Excellence in Foreign Material Exclusion

Building on the Principles for Enhancing Professionalism
APPLICABILITY

THIS WANO PRINCIPLES REPORT APPLIES TO ALL REACTOR TYPES

Keyword: Technical conscience, Design requirements, Safety margins

Plant Area: Organisation & Administration

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Excellence in Foreign Material Exclusion

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Foreword

WANO Principles depict fundamental principles and aspects that promote excellence in a given area. Utility managers are encouraged to make in-depth comparisons between these documents and their day-to-day policies and practices. WANO Principles provide an opportunity to communicate management philosophy and expectations to all nuclear personnel.

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Introduction

Excellence in Foreign Material Exclusion (FME) requires an engaged workforce that clearly understands FME principles and techniques and is motivated to implement appropriate controls at the job site. This document is a pocket guide for use in the field by supervisors and workers. It describes the basic building blocks of an FME programme, the desired worker practices and behaviours necessary for excellence in FME, supervisory behaviours necessary for excellence in FME and warning flags that indicate programme weaknesses.

Many adequate foreign material exclusion programmes exist and it is not the intent of this document to focus on any one model. However, successful implementation of any FME programme requires workers and supervisors to understand the programme, accept their roles and responsibilities and recognise the behaviours necessary to implement the programme effectively.
Why Have a Foreign Material Exclusion Programme?

Excellent foreign material exclusion programmes enhance station equipment reliability and system integrity. Rigorous programme implementation accomplishes the following:

- promotes nuclear safety
- protects fuel integrity
- contributes to dose reduction through reduction of contamination
- contributes to equipment reliability and component health
- reduces forced loss rates and increases unit capability
- reduces corrective maintenance and rework
- contributes to station cleanliness through higher standards for job-site cleanliness and housekeeping
The Building Blocks of an Effective Foreign Material Exclusion Programme

- **Management Support** – Managers foster a “focus on prevention” attitude. Roles and responsibilities for implementing FME controls are clear to all and ownership for the programme at every level is encouraged.

- **Ownership** – A high degree of awareness of the need to prevent foreign material intrusion exists throughout the station organisation. Workers demonstrate job-site behaviours that promote excellence in FME. Workers, supervisors and managers seek to identify and correct programme deficiencies, facilitate continuous FME improvement and hold each other accountable for the rigorous implementation of FME practices.

- **Housekeeping** – Housekeeping and the materiel condition of station areas, equipment and systems are maintained to high standards such that open systems or components are less likely to be subjected to foreign material incidents or events.

- **FME Procedure** – The FME procedure provides guidance for FME controls through all phases of the work process. The procedure clearly describes interfaces between the FME process and other station processes (such as housekeeping, work control and work planning). It provides workers with the information needed to plan, set up boundaries, implement controls and close out work areas to ensure the absence of foreign material in station equipment, systems and components.

- **Training** – Training in FME is provided to all appropriate personnel working at the site, including non-station personnel and equipment vendors working on station equipment off site. Additionally, training instructors reinforce the use of FME practices in the classroom and laboratories.

- **Human Performance** – Work plans are developed to prevent situations that could introduce foreign material during work activities. Foreign material hazards are discussed with workers during pre-job briefings and foreign material conditions are assessed during supervisor observations at the job site. Error traps are anticipated and controls established when needed to prevent the inadvertent introduction of foreign material.

- **Work Planning** – Foreign material exclusion planning is an integral part of the work planning process. FME plans include appropriate requirements for job-site cleanliness, identify critical points in the work where FME controls must be considered and reinforce that, when uncertain, workers should stop and obtain the appropriate guidance prior to proceeding. Work plans also incorporate guidance for FME zones around open systems or components.

- **Devices/Tools** – High quality devices and tools such as caps, plugs and covers are readily available for implementing FME controls at the job site. Tools and devices for retrieval of foreign material should also be readily available.

- **Observation of Work** – Station observation programmes specifically identify the need to observe FME practices during appropriate work activities.

- **Tracking and Trending of FME Shortfalls** – FME weaknesses identified during work observations, work performance, work planning or work control execution, self-assessments and training feedback processes are captured in the corrective action programme. Results from trends are used to identify subtle performance problems and drive continuous improvement.
• **Continuous Improvement** – Periodic self-assessments, corrective action programme trends, worker feedback and job-site observations are used effectively to identify gaps to excellent FME performance. Benchmarking is used to maintain an awareness of industry FME innovations and new techniques.
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The Role of the Worker in Foreign Material Exclusion

1. During walk-downs of job sites, workers are alert to area housekeeping conditions that may cause FME problems.

2. During walk-downs of work packages, workers verify that correct FME boundaries and controls are specified in the package instructions. If FME instructions are incorrect or missing, feedback is provided to planners so instructions can be corrected for the current and future jobs.

