



Department of Energy

Portsmouth/Paducah Project Office
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513
(859) 219-4000

MAR 30 2015

DISTRIBUTION LIST

PPPO-02-2742794-15

Dear Madam/Sirs:

DEFERRED MAINTENANCE REPORT

The enclosed memorandum is a Headquarters (HQ) report on the status of deferred maintenance within the U.S. Department of Energy (DOE) Environmental Management. As indicated in the memorandum, the recommendations will be addressed within an implementation plan for the lessons learned from the events at the DOE Carlsbad Site. Please review the recommendations in preparation for addressing the actions that will be forthcoming in the future HQ memorandum. Please provide within 60 days of the issuance of this letter a draft listing of the set of systems and components that would be considered safety-related and would warrant tracking within your maintenance program and would be reflected in metrics for deferred maintenance. Section E of the enclosed Deferred Maintenance Report provides guidance for identifying safety-related systems.

If you have any questions or require additional information, please contact Tom Hines at (270) 441-6829.

Sincerely,

for David R. Swett
Robert Swett
Lead Procurement Official
Portsmouth/Paducah Project Office

Enclosure:
Deferred Maintenance Report

e-copy w/enclosure:

brandy.mitchell@ffspaducah.com, FFS/Kevil
con.murphy@ffspaducah.com, FFS/Kevil
correspondence@duf6.com, BWCS/LEX
daniel.lillard@lex.doe.gov, PPPO/PAD
danielle.bullishak@lex.doe.gov, SMSI/LEX
david.senderling@lex.doe.gov, PPPO/LEX
dennis.carr@fbports.com, FBP/PORTS
detillionda@wems-llc.com, WEMS/PORTS
elizabeth.keeling@ffspaducah.com, FFS/Kevil
fred.hughes@fbports.com, FBP/PORTS
gary.hoovler@fbports.com, FBP/PORTS
greg.wilkett@fbports.com, FBP/PORTS
gregory.hock@fbports.com, FBP/PORTS
james.johnson@lex.doe.gov, PPPO/PAD
jan.preston@ffspaducah.com, FFS/Kevil
jdwoolery@duf6.com, BWCS/LEX
jennifer.stokes@lex.doe.gov, PPPO/LEX
jennifer.woodard@lex.doe.gov, PPPO/PAD
joel.bradburne@lex.doe.gov, PPPO/LEX
karen.walker@lataky.com, LATA/Kevil
latacorrespondence@lataky.com, LATA/Kevil
mark.duff@lataky.com, LATA/Kevil
matt.vick@lex.doe.gov, PPPO/LEX
megan.mulry@ffspaducah.com, FFS/Kevil
noah.lawson@lex.doe.gov, RSI/PORTS
onderac@wems-llc.com, WEMS/PORTS
pad.dmc@swiftstaley.com, SST/Kevil
paula.spear@lataky.com, LATA/Kevil
reinhard.knerr@lex.doe.gov, PPPO/PAD
robert.edwards@lex.doe.gov, PPPO/LEX
rochogg@duf6.com, BWCS/PAD
shannon.wathen@swiftstaley.com, SST/Kevil
susan.roberts@ffspaducah.com, FFS/Kevil
tldavis@duf6.com, BWCS/LEX
tom.hines@lex.doe.gov, PPPO/PAD

DISTRIBUTION LIST:

Mr. Dennis Carr, Site Project Manager
CONTRACT DE-AC30-10CC40017
Fluor-B&W Portsmouth, LLC
3930 US 23 S
Piketon, OH 45661

Mr. Damon Detillion, Project Manager
CONTRACT DE-CI0000004
Wastren-EnergX Mission Support, LLC
3930 US 23 S
Piketon, OH 45661

Mr. Mark J. Duff, Paducah Project Manager
CONTRACT DE-AC30-10CC40020
LATA Environmental Services of Kentucky, LLC
761 Veterans Avenue
Kevil, Kentucky 42053

Mr. Con Murphy, Program Manager
CONTRACT NO. DE-EM001131, TASK ORDER DE-DT0007774
Fluor Federal Services, Inc.
P.O. Box 369
Kevil, Kentucky 42053

Ms. Diane Snow, Program Manager
CONTRACT DE-AC30-10CC40021
Swift & Staley, Inc.
761 Veterans Avenue
Kevil, Kentucky 42053

Mr. John D. Woolery, President and Project Manager
CONTRACT DE-AC30-11CC40015
Babcock & Wilcox Conversion Services, LLC
1020 Monarch Street, Suite 300
Lexington, Kentucky 40513



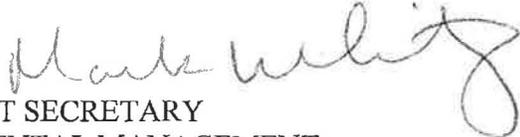
Department of Energy

Washington, DC 20585

January 12, 2015

MEMORANDUM FOR DISTRIBUTION

FROM:

MARK WHITNEY 
ACTING ASSISTANT SECRETARY
FOR ENVIRONMENTAL MANAGEMENT

SUBJECT:

Transmittal of Deferred Maintenance Report

On April 16, 2014, the then Acting Office of Environmental Management Assistant Secretary (EM-1) issued a memorandum to the EM sites requesting they perform extent of condition reviews on Deferred Maintenance (DM). In late July 2014, the Office of Safety, Security and Quality Programs (EM-40) formed a team and initiated a review of the site responses to the EM-1 memorandum. The team included EM-40 staff, representatives from the EM mission units, the Office of Program Planning and Budget, and the DOE Office of Environment, Health, Safety and Security.

Review of the responses indicated the majority of our contractors felt they were providing adequate resources for maintenance, and adequately maintaining safety-related equipment. As might be anticipated, several contractors related concerns with the condition and level of resources allocated towards maintaining site infrastructure. The DM Team also identified several areas of generic concern:

- Examples were identified at several sites in which portions of facility fire protection systems were out of service (impaired) for multiple years, with long-standing reliance on compensatory measures.
- Several contractors were experiencing negative trends in their Corrective Maintenance backlogs.
- Several contractors identified issues with recurring nuisance or sporadic alarms, representing a potential distraction to operator attention.
- Inconsistencies were noted with the use and communication of maintenance-related metrics.

The DM Team report included nine recommendations and one lesson-learned to address the above concerns. The recommendations will require action both at Headquarters (by EM-40) and in the field. EM-40 will be developing an Implementation Plan for the recommendations which will provide a schedule for EM-40 actions and additional information/guidance for any field required actions.

This memorandum communicates my acceptance of the attached DM Team report and its recommendations. I request you and your contractors begin familiarizing yourselves with



the report and its issues, pending further communication from EM-40 on implementation of the recommendations.

If you have any questions, please contact Mr. James Hutton, Acting Deputy Assistant Secretary for the Office of Safety, Security and Quality Programs, at (202) 586-5151.

Attachment

Distribution

Stacy Charboneau, Manager, Richland Operations Office
Kevin Smith, Manager Office of River Protection
David C. Moody, Manager, Savannah River Operations Office
Jose Franco, Manager, Carlsbad Field Office
William E. Murphie, Manager, Portsmouth/Paducah Project Office
Ralph Holland, Acting Director, Environmental Management Consolidated Business Center
Steven Feinberg, Manager, Separations Process Research Unit
Bryan Bower, Director, West Valley Demonstration Project Office
Donald Metzler, Director, Moab Federal Project Office
John P. Zimmerman, Deputy Manager for Idaho Cleanup Project
Susan Cange, Acting Manager, Oak Ridge Office of Environmental Management
John Jones, Federal Project Director, Energy Technology Engineering Center

cc: Richard H. Lagdon, Jr., CNS/EM-1
Monica C. Regalbuto, EM-2.1
Candice Trummell, EM-3
Mark A. Gilbertson, EM-10
Kenneth G. Picha, Jr., EM-20
Frank Marcinowski, EM-30
James Hutton, EM-40 (Acting)
J.E. Surash, EM-50
Connie Flohr, EM-60 (Acting)
Melody Bell, EM-70 (Acting)

**Office of Safety, Security and
Quality Programs (EM-40)**

**Summary of Environmental Management
Site Extent of Condition Reviews
of Deferred Maintenance**

December 2014



**U.S. DEPARTMENT OF
ENERGY**

**Summary of Environmental Management
Site Extent of Condition Reviews
of Deferred Maintenance**

Recommended for approval:



Tony Weadock
Deferred Maintenance Review Team Lead
Acting Director, Office of Operational Safety

12/16/14
Date

Approved by:



James Hutton
Acting Deputy Assistant Secretary
Safety, Security and Quality Programs

12/16/14
Date

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ACRONYMS AND ABBREVIATIONS

AIB	Accident Investigation Board
AMWTP	Advanced Mixed Waste Treatment Project
ANSI	American National Standards Institute
ATAT	Alarm Analysis and Tracking Tool
BWCS	Babcock and Wilcox Conversion Services, LLC
CHBWV	CH2M Hill, B&W West Valley, LLC
CHPRC	CH2M Hill Plateau Remediation Company
CM	Corrective Maintenance
CWI	CH2H-Hill Washington Group, Inc.
DCS	Digital Control System
D&D	Decontamination and Decommissioning
DMR	Deferred Maintenance Review
DOE	Department of Energy
DOE-SR	Department of Energy Savannah River
DSA	Documented Safety Analysis
DUF ₆	Uranium Hexafluoride
EAISPP	Enhanced Asset and Infrastructure Stewardship Program Plan
EM	Office of Environmental Management
EM-1	Office of the Assistant Secretary
EM-40	Deputy Assistant Secretary for Safety, Security, Quality Programs
EMWMF	Environmental Management Waste Management Facility
EOC	Extent of Condition
EPA	Environmental Protection Agency
ESRB	Executive Safety Review Board
ETEC	Energy Technology Engineering Center
ETTP	East Tennessee Technology Park
FBP	Fluor-Babcock & Wilcox Portsmouth
FFTF	Fast Flux Test Facility
FIMS	Facilities Information Management System
FIR	Field Inspection Report
FPD	Federal Project Director
GDP	Gaseous Diffusion Plant
HC	Hazard Category
HQ	Headquarters
HVAC	Heating, Ventilating, and Air Conditioning
ICP	Idaho Cleanup Project
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
IRPPL	Infrastructure Reliability Project Priority List
ITG	Idaho Treatment Group
LATA KY	LATA Environmental Services of Kentucky, LLC
LCO	Limiting Condition of Operation

MEG	Maintenance Executive Group
MEL	Master Equipment List
MF	Mandatory Factors
MIP	Maintenance Implementation Plan
MPI	Maintenance Program Initiative
MPPB	Main Plant Process Building
MSA	Mission Support Alliance
NFPA	National Fire Protection Association
NWP	Nuclear Waste Partnership, LLC
PM	Preventive Maintenance
PPPO	Portsmouth/Paducah Project Office
POM&C	Performance, Objectives Measures and Commitments
PORTS	Portsmouth Gaseous Diffusion Plant
O	Order
OREM	Office of Environmental Management
RTR	Real Time Radiography
SC	Safety Class
S&M	Surveillance and Maintenance
SME	Subject Matter Expert
SMP	Safety Management Program
SPRU	Separations Process Research Unit
SRNS	Savannah River Nuclear Solutions
SRR	Savannah River Remediation
SS	Safety Significant
SSC	Structures, Systems, and Components
SST	Swift and Staley, Inc.
TRU	Transuranic Waste
TSR	Technical Safety Requirement
TWPC	Transuranic Waste Processing Center
UCOR	URS/CH2M Oak Ridge, LLC
USEC	United States Enrichment Corporation
WAI	Wastren Advantage, Inc.
WCH	Washington Closure Hanford LLC
WEMS	Wastren-EnergX Mission Support, LLC
WIPP	Waste Isolation Pilot Plant
WRPS	Washington River Protection Systems
WTP	Waste Treatment & Immobilization Plant
WVDP	West Valley Demonstration Project

I. Executive Summary

On February 5, 2014, an underground fire involving a salt haul truck occurred at the Department of Energy's (DOE) Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. There were 86 workers in the mine (underground) when the fire occurred. All workers were safely evacuated. Two days later the DOE Office of Environmental Management (EM) formally appointed an Accident Investigation Board (AIB) to investigate the accident in accordance with DOE Order (O) 225.1B. The AIB's report identified direct, root and contributing causes of the event, including weaknesses in the preventive and corrective maintenance programs.

The Acting Assistant Secretary for Environmental Management (EM-1) issued a memorandum on April 16, 2014, directing an EM-wide Extent of Condition Review on Deferred Maintenance. The memorandum required each EM site to evaluate and respond to three fundamental questions: are sufficient resources being applied to system and equipment maintenance; are they maintaining up to date configuration management; and are necessary upgrades being made to support system infrastructure. In addition, the memorandum also requested that sites evaluate a list of mandatory factors (MFs) and their associated data over the last two years.

A Deferred Maintenance Review (DMR) team, to be led by the Office of Safety, Security, and Quality Programs (EM-40), was established by senior EM management to review the site responses. The DMR team's objectives were to evaluate the content and the overall responsiveness of the site reports to the questions posed by the EM-1 memorandum; follow up with the sites as necessary to collect additional information or clarification of the original responses; identify specific concerns associated with maintenance that should be highlighted to EM senior management; identify potential generic issues or lessons-learned that should be communicated to other EM sites; and provide specific recommendations for follow-up.

Each EM site responded to the EM-1 direction and submitted reports from their contractor(s). The DMR team noted that there was substantial variability in the scope and detail of responses received from the various EM contractors. Although most contractors addressed the majority of the MFs, the level of detail provided varied significantly. The presentation of the factors also varied considerably, with some submittals relying strictly on a numerical counting, and others providing an actual trend of the data. Despite these inconsistencies, the DMR team noted that review of performance against the mandatory factors was productive in identifying specific concerns.

The majority of EM contractors were able to answer the three fundamental questions identified above as either "Yes" or a "conditional Yes," indicating that adequate resources were being allocated towards maintenance, and that safety-related systems and equipment were being effectively maintained. A "conditional Yes" response indicates that the current condition is viewed as being safe and adequate; however, a continuing decline in physical condition or funding could result in the future curtailment of

operations. The question resulting in the majority of “No” responses from contractors pertained to making the necessary upgrades to site infrastructure, with several contractors providing a negative response. However, all EM contractors were found to be prioritizing their infrastructure upgrades to focus on the continuing availability of safety significant/safety class (SS/SC) equipment and essential utilities.

