Procedure History Sheet - Review Level 'A'

1 - BASIC INFORMATION

Is this procedure being rescinded? ☐ Yes ☒ No

If revising two or more procedures, enter VARIOUS in procedure no., complete form 69-20083, and attach to this PHS.

PROCEDURE NO.	REV	UNIT
OP B-8DS2	20	☐ 1 ☐ 2 ☒ 1&2

TITLE CORE LOADING SEQUENCE

2 - CHANGE DETAILS

List change details and why they are needed. Identify ARs, LERs, NCRs, etc.

Revised to allow use of either N51 or N52 in addition to one of the normal source range channels (N31 and N32). The two source range channels used must be powered by different vital power supplies. If N51 or N52 is used, it must be displayed in the control room via the PPC. Deleted criticality monitor requirements Revised the underload and overload setpoint check procedures to direct the final motion of the hoist just prior to recording data. This will minimize hysteresis effects. Added to step 3 of attachment 9.5 to verify acceptability of SFP temperature. References: A0417757, A0371129, A0425124, A0371130, DCL-97-035, and DCP J-049320.

3 - PREPARATION AND REVIEW

	Print Last Name	Signature	Date	
Sponsor	FARRER		12-12-97	
Ind. Tech. Reviewer	MAYER		12/12/97	
Surv. Test Coord. (1)				☒ N/A
PS (2)				☒ N/A
NQS (3)				☒ N/A

(1) For new or revised STPs that involve a change of intent & other procedures that affect the surveillance test program.
(2) For administrative procedures.
(3) For new Quality Related administrative procedures & revisions that require a change to a Q commitment in PCD.

4 - PSRC REVIEW

☒ N/A

- Special tests or infrequently performed evolutions (refer to AD13.ID1).
- New heavy load handling procedures/changes to methods & routes used.
- Procedures identified in EDMS, NPG Manual, Volume 01.

Recommend for Approval at Meeting #: _____ - _____ Date: _____

5 - PROCEDURE APPROVAL

Designate minimum approval level by checking ONE of the following blocks.

☐ PSRC CHAIR (PSRC REVIEWED) ☐ VP, DCPP (IDAPS) ☐ MANAGER (DLAPS) ☒ DIRECTOR (WORK PROCEDURES)

- "PASRO" PIMS code required to approve STPs, Emergency Plan Implementing and Operations section procedures.
- "PAOTH" PIMS code & TQ1.ID1 qual for position responsible for procedure required to approval all other procedures.

Approval Signature _____ Date 1/13/98

For IDAPs affecting the G.O., obtain approval of the VP,NTS or delegate. ☒ N/A

Approval Signature _____ Date _____

PROCEDURE CONTROL USE ONLY

Received	Effective	Distributed	Uploaded	CN Sent/By

Procedure History Sheet - Review Level 'A'

6 - CROSS DISCIPLINE REVIEW(S) AND CHANGE NOTICE

	Organization	Change Notice	CDR	Reviewer	Response Rec'd	Comments Resolved
NPG	SVP&GM	☐	☐		☐	☐
	Business Planning	☐	☐		☐	☐
	Budg & Perf Mgmt	☐	☐		☐	☐
	Mgr. NQS	☐	☐		☐	☐
	NQS Ops & Strategic	☐	☐		☐	☐
	NQS Maintenance	☐	☐		☐	☐
	NQS Engr & Procure	☐	☐		☐	☐
DCPP	VP&PM, DCPP	☐	☐		☐	☐
	Mgr, Site Services	☐	☐		☐	☐
	General Services	☐	☐		☐	☐
	Security Services	☐	☐		☐	☐
	Emergency Planning	☐	☐		☐	☐
	Health & Safety	☐	☐		☐	☐
	Environmental Ops	☐	☐		☐	☐
	Mgr Mnt Svs	☐	☐		☐	☐
	Procedure Services	☐	☐		☐	☐
	Technical	☐	☐		☐	☐
	Material Services	☐	☐		☐	☐
	Mechanical	☐	☐		☐	☐
	Mgr Outage Svs	☐	☐		☐	☐
	Unit 1 Outage	☐	☐		☐	☐
	Unit 2 Outage	☐	☐		☐	☐
	Sch & Otg Plng	☐	☐		☐	☐
	Proj & Support Svcs	☐	☐		☐	☐
	Mgr Operations Svs	☐	☐		☐	☐
	Operations	☐	☒	Abramovitz	☑	☐ Yes
	Radiation Prot.	☐	☐		☐	☐
	Chemistry	☐	☐		☐	☐
NTS	VP, NTS	☐	☐		☐	☐
	Nucl. Fuel Purch	☐	☐		☐	☐
	Learn Svs	☐	☐		☐	☐
	Contract Svs	☐	☐		☐	☐
	SFNPG Support Svs	☐	☐		☐	☐
	Mgr. Design Engr Svcs	☐	☐		☐	☐
	Engineering Proj.	☐	☐		☐	☐
	Tech Support Sect	☐	☐		☐	☐
	Mgr., NSAL	☐	☐		☐	☐
	Lic & Dsgn Basis	☐	☐		☐	☐
	Regulatory Services	☐	☒	[illegible]	☒	☑
	DCISC/NSOC/PNAC	☐	☐		☐	☐
	Mgr Eng Svs	☐	☐		☐	☐
	NSSS Sys Eng	☐	☐		☐	☐
	Scndry Sys Eng	☐	☐		☐	☐
	BOP Sys Eng	☐	☐		☐	☐
	Elec/I&C Sys Eng	☐	☐		☐	☐
	Support Eng	☐	☐		☐	☐
C&TS		☐	☐		☐	☐
TES		☐	☐		☐	☐
OTHER		☐	☐		☐	☐
		☐	☐		☐	☐

Procedure History Sheet - Review Level 'A'

7 - PROCEDURE REVISION DURATION

Is this procedure revision permanent? ☒ YES ☐ NO

If no, indicate expiration date or event _____

Should the previous revision be reinstated upon expiration of this revision?

☐ YES ☐ NO ☒ N/A

8 - OTHER AFFECTED PROCEDURES OR DOCUMENTS ☒ N/A

Identify documents to be written, revised, or rescinded due to this procedure/change. List tracking AR(s)/AE(s) unless revisions/rescissions are in progress.

