

NP 8.4.10

EXCLUSION OF FOREIGN MATERIAL FROM PLANT COMPONENTS AND SYSTEMS

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**EXCLUSION OF FOREIGN MATERIAL FROM PLANT
COMPONENTS AND SYSTEMS**

1.0 PURPOSE

- 1.1 Provides the necessary requirements and guidance to prevent the introduction of foreign materials into systems or components.
- 1.2 Controls the investigation and recovery activities when foreign material is discovered inside systems or components or when foreign material is introduced into a system or component.
- 1.3 Applies to all PBNP Departments and includes the maintenance, modification, repair, inspection, and operational activities on open systems or components.

2.0 DISCUSSION

NOTE: The following definitions are provided to clarify acronyms and terms used in this procedure. This section also provides the direction for establishing FMEA controls.

2.1 Foreign Material

Any material not part of any system or component as designed. This includes unexpected dirt and debris, tools, equipment combustible materials, machine tailings, grinding particles, paint chips, leak sealing compounds, unapproved chemicals, or any other item or residue which, left inside the system, could adversely affect its operation, components or chemistry.

2.2 Foreign Material Exclusion (FME)

The action by personnel that assures a system or component is free of foreign material at the time the system or component is closed up following inspection or maintenance. Poor housekeeping can result in foreign material being introduced into a system or component.

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2.3 FME Area (FMEA)

A work area, or Exclusion Zone, around an open process, instrumentation, or electrical component which may be surrounded by a physical boundary with signs, requiring specific controls to prevent introducing foreign material into the system/component.

2.3.1 FME Zone 1

Highest level of FME control imposed. Zone 1 controls, shall be established for activities that could introduce foreign material that is not immediately retrievable due to the configuration or other circumstances. Zone 1 shall also be established for systems or components where a closeout inspection may not provide a high level of assurance that no foreign material is present. FME signs and boundaries are required. The FME Material Control Log is required until temporary covers or internal barriers are installed, items in the FME area are fully accounted for and signed "out" and the temporary covers/internal barriers have been logged "in" on the material control log. Prior to removing temporary covers/barriers, the FME Material Control Log must be re-established and all items in the FME area logged "in". Temporary covers/internal barriers are then logged "out" on the material control log and then may be removed. Items physically too large to fit into the open component or system are exempt from lanyarding and logging with the exception of temporary covers or barriers as described above.

2.3.2 FME Zone 2

This level of FME control is established on systems or components where configuration or conditions allow for foreign material to be immediately retrievable and a final closeout visual inspection will verify that foreign material has not entered the system or component, FMEA signs are required to be posted except when paragraph 2.15 applies.

2.3.3 FME General Requirements

Application of Attachment A is required for all system/component breaches.

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2.4 Special Foreign Material Exclusion Zone (SFMEA)

A specific area for which predetermined foreign material controls apply. SFMEA's include the spent fuel pool, the refueling cavity when Reactor Vessel Head is removed, and the Turbine when opened for maintenance. See Attachment B for Refueling Cavity posting requirements.

2.5. Fail-safe

Describes an item, which is not easily breakable and is too large to fit through any openings in a breached system.

2.6. Fail-safe Area

An area made Fail-safe by damming or adequately sealing openings to make foreign material readily retrievable.

2.7 FMEA Boundaries and Posting

2.7.1 When an FMEA or SFMEA's and radiologically controlled area (RCA) boundaries are concurrent, the FME rope or tape barrier is not required. If the FMEA is Zone 1, then FME tape will be placed outside the radiological area on the floor. FME area signs will be posted on FME stanchions periodically along the outside boundary and FME requirements will be posted at the access point.

2.7.2 FMEA Boundaries will normally consist of:

- Stanchions and red and white rope or FME tape defining the perimeter of the FMEA. The access point will not be barricaded.
 - FME tape may be used alone in those locations where stanchions and rope are impractical due to space constraints.
- a. FME tape shall be placed on the floor outlining the Exclusion Zone for Zone 1 FMEA's except at the Spent Fuel Pool (SFP).
 - b. A single unbarricaded access point will normally be established for material control. Multiple access points, which shall be of limited exception, may be established if authorized by the Work Group Supervisor.
 - c. Temporary structures that provide positive control may be substituted as the barrier.