DMR team discussions with site DOE and contractor personnel identified that many had completed WIPP-related follow up actions (i.e., emergency response drills, training), but these actions were not documented in their responses due to the EM-1 memorandum’s focus on deferred maintenance. The DMR team believes that these WIPP follow-up actions should be systematically collected and evaluated by EM, and recommended to the Acting Deputy Assistant Secretary for EM-40 that a formal approach to collect this information be undertaken. A memorandum requesting EM sites to submit information on their WIPP follow up actions was subsequently developed and provided to EM-1 for consideration.

The DMR team did identify a concern with local acceptance of long-standing fire protection impairments. Compensatory measures were being implemented as required by the impairments; however, the DMR team views the application of long-term administrative controls to compensate for safety-related system deficiencies to be a poor practice due to the potential for such controls to degrade over time. The DMR team also found that contractors are typically prioritizing their maintenance activities (both preventive and corrective) to ensure the continuing operability of SS/SC systems and equipment, as evidenced by a typically high availability of such systems and equipment. However, many contractors did report either high or increasing Corrective Maintenance (CM) backlogs. Although these backlogs are not affecting SS/SC systems, this has the potential to be a more significant problem if not addressed in the near term. Similar to the CM backlog in many respects is the unacceptably high number of nuisance and sporadic alarms at certain EM facilities. The DMR team also determined that the lack of uniform metrics across EM sites made complex-wide evaluations and comparisons quite difficult. There was significant variation in the metrics being monitored between sites as well as the methodologies for performing similar metrics.

Although this report identifies a number of concerns, accompanied by recommendations and lessons learned, the DMR team concluded that safety-related systems are being adequately maintained across the EM complex, with the exceptions noted in this report.

Recommendations:

The DMR team recommends the following:

1. EM Headquarters (HQ) systematically collect and evaluate EM site corrective actions taken in response to the AIB report on the salt haul truck fire at WIPP.
2. Local DOE entities at EM sites perform a review to identify and address long-standing fire protection impairments involving long-term compensatory measures and/or administrative controls and identify corrective actions to resolve such impairments.
3. An EM HQ Fire Protection Subject Matter Expert should independently review corrective action plans developed in association with Recommendation 2.
4. EM HQ issue clarifying guidance outlining EM expectations related to the appropriate use of impairments and fire protection equivalencies.
5. EM follow-up reviews be performed at those sites reporting increasing CM backlog trends to evaluate the effectiveness of corrective actions.
6. EM follow-up reviews be performed at those sites reporting issues associated with nuisance and/or sporadic alarms to evaluate the effectiveness of corrective actions.
7. EM contractors track and report quarterly to local DOE the trending information for the following minimum set of maintenance related metrics:

Direct Metrics

- CM backlog (to be defined as noted below)
- CM work request age
- Preventive maintenance backlog including items in grace period
- Preventive maintenance delinquencies
- Scheduled vs completed work requests
- Maintenance budget

Indirect Metrics

- Number of unplanned Technical Safety Requirement (TSR) Limiting Condition of Operation (LCO) entries
- SS/SC system availability
- Number and age of inoperable SS/SC systems
- Fire protection system impairments age

8. EM HQ develops a standardized definition/approach for tracking maintenance backlogs, to ensure the metric conveys meaningful information about planned work activities.
9. EM field sites formally define their applicable set of safety-related systems, and initiate adjustments to their data collection/metrics systems to allow for the periodic monitoring of these systems and tracking of operable status.

Lessons-Learned

Several respondents to the EM-1 memorandum expressed confusion which stemmed from the undefined term “safety-related,” the apparent lack of applicability of many of the MFs, and the desired response for several of the MFs. Future EM HQ initiatives requesting performance data should be as detailed as possible regarding the information being requested, and anticipated values and units for response.

II. Introduction/Background

On February 5, 2014, an underground mine fire involving a salt haul truck occurred at the Department of Energy (DOE) Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. There were 86 workers in the mine (underground) when the fire occurred. All workers were safely evacuated. Two days later the U.S. Department of Energy, Office of Environmental Management (EM) formally appointed an Accident Investigation Board (the board) to investigate the accident in accordance with DOE Order (O) 225.1B.

The Board began the investigation on February 10, 2014, completed the investigation on March 8, 2014, and submitted findings to the EM on March 11, 2014. The report identified direct, root and several contributing causes of the event, and weakness in the preventive and CM program was called out in both the root and contributing cause areas. Specifically, maintenance of the salt haul truck to prevent and correct the buildup of combustibles was found to be a significant contributor to the event.

To ascertain whether weaknesses exist in other EM sites' maintenance management programs, the Acting Assistant Secretary for Environmental Management (EM-1) issued a memorandum on April 16, 2014, requesting an EM-wide Extent of Condition Review on Deferred Maintenance (Appendix A). The memorandum directed the sites to perform an initial extent of condition review and to assess among other areas, whether the site is applying sufficient resources to system and equipment maintenance, maintaining up to date configuration control, and making necessary upgrades to support system infrastructure. Further, the memorandum requested that sites consider a list of attached MFs, to cover a period of at least two years, and to consider and assess corrective and preventive maintenance backlogs, nature and age of operator work-arounds and compensatory actions, and to assess cumulative impact of the combination of degraded equipment on overall facility operational readiness.

The EM field sites (and corresponding contractors) responded to the EM-1 memorandum and submitted written reports. A Deferred Maintenance Review (DMR) team, led by the Office of Safety, Security and Quality Programs (EM-40), was established by senior EM management to review the site responses.

III. Approach

The DMR team was established consisting of team members from the EM-40 subsidiary offices and representatives from the EM HQ mission units. The team also included a representative from the Office of Environment, Health, Safety and Security. Team membership is shown in Appendix B. During the conduct of this review, the DMR team systematically reviewed the sites' submitted responses to the EM-1 memorandum. A sub-group of the DMR team reviewed all submitted reports, while the DMR team mission unit members and EM-44 team members reviewed those reports applicable to their assigned sites and/or facilities. Where it was determined to be necessary, the DMR team also conducted conference calls with site representatives (or in the case of FBP Portsmouth, a videoconference call) to discuss the submitted reports and ask follow-up questions on their submittals. A subset of the DMR team also conducted site visits to Savannah River (August 12-14, 2014) and Idaho (August 26-28, 2014) to perform a more in-depth follow up to the submitted reports; these sites were selected based on the scope of issues indicated in their responses.

The overall objectives of the DMR team review included:

- Evaluate the content and the overall responsiveness of the site reports to the questions posed by the EM-1 memorandum.
- Follow up with the sites as necessary to collect additional information or clarification of the original responses.
- Identify specific concerns associated with maintenance that should be highlighted to EM senior management.
- Identify potential generic issues or lessons-learned that should be communicated to other EM sites.
- As necessary, provide specific recommendations for follow-up.

It should be noted that the DMR team effort represents an attempt to systematically review responses to the EM-1 memorandum, and highlight potential concerns in the site responses to EM management and other EM sites. It does not represent an independent assessment of contractor and maintenance program implementation at each responding site, and the DMR team will not be making recommendations as to what specific site projects should be funded. Such funding recommendations are beyond the scope of the DMR review, particularly as no data was provided in the site responses to support such funding decisions.

IV. Results

A. Variability in Site Responses

The April 16, 2014, EM-1 memo directing sites to perform Extent of Condition reviews used the term “safety-related” when discussing structures, systems and components (SSCs), rather than a more explicitly defined category of SSCs (such as SS or SC), which has specific implications with reference to facility safety basis documentation. The use of the more generic “safety-related” term was intended so that contractors would include a broader scope of SSCs in their response, considering those systems that might impact worker safety even if not specifically credited in the Documented Safety Analysis (DSA), and include other facilities not required to have a DSA. This DMR report will also use the term “safety-related” (without further use of quotation marks) to indicate that broad category of SSCs that might impact worker safety even when not credited in a DSA.

Responses to the EM-1 memorandum were found to vary widely in the scope of their review and level of information presented in the response. Responses ranged from 1-2 page memos (for sites with smaller operating footprints) to detailed reports in excess of 100 pages. It was noted that several sites limited the scope of their responses (e.g., to just include Hazard Category (HC) 2 and 3 facilities, or to just consider SS/SC systems, while other sites expended significant time and effort to define and consider a broader category of safety-related systems. A comparison was performed to identify the safety-related systems most frequently cited by the respondents; those systems are discussed in section IV.E.

Sites also varied in their treatment of the MFs that were presented in the EM-1 memorandum for consideration in the site responses. Some contractors only addressed a subset of the MFs, based on an interpretation (by the contractor or local DOE) that many of the MFs were not applicable. Other contractors, however, went with the “spirit” of the factors and tried to apply them to their specific situation (e.g., sites without control rooms evaluated the number of lit indicators at individual control panels). Additional detail on site implementation of the MFs is provided in section IV.D.4.

Despite the inconsistencies among responses, the DMR team noted that review of performance against the MFs was productive in identifying specific concerns (discussed in section IV.D). The DMR team noted that some contractors also used specific MFs (e.g., system availability, unplanned LCO entries) to support their conclusions related to the overall viability of their maintenance programs.

The overall variability of site responses, as noted above (along with their varying applicability), makes comparisons between sites difficult and also limited the team in drawing generic conclusions from the responses. The variability of responses in this area, however, support a future lesson-learned in regards to the level of detail in data calls (**LESSON LEARNED**).

B. Overview of Responses

The DMR team's review of the submitted responses identified a number of potentially significant concerns with aging facilities, equipment and infrastructure. Several sites were noted to have concerns with high or increasing CM backlogs; potentially generic issues were also communicated related to nuisance alarms and long-standing fire protection impairments (see section IV.D).

Despite these concerns, the DMR team found that the majority of contractors responded in the affirmative to the three basic questions posed by the EM-1 memorandum (i.e., *are you allocating adequate resources to system and equipment maintenance; are you maintaining up to date configuration control; and are you making necessary upgrades to support system infrastructure?*), indicating in general that adequate resources were being allocated towards maintenance and that safety-related systems and equipment were being effectively maintained.

The table in Appendix C characterizes contractor responses to the EM-1 questions as a Yes/No answer; this characterization was either explicitly made in the contractor's response, or was determined through team follow-up discussion with the contractor and local DOE. Several contractors did provide what the team is considering a "conditional Yes" response to one or more of the basic EM-1 questions; as indicated by an asterisk (*) in the table. In summary, a contractor's "conditional Yes" response generally indicates that the current condition is viewed as being safe and adequate; however, a continuing decline in physical condition or funding that goes uncorrected could result in the future curtailment of operations.

The DMR team found that contractors are typically prioritizing their maintenance activities (both preventive and corrective) to ensure the continuing operability of SS/SC systems and equipment, as evidenced by a typically high availability of such systems and equipment. Although contractor maintenance databases are less effective at tracking activities related to more general safety-related systems and equipment, discussion with contractor staff also indicated their work prioritization systems typically assigns a high priority to any perceived safety-related work, not just SS/SC related work activities. System availability values for more general safety-related systems are not typically tracked and so were generally not reported in the site responses; however in the limited cases where they were reported (e.g., SRR, Isotek) availability values for such systems were typically high (80% or greater). During DMR team discussions with other responding contractors, availability for the more general safety-related systems was anecdotally related to be high.

Several contractors (Savannah River Nuclear Solutions (SRNS), Savannah River Remediation (SRR), Mission Support Alliance (MSA), Wastren-EnergX Mission Support (WEMS), and Washington River Protection Solutions (WRPS)) indicated they were not making adequate upgrades to site infrastructure; making this area (infrastructure) the most frequently cited negative response. Consistent with the above general maintenance discussion, the DMR team found that contractors were prioritizing their infrastructure

upgrades to focus on the continuing availability of SS/SC or critical equipment and essential utilities. The responses clearly indicate, however, the potential disruption of future operations based on infrastructure concerns. Although not specifically requested in the EM-1 memorandum, in order to obtain perspective, the DMR requested several contractors to identify their top unfunded maintenance needs (i.e., needed equipment or system upgrades); these are included in Appendix D. Individual summaries of the contractor/site responses are provided in Appendix E.

As part of their review, the DMR team did identify a concern with the acceptance of long-standing fire protection impairments (section IV.D.1) which appeared similar to maintenance issues identified in the WIPP Accident Investigation Report. The DMR team also noted that two of the site evaluations performed in response to the EM-1 memorandum included WIPP event-related evaluation criteria. Specifically, the DUF₆ review included an evaluation of inspections and maintenance performed on waste transportation vehicle and cylinder handling equipment, and the Idaho ITG evaluation included a secondary review of any recent DSA changes that had removed or downgraded controls.

DMR team discussions with various site DOE and contractor personnel identified that many had completed WIPP-related follow up actions (i.e., emergency response drills, training), but these actions were not documented in their responses due to the EM-1 memorandum's focus on maintenance. The DMR team was concerned these WIPP follow-up actions were not being systematically collected and evaluated by EM, and recommended to the Acting Deputy Assistant Secretary for EM-40 that a formal approach to collect this information be undertaken (**RECOMMENDATION**). A memorandum requesting EM sites to submit information on their WIPP follow up actions was subsequently developed and provided to EM-1 for consideration.