Affected Documents	(Write, Revise, Rescind)	Tracking AR(s)/AE(s)

9 - PROCEDURE COMMITMENT DATABASE (PCD)

Does any information in the PCD need to be updated or corrected? ☐ YES ☒ NO

If YES, submit the change in accordance with XI4.ID1 and XI4.ID2 as appropriate.

10 - BIENNIAL REVIEW

Was this procedure reviewed to determine if other changes were necessary or desirable. ☐ YES ☒ NO

11 - DESIGN CRITERIA MEMORANDA (DCM)

Does the procedure conflict with DCM Section 4, "Design Bases" or Section 5, "Surveillance/Maintenance Requirements"?

☐ YES ☐ NO ☒ N/A

If YES, contact the responsible Engineer (listed in the DCM folder in EDMS) and refer to CF3.ID2 for further guidance. The proposed revision cannot be made until the conflict is resolved.

12 - CHANGE NOTICE (TO BE E-MAILED TO PROCEDURE USERS) ☒ N/A

If a work procedure, check N/A.

Briefly describe how present practices are changed and who is affected. Also, if this information is available as an electronic file, send it to PS@PROC@DCPP.

Procedure History Sheet - Review Level 'A'

13 - LICENSING BASIS IMPACT EVALUATION SCREEN

Use the applicable TS3.ID2 appendices to answer the following questions:

Screening for Determining the Need for Prior Regulatory Agency Approval

1. Does the procedure or procedure change involve a change to the Facility Operating License (OL), including OL Attachments (Technical Specifications, Environmental Protection Plan and Antitrust Conditions?) If "Yes," submit an LAR to the NRC. Do not approve or release the procedure for use until the LA is received.	☐Y	☒N
2. Does the PCD contain any commitment to a regulatory agency that must be changed and require notification to that agency? If "Yes," process the change in accordance with XI4.ID2.	☐Y	☒N
3. Does the PCD contain any commitment to a regulatory agency that must be changed and require prior approval from that agency? If "Yes," do not approve or release the procedure for use until approval is received.	☐Y	☒N

10 CFR 50.59, 10 CFR 50.54(a)(3) and OL Condition 2.C.(5)b/2.C.(4)b. Screen

Does the procedure or procedure change:

1. Involve a change to the facility design, function or method of performing the function, as described in any SER, SSER, or the living FSAR Update.	☐Y	☒N
2. Involve a change to system operation or administrative control over plant activities, as described in any SER, SSER, or the living FSAR Update?	☐Y	☒N
3. Result in a test, experiment, condition or configuration that might affect safe operation of the plant but was not anticipated, described or evaluated in any SER, SSER, or the living FSAR Update?	☐Y	☒N
4. Rely on a vendor safety evaluation that has not been reviewed by the PSRC?	☐Y	☒N

If any questions are answered "Yes," complete LBIE Section 1 in accordance with TS3.ID2.

Environmental Protection Screen (TS3.ID2, Appendix 7.3)

Does the procedure or procedure change:

1. Involve discharging new effluents or changes to effluents currently discharged to air, fresh water, sea water, or land?	☐Y	☒N
2. Involve a change in: quantity*, use, or storage of materials classified as hazardous (including oils) or the generation of hazardous wastes? (*See paragraph 5.4.2 of TS3.ID2)	☐Y	☒N
3. Result in disturbing land that was previously undisturbed?	☐Y	☒N
4. Alter surface water runoff patterns or amounts?	☐Y	☒N
5. Involve work within the SLO-2 archeological site boundary?	☐Y	☒N

If any questions are answered "Yes," complete LBIE Section 2 in accordance with TS3.ID2.

Procedure History Sheet - Review Level 'A'

13 - (Continued)

Emergency Plan Screen (TS3.ID2, Appendix 7.1)

1. Does the Emergency Plan require review on the basis of TS3.ID2, Appendix 7.1? ☐Y ☒N
   If "No," skip the next question and signature.
2. If the answer to the above question was "Yes," does the procedure or procedure change result in a change to the EP? (See TS3.ID2, paragraph 5.5.4.a) ☐Y ☐N

   If "Yes," complete LBIE Section 3 in accordance with TS3.ID2.

   If "No," sign and date:

EMERGENCY PLAN REVIEWER SIGNATURE	DATE	PRINT LAST NAME

Security Plan Screen (TS3.ID2, Appendix 7.2)

1. Do any of the security plans (PSP, SCP, STQP) require review on the basis of TS3.ID2, Appendix 7.2? If "No," skip the next question and signature. ☐Y ☒N
2. If the answer to the above question was "Yes," does the procedure or procedure change result in a change to a security plan? ☐Y ☐N

   If "Yes," complete LBIE Section 4 in accordance with TS3.ID2.

   If "No," sign and date:

SECURITY PLAN REVIEWER SIGNATURE	DATE	PRINT LAST NAME

REMARKS: Briefly describe how any issues may interface with the licensing basis (documents). For each Screen Section above having all "No answers, provide the logic for the "No" answers if clarification is required. Identify any screen references or attachments.

A 10CFR50.59 Safety Evaluation of the use of N51 and N52 has been performed in PG&E Letter DCL-97-035 as part of the submittal of the Technical Specification Bases change. Prior Regulatory approval is not required prior to implememtation.

Based upon the above criteria, I have determined that an LBIE: ☐ is ☒ is not required.

SPONSOR SIGNATURE	DATE	PRINT LAST NAME
David Farrer	12-12-97	FARRER

Based upon my independent technical review, I concur with the above conclusion:

INDEPENDENT TECHNICAL REVIEWER SIGNATURE	DATE	PRINT LAST NAME
Mark L Mayer	12/12/97	MAYER

TITLE: CORE LOADING SEQUENCE

EFFECTIVE DATE

PROCEDURE CLASSIFICATION: QUALITY RELATED

1. SCOPE

1.1 This procedure describes the method for core loading of Units 1 and 2.

1.2 Each fuel assembly move is identified by fuel assembly identification number, step number and the location from which and to which it is moved. The step number should reflect the number of fuel assemblies in the core.

2. DISCUSSION

2.1 This procedure provides step by step guidance for core loading. Core unloading and insert shuffling sequences are discussed in OP B-8DS1 and OP B-8DS3 respectively.

