Department of Energy
Washington, DC 20585

July 14, 2004

Mr. Ronald Gallagher
[ ]
Fluor Hanford Incorporated
MSIN H5-20
P.O. Box 1000
Richland, WA 99352

EA 2004-06

Subject: Preliminary Notice of Violation and Proposed Imposition of Civil Penalty $935,000

Dear Mr. Gallagher:

This letter refers to the Department of Energy's (DOE) Office of Price-Anderson Enforcement (OE) investigation of the facts and circumstances concerning deficiencies related to the design and safety basis of the Sludge and Water System (SWS) at K Reactor, 100 Area, of the Hanford Site. In early 2003, the DOE-Richland Operations Office (DOE-RL) identified to Fluor Hanford Incorporated (FHI) a number of deficiencies related to configuration control and system design, and expressed concern about the SWS's overall readiness. Despite these concerns, FHI proceeded with a contractor operational readiness review (ORR) in April 2003. The ORR identified significant design discrepancies, and a DOE-RL facility representative discovered safety-significant safety relief valves that had relief pressure settings substantially above the piping design maximum pressure. The ORR was terminated and DOE-RL required that FHI perform a comprehensive review of the SWS design basis. The review performed by FHI discovered pervasive and significant design and quality assurance deficiencies within the SWS project.

OE initiated its investigation of the SWS quality assurance and safety basis deficiencies with a review of relevant documentation. In addition, discussions that involved DOE-RL and FHI personnel took place in each organization's headquarters office at Richland, Washington, on January 27 and 28, 2004. OE's findings were provided to you in its May 6, 2004, investigation summary report. An enforcement conference was held with you, members of your staff, and a representative of Fluor Corporation on May 27, 2004, to discuss these findings and to hear FHI's response to the identified apparent violations. A summary of the enforcement conference is enclosed.

Based on OE's evaluation of the facts and information obtained from its investigation, as well as the information provided by FHI during the enforcement conference, DOE has

concluded that violations of 10 CFR Part 830, Subpart A, “Quality Assurance Requirements,” Subpart B, “Safety Basis Requirements,” and 10 CFR Part 820.11, “Information Requirements,” have occurred. These violations are detailed in the enclosed Preliminary Notice of Violation (PNOV).

The PNOV describes examples of the numerous violations of DOE nuclear safety requirements that occurred during the design and construction of the SWS. Specifically, violations were identified in the following areas: (1) management processes/personnel training and qualification--the failure by FHI management to establish integrated schedules and ensure adequately trained and qualified personnel were assigned to supervise and perform the work; (2) quality improvement--the failure to ensure that corrective actions from a prior enforcement action and Compliance Order were effective in preventing the recurrence of quality problems, and the failure to identify and correct deficiencies at SWS that occurred over a long period of time; (3) design--significant design deficiencies with the as-built SWS that, in some cases, would have rendered safety-significant equipment and instrumentation incapable of performing their safety function; (4) inspection and acceptance testing--failures to establish an integrated test plan for the SWS and to adequately test safety-significant equipment; (5) work processes--several instances in which personnel failed to perform work in compliance with approved procedures and administrative controls; (6) documents and records--numerous deficiencies with design documents and records that were found to be incomplete and inaccurate in representing the SWS’s as-built design; (7) unreviewed safety question (USQ) process--failures to perform required and necessary USQ safety reviews, and USQ safety reviews that did not adequately consider SWS hazards; and (8) information requirements--the failure to ensure that complete and accurate information concerning the SWS was maintained in that FHI certified that the SWS was in conformance with its safety basis criteria following its inspection of the as-built SWS; however, some safety-significant equipment was either not installed or installed but not able to perform its intended function.

In accordance with 10 CFR 820, Appendix A, “General Statement of Enforcement Policy,” the violations in the PNOV have been classified as follows: the testing, work process, and document and record violations have each been designated as Severity Level II. The management, quality improvement, design, USQ, and information requirement violations have been designated as Severity Level I, based on their extensive and significant nature. DOE considered the actual and potential safety significance, the recurring nature, and management involvement in determining these severity levels. Therefore, to emphasize the importance of establishing and maintaining a comprehensive and proactive program to ensure compliance with DOE nuclear safety requirements, I am issuing the PNOV and Proposed Imposition of Civil Penalty in the amount of $935,000. I have determined that this civil penalty assessment is appropriate based upon considerations stated in DOE’s Enforcement Policy.

The inspection and acceptance testing, work processes, and documents and records violations summarized above were each designated Severity Level II status with a $55,000 civil penalty. These violations, while neither as safety-significant nor as

extensive as the other five, exemplify programmatic deficiencies in those processes that, if not corrected, could have led to more serious problems.

The design, USQ, and information requirements violations were each classified as Severity Level I with a civil penalty of $110,000 each. These violations were significant in that they represented a loss of control of the system design and safety basis, and a failure to adequately verify that the as-built system was consistent with its design and safety basis requirements prior to initiating the ORR. These design deficiencies could have continued to exist when the system was placed into operation since no additional design verification activities were planned. It was fortuitous that a DOE-RL facility representative identified a design problem and that DOE-RL subsequently required FHI to conduct a full investigation of the SWS project.