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2.7.3 FMEA Postings shall consist of red lettering on a white background.

a. An FMEA requirement sign shall be located at the FMEA access point.

| |
|--|
| Date Posted: _____ |
| <u>EXAMPLE</u> FME ZONE 1 |
| <ul style="list-style-type: none">• FMEA Boundaries Established (Rope, Tape, etc.), Sign Posted• Remove Loose Objects Or Tape Pockets• Lanyarding of tools is required (NOTE 1)• Secure Badges, Dosimetry, And Glasses• Implement FME Material Control Log (NOTE 2)• Emergency? Call Control Room X2911 |
| NOTE 1: NOT REQUIRED IF ITEMS ARE FAIL-SAFE NOTE 2: NOT REQUIRED WHEN TEMPORARY COVERS OR INTERNAL PLUGS ARE IN PLACE. |
| WORK ORDER/PROCEDURE NUMBER: _____ CONTACT _____ Phone: _____ |
| PBF-9198a |

b. Barrier postings are as follows and shall be placed on the barrier at intervals adequate to alert personnel to the presence of the FMEA:

| |
|--|
| Date Posted: _____ |
| <u>EXAMPLE</u> FME ZONE |
| ENTRY REQUIREMENTS |
| POSTED |
| AT ACCESS POINT |
| PBF-9158 |

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2.8 Closeout Inspection

A pre-closure verification that foreign material is not present in the system or component.
(B-1)

2.8.1 Consists of, as a minimum, a visual inspection either directly or by use of some other equipment, of all surfaces the foreign material could reach. The inspection verifies these surfaces are free of foreign materials such as sand, metal chips, weld slag, cutting oils, etc. Use of mechanical/electrical inspections should be limited to boroscopes, or mirrors, unless specified otherwise in the Work Package.

2.8.2 If flushing by either liquid or air is the only effective means for determining system cleanliness, the effluent shall be run through a cloth or filter media until there is no evidence of contaminants at the cloth or filter media
(EXAMPLE: Running air through a previously cut section of copper tubing to verify line is free of debris).

2.9 FME Monitor

An individual assigned to monitor and/or log the use and movement of tools and materials in and out of an FME Zone when required. An FME Monitor may be assigned collateral duties as long as these duties do not interfere with the monitoring duties and responsibilities.

2.10 Immediately Retrievable

The ability to maintain visual contact with and immediately retrieve foreign material is possible with the tools available, and retrieval will not present a greater threat to the system or component involved.

2.11 FME Device/Cover

An internal, retrievable barrier device or external opening cover installed to prevent foreign material intrusion.

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2.11.1 Pipe Dam

A temporary retrievable blocking device installed inside piping systems to limit the spread of foreign material. Consideration of the system or component temperature and pressure shall be made when selecting a material for use as a pipe dam. A temporary pipe dam, except for a dissolvable/consumable pipe dam, shall meet the following requirements based on the evaluation:

- Fire resistant/fire retardant (if required due to elevated temperatures).
- Non-brittle, non-splitting, non-melting (if required due to elevated temperatures).
- Non-tearable (materials such as paper or plastic should not be used unless reinforced).
- Will not result in damage to the system or component.
- Will not cause any type of chemical reaction.
- Is easily retrievable (shall be lanyarded).
- Comply with the requirements of NP 7.2.18, Temporary Modifications, and NP 7.2.15 Fleet Modification Process when applicable.
- Shall be logged into and out of the FMEA on a FME Material Control Log (PBF-9157.) (For Zone 1 applications)

2.11.2 Temporary Cover

A method of sealing and protecting a system or component from the introduction of foreign material when the system or component is unattended. Consideration of the system or component temperature and pressure shall be made prior to selecting a material for use. A temporary cover shall meet the following requirements based on the evaluation:

- Fire resistant/fire retardant (if required due to elevated temperatures).
- Non-brittle, non-splitting, non-melting (if required due to elevated temperatures).
- Non-tearable (materials such as paper, clear plastic, or non-reinforced plastic sheeting shall not be used).
- Will not result in damage to the system or component.
- Will not deteriorate or decompose during use.
- Will not cause any type of chemical reaction.

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- During general work activities, an evaluation by the worker, leadperson, or Work Group Supervisor can be made at the work site concerning materials used for the temporary closures. The material selected shall not be detrimental to the system, leave no residue that cannot be easily cleaned, and strong enough to prevent general material from entering the system during unattended periods.
- Comply with the requirements of NP 7.2.18, Temporary Modifications, and NP 7.2.15 Fleet Modification Process, as applicable.
- Shall be logged into and out of the FMEA on a FME Material Control Log (PBF-9157.) (For Zone 1 applications)

2.12 FME Material Control Log

A log used to keep track of items such as tools and parts moving in and out of an FMEA. Guidelines for completion of the PBF-9157 form are noted on the back of the form. Items physically too large to fit into the open component system are exempt from logging requirements.

