



**U.S. Department of Energy**  
**Office of River Protection**

P.O. Box 450, MSIN H6-60  
Richland, Washington 99352

05-ESQ-021

Mr. E. S. Aromi, President  
and General Manager  
CH2M HILL Hanford Group, Inc.  
Richland, Washington 99352

Dear Mr. Aromi:

CONTRACT NO. DE-AC27-99RL14047 – ASSESSMENT REPORT A-05-ESQ-TANKFARM-002 – CH2M HILL HANFORD GROUP, INC. (CH2M HILL) QUALITY ASSURANCE (QA) PROGRAM ASSESSMENT, MARCH 21 THROUGH 29, 2005

This letter forwards the results of the U.S. Department of Energy, Office of River Protection (ORP) assessment of the CH2M HILL QA Program conducted during the period of March 21 through 29, 2005.

The assessor found CH2M HILL had procedures in place to sufficiently implement the CH2M HILL QA Program requirements associated with the program elements reviewed. These procedures prescribed processes which, for the most part, were effectively implemented. The assessor identified one exemplary practice and two Findings. The two Findings identified do not require a response from CH2M HILL, as corrective actions for the Findings have already been established and are appropriate. The Findings identified during this assessment were:

- CH2M HILL Management is not effectively addressing training delinquencies; and
- Training and qualification records of CH2M HILL QA Inspectors trained and qualified by Fluor Hanford, Inc. have not been maintained as formal CH2M HILL training records.

The assessor also determined that CH2M HILL's efforts to facilitate the retrieval and use of lessons learned bulletins, and to institutionalize the use of lessons learned information in every day work planning and engineering activities was an exemplary practice.

The assessor also closed seven Findings from ORP assessment A-04-ESQ-TANKFARM-006, "Assessment of Computer Software Quality Assurance."

Mr. E. S. Aromi  
05-ESQ-021

-2-

If you have any questions, please contact me, or your staff may call Robert C. Barr, Director, Office of Environmental Safety and Quality, (509) 376-7851.

Sincerely,

ESQ:SAV

Roy J. Schepens  
Manager

Attachment

cc w/attach:

G. M. Grant, CH2M HILL

G. L. Harvey, CH2M HILL

R. L. Higgins, CH2M HILL

K. Parnell, PAC

C. R. Ungerecht, PAC

U.S. DEPARTMENT OF ENERGY  
Office of River Protection  
Environmental, Safety and Quality

ASSESSMENT: CH2M HILL Quality Assurance Program Assessment

REPORT: A-05-ESQ-TANKFARM-002

FACILITY: CH2M HILL Hanford Group, Inc. Tank Farms

LOCATION: Hanford Site

Dates: March 21 through 29, 2005

ASSESSOR: Samuel Vega, Lead Assessor

APPROVED BY: Patrick P. Carier, Team Lead  
Verification and Confirmation

# Executive Summary

## Introduction

From March 21 through 29, 2005, the U.S. Department of Energy, Office of River Protection (ORP) conducted an assessment of the Contractor's Quality Assurance (QA) Program. The ORP evaluated the effectiveness of the Tank Farm Contractor's QA Program, as prescribed in the CH2M HILL Hanford Group, Inc. (CH2M HILL) "Quality Assurance Program Description (QAPD)," TFC-PLN-N-02, Revision A-3. Assessment activities focused on verifying adequate implementation of procedure prescribed processes which implement QAPD requirements. The assessment focus was on QA processes not scheduled or covered in other ORP assessments. The following processes were sampled in this assessment:

- Personnel Training (Qualification Cards Process);
- Qualification & Certification;
  - Inspection & test Personnel.
  - Non-destructive Examination.
- Lessons Learned Program;
- Software QA.

ORP performed two software QA assessments of the Contractor's safety software systems in Fiscal Year 2004. The assessor also evaluated the effectiveness of the corrective actions resulting from those assessments

## Conclusions

The assessor concluded CH2M HILL procedures implemented the requirements of the CH2M HILL QAPD. The assessor also determined that CH2M HILL effectively implemented QA processes and activities. The assessor identified CH2M HILL's efforts to facilitate the use of lessons learned information and to institutionalize the use of lessons learned information in every day work activities as an exemplary practice. The assessor also identified the following Findings:

- **A-05-ESQ-TANKFARM-002-F01: CH2M HILL management is not addressing training delinquencies.** Monthly training delinquency reports indicated some CH2M HILL managers were not addressing required training delinquencies (many related to the use of emergency equipment and personnel safety equipment) within their organizations. The Contractor concurred with this Finding. Because CH2M HILL has initiated PER 2005-1475 which establishes appropriate corrective actions, no response is required; and

- **A-05-ESQ-TANKFARM-002-F02: Training and qualification records of CH2M HILL QA inspectors trained and qualified by Fluor Hanford, Inc. (FHI) were not maintained as CH2M HILL training records.** CH2M HILL inspectors are trained and qualified by FHI. FHI maintains the required qualification records, but is not required to transmit these records to CH2M HILL. As a result, CH2M HILL does not maintain documented proof of these qualifications within their official training record system. The Contractor has concurred with this Finding. Since CH2M HILL has initiated PER 2005-1433, which establishes appropriate corrective actions, no response is required.

This assessment closed seven safety software Findings from previous software quality assurance assessments.

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## List of Acronyms

CH2M HILL	CH2M HILL Hanford Group, Inc.
DOE	U. S. Department of Energy
ITEM	Integrated Training Electronic Matrix
FHI	Fluor Hanford, Inc.
NDE	Non-Destructive Examinations
ORP	Office of River Protection
PER	Problem Evaluation Request
QA	Quality Assurance
QAPD	Quality Assurance Program Description
TFC	Tank Farm Contractor
UT	Ultrasonic Testing
VISION	Software product name (not an acronym)

**CH2M HILL Hanford Group, Inc. (CH2M HILL)  
Quality Assurance (QA) Program Assessment  
March 21 through 29, 2005**

**Purpose and Scope**

From March 21 through 29, 2005, the U.S. Department of Energy (DOE), Office of River Protection (ORP) conducted an assessment of the Contractor's QA Program. The purpose of the assessment was to determine the effectiveness of the Tank Farm Contractor's QA Program as prescribed in the CH2M HILL "Quality Assurance Program Description (QAPD)," TFC-PLN-N-02, Revision A-3. To accomplish this, assessment activities focused on verifying the adequate implementation of procedure prescribed processes which implement QAPD. The assessment focus was on QA processes not scheduled or covered in other ORP assessments. The following specific processes were sampled as part of this assessment:

- Personnel Training (Qualification Card Process);
- Qualification & Certification;
  - Inspection & test Personnel.
  - Non-destructive Examination.
- Lessons Learned Program; and
- Software QA.

Two software QA assessments of the Contractor's safety software systems were performed in Fiscal Year (FY) 2004. These resulted in several corrective actions, of which, many were recently completed, and several still had additional work remaining. As such, ORP decided to not perform an assessment of safety software systems for FY 2005. Instead, ORP decided, for this audit, to perform closure verification of the seven completed corrective actions from ORP assessment A-04-ESQ-TANKFARM-006, "Assessment of Computer Software Quality Assurance."

**Observations and Conclusions**

The assessor concluded that for the processes and activities reviewed, CH2M HILL had in place adequate procedures which met the requirements of the CH2M HILL QAPD. The assessor also determined that CH2M HILL was effective in implementing the evaluated QA processes and activities. The assessor felt that CH2M HILL's efforts to facilitate the use of lessons learned information and to institutionalize the use of lessons learned information in every day work activities was an exemplary practice.



