Office of Enterprise Assessments (EA) Operational Awareness Record - Rev. 0 June 2015	**Report Number:** EA-WIPP-2014-12-02
Site: Waste Isolation Pilot Plant (WIPP)	**Subject:** Follow-up Review of Engineering Configuration Management Processes
Dates of Activity : December 2-5, 2014	**Report Preparer:** Charles R. Allen

Activity Description/Purpose:
Perform a follow-up review of issues identified during a June 23-27, 2014, visit to WIPP related to configuration management processes within the Nuclear Waste Partnership LLC (NWP) Engineering organization, including processes for design input control and engineering records control. Examine proposed corrective actions in response to the NWP internal review team report issued July 1, 2014.

Result:

EA conducted interviews with the Carlsbad Field Office (CBFO) engineer responsible for configuration management and the following NWP personnel:

1. Engineering deputy manager
2. Project engineering manager
3. Program performance assurance manager
4. Senior technical advisor
5. Cognizant system engineer (CSE) for ventilation.

This EA review was, in part, based on requirements related to records control and design control stemming from 10 CFR 830, Subpart A, paragraphs 830.122(d) and (f). NWP implementation at WIPP is driven by WP 13-1 R35, *Quality Assurance Program Description* (QAPD), which is based in part on American Society of Mechanical Engineers (ASME) NQA-1 1989. EA's review of the QAPD document found that it adequately addresses the various aspects of design and record control. However, EA noted issues with implementation of the QAPD in the performance of work within the Engineering Group.

Design Input Control

This portion of EA's review focused on controls in place to govern the transmittal of design input information from NWP Engineering to outside parties that perform engineering design tasks for WIPP in support of the interim ventilation project (IVP). Title 10 CFR 830, Subpart A, paragraph 830.122(f)(3), specifically requires that quality assurance programs must identify and control design interfaces. ASME NQA-1 1989 Supplement 4S-1 requires that:

"A review of the procurement documents and changes thereto shall be made to assure that documents transmitted to the prospective Supplier(s) include appropriate provisions to assure that items or services will meet the specified requirements."

"Procurement document changes shall be subject to the same degree of control as utilized in the preparation of the original documents."

NWP QAPD, Section 2.2, states:

"*Design interfaces shall be identified and controlled so that efforts are coordinated among affected organizations."*

"Design information transmitted across interfaces shall be documented and controlled."

"Verification shall be performed before release for procurement or manufacture, construction, or release to another organization for use in other design work."

On the IVP, NWP developed a substantive data package to provide the vendor with design input information and included the package in the original contract. That process was governed by WP 15-PC3609 R28, *Preparation of Purchase Requisitions.* EA reviewed the controls needed for the subsequent transfer of information to and from the IVP vendor as the design progressed, and found that adequate controls were in place for review, control, and approval of vendor submittals using procedure WP 15-PC3041, *Approval/Variation Request Processing*. However, controls in WP 15-PC3609 governing supplemental transmittal of design information from NWP Engineering to the IVP vendor were not clearly delineated. Interviews with individuals involved in the project indicated that information requests could be (and were being) received from the IVP vendor via email, with responses from NWP Engineering returned also via email. EA found no evidence that those responses were checked or verified prior to transmittal. One interviewee noted that a 'request for information' process had been established, but it was not in common use. Within NWP Engineering, the CSE is the focal point for technical responses, and the subcontract technical representative is normally copied on responses; however, this process lacks sufficient rigor to meet the design control commitments noted above from the QAPD.

Calculation Process

The previous EA Operational Awareness Record referenced below noted that calculations performed to support changes to the design basis at WIPP are not issued as stand-alone documents, but rather are included in the engineering change order (ECO) they support. This approach is considered contrary to ASME NQA-1 Supplement 3S-1 that states:

"Calculations shall be identifiable by subject (including structure, system, or component to which the calculation applies), originator, reviewer, and date; or by other data such that the calculations are retrievable."

NWP QAPD, Section 2.2, also states that:

"Calculations shall be identifiable by subject (including structure, system, or component to which the calculation applies), originator, reviewer, and date, or by other designator such that the calculations are traceable."

NWP Engineering does not assign calculation numbers, and WIPP calculations are not retrievable unless the ECO number is known. The previous EA report recommended in an OFI that calculations should be numbered and issued as stand-alone documents, retrievable directly from the electronic record system. Follow-up discussions during this visit found no planned corrective action(s) on the part of NWP to address this issue. EA concluded that the current methodology as described above does not meet the specific requirements or the intent of the QAPD commitment.

