BWR OWNERS' GROUP

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BWROG-14033
June 24, 2014

Project No. 691

Mr. Victor Cusumano
Safety Issues Resolution Branch Chief
Division of Safety Systems
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Submittal of Non-Proprietary BWROG Technical Product, BWROG-TP-11-006 – "ECCS Containment Walkdown Procedure, Rev 1 (January 2011)," as Formally Requested During the Public Meeting Held on April 30, 2014

REFERENCE:

1. BWROG Letter, BWROG-14030 dated June 5, 2014, "2014 BWROG Submittal Intentions Update and Summary of the April 30, 2014 NRC-BWROG Public Meeting (ML14090A352)"
2. BWROG Letter, BWROG-11002 dated January 8, 2010, "BWROG ECCS Suction Strainers Action Item No. 15 Status"
3. NRC Letter, ML102290064 dated August 2, 2010, from Mr. J.E. Dyer to Mr. Frederick P. Schiffley regarding waiver of NRC review fees in accordance with 10 CFR 170.11(a)(1)(ii)

Dear Mr. Cusumano:

Enclosed for your information and commentary is BWROG Technical Product, BWROG-TP-11-006 – "ECCS Containment Walkdown Procedure, Rev 1 (January 2011)," as requested by NRC Staff during our public meeting held on April 30, 2014. Details from this public meeting are captured in Reference 1.

The BWROG respectfully requests NRC Staff review of the enclosed content, with written feedback provided in accordance with Reference 2, within seven weeks (35 working days) of Staff's receipt of this letter.

In accordance with the provisions of 10 CFR 170.11(a)(1)(ii), the BWROG requests the waiver of NRC review fees associated with this project, as captured in Reference 3.

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NRR

We look forward to continued cooperation regarding the ECCS Suction Strainer project scope.

Respectfully,

Lesa P. Hill

Lesa P. Hill
BWROG Chairman
(205) 992-5727

cc: J. A. Golla, US NRC Project Manager
BWROG Executive Committee
BWROG Primary Representatives
BWROG ECCS SS Committee
K. A. McCall, BWROG Program Manager
M. A. Iannantuono, BWROG ECCS SS Committee Project Manager

Commitments: None

ENCLOSURE

1. Non-Proprietary BWROG Technical Product, BWROG-TP-11-006 – "ECCS Containment Walkdown Procedure, Rev 1 (January 2011)" (GEH Class I)

BWROG-TP-11-006
Revision 1
January, 2011

ECCS Containment Walkdown Procedure

BWROG Emergency Core Cooling System Suction Strainers Committee

Author:	Tony Borger (PPL)
Committee Chairman:	Steve Scammon (ENW)
Project Manager:	Rob Whelan (GEH)

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Entergy – Fitzpatrick	NPPD – Cooper
Entergy – Pilgrim	PPL – Susquehanna
Entergy – Vermont Yankee	PSEG – Hope Creek
Entergy – River Bend/Grand Gulf	Progress Energy – Brunswick
Exelon – Clinton	SNC – Hatch
Exelon – Oyster Creek	TVA – Browns Ferry
Exelon – Dresden/Quad Cities/LaSalle	Xcel – Monticello

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I. Executive Summary

This guidance governs the containment walkdowns to be performed at Boiling Water Reactor (BWR) nuclear power plants with Mark I, II, and III Containment types to compile the information needed to further address Nuclear Regulatory Commission (NRC) Bulletin 96-03, "Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in BWRs" due to issues raised by NRC Generic Safety Issue (GSI) 191, "Assessment of Debris Accumulation on PWR Sump Performance."

Revision 1 summarizes key walkdown topics and adds a walkdown decision tree (Attachment 1) and a sample walkdown result template (Attachments 2 and 3).

II. Scope

The following walkdowns are to be considered based on the guidance in Attachment 1:

- Debris Source Walkdowns - identify and document (type, location, quantity) insulation, other fibrous materials, latent debris, and temporary equipment left in containment that may present a challenge to the containment Emergency Core Cooling System (ECCS) strainer during and following a Loss-of-Coolant Accident (LOCA).

- Coatings Walkdowns - identify and document (type, quantity, condition) qualified and unqualified coatings that exist within the walkdown areas.

- Latent Debris Sample Collection Walkdown - collect dirt and dust debris samples from areas as categorized by Nuclear Energy Institute (NEI) Guidance 04-07 Volumes 1 and 2.

- Reactive Metals / Materials Walkdowns - inquire of cognizant site personnel and review plant documents to establish the potential materials that could affect post-LOCA chemistry. Aluminum will be evaluated at a minimum. Identify and document sources of potential reactive materials.

The debris source walkdowns, if necessary, will include a comprehensive and methodical inventory of the potential Suppression Pool strainer debris sources which could be dislodged due to the dynamic effects of a pipe break inside primary containment, post-LOCA environmental effects, and containment spray washdown. All of the accessible areas of the containment that may contribute debris to the Suppression Pool will be reviewed, rather than limiting the walkdown to selected areas associated with postulated break locations and spray washdown. This approach will ensure that all potential sources are fully documented to support future analyses. Inaccessible areas will be documented as fully as possible using available sources of information (for example, site personnel or existing pictures). The scope of debris sources will include past documented sources; for example, each plant will have identified their drywell insulations during their resolution of NRC bulletin 96-03 "Potential for Plugging of ECCS Suction Strainers by Debris in BWRs". The scope of debris sources will also include NRC's list of detrimental sources, consistent with NEI 02-01 "Condition Assessment Guidelines: Debris Sources Inside PWR Containments" and BWROG-TP-08-035 "ECCS Strainers Drywell & Wetwell Walkdown Guidance Document."

For plants that have performed walkdowns prior to issuance of this guidance document, effort should be made to reconcile walkdown results with information provided in document and consider performance of additional walkdowns if it is determined that significant information has not been

obtained. See Attachment 1, Walkdown Decision Tree, to help decide whether a further walkdown must be conducted.

Note: Handling and processing of debris samples after collection efforts is not within the scope of this walkdown procedure.