## **Conclusions:**

The assessor reviewed the procedures and processes used by CH2M HILL to describe and implement the QA program elements for Personnel Training (qualification and certification card process), Qualification & Certification of inspectors and nondestructive examination personnel, stop work authority, and Lessons Learned. The assessor also performed closure verification of findings associated with safety software QA identified during the ORP assessment A-04-ESQ-TANKFARM-006, "Assessment of Computer Software Quality Assurance." The assessor reviewed documents and records, and interviewed management and staff responsible for these processes to assess their adequacy in meeting the requirements of the CH2M HILL QA Program Description, TFC-PLN-02. Implementation of the processes was also assessed.

### **Personnel Training**

The assessor reviewed the training activities associated with the development of Qualification cards and the associated training. This was accomplished by reviewing applicable procedures, conducting interviews, walking through the automated processes managed by the VISION database, and reviewing training records for eight operators required to maintain qualification cards. Individual records queried were from operations, maintenance, closure projects, and the 222-S Laboratory. The assessor found no issue with the process or the qualification records reviewed.

The assessor reviewed Delinquency Training reports generated monthly by the Integrated Training Electronic Matrix (ITEM) database and distributed by the training organization to CH2M HILL Management. The assessor noted that some CH2M HILL management was not adequately addressing reported training delinquencies. What concerned the assessor most was that a large portion of the delinquent training was related to the use of emergency and personnel safety equipment. One significant example with safety significance included 35 Nuclear Chemical Operators which have not taken the "Decon Unit & Safety Shower" training. A review of the training course description indicated the objective of this 90 minute course was to make these operators familiar with the use and location of all emergency decontamination equipment within their work area. Other safety related training delinquencies older than 30 days included mask fit, lock & tag, and Tank Monitoring and Control System (TMACS) operations qualification. The contractor documented this issue in PER-20051475 and corrective actions were established which the assessor has concurred with. (This issue, with the agreed upon corrective actions, is identified in assessment Finding A-05-ESQ-TANKFARM-002-F01).

CH2M HILL Assessment FY-2004-CH2M-I-0119, "Independent Assessment of CH2M HILL Hanford Group Analytical Technical Services," April 2004, identified significant problems with missing and incomplete training and qualification records. The assessor looked at operator qualification records for two 222-S Laboratory Nuclear Chemical Operators performing NQA-1 related work contracted by Bechtel National, Inc. for the Waste Treatment and Immobilization Plant (WTP). In addition to reviewing training and qualification records, the assessor reviewed improvement plans, management assessment reports, and interviewed the training coordinator for the 222-S Laboratory. Corrective actions were not yet completed for the entire laboratory, but to minimize the impact on the WTP schedule, the assessor noted priority had been given to

those operators responsible for the WTP contracted work and all these operator's records were corrected. CH2M HILL had appropriately decided to requalify all the 222-S Laboratory operators with insufficient records instead of trying to recreate missing documentation or establish equivalencies or waivers. No issues were identified.

### Qualification & Certification

CH2M HILL employed the services of Fluor Hanford, Inc. (FHI) for performing training and qualification of their QA Inspection personnel. FHI provided the required training and testing, and maintained the qualification records. FHI also provided any required continuing training to maintain qualifications. At the time of the assessment there were seven qualified QA Inspectors. Each Inspector was qualified as basic QA Inspectors, but all maintained qualifications in more than one other area; welding, mechanical, electrical, instrumentation, and receipt inspection.

The assessor reviewed the Qualification records of three of the seven Inspectors. This included the review of qualification cards, eye examinations, lesson plans, on-the-job training, tests, indoctrinations, and evaluations of education and experience. All qualification and continuing training requirements were satisfied.

FHI provided copies of CH2M HILL qualification records to the CH2M HILL QA organization. The Manager of the QA field Support organization informally maintains these records. The assessor, through interviews with CH2M HILL training management and staff, determined that the qualification records for CH2M HILL Inspectors were not officially maintained by the CH2M HILL training organization. When notified of this issue, CH2M HILL assumed responsibility for this issue and generated PER-2005-1433 and committed to correct the problem. (This issue, with the agreed upon corrective actions, is identified in assessment Finding A-05-ESQ-TANKFARM-002-01-F02).

### Lessons Learned Program

The assessor reviewed the CH2M HILL Lessons Learned procedure TFC-OPS-C-28, "Lessons Learned," and interviewed key CH2M HILL staff responsible for implementing the program to determine if lessons learned information was properly reviewed, disseminated, and acted upon.

Internal lessons learned information (extracted from Problem Evaluation Requests [PER] documenting internal deficiencies) was converted into lessons learned bulletins which were then distributed within CH2M HILL as deemed appropriate or as indicated in the associated PER. Lessons Learned Bulletins were also posted on the River Protection Project (RPP) Lessons Learned Information System web site. The Training organization received all lessons learned bulletins and reviewed them for impact to established training courses. If warranted, training courses were revised to include lessons learned information. Of the four lessons learned bulletins sampled, the assessor was not able to track the final application of lessons learned information beyond its distribution. However, during interviews associated with training and qualification, the assessor noted examples where lessons learned initiated retraining/continuous

training was documented by both FHI and CH2M HILL. No issues with the internal lessons learned process were identified.

The process used for external lessons learned information was different than that used for the internal. PERs were generated for each external lessons bulletin received and assigned to a manager(s) to evaluate the impact of the reported item, activity, or condition. The assessor reviewed four PERs initiated in 2004 to assess the adequacy of evaluating external lessons learned bulletins. The documented actions in the PER were mainly focused on deciding if the lessons learned applied and needed to be distributed within the organization. Actions taken did not consider determining if any program changes were warranted, and if so, initiating required corrective actions. Two of the PERs reviewed by the assessor indicated the evaluated lessons learned were applicable to CH2M HILL. However, the only action taken was to further disseminate the lessons learned.

When this issue was discussed with the CH2M HILL Lessons Learned Coordinator and QA management, PER-2005-1278 was initiated to document this concern as a process improvement. Changes to procedure TFC-OPS-C-28, "Lessons Learned," were initiated to more clearly define expectations for evaluating external lessons learned for any needed changes to processes, training, or other related activities. Also, the instructions provided in PERs requesting the review of external lessons learned were revised to be more complete. The assessor reviewed and agreed with the proposed changes. The assessor also reviewed external lessons learned PERs generated after this issue was communicated to CH2M HILL and found the instructions had been changed as indicated. The assessor considered this issue corrected during the audit with no further actions required.

CH2M HILL internal and external lessons learned information had recently been reorganized to make it more assessable/retrievable to work planners and subject matter experts. This was in response to corrective actions and recommendations made during internal assessments which identified not utilizing past lessons learned as a contributor to process failures. Recent improvements included establishing a work planning lessons learned database where lessons learned bulletins had been consolidated, sorted, and binned by topics related to Tank Farm work activities. Procedures were revised to require work planners to review the database and take into account applicable lessons learned when planning work activities. Interviews with management indicated CH2M HILL had also initiated plans to expand the concept to include CH2M HILL Engineering. The above improvements which enabled CH2M HILL to use lessons learned information in every day work was considered by the assessor as an exemplary practice.

#### Software Quality Assurance Corrective Action Verification

Two software QA assessments of the Contractor's safety software systems were performed in FY 2004. These resulted in several corrective actions, of which, many were recently completed, and several still had additional work remaining. As such, ORP decided to not perform an assessment of safety software systems for FY 2005. Instead, ORP decided, for this audit, to perform closure verification of the seven completed corrective actions from ORP assessment

A-04-ESQ-TANKFARM-006, “Assessment of Computer Software Quality Assurance.” Closure of these findings is discussed in the section below.

## **Items Opened, Closed, and Discussed**

### **Opened Findings**

**A-05-ESQ-TANKFARM-002-F01: CH2M HILL Management is not addressing training delinquencies.**

#### **Requirements:**

TFC-PLN-02, Revision B-1, “Quality Assurance program Description,” in Section 2.2.4.1, it stated:

“Management at all levels is responsible ... for ensuring that personnel in their organizations are trained, qualified, and proficient to perform assigned work. They are further responsible for ... ensuring that training requirements and status are entered into the current electronic tracking system.”

