



Department of Energy
Carlsbad Field Office
P. O. Box 3090
Carlsbad, New Mexico 88221
OCT 31 2017

ENTERED



Ms. Mary McDaniel, Manager
Quality and Contractor Assurance
Nuclear Waste Partnership LLC
P.O. Box 2078
Carlsbad, NM 88221-2078

Subject: Issuance of CBFO Surveillance Report S-17-41

Dear Ms. McDaniel:

Enclosed is the report for Carlsbad Field Office (CBFO) Surveillance S-17-41, Nuclear Waste Partnership LLC (NWP) Quality Assurance (QA) Program related to application of software quality management and control of software packages that are identified as safety software items. The surveillance was performed September 27 - 28, 2017 at the Waste Isolation Pilot Plant (WIPP) near Carlsbad, NM.

As described in detail in the report, the surveillance team concluded that the activities evaluated are effective and satisfactory for compliance with applicable upper-tier requirements and related WIPP procedures. The two items that were in progress during the surveillance, completion of reviews of re-screenings of safety software items and updates of the Controlled Software Log (CSL) and the type C "general support software" list, will be evaluated during subsequent assessments to verify that work has been completed and that all records have been updated.

The surveillance team did not identify any concerns related to the safety software control program as a result of interviews with NWP personnel or review of documentation.

If you have any questions concerning the surveillance report, please contact me at (575) 234-7476.

Sincerely,


Michael R. Brown, Director
Office of Quality Assurance

Enclosure

Ms. Mary McDaniel

-2-

OCT 3 1 2017

cc: w/enclosure

J. Carswell, CBFO	*ED
D. Miehl, CBFO	ED
M. Navarrete, CBFO	ED
M. Stapleton, CBFO	ED
M. Fineran, CBFO	ED
E. Garza, CBFO	ED
R. Elmore, CBFO	ED
J. Britain, NWP	ED
V. Ballew, NWP	ED
S. Saiz, NWP	ED
A. Boyea, NWP	ED
J. Walsh, EPA	ED
J. Ellis, EPA	ED
T. Peake, EPA	ED
J. Kieling, NMED	ED
R. Maestas, NMED	ED
D. Biswell, NMED	ED
T. Runyon, CTAC	ED
P. Martinez, CTAC	ED
C. Castillo, CTAC	ED
M. Leroy, CTAC	ED
J. Schuetz, CTAC	ED
D. Harvill, CTAC	ED
G. White, CTAC	ED

CBFO QA File

CBFO M&RC

*ED denotes electronic distribution

CBFO SURVEILLANCE REPORT

Surveillance Number: S-17-41 **Date of Surveillance:** September 27-28, 2017

Surveillance Title: Quality Management / Control of Safety Software Items

Organization(s)

Assessed: Nuclear Waste Partnership LLC (NWP)

Surveillance Team:

Michael R. Brown	Management Representative, Carlsbad Field Office (CBFO) Office of Quality Assurance
Jim Schuetz	Surveillance Team Leader, CBFO Technical Assistance Contract (CTAC)
Joe Lopez	Team Member, CTAC

Surveillance Scope:

Surveillance S-17-41 verified the adequacy and implementation of the Nuclear Waste Partnership LLC (NWP) Quality Assurance (QA) Program with respect to application of software quality management and control of software packages that are identified as safety software items. The surveillance also evaluated and verified the implementation and effectiveness of applicable NWP implementing procedures.

Surveillance Results:

Activities Evaluated:

The following documents were provided to the surveillance team prior to the surveillance.

- DOE/CBFO-94-1012 Rev. 13, *Quality Assurance Program Document*
- Waste Isolation Pilot Plant Hazardous Waste Facility Permit NM4890139088-TSDF
- WP 13-1 Rev. 37, *NWP Quality Assurance Program Description*

During interviews with NWP personnel, the surveillance team was presented with an updated Controlled Software Log (CSL) dated 9-26-17 that was evaluated during the surveillance. This CSL was used to identify safety software line items and to select safety software items for discussion and further evaluation. The surveillance team determined that a link to this version of the CSL is posted on the WIPP Family Page at <http://wippcentral/sites/groups/QA>. NWP personnel access this web page to reference the current version of the CSL.

