are in line when the pusher arm rests against the hard stop. The lifting arm is connected to a dual-action hydraulic cylinder, which pulls the lifting arm (and thus the fuel container) through a 90 degree arc. The cylinder pulls the container against a hard stop when it is vertical. Although the container is stable when in the vertical position, hydraulic pressure is maintained on the cylinder as a safety measure.

The upender hydraulic unit is equipped with a flow control valve, which prevents rapid motion of the cylinder when the fuel is raised or lowered. In addition, the cylinder ends are equipped with dashpots, which cushion the last 2 inches of cylinder travel. Even if the upender hydraulic system failed and the loaded fuel container fell to the

Objective FHS06C

TEXT	***COMMENTS***

horizontal position it would not fall quickly because of the flow control valve.

The hydraulic power system is mounted on a stainless steel reservoir, which is automatically filled to compensate for leakage. A mechanical isolation valve is installed and can be closed if the float actuated valve fails open. The hydraulic pump cycles on discharge pressure which is indicated by a gage next to its respective control console. The fill line is connected to the plant demineralized water supply. Solenoid valves direct the pump discharge to the correct half of the dual-action piston for the selected operation.

The transfer tube (Figure FHS-007) is a 20 inch by 21 foot, tracked tubular passageway that connects the refueling canal in the containment building with the transfer canal in the spent fuel building. A blind flange suspended from a davit seals the tube's reactor side and a gate valve seals the tube on the pit side. The valve is operated by a handwheel on the operating deck. The valve allows removal of the blind flange without draining the spent fuel pool through the transfer tube into the containment.

The blind flange has double gasket seals which are replaced every refueling. The face of the bolting flange has two leak test ports, which must be plugged before refueling. The plugs are removed before the blind flange is reinstalled. This flange forms the containment boundary.

TEXT | COMMENTS

cask loading pit by a removable gate. The SFSC is lowered into the cask pit and the pit is filled with enough water to match the level of water in the spent fuel pit. The gate between the two pits is then removed. The spent fuel bridge, using the spent fuel handling tool, transfers enough spent fuel from locations in the spent fuel racks to the SFSC to fill the SFSC. The aforementioned gate is placed back in position, the head is placed back on the cask and the cask taken to the washdown sump for decontamination. After the SFSC is decontaminated and inspected, it is moved back to the railroad canopy to be loaded on a rail car for shipment.

3.2 ABNORMAL OPERATIONS

Objective FHS06C

3.2.1 Transfer System

The transfer drive gearbox and the hydraulic power system pump can be manually operated in an emergency with a speed wrench.

Electrical power should be turned off at the control panel before attempting manual operation of the transfer device gears.

The transfer car can also be moved back to the fuel building by means of the emergency pull-out cable system. The system consists of a cable that is stretched next to the transfer car the full length of the track on the fuel building side. One end of

<u>*TEXT*</u> | <u>*COMMENTS*</u>

the cable is connected to a shear pin on the track near the transfer tube's gate valve, and the other end terminates in a pulling eye at the opposite end of the track. The rear of the pusher arm has a sleeve, which loosely encircles the cable. As the pusher arm rides back and forth, the sleeve rides over the cable. Pulling upward on the pulling eye with the hook on the spent fuel bridge hoist will cause the cable to sever the shear pin near the transfer tube's gate valve. The clevis which connects the cable to the shear pin will wedge in the pusher arm cable sleeve. Further upward pulling on the eye will cause the pusher arm and the transfer car to be pulled back into the fuel building. A minimum of 20 feet of lift is required to pull the transfer cart all the way back into the fuel building.

Prior to using the emergency pull-out cable system, it is necessary to disconnect the gear drive motor from the drive box and to completely remove a broken chain to prevent its snagging or jamming in the system.

3.2.2 Spent Fuel Bridge

The spent fuel bridge hoist is equipped with a manual brake release and a shaft extension that is connected to a 90° gearbox with a socket for a long-handled tool. The hoist can be raised or lowered manually in the event that power is lost with a fuel assembly suspended.

Objective FHS06C

TEXT	***COMMENTS***

when load is greater than 1000 pounds unless hoist is at full up geared limit switch. Hoist Height lamp flashes when interlock is "in" and the hoist is not full up. Interlock may be bypassed.

- "SLACK CABLE INTERLOCK" (200 pounds) stops hoist downward motion and illuminates slack cable lamp, may be AVERTED.

- "FUEL UNDERLOAD INTERLOCK" (1500 pounds) stops hoist downward motion and illuminates fuel underload lamp, may be AVERTED.

- "TRAVERSE TRAVEL LIMIT INTERLOCK" stops bridge/trolley motion when hoist approaches restricted areas adjacent to the pool walls. Illuminates traverse travel lamp, may be AVERTED.

- "HOIST/BRIDGE/TROLLEY MOTION INTERLOCK" allows motion of one motor at time.

5.3.5 Fuel Transfer System

- "VALVE INTERLOCK" ensures the gate valve that seals the transfer tube on the pit side must be fully open before any traverse can begin, bypassable.

TEXT	COMMENTS

- "TRAVERSE INTERLOCK" ensures both lifting arms must be down before any traverse can begin, bypassable.

- "LIFT INTERLOCK" ensures the car must be at extreme ends to be upend or lower a fuel container, bypassable.

- "SIGMA REFUELING MACHINE INTERLOCK" (On the reactor side), when the SIGMA refueling machine is in the refueling canal, the gripper tube of the crane must be at its top limit position or in the GUD (Gripper Up Disengaged) position before the hydraulic cylinder can be operated to raise or lower the fuel container. The cylinder may be operated when the SIGMA refueling machine is over the core, regardless of gripper position. This interlock is bypassable.

- "HYDRAULIC PUMP INTERLOCK" ensures the pump for the hydraulic unit remains in "STBY" when the fuel container is fully vertical. (A pressure switch starts the pump motor when the hydraulic system pressure drops below a preset value.)

5.3.6 SIGMA Refueling Machine

- "PRIMARY HOIST OVERLOAD" (weight of fuel mast, fuel assembly and RCCA plus

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
NORTHEAST NUCLEAR ENERGY COMPANY	)	Docket No. 50-423-LA-3
	)	
	)	
(Millstone Nuclear Power Station, Unit No. 3)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF MOTION TO FILE AFFIDAVIT OF ANTONE CERNE REGARDING REFUELING OUTAGE 6", "AFFIDAVIT" of Antone of C. Cerne, and attachments in the above-captioned proceeding have been served on the following through deposit in the Nuclear Regulatory Commission's internal mail system or; hand-carried with copies by electronic mail, as indicated by an asterisk or; by facsimile and E-mail, as indicated by a double asterisk, followed by a conforming copy via first-class mail this 17th day of July 2000.

Charles Bechhoefer, Chairman*
Administrative Judge
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