TFC-BSM-TQ-MGT-C-02, Revision A-3, “Integrated Training Electronic Matrix (ITEM),” in Section 4.2 required responsible managers to:

1. “Evaluate ITEM report training requirements.
2. If a delinquent training requirement is identified in the ITEM report, ensure the employee does not perform work associated with that training requirement until the delinquency is corrected.
3. If a delinquent training requirement is not needed, request the training coordinator to remove requirement.”

#### **Discussion:**

The CH2M HILL training organization generated on a monthly basis Delinquency Training Reports from the ITEM database and distributed them to CH2M HILL Management. The assessor noted that some CH2M HILL management was not adequately addressing reported training delinquencies identified for their organizations. What concerned the assessor most was that a large portion of the delinquent training was related to the use of emergency decontamination equipment and personnel safety equipment. The reviewed reports identified over 200 training delinquencies. Most significant about these reports was that they indicated some required courses were never taken, they noted individuals had been delinquent for several months, and in some cases, they identified training delinquencies several years old. One significant example with safety significance included 35 Nuclear Chemical Operators which have not taken the required “Decon Unit & Safety Shower” training. Review of the training course description indicated the objective of this hour and a half course was to make these

operators familiar with the use and location of all (not just safety showers) emergency decontamination equipment within their work area. Other safety related training delinquencies older than 30 days included mask fit, loc & tag, and TMACS operations qualification.

The Contractor has concurred with this finding and has initiated PER 2005-1475. The following corrective actions were established with the assessor's concurrence:

1. Review and correct March 2005 "Delinquent Training Report" for those personnel in your organization, as follows:
  - If an employee is not required to receive the listed training, coordinate with the Training Coordinator to remove the subject training from the employee's ITEM;
  - If an employee is required to receive the listed training, coordinate with the Training Coordinator to schedule the training, and immediately submit a Training Extension Form to the Training Manager, per TFC-BSM-TQ-MGT-C-01;
  - Schedule training for employees who are delinquent in "Decontamination Unit and Safety Shower" training through coordination with the Training Manager; and
  - Ensure that employees listed in the March 2005 "Delinquent Training Report" are not being assigned to tasks/jobs that require the delinquent training.

**Actionee:** M. D. Hasty, K. C. Doewick, B. R. Hill, K. B. Adamson, G. L. Harvey, E. E. Kennedy, R Higgins      **Completion Date:** April 21, 2005

2. Effective in April 2005, transmit the monthly "Delinquent Training Report" to Director-level for increased visibility, scrutiny, and oversight.

**Actionee:** GL Harvey      **Completion Date:** April 21, 2005

3. Review and, if necessary, revise training procedures to clarify management expectations on training compliance requirements.

**Actionee:** GL Harvey      **Completion Date:** June 30, 2005

**A-05-ESQ-TANKFARM-002-F02: Training and qualification records of CH2M HILL QA inspectors trained and qualified by FHI were not maintained as CH2M HILL training records.**

**Requirements:**

Procedure TFC-BSM-TQ-IMP-C-02, Conduct of Qualification Cards and Guidance, in Section 4.8 required completed Qualification cards to be submitted to the Tank Farm Contractor (TFC) Training Records.

RPP-MP-011, "Tank Farms Contractor Qualification and Training Plan," in Section 4.6 stated that TFC training records are maintained and coordinated by the TFC training records custodian. Also, in Section 3.2 it stated that training provided by an outside organization in support of the qualification or certification of TFC personnel was required to meet the same basic requirements for development, implementation, testing, and documentation of training provided by the TFC.

### **Discussion:**

Through interviews with the training management and staff, it was noted that the qualification records for CH2M HILL QA Inspectors were not maintained by the training organization. The reason for this was that CH2M HILL Inspectors were trained and qualified by FHI. FHI maintained the required qualification records, but FHI was not required to transmit these records to CH2M HILL Training. As a result, CH2M HILL did not maintain any documented proof of these qualifications within their official training record system.

The Contractor has concurred with this finding and has initiated PER 2005-1433. The following corrective actions were established with the assessor's concurrence:

1. Copy the FHI maintained training record packages and submit them to the CH2M HILL training Coordinator.

**Actionee:** M. L. McElroy

**Completion Date:** May 19, 2005

### **Closed**

**A-04-ESQ-TANKFARM-006-F01:** "The Fluor Federal Services (FFS) quality assurance program and procedures did not implement one requirement of Nuclear Quality Assurance (NQA)-1 for documenting the use of computer software in design work."

- **Corrective action (F-01-CA-1):** Ensure FFS Practice 134 000 1100, "Quality Assurance Program," is revised to include the requirements of NQA-1, Supplement 3S-1 Which State: "Documentation of design analysis shall include ... Identification of any computer calculation, including computer type, computer program (e.g., name) revision identification, ... evidence of or reference to computer program verification, and design basis (or reference thereto) supporting application of the computer program to the specific physical problem."

**Verification:** Reviewed FFS Practice 134 000 1100, "Quality Assurance Program," dated January 17, 2005, and found the requirement was added into Section 6.1.

- **Corrective action (F-01-CA-2):** Ensure FFS Practice 134 200 1020, "Engineering Calculations," is revised to include the requirement of NQA-1, Supplement 3S-1 Which States: "Documentation of design analysis shall include ... Identification of any computer calculation, including computer type, computer program (e.g., name) revision identification, ... evidence of or reference to computer program verification, and design basis (or reference thereto) supporting application of the computer program to the specific physical problem."

**Verification:** Reviewed FFS Practice 134 200 1020, “Engineering Calculations,” dated August 1, 2004, and found the requirement was added in Page 3 in a section titled “Engineering Calculations.”

- **Corrective action (F-01-CA-3):** For design calculations performed by FFS for CH2M HILL establish computer-use logs as record information. These computer-use logs will identify the computer type, evidence of reference to computer program verification, and the basis supporting the application of the software program to the physical problems.

**Verification:** Sampled the Engineering Computer Program Use Record (computer use log) for a computer program called Auto Pipe used on project W-211.

**A-04-ESQ-TANKFARM-006-F02:** “The supplier evaluation of FFS did not identify FFS’s failure to implement some requirements.”

- **Corrective action (F-02-CA-1):** Ensure the Acquisition Verification Services (AVS) checklist for NQA-1, Supplement 3S-1, is revised by FHI to include all requirements or is otherwise structured to assure adequate verification of requirement implementation.

**Verification:** Reviewed current checklist to verify the required changes were made.

- **Corrective action (F-02-CA-2):** Perform an evaluation by AVS to ensure that FFS is compliant with the revised NQA-1, Supplement 3S-1 checklist;

**Verification:** Reviewed supplier QA evaluation dated September 14, 2004. The evaluation performed was a desk instruction and found no issues.

**A-04-ESQ-TANKFARM-006-F03:** “Some Personnel using quality-affecting software were inadequately trained in software quality assurance requirements and procedures.”

- **Corrective action (F-03-CA-1):** Ensure Personnel responsible for MicroShield are knowledgeable in the requirements of procedure TFC-BSM-IRM\_HS-C-01, “Software Development, Implementation, and Management;”

**Verification:** Reviewed an e-mail indicating task was completed via a briefing. Also reviewed a sample of the briefing rosters titled: “Software Quality Assurance Presentation.”

- **Corrective action (F-03-CA-2):** Prepare and issue a required reading describing the requirements of TFC-BSM-IRM\_HS-C-01; to be read by 95% of personnel responsible for quality-affecting software;

**Verification:** Reviewed TFC-BSM-IRM-HS-C-01, “Software Development Implementation and Management,” and the electronic required reading list report indicating who completed the assignment.