III. Preparation

A. ALARA

Walkdown teams should coordinate and meet with Radiation Protection (RP) to incorporate As Low As Reasonably Achievable (ALARA) principles. Review with RP the scope of the walkdown (see section 7.2), various locations, number of personnel, applicable Radiation Work Permit (RWP) requirements, and other pertinent issues.

B. Walkdown Scope Determination

Prior to entry into the containment building, the walkdown coordinator should determine the scope of the walkdowns based on the criteria in Attachment 1. Past work performed during the NEDO 32686-A Utility Resolution Guide (URG) for ECCS Suction Strainer Blockage may be credited and may affect the overall scope of the planned walkdowns.

Utilities should use Attachment 1 to help decide what walkdown scope to conduct. Four specific walkdown areas are considered in Attachment 1:

(1) Fixed Debris

(2) Coatings Debris

(3) Latent Debris

(4) Reactive Materials

All utilities are expected to perform a reactive materials walkdown, as the information gathered by the walkdown was not previously evaluated during the NEDO 32686-A URG.

Any reduction in walkdown scope should be formally documented using forms in Attachment 1.

C. Review Reference Materials

Prior to entry into the containment building, the individual walkdown teams should review plant documents (for example, drawings, specifications, calculations, equipment qualification reports, vendor manuals and reports) related to insulation and debris sources, coating systems, reactive materials and suppression pool strainer design, to become familiar with the associated containment areas. Using the reference materials, the team should document the debris source term information with Attachment 2 or 3, making appropriate notes regarding references when documenting the debris source term quantities.

For URG Method 3 plants, the team should determine where piping crosses the boundaries of Zones of Influence (ZOIs) Spheres to assist in early identification of differences between plant design basis and walkdown results.

In addition to understanding the debris source term quantities to expect in the walkdown, this will help develop a familiarity with the areas and an understanding of where in the area the walkdown will be focused. Surrogate tours and existing photographs will also be used (if available) to review the area of interest.

D. Review Insulation Types

The team should review with plant personnel, and be able to differentiate the various types of insulation that are expected to be observed inside containment. Some examples are as follows:

1. Reflective Metal Insulation (RMI) or Mirror Insulation
2. Calcium Silicate (Asbestos and Non-Asbestos)
3. Fiberglass
4. Min-K
5. Foam
6. Temp Mat
7. Uni-Jac (Foam Glass)
8. Mineral Wool Blocks and Blankets
9. Refractory Mineral Fiber
10. Kaowool
11. Microtherm

E. Review Jacketing Material for Insulation

Examples include:

1. Stainless steel jacket
2. Stainless steel mesh
3. Aluminum jacket
4. PVC
5. Fiberglass or asbestos lagging fabric
6. Silicon coated liner cloth (This type of insulation jacketing should not be installed inside containment)

F. Review Insulation Attachment Methods

1. Bands
2. Tie wires
3. Buckles
4. Insulating tapes (both fabric and metallic)
5. Fastening hardware (screws, rivets)

IV. Walkdown / Post Processing Documentation

The team should estimate, quantify, and locate all debris sources including insulation, coating, dirt, dust, lint, and potential reactive metals and materials to support future analyses. Obtaining photographic records of all walkdown observations is highly recommended to support data analysis and to address questions that may arise at a later date.

The team should then summarize the walkdown results for each of the walkdown tasks in Attachment 2 or 3. Where exemptions were taken for previous work, the exemption should be documented and attached using the appropriate Attachment 1 forms.

The containment walkdowns will be conducted as four tasks. A comprehensive walkdown report will be developed summarizing the results of these four tasks. The report will review the types, location, and thickness of insulation materials, and other potential debris materials such as fire barriers, coatings, latent debris, labels, and reactive materials. The report should contain at a minimum four attachments providing the appropriate documentation for each task. These should include the insulation and debris walkdown packages, qualitative estimates of qualified and unqualified containment coatings, foreign materials, latent debris samples and quantity calculations, and the reactive metals and materials summary. Additional attachments may include the walkdown procedure used, training records, walkdown team members, the area map, and other pertinent information that may not be retrievable in documentation control.

A. Task 1: Insulation

Due to the large quantity of insulation typically found in the containment, a master spreadsheet documenting the essential results of each walkdown package is suggested. Each walkdown package should include the type, location, jacketing, jacketing fasteners, and amount of the insulation. Walkdown packages should be reviewed by an experienced engineer. For insulation installed on piping, it is suggested that the package record the inside diameter, outside diameter, and length of the insulation used to determine the total volume. The mass of the insulation should be determined and recorded using the NRC accepted values where available for as-fabricated density. Drawing types include P&IDs, plan-views, isometrics, original insulation design, and manufacturer's drawings as they are available.

Walkdown packages should be arranged according to area as assigned in the Area Map. The Area Map should be formally documented either as part of the insulation attachment or as a separate attachment within the walkdown report.

B. Task 2: Coatings

The team should document the qualified coatings systems used within the plant. Also, each identified unqualified coating location should be documented. To the extent possible, the unqualified coatings' dry film thickness and dry density should be documented. A summary should be provided which includes the total area and mass for each unqualified (to include indeterminate) coating type, for example, epoxy, inorganic zinc, and alkyd.

C. Task 3: Foreign Material (Latent and Transient Debris)

A summary table should be provided documenting the mass of each debris type and the sampling method. At a minimum, tags, labels, and dirt and dust amounts should be documented.

1. Sample Collection Support (Dirt, Dust, and Lint)

Once samples have been collected and weighed, a table should be constructed documenting the location, sample area, sample weight, and collection efficiency. Sampling technique should also be stated (samples obtained using massilinn cloth, vacuum, etc) to assist in comparison of results. To the extent possible, a consistent sampling area (for example, 4 sq ft surface area) should be used for each sample and said area should be documented in the report. At least two samples of each surface type should be taken at each drywell elevation to provide meaningful data sampling. Additional samples should be considered if significant data scatter is observed. Once completed, statistical analysis is recommended to determine a 95% confidence interval of the plant debris density per area for each category. The area for each category should be calculated using plant drawings. HVAC, cable tray, or other system drawings may be useful in this effort. Subsequently, the total dirt, dust, and lint within the containment may be calculated. The debris should also be removed, where possible.