2.2 "Loaded" is a fuel-handling term which is used in this procedure, and is separate from nuclear coupling and the shutdown margin requirement. Loaded refers to a fuel assembly being down on the core plate pins and unlatched.

2.3 Nuclear coupling of a fuel assembly to the core occurs when the fuel assembly's bottom nozzle passes through the upper core slow zone and is within one location of the core assemblies.

3. RESPONSIBILITIES

3.1 Shift Foreman for operation of the plant and plant equipment.

3.2 Refueling SRO (with no other concurrent duties) for fuel handling operations and coordinating core loading with various assigned groups. He may delegate supervisory responsibilities at other duty stations to a designated operations representative. In the event of high radiation alarms, the SRO is also responsible for ensuring a safe and orderly evacuation of the refueling crew and determining the cause of the alarm.

3.3 SPPE (Reactor Engineering) for refueling procedures, fuel shuffle sequence, SNM tracking, and fuel inspection plans.

3.4 PPE (Nuclear) for technical guidance, fuel inspection, and changes to the fuel shuffle sequence.

3.5 Control Room operator to assist with Control Room activities associated with fuel movements. This includes:

- assuring there is repeat-back, verbal communication of fuel assembly location prior to latching or unlatching;
- and providing a check of fuel assembly locations when moving fuel.

4. PREREQUISITES

4.1 All applicable prerequisites of OP B-8D are current.

4.2 Core reloading sequence table requirements:

4.2.1 Verified by a Reactor Engineer to be correct.

4.2.2 Ensure that any fuel placement restrictions are met such as Tech Spec. 3.9.14.1 and 3.9.14.3.

4.2.3 Verify that the FOSAR of the lower core plate is complete.

4.2.4 The last step of the core loading sequence should be to return the completed core loading sequence and manipulator crane setpoint data sheets to the SPPE (Reactor Engineering).

4.2.5 The core loading sequence shall be printed with a minimum font size of 12 point.

4.3 OP L-6 completed to the point of core loading.

4.4 Contact Radiation Protection (RP) prior to transferring the first fuel assembly to containment to verify the fuel transfer tube High Radiation areas have been set up.

4.5 Optionally, a second timer/scaler has been installed (and jumper log entry made) to shorten required data taking time.

4.6 Optional, ensure PPC source range counts are available for data taking.

4.7 Prior to loading the core, determine and record background count rate for each source range or temporary detector.

4.8 Water clarity in the reactor vessel must be good enough to view the lower core plate alignment pins.

4.9 The dummy fuel assembly should be in containment and available for use.

4.10 All of the refueling crew above and support personnel are required to attend a briefing prior to the start of core loading. This briefing shall include, as a minimum, recent industry events relating to fuel movement, DCPP lessons learned, and Sections 5.0 and 6.0 of this procedure with an emphasis placed on individual responsibilities and the need for clear communications. Relieving shifts may then be briefed on-station by the crew being relieved. Only applicable precautions and instructions need to be covered.

5. PRECAUTIONS AND LIMITATIONS

5.1 GENERAL

5.1.1 Refueling personnel should observe all crane safety rules. This includes no mounting or dismounting of a moving crane.

5.1.2 When moving fuel in the Fuel Handling Building (FHB), do not raise an assembly out of the spent fuel racks until the upender has been unloaded in the containment.

5.1.3 When removing tools or equipment from the water, contact RP for monitoring.

5.1.4 If any work has been performed since core unloading on the manipulator crane load cell or circuits, the manipulator crane load cell over/underload trips should be checked. Additionally, the overload setpoint may need to be reset in the first few assemblies due to differences in buoyancy where the overload is set (an assembly weighs 50-100 lbs less when in the core as opposed to the upender). It may be necessary (and is allowed) to set the overload with a source assembly and then reset it with an assembly containing an RCCA.

5.1.5 The manipulator crane load cell underload trip should be checked using the dummy fuel assembly or the first fuel assembly without an insert. Record on Data Sheet 5.

5.1.6 Prior to latching or unlatching, an independent check shall be performed to verify that the fuel assembly location is in accordance with the core loading sequence.

5.1.7 If difficulties are experienced in seating a fuel assembly which are believed to be location or debris related, consideration should be given to utilizing a dummy fuel assembly. This will assure that the risks of damaging a fuel assembly are minimized.

5.2 SUSPENSION OF CORE LOADING

5.2.1 The loading procedure will be suspended, pending evaluation by the Refueling SRO and Power Production Engineer (Nuclear) under the following circumstances:

NOTE: A responding detector is defined as being geometrically coupled to the core, with at least one fuel assembly face adjacent or diagonally-adjacent to the detector, with a negligible background count rate relative to core neutron leakage. A detector in the process of being coupled to the core by fuel assembly loading in its vicinity is a nonresponding detector.

a. If there occurs on any one responding nuclear channel an unexpected increase in count rate by a factor of three (3).

b. An unexpected increase in count rate by a factor of two on all responding channels.

c. An unexpected change in Reactor Coolant System temperature of greater than 20°F.

d. If the measured boron concentration indicates a change of greater than ± 50 ppm from the nominal value at the start of core loading.

e. Communication between the Control Room and containment is lost.

5.2.2 In the event of a required halt in reactivity additions, fuel assemblies should not be left suspended, but should be moved to a suitable and safe excore location, such as the upender.

5.2.3 In the event of a Refueling Cavity Seal leak indicated by rapidly decreasing level, the Refueling SRO shall ensure that the fuel element in transit is stored at the lowest elevation possible. If the fuel element is in the upender, lower the upender. If the fuel element is in the manipulator and over the core area, lower the element into the core. Close the fuel transfer tube gate valve (SFS-50), shut the SFP swing gate and inflate the gate seal.

5.2.4 If a Containment Evacuation alarm occurs, CORE ALTERATIONS shall be suspended and all personnel in containment shall assemble in the main airlock after placing the fuel in a safe condition. The Refueling SRO shall inquire into the cause of the alarm and will determine the response to be taken. If it is determined that no hazards to personnel exist, evacuation need not proceed any further.

5.2.5 If a portable radiation monitor alarm occurs on the manipulator crane while handling fuel, CORE ALTERATIONS shall be suspended immediately and refueling personnel shall commence evacuation after placing the fuel in a safe condition. The Refueling SRO shall make a determination of the cause of the alarm and, if the alarm appears valid, the Control Room shall be notified to sound the Containment Evacuation Alarm. If it is determined that no hazards to personnel exist, evacuation need not proceed any further.