The following site responses were viewed as requiring specific discussion:

- The Fluor-B&W Portsmouth (FBP) response identified numerous significant infrastructure deficiencies at the Portsmouth site, including necessary upgrades to the power distribution systems, roof repairs, upgrades to the dry air plant, necessary upgrades to the steam plant, etc. FBP attributed the deficient conditions to a lack of infrastructure maintenance while the facilities were under the responsibility of the United States Enrichment Corporation (USEC). Despite the identified deficiencies at Portsmouth, during discussions with the DMR team FBP management responded affirmatively to the three EM-1 questions. As justification for this response, FBP indicated that with the recent extension of the Decontamination and Decommission (D&D) schedule at Portsmouth it was recognized that significant upgrades to infrastructure would have to be made. Consequently, during FY 2014 significant resources had been shifted from mission work to support maintenance and infrastructure upgrades, and further resource reallocations (i.e., from mission to maintenance) are being planned for FY 2015. It should be noted that similar infrastructure deficiencies are anticipated to be associated with the GDP buildings transition from USEC to DOE at Paducah in October 2014

- Although Preventive Maintenance (PM) backlogs were generally noted to be under control, several contractors demonstrated increasing CM backlogs. Section IV.D.2 of this report provides an expanded discussion in this area.
- The Energy Technology Engineering Center (ETEC) and Separations Process Research Unit (SPRU) responses were found to be limited and did not address the mandatory factors in the EM-1 memorandum. Subsequent discussion with each Federal Project Director (FPD) supplemented the initial responses and indicated maintenance activities appeared adequate given the nature and scope of site activities. With respect to Moab, another small site, the team found the Moab response to be significantly more expansive and included an evaluation of the relevant mandatory factors. The Moab response noted an ongoing concern in configuration control (adequacy of system drawings) which resulted in the FPD answering “No” with respect to adequacy of configuration controls; however, corrective actions in this area have been initiated and the FPD indicated drawing upgrades would be complete by December 2014.
- Due to competing accident recovery priorities, the DOE Carlsbad Field Office (CBFO) provided both an initial limited response and supplemental response to the EM-1 memorandum. Neither of these submittals explicitly addressed the fundamental questions in the EM-1 memorandum related to maintenance resources, configuration control and infrastructure upgrades. Consequently during a DMR team conference call with CBFO and NWP on October 8, 2014, these topics were discussed. NWP management indicated that current site configuration control was adequate to reflect system configuration, and that given the site’s recovery status sufficient resources were available to support needed infrastructure upgrades and there were no significant unfunded maintenance needs. NWP indicated a recent gap analysis had identified the need for additional maintenance staff (work planners, maintenance workers and supervisors); although these positions were authorized and funded they had not yet been filled (thus representing a “No” response to the maintenance resource question). NWP also identified their computerized maintenance management system provided only a limited capability for generating metrics; however a needs analysis and follow-up procurement for maintenance management software was already planned for FY2015 and FY2016, respectively.

Team review of the site reports and discussion with contractor staff highlighted the following observations related to D&D pace and infrastructure maintenance costs:

- Significant changes to the schedule of D&D activities greatly affect consequent maintenance requirements and costs associated with infrastructure upgrades. As noted by FBP, the recent extension in the overall D&D schedule for Portsmouth facilities has refocused their activities from D&D to surveillance and maintenance. As such, FBP is re-allocating significant amounts of mission funds to support maintenance and upgrade of long-term infrastructure needs. WVDP similarly noted that any significant extension in their D&D schedule would result in increased

infrastructure needs (e.g. if the D&D schedule for the Main Building slips significantly past FY 2017 the building roof (adequate for the short-term) would require replacement).

- As noted in the CH2M Hill Plateau Remediation Company (CHPRC) response, routine inspections of facilities awaiting D&D become more difficult over time as the facilities age and potential safety concerns accumulate. As a result, routine inspections become less frequent and less invasive in scope. Consequently, over time less and less is known about actual facility status even as the potential for safety concerns increase.

C. Real Property Asset Management (RPAM)

DOE O 430.1B, *Real Property and Asset Management*, establishes requirements related to real property life cycle asset management. The order requires that the cost of real property (e.g., facilities) repair and maintenance be identified through inspections called “condition assessments” which are conducted every five years. The resulting condition assessment cost estimates for repair and maintenance are included in the Facilities Information Management System (FIMS) database. Real property essentially includes all facilities, the equipment to make the facility habitable and other site infrastructure (i.e., utility systems). Real property typically does not include the equipment installed in the facility that is used by operations to produce a product or otherwise accomplish the mission. This “operations-owned” equipment is considered personal property, which is not covered by DOE O 430.1B and is not included in FIMS.

The real property maintenance and repair items listed in FIMS can range from necessary to anticipated, and can include functional or cosmetic items. Maintenance or repair items listed in FIMS that go unfunded are included in what is commonly called the “deferred maintenance” list. The decision to fund a repair, for both personal and real property, is determined based on safety considerations and the potential for the discrepant condition to impact the facility’s ability to accomplish its mission.

In following up on site responses to the EM-1 memorandum, the DMR team dealt largely with contractor’s operational maintenance organizations, which have responsibility for planning and accomplishing site preventive and CM activities. Except for utility work, the majority of work reviewed and discussed in conjunction with the site responses represented personal property maintenance, as it related to facility systems and equipment. During DMR discussions, multiple contractors indicated there was a significant lack of communication or interface between the operational maintenance organizations and the property personnel responsible for RPAM. Several operational maintenance representatives also indicated they viewed maintenance and repair estimates contained in FIMS as not reflective of actual operating condition.

Further evaluation of this issue was beyond the scope of this DMR team; however the team is aware of other EM initiatives to evaluate deferred maintenance costs and EM RPAM and provides this observation for consideration by those initiatives.

D. Generic Concerns/Observations

During the course of the DMR team review several concerns and/or observations applicable to more than one site were identified and are discussed below.

1. Long-Standing Fire Protection Impairments

The DMR team review of the site responses identified several instances in which facility fire protection systems were inoperable for multiple years due to long-standing fire protection impairments. Compensatory measures were being implemented as required by the impairments; however, the DMR team views the application of long-term administrative controls to compensate for safety-related system deficiencies to be a poor practice due to the potential for such controls to degrade over time.

The following specific examples of long-standing impairments were identified:

- Savannah River National Laboratory Building 735-A is an occupied non-nuclear and non-radiological laboratory with an inoperable Halon suppression system. The Halon system has been inoperable since 2009 due to lack of funding and difficulty in locating replacement parts. An every 4 hour fire patrol was implemented in 2009 as a compensatory action; however, DMR team review of the Impairment Permit identified conflicting information as to whether the fire patrol was still being maintained. FY2015 funding has been allocated to restore the Halon system in 2015.
- Savannah River National Laboratory Building 773-A is an occupied HC 2 nuclear facility with an impaired fire sprinkler system which does not meet safety basis requirements for operability. The sprinkler system has been impaired since 2011 due to needed modifications and a lack of funding to restore the sprinkler system to operation. A fire patrol was implemented as a compensatory action and appears to be continuing as required.
- Savannah River Buildings 704-1N and 766-H are administrative and training buildings that have had open impairments since 2007 and 2009, respectively. The duct fire detection system is inoperable in 704-1N and the motor operated damper system is inoperable in 766-H. The other elements of the fire detection systems in both buildings are still operational as are the fire suppression systems. A compensatory measure (Fire Department pre-plan to secure ventilation) is in place for Building 704-1N; a similar action is not in place for 766-H since the ventilation isolation function in response to detection of a fire is still operable. The fire detection systems in both buildings are old and expensive to repair or upgrade. Projects have been developed to upgrade the systems in both buildings but funding has not been identified to carry out the upgrades and remove the impairments.
- Paducah Buildings C-746-A and C-746-B are metal warehouses currently classified as radiological facilities (below HC 3 nuclear facilities). The sprinkler systems in

both facilities have been inoperable since 2007, due to leaks in the underground water mains supplying the facilities. An every 4 hour facility drive by performed by the fire department was instituted in 2007 as a compensatory measure and is still being implemented. In 2007 both buildings contained radioactive materials; however, in 2009 materials were removed from C-746-A and the facility is currently awaiting D&D. A portion of C-746-B is still being used to store an inventory of radioactively contaminated materials and equipment. Until recently this inventory was significantly greater; however, in July 2014 a large portion of the inventory was moved out of C-746-B with the objective of clearing all contaminated equipment out of the facility by the end of the year.

- Portsmouth Building X-333 is a process building which suffered extensive freeze damage to the sprinkler systems (50 of 86 sprinkler systems removed from service) during the polar vortex in February 2014. An impairment has been in place since that time; compensatory actions include a fire watch and restriction on hot work in the facility. Repair to the system is estimated to cost up to \$24M, and current scheduling indicates it will take approximately 3 years to complete repairs on the system, assuming DOE can identify the funding. Currently, only an engineering analysis is scheduled for 2015.

DOE requirements for fire protection are contained in DOE O 420.1C, *Facility Safety*. DOE Standard 1066-2012, *Fire Protection*, provides further fire protection implementation guidance. DOE O 420.1C (and its predecessor orders) also imposes the requirement to follow National Fire Protection Association (NFPA) codes and standards.

NFPA Standard 801, *Fire Protection for Facilities Handling Radioactive Materials*, 2008, discusses fire protection impairments, and indicates (section 4.5.2) that impairments to fire protection systems shall be managed to minimize the duration of the equipment outage. Section 4.5.2.2 indicates that when an unplanned impairment occurs, or when a system has discharged, the repair work or fire protection system restoration shall be expedited. NFPA 1, *Fire Code*, section 13.1.7 requires, in part, that fire protection systems and devices be maintained in a reliable operating condition and replaced or repaired where defective or recalled.

The above facility examples clearly fail to meet the expectations of NFPA 801 and/or NFPA 1 with respect to timeliness of addressing impairments or repairing systems. The DMR team did note, in discussions with DOE and contractor staff concerning Paducah Building C-746-B that it was viewed by DOE and the contractor that an active fire suppression system for the facility was not warranted and presumably would not be required by DOE order or NFPA standards. No formal analysis supporting this determination had been developed, however; and no equivalency request documenting this determination had been approved by DOE.

Given the long-standing nature of the above impairments, the DMR team is concerned that such impairments become, in effect, accepted de facto exemptions or equivalencies from the original analysis mandating the fire protection system. Other than the original

impairment permit itself, no formal analysis or approval is typically in place to support these de facto exemptions, particularly for those facilities that do not require a triennial review of the Fire Hazard Analysis. The DMR team is also concerned that the compensatory controls established at the outset of these impairments are administrative in nature, and consequently should only be considered appropriate for limited periods of time.

The following additional specific concerns were noted:

- To better track fire protection impairments, DOE Savannah River (DOE SR) directed their contractors to formally report to DOE any open impairments greater than 180 days. However, while following up on impairment status as part of their response to the EM-1 April 2014 memorandum, DOE SR determined such impairments were not being reported to DOE as required. An investigation was still underway at the time of this report.
- The DMR team review of impairment permits associated with the Paducah Building C-746-B issue noted they contained numerous deficiencies. The permits identified specific performance criteria for compensatory fire patrols (evaluate buildup of combustibles, ensure fire extinguishers are accessible) that could not be performed during a drive by fire patrol; also all compensatory measures were not included on the permits and the completion and closure of older permits was not adequately reflected on the permit form.

The DMR team notes the EM-1 memorandum did not specifically require the reporting of long-standing fire protection impairments, and consequently there could be examples at other sites that were not identified in the responses to the memorandum. Consequently, the DMR team recommends that local DOE at EM sites perform a review of open fire protection impairments to ensure similar issues do not exist. If similar long-standing impairments relying on compensatory/administrative controls are identified, corrective actions to resolve the impairments should be developed (**RECOMMENDATION**).

To ensure an appropriate level of independent review, the DMR team also recommends that the EM HQ Fire Protection Subject Matter Expert (SME) review any corrective action plans developed in association with the above recommended fire protection impairment review (**RECOMMENDATION**).

Finally, the DMR team recommends EM HQ issue clarifying guidance outlining EM expectations related to the appropriate use of impairments and Fire Protection equivalencies. (**RECOMMENDATION**).

It should be noted the DMR team communicated the circumstances regarding this concern to the EM-40 HQ Fire Protection SME, and solicited his input into the development of the above recommendation.

2. Corrective Maintenance Backlog

The EM-1 memorandum directing sites to perform an extent of condition review included direction for sites to assess their CM backlogs. Corrective backlog data can provide substantive indication of resource availability and allocation to the maintenance organization, and if properly used can prompt management to review the resources assigned to plan and perform maintenance activities. The data received from EM contractors and DOE field offices indicates that many organizations have substantial and growing CM backlogs. In addition to the obvious concern with the CM backlog, several related concerns were identified by this review.

On the surface, the size of the backlog of CM items creates the perception that the material condition of DOE facilities and equipment is less than adequate. However, during interviews with the sites possessing the most significant backlogs this perception was found to be misleading. Safety-related systems, and this term is used in a broad sense to include items pertaining to life safety as well as nuclear safety, are assigned the highest priority to ensure prompt CM is performed. Work requests that pertain to mission impacting systems receive the next highest priority. As a result, the CM backlog is dominated by items that do not affect worker safety or the ability to perform the site's mission. This is not to imply that nothing on the backlog is safety related. For example, if a work request is initiated on a safety related item, assigned the appropriate priority, but the work order is not closed out within the reporting period it can be listed on the backlog due to the reporting technique used.

Specific examples of the CM backlog concerns include the following:

- SRNS data indicated that their backlog was growing at a rate of approximately 10 percent per year. However, the SRNS report and on-site review of maintenance related performance determined that the majority of this increase could be attributed to a prior reduction in maintenance staffing. Actions have already been initiated to increase their maintenance resources to rectify the concern. SRNS has also developed additional corrective actions to ensure items in the backlog are properly prioritized and other initiatives aimed at improving efficiency.
- SRR data indicated that their CM backlog, while not increasing, was between 20 and 22 crew weeks which is larger than management's targeted expectations. SRR has made managing the CM backlog a priority to ensure the continued focus on ensuring the availability of safety related systems.
- The Idaho Treatment Group (ITG) also had a larger than desired backlog and they self-identified the cause to be a shortage of work planners. Since the completion of their internal review they have initiated actions to significantly increase the number of work planners in their organization. Hiring and training of work planning personnel has been initiated.

- NWP indicated a larger than desired CM backlog of approximately 1800 work items; the CM backlog related to SS/SC equipment was found to be much lower (<50 items). NWP has identified the need for additional work planning and maintenance staff; although these positions are approved and funded they are yet to be filled.
- MSA data indicated a steadily increasing CM associated with water utilities. Discussion with MSA indicated that although funding was limiting CM activities, critical equipment repairs were being prioritized and utility services maintained a high overall availability (97 percent). MSA has developed a water and electrical utilities backlog reduction plan and schedule; initial funding was approved to support backlog reduction work in FY 2015.
- FBP indicated that although their CM backlog was substantial, it consisted almost exclusively of low-priority items that they did not intend to perform. This raises a potential concern with work order screening processes and prioritization of work orders. What is the actual intent of the screening and prioritization process? If an item is not envisioned to be worked should it be on the backlog?