- **Corrective action (F-03-CA-3):** Prepare a briefing package consisting of lessons learned from this assessment and management’s expectations concerning software QA. Provide the briefing to 95% of the qualified CH2M HILL engineering and contractor staff;

**Verification:** Reviewed printout of the briefing overhead slides, and the Software QA Completion rosters for the briefings.

**A-04-ESQ-TANKFARM-006-F04:** “Subcontractors performing an evaluation of double-shell tank dome-loads in a staff-augmentation role used software that was not controlled under the CH2M HILL safety and quality assurance program.”

- **Corrective action (F-04-CA-1):** Update the ANSYS software QA plan and the ANSYS validation document to address the use of this software by staff augmentation contractors.

**Verification:** Reviewed QA-04-002, Revision A, “JLR Software Quality Assurance Plan for ANSYS Multi-Purpose Finite Element Analysis Software,” August 3, 2004, and JLR-QA-04-001, Revision A, “JLR Software Verification and Validation for Ansys 8.0 Multi-Purpose Finite Element Analysis Software,” August 3, 2004.

**A-04-ESQ-TANKFARM-006-F06:** “A CH2M HILL subcontractor was not obtaining error notices for AutoPIPE software and had not upgraded to a version that corrected some errors.”

- **Corrective action (F-06-CA-1):** Update the procurement statement of work template C-2 “general Contractor-technical,” to provide for computer-code-problem report.

**Verification:** Reviewed Template “C-2” General Contractor-Technical Statement of Work, “For acquisition of Non-Administrative Functions or Programs Support Services (Where the products generated are subject to established CH2M HILL program controls and review/approval processes and are performed by other general subcontractors.)”

- **Corrective action (F-06-CA-2):** Determine the list of calculations performed by ARES for CH2M HILL using the AutoPIPE code, determine if the calculations were impacted by the vendor-reported software problems, and ensure the ARES design process for safety-related systems ensure that computer-code problem reports are periodically evaluated during contract periods. Revise the calculations as necessary.

**Verification:** Reviewed ARES Corporation document dated July 8, 2004, “CH2M HILL Hanford Group Inc. –Contract No. 19225, Release 1 – Evaluation of AutoPIPE Error Reports (Revised) – ARES Task no. 0303107.01.”

**A-04-ESQ-TANKFARM-006-F07:** “The assessment and corrective action management systems did not assure that software quality assurance issues were comprehensively identified and resolved.”

**This was closed previously by DOE.**



**A-04-ESQ-TANKFARM-006-F09:** “The Contractor did not have an explicit error-reporting process that required documenting errors, notifying users, notifying vendors, and verifying completed work was still valid.”

- **Corrective action (F-09-CA-1):** Update the procedure TFC-BSM-IRM-HS-C-01, “Software Development, Implementation, and Management,” to provide explicit error-reporting requirements that will provide documenting errors, notifying users, notifying vendors, and verifying completed work as still valid.

**Verification:** Reviewed TFC-BSM-IRM-HS-C-01, “Software Development, Implementation, and Management,” Revision A-8, dated December 28, 2004.

## Signatures

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Samuel Vega,  
Assessment Team Leader

## INSPECTION NOTES

**Inspection Note Number:** A-05-ESQ-TANKFARM-002-01

**Inspectors Names(s):** Samuel Vega

**Dates of Inspection:** March 21- through 29, 2005

**Area/Items(s) Inspected:** Quality Assurance Program Review

The assessors reviewed the procedures and processes used by CH2M-HILL Hanford Group, Inc. (CH2M HILL) to describe and implement the Quality Assurance (QA) program elements for Personnel Training (qualification and certification card process), Qualification & Certification of inspectors and nondestructive examination personnel, stop work authority, and Lessons Learned. The assessors also performed closure verification of findings associated with safety software quality assurance identified during the U.S. Department of Energy (DOE), Office of River Protection (ORP) assessment A-04-ESQ-TANKFARM-006, "Assessment of Computer Software Quality Assurance." The assessors reviewed document and records, and interviewed management and staff responsible for these targeted processes to assess their adequacy in meeting the requirements of the CH2M-HILL Quality Assurance Program Description, TFC-PLN-02. The assessors also looked at implementation to assess the effectiveness these processes.

~~The assessors reviewed the procedures and processes used by CH2M HILL to describe and implement the Quality Assurance program elements for Personnel Training, Qualification & Certification of inspectors and nondestructive examination personnel, stop work authority, and Lessons Learned. The assessors also performed closure verification of findings associated with safety software quality assurance identified during the ORP assessment A-04-ESQ-TANKFARM-006, Assessment of Computer Software Quality Assurance.~~

~~The assessors reviewed document and records, and interviewed management and staff responsible for these activities to assess their adequacy in meeting the requirements of the CH2M-HILL Quality Assurance Program Description, TFC-PLN-02. The assessors also looked at the effectiveness the related processes.~~

### Observations and Assessments:

The assessors reviewed the following documents to assess the quality improvement processes:

- TFC-PLN-02, ~~REVISION~~ B-1, “Quality Assurance Program Description,” March-9, 2005;
- TFC-ESHQ-S\_SAF-C-04, ~~REVISION~~ B-5, “Stop Work Authority-,” January-19, 2005;
- Out-brief slides, “ISM Improvement Validation Post-implementation Assessment,” March-17, 2005;

### Personnel Training

- RPP-MP-011, ~~Revision~~ 1b, “Tank Farm Contractor Qualification and Training Plan,” October-28, 2004;
- TFC-BSM-TQ\_ADD-C-01, ~~Revision~~ C-1, “Training Analysis, Design, and Development,” December-1, 2004;
- TFC-BSM-TQ-IMP-C-02, ~~Revision~~ A-1, “Conduct of Qualification Cards and Guides;”
- Course Description Report, Course No. 351560, “Decontamination Unit & Safety Shower Orientation;”
- ATS-MP-1008, ~~Revision~~ 2, “Analytical Technical Services 222-S Laboratory Management Plan- Training and Qualification Program Upgrade Plan,” November-12, 2004;
- Analytical Technical Services 222-S Laboratory, “Qualification Card/Guide Status Complete or Inactivated,” March-28, 2005, (re-qualification status matrix);
- ATS-MP-1006, ~~Revision~~ 3, “Analytical Technical Services Management Plan- Training Implementation Matrix,” ~~September 09/022/, 2004;~~
- Management Assessment report FY-2004-HD&C-M-0051, “Assessment of 222-S Training Records for Quality And Accuracy;”
- Analytical Technical Services Worker Assessment Report FY04-ATSTR-WA-013, “Analytical Services (ATS) Education and Experience Documentation and Verification,” June-17, 2004;
- Analytical Technical Services Worker Assessment Report FY04-ATSTR-WA-018, “Analytical technical Services (ATS) Training Records,” September-15, 2004;
- Individual training Plan Reports (2 ATS Chem. Tech. Personnel & 7 CH2M\_HILL Operators)
- TFC-BSM-TQ-MGT-C-02, ~~Revision~~ A-3, “Integrated Training Electronic ~~M~~matrix (ITEM) Administration,” February-20, 2004;
- RPP-MP-011, ~~Revision~~ 1b, “Tank Farm Contractor Qualification and Training Plan,” October-28, 2004;
- TFC-BSM-TQ-MGT-C-04, ~~Revision~~ A-2, “Training Records Administration,” October-25, 2004;
- TWRS Training, ~~Revision~~ 0, “Characterization Project Operations (COP) Routine Conversion to Tank Farm Routines Training Plan;”
- OJT Card and Guide 350030, ~~Revision~~ 4, “Routines Initial- OJT,” ~~December 12/27/, 2004;~~