2.13 Chemical Exclusion

Chemical exclusion is the prevention of chemical contaminants from entering systems and components. NP 3.1.1 states additional requirements for work on corrosion resistant materials and a listing of approved materials (cleaners, lubricants, adhesives, etc.) used on corrosion resistant alloys.

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NOTE: The PAB truck bay decon area shall be labeled a Chemical Exclusion Zone for chemicals approved for dry storage when an uncovered Multi-assembly Storage Basket (MSB) is in the decon area.

2.14 Chemical Exclusion Zone

A chemical exclusion zone is defined as a zone with additional postings indicating specific controls are in place to preclude the introduction of unwanted chemical contaminants.

2.15 Postings, barricading, protective covers and FME Material Control Log (PBF-9157) are not required for:

NOTE: The following activities shall still employ good FME work practices. The individual performing the system opening shall inspect the area and take appropriate precautions to protect the components or system from intrusions that may result from other activities in the vicinity.

2.15.1 Electrical boxes, panels, and cabinets, unless required by the cognizant supervisor.

2.15.2 Two inch nominal size or less diameter piping, 2 inch nominal size or less electrical conduit, or any system opening less than approximately 4 square inches as determined by either the planner or cognizant supervisor, as long as they are continuously attended, or barricaded and posted with controlling group and individual contact noted to deter personnel access, or properly covered when not attended.

2.15.3 Maintenance activities involving compression or screwed fittings on tubing.

2.15.4 Maintenance or Operations pump and valve repacking where the area/component is continuously attended or opening covered when not attended.

2.15.5 Maintenance or Operation oil changes, oil sampling, or repacking of grease in components using factory installed fill and vent ports.

2.15.6 Radiation Protection activities involving contamination surveys of component internals in areas where specific FME controls have not been formally established.

2.15.7 System openings less than or equal to 4 inches in diameter (e.g., waterbox drain) oriented downward between 4 o'clock and 8 o'clock.

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2.15.8 All temporary hoses or other devices used for system evolutions such as:

NOTE: Personnel performing these or similar evolutions shall ensure connections are properly sealed prior to connecting and after disconnecting. Unprotected hoses shall not be used unless effluents are sampled and found to be acceptable.

- a. Recharging MSIV accumulators.
- b. Adding Electro-Hydraulic Fluid to EHC systems.
- c. Adding Coolant to the Emergency Diesels.
- d. Taking on fuel oil, N₂ and H₂ and CO₂.
- e. Portable sampling equipment (includes RP-Safety and Chemistry).
- f. Adding oil to various bubblers.
- g. Turbine oil flushing.

3.0 RESPONSIBILITIES

NOTE 1: This section outlines the requirements of personnel directly and indirectly involved with FME control. All personnel share a common responsibility for FME. Work is to be stopped and supervision informed if FME integrity becomes, or is in danger of becoming, compromised.

NOTE 2: Personnel not directly associated with the work must receive approval from either the Work Group Supervisor or leadperson for entry into the FMEA when work is in progress. Entry by personnel to the area during off-normal work hours by personnel performing routine duties is approved as long as all posted requirements are met.

3.1 Individual worker

- 3.1.1 Establishes the requirements for all Zone 1 and Zone 2 FMEA per paragraphs 2.3.1 through 2.3.3.

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- 3.1.2 Inspects all items before taken into and upon exit of FMEA for disrepair, broken or missing parts and noting any discrepancies on the FMEA log, when applicable.
- 3.1.3 Performs Pre-System Opening Area Inspection/Clean-up prior to initial breach and Final Closeout Inspections after job completion. Documents on PBF-9158 or the Work Order or Work Plan.
- 3.1.4 Ensures the FME Material Control Log is maintained when required.
- 3.1.5 Reports any item that is lost, dropped, or cannot be immediately retrieved to the Work Group Supervisor.
- 3.1.6 Maintains work area cleanliness and good housekeeping practices throughout the work activity, including cleaning of tools as required prior to FMEA entry.
- 3.1.7 Uses clean stainless wire brushes on stainless steel or inconel.
- NOTE:** When weld prepping pipes and it is not possible to keep the dams or devices tied off, they must be constantly attended and tied off as soon as possible after work completion.
- 3.1.8 When required, maintains PBF-9157, FME Material Control Log.
- 3.1.9 Save any foreign material (including zebra mussels) found during component disassembly and inform supervision. Initiates an Action Request (formerly a Condition Report).
- 3.1.10 Ensures foreign material does not exist inside a component before installing internal FME barriers by performing an inspection per Paragraph 2.8.
- 3.1.11 Records installation and removal of internal FME barriers on FME Material Control Log, PBF-9157.
- 3.1.12 Complies with Attachment A, FME General Requirements.