During interviews, many contractor representatives described their maintenance work order prioritization processes and it was learned that at many of the larger sites (where larger numbers of work orders/requests are generated) the vast majority of work orders (60 percent – 85 percent) end up being prioritized into the same category, generally known as “routine work”. Safety and mission related maintenance work orders are readily identifiable and given a high priority to ensure their prompt attention and repair. Work orders that do not meet those criteria are generally binned together and constitute the vast majority of the backlogs. The DMR team noted that having a prioritization process that results in the large majority of work orders all ending up in the same bin does not appear to constitute effective prioritization. During prioritization discussions the DMR team identified that one contractor (SRR) had initiated a pilot program to provide additional categorization within the “routine work” category, so that it was clearer to the work planning organization which work requests had priority.

This review also identified that the EM contractors use different methods to estimate and monitor their CM backlogs. The majority of respondents count the number of open work requests/orders submitted and compare that to the number of work requests/orders closed, and use the difference to identify their backlog. Two contractors (SRNS and SRR) provided backlog data in crew-weeks or labor hours; this approach involves estimating the amount of time required to complete all of the work on the backlog. This is a more involved method of tracking the backlog, but it provides management with a more precise measure of the resources required to complete all of the CM activities that have been identified.

In addition to having differing methods for tracking backlogs, CH2M-Hill Washington Group, Inc. (CWI) indicated that they did not routinely track CM backlog, and that the backlog values provided in response to the EM-1 memorandum were obtained through a non-routine data review. CWI indicated they instead favored tracking percentage

completion of scheduled work as a maintenance-related metric; however they also indicated that their perception was the CM backlog was decreasing. The DMR team requested they provide the current CM backlog data for INTEC (to compare with the value submitted with their original response) and it was noted they had experienced a slight increase in their backlog over recent months.

The DMR team recommends a follow-up review be performed at those sites reporting increasing CM backlog trends to evaluate effectiveness of corrective actions **(RECOMMENDATION)**.

An additional recommendation related to CM backlog metrics is discussed in section IV.D.4.

3. Nuisance and Sporadic Alarms

One of the MFs included in the attachment to the EM-1 April 2014 memorandum requested information related to alarms (specifically, “number of lit/alarming control room annunciators”.) In their evaluation of this MF, the majority of the respondents indicated this MF was not routinely tracked as a metric. As part of their specific evaluation of the MF, however, several contractors identified issues in this area, or communicated corrective actions that had been taken based on a previously identified issue related to alarms. Specific details are provided below.

- The WVDP employed a Quality Assurance audit format to conduct their EOC review. Their review noted the occurrence of multiple instances of nuisance, incorrect or overcome by events alarms (e.g., no longer in service, or equipment modified or removed). The WVDP audit identified an Observation that “Many instances of nuisance alarms were found to exist throughout the plant site, potentially distracting operators in determining the need for and scope of response actions.” Two corrective actions were developed to address this issue:
 - Systematically identify all nuisance alarms, and set up a prioritized corrective action program to eliminate or minimize these alarms (e.g., termination of contacts, reprogramming, changes to operating procedures, etc.).
 - A new system replacement for the Keltron alarm system has been authorized and is being processed for procurement. However, due to the Keltron alarm system age, unreliable behavior, potential for creating error prone situations, and difficulty of repair, system upgrade needs to be given a top priority.
- The review conducted by the PPPO DUF₆ Integrated Project Team identified as a weak area the timeliness and consistency with resolving previously noted alarm management concerns from a Conduct of Operations Assessment (PPPO-01-1901082-13) completed in March 2013. At the time of the 2013 review there were over 40 alarms locked in at both the Portsmouth and Paducah DUF₆ facilities under conditions that require resolution to eliminate nuisance alarms. The current PPPO

DUF₆ review noted that the 2013 corrective actions lacked prioritization and the specifics to correct the identified issues, and no progress has been made since then in resolving the issue. A condition report was initiated to address the lack of response to the previously identified concerns in this area.

- The ITG Advanced Mixed Waste Treatment Plant (AMWTP) review sampled alarms received in the Treatment, Characterization and Retrieval Control rooms over a 4 month period and noted that thousands of alarms were received, the majority of which were the same parameters alarming at a high frequency. The ITG response notes that alarms at this rate may serve as a distraction to the operators, potentially masking alarms that may need attention. A variety of causes were noted for the high alarm rate, including:
 - Active alarms associated with equipment that has been removed from service
 - alarms hovering around set points that need to be evaluated for dead band changes
 - Multiple cascading alarms received when a single parameter is exceeded, and
 - Equipment status changes initiated by the operators that are represented as alarms.

It was noted that the magnitude of this problem had only recently been recognized through this comprehensive evaluation and that an extensive effort would be necessary to evaluate and correct all of the issues on an individual alarm basis. ITG identified a corrective action to perform a management assessment in this area to better review the issue.

- The SRR response identified a significant number of nuisance and sporadic alarms at Liquid Waste facilities. In particular, the Saltstone facility and the 2F and 28H Tank Farm control rooms had a significant number of alarms identified during the day of the SRR review:
 - Saltstone – 42 alarms
 - 2F – 50 alarms
 - 28H – 29 alarms

The control room alarm conditions are summarized as resulting from primarily three sources: normal process operations, abnormal process operations, and degraded equipment conditions or out of service equipment.

Although the SRR response noted that a reduction in the total number of alarms at the Saltstone facility was achievable and a possible action was hypothesized, no formal issue or corrective action for this reduction was identified in the SRR report. By the time the DMR team conducted a site visit – six weeks following the report submission - to discuss the Site's extent of condition review, actions responsive to the reports documented nuisance and sporadic alarms were under development.

Review of the site responses also identified one example of a site that had previously identified an issue with nuisance/recurrent alarms and had completed an alarm reduction

program to address the issue. An initiative to reduce the number of nuisance alarms in Hanford Tank Farms was chartered in 2010 when there had been, on average, 3000 monthly nuisance and sporadic alarms. This included control system alarms; advisory system alarms and alerts (including equipment status alarms that were faulty or needing repair), and alarms generated by faulty or decommissioned field instruments. This phased effort required over three years to complete. The process significantly reduced the nuisance alarms to a monthly average of less than 100 and included the following reduction methods:

- Alarm filtering and noise reduction;
- Removal of obsolete equipment;
- Field equipment repair and replacement;
- System communication repair and system tuning;
- Enhanced alarm classification; and
- Improved alarm management software.

Processes have been implemented to prevent the nuisance alarm issue from recurring including:

- Development of a company standard for alarm management (TFC-ENG-STD-40);
- Development and deployment of the Alarm Analysis and Tracking Tool (ATAT) used for monitoring and analyzing alarms in the tank farms and evaporator;
- Implementation of a monthly alarm analysis, repair, and reduction process;
- Monthly tracking of alarms as a performance indicator; and
- Establishment of a Rounds Action Tracking Log to track alarms and resolve associated issues.

During the conduct of this review, the DMR team conducted site visits at Savannah River and Idaho where observations were made of the control areas where nuisance and sporadic alarms had been identified as issues. The issue was discussed by conference call with other affected sites. Although it is acknowledged that the newer Digital Control Systems (DCS) allow the suppression of unwarranted alarms so as to not present a distraction to the operators, the development and implementation of corrective actions to alleviate the distractions presented by nuisance and sporadic alarms on older control panels is expected and necessary. Given the significance of this issue, the DMR team recommends a follow-up review be performed at those sites reporting issues with nuisance and/or sporadic alarms to evaluate the effectiveness of corrective actions (**RECOMMENDATION**).

4. Maintenance Metrics

As noted in section IV.A, the DMR team noted a varied response with respect to the site's treatments of the MF's identified in the EM-1 April 16, 2014 memorandum. The majority of respondents failed to address all of the MFs, typically due to a decision (either by the contractor or local DOE) that many of the MFs were not applicable due to

the limited nature of operations at their facility. Few of the sites provided actual trending data, providing instead a simple total number of occurrences over the evaluated period, or a “snapshot” of data representing one point in time. Even when reporting MF data, the DMR team noted that site responses often used inconsistent units (e.g., CM backlog in number of work requests or in number of labor hours). Several sites only reported performance data associated with the MFs, and did not respond to the fundamental questions posed in the EM-1 memorandum. These inconsistencies in received responses made interpretation of the data more difficult by the DMR team.

Even in light of the above inconsistencies, however, the evaluation and reporting of MF data was noted to be productive in uncovering specific issues and trends. Examples include:

- As discussed in section IV.D.2, one contractor did not routinely track CM backlog but believed their backlog trend was positive (declining). However, after reviewing the actual data, it was determined the CM backlog trend appeared to be negative (increasing).
- The compiling and evaluation of data related to lit control room indicators resulted in the identification of nuisance alarm issues at several sites (see section IV.D.3).
- The compiling of data related to unplanned Technical Safety Requirement (TSR) Limiting Condition of Operation (LCO) entries at Savannah River indicated that the majority of such entries (45 of 77) were due to operations at two facilities (H Canyon and HB Line). In discussion with DOE SR it was indicated they had noted the high percentage and were planning specific follow-up with the contractor.

The DMR team recognizes the obvious value associated with tracking appropriately chosen metrics related to maintenance management, but sees a need to promote a more uniform approach in this area given some of the inconsistencies noted during this review. Consequently, the DMR team recommends the following minimum set of maintenance related metrics be tracked by EM contractors and trending information reported to local DOE on a quarterly basis (**RECOMMENDATION**). These proposed metrics are based, in part, on information solicited from the various responding contractors during the course of this review.

Direct Metrics

- CM backlog (to be defined as noted in below Recommendation)
- CM work request age
- Preventative maintenance backlog and in grace period
- Scheduled vs completed work requests
- Maintenance budget

Indirect Metrics

- Number of unplanned TSR LCO entries
- SS/SC system availability
- Number and age of inoperable SS/SC systems
- Fire protection system impairments age

The DMR team additionally recommends that EM develop a standardized definition/approach for tracking maintenance backlogs, to ensure the metric conveys meaningful information about planned work activities (**RECOMMENDATION**).

System “availability” as used in the above metric is defined as the proportion of total time that equipment is capable of performing its specified functions, normally expressed as a percentage.

E. Safety-Related Systems

The attachment to the April 16, 2014, memorandum regarding Deferred Maintenance required an extent of condition review for “...safety-related systems”. This broad term is not defined in DOE Orders or Standards, but was chosen to expand the focus of the extent of condition reviews beyond exclusive documented safety analysis terms that identify systems based upon their credited function in an accident. Although it was clear all Safety Class (SC) and Safety Significant (SS) systems should be included within the scope of safety-related, some sites struggled to define the broader set of systems expected. The flexibility granted each site to define what systems should be included in the review did generate some variance in the scope of the review.

The table in Appendix F lists those systems identified by the various contractors as falling within the broader scope of safety-related, ranked in order of prevalence. The systems are listed as specified in the site responses, with some combining of like systems by the DMR team. In addition to safety basis related systems, the table identifies ventilation, electrical and Life Safety Code related systems as being most frequently cited.

In reviewing the site responses, the DMR team found that even after defining a broader safety-related category of systems, many sites did not have the ability to easily assess the availability or reliability those systems. This was noted to contrast sharply with SS/SC systems, as most contractors had existing systems in place to track system availability, preventative and CM associated with such systems.

Given the significance of these safety-related systems in the overall safety of EM operations, the DMR team recommends that EM field sites formally define their applicable set of safety-related systems, and initiate adjustments to their data collection/metrics systems to allow for the periodic monitoring of these systems and tracking of operable status (**RECOMMENDATION**).

It is recognized that the specific systems included in the safety-related category will be site specific; however based on review of the site responses in this EOC initiative (Appendix C) the DMR team views the following generic list as providing a suggested minimum set of systems.

- Safety Significant/ Safety Class systems
- Important to Safety/Defense in Depth systems
- Emergency Lighting
- Fire Protection (detection and suppression systems, dampers/fire doors, fire extinguishers)
- Emergency Communications/alarm and Public Address systems
- Non-credited ventilation systems used for confinement
- Radiation monitoring systems (including stationary continuous air monitors and criticality detection systems)
- Water utilities that supply fire suppression systems
- Electrical systems and components
- Evacuation/Egress/Shelter Systems
- Site medical (emergency response vehicles and Automatic Electronic Defibrillators)
- Chemical Protection (Deluge showers, Eye wash stations)

V. Conclusion/Recommendations

In their review of the site responses to the EM-1 memorandum dated April 16, 2014, the DMR team determined the following:

- There was substantial variability in the quality and detail of responses received from the various EM contractors.
- The majority of EM contractors were able to answer the three primary questions contained in the EM-1 memorandum as either “Yes” or a “conditional Yes,” indicating that indicating in general that adequate resources were being allocated towards maintenance and that safety-related systems and equipment were being effectively maintained.
- The question resulting in the majority of “No” responses from contractors pertained to making the necessary upgrades to site infrastructure, with several contractors (SRNS, SRR, MSA, WEMS, and WRPS) providing a negative response. However, all EM contractors were found to be prioritizing their infrastructure upgrades to focus on the continuing availability of safety significant/safety class (SS/SC) equipment and essential utilities.

The DMR team review of site responses did identify a concern with the local acceptance of long-standing fire protection impairments, increasing trends of CM backlog at several sites, a high number of nuisance/sporadic alarms at several sites, and a need for improving consistency in the monitoring of maintenance metrics and the definition and tracking of safety-related systems.

Although a number of concerns are identified in this report, along with recommendations and lessons learned, the DMR team concluded that safety-related systems are being adequately maintained across the EM complex, with the exceptions noted in this report.

Recommendations:

The DMR team recommends the following:

1. EM Headquarters (HQ) systematically collect and evaluate EM site corrective actions taken in response to the AIB report on the salt haul truck fire at WIPP.
2. Local DOE entities at EM sites perform a review to identify and address long-standing fire protection impairments involving long-term compensatory measures and/or administrative controls and identify corrective actions to resolve such impairments.
3. An EM HQ Fire Protection Subject Matter Expert should independently review corrective action plans developed in association with Recommendation 2.

