1-14-94 | 94-01

FORM APPROVED BY VICE PRESIDENT – MILLSTONE STATION | EFFECTIVE DATE | SORC MTG. NO.

PLANT INFORMATION REPORT – PART A INITIATION

Report No.: 3-94-019 (Unit Year Number)

I. PIR INITIATION (To be completed by Responsible Supervisor) EVENT DATE: 27 APR 94 EVENT TIME: 0950 REPORT DATE: 27APR94

Event Title: Fuel Misplacement

Description of Event: Fuel assembly moved to wrong location and momentarily placed on another fuel assembly

Description of Suspected Cause: (If Known) Human Error

Personnel Questionnaires Attached: (Part B) ☒ Yes ☐ No | Material Being Held: ☐ Yes ☐ No | Location:

System Affected: SFP Cont Fuel Bldg | System Number: 3303 | PMMS ID Number: | Signature: [signature] | Date: 4-27-94

II. PLANT INFORMATION (To be completed by SS)

Plant Conditions: Mode: 1 Power(%): 100% Temp.: 587°F Pressure: 2255 psig

Description of Initial Action: Fuel movement was stopped

Safety Implications: NA

Security Implications: NA

Event Category:
☐ A. Immediate ☐ B. 30-Day LER ☐ C. Public Interest
☒ D. Not reportable to NRC ☐ E. Fitness for Duty ☐ F. Preliminary/Potential LER

Basis (Not Required for D):

Duty Officer Notified: Name: J. Rutter Date: 4/27/94 Time: 1605

Operations Manager Notified (Normal Hours) of A,B,C Events: ☒ Yes ☐ No Name: J. Rutter Date: 4/27/94 Time: 1605

SSSA Notified and EPIP 4400 Notification Made: ☐ Yes ☒ No Name: Date: Time:

Security Shift Supervisor (Potential Security Threat): ☐ Yes ☒ No Name: Date: Time:

Procedures Used: ACP-QA-10.01 | Shift Supervisor Signature: [signature] | Date: 4/27/94

III. DUTY OFFICER REVIEW

Reportability Verified ☒ Yes ☐ No | Recommend Immediate Closure of PIR ☐ Yes ☒ No

Immediate Investigation Required ☒ Yes ☐ No | Investigator Assigned: R. Engg & McDaniel

(Required for Emergency Plan Activation, Unplanned RPS/ESF Actuation, Reportable Oil/Chemical Spill, Serious Injury/Fatality)

Duty Officer Signature: [signature] Date: 4/27/94

IV. UNIT DIRECTOR REVIEW NEO 2.25 Initiated: ☐ Yes ☒ No

Reportability Verified: ☒ Yes ☐ No _____ to evaluate ☐ Reportability ☐ Operability

PORC Review: ☒ Yes ☐ No (Required for Tech Spec violations, reportable events, PSSH) | Close PIR without Phase I Investigation ☐

SORC Review: ☒ Yes ☐ No (Required for RPS/ESF Actuation and Common Site Technical Specification Violations) | NRB Review: ☐ Yes ☒ No

Investigator Assigned: ENG/Goerber | Unit Director Signature: [signature] Date: 4/28/94

Root Cause Evaluation Required ☒ Yes ☐ No

V. INVESTIGATION INFORMATION (To be completed by Investigator)

Trouble Reports Submitted: ☐ Yes ☒ No | Procedure Changes: YES - See PIR Phase 2&3

Photographs: ☐ Yes ☒ No | Material Being Held: ☐ Yes ☒ No Location:

AWO Copy Attached: ☐ Yes ☒ No | Safety Tag Sheet Copy Attached: ☐ Yes ☒ No

Investigator Signature: [signature] Date: 7-30-94

PLANT INFORMATION REPORT – PART B Report No. 3-94-79
PERSONNEL QUESTIONNAIRE

NAME Butch Bort (PRINT) POSITION Engineer

PLANT EVENT TITLE Fuel Misplacement

EVENT DATE/TIME 27APR94 / 0850

PIR NUMBER (IF KNOWN) 3-94-79

1. Describe the event:
See attachment

2. When did you know there was a problem, and how did you find out?
When the PED attempted to lower the fuel assembly into the cell and the hoist stopped.