3.2 FME Monitor, when established

- 3.2.1 Understands and ensures the requirements of the appropriate FMEA are implemented.

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- 3.2.2 Inspects the area periodically to verify compliance with FMEA requirements.
- 3.2.3 Maintains PBF-9157, FME Material Control Log.
- 3.2.4 Examines all personnel and equipment prior to authorizing entry into FMEA.
- 3.2.5 Notifies the Work Group Supervisor of activities that threaten the FME controls integrity.
- 3.2.6 Ensures PBF-9157 is reconciled at the conclusion of the job (or end of shift for longer duration job) and performs an accurate turnover to the on-coming FME Monitor.
- 3.2.7 Records material not accounted for in the remarks section of PBF-9157, informs supervision of loss, and goes to Paragraph 4.4, Recovering from Loss of Foreign Material Exclusion. Initiates an Action Request documenting the condition.

3.3 Work Group Supervisor or leadperson

NOTE: The Work Group Supervisor has authority to change the initial FME requirements when the requirements are not consistent with the as found condition of the system or component. Changes to initial FME requirements, if necessary, will be documented on form PBF-9158, or on the Work Order or Work Plan.

- 3.3.1 Establishes FME requirements, implements the FME requirements, briefs the work group, performs random surveillance of the work activities, and provides feedback to planning on problems or good practices.
- 3.3.2 Establishes hardhat control requirements commensurate with jobsite conditions.
- 3.3.3 Performs the following activities before a system or component is opened;
 - a. Ensures a pre-work area cleanliness inspection is performed and documented on the WO, Work Plan, or FME Checklist, PBF-9158.
 - b. Ensures the work area FME controls comply with the requirements of FMEA per Paragraphs 2.3.1 and 2.3.2 (Zone 1 or Zone 2 requirements)

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- c. Ensures appropriate access control boundaries, e.g., tape, red and white ropes and stanchions, tenting, are established when required.

NOTE: The FME Material Control Log is to be reviewed to assure proper completion periodically during the shift and at the end of the shift before turnover to the oncoming work crew.

- d. Ensures implementation of PBF-9157, FME Material Control Log, when required.

3.3.4 Designates an FME Monitor, if applicable.

3.3.5 Monitors the work area while the job is in progress to ensure FME controls remain adequate.

NOTE: When determining the type of cover to use, consideration should be given to the possibility of intrusion of the cover due to a vacuum on the system.

3.3.6 Ensures system or component openings are covered to prevent entry of foreign materials.

3.3.7 Evaluates covers in accordance with NP 7.2.18, Temporary Modifications, and NP 7.2.15 Fleet Modification Process, to ensure they do not alter plant configuration. Examples of FME covers requiring a Temporary Modification for equipment in service or considered operable include:

- a. Covering or draping an electric motor or other electrical equipment (air flow or ventilation may be affected).
- b. Covering a vessel relief valve opening or vacuum breaker opening.
- c. Covering the Pressurizer Manway when it is being used as a Reactor Coolant System (RCS) vent path.

3.3.8 Ensures temporary pipe dams, covers, or seals are made of materials compatible with the application.

NOTE: Use of Duct type tapes shall be minimized. When used on Stainless Steel (SS) materials, all tape residue shall be completely removed.

- a. Acceptable materials include metal (Carbon Steel (CS) on CS, or SS on SS), wood, or plastic disks, pipe plugs, blind flanges, heavy gasket materials, and herculite.
- b. Paper product or rags inserted into pipes or openings are not acceptable for use as temporary pipe dams, covers, or seals.