5.2.6 If the fuel loading SRO or PPE (Nuclear) suspects that continued operation will involve undue risk to personnel or equipment or will compromise the Tech Specs or license provisions, operations will be suspended pending resolution.

5.2.7 If the loading operation is suspended, source range detector count rates will be monitored on an <u>hourly</u> basis and recorded on the Control Operator's Log.

5.3 FUEL

5.3.1 To preclude grid strap and/or fuel assembly damage, the following must be complied with:

a. Fuel assemblies should be lowered into the core with about two or more inches of clearance on all sides.

b. For detailed equipment and fuel handling operations, refer to Reference 7.5.

c. If fuel damage is evident, refer to OP AP-21, "Irradiated Fuel Damage."

d. Avoid dragging a fuel assembly into an unsupported inside baffle corner edge or other corner-corner interactions.

5.3.2 The following restrictions on lateral movements apply and shall be observed:

a. Movements of a fuel assembly above the core should be made with the assembly fully withdrawn inside of the manipulator mast. The crane has built-in interlocks specifically designed to ensure this. However, in some situations it is necessary for these interlocks to be bypassed. If bypassed, every precaution must be taken to prevent accidental crane lateral motion that could damage the fuel assembly, core component or gripper mast.

b. Movements while inserting a fuel assembly into a spent fuel storage cell, new fuel elevator, upender or RCCF should be avoided unless absolutely necessary and are specifically authorized by the refueling SRO.

5.3.3 The following Speed limits apply and shall be observed:

a. When lifting or lowering a fuel assembly with the refueling machine under normal conditions, use jog speed (or slower, using the hoist master switch) when any portion of the fuel assembly is in the core and adjacent to another fuel assembly or core structure.

b. When indications of large load variations or other similar difficulties occur, hoist speed should be reduced to less than jog speed (3 ft/min) using the hoist master switch.

5.3.4 The following Load limits apply and shall be observed:

a. During the movements of fuel assemblies into or out of the core, a nominal load fluctuation of less than 100 lbs should be maintained if possible.

b. During the movement of fuel assemblies in the FHB, a nominal load fluctuation of less than 100 lbs should be maintained if possible.

c. When the manipulator crane has raised the assembly approximately six inches from the bottom of the upender, adjust the null meter to zero.

d. The maximum load fluctuation (rapid) shall be maintained less than 250 lbs. This requires careful observation of load cells on the spent fuel pool and manipulator cranes. If this limit is reached, the fuel must be inspected for possible damage.

5.3.5 Miscellaneous Precautions

a. If a fuel assembly being lowered is bowed or out of plumb such that the bottom nozzle is off the core location when the crane is indexed, or if the top of an adjacent assembly is violating the space for an assembly being lowered, it may be necessary to move the crane off index to permit entry into the core. The crane movement may be accomplished with manual rotation of the drive shaft or jogging the controls. Appendix 1 of Reference 7.1 provides guidance for off-index operations.

b. Free standing fuel assemblies during core loading and refueling operations are to be avoided. If a fuel assembly is set aside in the vessel temporarily, it should be placed in a corner baffle location if possible. (Refer to Step 5.7.5.) Positive verification of correct seating on the core plate pins must precede unlatching the assembly. (See unlatching instructions.)

c. If a lowered fuel assembly will not engage the lower core plate guide pins, use a fuel assembly loading guide or remove the assembly to an acceptable temporary location until the loading sequence creates a "box" by inserting assemblies at the surrounding locations.

d. If manual manipulation of hoist cables is to be used to aid in seating assemblies, ensure that the cables are not suddenly released (i.e., no snapping). Sharp impacts may cause bottom nozzle damage.

e. If the bottom of an assembly to be inserted into the core is out of position, move the manipulator crane laterally by manual methods to position the bottom nozzle. Then, prior to unlatching the assembly, the manipulator crane should be moved back to the index position manually or by using the inching motors.

f. Near the end of the reload sequence when an open water baffle position no longer exists in the core, do not lift a fuel assembly from the spent fuel pool until the previous assembly is unlatched in the core. This allows for an open location in the upender in which to quickly place an assembly should the need arise.

5.4 INSTRUMENTATION

5.4.1 Two Source Range detector channels shall provide continuous visual indication in the Control Room. Audible monitoring shall be provided in both the containment and Control Room by one of the two source range detectors. Should either N51 or N52 be used, it shall be powered by a different vital power supply than the other operable source range and be continuously displayed via the PPC in the Control Room.

5.4.2 The High Flux at Shutdown Alarm shall be in the "normal" setting for each source range channel and be capable of alarming in the Control Room (PK03-07). However, the alarm is allowed to be blocked temporarily after the start of core loading and must be reinstated upon placing the source assemblies in their final core locations.

5.4.3 The steel tape provided on the manipulator crane for monitoring elevation changes should be marked to indicate the fuel full down position and the core entry position. Markings should also be provided 10 inches above full down position and 10 inches above the top of seated fuel assemblies to warn operators of approaching critical locations.

5.4.4 The manipulator crane load cell overload trip should be checked using the first assembly containing a RCCA. The underload trip should be checked using an assembly without an insert.

5.4.5 After completion of loading a source into its final core location, a minimum count rate of one-half count per second (above background), is required on at least one source range channel at all times during subsequent core loading.

5.4.6 If, after loading the secondary source assemblies into their final locations the signal-to-noise ratio is less than two (2), then have the PPE (Nuclear), SRO and TM Supervisor evaluate the situation. Loading may not continue unless at least two of the source range detector channels are considered to provide proper indication.

5.4.7 A fuel assembly shall not be unlatched from the manipulator crane until the PPE (Nuclear) who is monitoring the count rate has given his approval to unlatch after verification that the new count rate is satisfactory. Additionally, positive verification of proper seating on the lower core plate pins is required including slack cable and proper Z-Z tape indication. (See unlatching instructions.)

5.5 PERSONNEL

5.5.1 The minimum fuel handling crew complement shall be:

a. Containment

1. An SRO with no other concurrent duties for overall fuel handling operations.

2. Two knowledgeable individuals, at least one of whom is an experienced crane operator for fuel handling.

b. Fuel Handling Building

1. Two knowledgeable individuals, at least one of whom is an experienced crane operator for fuel handling.

2. PPE (Nuclear) or designated inspector when fuel inspections are being done concurrently.

c. Control Room

1. A licensed R.O.

2. One or more PPE (Nuclear) for technical guidance and ICRR plots during core loading or incore fuel shuffle operations.

5.5.2 As given in Step 3.2, the Refueling SRO is responsible for ALL fuel handling operations and compliance with applicable procedures. Any difficulties or problems during the core loading evolution must be reported immediately to the Refueling SRO and the Control Room.

5.6 FUEL HANDLING BUILDING (FHB)

5.6.1 SFP radiation monitor RM-58 has two setpoints, high (FHB evacuation alarm) and low (local). In the event of a local alarm, personnel should move to a low radiation area while awaiting instructions and radiation survey results from the RP technician.

5.6.2 In the event of a FHB evacuation alarm:

- Place the fuel assembly or load being handled in a safe location (fuel assemblies should be placed in a storage rack, or in the upender and the upender lowered).
- Evacuate personnel to Access Control and request the Control Room to make a PA announcement to evacuate the FHB. Refer to AR PK11-10 and Tech Spec Table 3.3-6 for more information on this alarm.

5.6.3 During the core loading, the SFP crane operator shall periodically check that the mark on the spent fuel handling tool is above the top of the SFP crane railing, when the hoist is in the full up position. This check is to ensure fuel assemblies will clear the top of the upender basket.

5.6.4 Problems with the SFP crane shall be brought to the attention of the Refueling SRO and the PPE (Nuclear).

5.7 CRITICALITY/ICRR

5.7.1 Because of criticality considerations, do not place any fuel assembly in Region II (nonboraflex) high density fuel racks unless specifically authorized by a plant procedure or SNM custodian. Observe "cells not to be used for fuel" identified on spent fuel rack maps.

5.7.2 The first assemblies loaded on each side should be the source assemblies with their initial location adjacent to an installed source range detector. The source assemblies shall occupy core location G-1 or J-1 (N-31), G-15 or J-15 (N-32), R-7 or R-9 (N-51), or A-7 or A-9 (N-52). These locations are permissible until the source assembly is moved to its final location.

5.7.3 When moving a source assembly to its final location, only one open location shall be permitted to exist between the source assembly and its corresponding detector. If an open location exists, it shall be filled before any additional assemblies are added to the core configuration.

5.7.4 The core configuration shall always satisfy the shutdown margin requirement, K_{eff} less than or equal to 0.95. This is satisfied by lowering each fuel assembly into its final core location, or an uncoupled location (the DISCUSSION section clarifies when nuclear coupling occurs), or other analyzed location.

5.7.5 Temporary storage of an assembly or assemblies in baffle locations is permissible as long as no stored assembly is face-adjacent to any other stored assembly and there is at least one open location between the core assemblies and all inward faces and corners of the stored assembly.

NOTE: When temporary locations are required while loading the last assemblies, meeting these restrictions may be impossible. In this case, assemblies must be returned to the Spent Fuel Pool (SFP) unless additional analyses are done to ensure sufficient shutdown margin.

5.7.6 Methods for forming a box to load a fuel assembly.

a. Use a fuel assembly loading guide to form the box.

b. All assemblies within the box are in their final locations.

c. The dummy fuel assembly can be used to form the box.

5.7.7 Criticality is indicated when the inverse count rate ratio (ICRR) approaches zero, and if the straight line determined by the last two ICRRs for a responding detector indicates that criticality could occur if the next twelve (12) or less fuel assemblies are loaded. Such a situation shall be evaluated by the PPE (Nuclear) and SRO prior to loading additional fuel assemblies. This criterion shall apply only after the first thirteen (13) fuel assemblies have been loaded next to the applicable detector.

5.7.8 Should the loading operation be interrupted for a period of four (4) hours or more, take new count rate data for each detector and compare it with the last ICRR performed. If the more recent average count rate data deviates by more than 20% from the former data, the last loading step ICRR calculation will be repeated using the new count rate data.

6. INSTRUCTIONS

6.1 At the start of each refueling shift:

6.1.1 The Refueling SRO shall establish or verify communication with operators, observers and the Control Room and verify that all requirements of STP I-1A are being met for MODE 6 operation and core alterations.

6.1.2 There shall be briefings for personnel in containment and the FHB, which will include actions to take in the event of a radiation monitor alarm, including P.A. announcements and evacuation instructions. These briefings may be conducted on-station.

6.2 Daily, the Control Operator should record RHR pump discharge temperature and boron concentration on the Control Operator's Log. Monitor for trends requiring rebaselining of source range detectors.

6.3 Prior to fuel loading, perform a visual inspection of the lower core plate for debris.

6.4 Center the spent fuel tool over the desired SFP location and obtain an independent check of the correct location as specified in the core loading sequence.

6.5 Latch and raise the fuel assembly off the bottom. Verify a load increase and transfer the assembly to the desired location.

6.5.1 Monitor the SFP crane load cell carefully while lifting an element from the SFP storage racks or while lowering it into the upender.

6.5.2 After unlatching, verify the load cell reading does not increase during hoisting of the fuel tool.

6.6 Center the manipulator crane over the upender and latch onto the fuel assembly. While observing the Dillon meter, raise the fuel assembly about six inches above the upender bottom and verify a load increase. Zero out the null meter.

6.6.1 Reset the overload or underload trip setpoints as necessary per Attachments 9.4 and 9.5. Refer to Precaution in Step 5.1.5.

6.7 Raise the fuel assembly to the "hoist up" position within the manipulator crane, closely observing the load readings.

6.8 Transfer the fuel assembly to over the desired core location, positioning the manipulator approximately 2 inches off index toward open water or as necessary.

6.8.1 If access to open water does not exist, lower the fuel assembly using jog speed (or slower, using the hoist master switch) while within the core area.

6.9 During insertion of a fuel assembly into the core, at least one source range detector shall be monitored audibly continuously in both containment and the Control Room and visually in the Control Room for unexpected behavior by observing its response, including the strip chart (NR-45) recorder.

NOTE: When loading the source assembly, "bugging" the source range detector is necessary to ensure operability.

6.10 Once source range detectors have been "bugged," block the High Flux at Shutdown Alarm. This alarm must be unblocked after each source assembly is moved into its final location. (The alarm should clear at that time.)

6.11 During axial movements of fuel assemblies into or out of the core, an observer shall be positioned to permit unobstructed viewing and inspection. Observers should be positioned on opposite sides of the core such that each observer can monitor two sides of an assembly. Each should be equipped with binoculars for closer viewing.

6.12 Follow the guidelines below to prevent grid strap damage. Monitor the load cell on the manipulator crane carefully.

6.12.1 When there are vacancies on adjacent sides of the loading location:

a. Position the manipulator crane off index in both directions 2 or more inches (at least ¼ cell).

b. Lower the fuel assembly and when clearance is confirmed, proceed at as fast a speed as desired until about 6 inches above the lower core plate.

c. Manually or with inching motors reposition the manipulator and fuel assembly laterally until on index.

d. Lower the fuel assembly the remaining distance at "jog" speed.

6.13 If load limits are reached during insertion, complete this step. If not, then go to the next step.

6.13.1 If a rapid load fluctuation of greater than 100 lbs is experienced, (except when movement is just started or the assembly is resting on its bottom nozzle), loading shall be stopped. The following actions may be taken under the Refueling SRO's direction:

a. Reverse the direction of movement approximately 2 inches (i.e., raise the assembly).

b. Adjust the lateral crane position manually or with inching motors to re-center the suspended fuel assembly relative to any equipment, the surrounding assemblies or within the reference core position as applicable.

c. If a. and b. produced a load correction, proceed with movement. If not, repeat a and b; if not corrected then the SRO shall evaluate.

6.13.2 If a rapid load change in excess of 250 lbs should occur on the fuel assembly, the assembly shall be examined for damage before proceeding. In the case where overload occurs on lifting of a fuel assembly, this may require setting the assembly back in position and removal of adjacent assemblies to preclude exceeding of load limits. The surrounding assemblies also should be examined and dispositioned appropriately.

6.14 Changes to the core loading sequence may be required:

6.14.1 If steps are performed out of sequence, enter the actual step number on the tracking sheet.

6.14.2 If other deviations from the core loading sequence are necessary (e.g., change of location), complete the following steps:

a. Assign a consecutive deviation number (i.e., 1, 2, 3...) and log it in the designated space on the sequence table for that planned step.

b. On a Fuel Movement Deviation Sheet, fill in the new step information including deviation number, fuel assembly number, actual step number, to and from location information. The PPE (Nuclear) and SRO must approve the deviation. Communicate the necessary deviation information to the other stations, then complete the move.

c. Continue with subsequent loading steps until a deviation step can be completed moving the affected fuel assembly to the original planned "To" location.

d. When the assembly can be moved, fill in the new step information on the Fuel Movement Deviation Sheet as done previously. The actual step number in this case will be a substep of the most recent completed move (e.g., 2B, 2C) and will be determined by the number of intermediate steps the assembly has been moved.

e. Attach the completed Fuel Movement Deviation Sheet(s) to the procedure.

6.15 Unlatching Instructions:

6.15.1 Unlatching of the fuel assembly in the core will be accomplished only AFTER the following conditions are met:

a. The PPE (Nuclear) monitoring count rate data observes no unexpected or unusual increase in count rate.

b. The Z-Z tape is indicating the assembly is fully inserted in the core.

c. The slack cable indication is received.

d. Positive visual verification is made of proper seating on the lower core plate alignment pins. Use additional drop lights and/or underwater camera, as necessary.

e. Independent check of correct core location, as specified in the core loading sequence, is performed.

6.15.2 After unlatching, verify the load cell reading does not increase during hoisting of the gripper assembly. Actively observe the fuel assembly and mast for any abnormal lateral movement during disengagement. Correct any off index problems.

NOTE: For ICRR tracking purposes, the data sheets in this procedure (Attachments 9.1 to 9.3) or the "ICRR" Code (Reference 7.4) or the PPC may be used.

6.16 Following the addition of an activated source determine and record baseline count rates for the nearest detector. Ensure that the detector count rate increases, or suspend operations pending resolution by the Refueling SRO and PPE (Nuclear).

6.17 For each source range or temporary channel, calculate and record the ICRR following each additional fuel assembly loaded. Maintain at least a continuous plot. A calculated prediction of critical assemblies may be performed but is not required until after the first thirteen (13) fuel assemblies have been loaded adjacent to a detector.

NOTE: When background is less than 1% of average or baseline count rate in a given detector, background may be ignored for that detector.

6.18 Establish and record new baseline count rate(s) for the following:

6.18.1 For the affected detector(s), following the relocation of a source. No new ICRRs need to be calculated until the next additional assembly is loaded.

6.18.2 Establish new baseline count rates for all detectors following changes in boron concentration in excess of 50 ppm from nominal or RCS temperature in excess of 20°F.

NOTE: If there is an unexplained change from previous data, evaluation by the SRO and PPE (Nuclear) is required.

6.18.3 For a given source range or temporary detector channel following any movement of the channel's detector. No new ICRR needs to be calculated until the next additional assembly is loaded.

6.19 If the ICRR drops below 0.2 (i.e., due to detector or source relocation), renormalize that detector to an ICRR of 1.0 by setting its new baseline equal to the average count rate.

6.20 If the ICRR rises above 1.0 for any detector, renormalize that detector to an ICRR of 1.0 by setting its new baseline equal to the average count rate.

6.21 If, after loading the secondary source assemblies in their final location, fewer than ½ counts per second above background are obtained on the plant source range channel nearest the source assembly, the PPE (Nuclear), SRO, and TM Supervisor will evaluate the situation. Consideration may be given to corrective maintenance of the source range channel, including detector replacement. Loading may not continue unless at least two of the available nuclear channels reads at least ½ counts per second above background (for N31 or N32) or has a signal-to-noise ratio of at least 2 (for N51 or N52).

6.22 After loading the first thirteen (13) assemblies adjacent to a detector, if the ICRR monitoring for any responding channel indicates that criticality could occur if the next twelve elements are loaded, the following steps can be used to confirm the validity of the prediction:

6.22.1 Withdraw the last two assemblies loaded, while monitoring the count rates.

6.22.2 Increase the reactor coolant boron concentration by approximately 80 ppm and monitor the count rate during boration.

6.22.3 Recalculate the baseline count rate at the new boron concentration.

6.22.4 Reinsert the two assemblies, noting the count rate after each insertion.

6.22.5 If the inverse count rate ratio is appreciably more than that measured previously, it must be assumed that a true core multiplication had taken place. The procedure must be analyzed and appropriate changes made in the procedure such that criticality will not occur.

6.23 Update the fuel status boards as necessary in the Control Room, containment and Fuel Handling Building.

NOTE: The containment fuel status board is optional (per TS6.ID2). The FHB fuel status board is for information only and should be updated at least once per shift.

6.24 Repeat Steps (6.4 - 6.23) above as necessary for each fuel assembly to be loaded into the core.

6.25 Perform a fuel accountability audit and a foreign materials scan at the completion of core loading, prior to placement of upper internals. This will consist of either producing a video tape of the core and review for foreign objects, coupled with a verification of proper loading from the tape, or visual (camera and monitor) verification with two signatures to document the inspection. Inspect and verify the nozzle-to-nozzle and nozzle-to-baffle clearances.

6.26 Return the dummy fuel assembly to the SFP.

6.27 Restore SFP heat exchanger flows to pre-offload conditions, or per SFM:

- CCW flow less than 3000 gpm.
- SFP pump flow within pump STP or round sheet limits.

7. REFERENCES

7.1 Instructions Precautions and Limitations for Handling New and Partially Spent Fuel Assemblies, W Specification F-5, Rev. 14, 2/28/92.

7.2 Unit 1 Initial Core Loading, W Procedure PG&E-SU-6.1

7.3 Diablo Canyon Unit 1 or 2, Nuclear Design Report, for applicable unit and current cycle.

7.4 Program "ICRR," DPP-PC-3.

7.5 OP B-8G, "Fuel Handling Operating Instructions."

7.6 Westinghouse Letter 90PGE-G-0014, January 29, 1990, Information for Subcriticality During Core Reloading, and January 18, 1990, Subcriticality and Core Coupling Guidelines for Core Loading.

7.7 Westinghouse letter 90PGE-G-0019, February 8, 1990, "Response on Core Reloading Guidelines."

7.8 OP L-6, "Refueling."

7.9 OP1.DC37, "Operator Logs."

7.10 STP I-1A, "Routine Shift Checks Required by Licenses."

7.11 SREF 93-062.

7.12 Nonconformance Report Commitments:

7.12.1 NCR DC0-90-TN-N021; (para 5.6.1, 6.1.2).

7.12.2 NCR DC2-90-TN-N046; (para 5.6.2, 5.6.3).

7.13 OP AP-21, "Irradiated Fuel Damage."

7.14 OP B-7:IX, "Refueling Door to SFP Door Operations."

7.15 OP1.DC12, "Conduct of Routine Operations."

7.16 TS6.ID2, "Control and Accountability of Special Nuclear Material."

8. RECORDS

8.1 All plots and data sheets should be maintained current.

8.2 All fuel status boards should be maintained current, in accordance with TS6.ID2.

8.3 All fuel movements shall be recorded in the Control Operator's Log. The refueling stations shall record all applicable moves at their locations in each respective sequence tables.

8.4 The final core loading records will include a videotape of the top nozzles of the fuel in the core and a map or table made visually from the tape or visual verification, with two signatures.

8.5 Count rate data sheets and plots may be produced manually or by computer.

8.6 All completed refueling station sequence tables, videotapes, data sheets and plots should be forwarded to the SPPE (Reactor Engineering) upon completion.

8.7 All applicable Special Nuclear Material Accountability Records shall be updated.

9. ATTACHMENTS

9.1 Form 69-11825-1, "Loading Step Inverse Count Rate Ratio Calculation-Data Sheet 1," 08/91

9.2 Form 69-11825-2, "Detector Baseline Calculation - Data Sheet 2 ," 08/91

9.3 Form 69-11825-3, "Detector Inverse Count Rate Ratio Status Sheet- Data Sheet 3," 10/07/94

9.4 "Manipulator Overload Setpoint - Data Sheet 4," 09/04/97

9.5 "Manipulator Underload Setpoint - Data Sheet 5," 09/04/97

NOTE: Reactor Engineering will provide the actual Fuel Movement Tracking and Deviation Sheets.

9.6 "Fuel Movement Tracking Sheet (Typical)," 01/07/95

9.7 "Fuel Movement Deviation Sheet (Typical)," 01/07/95

10. SPONSOR

D. Farrer

DIABLO CANYON POWER PLANT
OP B-8DS2

1 AND 2

TITLE: LOADING STEP INVERSE COUNT RATE RATIO CALCULATION-DATA SHEET 1

DATE _____	STEP _____	FROM SFP _____	TO CORE _____
TIME _____	ASSEMBLY # ___	WT (sec) _____	

DETECTOR	COUNT RATE (CPS)	AVG. COUNT RATE (CPS)	AVG. COUNT RATE** - (BACKGROUND)	BASE COUNT RATE -(BACKGROUND) + **	ICRR*
A					
B					
C					
N-31					
N-32					

HIGH FLUX AT SHUTDOWN SETPOINT	N-31		N-32	

REMARKS: _____

$$*ICRR_i = \text{Inverse Count Rate Ratio Detector i} = \frac{(\text{Base CPS}) - (\text{Background}) \mid \text{detector i}}{(\text{Avg. CPS}) - (\text{Background}) \mid \text{detector i}}$$

\+ Movement of source or detector requires redefinition of Base CPS (Data Sh. 2)

** When background is less than 1% of average or baseline (base) count rate, background may be ignored for that detector.

PERFORMED BY (SFM/PPE): _____ / _____
DATE

REVIEWED BY (PPE): _____ / _____
DATE

DIABLO CANYON POWER PLANT
OP B-8DS2

1 AND 2

TITLE: DETECTOR BASELINE CALCULATION - DATA SHEET 2

DATE _____ STEP _____ DETECTOR _____
TIME _____ MOVEMENT OF: SOURCE ____, DETECTOR _____
INITIAL POSITION _____ FINAL POSITION _____

Δt (sec)			
	COUNT RATE (CPS)	AVERAGE COUNT RATE (CPS)	AVG. COUNT ** - (BACKGROUND) (CPS)
INITIAL POSITION	_____ _____ _____	_____	_____
FINAL POSITION	_____ _____ _____	_____	_____

** When background is less than 1% of average or baseline count rate, background may be ignored for that detector.

$$N = \frac{[(\text{Avg. CPS}) - (\text{Background})]^{**}\ \text{Final Position}}{[(\text{Avg. CPS}) - (\text{Background})]^{**}\ \text{Initial Position}}$$

N = [_____] / [ ] = _____

New Base CPS = (Background)** + ((N) x (Old Base CPS - Background))**
(Final Position) (Initial Position)

New Base CPS = ( ) + (( ) x ( )) = _____

REMARKS: _____

_____

	Yes	No
Was the High Flux at shutdown alarm setpoint changed?	[ ]	[ ]

Setpoint value if changed _____ CPS.

PERFORMED BY (SFM/PPE): _____ / _____
DATE

REVIEWED BY (PPE): _____ / _____
DATE

DIABLO CANYON POWER PLANT
OP B-8DS2

1 AND 2

TITLE: DETECTOR INVERSE COUNT RATE RATIO STATUS SHEET- DATA SHEET 3

DETECTOR _____ *HI FLUX AT S/D SETPOINT _____ CPS

STEP NUMBER (n)	C_b ** BACKGROUND COUNT RATE (CPS)	C_o #BASELINE COUNT RATE (CPS)	C_i DETECTOR AVG. COUNT RATE (CPS)	ICRR** $\frac{C_o - C_b}{C_i - C_b}$	REMARKS

Movement of a source or detector requires redefinition of the baseline count rate by Data Sheet 2.

* If changed, indicate new setpoint in "REMARKS."

** When background is less than 1% of average or baseline count rate, background may be ignored.

PERFORMED BY: _____ / _____
DATE

REVIEWED BY: _____ / _____
(PPE) DATE

DIABLO CANYON POWER PLANT
OP B-8DS2
ATTACHMENT 9.4

1 AND 2

TITLE: MANIPULATOR OVERLOAD SETPOINT - DATA SHEET 4

The following procedure steps for setting or verifying the Manipulator OVERLOAD trip setpoint should be done using a fuel assembly containing an RCCA:

1. Raise the fuel assembly about 12 inches above upender bottom, (equivalent to the top-of-core slow zone).
2. Lower the fuel assembly about 6 inches.
3. Record the hanging weight from the Dillon Meter.

   _____ lbs

4. Add 150* lbs. to the value from Step 3 and using the tare adjust, increase the meter reading to the new weight. Record the weight from the Dillon Meter.

   _____ lbs

5. Lower the Overload Trip Setpoint using the potentiometer (fourth from the left) until the overload light just comes on.
6. Lower on the tare adjust until the overload light goes out (should be about 30 lbs less than Step 4). Record the weight from the Dillon Meter.

   _____ lbs

7. Return the Dillon Meter reading to the original value recorded in Step 3 using the tare adjust.

* Add as much as an additional 50 lbs ONLY if necessary. The overload setpoint is not to exceed 200 lbs above the hanging weight.

PERFORMED BY: _____ / _____
DATE

REVIEWED BY: _____ / _____
PPE (Nuclear) DATE

DIABLO CANYON POWER PLANT
OP B-8DS2
ATTACHMENT 9.5

1 AND 2

TITLE: MANIPULATOR UNDERLOAD SETPOINT - DATA SHEET 5

The following procedure steps for setting or verifying the Manipulator UNDERLOAD cutout setpoint should be done using a fuel assembly without an insert:

NOTE: Prior to recording the weight in Step 2, prior to repeating Step 4 when necessary, and prior to returning the meter to the original value (Step 5), insure that the last movement of the hoist was in the up direction. This will insure consistency of any hysteresis effects.

1. Raise the fuel assembly about 6 inches above the upender bottom (approximately the top of the core slow zone).

2. Record the hanging weight from the Dillon Meter.

   _____ lbs

3. Lower the Dillon Meter indication to about 1600 lbs using the tare adjust.

4. While attempting to lower the hoist, increase the meter reading with the tare adjust and note the value at which hoist movement begins. This value should be 200 lbs less than the amount recorded in Step 2. If not, use the UNDERLOAD potentiometer (third from the left) and adjust the setpoint. Repeat this step until properly set. Record the final value below.

   _____ lbs

5. Return the Dillon Meter reading to the original value recorded in Step 2 using the tare adjust.

PERFORMED BY: _____ / _____
DATE

REVIEWED BY: _____ / _____
PPE (Nuclear) DATE

DIABLO CANYON POWER PLANT
OP B-8DS2
ATTACHMENT 9.6

1 AND 2

TITLE: FUEL MOVEMENT TRACKING SHEET (TYPICAL)

DIABLO CANYON POWER PLANT
FUEL MOVEMENT TRACKING SHEET

UNIT ____ NEXT CYCLE ____ PAGE ____ OF ____

LEGEND:
CORE LOC.: - REACTOR CORE LOCATION
SFP LOC. - SPENT FUEL POOL LOCATION
UP END - UPENDER

* ACTUAL STEP NO. USUALLY TOTAL ASSYS INTO OR OUT OF CORE

ACTUAL STEP NO.*	PLAN STEP NO.	FUEL ASSY.	INSERT	FROM				TIME	TO				DEV. NO.	TIME	INIT	COMMENTS
				CORE LOC.	SFP LOC	UP END	OTHER		CORE LOC	SFP LOC	UP END	OTHER				DATE:

DIABLO CANYON POWER PLANT
OP B-8DS2
ATTACHMENT 9.7

1 AND 2

TITLE: FUEL MOVEMENT DEVIATION SHEET (TYPICAL)

DIABLO CANYON POWER PLANT
FUEL MOVEMENT DEVIATION SHEET

UNIT ____ NEXT CYCLE ____ PAGE ____ OF ____

LEGEND:
CORE LOC. - REACTOR CORE LOCATION
SFP LOC. - SPENT FUEL POOL LOCATION
UP END - UPENDER

* ACTUAL STEP NO. USUALLY TOTAL ASSYS INTO OR OUT OF CORE

DEV NO.	ACTUAL STEP NO.*	FUEL ASSY.	INSERT	FROM				TIME	TO				DATE	INIT	APPROVALS PPE/SRO
				CORE LOC.	SFP LOC	UP END	OTHER		CORE LOC	SFP LOC	UP END	OTHER	TIME		
															/
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