In additional discussions with NWP Engineering personnel after the December 2-5 visit, NWP proposed to revise calculation procedure 09-CN3031 to assign tracking numbers to future calculations and to implement a calculation log to assist in retrieval of specific calculations. This is a positive step to potentially address both identification and retrievability issues, although it does not address the compliance issue described above for past completed calculations.

Engineering Records Control

EA followed up on previous observations in this area, validating that the electronic record system is available to individual users on site. EA also verified that engineering drawings are available to users on their desktops

through that system. Procedures are accessed through a different system, QMIS, which similarly provides controlled access and ensures receipt of the record copy of procedures requested.

Corrective Actions for Review Team Findings

An internal NWP review team performed an assessment of design control at WIPP in May and June 2014. NWP transmitted the review team report to the U.S. Department of Energy (DOE) on July 1, 2014. The report contained four findings. This EA follow-up review was planned in part to look at progress made in developing and implementing corrective actions for those findings. In this regard, NWP QAPD, Section 1.3.4.1, states:

"*Conditions adverse to quality (CAQs) shall be documented and reported to the appropriate levels of management responsible for the condition and to QA for tracking."*

"Responsible management shall perform the following for CAQs:

- *Identify the cause of the adverse condition*
- *Determine the extent and impact of the adverse condition*
- *Notify affected organizations, including external organizations, as applicable*
- *Plan and complete action to correct the adverse condition*
  - *Complete remedial action as soon as practical*
  - *Include prevention of recurrence of the adverse condition as part of the corrective action planning"*

EA found that the four findings had been documented in a single WIPP Form with four subparts, WF14-266-S000 through -S003. WF14-266 was initiated approximately six weeks after the review team report was issued. Additional observations specific to each subpart are provided below.

SMP-14-002 Finding 1: *The hierarchy of technical baseline documents is not formally defined beyond the System Descriptions. The technical baseline must be clearly defined to include specific design basis documents (e.g., SDDs calculations, drawings, specifications) for each system and should also identify the categorization of those drawings which are essential, support, or general.*

The corrective action plan for WF14-266-S000, which remained unapproved as of December 4, 2014, provided for revision of unidentified procedures to correct the CAQ. The plan contained no actions or commitments to implement the revised procedural requirements. EA concluded that the proposed corrective action plan would not result in correction of the CAQ condition. In discussions with NWP personnel subsequent to the December 2-5 visit, NWP noted that causal analysis had been performed and that additional internal review of this issue was documented in a Management Assessment Report. That report identified specific procedures requiring revision and recommended corrective actions. Those corrective actions were added to the Recovery Plan Schedule. NWP personnel stated that the corrective actions have not been added to the corrective action plan for WIPP Form WF14-266. Review of the Management Assessment Report is included as a follow-up item in this report.

SMP-14-002 Finding 2: *The engineering calculation procedure does not address all of the required elements in the QAPD and lacks the detailed guidance necessary to ensure a consistent and appropriate level of engineering rigor. Design inputs based on assumptions that require re-verification are not tracked and controlled.*

In this finding, the internal review team noted shortcomings in the WIPP calculation process in meeting QAPD commitments. The NWP QAPD states the following requirements:

"Design inputs will be identified and documented, and their selection reviewed and approved by those responsible for the design."

"Design inputs based on assumptions that require reverification shall be identified and controlled."

The corrective action plan for WF14-266-S001, which also remained unapproved as of December 4, 2014, included a commitment to revise existing procedures or create a new procedure to address the required elements of the QAPD. The plan also included a commitment to define a process to track and resolve unverified assumptions during the design process. EA noted problems with the proposed corrective action:

- The proposed corrective action will likely correct the identified problem in future calculations, but does not include actions to conduct an extent of condition review of this particular issue (i.e., identification and resolution of existing unverified assumptions in calculations that have already been performed).

- The corrective action plan does not include proposed action(s) to examine the extent of condition and consequences of other non-compliances with the QAPD. In this finding, the failure to identify, track, and close unverified assumptions was identified as an example of the larger issue, which was that "the engineering calculation procedure does not address all of the required elements in the QAPD." The corrective action plan for this finding does not address the larger issue.

- Although one NWP individual expected that the calculation procedure would be revised in January 2015 to address some of these issues, this action was not reflected in the corrective action plan.

In discussions with NWP personnel subsequent to the December 2-5 visit, NWP noted that a sampling approach is being considered to address the issue of unverified assumptions and that the scope of corrective actions might be limited to safety-related structures, systems, and components. EA commented that a sampling approach might not be adequate to identify all potential problems. This is listed as a follow up item below.