2. Tags and Labels Walkdown

It is recommended that each type of non-metallic tag, label, tape, stickers and other materials of this nature be documented by photograph or written description. Tags with fastening devices qualified for use in the drywell LOCA environment should be excluded from this tally. An average area for each type should be assigned. Once assigned, the tally for each tag type may be tabulated per area of the containment and a total area, volume, or mass term may be determined. Tags with the same dimensions and materials, but differing in attachment method, would be considered different types and should be documented accordingly. If a 100% count of unqualified tags, labels, and other material has not been achieved, engineering judgment may be used to scale the sampling results but justification should be documented to provide reasonable assurance that the values obtained are conservative. Unqualified tags, labels and other material should be removed to the extent possible.

3. Miscellaneous Debris

Miscellaneous foreign materials that do not fall within the above descriptions should be documented as appropriate. Material, weight, size, geometry, and location should be documented at a minimum. For example, if zip ties are present within the containment, they should be estimated based on walkdown observations. Engineering judgment may be used to scale the sampling results but justification should be documented to provide reasonable assurance that the values obtained are conservative. The material and its quality level (qualified / unqualified) should also be documented. Unqualified foreign materials should be removed to the extent possible.

D. Task 4: Reactive Metals / Materials Walkdown

The purpose of the reactive materials walkdown is to identify and quantify the reactive materials inside containment that could potentially contribute chemical precipitates to the suppression pool. The reactive metals and materials walkdown attachment report should document the findings of the reactive materials walkdowns and summarize the quantity of reactive materials with respect to surface area and mass that is submerged, in the spray zone, or above the spray zone.

Documentation and verification should include the following as applicable:

1. Photos of reactive material sources
2. Location in the containment building
3. Mass and surface area calculations
4. Basis for why each component was documented as containing reactive materials
5. Determination on whether some sources of reactive material can be easily removed from the submerged zone, or shielded from spray
6. Other relevant information

E. Reporting

The completed Attachment 2 or 3 should be sent to the BWROG ECCS Source Term Subcommittee Vice Chairman and the GEH BWROG Project Manager for storage and compilation.

V. Conclusion

Information gleaned from containment walkdowns form the basis for many activities in the BWROG ECCS Suction Strainer issue resolution effort. Walkdowns must be budgeted and scheduled well in advance in order to get the most impact from the evolution. Coordination is also required among many departments, including health physicists and outage managers. Recording and reporting the information to the BWROG is a very important final step so that source term issues can be addressed in a timely and complete manner.

VI. Implementation

This ECCS Containment Walkdown Procedure is considered implemented when the completion of Attachment 2 or 3 are scheduled as part of the necessary walkdown report documentation.

VII. Technical Reference Documents

The BWROG has prepared the following documents to support the walkdowns:

1. BWROG-TP-08-035, "Drywell & Wetwell Walkdown Guidance Document," Revision 0, dated January 21, 2009.

2. BWROG-TP-09-001, "Containment Walkdown Procedure for Potential Strainer Debris Sources at BWR Nuclear Power Plants," Revision 0, dated January 28, 2009.

VIII. Attachments

Walkdown Decision Tree

Containment Walkdown Summary Sheet

Containment Walkdown Summary Sheet for URG Method 3 Plants

Walkdown Decision Tree

Determination of Required Drywell and Wetwell Walkdown Scope To Support ECCS Suction Strainer Resolution

Introduction

Industry and NRC staff activities addressing GSI-191, *Assessment of Debris Accumulation on PWR sump Performance*, and NRC Generic Letter 2004-02, *Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors,* issues for PWRs has significantly improved the nuclear industry's knowledge base regarding various technical aspects of suction strainer performance. This issue had its genesis with the BWR effort during the 1990's to remediate ECCS strainers in response to NRC Bulletin 96-03, *Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in BWRs*.

As part of the GSI-191 PWR Program, the NRC has identified differences between the PWR and BWR methodologies, including the debris source term and transport. By and large, the PWR program used the methodologies of the BWR NEDO-32686; Utility Resolution Guidance (URG) as a starting point, and built upon them. A result was additional levels of rigor in establishing debris source terms for each plant.

The objectives of the field walkdowns are to:

- Identify and document the type, location and extent of various types of potential debris sources and reactive materials inside the containment.
- Collect latent debris samples.

The extent of the field walkdowns is dependent on the methodologies used and technical documentation existing from the previous BWR URG efforts.