The Enforcement Policy emphasizes that where there is repeated poor performance in an area of concern or a serious breakdown in management controls, "DOE intends to apply its full statutory enforcement authority." It is particularly unfortunate, and a matter of great concern, that both of these conditions existed in the SWS project. As a matter of management controls, as indicated by the substantially complete replacement of management personnel associated with this project and by your own admission at the enforcement conference, the responsibility for the significant deficiencies discussed in the PNOV was shared all the way up the former FHI management chain. The failure of program oversight of this project by every level of FHI management and at every stage of the SWS project is disturbing. A particularly troubling aspect of this situation is the apparent subrogation of established quality assurance controls by all levels of management in order to meet schedules. As you are aware, DOE's statutory authority permits it to issue a civil penalty of $110,000 per violation per day. In this case, given the acknowledged significant failure of management at all levels to properly oversee the SWS project for an extended period of time, I have determined that a Severity Level I citation for two separate days is appropriate, thus resulting in a civil penalty of $220,000.

I have also determined that a Severity Level I citation for two separate days ($220,000) is appropriate for the quality improvement violation that is discussed in the PNOV. The basis for this determination is that the deficiencies described in the PNOV represent repeated poor performance in areas for which DOE had previously issued a PNOV and a Compliance Order. The 1999 PNOV specifically included a Severity Level I quality improvement citation. Thus, even several years ago there were issues associated with the Spent Nuclear Fuel project that involved concerns related to repeated poor performance and opportunities available, but not taken, to correct those deficiencies. Now we have yet additional examples of deficiencies associated with the SWS that are remarkably similar to those for which penalties were assessed and a Compliance Order issued, but they are problems which have still not been remedied. The full use of DOE's statutory authority is, therefore, particularly appropriate in such a situation.

DOE has further determined that no mitigation is warranted because of the nature and extent of these violations. These violations occurred repeatedly over several years and then were not corrected. In some cases, internal and DOE-RL assessments identified these deficiencies. Any resultant corrective actions, however, were either not implemented or were ineffective. FHI did not adequately begin the process of identifying the deficiencies' extent of condition and the development of corrective actions until required to do so by DOE-RL. FHI appears to recognize these facts in that, during the enforcement conference, FHI conceded that no mitigation is warranted in this case.

DOE recognizes that these problems were primarily at the SWS project and the extent of condition review identified no pervasive or significant quality problems at other facilities and activities for which FHI is responsible. Thus far, FHI's responses to the SWS event have included selected changes to its management team to strengthen its commitment to quality as well as a substantial analysis of the SWS project's problems. Long-term corrective actions have been developed and implemented. Based upon these actions, DOE has chosen to forgo the issuance of another, more comprehensive, Compliance Order to allow FHI a reasonable time to determine their effectiveness. However, DOE will continue to monitor FHI's progress and future work to ensure that these problems have been corrected and work is being performed safely and effectively.

You are required to respond to this letter and follow the instructions specified in the PNOV when preparing your response. Your response should document any additional specific actions taken to date. Corrective actions should be tracked in DOE's Noncompliance Tracking System (NTS). You should enter into the NTS (1) any actions that have been or will be taken to prevent recurrence and (2) the target and completion dates of such actions.

After reviewing your response to the PNOV, including your proposed corrective actions, in addition to the results of future assessments or inspections, DOE will determine whether further enforcement action is necessary to ensure compliance with DOE nuclear safety requirements.

Sincerely,

Stephen M. Sohinki
Director
Office of Price-Anderson Enforcement

Enclosures:
Preliminary Notice of Violation
Enforcement Conference Summary
List of Attendees

cc: K. Klein, DOE-RL
S. Hahn, DOE-RL
L. Nye, FHI
J. Roberson, EM-1
L. Vaughan, EM-5
A. Acton, IG-33
R. Azzaro, DNFSB
D. Garman, S-3
A. Kindrick, EH-1
S. Zobel, EH-6
Docket Clerk, EH-6

PRELIMINARY NOTICE OF VIOLATION
and
PROPOSED IMPOSITION OF CIVIL PENALTY

Fluor Hanford Incorporated

EA 2004-06

During January 2004, including a site visit on January 27 and 28, 2004, the Department of Energy's (DOE) Office of Price-Anderson Enforcement (OE) conducted an investigation and reviewed pertinent documentation concerning the quality assurance and safety basis deficiencies in the Sludge and Water System (SWS) project. Following an enforcement conference held on May 27, 2004, DOE has concluded that a significant number of violations of DOE nuclear safety requirements have occurred; these are set forth below with associated civil penalties. Citations specifically invoking the quality assurance requirements of 10 CFR 830.122 represent a 10 CFR 830.121(a) violation, which mandates compliance with these requirements.

In accordance with 10 CFR 820, Appendix A, "General Statement of Enforcement Policy," and pursuant to section 234a of the Atomic Energy Act of 1954, as amended, 42 USC 2282a, DOE issues this Preliminary Notice of Violation (PNOV) and Proposed Imposition of Civil Penalty.

I. Quality Assurance Violations

A. Management Processes/Personnel Training and Qualification

Part 830.122(a)(2) requires that the contractor establish certain "…management processes, including planning, scheduling, and providing resources for the conduct of work."

Part 830.122(b)(1) requires that the contractor "…train and qualify personnel to be capable of performing their assigned work."

Contrary to the above, Fluor Hanford Incorporated (FHI) management failed to establish and implement management processes, including planning, scheduling, and providing resources for the conduct of work, to ensure that adequate planning was performed for the SWS project, and that sufficiently trained and qualified personnel were capable of performing their assigned work. Examples are as follows:

1. FHI management failed to establish an effective process for planning and scheduling work in that it failed to develop an integrated, resource-loaded schedule to manage the work at the SWS project. FHI management made the decision to fast track this project, which involved performing key activities, such as hazards assessment, safety analysis, design, fabrication, and construction, all in parallel. This fast tracking resulted in many ongoing changes to the design during construction. The failure to develop an integrated schedule and plan were contributing causes of the substantial number of design and safety basis deficiencies.