3. What were your actions?
See attachment

4. What could be done or changed to prevent this problem from happening again?
① Rig an underwater light from Bridge Crane to illuminate those racks. ② Continue to check MTF vs. map prior to lowering fuel assembly ③ Minimize conversations on the Bridge. ④ Dual verification of fuel movement

5. Any other information you consider important:
I have allowed myself to get overextended with too many ~~other~~ projects: Blackness Testing preps, BTRS resurrection, Mode Ø Alternate Cooling. Also I've been up since 0130. I came into work 0500

Signature 27APR94 Date 1150 Time

PIR # 3-94-079

PIR PART B
PERSONNEL QUESTIONNAIRE

NAME: Butch Bornt POSITON: Engineer

Description of Event

We were moving fuel in preparation for Blackness testing scheduled for 09-20 May 1994. Three people were on the Bridge Crane: Jeff Cote (PEO operating Bridge Crane), Tom Cummins (HP Tech), and myself. I was supervising the evolution.

I was using a copy of the SFP Map with the Materials Transfer Form (MTF) to keep track of each move. Prior to each move, I was comparing the map and MTF with each other to ensure we were moving the correct fuel assembly from the correct cell to the new cell. After each move I was crossing out the cells. Prior to inserting the fuel assembly, I visually checked to verify that the cell was empty.

We had completed move 48 on MTF # 3-94-005 (F/A B39 from cell AA-30 to Y-41). I was holding a conversation with Tom concerning Mode 0 Alternate Fuel Pool Cooling. I forgot to cross out the cell we had just loaded. We then commenced move 49 on MTF 3-94-005, which was supposed to be F/A C08 from cell AA-29 to cell X-44. I mistakenly told the PEO to go to cell Y-41 and forgot to cross-check the MTF and the map. We moved over cell Y-41 and I visually checked to verify that the cell was empty. However, due to the poor lighting in that area I did not see the fuel assembly. The PEO also checked, but he apparently did not see it either.

The PEO lowered the fuel assembly, and the hoist stopped. We raised the fuel assembly, moved it away, and visually inspected the cell again. I also double checked the MTF and the map, and then discovered my error. The time was approximately 0850.

We resumed fuel movement, and I took the following corrective actions:

- I reviewed STAR principles, and reminded myself that this activity is a prime candidate - repetitive, monotonous, etc.
- Focussing more intently on the task at hand
- I stopped talking with all personnel on the Bridge, except to give directions to the PEO;
- I resumed double checking the map and the MTF, but twice each move - prior to picking up an assembly and prior to moving to its destination.

I now realize that we should have halted fuel movement and notified the Shift Supervisor when the misplacement occurred.

We halted fuel movement at approximately 1000. I called my supervisor and left a message. I then went up to the Control Room and informed the Shift Supervisor. The Operations Department Manager halted all fuel movement until further notice.

PLANT INFORMATION REPORT – PART B Report No. 3-94-79
PERSONNEL QUESTIONNAIRE

NAME Tom Cummins (PRINT) POSITION H.P. Tech

PLANT EVENT TITLE Fuel Misplacement

EVENT DATE/TIME 4.27.94 0850

PIR NUMBER (IF KNOWN) 3-94-79

1. Describe the event:
The PEO (Jeff Cote) attempted to lower a fuel assembly into a cell when the crane stopped. He raised the assembly and looked in the cell. By this time R. Burnt had rechecked his paper work and realized this cell had an assembly in

2. When did you know there was a problem, and how did you find out?
Almost immediately because I was on the bridge with the work group.

3. What were your actions?
Basically to stand back while the Reactor engineer and PEO discussed the error.

4. What could be done or changed to prevent this problem from happening again?
In my opinion the lighting was poor and the paper work/accountability could be improved.

5. Any other information you consider important:
During this evolution I was taking a Tritium and particulate air sample. The general area radition levels were 0.5mr/hr.

Tom Cummins — Signature
4.27.94 — Date
1230 — Time

PLANT INFORMATION REPORT – PART B Report No. 3-94-079
PERSONNEL QUESTIONNAIRE

NAME J. Cote POSITION Plant Equipment Operator

(PRINT)

PLANT EVENT TITLE ~~Placed fuel assembly on another assembly~~ Fuel Misplacement 4/27/94

EVENT DATE/TIME 4/27/94

PIR NUMBER (IF KNOWN) 3-94-79

1. Describe the event:
I picked up one fuel assembly by the engineer's direction, then went to place the assembly into the fuel pool location specified by the engineer. When I went to insert the assembly, it would(over)

2. When did you know there was a problem, and how did you find out?
When I knew the bottom of the assembly was inside the fuel rack, and it wouldn't go down any further.

3. What were your actions?
I raised the assembly and moved it away from the location, under direction of the engineer. He looked at his paperwork and found that he gave me a wrong grid location in the fuel pool. Then, he directed me to the proper location of the fuel assembly.

4. What could be done or changed to prevent this problem from happening again?
Provide lighting from under the spent fuel pool bridge in order to be able to see if there is an assembly in any location in the pool. The only lights available are on the pool walls and the location I was going to was in the corner of the fuel rack furthest from the wall.

5. Any other information you consider important:
The engineer should have a better way of keeping track of the fuel assemblies.

Signature 4/27/94 Date 1102 Time

PLANT INFORMATION REPORT – PART C Report No. 3-94-079
PHASE I INVESTIGATION

Similar PIRs: (Within last 12 months) List or attach list.
NONE - 1 PIR on Unit 1 in 1991 (Roman numeral lettering on Racks)
1 PIR in 1991 on Unit 3 (3-91-065)
1 Similar Work observation problem in 1993

Open PM/CMs: List or attach list.
ADJUSTMENT OF DIGITAL READOUT.

Recent Work History: (Within last 6 months) List or attach list.
RFO4 FUEL MOVEMENT IN AUG + SEPT 1993
PREPS FOR BORAFLEX TESTING IN FEB + MARCH OF 1994

Pending Design Changes: List or attach list.
NONE.

Other Pertinent Information:
1. No stop work order given or notification to Supervisor-
2. Lighting was poor in this rack section, some confusion maybe created by the number of procedures in use (4) plant + 1 ACP.

Trends Identified: ☐ Yes ☑ No
Fuel Restart Requirements - 1. Better lighting, 2. Procedure review, preparation of job briefing + stop work

Phase II Investigation Complete: ☐ Yes ☑ No

If NO expected completion date 5/15/94 (Not to exceed 3 months)

Management Review: (Required within a few working days)

Date: 4/28/94

Investigator Signature: [signature] Date: 4/28/94

Ref: ACP–QA–10.01

PLANT INFORMATION REPORT – PART D Report No. 3-94-074
PHASE II INVESTIGATION

I. PIR INVESTIGATION (To be completed by Investigator)

QA Category				Required for Equipment Failures and Significant Events Industry Data Base Query Completed	☐ Yes ☐ No
CAT 1	☐ Yes ☐ No	SBOQA	☐ Yes ☐ No	Procedures Properly Followed	☐ Yes ☐ No
FPQA	☐ Yes ☐ No	RWQA	☐ Yes ☐ No		
		ATWSQA	☐ Yes ☐ No		

Cause: SEE ATTACHED WRITEUP

Root Cause (Attach Part E) Root Cause Analysis Planned ☐ Yes ☒ No

Corrective Action: SEE ATTACHED

Action to Prevent Recurrence: SEE ATTACHED

CR No. NA	NCR No. NA	PDCR No. NA
Procedure Change No. OP3261 3100102 3100702	AWO No. NA	Commitment No.
Other: NA	Investigator: [signature]	Date: 9-30-94

II. CLOSEOUT (To be completed by Investigator)

PORC Review	Meeting No. 3-94-115	Date: 7-28-94
SORC Review NA	Meeting No. NA	Date: NA
Comments/Action Items	Commitment No: (if applicable)	

Approved: Unit Director [signature] Date: 10/4/94

III. REPORT COORDINATOR [signature] 10-6-94

LER No. N/A	Date Required: N/A	Date Sent:

PLANT INFORMATION REPORT – PART E Report No. 3-94-079
ROOT CAUSE

Select at least one major and one minor root cause category. (Circle applicable items)

I. **Personnel Error**
- a. Verbal communication
- b. Written communication
- c. Interface design/equipment condition
- d. Environmental conditions
- e. Work schedule
- f. Work practices
  - 1. Procedure not used.
  - (2.) Procedure not followed.
  - 3. Verification not done.
  - 4. No self-checking
- g. Work organization/planning
- h. Supervisory methods
- i. Training/qualification methods
- j. Training/qualification content
- k. Change management
- l. Resource management
- m. Managerial methods

II. **Equipment Failure**
- a. Inadequate design
- b. Incorrect procedure
- c. Manufacturing defect
- d. Installation error
- e. Operating error
- f. Improper maintenance
- g. Improper testing
- h. Wear out
- j. Misoperation of another component or system
- k. Other _____

III. **Program Failure**
- (a.) Procedure deficiencies:
  - 1. Lack of detail
  - 2. Technical error
  - 3. Administrative error
  - (4.) Incomplete
  - 5. Data from wrong source
- b. Insufficient planning
- c. Management deficiency
  - 1. Standards/expectations not set
  - 2. Standards/expectations not monitored
  - 3. Inappropriate decision

PIR 3-94-079
Fuel Misplacement

Description of Event

On April 27, 1994 fuel assembly C08 was momentarily placed on top of fuel assembly B39 in SFP location Y-41. About 300 pounds was unloaded onto the top of assembly B39. Following this the assembly was picked up and moved to its proper location in SFP cell AA-29. Fuel movement continued for approximately one hour before work was stopped and those performing the job decided to inform supervision of the event. This event is of great concern due to risk associated with mishandling of fuel assemblies and the fact that the job was not stopped in a timely manner.