4. EM HQ issue clarifying guidance outlining EM expectations related to the appropriate use of impairments and fire protection equivalencies.
5. EM follow-up reviews be performed at those sites reporting increasing CM backlog trends to evaluate the effectiveness of corrective actions.
6. EM follow-up reviews be performed at those sites reporting issues associated with nuisance and/or sporadic alarms to evaluate the effectiveness of corrective actions.
7. EM contractors track and report quarterly to local DOE the trending information for the following minimum set of maintenance related metrics:

Direct Metrics

- CM backlog (to be defined as noted below)
- CM work request age
- Preventive maintenance backlog including items in grace period
- Preventive maintenance delinquencies
- Scheduled vs completed work requests
- Maintenance budget

Indirect Metrics

- Number of unplanned Technical Safety Requirement (TSR) Limiting Condition of Operation (LCO) entries
 - SS/SC system availability
 - Number and age of inoperable SS/SC systems
 - Fire protection system impairments age
8. EM HQ develops a standardized definition/approach for tracking maintenance backlogs, to ensure the metric conveys meaningful information about planned work activities.
 9. EM field sites formally define their applicable set of safety-related systems, and initiate adjustments to their data collection/metrics systems to allow for the periodic monitoring of these systems and tracking of operable status.

Lessons-Learned

Several respondents to the EM-1 memorandum expressed confusion which stemmed from the undefined term safety-related, the apparent lack of applicability of many of the MFs, and the desired response for several of the MFs. Future EM HQ initiatives requesting performance data should be as detailed as possible regarding the information being requested, and anticipated values and units for response.

Appendices:

- A. EM-1 Extent of Condition Memo
- B. DMR Team Roster
- C. Table summarizing site responses
- D. Site maintenance needs
- E. Individual site summaries
- F. Table listing site-identified safety related systems

APPENDICES



Department of Energy

Washington, DC 20585

April 16, 2014

MEMORANDUM FOR DISTRIBUTION

FROM:

David Huizena
DAVID HUIZENGA
ACTING ASSISTANT SECRETARY
FOR ENVIRONMENTAL MANAGEMENT

SUBJECT:

EM-wide Extent of Condition Review on Deferred Maintenance

Safe performance of work is the overriding priority that is expected to guide all decisions within the Office of Environmental Management (EM) to protect workers, the public and the environment. This includes allotting adequate resources to system and equipment maintenance, maintaining up to date configuration control, and making necessary upgrades to support system infrastructure. While EM sites have been expected to make these investments all along, one of the early lessons learned from the recent Waste Isolation Pilot Plant events is that we must not accept, tolerate, or otherwise justify out of service safety-related equipment.

Therefore, I am directing that each site in the EM complex complete and report to me, within 60 days, an initial extent of condition review assessing whether the site has applied sufficient resources to system and equipment maintenance, maintaining up to date configuration control, and making necessary upgrades to support system infrastructure.

The review should consider and assess corrective and preventative maintenance backlogs, the nature and age of operator work-arounds and operator compensatory actions, and other factors associated with safety-related systems as outlined in the attachment to this letter. The review should also assess the cumulative impact of the combination of degraded equipment on overall facility operational readiness.

It is imperative that maintenance and engineering programs are effective in keeping critical structures, systems and components in a high state of operational readiness. This is a key component of ensuring the safety of our workers and facilities.

Thank you for your attention to this important matter, if you have any questions, please contact me, or Mr. James Hutton, Acting Deputy Assistant Secretary for Safety, Security, and Quality Programs at (202) 586-5151.

Attachment



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Distribution

Matthew S. McCormick, Manager, Richland Operations Office
Kevin Smith, Manager, Office of River Protection
David C. Moody, Manager, Savannah River Operations Office
Jose Franco, Manager, Carlsbad Field Office
William E. Murphie, Manager, Portsmouth/Paducah Project Office
Ralph Holland, Acting Director, Environmental Management Consolidated Business Center
James Cooper, Deputy Manager for Idaho Cleanup Project
Mark Whitney, Manager, Oak Ridge Office of Environmental Management

cc: Olen Podonsky, HS-1
Colin Jones, EM-1 (Acting)
James Owendoff, EM-2 (Acting)
Jack Craig, EM-2.1 (Acting)
Mark Gilbertson, EM-10
William Levitan, EM-10
Kenneth Picha, Jr., EM-20
Jay Rhoderick, EM-20
Frank Marciniowski, EM-30
Christine Gelles, EM-30
James Hutton, EM-40 (Acting)
J.E. Surash, EM-50
Thomas Johnson, Jr, EM-50
Teresa Tyborowski, EM-60
Dennis Deziel, EM-60
Melody Bell, EM-70 (Acting)

Mandatory factors to consider in the extent of condition review (the review should cover a period of at least two years and identify and analyze trends) for safety-related systems:

- Number of unplanned TSR LCO entries
- Number of inoperable control room indicators and controls
- Number of lit/alarming control room annunciators
- Corrective maintenance backlog, age, and trend
- Preventative maintenance backlog, and in grace period, and trend
- Surveillances performed in grace period and trend
- Safety system availability
- Number of safety system challenges (number of times a safety system has been demanded to respond or be manually initiated)
- Number of unplanned safety system actuations
- Corrective action process (issues management system) items initiated and trend
- Average age of open corrective action process items (both open issues and open corrective actions)
- Number of corrective action process items overdue
- Number and rate of human performance errors
- Number of abnormal procedure entries
- Number of emergency procedure entries
- Number of unplanned process shutdowns
- Number of unplanned automatic process shutdowns
- Number of procedure non-compliance events
- Number and age of LO/TO hanging
- Number and age of temporary modifications
- Number and age of inoperable safety systems
- Safety system performance (successful or not) when tested
- Safety system performance (successful or not) in response to actual demand
- Number of spurious safety system actuations
- Number of significant unplanned production level changes
- Number of temporary procedure changes
- Number of grievances
- Management observation system data, number of observations by senior managers, number of management observations that identify deficiencies and result in corrective action
- Number of personal contamination events
- Number of personal chemical exposure events

**Deferred Maintenance Review
Team Members**

EM-40

Tony Weadock, EM-42 (lead)
Al Baione, EM-41
Craig Scott, EM-42
Ed Westbrook, EM-42
Terry Tracy, EM-42
Jim Davis, EM-43
Ray Lopiccolo, EM-44 (CBFO, ID)
Aaron Wisener, EM-44 (OR, PPPO)
Dave Bivans, EM-44 (ORP, RL)
Leigh Gunn, EM-44 (SRS)
Greg Campbell, CBC (ETEC, WVDP)
Gordon Langlie, EM-44 (MOAB, SPRU)
Sally Fitzgerald, EM-44 (OR, ETEC, WVDP)
Frank Moussa, EM-44 (PPPO, Moab, SPRU)

Mission Unit Representatives

Fred Butterfield, EM-13 (OR)
Ming Zhu, EM-11 (RL)
Blaine Rowley, EM-12 (PPPO)
Tania Smith, EM-10 (Infrastructure POC)
Jomaries Rovira, EM-22 (SRS)
Denis Koutsandreas, EM-23 (ORP)
Julia Donkin, EM-31
Chris Murnane, EM-63

Other

James Heffner, AU POC

Appendix C

SUMMARY OF SITE RESPONSES

Site	Contractor	Adequate Maintenance Resources?	Up to Date Configuration Control?	Infrastructure Upgrades?	Comments
SR	SRNS	Y*	Y*	N	Maintenance activities viewed as adequate, although increasing backlog trend results in operational risk for future missions. Deficiencies in configuration control, however compensatory measures in place. Infrastructure support systems are continuing to age/degrade.
	SRR	Y*	Y*	N	Maintenance resources currently sufficient, but CM backlogs are larger than target. Numerous infrastructure equipment challenges: Aging underground transfer lines not being replaced, buried infrastructure systems (instrument air, cooling water) past usable life, etc.
WVDP	CH2	Y*	Y*	Y*	Level of CM is commensurate with usage, age, purpose and planned future for systems/equipment. Legacy system drawings are not updated, requiring compensatory measures. Some infrastructure upgrades have been deferred given the closure mission; if D&D schedule protracted significant infrastructure upgrades (e.g., main building roof replacement) will be necessary.

WIPP	NWP	N	Y	Y	Maintenance staffing (planners, supervisors and workers) currently viewed as insufficient. New positions have been authorized but NWP is still recruiting. Configuration control is adequately reflected on drawings coupled with Engineering Change Orders. The NWP "Y" response for infrastructure reflects the current (post-accident) funding situation.
ID	ITG	Y	Y	Y	
	CWI	Y	Y	Y	
RL	MSA	Y*	Y*	N	Scope limited to electrical/water/sewage utilities; responses generally limited to these critical systems. Utility systems show continuing degradation/failure rate of components; MSA repairs and system redundancy maintains a high service delivery rate for electrical, water and sewer utilities.
	WCH	Y	Y	Y	Scope limited to SS systems and systems under configuration management.
	CHPRC	Y	Y	Y	Scope limited to HC 2 and 3 facilities, SS/SC systems.
PORTS	WEMS	Y	Y	N	"No" response to infrastructure reflects lack of attention over past years to address lower priority infrastructure upgrades (e.g.; roads, bridge, culverts, roof repair, building heating water distribution system) due to available funding and focus on higher priority infrastructure upgrades.
	FBP	Y	Y	Y	Response identifies significant deficiencies associated with aging facilities and equipment, legacy deficits in configuration management. FBP's "Yes" responses predicated on

					significant diversion (for FY14 and planned for FY15) of funding from mission work to upgrade critical systems and infrastructure.
PADUCAH	SST	Y	Y	Y	Supplemental response (6/18/14) expanded to address systems related to personnel safety.
	LATA	Y	Y	Y	Limited MFs reviewed.
PORTS/ PAD	BWCS	Y	Y	Y	
ORP	WRPS	Y	Y	N	Infrastructure upgrades to ensure continued safe operation estimated at \$1000M over next 10 years.
OR	Isotek	Y	Y	Y	
	UCOR	Y	Y	Y	
	WAI	Y	Y	Y	
SPRU	UCOR	Y	Y	Y	Minimal response provided by DOE.
Moab	Portage/ S&K Aerospace	Y	N	Y	"No" response due to identified as-built drawing issue; corrective actions ongoing and should be resolved by end of year.
ETEC	Boeing	Y	Y	Y	Minimal response provided by DOE.

Y* = Indicates "Conditional Yes" response as described in section IV.B of the report.

Appendix D

Site Identified Unfunded Maintenance Needs

Project	Risk/Impact
Savannah River (SRNS)	
L and K-Areas Main Power Supply Upgrade	Mission impact - Mission risk due to unplanned outages.
A-Area Fire Water Supply (FWS) Upgrades	Mission and safety impact - FWS failure would suspend HC2 facility and hot lab operations. Credited safety systems would be temporarily lost.
285-H Electrical Supply Upgrade	Mission impact - Mission risk due to unplanned outages.
Electronic Safeguards and Security System (E3S) Upgrades	Mission impact - Failure of system would cause facility lockdown with no material movements.
Savannah River (SRR)	
Well Water Piping Upgrades - H Tank Farms (HTF) - East Hill	Mission impact - Supplies raw water for tank operations.
Steam Piping Upgrades - H Tank Farm	Mission impact - Degraded steam piping impacts waste transfers.
Electrical Upgrades - H Tank Farm	Mission impact - Loss of power suspends operations until restoration.
Air Piping Upgrades - H Tank Farm	Mission impact - Underground air leaks account for 50% of plant air.
Evaporator Condensate Lines Upgrade - HTF	Mission impact
Portsmouth (FBP)	
Bldg. 333 Sprinkler Repair	Safety impact - system inoperable. FY15 funding limited to engineering analysis; repairs scheduled to take 3 years with reliance on comp measures.
Idaho (ITG)	
Infrastructure (roofs, electrical upgrades)	Mission impact - Several facilities containing radioactive waste have developed roof leaks and increased electrical demands on electrical feeds are necessitating upgrades.
Rolling stock fleet (forklifts, trucks)	Mission impact - Normal wear and tear due to thousands of required drum/box moves. Equipment exhibits high failure rates.
IT improvements	Mission impact - Custom built Integrated Control System is obsolete/

Fire Dampers/Fire Panels - WMF 676 Lightning protection	Safety impact - Several motorized dampers require testing and repair. Safety impact - Multiple issues with this at different facilities around the site.
Idaho (CWI)	
INTEC Emergency Communication System	Safety impact - Replace components and system that are no longer supported by the manufacturers with new up-to date system and components.
INTEC Utility Control System	Safety impact - Upgrade existing hardware and software for utility control system.
FAST Distributed Control System (water treatment and HVAC)	Mission impact - Replace outdated analog control systems with digital controls. Replace mechanical components near end of life.
INTEC Power Distribution Recovery	Mission impact - Complete modeling of distribution system for flash hazard analysis. Current modelling is excessively conservative.
CAMs and Air Samplers Replacement	Mission impact - Replace end-of-life CAMs and air samplers.
ORP (WRPS)	
Tank Farm transfer line pressure rating qualification	Mission impact.
Tank Farm valve fitness for service testing	Mission impact - Critical; approval of alternate valve vendors to augment spare parts inventory.
241-AP Farm Lighting Upgrade	Safety impact - Work-around (diesel powered light plants) in place but requires additional entries/exposure to tank farms to re-fuel.
241-AP Farm Pit Upgrades	Mission impact.
Cross-Site Transfer Line Qualification	Safety and Mission impact - Currently limits ability to utilize west tank farm space for emergency transfers.
Richland (MSA)	
Replace Hanford Radio Fire Alert Reporting (RFAR) system	Safety impact – System is experiencing an increase in breakdowns. Components no longer manufactured and serviced.
L-525 Renovation and replacement of 24" service water to 200 East	Mission impact – Supplies raw water for sanitary treatment and fire protection in the 200 E Area.
Replace wooden electrical power poles	Mission impact - 13.8 kv electrical power supplied on aging wooden power poles.
L-840 Renovation and replacement of 24" service water to 200 West	Mission impact – Supplies raw water for sanitary treatment and fire protection in the 200 W Area.
Replace portions of the 230 kv electrical lines	Mission impact – Lines A2, A7 and A9 require line conductor and insulator repair work.
Richland (CHPRC)	

WESF K3 Ventilation System
Upgrade

Safety and environmental impact – existing filters are loaded requiring change out, additional upgrades required. Project partially funded.

PUREX and REDOX Facility
(Bldgs. 202-A and 202-S)

Potential safety and environmental impact - Facility infrastructure conditions not well known due to limited annual inspections.

Condition

Solid Waste Operations Complex

Potential safety and environmental impact – No waste disposition pathway, capabilities to address drum integrity issues are limited.

MOAB

Excavator

Mission impact – Excavator purchased from prior contractor tagged out due to safety concerns.