- [Performance Demonstration \(Certification 350030/32\), Revision 5a, "Tank Farms Routine Operations," December 12/27, 2004;](#)
- [Training Guide, Revision 4, "Tank Farms Routine Operations- Course Number 350031;"](#)
- [Job Task Analysis Hierarchy, "Complete Operating Logbooks;"](#)
- [Objectives Analysis Summary, "Log keeping;"](#)
- [Training Activity Sheet 350030, "Tank Farms Routine Operations – Initial Certification;"](#)
- [Training Activity Sheet 350830, "Waste Tank Lock and Tag technical Review Qualification;"](#)
- [Training Plan – 7A300-03-05, Revision 0, "Lockout/Tagout technical Reviewer transitional Qualification Training Plan;"](#)

#### Qualification & Certification

- [COGEMA-SVCP-PRC-014, Revision 2, "Qualification and Certification of Nondestructive Examination Personnel," April 23, 2003;](#)
- [Statement of Work Requisition #: 102204, Revision 3, "Blanket Master Agreement DSTIP Ultrasonic Testing and NDE Support Suggested Vendor; COGEMA," August 08/26, 2004;](#)
- [HNF-PRO-263, Revision 9, "Qualification and Certification of Inspection and Test Personnel," December 8, 2004;](#)
- [Training and Qualification records for 3 FH trained CH2M-HILL Inspectors;](#)
- [Training and Qualification records for COGEMA NDA Inspectors; 2 Level III inspectors, and one Level I;](#)
- [FH Training Summary reports \(for 3 CH2M-HILL Inspectors\);](#)
- [Activity QA Inspection Personnel Record – inspector status tracking tool \(for 48 inspectors; 7 from CH2M-HILL\);](#)

#### Lessons Learned Program

- [TFC-OPS-OPER-C-28, Revision A, "Lessons Learned," March 16, 2004;](#)
- [DOE-STD-7501-99, "DOE Standard- The DOE Corporate Lessons Learned Program," December 1999;](#)
- [CH2M HILL FOCUS Weekly Publication, "Lessons Learned Corner," March 14, 2005;](#)
- [Significant Event Report SER-4-98, "Unplanned personnel Radiation Dose," November 23, 1998;](#)
- [White Paper, "Work Management Feedback and Lessons Learned;"](#)
- [TFC-OPS-MAINT-C-01, Revision G2, "Tank Farm Contractor Work Control," March 17, 2005;](#)
- [FY2004-CP-M-0015, "CH2M HILL Hanford Group, Inc. Closure project Assessment Report for Lessons Learned Program Performance," January 01/28, 2004;](#)
- [RPP Lessons Learned Reports \(WEB Page\), Lessons Learned bulletins for 2005;](#)
- [Problem Evaluation Report printout of all External DOE Lessons Learned;](#)

- [Midpoint Assessment FY-2005-CP-M-0169, “244-CR Vault Thermocouple Removal; Extremity Administrative Control level Exceeded, January 2005;”](#)
- [Causal Analysis Report, “244-CR Vault Thermocouple Removal; Extremity Administrative Control level Exceeded,” July 22, 2004;](#)
- [A-04-ESQ-TANKFARM-006, “Assessment of Computer Software Quality Assurance,” April 19-26, 2004;](#)

Software QA verification documents:

- ~~A-04-ESQ-TANKFARM-006, Assessment of Computer Software Quality Assurance, April 19-26, 2004~~
- ~~Letter 04-ESQ-044, Contract No. DE-AC27-99RL14047 – Request for Action on Assessment of Computer Software Quality Assurance, Dated June 01, 2004~~
- Letter CH2M-0401199 R1, “Contract No. DE-AC27-99RL14047 – Response to Request for Action on Assessment of Computer Software Quality Assurance, A-04-ESQ-TANKFARM-006,” Dated July 15, 2004;
- FFS Practice 134 000 1100, “Quality Management Program,” January 17, 2005;
- FFS Practice 134 000 1100, “Quality Assurance Program,” January 17, 2005;
- Engineering Computer Program Use Record for Project W-211 AutoPipe software;
- Fluor Hanford Company ASME NQA-1 Checklist, “Supplement 3S-1 Design Control;”
- Letter CHG R2-87, “Supplier Quality Assurance Evaluation for Entry on the Evaluated Supplier Listing for Fluor Hanford –Fluor Federal Services;”
- Course Completion Roster, “Software Quality Assurance Roster,” January 17, 2005, & January 10, 2005;
- TFC-BSM-IRM-HS-C-01, “Software Development Implementation and Management;”
- QA-04-002, Rev-ision A, “JLR Software Quality Assurance Plan for ANSYS Multi-Purpose Finite Element Analysis Software,” ~~August 08/03/, 2004;~~
- JLR-QA-04-001, Rev-ision A, “JLR Software Verification and Validation for Ansys 8.0 Multi-Purpose Finite Element Analysis Software,” ~~August 08/03/, 2004-;~~
- TFC-BSM-IRM-HS-C-01, “Software Development, Implementation, and Management,” ~~rev~~Rev-ision A-8, dated ~~December 12/28/, 2004;~~
- ARES Corporation document dated July 8, 2004, “CH2M HILL Hanford Group Inc. –Contract No. 19225, release 1 – Evaluation of AutoPIPE Error Reports (Revised) – ARES Task no. 0303107.01;”
- Template “C-2” General Contractor-Technical Statement of Work, “For acquisition of Non-Administrative Functions or Programs Support Services (Where the products generated are subject to established CH2M HILL program controls and review/approval processes and are performed by other general subcontractors.);”
- [Letter 04-ESQ-044, “Contract No. DE-AC27-99RL14047 – Request for Action on Assessment of Computer Software Quality Assurance,” Dated June 01, 2004;](#)
- [Qualification Card and Guide 350830, Rev-ision 5b, “Lockout/Tagout Technical Reviewer;”](#)

### Problem Evaluation Reports (PERs):

PER-2004-3414	PER-2004-3414	PER-2004-3416
PER-2004-3538	PER-2004-3540	PER 2004-3543
PER 2004-3541	PER-2005-0326	PER-2004-1529
PER-2004-3473	PER-2004-1848	PER-2004-4166
<u>PER-2004-0457</u>	<u>PER-2005-1278</u>	

### Personnel Training

The assessor reviewed the training activities associated with the development of Qualification cards and the associated training. This was accomplished by reviewing applicable procedures, conducting interviews, walking through the processes managed by the VISION database, and reviewing training records for some CH2M -HILL staff required to obtain and maintain a qualification card. Individual records queried were from CH2M -HILL operations, maintenance, closure projects, and the 222-S Laboratory.

At CH2M -HILL, management was responsible for determining the need for training for each job function within their organization. With the support of the training organization, training plans were developed. Training plans documented the type of training required (classroom, on-job-training (OJT), reading assignment, etc.), any qualification cards required, and any required continuing training. The plan provided the objectives for each type training required, the type of examines required, and any other information pertinent to the position the plan applied. Training plans were reviewed and approved by both the training organization and the management of the organization responsible for the worker position.

After training plans were developed, job analyses were performed using the VISION database. All job tasks associated with the analyzed job function were identified, the knowledge and experience required to perform those tasks was determined, job objectives and learning objectives were established, and training methods for each objective were designated. From the job analysis, the VISION database created and maintains a relation tree for each job function which became the template for the development of training course lesson plans, lesson outlines, training guides, exams, OJT cards, and qualifications card. All data was maintained in VISISON and when required, training, and qualification material could be printed out and used. The assessor found no issues with the process or with the training record packages for the eight operator records reviewed.

One of the uses for the Integrated Training Electronic Matrix (ITEM) database was to document and monitor completion of all CH2M- HILL employees's required training. The assessor reviewed the required training for eight CH2M -HILL operators to verify that minimum required training and training requirements for qualification cards were satisfied and up-to-date. The assessor found no issue.