2. Insufficient personnel resources were committed to this project. Personnel were frequently reassigned to other projects or replaced. The lack of adequate personnel contributed to inadequate critical safety and design reviews, and design and testing activities not being adequately performed.

3. Both the qualifications of and training provided to the primary Design Authority (DA) were inadequate. The primary DA position had key job responsibilities that included approving design changes, approving unreviewed safety questions (USQs), and ensuring that the physical structure, systems, and components met design requirements. No formal training requirements were established for the DA position to ensure adequate knowledge of the SWS processes, systems design, and safety functions. The primary DA position was filled numerous times during the project. Each new primary DA received inadequate turnover information from the departing DA, and the new DA received little or no training on the SWS system.

Collectively, these violations constitute a Severity Level 1 problem which is being assessed at $110,000 per day for two days.
Civil Penalty - $220,000

B. Quality Improvement

Part 830.122(c)(2) and (3) require that the contractor "…identify, control, and correct items, services, and processes that do not meet established requirements; and identify the causes of problems and work to prevent recurrence as a part of correcting the problem."

DOE issued Enforcement Action EA-1999-04 to Fluor Daniel Hanford (FDH) (subsequently reorganized as FHI) on May 26, 1999. This included a Compliance Order that required FDH to implement certain quality processes, including the following:

"FDH shall implement work control processes such that all nuclear facility and support system work activities are properly supervised by designated and trained work control personnel; work is performed in accordance with established project requirements and approved work procedures; and an approved critique process

ensures that deficient work processes are evaluated in a timely manner and that appropriate immediate and longer term corrective actions are taken."

"FDH shall implement a deficiency tracking system such that deficiencies are tracked to closure and evaluated for quality improvement opportunities. FDH shall implement a single FDH site-wide corrective action management process. FDH shall implement a process that ensures the effectiveness of corrective actions to prevent recurrence, and that performance indicators of deficiency tracking, trending, and closure are available for management review."

Contrary to Part 830.122(c)(2) and (3), FHI failed to identify, control, and correct items, services, and processes that did not meet established requirements at SWS. FHI also failed to identify the causes of problems and work to prevent recurrence of significant quality and safety basis deficiencies that occurred during the design and construction of the SWS. Some of these quality problems, such as design deficiencies, were wide spread and they continued over many months. The failure to identify and correct these quality problems was significant in that FHI initiated the SWS operational readiness review (ORR) despite many design deficiencies that still existed with the as-built system. Some of these design deficiencies were significant in that some safety-related equipment was not installed and other equipment would not have been able to perform its intended safety function. Collectively, these deficiencies represented repeated poor performance in an important process that FHI had been ordered to correct by the 1999 Compliance Order. Examples are as follows:

1. A quality improvement violation, in Enforcement Action EA-1999-04, identified that continuing problems existed at the Spent Nuclear Fuel project (SNFP) such that (1) design work did not comply with established requirements, (2) there was inadequate training for key personnel positions, and (3) corrective action management processes were inadequate. These problems were characterized as programmatic concerns that had been identified in several DOE-Richland Operations Office (DOE-RL) assessments and had not been corrected. DOE issued a Compliance Order as part of EA-1999-04 that directed Fluor Daniel Hanford (subsequently reorganized as FHI) to correct these problems and prevent recurrence by correcting the controlling processes.

   However, significant and pervasive quality assurance and safety basis deficiencies existed during the design and construction of the SWS that were not identified and corrected. Some of these deficiencies involved processes that FHI was directed to correct by the Compliance Order. For example, FHI failed to ensure that key personnel, including the Design Authority, were trained or qualified for their positions and responsibility; that necessary work processes were implemented to ensure compliance with procedures; and that the corrective action management process was effective. These problems existed for many months during the design and construction of the SWS, and they were not detected or corrected. These failures were significant in that they resulted in

some safety-significant equipment not being appropriately designed to perform its safety-related function.

2. FHI failed to effectively implement the site-wide corrective action management (CAM) system at the SWS project such that significant quality deficiencies were entered into the system, corrected and tracked to closure. Examples are as follows:

   a. During 2002 through 2003 FHI conducted eight management and independent self-assessments that identified SWS issues; issues from five of those assessments were not submitted to the CAM process and tracked to closure as required by Procedure HNF-PRO-052, "Corrective Action Management," and issues from the remaining three assessments were submitted to the CAM but were not corrected despite the significant deficiencies they described.

   b. DOE-RL identified that similar deficiencies with the large diameter container (LDC) level detector were described in SNFP self-assessments performed in December 2002, March 2003, June 2003, and July 2003. These self-assessments either were not submitted to the CAM system or were ignored when placed on the CAM. FHI took no effective action to resolve the level detector deficiencies until after DOE-RL identified them in surveillances S-03-OOD-SNF-041 and S-03-ESD-SNF-002 and formally requested resolution.