The surveillance team conducted interviews and reviewed objective evidence of application of software quality assurance to safety software items that are controlled and managed by NWP. The surveillance team determined that the QA department has elected to perform re-screenings of all safety software line items listed on the CSL. These screenings were performed by the Nuclear Safety (NS) engineering organization per procedures WP 13-1 Rev. 37, *Quality Assurance Program Description* and WP

CBFO SURVEILLANCE REPORT
S-17-41 – Quality Management / Control of Safety Software Items
September 27-28, 2017

16-2, *Software Screening and Control* that flow down requirements of DOE/CBFO-94-1012 QAPD Rev 13. Software Screening Checklist forms (EA16-2-1-0) have been completed and are under review by NWP QA. Upon completion of the review by NWP, the results will be reflected in a revised CSL. An evaluation of the completed and reviewed EA16-2-1-0 Software Screening Checklist forms for all safety software applications and a review of the revised CSL will be included in the scope of surveillance S-18-10. The surveillance team reviewed the following sample of completed Software Screening Checklist forms.

Software Line Item Selected for evaluation during the Surveillance	Note
413-CP-321-03 PLC Application Program	This is the Interim Ventilation System (IVS) software line item.
Sixnet_CMS	This is the code that runs on the Programmable Logic Controllers (PLCs) that provide Input/Output to the CMS developed using the Sixnet language.
Ignition	This is the software language that is used to develop the CMS code, a type "A" software that is identified as "Not Controlled."
Safety Significant instrument Loops	This is the code that runs on the PLCs that are accredited in the Documented Safety Analysis (DSA) for annunciation of safety-significant alarms.
SVS Fan Controller Software	This is the code that runs on the PLCs controlling the two fans.
Central Monitoring System (CMS)	This is the code for the Human Machine Interface (HMI) operators use to interface with the system.
Firetrol Diesel Fore Pump Controller Software	This was a re-screen of the existing legacy software.

The surveillance team reviewed Software Quality Assurance Elements Checklist EA-16-2-2-0 documents for the Firetrol Diesel Fire Pump Controller Software and the 413-CP-321-03 PLC Application Program (IVS fan controllers) software applications. These checklists satisfy the need for Software Quality Assurance Plans (SQAP) for software applications that are classified as type A "acquired" and type D "developed" respectively in accordance with WP 16-2, *Software Screening and Control* § 5.5.1 *Software Quality Assurance Plan*. These applications are supplied and modified by respective vendor organizations.

The surveillance team reviewed the SQAP for the *Supplemental Ventilation System (SVS) PLC & Human Machine Interface (HMI)* software application. This plan was generated by NWP personnel and adequately describes application of software quality assurance and describes responsibilities for management of the software.

CBFO SURVEILLANCE REPORT
S-17-41 – Quality Management / Control of Safety Software Items
September 27-28, 2017

Changes to software applications were evaluated by the surveillance team. NWP procedure adequately addresses the process for changes to software applications that are performed by either NWP personnel or by the vendor/developer of a specific software application.

Software changes performed by NWP personnel are managed by the Software Custodian for a specific software application implementing the process in WP 09-CN3007, *Engineering Change Notice*. The changed software applications are then installed using the process in WP 10-WC3011, *Work Control Process*. The surveillance team determined that recent changes to the CMS software application were performed by NWP personnel and were adequately managed using the engineering change notice (ECN) and approval request (AR) processes. NWP WIPPFForms WF17-418 and WF17-649 were written to address a condition adverse to quality regarding unexpected shutdown of IVS Fan during SVS fan testing and inadequate documentation of unexpected shutdown of a surface fan during the recent software changes / SVS fan testing. These WIPPFForms are currently open. An evaluation of the work control process for making software related changes to the WIPP facility and generation/revision of software life-cycle documentation covering the recent software change will be included in the scope of surveillance S-18-10. Both requests for changes and problem reports are submitted to the software custodian that is responsible for a software application. The software custodian then evaluates the request and identifies software modules and/or software life-cycle documents that are impacted by the scope of a change. Details of changes are described and documented on controlled engineering drawings and record documents. Installation is performed by the software custodian in coordination with operations allowing for equipment to be out-of-service for installation and testing of the software change. Testing of changes is done in the production environment. The production environment for a specific software application is a server environment or an environment that uses a laptop for code development that is connected to a PLC for update. The baseline for the CMS software application that is described in the SQAP is managed and updated by the Software Custodian. The SQAP addresses the appropriate software QA elements for the CMS software application including the; Requirements Document, verification and Validation (V&V) plan, Design Document, Implementation Document, V&V Documents for each phase, and User documentation. In addition, the surveillance team reviewed software screening documentation for the IVS and the SVS. An evaluation of the work control process for software related changes to the WIPP facility, software life-cycle documentation covering the recent software change, and status of WIPPFForms related to the facility/software change process will be included in the scope of surveillance S-18-10.