The assessor reviewed Delinquency Training reports generated monthly by the ITEM database and distributed by the training organization to CH2M- HILL Management. The assessor noted that some CH2M- HILL management was not adequately addressing reported training delinquencies. What concerned the assessor most was that a large portion of the delinquent training was related to the use of emergency and personnel safety equipment.

Procedure TFC-BSM-MGT-C-02, "Integrated Training Electronic Matrix (ITEM) Administration," in 4.2 requires responsible managers to evaluate received ITEM delinquency reports and assures employees do not perform work associated with the delinquent training, and if the training is not required, they were to remove the required training. CH2M- HILL management was not always accomplishing this. The reviewed reports identified over 200 training delinquencies. Most significant about these reports was that they indicated some required courses were never taken, they noted individuals had been delinquent several months, and in some cases, identified training delinquencies several years old. One significant example with safety significance included 35 Nuclear Chemical Operators which have not taken the "e-Decon Unit & Safety Shower" training. A review of the training course description indicated the objective of this hour and a half course was to makes these operators familiar with the use and location of all emergency decontamination equipment within their work area. Other safety related training delinquencies older then 30 days included mask fit, loc & tag, and TMACS operations qualification. (This issue is identified in assessment finding A-05-ESQ-TANKFARM-002-F01)

The contractor documented this issue in PER-20051475 and corrective actions were established which the assessment team leader has concurred with.

CH2M -HILL Assessment FY-2004-CH2M-I-0119, "Independent Assessment of CH2M HILL Hanford Group Analytical Technical Services," April 2004, was conducted, in part, to assess compliance with NQA-1 requirements in preparation to expand the laboratory work scope contracted by Bechtel National, Inc. (BNI)-. That assessment team included ORP staff and had identified significant problems with the training and qualification records. The assessor looked at operator qualification records for 222-S Laboratory Nuclear Chemical Operators to follow up on the progress made by the laboratory in correcting the qualification records problems.- In addition to reviewing training and qualification records, the assessor reviewed improvement plans, management assessment reports, and interviewed the training coordinator for the 222-S Laboratory. Corrective actions were not yet completed, but the assessor noted priority had been given to those laboratory operators responsible for the BNI NQA-1 and HASQARD contracted work. The assessor was pleased to find that instead of trying to recreate missing documentation or establish equivalencies or waivers, the laboratory had chosen to re-qualify all their technical operators. The assessor reviewed the qualification records of two Nuclear Chemical Operators performing BNI related work, and found these operators had been re-qualified and all the required records were in place. No issues were identified.

## Qualification & Certification

CH2M-HILL employed the services Fluor Hanford (FH) for performing training and qualification of their QA Inspection personnel. QA Inspectors performed in process inspections and final inspections of fabrication and installations of items. These inspections involved looking at activities such as welding; installation and testing of mechanical, electrical, and instrumentation systems; and receipt inspection. FH provided the required training and testing, and maintained the qualification records. FH also provided any required continuing training to maintain qualifications ~~of CH2M HILL inspection personnel.~~ At the time of the assessment there were ~~seven~~<sup>7</sup> qualified QA inspectors. Each Inspector was qualified ~~as basic QA inspectors, but all maintained qualifications in more than one other area discipline, but all were qualified as Basic QA inspectors;~~ ~~Other inspector qualifications included the following disciplines:~~ welding, mechanical, electrical, instrumentation, and receipt inspection.

The assessor reviewed the Qualification records of ~~three~~<sup>3</sup> of the ~~7~~<sup>seven</sup> Inspectors. This included the review of qualification cards, eye examinations, lesson plans, on-the-job training, tests, indoctrinations, and evaluations of education and experience.

~~Qualification training was divided into 3 levels:~~

- ~~•Core 1: Introduction type training~~
- ~~•Core 2: training required to qualify as an inspector~~
- ~~—Core 3; Extra courses beyond qualification requirements to enhance knowledge of qualification subject~~

~~The records reviewed were found to be complete. Inspectors were trained to meet the Core 2 or 3 criteria and a~~ All qualification ~~Card~~ requirements were satisfied.

Through interviews of the FH training Coordinator, the assessor found that FH had in place many tools to monitor and maintain a current knowledge of the status of all 48 QA Inspectors trained by FH. From these, reports were generated monthly indicating which training activities were to expire and required retraining. CH2M-HILL management was provided with a 30 days notification of pending training expirations. FH also monitored procedure revisions, and revisions of requirements that impacted training content. When such changes impacted CH2M-HILL inspectors, re-baseline training was determined, developed and provided to CH2M-HILL inspectors. Records of completion of re-baselines training were collected and maintained. The assessor identified no issues with the training of CH2M-HILL QA Inspectors.

FH provided copies of CH2M-HILL qualification records to the CH2M-HILL QA organization. The Manager of the QA field Support organization informally maintains these records.

~~Procedure TFC-BSM-TQ-IMP-C-02, Conduct of Qualification Cards and Guidance, in Section 4.8 required completed Qualification cards to be submitted to the Tank Farm Contractor (TFC) Training Records. RPP-MP-011, “Tank Farms Contractor Qualification and Training Plan,” in Section 4.6 states that TFC training records are~~



maintained and coordinated by the TFC training records custodian. Also, in ~~s~~Section 3.2 it states that training provided by an outside organization in support of the qualification or certification of TFC personnel must meet the same basic requirements for development, implementation, testing, and documentation of training provided by the TFC. The assessors, through interviews with ~~CH2M-HILL~~~~TFC~~ training management and staff, determined that the qualification records for CH2M-HILL Inspectors were not maintained by TFC training. When notified of this issue, CH2M-HILL assumed responsibility for this issue and generated PER-2005-1433. The ~~resultant agreed upon corrective action was to~~ corrective action was to copy the FH maintained training record packages and submit them by May 19, 2005, provide the to the TFC training coordinator ~~with the required training records by XX/XX/XX.~~ The assessment team leader concurred with the corrective action. (This issue is identified in assessment ~~F~~inding A-05-ESQ-TANKFARM-002-01-F02)

For non-destructive examination (NDE), the only recent type of NDA testing utilized by CH2M-HILL was Ultrasonic Testing (UT). CH2M-HILL employed the services of COGEMA Engineering to perform the NDE and for providing Qualified and trained personnel. -As specified by the contract's statement of work, COGEMA's NDE qualification process was in compliance with ASME NQA-1 which required meeting the guidelines established in the American Society for Nondestructive testing (ASNT) in "Nondestructive Testing," 1996 edition with 1998 addendum. The assessor reviewed the qualification records for all the COGEMA Inspector (1 Level I and 1 Level III). These records were found to be complete and adequate. COGEMA also contracted a second Level III NDE Inspector to support CH2M-HILL work. This individual's records were not maintained by COGEMA. When asked, the contracted inspector provided qualification records, but they were found lacking evidence of a required re-qualification. ~~This concerned the assessors for the following reasons:~~

—The COGEMA statement of work, in Section 7.1 requires the implementation of ASME NQA-1-1994, ~~and then specifies~~ which sections of NQA-1 will apply to the work scope of the contract. ~~The following requirements were designated as applicable:~~ Supplement 9S-1 is checked as being applicable.

- ASME NQA-1-1994, Basic ~~R~~requirement 9, "Control of Processes," states ~~clearly~~ clearly that processes used for performing nondestructive examination ~~were~~ are considered as special processes;
- Supplement 9S-1, "Supplementary requirements for control of Processes," in ~~P~~Paragraph 3.3 it states ~~ds:~~ ds: "Records shall be maintained as appropriate for the currently qualified personnel, processes, and equipment of each special process;" ~~and:~~
- Supplement 2S-2, "Supplementary Requirements for the Qualification of Nondestructive Examination Personnel," in Paragraph 2.3 it states ~~ds:~~ ds: "Records of personnel qualification shall be established and maintained by the employer.