3. FHI failed to perform causal analysis of significant quality and safety basis deficiencies identified at SWS and failed to implement corrective actions to prevent recurrence. Examples are as follows:

   a. DOE-RL has rejected numerous surveillance closure packages prepared by FHI, as detailed in surveillance report S-04-OOD-SNF-008, because of inadequate causal analysis and corrective actions.

   b. A stop work order was issued at the SWS project due to continued non-resolution of radiological engineering and As Low As is Reasonably Achievable design issues that were identified from design specification development and design reviews. FHI's Independent Technical Assessment, SNF-16302, stated that no evidence existed that a causal analysis was performed and corrective actions developed to correct the problems with the design input and control process.

   c. The Independent Technical Assessment identified 23 discrepancies between the approved Documented Safety Analysis (DSA) and the as-built SWS, the Sludge Transport System, and the T-Plant. A causal analysis was not performed.

d. The USQ process had numerous deficiencies ranging from the failure to perform required USQs to inadequate USQs. This contributed to the loss of configuration control in the SWS project. A causal analysis was not performed to evaluate these USQ deficiencies collectively.

e. Numerous deficiencies were identified in the accuracy and completeness of SWS documents and records. The inaccurate documents and records included System Design Description documents, Process Flow Diagrams, Piping and Instrument Drawings, and the Master Equipment List. A causal analysis was not performed to determine why these records and documents were not accurate.

f. FHI's causal analysis of deficiencies related to the safety-significant spray shield did not adequately identify the causes. The causal analysis concluded that inadequate identification of commercial grade item dedication requirements, inadequate material selection, and inadequate testing were the main causal factors. In addition, the causal analysis identified that an informal design process was used in lieu of complying with the formal design requirements. Multiple failures occurred in the design, design change, and commercial grade item dedication processes. However, the causal analysis did not evaluate these process failures to determine why the procedure controls and checks and balances, such as design reviews, were not adequate to prevent this problem.

g. DOE-RL surveillance report S-03-OOD-SNF-022, dated April 15, 2003, and formally transmitted to FHI on May 2, 2003, had four findings describing discrepancies associated with the helium purge system deficiencies. These deficiencies were a recurrent condition that had been previously identified and documented in earlier surveillance reports. No causal analyses were performed until after the ORR was stopped and FHI was directed to assess the SWS's deficiencies.

Collectively, these violations constitute a Severity Level 1 problem which is being assessed at $110,000 per day for two days.
Civil Penalty - $220,000

C. Design

Part 830.122(f)(1), (2), (3), and (5) require that the contractor "…design items and processes using sound engineering/scientific principles and appropriate standards; incorporate applicable requirements and design bases in design work and design changes; identify and control interfaces; and verify or validate work before approval and implementation of the design."

Contrary to the above, significant design changes made to the SWS were determined to be noncompliant with design requirements or, in several cases,

redesigned components were found to be incapable of performing the safety function credited in the safety basis. Design changes were not controlled to the same requirements and standards as the original design in that the required formal safety reviews and design verifications were not performed. In addition, the design reviews that were performed were not comprehensive in that they failed to evaluate the impact of specific changes on the entire system, failed to verify the adequacy of the SWS design, and failed to ensure that the design configuration met procedural design requirements. Examples are as follows:

1. HNF-RD-1819, "PHMC Engineering Requirements," revision 1, Section 5.10, "Design Changes," required all changes to final designs be controlled by measures equal to those applied to the original design. However, after the 100 percent design was issued, design changes were not controlled in the same manner. FHI identified, in its "Broader Scope Issues Summary Report," dated January 15, 2004, (Summary Report) that design changes processed by the construction forces failed to incorporate a nuclear safety review. A nuclear safety review was part of the original design process, and it was necessary to ensure that the design change did not affect a safety control or area in the safety basis, and that the DSA was maintained accurate to the facility design.

2. Safety-significant safety relief valves (SRV), SWS-SRV-402 and -404, had a relief pressure set at 135 pounds per square inch gauge (psig), but they were installed in a piping system with a design pressure of 90 psig. This relief pressure setting would result in the piping failing before the pressure relief valves activated. These SRVs were credited in the DSA to mitigate a large diameter container (LDC) overpressure event.

3. SWS piping and instrument diagram H-1-86777, sheet 4, note 2, showed a 6,000 psig helium supply connected to piping with a design pressure of 2,400 psig. Introduction of 6,000 psig into a system designed for 2,400 psig would result in a pressure boundary failure (rupture) and failure of the helium purge system itself.

4. Helium purging is credited in the safety basis to prevent a potentially flammable atmosphere in an LDC. Standard Design Document SNF-13069, revision 0, states that six pressurization cycles to 35 psig will reduce the oxygen content to less than one percent. No helium purge calculations were identified to support this statement.

5. SNF-13573, "Master Equipment List for KE-Basin Sludge and Water System – Project A.1," revision 1, identified a body rating of 15 psig for pressure differential indicator PDI-370-5, but this component was installed in a system with operating pressures as high as 35 psig. The pressure differential indicator could fail structurally under the operating conditions thus causing a pressure boundary failure, or could fail to perform its function.

6. Pipe specification M31, as set forth in SNF-10841, “Fabrication Specification, K-East Basin Sludge and Water System, Project A-16,” and SNF-10843, “Construction Specification, Sludge Retrieval System,” specified a pressure relief setting of 35 psig for SRV SW-SRV-501. This SRV, however, was found to have been set at 80 psig; thus it would not have protected the 35 psig piping from an overpressure.

7. Procedure EN-6-035-03, “Spent Nuclear Fuel Project Dedication of Commercial Grade Items (CGIS),” section 6.4, requires the component safety function to be determined and documented on the CGI Upgrade Dedication Form. The technical evaluation requirements of section 6.4 also require that the operating environment be established through a review of the hazards analysis and safety analysis to identify the design requirements. Section 6.6 of the CGI procedure requires that critical characteristics be identified for each safety function, and section 6.7 requires acceptance criteria be developed for each critical characteristic to confirm the component’s capability to meet the safety function.