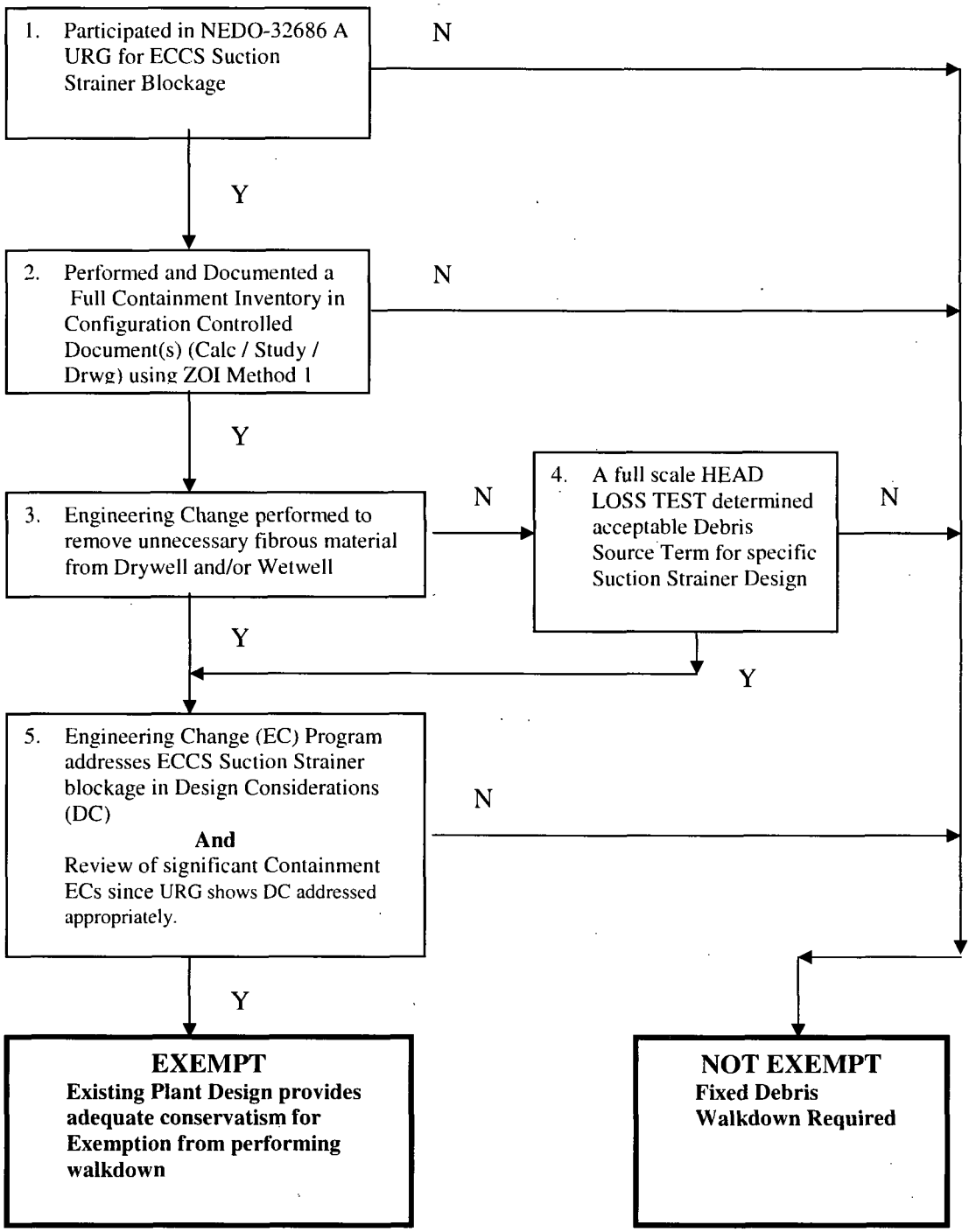
Technical Reference Documents:

The BWROG has prepared the following documents to support the walkdowns:

- BWROG-TP-08-035, "Drywell & Wetwell Walkdown Guidance Document," Revision 0, dated January 21, 2009.
- BWROG-TP-09-001, "Containment Walkdown Procedure for Potential Strainer Debris Sources at BWR Nuclear Power Plants," Revision 0, dated January 28, 2009.
- BWROG-TP-09-001 "Containment Walkdown Procedure for Potential Strainer Debris Sources at BWR Nuclear Power Plants," Revision 1, dated January 28, 2009

Walkdown Scope Determination for: Fixed Debris:

Decision Tree:



In accordance with Section 4.1.4 of TP-08-035, the walkdowns for Fixed Debris would include identification and evaluation of the following insulation materials:

PIPING and THERMAL INSULATION
Calcium Silicate (asbestos/non-asbestos)
Reflective Metal Insulation (RMI) or Mirror Insulation
NUKON®
Armaflex
TempMat™
Min_K
Kaowool
Koolphen®
Fiberfrax
FiberMat
Unibestos Block
Mineral Wool Blocks
Mineral Wool Blankets (Turbine Felt)
Corning Uni-Jac (Foamglas)
Refractory Mineral Fiber (Cerafelt)
Vi-Cryl C, CP-12-1
Microtherm

The walkdowns for Fixed Debris would also include identification and evaluation of the following materials:

3M type Fire Wrap
Conduit thermal protection insulation
Cable tray fire barrier stops
Fibrous insulation inside electrical junction boxes and electrical penetrations
Fibrous damming minerals used in fire stops and penetration seals

Walkdown Scope Determination Elements:

1. **Participated in NEDO-32686-A; Utility Resolution Guidance for ECCS Suction Strainer Blockage?**

   The Station formally participated in the NEDO-32686-A; Utility Resolution Guidance (URG) for ECCS Suction Strainer Blockage.

   ☐ **YES** ☐ **NO**

   Basis / References:

2. **Performed and Documented a Full Containment Inventory in Configuration Controlled Document(s) (Calc / Study / Drwg) using ZOI Method 1?**

   URG Section 3.2.1.2.3 (p. 36) identified four methods:
   Method 1: Entire drywell is assumed the Zone of Influence (ZOI): All insulation is assumed to become debris.
   Method 2: Target-based ZOI: ZOI selected based upon worst-case location of insulations
   Method 3: Break-Specific Analysis: ZOI's determined for largest identified pipe breaks
   Method 4: Computational Fluid Dynamics (CFD) used to determine more realistic ZOI(s).

   URG Method 1 is the most conservative method for determining the Debris Source Term. Within Method 1 it is also allowable per URG Guidance to use two transport factors; (1) entire Debris Source Term reaches the suppression pool, (2) a calculated amount of debris does not transport to the Suppression Pool through settling and interferences. Both are accepted per the URG, although a 100% transport factors provides greater conservatism.

   ☐ **URG Method 1** ☐ **URG Method 2** ☐ **URG Method 3**
   ☐ **URG Method 4** ☐ **Other**

   100% Transport Factors: ☐ **YES** ☐ **NO**

   Basis / References:

3. **Engineering Change performed to remove unnecessary fibrous material from Drywell and/or Wetwell**

   As a result of the URG for ECCS Suction Strainer Blockage the Station performed removal of unnecessary fibrous material from Containment used in the Head Loss analysis.