COGEMA failed to meet the ~~se~~-above mentioned ~~criteria.criteria~~. ~~As a result~~, CH2M HILL issued PER 2005-1233. Before the assessment was completed, it was determined the required re-qualification was completed, but the record ~~files~~ were not updated. The required updates to the record ~~files~~ were made, and copies of the contracted Level III Inspector qualification records were provided to COGEMA ~~to be~~ maintained as required in the statement of work. This issue was considered completed during the assessment.

### Lessons Learned Program

The assessor reviewed the CH2M HILL Lessons Learned procedure TFC-OPS-C-28, “Lessons Learned,” and interviewed key CH2M HILL staff responsible for implementing the program to determine if lessons learned information was properly reviewed, disseminated, and acted upon.

The assessors determined lessons learned information was generated from two sources:

1. Internal activities such as ~~as~~:

- . Pre/Post-job reviews;
- . Operating experience;
- . Project planning and evaluation;
- . Budget planning process;
- . Occurrence reporting process;
- . Assessments;
- . Critiques and Investigations;
- . Operational readiness reviews; and
- . Process improvement initiatives.  
~~sessments, occurrence reports, process improvement initiatives, planning activities (project, job, budget, etc.), readiness reviews, critiques, etc.~~

2. External sources came in the form of bulletins primarily form the DOE Lessons Learned Server operated by the Society for Effective Lessons Learned (SELLS). These bulletins were compiled from other DOE prime contractors information sources such as:

- a. Occurrence Reporting and Processing System final reports;
- b. DOE Operating Experience Weekly;

- c. DOE Safety Notices; and
- d. General Industry information (GIDEP).

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~~DOE Operating Experience Weekly~~

~~DOE Safety Notices~~

~~DOE Safety Notices~~

~~General Industry information (GIDEP)~~

Internal lessons learned information (extracted from PERs documenting internal deficiencies) was converted into lessons learned bulletins which were then distributed within CH2M-HILL as deemed appropriate or as indicated in the associated PER. Lessons learned Bulletins were also posted on the RPP Lessons Learned Information System web site. The Training organization received all lessons learned bulletins and reviewed them for impact to established training courses. If warranted, training courses were revised to include lessons learned information.

Dissemination of internal lessons learned was for the purpose of providing information to CH2M-HILL Managers. Managers distributed lessons learned information and initiated actions within their own organizations as they felt necessary. This was appropriate since all internal lessons learned were derived from PERs, and if lessons learned distribution was required as part of a PER corrective action, the PER specified the required actions. The assessor found no issues with the internal lessons learned process.

PERs were generated for each external lessons bulletin received and assigned to a manager(s) to evaluate the impact of the reported item, activity, or condition. Procedure TFC-OPS-C-28, "Lessons Learned," gave the following instructions to management for reviewing these external lessons learned:

"3.- Evaluate the lesson learned for the following attributes.

- a. Evaluate the lesson learned for potential impact on specific programs or processes (document the evaluation on the PER resolution);-
- b. Evaluate the need to further disseminate the lesson learned (document the evaluation on the PER resolution); and-
- c. Evaluate the need to flow the lesson learned down to subcontractors.

4.- If the above evaluations resulted in the need to change the process, disseminate the lesson learned internally or flow down the lesson learned to a subcontractor. An action assignment to perform the requisite action shall be identified as part of the resolution."

The assessor reviewed 4 PERs initiated in 2004 to assess the adequacy of evaluating external lessons learned bulletins. The direction provided in these PERs requesting the lessons learned evaluations included:

“Evaluate the lessons learned for the following:

1. for potential impact to specific programs or processes;
2. if there is a need to further disseminate the lessons learned; and
3. to determine if the lessons learned needs to be flowed down to subcontractors.”

if there is a need to further disseminate the lessons learned, and to determine if the lessons learned needs to be flowed down to subcontractors.”

The documented actions associated with the performed evaluations indicated the assessment activities performed were focused only on addressing the criteria provided in the PER and did not consider procedure step 4 quoted above which required determining if any program changes were warranted, and if so, adding required actions to the PER. Two of the PERs reviewed by the assessor indicated the lessons learned evaluated were applicable to CH2M- HILL, but the only actions taken were to disseminate the lessons learned further.

The DOE Standard DOE-STD-7501-99, “The DOE Corporate Lessons Learned Program,” in Section 6.1 indicated that lessons learned should be used “to improve work performance at all levels.” It also stated that applicable lessons learned information should be incorporated into DOE and contractor activities. The assessor determined that by not including the procedure sStep 4 in the PER provided directions, the managers responsible for assessing the lessons learned were misled into thinking dissemination of the lessons learned was their only responsibility. For the external lessons disseminated further, it was left to the discretion of the recipient to initiate any required program changes. This was not in accordance to the Guide or the CH2M- HILL procedure.

When this issue was discussed with the CH2M- HILL Lessons Learned Coordinator and QA management, PER-2005-1278 was initiated to document this concern as a process improvement. Changes to procedure TFC-OPS-C-28, “Lessons Learned,” were initiated to make clearer the expectation to also evaluate external lessons learned for any needed changes to processes, training, or other related activities. Also, the instructions provided in PERs requesting the review of external lessons learned were revised to be more complete. - The assessor reviewed and agreed with the proposed changes. The assessor also reviewed external lessons learned PERs generated after this issue was communicated to CH2M- HILL and found the instructions had been changed as indicated. The assessor considered this issue corrected during the audit with no further actions required.

Lessons Learned information, both internal and external was provided to the training organization for review. Applicable lessons learned were incorporated into training

activities. Also, lessons learned information of general interest was regularly published in the CH2M- HILL weekly publication, "FOCUS."

The assessor noted that in response to corrective actions and recommendations made during internal assessments which identified not utilizing past lessons learned as a contributor to process failures, lessons learned information had been reorganized to make it more assessable/retrievable to work planners and subject matter experts. These efforts included establishing a work planning lessons learned database where lessons learned bulletins had been consolidated, sorted, and binned by topics related to Tank Farm work activities. Procedures had been revised to require work planners to review the database and take into account applicable lessons learned when planning work activities. Interviews indicated that these changes had proven to be so successful that CH2M- HILL had initiated plans to expand the concept to include topics usable by CH2M- HILL Engineering. The use of this lessons learned database which enabled CH2M- HILL to use lessons learned information in every day work was considered by the assessor as an exemplary practice.

#### Stop work authority

The assessor determined it was not necessary to address stop work authority during this assessment because it was recently covered in detail during another ORP assessment, "ISM Improvement Validation Post-Implementation Assessment," which was completed March 17, 2005.

#### Software Quality Assurance- Corrective Action Verification

Two software Quality assurance assessments of CH2M- HILL safety software systems performed in FY 2004 resulted in several corrective actions. Many of these corrective actions had just recently been completed and several still hadve additional work to be completed. As such, it was not prudent to perform an assessment of safety software systems for FY 2005. Instead, the assessment team it was decided to performed closure verification of the completed corrective actions for ORP assessment A-04-ESQ-TANKFARM-006, "Assessment of Computer Software Quality Assurance." All seven7 of the corrective actions reviewed were found to have been adequately corrected:

- **A-04-ESQ-TANKFARM-006-F-01:** "The Fluor Federal Services (FFS) quality assurance program and procedures did not implement one requirements of Nuclear Quality Assurance (NQA)-1 for documenting the use of computer software in design work."

⊖ **Corrective action (F-01-CA-1):** Ensure FFS Practice 134 000 1100, "Quality Assurance Program," is revised to include the requirements of NQA-1,

Supplement 3S-1 Which State: “Documentation of design analysis shall include ... Identification of any computer calculation, including computer type, computer program (e.g., name) revision identification, ... evidence of or reference to computer program verification, and design basis (or reference thereto) supporting application of the computer program to the specific physical problem.”