   Contrary to these requirements, the safety function of the spray shield was not determined, based upon a review of the operating environment established by the hazards and safety analysis. The CGI dedication form identified the safety function as “…able to withstand a 75-psi spray…,” which did not adequately account for the particulates in the spray or the time duration. The spray shield was credited in the safety basis for withstanding a sludge aerosol spray of 75 psig for eight hours. The critical characteristic for the spray shield was also incorrectly identified as the material thickness, rather than the ability to resist erosion of the particulate spray for eight hours. The PVC spray shield was accepted by FHI based upon inspection only with no testing requirements in the commercial grade item dedication package to ensure that the safety function was met.

8. HNF-RD-1819, “PHMC Engineering Requirements,” revision 1, section 5.10, “Design Changes,” required all changes to final designs to be controlled by measures equal to those applied to the original design. Section 5.9, “Design Verification,” required that design “…verification shall be performed in a planned and controlled manner, and shall provide assurance the final design is correct and satisfactory.”

   Contrary to these requirements, an informal “white paper” was used to justify selection of the PVC spray shield material. This process was not an approved design change process, and it did not include the same level of review and approval as the original design. This informal process also failed to provide assurance that the design was correct and satisfactory.

9. HNF-RD-1819, “PHMC Engineering Requirements,” revision 1, section 3, “Configuration Management,” requires that configuration management “…shall

be used to develop and maintain consistency among system requirements and performance criteria, among system documentation, and physical configuration." Section 5.9 requires that design verification "…shall be completed and design outputs released for use, before relying on structures, systems, and components or computer programs to perform their function and before installation becomes irreversible."

Contrary to these requirements, FHI failed to maintain consistency between the safety basis calculations, the technical safety requirement (TSR), and the TSR implementing procedure with regard to limiting the oxygen level within an LDC. The design calculation assumed a ten-minute time frame for the LDC ports to be open to the atmosphere while TSR 3.8 allowed 8 hours, and operating procedure Process Standard 800 allowed up to 90 minutes. The causal analysis for these inconsistencies concluded that the required formal peer review was not performed. The result was a significant safety-related inconsistency between the design calculation, the TSR control, and the operating procedure for this safety function.

10. HNF-RD-1819, "PHMC Engineering Requirements," revision 1, section 5.9, "Design Verification," requires that design verification shall be performed in a planned and controlled manner, and shall provide assurance that the final design is correct and satisfactory.

    Contrary to this requirement, SWS Motor Operated Valves (MOV) 401 and 405 were not designed to perform functions that were credited in the safety basis. To prevent oxygen buildup above flammable limits in the LDC, the safety basis takes credit for certain physical and administrative controls that limit the oxygen content to less than a combustible condition in an LDC. One control described in the System Design Description is a quick-stop activation, in which the pumps stop and the motor operated valves (MOV) close quickly to the fail safe position to prevent oxygen from entering the LDC. This places the LDC in a "Safe State Condition."

    On July 16, 2003, FHI identified as part of a USQ review that the SWS-MOV-401 and -405 valves were not designed to stop in a fail-safe condition and close quickly enough to prevent oxygen ingress. FHI design verification activities were not adequate to identify that these functional criteria had been incorporated into the MOV-401 and -405 design.

Collectively, these violations constitute a Severity Level I problem.
Civil Penalty - $110,000

D. Inspection and Acceptance Testing

Part 830.122(h)(1) requires that the contractor "…inspect and test specified items, services, and processes using established acceptance and performance criteria."

Contrary to the above, FHI did not inspect and test specified items, services, and processes using established acceptance and performance criteria in that FHI identified numerous deficiencies related to inadequate and incomplete testing of equipment and instrumentation at SWS. FHI performed a comprehensive assessment of the testing and inspection processes at SWS, and documented the results in SNF-15099, "Evaluation of Testing Performed for the K East Basin Sludge and Water System," revision 1, dated April 18, 2003. Examples are as follows:

1. Procedure HNF-PRO-286, "Testing and Commissioning of Equipment and Systems," requires that an integrated test plan be developed to establish the scope of the required testing and to provide a method for verification of completed testing. However, an integrated test plan was not developed for the SWS.

2. "Packaging Safety Analysis Assessment for Sludge Transportation System," revision 0-B, (PSAA) requires that the "…metallic containment boundary shall be leak tested per Section 11.1.2.2 following pressure testing to demonstrate containment integrity." However, vendor information files identified that factory leak tests were performed before any pressure tests on LDC cask number 2 and not after the pressure tests, as required.

3. The PSAA, sections 10 and 11, stated that the acceptance criterion for a Sludge Transportation System cask was a total leakage rate of less than $1x10^{-7}$. Helium purge operating procedure OP-70-126E identified that each port was tested separately to an acceptance criteria of $1x10^{-7}$. The operating procedure incorrectly applies the cask total leakage acceptance criteria to each of the four penetrations tested rather than to the sum of the leak rates for the four penetrations, as required by the PSAA.

4. The safety-significant LDC sludge level detector is credited in the SWS safety basis for reliably indicating the level of sludge. Controlling the level of sludge is necessary to prevent an LDC over-pressurization. FHI's Independent Assessment, appendix F, stated that no documentation was found to demonstrate that sludge level sensor LIT-370-1A was ever tested or calibrated with sludge prior to initiating the ORR. This finding stated, in Issue Number IC-14, that the safety-significant LDC sludge level sensor was not calibrated as required by SNF-8166, "Functional Design Criteria KE Basin Sludge and Water System Project A.16."