WVDP (CHBWW)

Main Plant Process Building Roof

Potential safety impact - Roof replacement not currently anticipated but will be required if D&D schedule slips significantly past FY2018.

Summaries of Site Submittals

The following information was excerpted from the individual site responses to the April 16, 2014 EM-1 memorandum.

1.1 Savannah River Site

1.1.1 Savannah River Nuclear Solutions, LLC (SRNS)

SRNS provides site management and operations, environmental management, and nuclear operations management services at the U.S. Department of Energy (DOE) Savannah River Site (SRS). SRNS also manages the Savannah River National Laboratory. The scope includes nuclear facilities and SS/SC systems.

A site visit was conducted by the DMR team to review issues in detail with SR-DOE and SRNS management and to visit facilities at issue.

Review Scope

SRNS evaluated all of the Office of Environmental Management (EM-1) memorandum factors for seven separate site areas within their scope. The systems evaluated included Safety Class and Safety Significant (SC/SS) systems and also Defense in Depth/Important to Safety systems and other systems that contribute to personnel safety.

Maintenance Status

The SRNS response indicates they are applying adequate resources to maintenance, as indicated by their 96 percent SS/SC system availability. There is an increasing trend in Corrective Maintenance (CM) backlog, with a 10 percent increase in past year for total CM. This trend was attributed to staffing reductions in the maintenance organization, a 2013 reduced work schedule due to reduced funding, and 2014 severe weather events.

The SRNL Building 773-A fire protection systems are in a degraded condition, relying on compensatory measures, pending upgrades. This issue is discussed in detail under Long-Standing Fire Protection Impairments in this report.

Configuration Control

The configuration management program is not robust; reliance is placed on compensatory measures (such as field walk-down/verification of configuration prior to work). Such measures are resource intensive and add to maintenance backlogs.

Infrastructure

Equipment and systems both within the process boundaries and the common infrastructure continue to age and degrade, contributing to increased CM backlogs.

Impact

SRNS reports the safety of personnel is being maintained, yet there is a declining trend in regards to increasing CM backlogs and the ability to sustain aging equipment at current levels. If the current funding posture continues, the risk of interruption and/or loss of mission capability become more pronounced.

Issues/Initiatives

SRNS did not identify any issues during the course of the review that were added to their Issues Management System for tracking and resolution.

Competing priorities have driven decisions regarding the allocation of resources and funding. This alone has caused challenges in maintaining system reliability with the knowledge of knowing a system, which has not been maintained to its fullest capability, may not be able to be returned to its original state. This trend has been recognized and processes are now being developed to assure that the right balance is achieved. Most importantly, the site programs give high priority to those activities that are necessary for worker and public safety, including corrective and preventive maintenance items that are required to assure safety of operations.

DOE-SR has established a site-wide Maintenance Program Initiative (MPI) led by the Maintenance Executive Group (MEG), comprising Federal senior management from several organizations that have roles and responsibilities in this area. The MEG will work to better coordinate and integrate all site maintenance activities, working with both federal and contractor staff.

SRNS has initiated a number of actions to address the backlog concern. These actions focus on both increased staffing and increased efficiency of the existing workforce procedures to yield improved results. These actions are identified in SRNS Maintenance Improvement Plan (SRNSR- 2013-008630-MIP).

Additional field strategies ensure adequate oversight is maintained and efforts are being taken to address the backlog trends. These strategies are identified in SRNS-N0000-2013-00052- "Environmental Management Operations Over-Arching Issues Report."

1.1.2 Savannah River Site- Savannah River Remediation LLC (SRR)

SRR is the liquid waste contractor at the Savannah River Site. The operations include handling radioactive materials and SS/SC equipment.

A DMR team site visit was conducted to review issues in detail with SR-DOE and SRR management and to visit facilities at issue.

Review Scope

SRR evaluated all of the EM-1 memo factors for the types of systems defined by guidance from SR-DOE. The systems evaluated included SC/SS systems and also Defense in Depth/Important to Safety systems and other systems that contribute to personnel safety.

Maintenance Status

SRR has applied sufficient resources to maintain the systems and equipment under review; however, aging equipment and a growing list of technically obsolete equipment, coupled with increased production goals will present a challenge that current resource levels will not support. CM backlogs have been consistently larger than target (22 work crew weeks vs. 12-15 crew week target) and are anticipated to require a multi-year effort to bring about a large scale reduction. CM backlogs attributed to reduction in work group staff supporting maintenance. PMs are being performed on schedule (delinquencies maintained below 1 percent) to adequately maintain operating equipment.

System Availability

The SRR submittal indicates SC/SS system has been high over the past two years.

Configuration Control

No broad programmatic or staffing-related configuration management issues were reported. Improvements could be made; cited examples include reduction in the use of temporary modifications and the retiring of obsolete control room indication devices.

Infrastructure

The SRR response cites several infrastructure/equipment issues challenging the liquid waste program: through wall cracking of 10 Type I and II waste tanks; degraded secondary containment in buried waste transfer lines leading to removal from service; 2F evaporator removal from service; localized failures of buried infrastructure systems (instrument air/cooling water).

Cumulative Impact

To date, SRR reports successful completion of milestones and operating goals, with no significant safety issues. Focus is maintained on managing equipment repair priorities to address safety deficiencies and critical operations. Despite these efforts, the overall impact is that equipment/system capability to support operations is declining and requires additional resources.

Issues/Initiatives

SRR stated that to improve maintenance performance, major initiatives include:

- Introduction of LEAN concepts to select areas of work planning and supply chain processes.
- Enhanced focus on asset preservation consistent with mission goals and system planning.
- Maintenance back log reduction through strategic contracts for nuclear and site services.
- Development of hiring plans to address mechanic, planner and safety technician attrition.

SRR did not identify any issues during the course of the review that were added to their Issues Management System for tracking and resolution; however, by the time the review team was on site SRR management was formulating some actions.

1.2 Richland Field Office

In addition to the items listed in the attachment to the April 16, 2014, memorandum from EM-1, the following eight topics were required by RL to be addressed:

- Sufficient resources applied to meet maintenance program requirements.
- Equipment maintained to meet manufactures and/or System Engineer requirements.
- Procedures adequate to implement the maintenance program.
- Configuration control of equipment maintained.
- Necessary upgrades made to create reliable operable systems.
- Cumulative impact of degraded equipment on facility readiness.

Additionally, corrective action plans were to be addressed.

These topics were addressed by the three major RL contractors.

1.2.1 Mission Support Alliance, LLC (MSA)

MSA provides site-wide services and integrated infrastructure support for water, sewer, and electrical power. Their scope does not include nuclear facilities or SS/SC equipment. Two DMR team conference calls were conducted to discuss the review and to garner additional details.

Review Scope

MSA reviewed eight of the mandatory factors, as appropriate to its scope. Their review focused on electrical and water utilities.

Maintenance Status

Electrical Utilities, Water Utilities, and Sewer Utilities equipment has been maintained to meet Min Safe requirements, which has enabled MSA to satisfy site wide service delivery needs for utilities. However, exceptions have been recently identified in MA-14-0018, Management Assessment of Regulatory Compliance for MSA Controlled Sewage Systems. Exceptions found involved the On -Site Sewage Systems; Large On-Site Sewage Systems; and the 200 West Sewage Lagoon where many of the O&M Manual required inspections and maintenance/surveillance items were not documented as being performed.

At the time of the individual site report, Water Utilities had a backlog of approximately 290 corrective maintenance packages in various stages of the work control process. The age of these items varied from 0 to just over 3 years. Electrical Utilities had a backlog of 77 corrective maintenance packages in various stages of the work control process. The age of these items varied from 0 to about 14 months.”

System Availability

There are no safety significant SSCs in the MSA scope. MSA indicated an approximate 97% system availability for electrical and water utilities.

Configuration Control

Adequate configuration control of equipment has been maintained to satisfy Min Safe requirements for critical utility systems and components under configuration management. Drawings and other documentation addressing non-essential, non-critical systems and components have not been as-built and kept up to date.

Infrastructure

As documented in the MSA Infrastructure Reliability Project List (IRPPL), Condition Assessment, and Master Plan, utility systems exist that have numerous components which are operating well beyond their originally intended life and will require replacement/upgrading to maintain reliable service.

Cumulative Impact

The age of the above noted utility systems and components present an increased risk of failure, which could result in impacts to the Hanford site remediation/site cleanup mission.

Issues/Initiatives

No formal issues were identified as part of the MSA response. No specific initiatives were described.

1.2.2 Washington Closure Hanford LLC (WCH)

The scope of work for the River Corridor Closure Project team is to safely demolish 331 buildings, clean up an estimated 588 waste sites and burial grounds, place the H and N reactors and the 109-N Heat Exchange Building in interim safe storage, and operate the Environmental Restoration Disposal Facility and expand it as necessary.

Two DMR team conference calls were conducted to discuss the review and to garner additional details.

Review Scope

Due to the scope and nature of the lines of inquiry the review was concentrated on Design Safety Analysis (DSA) credited Safety Significant Systems, Structures, and Components (SSC), and the deferred maintenance associated with these systems. This was applied to a major contaminated facility undergoing decommissioning, certain waste site cleanups, and the disposal cells.

WCH provided a response to all of the mandatory factors.

Maintenance Status

WCH determined that there is no deferred maintenance associated with the identified systems addressed in this Management Assessment on any active systems. Each project has scheduled out periodic maintenance activities through the remaining project duration and continues to perform PM activities on operating equipment and components.

System Availability

All safety systems were verified to be available during the past two years noting that there were some cases where redundant systems remained available.

Configuration Control

Currently WCH has maintained configuration control as required, and performs assessment of the configuration control as a routine element of the periodic Performance Oversight and Evaluation Team independent assessment activities that is closely monitored by DOE-RL Oversight Division.

Issues/Initiatives

WCH developed thirteen lines of inquiries that captured the intent of the extent of conditions review on deferred maintenance, and was designed to identify any areas that needed additional resources/attention.

No formal issues were identified as part of the WCH response.

1.2.3 CH2M Hill Plateau Remediation Company (CHPRC)

The CHPRC is tasked with environmental cleanup of the Central Plateau and cleanup of waste sites and contaminated groundwater to eliminate risks to the Columbia River. The CHPRC scope includes the solid and liquid waste treatment and disposal, soil and groundwater remediation, facility and canyon disposition, and closure of the Plutonium Finishing Plant, as well as treatment of highly radioactive sludge.

There are safety significant systems in some of the facilities (such as HEPA filtered exhaust ventilation).

Two conference calls were conducted to discuss the review and to garner additional details.

Review Scope

The review focused on hazard category 2 and 3 facilities only. Two conference calls were conducted to discuss the review and to garner additional details.

Maintenance Status

Sufficient resources have been applied to meet maintenance program requirements. The CHPRC Maintenance Program is a Safety Management Program.

System Availability

An identified vulnerability is the estimating uncertainty regarding the planning for equipment reliability within the baseline for the project. End of Life failures for equipment is difficult to estimate and plan the older the equipment becomes.

Configuration Control

The CM process/ procedure establishes a Configuration Management System consistent with the American National Standards Institute (ANSI) Electronics Industries Association's EIA-649- 1998, National Consensus Standard/or Configuration Management, and DOE-STD-1073- 2003, Configuration Management.

A potential vulnerability beyond the facilities focused on during this evaluation is the condition of the inactive process facilities within the CHPRC contract scope. The de-activated facilities such as (224-B, 224-T, B-Plant, Plutonium Uranium Reduction Extraction, Reduction and Oxidation, U-Plant, and Fast Flux Test Facility (FFTF) are being inspected on an annual basis to meet environmental requirements and records are being maintained of changes in the conditions of the buildings as they are observed. Due to changes in the conditions (roof leaks, contamination, and lighting), the scope of the inspections decreases because of worker safety issues. In response to concerns, CHPRC specifically reviewed facility annual updates and the Corrective Action Management database to determine if the changing conditions represented a PISA or new information. The results of the review determined there were no new issues or new information, and nothing was identified indicating the facilities are being operated outside their respective safety bases.

Cumulative Impact

Currently there is no impact of degraded equipment relative to facility readiness.

Issues/Initiatives

No formal issues were identified as part of the CHPRC response. No specific initiatives were described.

1.3 Portsmouth/Paducah Project Office

1.3.1 Wastren-EnergX Mission Support, LLC (WEMS)

WEMS performs infrastructure maintenance in non-nuclear facilities, on grounds, and on roadways/parking lots. WEMS has no responsibility for nuclear facilities nor maintaining associated safety significant/safety class systems.

A conference call was conducted to discuss the review and to garner additional details.

Review Scope

WEMS evaluated a subset of six of the EM-1 mandatory factors based on direction from DOE-PPPO.

Maintenance Status

Sufficient resources have been applied to maintain safety related systems. However, in some cases the infrastructure that supports safety related system and equipment maintenance would benefit from the application of additional resources. Over the past 3 years there have been substantial upgrades to the information technology, cyber, and security infrastructure. Pavement improvements have also recently been made and continued improvements are under consideration. Degraded equipment (mowers, vehicles, hand tools) is being replaced as identified and will continue to be monitored to ensure the safety of site employees. As necessary, upgrades are identified and WEMS formally provides the justification for DOE to consider.

System Availability

Items related to measuring and test equipment, hoisting and rigging equipment, pressure vessels, security systems, and safety are well controlled and maintained.

Configuration Control

Configuration control is maintained sufficiently on the small number of items and systems that require configuration control.

Infrastructure

No safety systems or safety significant systems are under the oversight of WEMS. Sufficient resources have been applied to maintain safety related systems. However, in some cases the infrastructure that supports safety related systems and equipment maintenance would benefit from the application of additional resources. Examples include: culvert repairs, paving, X-I000 heating water distribution system, and X-540 backup power. W EMS continues to closely monitor and report facility conditions to allow an adequate opportunity for DOE to budget for required resources in the future.

Issues & Initiatives

No formal issues were identified as part of the WEMS response. No specific initiatives were described.

1.3.2 Fluor-B&W Portsmouth, LLC (FBP)

The Portsmouth Gaseous Diffusion Plant's (PORTS) mission is to D&D the uranium enrichment facilities and remediates the site for future use. For the nuclear facilities, FBP is in the process of deactivating the enrichment process building, operating the X-340 complex to support the uranium barter program, and providing the support services required for the deactivation work (e.g. decontamination services, uranium deposit storage and processing, laboratory support, radioactive and hazardous waste management, storage and shipping, maintenance support including instrument

calibration, etc.) FBP is also responsible for providing site infrastructure support services including utilities, site control, security and emergency response.