**Verification:** Reviewed FFS Practice 134 000 1100, “Quality Assurance Program,” dated January 17, 2005, and found the requirement was added into Section 6.1.

⊖ **Corrective action (F-01-CA-2):** Ensure FFS Practice 134 200 1020, “Engineering Calculations,” is revised to include the requirement of NQA-1, Supplement 3S-1 Which State: “Documentation of design analysis shall include ... Identification of any computer calculation, including computer type, computer program (e.g., name) revision identification, ... evidence of or reference to computer program verification, and design basis (or reference thereto) supporting application of the computer program to the specific physical problem.”

**Verification:** Reviewed FFS Practice 134 200 1020, “Engineering Calculations,” dated August 1, 2004, and found the requirement was added in page 3 in a section titled “Engineering Calculations.”

⊖ **Corrective action (F-01-CA-3):** For design calculations performed by FFS for CH2M-HILL Hanford Group, Inc. establish computer-use logs as record information. These computer-use logs will identify the computer type, evidence of reference to computer program verification, and the basis supporting the application of the software program to the physical problems.

**Verification:** Sampled the Engineering Computer Program Use Record (computer use log) for a computer program called Auto Pipe used on project W-211

- **A-04-ESQ-TANKFARM-006-F-02:** “The supplier evaluation of FFS did not identify FFS’s failure to implement some requirements.”

⊖ **Corrective action (F-02-CA-1):** Ensure the AVS checklist for NQA-1, Supplement 3S-1, is revised by FH to include all requirements or is otherwise structured to assure adequate verification of requirement implementation.

**Verification:** Reviewed current checklist to verify the required changes were made.

⊖ **Corrective action (F-02-CA-2):** Perform an evaluation by AVS to ensure that FFS is compliant with the revised NQA-1, Supplement 3S-1 checklist.

**Verification:** Reviewed supplier quality assurance evaluation dated September 14, 2004. The evaluation performed was a desk instruction and found no issues.

- **A-04-ESQ-TANKFARM-006-F-03:** “Some Personnel using quality-affecting software were inadequately trained in software quality assurance requirements and procedures.”

⊖ **Corrective action (F-03-CA-1):** Ensure Personnel responsible for MicroShield are knowledgeable in the requirements of procedure TFC-BSM-IRM\_HS-C-01, “Software Development, Implementation, and Management.”

**Verification:** Reviewed an e-mail indicating task was completed via a briefing. Also reviewed a sample of the briefing rosters titled: “Software Quality Assurance Presentation.”

⊖ **Corrective action (F-03-CA-2):** Prepare and issue a required reading describing the requirements of TFC-BSM-IRM\_HS-C-01; to be read by 95% of personnel responsible for quality-affecting software.

**Verification:** Reviewed TFC-BSM-IRM-HS-C-01, “Software Development Implementation and Management,” and the electronic required reading list report indicating who completed the assignment.

⊖ **Corrective action (F-03-CA-3):** Prepare a briefing package consisting of lessons learned from this assessment and management’s expectations concerning software quality assurance. Provide the briefing to 95 percent of the qualified CH2M HILL engineering and contractor staff.

**Verification:** Reviewed printout of the briefing overhead slides, and the Software Quality Assurance Completion rosters for the briefings.

- **A-04-ESQ-TANKFARM-006-F-04:** “Subcontractors performing an evaluation of double-shell tank dome-loads in a staff-augmentation role used software that was not controlled under the CH2M-HILL safety and quality assurance program.”

⊖ **Corrective action (F-04-CA-1):** Update the ANSYS software QAquality assurance plan and the ANSYS validation document to address the use of this software by staff augmentation contractors.

**Verification:** Reviewed QA-04-002, Rev:ision A, “JLR Software Quality Assurance Plan for ANSYS Multi-Purpose Finite Element Analysis Software,” August 08/03/, 2004, and JLR-QA-04-001, Rev:ision A, “JLR Software Verification and Validation for Ansys 8.0 Multi-Purpose Finite Element Analysis Software,” August 08/03/, 2004.



- **A-04-ESQ-TANKFARM-006-F-06:** “A CH2M-HILL subcontractor was not obtaining error notices for AutoPIPE software and had not upgraded to a version that corrected some errors.”

⊖ **Corrective action (F-06-CA-1):** Update the procurement statement of work template C-2 “general Contractor-technical,” to provide for computer-code-problem report.

**Verification:** Reviewed Template “C-2” General Contractor-Technical Statement of Work, “For acquisition of Non-Administrative Functions or Programs Support Services (Where the products generated are subject to established CH2M-HILL program controls and review/approval processes and are performed by other general subcontractors.)”

⊖ **Corrective action (F-06-CA-2):** Determine the list of calculations performed by ARES for CH2M-HILL using the AutoPIPE code, determine if the calculations were impacted by the vendor-reported software problems, and ensure the ARES design process for safety-related systems ensure that computer-code problem reports are periodically evaluated during contract periods. Revise the calculations as necessary.

**Verification:** Reviewed ARES Corporation document dated July 8, 2004, “CH2M-HILL Hanford Group Inc. –Contract No. 19225, release 1 – Evaluation of AutoPIPE Error Reports (Revised) – ARES Task no. 0303107.01.”

- **A-04-ESQ-TANKFARM-006-F-07:** “The assessment and corrective action management systems did not assure that software quality assurance issues were comprehensively identified and resolved.”

**This was closed previously by DOE.** The assessor, in reviewing the commitments made by CH2M-HILL in their response to the ORP assessment findings which lead to closing this particular finding, found that similar issues identified during ORP assessment A-04-ESQ-TANKFARM-014, “CH2M-HILL Management and Independent Assessments and Quality Improvements” have a potential to impact these commitments. The assessor did not identify any adverse impact to the specific commitments made to close ~~finding-Finding~~ A-04-ESQ-TANKFARM-006-F-07, and determined there was no need to reopen this finding because the current open findings from assessment A-04-ESQ-TANKFARM-014 were sufficient.

- **A-04-ESQ-TANKFARM-006-F-09:** “The Contractor did not have an explicit error-reporting process that required documenting errors, notifying users, notifying vendors, and verifying completed work was still valid.”

⊖ **Corrective action (F-09-CA-1):** Update the procedure TFC-BSM-IRM-HS-C-01, “Software Development, Implementation, and Management,” to provide



explicit error-reporting requirements that will provide documenting errors, notifying users, notifying vendors, and verifying completed work as still valid.

**Verification:** Reviewed TFC-BSM-IRM-HS-C-01, “Software Development, Implementation, and Management,” Revision A-8, dated December 12/28/2004.

**-Conclusions:**

The assessor concluded that for the processes and activities reviewed, CH2M- HILL had in place adequate procedures which met the requirements of the CH2M- HILL QAPD. The assessors also determined that CH2M- HILL was effective in implementing the QA processes and activities looked at. The assessors felt that CH2M- HILL’s efforts to facilitate the use lessons learned information and to institutionalize the use of lessons learned information in every day work activities was an exemplary practice.

**Key Personnel Contacted:**

G. L. Harvey, CH2M HILL Training  
E. R. Hamm, CH2M HILL Engineering Standards  
T. Maciuca, CH2M HILL Quality Assurance  
J. Morris, CH2M HILL Laboratory Support  
M. A. Wright, CH2M HILL Performance Assurance  
J. M. Cannon, CH2M HILL QA Field Support  
D. R. Gregory, ———FH QA Programs  
W. Nelson, COGEMA Level III NDE Inspector  
R. W. Cook, CH2M HILL Work Planning

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**Submitted by:** \_\_\_\_\_ **Approved by:** \_\_\_\_\_  
**Date:** \_\_\_\_\_ **Date:** \_\_\_\_\_