5. In response to the deficiency identified in Item 4 above, FHI performed the testing and calibration of the sludge level detector and submitted to DOE-RL a closure package for this deficiency. The closure package included portions of document SNF-16064, "K East Basin Sludge and Water System Large Diameter Container Level Detector Calibration." Assessment of this closure package by

DOE-RL, surveillance report S-03-OOD-SNF-041, found numerous deficiencies related to the sludge level sensor's CGI dedication document and its calibration.

6. Cask transport venting tool SWS-SP-600-1 was not leak tested as required by tool drawing H-1-87434.

Collectively, these violations constitute a Severity Level II problem.
Civil Penalty - $55,000

E. Work Processes

Part 830.122(e)(1) requires that the contractor "…perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instruction, procedures, or other appropriate means."

Contrary to the above, FHI personnel failed to perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instruction, procedures, or other appropriate means at the SNFP. Examples are as follows:

1. On August 3, 2003, a shift director asked a maintenance worker if a safe condition check specified in procedure MP-70-038, "Maintenance of STC Lift Air System and Screw Jack Assembly," sections 4.1.9 a through e, had been performed because the appropriate steps in the procedure were not initialed. The safe condition check was to ensure that the system was depressurized prior to work being conducted on that system. The maintenance worker, who had performed a similar but different task the previous day, thought he had performed the safe condition check the previous day and initialed the corresponding steps on the procedure without verifying that they were performed.

   Procedure MP-70-038 includes the requirement that the procedure be in the hand of the person performing the safe condition check and that the steps be initialed at the time they are performed. Contrary to this requirement, the worker initialed the procedure steps for the safe condition check without actually performing the work. Subsequently, during preparation by other workers to work on this system, it was found to still be pressurized. The significance of this event is greater because the shift director allowed the procedure to be initiated without requiring that the work be performed again, which was not in compliance with the requirements of the procedure.

2. On May 20, 2003, a DOE-RL facility representative discovered that a lock and tag violation had occurred at the 105 K East facility concerning a vent line hose replacement job at an ion exchange module. During the pre-job briefing for this work, the Shift Operations Manager provided oral instructions on removing the valve handles from the inlet valves because an inspection determined that locks

could not physically be installed. Procedure HNF-PRO-081, "Hazardous Energy Control," required any instructions authorizing an alternative to installing locks to be in writing.

However, the Shift Operations Manager did not provide written instructions as required by the procedure. Subsequent to the pre-job briefing, the Field Work Supervisor, who was responsible for removing the valve handles, decided not to remove the valve handles. This decision did not receive the required review and approvals and it was also a violation of procedure HNF-PRO-081.

3. On June 18, 2003, the 105 K West facility manager was notified of a lock and tag violation in which craft workers installed an authorized lock on the wrong component, and a required associated safe condition review was not performed. A routine work package was used to direct modifications to a sub-monorail system. At the end of the day, the Field Work Supervisor requested a lock out of the work platform since work would resume the following day. The Shift Operations Manager, who was responsible for implementing the work platform lock out, instead decided to lock out the platform's power disconnect box.

   However, the decision to lock out a component different from the one requested was not permitted by HNF-PRO-081, "Hazardous Energy Control." The following day, prior to starting work, electricians were directed to perform a safe condition check on the platform's disconnect box. The electricians, however, inspected the power disconnect and lockbox for a hydraulic power unit, thought this was the disconnect and lockbox for the work platform itself, and concluded a safe condition check had already been performed. Because of this error, the safe condition check required by HNF-PRO-081 was not performed on the work platform's power disconnect box.

4. On August 6, 2003, maintenance was performed on the 105 K East Fuel Transfer System Shielded Transfer Cask lift platform jackscrew brake.

   However, maintenance was not authorized by work package 1K-03-00812, "Backlash Measurements," that was being used at that time.

5. On August 12, 2003, three nuclear chemical operators entered the 105 K West annex to perform a crane inspection without wearing anti-contamination clothing and personal protective equipment required by radiological work permit K-209. The operators were in the posted area for approximately 15 minutes.

   This area was posted as a contamination and airborne radioactivity area (ARA). All of these workers had radiological training and all of the required postings were present.

Collectively, these violations constitute a Severity Level II problem.
Civil Penalty - $55,000

F. Documents and Records

Part 830.122(d)(1) and (2) require the contractor to "…prepare, review, approve, issue, use, and revise documents to prescribe processes, specify requirements, or establish design; and specify, prepare, review, approve, and maintain records."

Contrary to the above, FHI did not prepare, review, approve, issue, use, and revise documents to prescribe processes, specify requirements, or establish design; and did not specify, prepare, review, approve, and maintain certain records. Furthermore, FHI procedure HNF-RD-1819, "PHMC Engineering Requirements," revision 1, section 3b, requires that documents "…that define the system design basis and supporting documents shall be compiled and kept current using formal change control/work control." A significant number of document and record deficiencies related to SWS were identified after FHI declared it ready for the ORR. Examples of these deficiencies are as follows:

1. System Design Descriptions (SDD) were not maintained current with the as-built design. Twelve deficiencies were identified in SDDs in that they did not reflect the current design. One example was a design change from two strainer baskets to a redesigned single strainer basket. However, this design change was not indicated in the appropriate SDD.

2. Piping and instrument diagrams (P&ID) were not consistent with the requirements in HNF-RD-709, "Preparation and Control Standards for Engineering Drawings," revision 0. Thirty discrepancies were identified in the P&IDs, including missing piping interfaces, flow directional arrows, equipment dimensions, and design data.

3. Document SNF-10843, "Sludge Retrieval System, Project A-16," revision 3, contained incorrect model numbers, design pressures, and references to other design media.