Software changes performed by a vendor are managed using the Approval Request/Variation Request (AR/VR) process. The surveillance team determined that recent changes to the Safety Significant Software Loops software application were performed by the vendor and were adequately managed using the AR/VR process.

The surveillance team discussed software applications with NWP QA personnel that are used by NWP and are classified as type C "general support software." The listing of this type of software application is currently under revision. NWP QA is coordinating with all

CBFO SURVEILLANCE REPORT
S-17-41 – Quality Management / Control of Safety Software Items
September 27-28, 2017

software custodians to identify and classify all general support software that is either controlled or not controlled. A list is being generated and will be maintained in accordance with WP 16-2, *Software Screening and Control* § 5.1.1.3 [A] to provide information of software that is used in the development and/or change of software application coordinating versions and dates of installation of general support software with applications that are found on the CSL.

The surveillance team verified training of individuals for qualification as software custodians.

Steve Bannister
Kevin S Johnson

Neil A. Dickes
Forrest E. Queen

Laura Cue

The surveillance team determined that the training curriculum for software custodians is adequate and that all personnel are adequately trained. The surveillance team offers a recommendation to add a line time to the training examination document for software custodians to have the candidate demonstrate knowledge in the identification of software configuration items. This will reinforce situations where software packages may consist of one or multiple configuration items and may be controlled independently.

Corrective Actions:

The surveillance team identified no concerns as a result of interviews with NWP personnel or review of documentation.

Conclusion:

The surveillance team determined that the format of the current CSL is adequate with respect to safety software applications. Re-screening classifications that have been reviewed by the QA department are included in the current version. An evaluation of the CSL will be included in the scope of surveillance S-18-10 to verify status of final re-screening classifications, QA reviews, and update of the CSL.

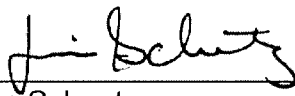
The surveillance team determined that software quality assurance plans for safety software applications are generated in accordance with procedure including Software Quality Assurance Elements Checklist documents and SQAP documents as appropriate for the software application being controlled under either. Review of the content of software life-cycle documents and work control packages will be included in the scope of surveillance S-18-10.


The surveillance team determined that changes to safety software applications are being controlled in accordance with procedure. Evaluation of the content of documentation of recent CMS software change control, software installation, and software testing packages will be included in the scope of surveillance S-18-10. An evaluation of the status of corrective actions under WIPPF Form WF17-649 related to development of a stand-alone process that is integrated with the NWP ECN process for implementing software changes will also be included in the scope of surveillance S-18-10.

CBFO SURVEILLANCE REPORT
S-17-41 – Quality Management / Control of Safety Software Items
September 27-28, 2017

The surveillance team determined that type C “general support software” applications related to safety software items are controlled in accordance with procedure. The listing of type “C” software is currently under revision. An evaluation of the status of the list of type C “general support software” and the draft list will be included in the scope of surveillance S-18-10.

The surveillance team determined that software custodians are trained and qualified in accordance with acceptable training curriculum.

Surveillance Team Leader Signature:  Date: 10/31/17
Jim Schuetz

CBFO OQA Director (or Designee):  Date: 10/31/2017
Approval Signature: Michael R. Brown