SMP-14-002 Finding 3: *The design review and verification processes are not being conducted or documented in a manner intended by the procedure. This finding was previously self-identified and a CAP is in place with actions planned.*

This subpart of WF14-266 states that this finding was previously identified during another review and documented in an earlier WIPP Form, WF14-039. The corrective action is to be performed under CAR-14-039, and this subpart was closed. EA will follow up on CAR-14-039 in a later review.

SMP-14-002 Finding 4: *System health reports are not performed in a consistent manner and the examples provided do not contain an analysis by the cognizant system engineer and therefore do not meet the intent of DOE O 420.1B.*

The corrective action plan for this finding, which also remains unapproved as of December 4, 2014, includes a commitment to revise existing procedures and provide training to CSEs on effective system health reporting and analysis. DOE Order 420.1B requires:

"System assessments must include periodic review of system operability, reliability, and material condition. Reviews must assess the system for—

a) Ability to perform design and safety functions,
b) Physical configuration as compared to system documentation, and
c) System and component performance in comparison to established performance criteria."

Other sites within the DOE complex have successfully utilized system health reports to accomplish these requirements. Application of system health reporting at WIPP will provide a positive means of documenting and

communicating system status, tracking maintenance/performance issues, and strengthening configuration management.

Other Issues

During this visit, EA also found that the Engineering Performance Improvement Plan had not been revised based on the NWP review team results. A commitment to produce a Performance Assurance Management Plan by September 30, 2014, has been rescheduled to May 1, 2015. An NWP management assessment performed in October 2014 (draft, report not yet issued) looked at overall improvements needed within Engineering to support restart reviews in 2015. Recommendations included completion of key system design description documents and tightening of processes in several areas. EA will follow up on results of that review.

Conclusions

In regard to design input control and the calculation process document areas, NWP falls short of compliance with commitments made in the NWP QAPD (and therefore with the CBFO QAPD, DOE/CBFO-94-1012 Revision 11). EA found that the process for transfer of design input information to outside contractors for the IVP is unclear and is not being adequately implemented. The NWP engineering calculation process produces calculations that are not readily identifiable or retrievable. These calculations are an integral part of the technical baseline; therefore, documentation of the technical baseline does not appear to be adequate. NWP has proposed corrective measures going forward that are designed to achieve compliance with QAPD requirements, but the plan as stated does not retroactively address the problem.

Corrective actions planned for findings identified by the internal review team are insufficient to correct the deficiencies reported. WIPP personnel did not enter the findings into their corrective action process in a timely manner and had not yet finalized corrective action plans. In discussions with NWP personnel subsequent to the December 2-5 visit, NWP described additional corrective actions and noted that those actions have been entered into their Recovery Plan Schedule.

EA noted positive developments in the increased emphasis on system health reporting and on completing or upgrading system design descriptions.

EA identified the following opportunities for improvement and findings during this review:

Opportunities For Improvement

1) Consider expanding proposed corrective action plans for findings from the NWP internal review (as noted above) to address all aspects of the CAQs and documenting the plans in WF14-266 as required by the contractor assurance system.

2) Consider improving timeliness in documenting problems and developing corrective action plans to ensure a more effective contractor assurance program.

3) Consider revising WP 15-PC3609 to clarify requirements for transmittal of design information to outside vendors in accordance with the QAPD.

4) Consider internally assessing compliance with the requirements of WP 15-PC3609 pertaining to transmittal of design information to outside vendors.

Findings

1) WIPP-NWP-1 – Contrary to the requirements of ASME NQA-1 and the NWP QAPD, the NWP Engineering calculation process does not result in calculations that are identifiable and retrievable in a manner that supports facility operability and the technical baseline.

EA Participants	**References**
1(lead). Charles Allen	NWP Independent Review SMP-14-002
2. Click here to enter text.	NWP WP 09 Rev. 36, *Conduct of Engineering*
	EA Operational Awareness Record EA-WIPP-2014-06-23
	NWP WP 15-PC3041, *Approval/Variation Request Processing*
	WIPP Form WF14-266 Subparts -S000 through –S003
	DOE/CBFO-94-1012 Revision 11, *Quality Assurance Program Document*
	WP 13-1 Rev. 35, *Quality Assurance Program Description*

Were there any items for EA follow up? ☒Yes ☐No

EA Follow Up Items

- NWP responses to findings identified regarding the design input process and the calculation process compliance with the QAPD
- Engineering calculation procedure revision due in January 2015
- Results and proposed actions from NWP internal management assessment, MA-OPS2014-28, of October 2014
- Planned corrective actions for CAR-14-039, as well as WF14-266-S000 and -S001
- Timeliness and effectiveness of the WIPP contractor assurance program.