   ☐ **YES** ☐ **NO**

   Basis / References:

4. **A full scale HEAD-LOSS TEST determined acceptable Debris Source Term for specific Suction Strainer Design**

   As part of the URG, the Station justified their suction strainer design at the designed Debris Source Term by performing full-scale head-loss lab tests.

   The Station performed a full scale test and has the results documented in a report and available.

   ☐ **YES** ☐ **NO**

   Basis / References:

5. **Engineering Change Program and Insulation Installation Program addresses ECCS Suction Strainer blockage in Design Considerations AND Review of Containment Engineering Changes and containment related work orders since URG shows Design Consideration is addressed appropriately**

   Engineering Change Program Design Considerations (or Design Inputs) control the installation of fibrous insulation or potential debris that could impact the ECCS Suction Strainers within the Drywell and/or Wetwell.

   ☐ **YES** ☐ **NO**

   Basis / References:

Conclusions:

☐ **EXEMPT: Existing Plant Design provides adequate conservatism for Exemption from performing walkdown**

As a result of previous walkdown(s), conservatism in the determination of the Debris Source Term and programs controlling the plant configuration and limiting of possible debris sources through the Engineering Change/Modification process, the scope of the fixed debris walkdowns may be reduced to a confirmatory walkdown looking at the worst case breaks only and generally denoting the condition of the drywell and wetwell.

Basis / References:

☐ **NOT EXEMPT: Fixed Debris Walkdown Required**

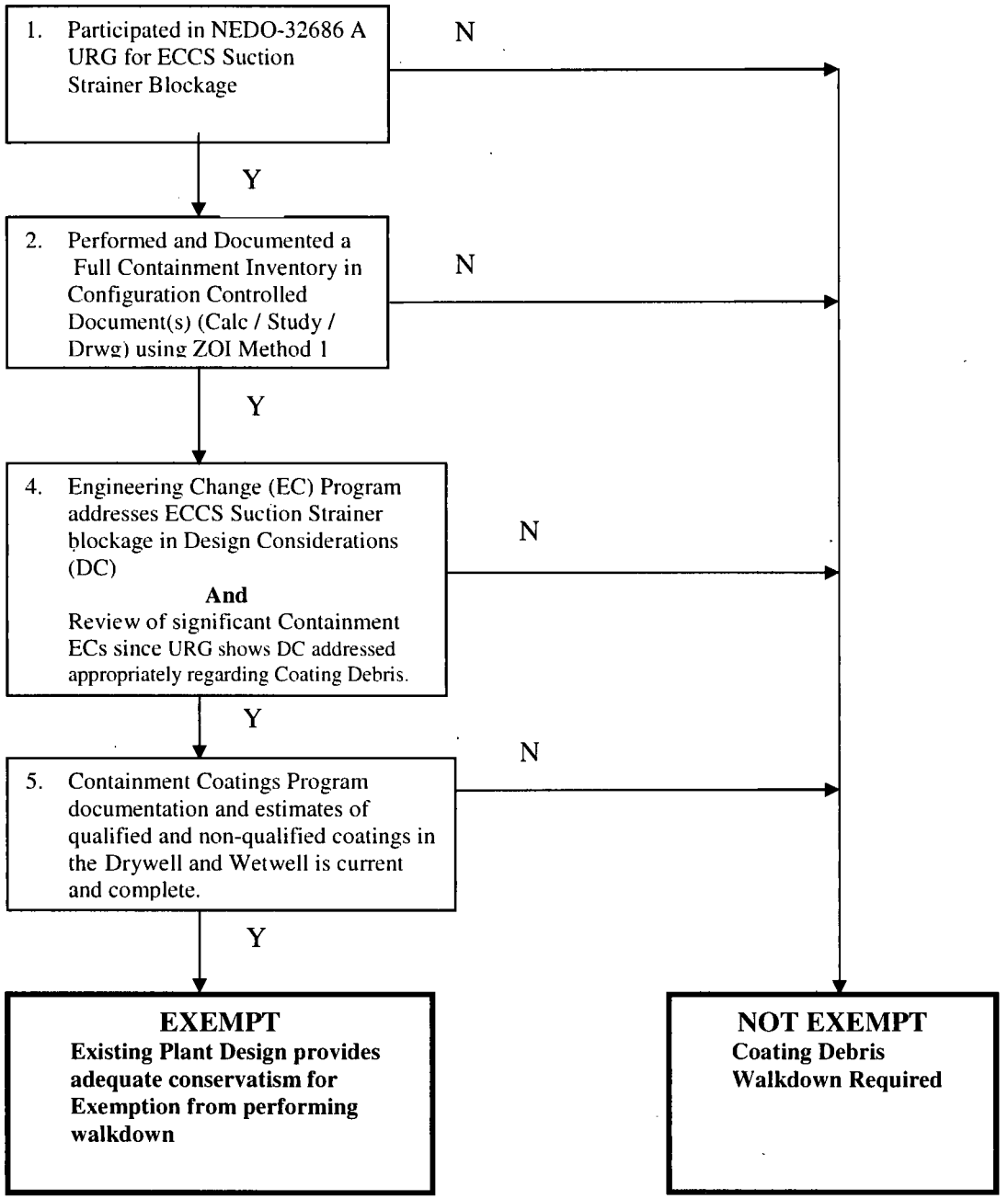
Based on the results of the decision tree guidance, a full-scope fixed debris walkdown in accordance with TP-08-035 and TP-09-01 is required.

In addition, a review of the Foreign Material Exclusion, Configuration Management and Housekeeping programs should be performed to ensure future walkdowns are not necessary. Also, ensure the Engineering Change/Modification program addresses through use of Design Considerations (and/or Design Inputs) any installation of fibrous material and other potential debris installed in either the drywell or wetwell.

Basis / References:

Walkdown Scope Determination for: Coatings:

Decision Tree:



The coatings walkdown(s) will be performed to identify and evaluate the condition of coatings on structures, systems and components.

For qualified coatings, the ECCS Blockage URG recommended the use of a generic maximum value of qualified coating debris for the appropriate plant-specific coating type using a ZOI based on an ANSI steam jet model. Qualified coatings outside the ZOI are not expected to fail.