Currently, PORTS has eight Category 2 nuclear facilities in operation (full or partial) essentially as originally intended; the three major enrichment process buildings are Category 2 facilities, but the enrichment operations are shutdown - deactivation and Surveillance and Maintenance (S&M) are the primary activities; and the remaining Category 2 nuclear facilities have minimal ongoing nuclear operations but have not been surveyed to downgrade them from nuclear to non-nuclear category.

A DMR team videoconference call was conducted to discuss the review and to garner additional details.

Review Scope

FBP performed an initial extent of condition review assessing the adequacy of resources applied to PORTS for system and equipment maintenance, to maintain up-to-date configuration control, and to make necessary upgrades to support the system infrastructure. This report also contains an assessment of the cumulative impact of the combination of degraded equipment on overall facility operational readiness.

Maintenance Status

Proactive initiatives have been undertaken to maintain and upgrade the most critical infrastructure systems; more are needed, and some are planned to be completed this year and next. Although the required safety envelope has been maintained, the efficacy of safety management programs (SMPs) and the associated defense-in-depth for site nuclear facilities has eroded due to age-induced problems with safety-related systems and increasing reliance on compensatory measures in lieu of restoration. Mission risks remain elevated as corrective and preventive maintenance backlogs continue at a high level and essential infrastructure systems become impaired. Resources currently committed to infrastructure and maintenance activity and support must be significantly increased to stabilize and ultimately reverse these negative trends.

The data indicate a chronic budget deficit for these areas and systems, whose performance capability must be maintained to support both the near term safety of FBP and the remaining project lifecycle. Primary contributing factors to this deficit and to the accumulation of the maintenance backlog include: age; obsolescence; historical neglect of systems and equipment as received from the previous contractors; legacy deficiencies in configuration management; shutdown of enrichment operations, which has accelerated the decline in certain structures and critical systems; and, increased rigor and formality with which maintenance work is planned and controlled.

Configuration Control

The plant's current configuration management program has been effective in maintaining configuration control of safety related Structures, Systems, and Components (SSCs). It has also been effective at confirming or re-establishing configuration control on other systems as they are upgraded or repaired. However, historical deficiencies in configuration management - including undocumented plant modifications, failure to maintain as-built drawings, missing technical information, failure to maintain compliance with changes in applicable industry standards, and degraded facility/equipment conditions have resulted in requiring more time and schedule to accurately verify and document system configurations to support accomplishing planned work safely.

Infrastructure

Constrained funding levels, increasing requirements, and declining infrastructure reliability made it necessary to balance the cost of upgrades to the aging PORTS utility infrastructure in order to ensure reliability of utility services to PORTS site tenants, and to support the long term PORTS D&D mission. Insufficient budget for maintaining the PORTS infrastructure increases the present risks associated with the single point system failures or dilapidated systems caused by lack of, or deferred maintenance. Despite the funding constraints, several major upgrades have been completed, others are planned, and some have been deferred until a later date.

Issues/Initiatives

Several initiatives by FBP have been completed or are underway to identify and prioritize corrective and preventive maintenance and needed infrastructure upgrades in a manner that optimizes the application of resources to preserve safety margins and manage mission risk. These include:

- Surveillance and Maintenance (S&M) Performance Improvement Team evaluates S&M activities for where efficiencies and improvements could free up resources to support D&D activities in the X-326.
- The S&M PIT, a 5-5-5 team was established to find ways to increase overall efficiency of the Site Maintenance/ Infrastructure D&D (SMIDD) division and to reduce costs. The premise was 5 people, 5 months with a savings of \$5 million.
- FBP has developed a System Health Report (SHR) to monitor reliability and availability of 15 critical systems required for the safe, effective, and efficient execution of FBP's Ports D&D mission, including delivery of utility services to all Portsmouth Gaseous Diffusion Plant tenants.
- Per FBP-NSE-PRO-OOI01, Structural Inspection and Maintenance of Structures Important to Safety, the facilities designated as Safety Significant are inspected every 5 years.
- The Utilities Infrastructure Plan is currently being developed and will be submitted to DOE in June 2014. This plan summarizes the critical utility systems required to sustain the mission at the PORTS plant, and will allow strategic planning to support the 5-year/10-year long term goals of the site.

FBP did not identify any issues during the course of the review that were added to their Issues Management System for tracking and resolution.

1.3.3 LATA Environmental Services of Kentucky, LLC (LATA KY)

LATA KY is the environmental restoration contractor at Paducah. They are responsible for characterizing and remediating facilities and areas of the site per the Site Management Plan. Facilities within their scope have a limited number of safety related and life safety systems. Maintenance on this equipment is performed by other site contractors under DOE contract.

A DMR team conference call was conducted to discuss the review and to garner additional details.

Review Scope

LATA KY conducted an initial extent of condition review assessing whether LATA KY areas have applied sufficient resources to system and equipment maintenance, maintaining up to date configuration control, and making necessary upgrades to support system infrastructure. LATA KY also has assessed the cumulative impact of degraded equipment on overall facility operational readiness.

Maintenance Status

LATA KY has applied sufficient resources for safety related systems and equipment maintenance. In evaluating maintenance of active safety systems and design features that are under LATA KY formal configuration management, all maintenance of these systems in the Nuclear Category II C-746-Q waste facility is current and has been maintained current for at least the last two years. For general maintenance of other facilities and equipment under LATA KY cognizance, all maintenance is evaluated for safety impacts and appropriate priorities applied.

Review of open LATA Kentucky Maintenance Work Requests (MWRs) shows that, currently, none identified as safety-related are open.

Configuration Control

LATA KY has sufficient resources applied for maintaining up to date configuration control. Configuration control is maintained through as-building drawings for systems, buildings, and procedures.

Infrastructure

LATA KY has applied sufficient resources to make necessary upgrades to support system infrastructure, consistent with the scope established and standards defined in the prime contract, to meet the mission requirements of assigned facilities and systems.

Issues/Initiatives

No formal issues were identified as part of the LATA KY response. No specific initiatives were described.

1.3.4 Swift and Staley, Inc. (SST)

SST maintains the DOE infrastructure as assigned under the prime contract, and provides support to other prime contractors for infrastructure maintenance as requested. Systems under their cognizance include support for safety related and life safety systems.

A DMR team conference call was conducted to discuss the review and to garner additional details.

Review Scope

SST conducted a review of deferred maintenance listed on SST facilities in the Facility Information Management System database.

Maintenance Status

SST completed a review and determined there were no deferred maintenance activities that presented any issues or concerns for safety.

Configuration Control

SST has implemented adequate configuration control practices for the scope of work conducted to date. Improvements in the configuration management program needed to address new scopes of work potentially being added to the SST contract this fiscal year have been identified.

Infrastructure

SST is currently evaluating several infrastructure upgrades in response to prime contract modifications to support DOE in the turnover of the Paducah Gaseous Diffusion Plant from the United States Enrichment Corporation.

Issues/Initiatives

No formal issues were identified as part of the SST response. No specific initiatives were described.

1.3.5 Babcock and Wilcox Conversion Services, LLC (BWCS)

BWCS is the contractor for the Depleted Uranium Conversion Facility at both sites. Both facilities have nuclear and life safety systems.

A DMR team conference call was conducted to discuss the review and to garner additional details.

Review Scope

The extent of condition review for the DUF6 conversion facilities was conducted by members of the DOE PPPO Integrated Project Team. The Assessment scope focused on the 30 areas/topics identified in the EM Memorandum. Additional areas reviewed included cylinder hauler maintenance, including fire suppression systems, and vehicle inspections entering the site.

Maintenance Status

Corrective maintenance backlog has trended downward over the last two years. Approximately 20 of the 141 at Paducah and 7 of the 87 at Piketon are associated with safety related systems which have been screened for safety basis and mission impact. Plant operability has not been impacted by current backlog levels.

The preventive maintenance backlog does not contain any safety system related items.

System Availability

All safety systems are normally maintained operable/available. Scheduled surveillance activity and unplanned entries into the LCO process will render a safety system inoperable but they are restored within allowable TSR timelines and restrictions.

Configuration Control

B&WCS maintains configuration control for the safety related systems. Some minor deficiencies, associated with maintenance and configuration control, had already been identified through normal oversight activity and assessments and are being addressed through corrective actions via the condition reporting system.

Issues/Initiatives

The review identified some weak areas associated with:

- Timeliness and consistency with resolving previously noted alarm management concerns from a Conduct of Operations Assessment in March 2013.
- Senior management documented corrective action tracking and follow-up
- Temporary procedure processing times.
- Increasing use of the grace period for Technical Safety Requirements (previously identified in a recent Field Inspection Report (FIR) (C-201403-007).

These issues were captured in the Condition Reporting System for action and follow-up.

1.4 Oak Ridge

1.4.1 Isotek Systems LLC (Isotek)

The Isotek work scope is the design, construction, and operation of processing systems in Oak Ridge National Laboratory's Building 3019. This process will dissolve U-233 material, down-blend with depleted uranium, concentrate and dry the resulting solution, and ship the depleted U-233 for disposal. Upon completion of the processing phase, Isotek will deactivate the facility in preparation for decommissioning.

By the nature of the process, there are several SS/SC systems and equipment.

A DMR team conference call was conducted to discuss the review and to garner additional details.

Review Scope

Isotek evaluated each of 17 systems against the 30 mandatory criteria.

Maintenance Status

There is no preventive maintenance backlog or preventative maintenance items that are currently delinquent related to the Building 3019 Off-gas systems. Preventive Maintenance has been applied as prescribed by the maintenance scheduling software DataStream.

System Availability

Isotek has one Safety Class passive system and two Safety Significant passive systems. These systems have been available 100 percent of the time. All other active systems that were evaluated were available 100 percent of the time, except for the canister grapple lift device which is described in detail under "Number of Unplanned Process Shutdowns".

Configuration Control

No issues identified.

Issues/Initiatives

No formal issues were identified as part of the Isotek response. No specific initiatives were described.

1.4.2 URS /CH2M Oak Ridge (UCOR)

UCOR's scope of work mainly involves completing cleanup of ETTP, including completion of the K-25 Building demolition project, demolition of the K-27 Building, and demolition of buildings in the Poplar Creek area. UCOR's scope also includes managing DOE's onsite disposal cell, the Environmental Management Waste Management Facility (EMWWMF), and performing various other operations at ORNL and the Y-12 Complex.

A DMR team conference call was conducted to discuss the review and to garner additional details.

Review Scope

UCOR split the mandatory factors into two categories: a) System Related Lines of Inquiry; and b) General Lines of Inquiry for Maintenance and Issues Management. They then evaluated all factors by methods appropriate to each of the two categories.

Maintenance Status

The data collected during this review show that preventive maintenance is being performed in a timely manner for active safety systems as well as for safety related equipment and that active safety systems and other equipment important to safety are in place and are operational when called upon to perform their function. Based on the operability levels of the Safety-Related equipment and the lack of maintenance issues, there are no indications of any issues with operator work-arounds or other compensatory measures being taken on these systems.

Configuration Control

No issues identified.

Issues/Initiatives

The UCOR issues management system shows 88 open corrective action items with 8 (11 percent) overdue as of June 4, 2014, with an average of 20 days overdue. The number of overdue corrective actions is not currently meeting UCOR management expectations and will be corrected. The status of overdue corrective actions is routinely monitored by the ICARB.

No formal issues were identified as part of the UCOR response. No specific initiatives were described.

1.4.3 WAI (Wastren Advantage, Inc)

WAI manages the Oak Ridge Transuranic Waste Processing Center (TWPC). The TWPC is a multi-purpose non-reactor Nuclear Hazard Category 2 facility constructed by the Oak Ridge Office of Environmental Management (OREM) to house treatment processes for high-alpha TRU waste. The analysis focused on TWPC's two credited safety significant systems (Fire Suppression System and Main Building Ventilation System) and one designated worker safety system (Breathing Air System).

A DMR team conference call was conducted to discuss the review and to garner additional details.

Review Scope

WAI conducted an initial extent of condition review assessing whether it has applied sufficient resources to system and equipment maintenance, maintaining up to date configuration control, and making necessary upgrades to support system infrastructure. WAI addressed all 30 factors with respect to the three systems listed above.

Maintenance Status

Out of 1269 corrective maintenance actions identified in the 24 month period, three non-critical repairs were evaluated and deferred until the work could be appropriately prioritized with operations. One of the three is being evaluated for cancellation. There were a total of 1,049 preventative maintenance actions for this reporting period.

None have been deferred or remain open.

System Availability

During the 24 month period, Safety Significant System Availability (Fire Suppression System and Main Building Ventilation) was 100 percent with the exception of planned maintenance outages.

Configuration Control

TWPC maintains configuration control and support system infrastructure to ensure safety-related system reliability.

Issues/Initiatives

Identified issues are being tracked to resolution in the contractor's issues management system.

1.5 Office of River Protection

1.5.1 Washington River Protection Systems (WRPS)

WRPS monitors and manages the 177 underground storage tanks at Hanford. These tanks contain liquid and semi-solid wastes that will ultimately be turned into a glass product within the Waste Treatment Plant for permanent disposition. WRPS operates safety systems for waste transfer and ventilation. The Waste Treatment Plant is under construction and was not evaluated.

A DMR team conference call was conducted to discuss the review and to garner additional details.

Review Scope

WRPS responded to all mandatory factors with a detailed analysis for each. The bases were in eleven area SSC Status Reports.

Maintenance Status

Sufficient resources have been applied to maintain safety related systems. The preventive maintenance backlog has been trending downward over the past two years. The corrective maintenance backlog has been reasonably steady in spite of new requirements due to Evaporator start up. Infrastructure upkeep and improvements have been lacking due to limited funding. WRPS has an Enhanced Asset and Infrastructure Stewardship Program Plan (EAISPP) that prioritizes and facilitates infrastructure improvements to insure the continued safe operation of tank farm facilities and to highlight the risk associated with not funding any given infrastructure project. Infrastructure upgrades to ensure continued operation are estimated at \$1000M over the next ten years.

System Availability

System status and health reports indicate satisfactory status.

Configuration Control

Sufficient resources have been applied to maintain adequate configuration management control. Programs and metrics are in place to insure drawings are updated when modifications are completed.