4. The Master Equipment List (MEL) had more than 40 instances in which information was inconsistent with drawings. Examples included equipment on the P&IDs but missing from the MEL, equipment on the MEL but not included on any P&IDs, and inaccurate information in the MEL.

Collectively, these violations constitute a Severity Level II problem.
Civil Penalty - $55,000

II. Safety Basis Violation

Part 830.203(a) requires that the "…contractor responsible for a hazard category 1, 2, or 3 DOE nuclear facility establish, implement, and take actions consistent with a USQ process that meets the requirements…" of 10 CFR 830.

Contrary to the above, FHI failed to effectively establish, implement, and take actions consistent with a USQ process that meets the requirements of 10 CFR 830. Furthermore, FHI procedure NS-4-001-23, "Unreviewed Safety Questions," requires that USQ reviews be performed for both Design Change Notice (DCN) and Facility Modification Package (FMP) design changes. Section 2.0, "Scope," allows approved categorical exclusions (CX) to exclude certain activities from the USQ process. FHI did not comply with these requirements in that it inappropriately applied CXs intended for editorial changes to non-editorial document modifications, thereby resulting in USQ reviews not being performed that otherwise would have been required. FHI also continued to use a CX after it had been specifically prohibited (as discussed below). In addition, FHI's Broader Scope Summary Report identified that some USQ reviews were inadequate. These failures allowed design changes to be made without the required safety reviews and assurances that these changes were within the safety basis. Examples are as follows:

A. FHI submitted the SWS Preliminary Documented Safety Analysis (PDSA) to DOE on August 23, 2002. Use of USQ CX O was specifically prohibited following the PDSA's submittal. Categorical exclusion O states, in part, that "…the specification, design, and analysis for Major Modifications at the K basins are categorically excluded from USQ Review until the submittal to RL of the appropriate Preliminary Safety Analysis Report."

   However, the Independent Technical Assessment, dated June 27, 2003, stated that FHI continued to apply CX O after August 23, 2002, when the PDSA was submitted to DOE-RL. The Independent Technical Assessment identified 42 DCNs, one Deficiency Report, and two FMPs, all of which did not receive the required USQ review due to use of CX O after its prohibition went into effect. These USQ reviews were necessary to insure the changes did not invalidate the safety basis or create new hazards. Examples are as follows:

   1. On October 1, 2002, DCN A-16-075 was issued to change the design pressure of M9 piping from 115 psig to 60 psig. This change was performed without a USQ evaluation. The DCN inappropriately identified a categorical exclusion as the basis for not performing the required USQ.

   2. The process shield plate (PSP) is part of a safety class item for the K East basin facility. A DCN was issued to enlarge some holes on the PSP. However, the DCN did not undergo the required USQ screen due to the inappropriate use of a categorical exclusion.

B. FHI's Broader Scope Summary Report stated that numerous inadequate USQ evaluations were performed. These inadequacies included (1) incomplete or insufficient justifications resulting in a negative USQ and (2) USQ determinations that were not based upon an adequate review of the existing safety basis. Examples are as follows:

1. FHI's Nuclear Safety Group inappropriately categorized the change to the SNF facility for the installation and operation of the SWS as a negative USQ. This USQ determination did not adequately address the safety basis values established in Technical Databook HNF-SD-SNF-TI-015. This USQ review failed to recognize that the hazards associated with the SWS were not adequately analyzed in the existing safety basis.

2. On April 18, 2003, DCN A16-227 was issued changing the M9 piping pressure from 60 psig to 90 psig. USQ screen 0395-2003, revision 1, was performed and determined negative. This screen failed to identify that the SRVs in this line had 135 psig activation set points that would have resulted in a piping failure prior to the relief valve's activation.

C. DOE-RL surveillance report S-03-OOD-SNF-041 identified that the USQ 0685-2003 evaluation of the effect on the LDC of a loss of electrical power to the SWS was inadequate. DOE-RL concluded this USQ review was not based on sound engineering. FHI subsequently reopened the USQ closure report and a positive USQ determination was the result.

Collectively, these violations constitute a Severity Level I problem.
Civil Penalty - $110,000

III. Information Requirement Violation

Part 820.11(a) requires, in part, that "…any information pertaining to a nuclear activity provided to DOE by any person or maintained by any person for inspection by DOE shall be complete and accurate in all material respects."

Contrary to the above, on April 1, 2003, FHI certified by signature of the Project Review Committee chairman that the SWS "Authorization Basis Document Implementation Plan" was complete. One section of this plan required assurance that "…the plant configuration as described in the SAR (chapter 2) is consistent with the facility as-built configuration, and identify any discrepancies." No discrepancies with the as-built configuration were identified in the report. Associated project closeout documentation indicated that the design had been appropriately validated (e.g., drawings verified, field walk-downs performed). However, subsequent to the April 1, 2003, certification, the FHI Independent Assessment Team found that some safety-significant equipment had never been installed or it was installed to the wrong specifications. Examples are as follows:

A. The safety-significant spray shield was not installed.

B. The safety function of over-pressurization protection was not met because safety relief valves SWS-SRV-402 and -404 had pressure relief settings that exceeded the maximum pressure rating for the piping the valves were intended to protect.

Collectively, these violations constitute a Severity Level I problem.
Civil Penalty - $110,000

Pursuant to the provisions of 10 CFR 820.24, FHI is hereby required, within 30 days of the date of this PNOV and Proposed Imposition of Civil Penalty, to submit a written statement or explanation to one of the following addresses:

(if sent by U.S. Postal Service):

Director, Office of Price-Anderson Enforcement
Attention: Office of the Docketing Clerk
EH-6, 270 Corporate Square Building
U.S. Department of Energy
1000 Independence Avenue, SW
Washington DC 20585-0270

(if sent by overnight carrier):

Director, Office of Price-Anderson Enforcement
Attention: Office of the Docketing Clerk
EH-6, 270 Corportate Square Building
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874-1290

A copy should also be sent to the Manager, DOE Richland Operations Office.
This reply should be clearly marked as a "Reply to a Preliminary Notice of Violation" and should include the following for each violation: (1) admission or denial of the alleged violations, (2) any facts set forth in this PNOV which you believe are not correct, and (3) the reasons for the violations if admitted, or if denied, the basis for denial. Corrective actions that have been or will be taken to avoid future violations should be delineated with target and completion dates in OE's Noncompliance Tracking System. In the event the violations set forth in the PNOV are admitted, this PNOV will constitute a Final Order in compliance with the requirements of 10 CFR 820.24.

Any request for remission or mitigation of civil penalty must be accompanied by a substantive justification demonstrating extenuating circumstances or other reasons why the assessed penalty should not be paid in full. FHI should address the adjustment factors described in section IX of 10 CFR 820, Appendix A, should mitigation of the proposed civil penalty be requested. Within 30 days after the issuance of the PNOV and civil penalty, unless the violations are denied, or remission or additional mitigation is requested, FHI shall pay the civil penalty of $935,000 imposed under section 234A of

the Act by check, draft, or money order payable to the Treasurer of the United States (Account 891099) and mailed to one of the above addresses. Should FHI fail to answer within the time specified, FHI will be issued an order imposing the civil penalty.

Stephen M. Sohinki
Director
Office of Price-Anderson Enforcement

Dated at Germantown, MD
this 14th day of July 2004

ENFORCEMENT CONFERENCE SUMMARY

K Reactor Sludge and Water System Deficiencies

(NTS-RL--PHMC-SNF-2003-0007 through -0011)

On May 27, 2004, the Office of Price-Anderson Enforcement (OE) held an enforcement conference with Fluor Hanford Incorporated (FHI) at OE's offices in Germantown, Maryland. The conference was called to discuss the facts, circumstances, and corrective actions pertaining to significant quality and safety basis deficiencies discovered at the K Reactor basin Sludge and Water System (SWS). Mr. Stephen Sohinki, Director, OE, called the conference to order. Mr. Sohinki stated that OE had convened the conference to (1) address issues discussed in OE's May 6, 2004, investigation summary report, (2) discuss corrective actions taken to prevent recurrence, and (3) discuss mitigation factors for OE's consideration. Information and key areas discussed at the conference are summarized below, and material provided by FHI for the conference has been incorporated in the docket file.

Mr. Ronald Gallagher, FHI, stated in his opening remarks that the SWS event resulted in Fluor Corporation's installation of a new FHI senior management team and the SWS project had become a high-visibility project within the corporation. Mr. Gallagher further stated that FHI's weekly reports to corporate headquarters are currently being read by the chief executive officer. Just prior to the enforcement conference, the SWS had undergone an operational readiness review (ORR) performed by Department of Energy (DOE) personnel, and Mr. Gallagher said that there were only two pre-start and four post-start findings, none of which would prevent the project from continuing forward. In conclusion, both Mr. Gallagher and Ms. Donna Busche, FHI, emphasized that they agreed with the facts as stated in OE's investigation summary report.

Mr. Sohinki asked what, if any, future oversight Fluor Corporate will perform with respect to FHI and FHI's contractual and regulatory requirements. Mr. Gary Coxan, Fluor Vice President for Nuclear and Environmental Operations, said that headquarters' audits focus on safety and accounting issues, and that DOE's quality assurance requirements are somewhat unique when compared to commercial activities.

Ms. Busche stated that between the contractor ORR initiated in April 2003 and the recent DOE ORR, the SWS was tested using sludge in the K Reactor basins known to be relatively free of uranium particles (thus no potential for hydrogen gas generation) and the system performed as intended. Furthermore, FHI developed a new Documented Safety Analysis rather than modifying the existing version. Ms. Busche stated that the previous manager of the SWS project had failed to ensure that Fluor's

own construction services adhered to FHI's procedures and this failure accounted for a sizeable amount of the project's problems. This situation was further compounded by a number of schedule pressures and the lack of effective oversight by FHI's former senior management. Ms. Busche then reviewed the Noncompliance Tracking System reports pertinent to the SWS event and offered clarifying information for OE's consideration. In closing, Ms. Busche stated that FHI was not requesting mitigation and that the primary root cause of the project's problems was poor project management.

Mr. Sohinki stated that OE would consider the information presented by FHI together with the entire record when OE undertakes its enforcement deliberations. Mr. Sohinki then adjourned the conference.

May 27, 2004

K Reactor Sludge and Water System Deficiencies

Enforcement Conference Attendees

DOE – Office of Price-Anderson Enforcement

Stephen M. Sohinki, Presiding Officer
Steven Hosford, Technical Advisor
Howard Wilchins, Counsel
Steven Zobel, Enforcement Specialist

DOE – Richland Operations Office

Michael Weis, Deputy Operations Office Manager
Sheila Hahn, PAAA Coordinator

Fluor Hanford Incorporated

Ronald Gallagher, President and Chief Executive Officer
Donna Busche, Vice President for Regulatory Compliance
Lynn Nye, Manager for Nuclear Safety Regulatory Compliance
Scott Sax, Vice President for Sludge Retrieval and Disposition Project (via telephone)
Michael Wilson, Manager for Warehouse Operations

Fluor Corporation

Gary Coxan, Vice President for Nuclear and Environmental Operations