3. During walk-downs of work package instructions, workers identify FME materials that may be needed (pipe plugs, covers, caps) and ensure these materials are listed in the package. If materials are not listed, feedback is given to the planners such that the necessary FME equipment is identified for future jobs.

4. Prior to starting work, workers verify that necessary FME equipment is available and stage the material at the job site with the other parts, materials and supplies.

5. During pre-job briefings, workers and the supervisor discuss FME controls required for the job. Workers should consider leading this discussion.

6. Workers stop work and consult the supervisor when uncertain of proper FME techniques unsure of how to prevent foreign material intrusion at any point in the work, or if a new FME threat is discovered that was not anticipated when the work was planned.

7. At the job site, workers demonstrate ownership for the FME controls as if prevention of foreign material problems on this job is completely up to them. In other words, workers do not rely on others (such as supervisors or quality control personnel) to enforce foreign material exclusion requirements.

8. If foreign material is inadvertently introduced into a system, workers stop and immediately notify their supervisor. Workers are included in developing plans to recover the material.

9. During work that may not routinely involve FME controls, workers remain alert to possible foreign material problems that may not have been anticipated. For example, workers should be alert to internal degradation of systems from corrosion or deterioration of gasket material fasteners. Also, parts inadvertently dropped during work in electrical panels used and tie wraps or refuse on or near relays are examples of foreign material problems.

10. Workers are involved in continuous improvement of FME practices by providing suggestions for methods and practices that will further strengthen FME processes.
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The Role of the Supervisor in Foreign Material Exclusion

1. Supervisors have a strong working knowledge of the station’s foreign material exclusion process.
2. The supervisor ensures the work package provides adequate FME instructions. FME materials that may be needed (pipe plugs, covers, caps) should be listed in the package.
3. The supervisor provides sufficient time for workers to conduct adequate walkthroughs of work packages.
4. The supervisor ensures necessary FME equipment is available for the job.
5. During pre-job briefings, workers and the supervisor discuss FME controls required for the job. The supervisor may have the worker lead this discussion.
6. The supervisor is prepared to advise workers of proper FME techniques at any point in the work.
7. Supervisors demonstrate ownership for the FME controls as if prevention of foreign material problems on this job is completely up to them. The supervisor is a key team member of the maintenance force and should adopt the attitude of “trust but verify” to ensure that adequate foreign material exclusion measures are being implemented.
8. Supervisors involve workers in plans for resolving problems caused by foreign material introduction.
9. Supervisors alert workers to possible foreign material problems that may not have been anticipated, such as internal corrosion or deterioration of gasket material fasteners. Parts inadvertently dropped during work in electrical panels and used tie wraps or refuse on or near relays are examples of foreign material problems.
10. Supervisors are involved in continuous improvement of FME practices by providing suggestions for methods and practices that will further strengthen FME processes.
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Warning Flags: Foreign Material Exclusion Programme
Weaknesses

1. Management does not support the FME programme sufficiently. Examples of this include bypassing FME controls to meet schedule, not enforcing FME boundaries and not holding supervisors and workers accountable for identifying and correcting poor FME practices.

2. Workers do not understand the expectations and standards for FME programme implementation.

3. Workers view FME controls as a burden.

4. FME materials/tools are not readily available.

5. Workers are not using available FME materials.

6. The workforce demonstrates poor housekeeping practices.

7. Supervisors tolerate poor housekeeping practices.

8. FME is not considered a site-wide programme (for example, only maintenance personnel are expected to implement the FME programme).

9. The FME procedure is unwieldy or unclear.

10. Equipment-related failures are occurring from foreign material intrusion.

11. Debris is found in systems and equipment.

12. FME requirements are not included in work packages.

13. FME equipment and materials are not specified in work packages.

14. FME zones and/or boundaries are not enforced or are not clearly established at the work site.

15. Oversight and coaching of worker FME practices are lacking.

16. Warehouse/storage FME practices are not consistent with requirements in station areas (lower standards for FME controls in warehouse areas).

17. Workers are uncomfortable reporting FME issues.

18. Pre-job briefings insufficiently focus on foreign material prevention and detection.

19. Vendors and/or non-station personnel are on the site performing work without being aware of and accountable to the site standards for FME.

20. Situations arise in which the site staff cannot verify the absence of foreign material in refurbished or pre-assembled parts and equipment coming from a vendor.

21. Receipt inspections do not include FME inspection as a criterion.

22. Concern for foreign material is weak during debris-generating activities, such as mechanical cutting and grinding.
23. Insufficient initial training on FME expectations and requirements is identified in cause reviews or self-assessments.

24. Continuing training does not include recent industry or station FME operating experience.

25. Training instructors do not reinforce FME practices during practical training sessions on mockups or actual station equipment.

26. Human performance simulators and equipment mockups lack FME covers, plugs and other controls.

27. FME is not integrated into training activities for which, if the same activity were to be performed in the station, FME controls would be expected.

28. FME lessons learned are not captured following work.
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