For unqualified or indeterminate coatings, the ECCS Blockage URG recommended that stations perform an evaluation to establish the quantity and characterization of this coatings debris assumed to be available for transport from the drywell to the wetwell.

The ECCS Blockage URG recommended an assumption that 100% of the failed coatings will reach the strainers.

Walkdown Scope Determination Elements:

1. **Participated in NEDO-32686-A; Utility Resolution Guidance for ECCS Suction Strainer Blockage?**

   The Station formally participated in the NEDO-32686-A; Utility Resolution Guidance (URG) for ECCS Suction Strainer Blockage.

   ☐ **YES** ☐ **NO**

   Basis / References:

2. **Performed and Documented a Full Containment Inventory in Configuration Controlled Document(s) (Calc / Study / Drwg) using ZOI Method 1?**

   URG Section 3.2.1.2.3 (p. 36) identified four methods:
   Method 1: Entire drywell is assumed the Zone of Influence (ZOI): All insulation is assumed to become debris.
   Method 2: Target-based ZOI: ZOI selected based upon worst-case location of insulations
   Method 3: Break-Specific Analysis: ZOI's determined for largest identified pipe breaks
   Method 4: Computational Fluid Dynamics (CFD) used to determine more limited ZOI(s).

URG Method 1 is the most conservative method for determining the Coating Debris Source Term. Assuming the entire drywell is the ZOI will result in a conservative maximum value for qualified coating debris and also envelope all unqualified or indeterminate coatings in the entire drywell. The ECCS Blockage URG recommended assumption that 100% of the failed coatings will reach the strainers provides greater conservatism.

☐ **URG Method 1** ☐ **URG Method 2** ☐ **URG Method 3**
☐ **URG Method 4** ☐ **Other**

Basis / References:

3. **Engineering Change Program addresses ECCS Suction Strainer blockage in Design Considerations AND Review of significant Containment Engineering Changes since URG shows Design Consideration is addressed appropriately**

   Engineering Change Program Design Considerations (or Design Inputs) control the installation of or changes coating system(s) installed in both the drywell and wetwell.

   ☐ **YES** ☐ **NO**

   Basis / References:

4. **Containment Coatings Program documentation and estimates of qualified and non-qualified coatings in the Drywell and Wetwell is current and complete.**

   GL 98-04, "Potential for Degradation of the ECCS and the CS System after a LOCA because of Construction and Protective Coating Deficiencies and Foreign Material in Containment," required licensees to provide the NRC with a description of their programs for qualified and unqualified coatings.

   The station has a Containment Coatings Program with current and complete documentation and estimates of qualified and non-qualified coatings in the Drywell and Wetwell.

   ☐ **YES** ☐ **NO**

   Basis / References:

Conclusions:

☐ **EXEMPT: Existing Plant Design provides adequate conservatism for Exemption from performing walkdown**

As a result of previous thorough walkdown(s), conservatism in the determination of the Coatings Debris Source Term and strong programs controlling the plant configuration and limiting of possible coatings debris sources through the Engineering Change/Modification process and a current Containment Coatings Program, the scope of the coating debris walkdowns may be reduced to those required by the Containment Coatings Program.

Basis / References:

☐ **NOT EXEMPT: Coating Debris Walkdown Required**

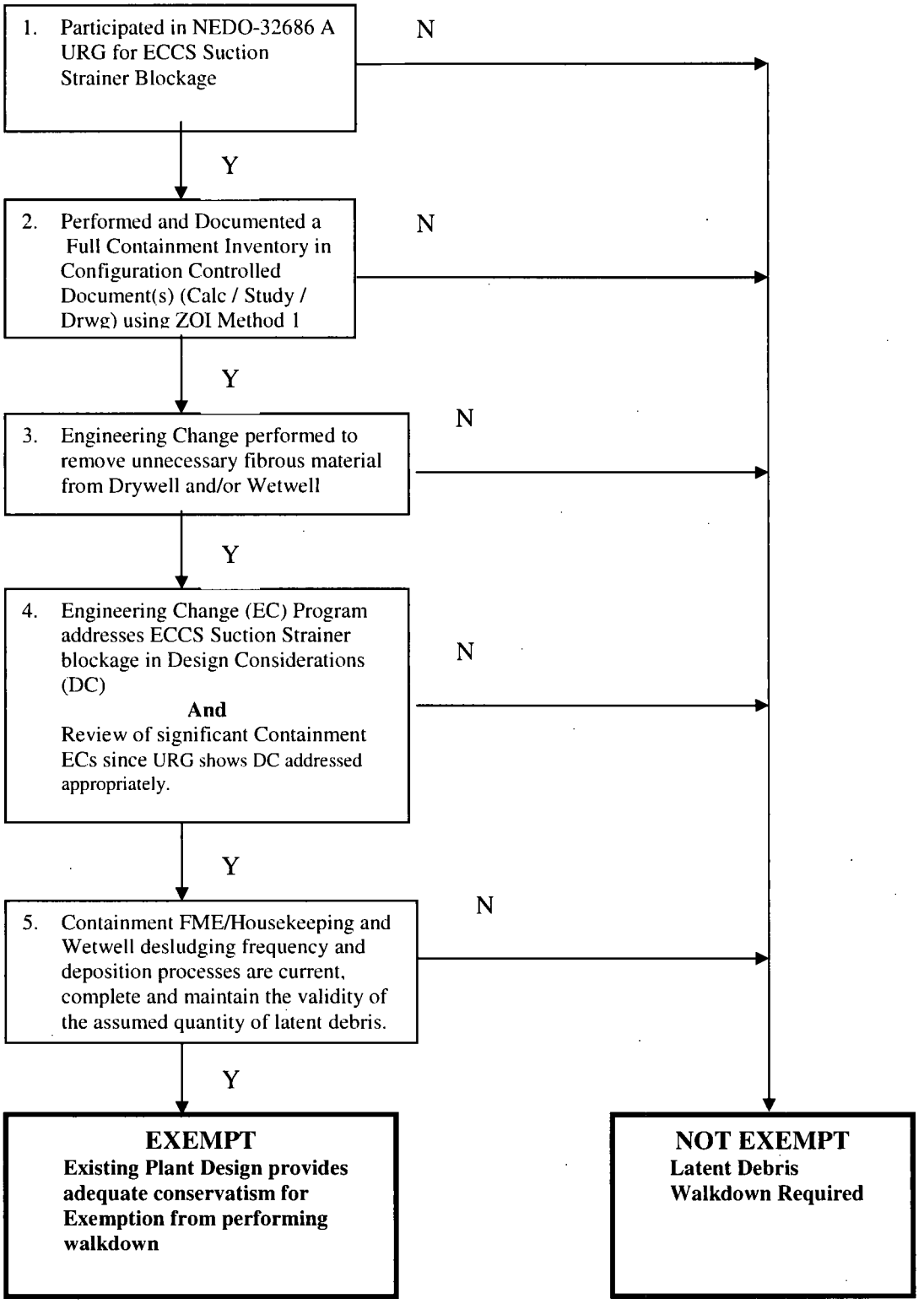
Based on the results of the decision tree guidance, a full-scope coating debris walkdown in accordance with TP-08-035 and TP-09-01 is required.