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- 3.3.9 When notified of loss of FME integrity, refers to paragraph 4.4 for recovery plans.
- 3.3.10 Ensures the initiation of an Action Request (formerly a Condition Report) for any loss of FME controls.
- 3.3.11 Directs performance of a flush if it cannot be positively determined that all maintenance residue has been removed.
- 3.3.12 Ensures that a Closeout Inspection is performed on system or component openings per Paragraph 2.8 and documented on the WO, Work Plan, or FME Checklist, PBF-9158.

NOTE: Engineering personnel preparing work packages are planners with respect to this procedure.

3.4 Work Group Planner (Work Package Preparer)

- 3.4.1 Places a FME Checklist, PBF-9158, in the Work Package and designates the initial FME requirements based on system/component accessibility at the time of package development.

NOTE: The Work Group Supervisor has authority to change the initial FME requirements when the requirements are not consistent with the as found condition of the system or component. Changes to initial FME requirements, if necessary, will be documented on form PBF-9158, or on the Work Order or Work Plan.

- 3.4.2 If FME controls are required, determines the FME zone classification based on the requirements of Paragraphs 2.3.1 through 2.3.3.
- 3.4.3 Determines and documents any additional requirements (pipe dams, other engineering controls, etc.) on the appropriate FME requirement form.
- 3.4.4 Including the appropriate zone posting in the WO or Work Plan.
- 3.4.5 Establishes FME inspection points in work plans or procedures.
- 3.4.6 Plans a system flush or cleanout in the work plan or procedure if the work activity is expected to generate debris that will challenge FME integrity.

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3.5 System Engineers or cognizant management individuals

3.5.1 Evaluates FME concerns and assesses loss of FME integrity.

3.5.2 Concurs with retrieval plans for FME recovery.

3.6 Work Group Manager

3.6.1 Implements the FME program.

3.6.2 Conducts periodic random work site observations to verify FME control compliance.

4.0 PROCEDURE

NOTE: This section outlines the specific requirements for SFMEA controls, loss of FME integrity, and recovery from loss of FME controls.

4.1 SFMEA Requirements for SFP and Refueling Cavity when Reactor Vessel Head Removed

NOTE 1: Fail-safe tools, equipment, and material are items too large to fit into a system or component or are properly lanyarded to reduce the potential for inadvertent intrusion.

NOTE 2: When an FME barrier is established a single unbarricaded access point will normally be established for tool/material control. Multiple access points, which will be of limited exception, may be established if authorized by the Work Group Supervisor. See Attachment B for Refueling Cavity posting requirements.

4.1.1 Personnel working within or over FME Zones at the SFP or the refueling cavity shall ensure personal items are fail-safe prior to entry. When protective coveralls are being worn, personal items including picture badges shall be secured inside the coveralls. Location of TLD's and ED's are per RP requirements but must be securely attached to prevent inadvertent loss.

4.1.2 Biological shield wall walkways become Zone 2 FME areas when the reactor vessel head is removed. The Zone classification may be made more strict if work on systems or components inside the biological shield warrant a higher level of FME controls.

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- 4.1.3 Tools and components to be used in the SFP and Flooded Refueling Cavity areas shall be inspected prior to and during use to ensure chemical contaminants are not introduced into the SFP or Flooded Refueling Cavity. This includes inspection of the cranes and bridge lifting components for oil/lubricant leakage.
- 4.1.4 FME curtains shall be installed on the refueling cavity handrail located by the walkway next to the 66' level opening to the 21' elevation when reactor vessel head is removed and cavity is flooded.
- 4.1.5 Tools used within or over FME Zones at the SFP or the Refueling Cavity shall be secured by a lanyard and controlled via use of PBF-9157, FME Material Control Log. This applies to clipboards, pens, tape rolls, or any other loose object which could fall into the SFP or cavity.
- 4.1.6 Small parts (e.g., lugs, screws, washers, smears, etc.) which are bagged or otherwise contained until use meet the requirements of Paragraph 4.1.5. The number of parts will be limited to that required for use and recorded on Form PBF-9157, FME Material Control Log.
- 4.1.7 Safety glasses, or ear plugs are exempt from logging requirements but are to be lanyarded or otherwise secured to the person when worn in FMEA. Individual ear plugs are not to be worn in FMEA's. Hard hat controls are established by Supervisor/Leadperson commensurate with job site conditions.
- 4.1.8 Non-stainless materials, except for underwater lights and associated cables, shall be removed from the SFP or cavity water at the completion of the task.
- 4.1.9 Any item dropped into the SFP or flooded Refueling Cavity shall be reported to the Work Group Supervisor, the DSS, Reactor Engineering, and an Action Request initiated. Retrieval will only be pursued with RP direction.
- 4.1.10 Transparent materials, unless conspicuously marked so that they are visible underwater, shall not be allowed within the refueling cavity or SFP FMEA's. Transparent covers or lenses integral to lights, the mini-sub, face shields or other equipment are exempt from this restriction.
- 4.1.11 Only non-floating rope will be used within the cavity or SFP FMEA's. An exception is for dry cask storage handling. Ropes shall be replaced after each cask loading evolution.