Issues/Initiatives

No formal issues were identified as part of the WRPS response. WRPS has established a documented system of assessment, data collection, and review of Safety Management System performance that culminates in a scheduled presentation, discussion, and review by senior management. The objective is to identify actions to address issues.

1.6 Idaho Operations Office

1.6.1 CH2M-WG Idaho, LLC (CWI)

CWI is the prime contractor for the Idaho Cleanup Project (ICP) at the Idaho National Laboratory (INL). The scope of the project includes decontamination, decommissioning, demolition, and disposal activities at the Idaho Nuclear Technology and Engineering Center, the Radioactive Waste Management Complex, and the Advanced Test Reactor Complex. The project does have a number of nuclear and life safety systems and components.

A DMR team site visit was conducted to review issues in detail with EM-ID and CWI management and to visit facilities at issue.

Review Scope

CWI addressed all mandatory factors in two site areas (INTEC and RWMC).

Maintenance Status

Contrary to Best Management practice and MCP-6401, the Maintenance program metrics, i.e. corrective and preventive maintenance on-time completion rates, have not been developed for consistency and retrievability across the ICP. Individual project areas have informal mechanisms in place to track performance, but these have not been institutionalized within company processes.

At INTEC the backlog of corrective maintenance is significant but manageable considering the age of INTEC structures and management knowledge of the issues. For example there are several work requests and work orders for the CPP-666 Heating, Ventilating, and Air Conditioning (HVAC) system that have been in work control for many days. The current condition results in difficulties in operation of the HVAC system dampers.

System Availability

There has been no time in the last two years that the safety significant SSCs have not been available.

Configuration Control

Though not required by DOE orders based on classification of Hazard Category 3 facilities, CWI created LST-774, ICP D&D Conduct of Operations Best Management Practices Implementation Matrix. This action establishes a rigorous process of Configuration Management of decontamination and decommissioning (D&D) activities.

Issues/Initiatives

Compensatory actions have been implemented at INTEC due to valve position indicator issues. Form INTEC-5446, "Evaluation of Inoperable Valve Position Indicator," is used to evaluate possible consequences and compensatory actions for valves with position indicators that have failed. (INL/CH2WG)

The Essential Equipment List is a software program that lists equipment deemed essential to the support of operations in INTEC. If a piece of equipment changes status during a shift, the shift manager updates the status window for the equipment in question. (INL/CH2WG)

The CWI review identified findings, opportunities for improvement and noteworthy practices.

1.6.2 Idaho Treatment Group (ITG)

ITG is responsible for operation of the Advanced Mixed Waste Treatment Plant (AMWTP). The project's mission is to safely retrieve, characterize, treat and package Transuranic Waste (TRU) for shipment out of Idaho to permanent disposal at the WIPP. AMWTP is a category II nuclear facility.

A site visit was conducted to review issues in detail with EM-ID and ITG management and to visit facilities at issue.

Review Scope

ITG developed Lines-of-Inquiry and conducted the review as a readiness review.

Maintenance Status

ITG reported "The current staffing levels have been able to maintain throughput of preventative maintenance work packages but the corrective maintenance backlog is steadily increasing. This increase is due to the longer planning periods per package, recent attrition in the work control center, and the increased number of new work orders. A percentage of this increase is deemed low hazard work and will require minimal planning involvement. The original Work Planning and Control procedures did not allow full utilization of low hazard work planning. ITG recently modified its Work Planning/Control procedures to align with the DOE Handbook and the URS Work Control Standard, which will allow for expediting these low hazard work activities. These changes will help offset the increase in corrective maintenance work orders by allowing minimal planning involvement for those low hazard activities. ITG recognizes the need for additional planning resources and is taking steps to increase planner staffing."

System Availability

The credited nuclear safety systems, specifically the real time radiography (RTR) and box/drum assay systems were experiencing availability issues primarily due to failed

surveillances. Improvements to availability of these systems have been made through reanalysis of their safety function and corresponding changes have been made to the documented safety analysis (DSA) and Technical Safety Requirements (TSRs). The changes no longer credit the RTR systems as being safety significant but instead as standard industrial hazards, so their corresponding TSRs, Limiting Conditions for Operations (LCOs), and Surveillances were removed. The LCOs for the box/drum assay systems were adjusted to make LCO entry requirements more reflective of their safety function.

Configuration Control

Configuration controls are in place and effective to maintain systems up to date and necessary upgrades are made to support system infrastructure. Changes to the plant are conducted in accordance with procedures. These changes have not resulted in life safety system degradation.

Issues/Initiatives

The plant completed ISMS Phase II certification and VPP recertification during the past two years.

ITG identified seven areas to be reviewed by ITG's Management Assessment Program to determine any necessary corrective actions.

1.7 EMCBC Sites

Of these sites:

- SPRU is a below category 3 nuclear site that has no safety significant systems. The few systems considered important to safety are operating satisfactorily. The site is in D&D. No formal issues were identified as part of the SPRU response.
- MOAB is a cleanup site with no safety significant systems. Configuration Management requires corrective action due to identified "as built" drawing issue.
- ETEC activities consist of soil and groundwater characterization. There are no safety significant systems. No formal issues were identified as part of the ETEC response.

DMR team conference calls were conducted with representatives of the above sites to discuss their submittals. .

1.7.1 West Valley Demonstration Project (WVDP)

CH2M Hill, B&W West Valley, LLC (CHBWV) is the current DOE prime contractor for the remediation work at the WVDP site. The WVDP has no active or passive systems or equipment that is designated as safety class or safety significant in the site DSA. However, there are systems and equipment that are important to maintaining safe

operations. The WVDP review focused on defense-in-depth equipment at the WVDP and included, but was not limited to radiation-monitoring systems, ventilation systems, effluent monitoring systems, fire protection systems, and passive confinement barrier integrity. A DMR team conference call was conducted to discuss the review and to garner additional details.

Review Scope

The WVDP is a nuclear remediation and cleanup site with no ongoing production mission. Most of the site's facilities are scheduled for deactivation and demolition (D&D) over the next several years. The scope of the review involves predominantly the five Hazard Category 3 nuclear facilities at WVDP. The review was performed as an "audit" under NQA-1 to ensure sufficient rigor was employed in conducting the assessment.

Maintenance Status

CHBWV reported "While a significant improvement in maintenance programs has been instituted, the fact remains that the Main Plant Process Building (MPPB) and its attendant infrastructure systems that support its availability for safe and efficient performance of the deactivation work are long past their design life, and some systems and equipment are in danger of failure. Most notable among these are the MPPB ventilation system, the site electrical distribution system, and the MPPB facility structure itself (e.g., leaking roofs)."

Issues/Initiatives

A computerized maintenance management system, referred to as CHAMPS, was procured and populated with all equipment and components to update the site Preventive Maintenance (PM) and Corrective Maintenance (CM) process from an antiquated system. This has provided a more reliable notification of PM cycles, as well as a better means of tracking.

The development of a Maintenance Implementation Plan (MIP) and a Master Equipment List (MEL) that clearly delineate the systems and equipment that are deemed important for safe and efficient operations. The completion of preventive maintenance for MEL listed structures, systems, and components (SSCs) are tracked as part of the Performance, Objectives, Measures and Commitments (POM&Cs).

CHBWV formed an Executive Safety Review Board (ESRB), comprised of the contractor's senior executive staff, meets regularly and is chartered to provide thorough and comprehensive review of all site safety programs. The Maintenance Program and the overall reliability of MEL-listed SSCs is one of 16 site safety programs routinely evaluated to assess overall compliance and health of the program.

Issues were identified during the review that are being tracked to resolution.

1.7.2 Carlsbad Field Office

Nuclear Waste Partnership LLC (NWP)

NWP manages and operate the U.S. Department of Energy's Waste Isolation Pilot Plant (WIPP) in southeast New Mexico. Operation of WIPP involves SS/SC equipment.

Review Scope

NWP responded to all of the mandatory factors, indicating that six were under review. A monthly tabulation of Safety System and Emergency Management Performance upsets was provided from January 2012 through May 2014.

Maintenance Status

NWP reported “The corrective actions associated with the JON result in identifying the extent of condition for impaired or out-of-service equipment and developing a comprehensive corrective action plan to address the identified deficiencies. The corrective actions to address the causal factors are intended to first develop the process to provide sufficient direction to project staff on equipment operability relative to system interactions in the plant/facility and their impacts to implementation of the effected safety management programs. Provide training to the plant staff on the associated processes such that personnel understand how to implement the process and why the process is necessary, and finally conduct a systematic impact evaluation and correction of impaired or out-of-service equipment. Once this impact evaluation is performed the corrective actions for impaired or out-of-service equipment will be dispositioned through the ESQRB.”

Issues/Initiatives

The incidents at WIPP are the driver for the EM-1 memo to the sites regarding deferred maintenance. The initial site response, dated June 18, 2014, was a limited response (due to actions in progress to address the initiating events for this Deferred Maintenance Review) to the mandatory factors delineated in the Attachment to the EM-1 memo requesting this review. A second site response, received on September 23, 2014, completed addressing the mandatory factors and provided additional information; however, it did not address the application of sufficient resources to equipment maintenance, configuration control, and upgrades to support system infrastructure.

During the DMR team conference call, NWP management indicated that current site configuration control was adequate to reflect system configuration, and that given the site's recovery status sufficient resources were available to support needed infrastructure upgrades and there were no significant unfunded maintenance needs. NWP indicated a recent gap analysis had identified the need for additional maintenance staff (work planners, maintenance workers and supervisors); although these positions were authorized and funded they had not yet been filled. NWP also identified their computerized maintenance management system provided only a limited capability for

generating metrics; however a needs analysis and follow-up procurement for maintenance management software was already planned for FY2015 and FY2016, respectively. No formal issues were identified as part of the NWP extent of condition review.

Appendix F

Site Identified Safety Related Systems By Prevalence

Site-Identified Safety Related Systems	CBFO	EMCBC				ID		OR			ORP	PPPO					RL			SR	
	NWP	ETEC	MOAB	SPRU	CHBWV	CWI	ITG	Isotek	UCOR	WAI	WRPS	WEMS	FBP	BWCS	LATA	SST	CHPRC	MSA	WCH	SRNS	SRR
Safety Significant/Safety Class	x					x	x	x	x	x		x		x		x		x	x	x	x
Ventilation System	x					x	x		x	x	x		x						x	x	x
Emergency Lights	x					x	x	x	x	x					x						x
Fire Protection Systems					x		x	x	x	x	x		x	x	x						x
Electrical System			x		x			x	x		x	x	x					x			
Fire Suppression Systems	x					x			x				x								x
HEPA Filtered Ventilation System	x			x	x			x	x												x
Radiation Monitoring Systems					x		x				x										x
Emergency Communications Systems	x					x				x			x	x							
HVAC	x					x						x			x		x				
Public Address Systems	x							x					x								x
Continuous Air Monitoring Systems						x	x		x				x								x
Water Utilities	x										x		x					x			x
Breakers/Switch Gear/Transformers									x												x
Eyewash Stations										x											x
Fire Detection System				x		x			x												x
Fire Extinguishers										x											x
Defense in Depth/Important to Safety Equipment									x												x
Criticality Incident Detection and Alarm System							x		x												
Chemical Systems																					x
Safety Showers																					x
Battery Banks																					x
Construction Equipment													x		x						
Facility Safety Systems			x												x						
Facility Support Systems												x	x								
Hoisting and Rigging Equipment								x				x									
Integrated Controls System							x														x
Liquid Nitrogen Systems																					x
Passive Confinement Barrier Integrity					x		x														
Personal Protective equipment															x						
Pressure Protection																					x

Site-Identified Safety Related Systems	CBFO	EMCBC				ID		OR			ORP	PPPO					RL			SR	
	NWP	ETEC	MOAB	SPRU	CHBWW	CWI	ITG	Isotek	UCOR	WAI	WRPS	WEMS	FBP	BWCS	LATA	SST	CHPRC	MSA	WCH	SRNS	SRR
Sewer Systems												x					x				
Soil and groundwater treatment system		x												x							
Steam System																			x	x	
Tele/Datacommunications											x	x									
324 Building Safety Equipment List																		x			
324 Essential Drawing List																		x			
Air Pallet								x													
Assay Machine							x														
Bridges											x										
Circuit interrupters														x							
Confinement Boundary							x														
Cooling Tower System												x									
Culvert Replacement											x										
Cylinder Handling Equipment													x								
Dampers and Doors						x															
Drum and Box Assay Systems							x														
Drum Penetration Facilities																		x			
Drum Venting Barriers							x														
Effluent Monitoring Systems				x																	
Electrical One-line Diagrams for 618-10 Project																		x			
Elevator Controls											x										
Emergency Egress							x														
Emergency Management Program							x														
Evaporator Facility Systems										x											
Exhaust Fan Housings and Ducts																		x			
Fire Barriers						x															
Fissile Tracking System							x														
Groundwater Remediation System			x																		
Heating Water Distribution System											x										
Hot Cell Walls and Ceilings																			x		
Leachate Collection and Storage																			x		
Local tank Volume Indication System									x												
Major Tailings-handling and Loading Equipment			x																		
Material Grapples							x														

Site-Identified Safety Related Systems	CBFO	EMCBC				ID		OR			ORP	PPPO					RL			SR	
	NWP	ETEC	MOAB	SPRU	CHBWW	CWI	ITG	Isotek	UCOR	WAI	WRPS	WEMS	FBP	BWCS	LATA	SST	CHPRC	MSA	WCH	SRNS	SRR
NPDES Effluent Discharge Sampling System													x								
Pavements (Road/Parking Lots)												x									
Personnel Radiation Detection Instruments									x												
Piping and Instrumental Diagrams																			x		
Plant Air Systems																				x	
Portable Vacuum Lift Device								x													
Process Monitoring and Control											x										
Radioactive Groundwater Collection System				x					x												
Radiological Surveillance System							x														
Real Time Radiography Systems							x														
Retrieval Contamination Enclosure Diesel Fueling System							x														
Roof													x								
Roof and Walls Surrounding Ventilated Area																			x		
Special Case Waste Packet Assay Monitor							x														
System Leachate Transfer System																			x		
Tank Leak Detection System											x										
Tank Pressure Instrumentation System											x										
Transuranic Storage Area Retrieval Enclosure							x														
Vehicle Inspections													x								
Vital Safety Systems																	x				
Waste Tracking System							x														
Waste Transfer System											x										