In addition, a review of the Containment Coatings programs should be performed to ensure future walkdowns are not necessary. Also, ensure the Engineering Change/Modification program addresses through use of Design Considerations (and/or Design Inputs) any installation of or change to the coating system(s) installed in either the drywell or wetwell.

Basis / References:

Walkdown Scope Determination for: Latent Debris:

Decision Tree:



In accordance with Section 4.2 of TP-08-035, the walkdowns for Latent Debris would include identification and evaluation of the following:

Misc loose debris
Dirt, loose paint chips, etc
Rust on piping, equipment and structural steel
Iron Oxide sludge
Plastic sheathing on flexible conduits and cabling
Tape used for markings on conduits and cables
Lead Wool Blankets
Labels on valves, equipment, cable trays, etc that may be susceptible to destruction or delamination due to exposure to LOCA fluid jets or long term LOCA environment in the containment

Walkdown Scope Determination Elements:

1. **Participated in NEDO-32686-A; Utility Resolution Guidance for ECCS Suction Strainer Blockage?**

   The Station formally participated in the NEDO-32686-A; Utility Resolution Guidance (URG) for ECCS Suction Strainer Blockage.

   ☐ **YES** ☐ **NO**

   Basis / References:

2. **Performed and Documented a Full Containment Inventory in Configuration Controlled Document(s) (Calc / Study / Drwg) using ZOI Method 1?**

   URG Section 3.2.1.2.3 (p. 36) identified four methods:
   Method 1: Entire drywell is assumed the Zone of Influence (ZOI): All insulation is assumed to become debris.
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   Method 3: Break-Specific Analysis: ZOI's determined for largest identified pipe breaks
   Method 4: Computational Fluid Dynamics (CFD) used to determine more limited ZOI(s).

   URG Method 1 is the most conservative method for determining the Latent Debris Source Term. Within Method 1 it is also allowable per URG Guidance to use two transport factors; (1) entire Debris Source Term reaches the suppression pool, (2) a calculated amount of debris does not transport to the Suppression Pool through settling and interferences. Both are accepted per the URG, although a 100% transport factors provides greater conservatism.

☐ **URG Method 1** ☐ **URG Method 2** ☐ **URG Method 3**
☐ **URG Method 4** ☐ **Other**

100% Transport Factors: ☐ **YES** ☐ **NO**

Basis / References:

3. **Engineering Change performed to remove unnecessary fibrous material from Drywell and/or Wetwell**

   As a result of the URG for ECCS Suction Strainer Blockage the Station performed removal of unnecessary fibrous material from Containment to possibly provide margin for the Debris Source Term used in the Head Loss analysis.

   ☐ **YES** ☐ **NO**

   Basis / References:

4. **Engineering Change Program addresses ECCS Suction Strainer blockage in Design Considerations AND Review of significant Containment Engineering Changes since URG shows Design Consideration is addressed appropriately**

   The URG defined the use of a generic value of 150 lbs. of dirt and 50 lbs of rust for latent debris. Alternately, some stations performed specific analysis to develop a limiting value for latent debris.

   Engineering Change Program Design Considerations (or Design Inputs) control the installation of potential latent debris, such as plastic sheathing on flexible conduits and cabling, tape used for markings on conduits and cables, lead wool blankets, or labels on valves, equipment, cable trays, etc, that could impact the ECCS Suction Strainers within the Drywell and/or Wetwell.

   ☐ **YES** ☐ **NO**

   Basis / References:

5. Containment FME/Housekeeping and Wetwell de-sludging frequency processes are current, complete and maintain the validity of the assumed quantity of latent debris.

The URG put forward the expectation that each station have a performance goal for their FME/housekeeping program to maintain the validity of the assumed quantity of latent debris. This should include containment FME and closeout inspections for latent debris and also monitoring and estimation of sludge buildup in the Wetwell / Suppression Pool.

The station Containment FME/Housekeeping processes are current, complete and maintain the validity of the assumed quantity of latent debris in the Drywell and Wetwell.

☐ **YES** ☐ **NO**

The station processes for monitoring and estimation of sludge buildup in the Wetwell / Suppression Pool are current, complete and maintain the validity of the assumed quantity of latent debris.

☐ **YES** ☐ **NO**

Basis / References:

Conclusions:

☐ **EXEMPT: Existing Plant Design provides adequate conservatism for Exemption from performing walkdown**

As a result of previous thorough walkdown(s), conservatism in the determination of the Latent Debris Source Term and strong programs controlling the plant configuration and limiting of possible latent debris sources through the Engineering Change/Modification process and current Containment FME/Housekeeping and Wetwell sludge deposition processes, the scope of the latent debris walkdowns may be reduced to those required by the Containment FME/Housekeeping and Wetwell sludge deposition processes. It is recommended that a confirmatory walkdown be performed generally denoting the condition of the drywell and wetwell.