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4.1.12 Trash cans, storage bags, and contamination clothing storage receptacles shall not be stored in the FMEA's. If necessary during a work activity, the cans may be placed in the FMEA near the jobsite while work is in progress. The cans or receptacles shall be emptied prior to placing them in the area, and shall be removed upon job completion or at the end of shift, whichever comes first.

4.1.13 The polar crane shall be established as a FMEA (The area above the flooded refueling cavity will be Zone 1 when work on the crane is being performed, otherwise the crane will be a Zone 2).

4.1.14 The PAB crane (bridge, trolley, rigging) shall be established as a FMEA (The area above the Spent Fuel Pool will be a Zone 1 when work on the crane is being performed, otherwise the crane will be a Zone 2).

4.2 SFMEA Controls - Turbine

NOTE 1: Fail-safe tools, equipment, and material are too large to fit into a system or component or are properly lanyarded to reduce the potential for inadvertent intrusion.

NOTE 2: When a FME barrier is established a single unbarricaded access point will normally be established for tool/material control. Multiple access points, which will be of limited exception, may be established if authorized by the WEPCO Turbine Engineer.

NOTE 3: Transparent materials, unless conspicuously marked, are not allowed on the turbine structure when it is in a state of disassembly.

4.2.1 Main Generator and Exciter

- a. FME barriers and postings shall be established.
- b. FME Material Control Log (PBF-9157) is put in use.
- c. Personnel working within this FMEA shall ensure the FMEA is fail-safe. As a minimum, badges (with picture remaining visible), and eyeglasses will be secured, and pockets emptied.
- d. During major disassembly of the main generator an FME Monitor will be established.

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4.2.2 Condenser

- a. FME access point(s) and postings shall be established at the manways when the LP Turbine outer cover is not removed.
- b. FME barrier and postings shall be established when the LP Turbine outer cover is removed.
- c. FME Material Control Log (PBF-9157) is put in use. This can be discontinued when the area is made fail-safe.
- d. Personnel working within this FMEA shall ensure the FMEA is fail-safe. As a minimum, badges (with picture remaining visible), and eyeglasses will be secured, and pockets will either be emptied or taped.
- e. Screens shall be installed over the open manways when personnel are not performing work inside or the area is unattended when the outer cover is not removed.

4.2.3 Turbine Bearing Pedestals

- a. Shall be made fail-safe immediately upon opening with lanyarded plugs inserted into the oil drain/supply lines.
- b. The plugs and any temporary covers shall be logged on a FME Material Control Log (PBF-9157).

4.2.4 LP or HP Turbine Rotor/Cylinder Work

- a. FME barrier and postings shall be established.
- b. FME Material Control Log (PBF-9157) is put in use. This can be discontinued when the area is made fail-safe.
- c. Personnel working within this FMEA shall ensure that the FMEA is fail-safe. As a minimum, badges (with picture remaining visible), and eyeglasses will be secured, and pockets either taped or emptied.

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4.2.5 Governor and Stop Valve Bonnet Removal

- a. Shall be made fail-safe immediately upon opening with lanyarded plugs inserted into the oil drain/supply lines.
- b. Bonnet openings shall be covered when not attended.
- c. The plugs and any temporary covers shall be logged on a FME Material Control Log (PBF-9157).

4.2.6 MSR's

- a. Shall be made fail-safe by inserting lanyarded plugs or blocking off drain lines prior to entry.
- b. Personnel working within this FMEA shall ensure the FMEA is fail-safe. As a minimum, badges (with picture remaining visible), and eyeglasses will be secured, and pockets either taped or emptied.
- c. Screens or covers shall be installed over the open manways when personnel are not performing work inside or the area is unattended.
- d. Remove FME devices/covers prior to conducting the final Closeout Inspection.

4.2.7 Crossunder Line During Any Work Inside

- a. Drain holes will be blocked during first entry.
- b. Personnel working within this FMEA shall ensure the FMEA is fail-safe. As a minimum, badges (with picture remaining visible), and eyeglasses will be secured, and pockets emptied.
- c. Screens or covers shall be installed over the open manways when personnel are not performing work inside or the area is unattended.
- d. Remove drain plugs during final closeout inspection.

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4.2.8 Waterbox Manway Opening

Either:

- a. An FME Cover/Screen will be secured over the opening,

OR

- b. Zone 1 posting and Material Control Log shall be
Posted/Implemented.

OR

- c. Zone 2 posting, as a minimum, shall be posted when the
inlet valve to the waterbox is shut to facilitate retrieval of
any dropped items.

4.3 Loss of FME integrity exists when:

- 4.3.1 Unexpected foreign material is discovered inside a system upon initial breach.
- 4.3.2 Material logged into an FME Zone 1 which cannot be accounted for during
tool log reviews or closure activities.
- 4.3.3 Material is found inside an FME Zone 1 which was not logged in during the
time that an FME log was required.
- 4.3.4 Material which cannot be immediately retrieved is dropped into a system.
- 4.3.5 Internal barriers fail, or external covers are damaged or missing while the area
has been left unattended.
- 4.3.6 Assembled or disassembled component used in FMEA is found to be missing
parts.
- 4.3.7 Foreign material is found in an open system (e.g., fuel pool, open tanks,
flooded Reactor Cavity).

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4.4 Recovery from Loss of FME Controls

NOTE: Foreign material retrieval methods shall comply with balance of plant procedures.

4.4.1 The Work Group Supervisor or leadperson shall notify the cognizant systems engineer (Reactor Engineering if in the SFP) that FME controls have been lost or that foreign material has been introduced into an open system or component and not retrieved.

4.4.2 If possible, the Work Group Supervisor or leadperson shall inspect the work area and try to determine the location of the lost material or the material that has been introduced into a system or component. The following or additional methods can be used.

- a. Visual inspection.
- b. Mirrors.
- c. Fiberscope/Boroscope inspection.
- d. Remotely operated TV camera.
- e. Radiography.
- f. Robotics.
- g. Mini-sub with camera.

4.4.3 The Work Group Supervisor or leadperson shall ensure that Action Requests are initiated for intrusion of foreign material and work packages are revised to support the retrieval of the foreign material.

5.0 REFERENCES

5.1 PBNP FSAR Section 1.4.2.

5.2 INPO Good Practice MA-320, Foreign Material Exclusion (FME) Program.

5.3 INPO SOER 90-02.

5.4 INPO SOER 95-01.

5.5 VPNPD 93-002, Response to NRC Notice of Violation IR 92-018.

5.6 ANSI N45.2.1-1973, Cleaning of Fluid Systems & Associated Components for Nuclear Power Plants

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5.7 NP 3.1.1, Chemical Contamination Control for Corrosion Resistant Alloys.

5.8 NP 7.2.18, Temporary Modifications.

5.9 NP 10.2.4, Work Order Processing.

5.10 NP 1.9.6, Plant Cleanliness and Storage.

5.11 NP 10.2.1, Outage Planning, Scheduling and Management.

5.12 NP 5.3.1, Action Request Process

5.13 PBF-9157, FME Material Control Log.

5.14 PBF-9158, FME Checklist.

5.15 PBF-9198a, FME Zone (Zone 1) (Posting).

5.16 PBF-9198b, FME Zone (Zone 2) (Posting).

5.17 PBF-9198c, FME Zone (Condenser/LP Turbine) (Posting).

5.18 PBF-9198d, FME Zone (Fail-safe Pedestal) (Posting).

5.19 PBF-9198e, FME Zone (Exciter) (Posting).

5.20 PBF-9198f, FME Zone (LP/HP Turbine Rotor/Cylinder) (Posting).

5.21 PBF-9198g, FME Zone (Generator) (Posting).

5.22 PBF-9198h, FME Zone(MSR) (Posting).

5.23 PBF-9198i, FME Zone (Crossunder Line During Work Inside) (Posting).

5.24 PBF 9198j, FME Zone (Governor/Stop Valve Removal) (Posting).

5.25 PBF-9929, Feedback.

5.26 NP 7.2.15 Fleet Modifications Process.

6.0 BASES

B-1 VNPD 93-002, Response to NRC Notice of Violation IR 92-018.

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ATTACHMENT A
FME GENERAL REQUIREMENTS

Prior to system/component opening, an area inspection shall be completed and the area cleaned as required. This inspection shall be documented on form PBF-9158 or on the work order plan with conditions and any corrective actions noted.

System or component openings on all breached systems shall have a Closeout Inspection performed on them. This inspection shall be documented on form PBF-9158, or on the Work Order or Work Plan. (B-1)

1. Prior to whole body entry to a POSTED FMEA, badges and eyeglasses will be secured and pockets either emptied of contents or taped.
2. Transparent materials, unless conspicuously marked for easy retrieval, shall not be allowed within FMEA's. (See Step 4.1.10 for exemption)
3. Ensure work area is clean and free of debris prior to initial breaching of system/component.
4. The worker shall perform maintenance activities in a manner that reduces the possibility of introducing foreign material into a system/component (i.e.; piping, valves, vessels, pumps). Some other examples include the following:
 - When working in electrical enclosures with multiple door or access openings, only those doors or access areas required to perform the task should be opened.
 - Use caution when opening and working in control cabinets, relay cabinets, or junction boxes to ensure that tools, parts, dirt, debris, or filings do not fall into electrical equipment.
 - During removal of plant equipment for repair or bench calibration, ensure the system or component in the field is protected to prevent entry of foreign material.
 - While working on equipment in the shop work areas, assure FME practices are maintained. Items awaiting maintenance shall be protected for FME purposes with appropriate covers.
 - Ensure small metal shavings or debris does not enter electronic components during drilling on electrical panels.
 - Ensure foreign material such as tools, dirt, debris, is removed following maintenance.
 - When adding or filling oil reservoirs, do not leave filler cap or sight glass off when unattended. (i.e.; individual going for more oil).

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5. Upon opening equipment, perform a visual inspection to ensure no foreign material already exists in the component.
6. The cognizant supervisor shall inform the Engineering zebra mussel coordinator whenever zebra mussels are found in a system or component.
7. Keep system and component openings covered, except when performing necessary operations.
8. Use suitable coverings or barriers when working above or below gratings or other openings to prevent materials and tools from intruding into the area or dropping to the level below. Upon completion of the task, an inspection with appropriate lighting will be performed of adjacent areas and levels.
9. Provide barriers, screens, shields, access restrictions, or other protection as necessary to isolate areas in which welding, dust, inclement weather, or other conditions may affect the quality of work. Consider ventilation requirements when applying this type of protection.
10. Minimize the use, location, and deployment of tools and equipment, such as welding and stress relieving leads, welding machines, hydraulic power units, air and water hoses, compressor units, gas bottles, and portable air tools within established FMEA's. Tools should be inspected prior to use and after completion of task. Inspections should note if tools are in need of repair or in a condition that could compromise FME integrity.
11. Duct tape should only be used when no acceptable alternatives exist and shall be completely removed when no longer required for work in progress.
12. Place waste material and rubbish in proper containers for disposal. Empty or remove containers as often as necessary. Oil drums, chemicals, and poly bottles that are not required for work in progress or planned for work shall be removed.
13. Cap or cover solvent or lubricants when not in use.
14. Lanyarding of tools is required for work in all breached systems unless there is no retrieveability concern (Zone 2 or fail-safe).
15. Safety glasses, or ear plugs are exempt from logging requirements but are to be lanyarded or otherwise secured to the person when worn in a FMEA. Individual ear plugs are not to be worn in FMEA's. Hard hat and eyeglass side shield controls are established by Supervisor/Leadperson commensurate with condition of PPE and job site conditions.

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16. Personal items such as jewelry, earrings, rings, watches, etc. shall normally be removed. Personal items difficult to remove may be secured by the wearer by another means as approved by Supervision. Glasses shall be secured by lanyards or tape.
17. When storing test equipment containing tubing or piping connections, ensure all openings are capped or plugged to minimize the possibility of foreign material intrusion between calibration and when the equipment is stored.
18. Tie wraps with metal tab clips are NOT allowed in FMEA's. Molded plastic tie wraps (NO metal tab clips) are available in stores and in the Maintenance Tool Rooms for TEMPORARY use in FMEA's.
19. Existing tie wraps in an area that are difficult to remove or replace with tie wraps without metal clips are exempted from the requirement of Step 19 as long as they are tracked on a FME Material Control Log for the duration of the FMEA.
20. If any of the above work practices cannot be followed immediately inform your supervisor so additional precautions may be taken , up to and including the establishment of an FME area.