Cause of Event

The cause of this event was personnel error compounded by programmatic deficiencies that allowed the fuel movement process to be prone to a single failure by personnel error.

ACP-QA-4.10, EN 31001, and OP 3271 require that when fuel is moved in the spent fuel pool during non-refueling periods fuel, that the fuel be moved in accordance with an approved Materials Transfer Form (MTF). The individual controlling fuel movement on April 27, 1994 had created an alternate method of controlling fuel movement which involved the use of a spent fuel pool map and a numerical numbering of fuel assembly moves. Rather than following the guidance provided in ACP 4.10 for the use of the MTF (SF1422) fuel movement was being partially controlled by referring to the numbered map and crossing out the location as steps were completed. The MTF was also being completed in parallel. The individual controlling fuel movement allowed himself to become distracted and failed to complete the MTF and alternate tracking mechanism. When the SFP crane operator requested the location for the next transfer after picking up assembly C08, the wrong location was given as the preceding fuel movement had not been logged as properly completed. As a result the fuel assembly was placed in the wrong location. Had the use of the MTF been properly performed this event would not have occurred.

The individual responsible for controlling fuel movement for reactor engineering was counseled on the expected use of procedures when moving fuel and when to stop work. Progressive discipline was applied in accordance with the corrective progressive discipline policy.

This event also showed that a single error on the part of an operator or engineer can lead to an error in fuel handling. Fuel

movement during non-refueling operation was found to be subject to some programmatic deficiencies that do not make the process single failure proof. Specific deficiencies include:

1 Lack of a double check on MTF usage.

2 The specific lack of any stop work criteria.

3 The lack of a formal visual aid such as a tag board.

4 The lack of a formal pre-job brief or training session.

5 Water clarity and lighting could have been improved.

The fuel movement process during SFP only operations in a non-refueling mode was missing some checks and balances that are present during new fuel receipt and refueling operations. Procedures for all three units have the same basic words to control fuel movement from ACP 4.10 "move fuel In accordance with an approved MTF or refueling worklist". Although the words are the same for each unit and evolution, the implementation of those words varies depending on the circumstances. Table 1 shows a comparison of what actually occurs during fuel movement in SFP only operations, Refueling operations, new fuel receipt and to what is done on Units 1 and 2.

Table 1

Control	SFP OPS	New Fuel Receipt	Refueling OPS	U1 SFP OPS	U2 SFP OPS
Multiple MTF or Worklists	N	Y	Y	Y	Y
Tag Board/ Visual Aid	N	Y	Y	N	N
Second Operator	N	Y	Y	N	N
Stop Work Criteria	N	Y	Y	Y	N

Two Way Comm Req	N	N	N	N	N
Procedure Use Crit	INFO/ GEN	GEN	GEN	INFO	GEN
Pre Job Brief/Trng Required	N	Y	Y		

Another factor review in this event is the number of procedures in use at MP3 for this evolution when compared to the other units. A comparison follows:

U3	U1	U2
SNM Control		
ACP 4.10 and EM 31001	ACP 4.10 Only	ACP 4.10 and EN 21001
Equipment Usage		
OP 3271 OP3303A OP3303D	OP328-C	OP 2303

Specifics on the above include:

1 During refueling operations a copy of the refueling work list is at each work station with the master held by reactor engineering in the control room.

2 During refueling operations a tag board is used by the control room to assist in tracking fuel movement. During a new fuel receipt a white board has been used at times to record the move in process.

3 During refueling operations or new fuel receipt a second operator is available in the building to operate the transfer cart or elevator. This operator has been used in the past to follow the refueling worklist or MTF.

4 There is no specific stop work criteria detailed in the above process.

5 The communications process between individuals needs to be more formal. A two way process similar to that used in the control room should be emphasized.

6 During refueling and New Fuel receipt a formal training session is required (similar to the IPTE process). There is no similar requirement for SFP only fuel moves. Although a pre job brief occurred on Monday 4-27-94, some personnel had changed by the date of this PIR.

7 At the time of this PIR, five procedures were all in use at MP3 when compared a low of two required at MP1 and 3 for MP2. As all the procedures in effect were at the general use level or information level the number of procedures was not overly burdensome to the operator and did not have a large impact on this event. MP3 should consider combining some on the above listed procedures into one procedure to reduce the number of procedures for efficiency and possible increase procedure clarity.

Corrective Action

When shift supervision was notified fuel movement was stopped and a night order written to stop fuel movement until permission has been given by the unit director.

In addition, Attachment 4 of EN 31001, Restrictions on the Use and Movement of fuel assemblies has been updated to include fuel assemblies B39 and C08.

Action to Prevent Recurrence

1 EN 31001 Supplemental SNM and EN 31007 RE Refueling Worklist were changed to include a step to require that both the SNM executor and SNM checker have a copy of the MTF or Refueling worklist. (EN 31001 rev 4 change 1 and EN 31007 rev 3 change 2)

2 OP3271 Spent Fuel Pool Operations was modified to require that SFP moves not being controlled from the Control Room

with a Tag Board shall use a white board in the SFP area visible from the SFP Bridge crane.

A commitment to evaluate an electronic means of tracking fuel in the fuel building, placing a tag board in the fuel building or other visual aids will be further evaluated.

3 OP 3271 and EN 31007 shall be modified to include specific stop work criteria. MP1 presently has a good list of stop work criteria which were applied to MP3. (EN 31007 rev 3 change 2)

4 OP3271 was modified to include a pre-job brief or training session to include as a minimum a discussion of IN 90-13, Work scope, stop work requirements, and procedure precautions. All personnel shall be required to be briefed or trained prior to working on the job.

5 A visibility requirement was placed in OP 3271. A requirement was added to ensure that an operator can see down to the top of a fuel assembly in a storage cell prior to proceeding with fuel movement. For center of fuel pool area operations a drop light will be required.

6 Procedures were modified to all be general use. EN 31001 was modified to make SF 1422 a in hand document for the SNM Checker and at the job site for the SNM executor.

7 A Commitment was wirtten to have operations and engineering evaluate consolidating procedures.

8 OP3271 and EN 31007 were modified to include a requirement to require the use of a formal communications process as described in OP 3276 conduct of Operations. (EN 31007 rev 3 change 2)

Human performance concerns were reviewed.

Fuel movement is a highly repetitive boring task. The fuel movement process could be broken down into as many as 11 separate tasks that could be proceduralized. This would be in contrast to the general procedure guidance provided by the existing procedures that state "move fuel as directed by the MTF or Refueling worklist". Making repetitive tasks more restrictive by more detailed procedure requirements usually does not improve the

process. The changes recommended above have been reviewed with the HPES coordinator and are deemed adequate to prevent a repeat of this event.

Post event interviews indicated that the SNM checker for this event felt a lot of schedular pressure. As the amount of work planned should have taken about 45 hours and 80 hours was scheduled the schedular pressure was self imposed.

Related Topics

1 Unit 1, Unit 2, CY and Seabrook will be sent a copy of this PIR for review of the corrective actions.

2 Fuel movement is a infrequent event at MP3. It is complicated even more by the fact that during refueling, fuel movement is performed by a vendor. As a result there is a fairly low experience level through out the MP3 staff for fuel handling and the requirements that go with it. A Fuel Pool ethic needs to be established at MP3 for all personnel in order to ensure that when work around the fuel pool or reactor cavity the requirements for FMEA, Hot Particles, and Job performance is understood. A copy of the proposed ethic is attached.

PIR 3-94-079 Generic Implications Review

1 What systems could ecperience this problem

Fuel Handling systems, any system or task where long repetative tasks are required such as computer data base implications.

2 When could this event recur?

Any time when moving fuel or other core components.

3 Could this failure have directly or indirectly affected other components?

Yes, Damage to other fuel assemblies, damage to the fuel racks and potential carry over into the RCS if the fuel had been reused.

4 What is the consequence of this failure occuring at other plant conditions?

The consequences are no different.

5 What is the consequences of this occurring in other systems at all different potential plant conditions?

None

6 Has this event occurred before?

Yes as noted in the phase 1 on MP3 in 1991 and at MP1

7 Have we checked with knowledgeable individuals to see if similar events have occurred outside the PIR system?

Yes, There were two similar events noted in the phase 1 that were not docuemented via the PIR process.

8 If this event occurred before, why has the corrective action been ineffective?

The corrective on the previous events was too specific. Corrective action address problems with the MP1 pool numbering system, or with how new fuel receipt occurred. The corrective action was not broad enough.

9 What is the action to prevent recurrence ?

See the phase 2 PIR review.

10 If this event can recur, has the risk and consequences been accepted by management ?

With the corrective actions implemented by the phase 2 review the possibility of this event repeating have been minimized.