Basis / References:

☐ **NOT EXEMPT: Latent Debris Walkdown Required**

Based on the results of the decision tree guidance, a full-scope latent debris walkdown in accordance with TP-08-035 and TP-09-01 is required.

In addition, a review of the Foreign Material Exclusion, Configuration Management and Housekeeping programs should be performed to ensure future walkdowns are not necessary. Also, ensure the Engineering Change/Modification program addresses through use of Design Considerations (and/or Design Inputs) any installation of fibrous material and other potential latent debris installed in either the drywell or wetwell.

Basis / References:

Containment Walkdown Summary Sheet

Debris Source Term Walkdown Results Summary Worksheet (p 1 of 2)

Debris Sources	Specific Debris Name	URG Value (units)	Current Configuration Control Value (units)	Walkdown Exempt (Y/N)	Walkdown Results (units)	New DST Value (units)
FIXED	RMI or Mirror Insulation					
Materials that are part of the plant design, which when subjected to the direct effects of a high energy line break could be damaged or destroyed and become a potential source of transportable debris.	Calcium Silicate (encased / exposed)					
	NUKON®					
	Min-K					
	TempMat™					
	Microtherm					
	Kaowool					
	Koolphen-K®					
	Other _____					
	Other _____					
TRANSIENT	Other _____					
Such as non-permanent items brought into containment typically during outages	Other _____					
	Other _____					
	Other _____					
	Other _____					
LATENT	Dirt on floors, pipes, and equipment					
Materials inside containment that may become a debris source as a result of degradation due to the effects of post-LOCA environmental conditions.	Rust on pipes, equipment, structural steel					
	Sludge					
	Lead Wool Blankets					
	Labels on valves and equipment					
	Tape for markings on conduits and cables					
	Other _____					
	Other _____					

Debris Source Term Walkdown Results Summary Worksheet (p 2 of 2)

Debris Sources	Specific Debris Name	URG Value (units)	Current Configuration Control Value (units)	Walkdown Exempt (Y/N)	Walkdown Results (units)	New DST Value (units)
COATINGS	Qualified Coatings – Top Coat					
Paint or other coatings applied to walls, floors, structural steel, equipment, electric panels	Qualified Coatings - Primer					
	Unqualified Coatings – Top Coat					
	Unqualified Coatings - Primer					
	Other _____					
REACTIVE MAT.	Aliminum	n/a				
Fine precipitates can form from reactions with leaching chemicals from the containment's reactive materials.	Zinc	n/a				
	Nickel	n/a				
	Carbon	n/a				
	Other _____					

NOTES:

Containment Walkdown Summary Sheet for URG Method 3 Plants

Debris Source Term Walkdown Results Summary Worksheet for Method 3 Plants (p 1 of 3)

Unit Number	
ZONE of Influence Identifier Number[1]	

Debris Sources	Specific Debris Name	Current DST within ZOI (units)	URG Case DST in Suppression Pool (units)[3]	Walkdown Exempt (Y/N)	Walkdown Results Value within ZOI (units)	New DST Value within ZOI (units)	New DST Value in Suppression Pool (units)
FIXED	RMI or Mirror Insulation						
Materials that are part of the plant design, which when subjected to the direct effects of a high energy line break could be damaged or destroyed and become a potential source of transportable debris.	Calcium Silicate (exposed)						
	Calcium Silicate (encased)						
	NUKON® (above lowest grating)						
	NUKON® (below lowest grating)						
	Min-K						
	TempMat™						
	Microtherm						
	Kaowool						
	Koolphen-K®						
	Lead Wool Blankets [4] (if covering included as equivalent insulation) Insulation type_____						
	Lead Plate Blankets [4] (if covering included as equivalent insulation) Insulation type_____						
	Other _____						
	Other _____						

1) Individual Debris Source Term Walkdown Results Summary Page 1 Worksheets should be completed for each zone of influence and each Unit for URG Method 3 plants

2) Pre-walkdown limiting ZOI design basis value of debris source term within ZOI (value not reduced by transport factors)

3) Pre-walkdown ZOI design basis value of debris source term within suppression pool (value reduced by transport factors)

4) Rows may be duplicated for different lead blanket geometries

NOTES:

Debris Source Term Walkdown Results Summary Worksheet for Method 3 Plants (p 2 of 3)

Debris Sources	Specific Debris Name	URG Value (units)	Current Configuration Control Value (units)	Walkdown Exempt (Y/N)	Walkdown Results (units)	New DST Value (units)
TRANSIENT	Other _____					
Such as non-permanent items brought into containment typically during outages	Other _____					
	Other _____					
	Other _____					
	Other _____					
LATENT	Dirt on floors, pipes, and equipment					
Materials inside containment that may become a debris source as a result of degradation due to the effects of post-LOCA environmental conditions.	Rust on pipes, equipment, structural steel					
	Sludge					
	Lead Wool Blankets [1]					
	Labels on valves and equipment					
	Tape for markings on conduits and cables					
	Other _____					
	Other _____					

1) Rows may be duplicated for different lead blanket geometries

NOTES:

Debris Source Term Walkdown Results Summary Worksheet for Method 3 Plants (p 3 of 3)

Debris Sources	Specific Debris Name	URG Value (units)	Current Configuration Control Value (units)	Walkdown Exempt (Y/N)	Walkdown Results (units)	New DST Value (units)
COATINGS	Qualified Coatings – Top Coat					
Paint or other coatings applied to walls, floors, structural steel, equipment, electric panels	Qualified Coatings - Primer					
	Unqualified Coatings – Top Coat					
	Unqualified Coatings - Primer					
	Other _____					
REACTIVE MAT.	Aliminum	n/a				
Fine precipitates can form from reactions with leaching chemicals from the containment's reactive materials	Zinc	n/a				
	Nickel	n/a				
	Carbon	n/a				

materials.	Other _____					

NOTES: