



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323

JAN 19 1993

Docket No. 70-143
License No. SNM-124
EA 92-231

Nuclear Fuel Services, Inc.
ATTN: Mr. Dwight B. Ferguson, Jr.
President and Chief Operating
Officer
Post Office Box 337, MS 123
Erwin, Tennessee 37650

Gentlemen:

SUBJECT: NOTICE OF VIOLATION AND PROPOSED IMPOSITION OF
CIVIL PENALTIES - \$37,500 (NRC INSPECTION REPORT
NOS. 70-143/92-26 AND 70-143/92-27)

This refers to the NRC inspection conducted between October 3 and November 17, 1992, at the Nuclear Fuel Services (NFS) facility in Erwin, Tennessee. This inspection included a review of the facts and circumstances related to: (1) the September 10, 1992 fire and explosion in the High Enriched Uranium Recovery Facility (HEURF), and (2) the October 13, 1992 transfer of a solution containing uranium from a favorable to an unfavorable geometry vessel without verifying that the concentration was safe. With regard to the first event, a Confirmation of Action Letter (CAL) was forwarded to you on September 14, 1992, documenting our understanding of the processing operation associated with the event and your assurances of cooperation with the planned NRC Augmented Inspection Team (AIT) activities. The report documenting the AIT findings was sent to you by letter dated October 22, 1992. The inspection report concerning the second event and followup of the AIT findings, was sent to you by letter dated November 25, 1992.

As a result of these inspections, violations of NRC requirements were identified. An enforcement conference was held on December 15, 1992, in the Region II office to discuss the violations, their cause, and your corrective actions to preclude recurrence. This enforcement conference was open for public observation in accordance with the Commission's trial program for conducting open enforcement conferences as discussed in the Federal Register, 57 FR 30762, July 10, 1992. A summary of the enforcement conference was sent to you by letter dated January 12, 1993.

Violation I.A of the enclosed Notice of Violation and Proposed Imposition of Civil Penalties (Notice) involved the failure of your operations staff to adhere to the facility standard operating procedures (SOP) for controlling fuel manufacturing waste activities. On September 9, 1992, two 11-liter cylinders of concentrated non-product boildown solution were not processed through the Waste Precipitation Area (WPA), as required by SOP 266, Non-Product Boildown Building 303, prior to transferring the solution to the

dissolver tray system in the HEURF. As a consequence, an oxidizing agent which would have been removed by the WPA was inadvertently introduced into the dissolver tray system, resulting in an explosion and fire.

A number of factors contributed to this event. During the seven preceding months, non-product concentrate had been transferred from the 303 boildown evaporator to 11-liter cylinders on 24 occasions. Twenty-one of these cylinders were incorrectly labeled as coming from the 302 boildown concentrate. Four of the 24 cylinders were improperly processed through waste boildown, with two cylinders ultimately bypassing the WPA. Hence, there was an ongoing potential during this time period for an explosion and fire similar to the September event.

Inadequate operator training and supervision also contributed to this event. The operator who actually performed the evolution had not been adequately trained in the operation of the area, nor was he adequately supervised while becoming proficient in using SOP 266, which is a complex procedure that lacks human factors considerations. In addition, the NRC determined that prior to 1989, solutions from both the 302 and 303 process lines were coded as "BL", and some of the operators who were trained in that time period were still following that practice at the time of the September event.

Finally, the NRC notes that past licensee audits have not been successful in identifying the weaknesses evident in the conduct of operations at NFS. Both operator training and procedure adherence have been recurring problems at NFS. In addition, audits of operational activities should have alerted management to the operational practices involving labeling and process control of the 11-liter cylinders.

The September event involved a breakdown in your process controls that created a substantial potential for serious personal injury and possible radionuclide uptake had personnel been in the immediate vicinity at the time of the fire and explosion. Therefore, in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," (Enforcement Policy) 10 CFR Part 2, Appendix C (57 FR 5791, February 18, 1992), Violation I.A has been categorized at Severity Level II. Specific violations that led to this event are described in Part II of this Notice.

As to your response to the explosion and fire, the NRC recognizes that immediate corrective actions were initiated to extinguish the fire, evacuate the facility, shut down the processing system, perform appropriate radiation surveys, and form an investigation team to review the event. In addition, all liquid transfers were stopped and the operators involved in the process were retrained. Other long term actions included an evaluation of the root cause of the event and implementation of actions to address specific problems identified in the root cause analysis such as training and procedure enhancement.

Notwithstanding those corrective actions, and to emphasize the importance of ensuring that operating procedures are adequate, that personnel are properly

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supervised and trained to perform their assigned tasks, and that management is aware of the operational practices in the facility, I have been authorized, after consultation with the Director, Office of Enforcement, and the Deputy Executive Director for Nuclear Materials Safety, Safeguards, and Operations Support, to issue the enclosed Notice of Violation and Proposed Imposition of Civil Penalty in the amount of \$25,000 for the Severity Level II violation. The base value of a civil penalty for a Severity Level II violation is \$20,000. The escalation and mitigation factors in the Enforcement Policy were considered as discussed below.

The base civil penalty was mitigated by 25 percent for identification because, even though the event was self-disclosing, the actions by the facility staff to develop a root cause determination were promptly initiated and thoroughly reviewed. In addition, mitigation of 50 percent was warranted for your corrective actions, as discussed above. The civil penalty was escalated 100 percent based on past licensee performance in this area and prior opportunity to identify the violation. EA 90-124 was issued in March 1991 for the unauthorized transfer of an 11-liter cylinder of non-product boildown solution to an unfavorable geometry vessel. Problems associated with this event included operator failure to follow posted procedures, mislabeled 11-liter cylinders, lack of adequate first line supervision of operators, lack of management oversight, inadequate operator training and inadequate audits of operational activities. Although this event occurred more than two years ago, issuance of the enforcement action provided another opportunity to consider corrective action. EA 91-186 was issued for a November 1991 event involving the transfer of a uranium solution to an unfavorable geometry vessel in excess of concentration limits. Operator performance problems, an error by first line supervision and human factors problems with the computerized sample tracking system contributed to this event. In addition, a precursor event that involved a small fire in the dissolver tray occurred approximately 30 minutes before the explosion. Operators extinguished that initial fire by adding water. However, notwithstanding this off-normal situation, the operators failed to promptly notify supervisory personnel of the unusual occurrence, or shutoff the heat source. The other adjustment factors in the Policy were considered and no further adjustment to the base civil penalty is considered appropriate. Therefore, based on the above, the base civil penalty has been escalated by 25 percent.

Violation I.B in the enclosed Notice involved the inadvertent transfer of a solution from favorable geometry raffinate storage columns T-4-5-6 to an unfavorable geometry tank, T-3, when an operator connected a quick disconnect transfer hose to the wrong set of raffinate columns. The concentration of uranium in those columns was 0.0545 grams of uranium per liter (gU/l), which exceeded the procedural limits of 0.03 gU/l. This violation is of concern to the NRC because it indicates that a single operator error defeated your nuclear criticality controls (double contingency) for this process. The staff does recognize that once the operator realized his error, he immediately shut down the solvent extraction process and notified his supervisor of the event. This later action on his part was noteworthy.

In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," (Enforcement Policy) 10 CFR Part 2, Appendix C (57 FR 5791, February 18, 1992), Violation I.B has been categorized at Severity Level III to reflect the safety significance associated with criticality controls. The potential for an inadvertent criticality existed as a result of the failure to ensure that operations involving solution transfer from a favorable to an unfavorable geometry vessel were properly controlled. Had an upstream process upset occurred under these circumstances, uranium of sufficient concentration and mass to cause a criticality could have been transferred to the unfavorable geometry vessel.

The NRC recognizes that actions were taken to correct the violation and prevent recurrence. Those actions included conducting an analysis to determine that a less than "safe mass" (45% of a critical mass) of special nuclear material was transferred, improving the labeling of valves and hose connections, locking discard lines, and institution of a key control program. Long term actions included an evaluation of other generic implications throughout the plant and improving double verification procedures.

Notwithstanding those actions, and to emphasize the importance of ensuring that adequate nuclear criticality safety controls are established and maintained and that facility procedures are followed, I have been authorized, after consultation with the Director, Office of Enforcement, and the Deputy Executive Director for Nuclear Materials Safety, Safeguards, and Operations Support, to issue the enclosed Notice of Violation and Proposed Imposition of Civil Penalty in the amount of \$12,500 for the Severity Level III violation. The base value of a civil penalty for a Severity Level III violation is \$12,500. The escalation and mitigation factors in the Enforcement Policy were considered as discussed below.

The base civil penalty was mitigated by 50 percent for identification because the event was identified and immediately reported by the operator. Mitigation of 50 percent was warranted for the corrective actions discussed above. Escalation of 100 percent was warranted for licensee performance in this area. EA 91-186 was issued for a Severity Level III violation involving the inadvertent transfer of a raffinate solution containing a higher than normal concentration of uranium to the Waste Water Treatment Facility. No mitigation was deemed warranted for the facility's recent overall good performance as it has not been sustained for a sufficient length of time. The other adjustment factors in the Policy were considered and no further adjustment to the base civil penalty is considered appropriate. Therefore, based on the above, no change has been made to the base civil penalty.

Violations II.A through II.D involved inadequate operating procedures and inadequate training of operator personnel. Violation II.A specifically addresses the failure to modify or amend SOP 266 which referenced a procedure that had been completely revised to delete an operational requirement for processing small amounts of solution removed from the non-product boildown system. Violation II.B addresses the operators' error of incorrectly labeling solution cylinders. Violation II.C involved the inadequate training of an

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operator that contributed to an incident where the operator inappropriately transferred solution to the waste boildown system. Violation II.D involved the failure to perform audits in an effective manner to assure that operations were being conducted in accordance with established regulatory requirements and approved procedures. These violations are of concern to the NRC as they contributed to both the safety and regulatory significance of the explosion and fire event.

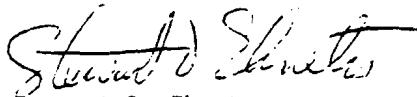
You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. In your response, you should document the specific actions taken and any additional actions you plan to prevent recurrence. After reviewing your response to this Notice, including your proposed corrective actions and the results of future inspections, the NRC will determine whether further NRC enforcement action is necessary to ensure compliance with NRC regulatory requirements.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

The responses directed by this letter and the enclosed Notice are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, Pub. L. No. 96-511.

Should you have any questions concerning this letter, please contact us.

Sincerely,



Stewart D. Ebnetter
Regional Administrator

Enclosure:
Notice of Violation and Proposed
Imposition of Civil Penalties

cc w/encl:
A. Maxin, Acting Vice President,
Safety and Regulatory Management
P. O. Box 337, MS 123
Erwin, TN 37650

State of Tennessee

NOTICE OF VIOLATION
AND
PROPOSED IMPOSITION OF CIVIL PENALTIES

Nuclear Fuel Services, Inc.
Erwin, Tennessee

Docket No. 70-143
License No. SNM-124
EA 92-231

During an NRC inspection conducted from October 3 through November 17, 1992, violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," 10 CFR Part 2, Appendix C (57 FR 5791, February 18, 1992), the Nuclear Regulatory Commission proposes to impose civil penalties pursuant to Section 234 of the Atomic Energy Act of 1954, as amended (Act), 42 U.S.C. 2282, and 10 CFR 2.205. The particular violations and associated civil penalties are set forth below:

I. Violations Assessed a Civil Penalty

- A. Condition 9 of Special Nuclear Material License Number 124 (SNM-124) requires that licensed materials be used in accordance with the statements, representations, and conditions contained in Chapters 1 through 8 of the license application dated August 15, 1989 (submitted by letter dated August 11, 1989), and supplements dated October 15, 1990; and May 15, July 31, December 15 and 31, 1991; and June 30 and July 8, 1992, except as modified by conditions of the license.

Chapter 2, Section 2.7 of the license application specifies that "SNM operations and safety function activities are conducted in accordance with written procedures as defined in Section 1.7.4 and 1.7.5."

Section 1.7.4, "Operating Procedure," states that "an operating procedure is a written set of instructions for production and support groups used in the handling, processing and storage of Special Nuclear Material. Operating procedures contain the limits and controls set up by the Safety Discipline."

Standard Operating Procedure (SOP) 266, Step MF.C.4, requires that concentrated non-product solution be processed per SOP 266, Section MF.A, Precipitation of Blowback Solution and Boildown Solution, before being sent to the High Enriched Uranium Recovery Facility. Section MF.A, delineates the operational steps required to precipitate the concentrated non-product solution.

Contrary to the above, on September 9, 1992, concentrated non-product boildown solution which had been contained in 11-liter cylinders numbered 1004423 and 1621218 between August 24 and 31, 1992, was not processed per SOP 266, Section MF.A, to precipitate the solution prior to transferring the solution to dissolver tray number 7 in the High Enriched Uranium Recovery Facility.

This is a Severity Level II violation (Supplement VI).
Civil Penalty - \$25,000.

- B. Condition 9 of SNM-124 requires that licensed materials be used in accordance with statements, representations, and conditions contained in Chapters 1 through 8 of the application dated August 15, 1989 (submitted by letter dated August 11, 1989), and supplements dated October 15, 1990; and May 15, July 31, December 15 and 31, 1991; and June 30 and July 8, 1992, except as modified by conditions of the license.

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SOP 204, Revision 9, Section 9, Section 9.8, Operation of the First Pass Extraction, Step 12, notes that "The quick disconnect at valve 360 is a physical barrier to prevent unauthorized transfer of solution to the T-2, T-3 tanks which could create a criticality. Make sure the solution to be transferred has a Uranium concentration below the 0.03 grams Uranium per liter (gU/l) discard limit before connecting the hose in Step 9.8.12.1 below. Also be careful to connect the disconnect to the correct set of raffinate rockets [columns]".

Contrary to the above, on October 13, 1992, the licensee failed to adhere to the limits and controls specified in SOP 204 in that 430 liters of solution containing 0.0545 gU/l was improperly transferred from favorable geometry raffinate storage columns T-4-5-6 to an unfavorable geometry tank T-3 when the quick disconnect transfer hose was connected to the incorrect set of raffinate columns. The concentration of this solution exceeded the procedural limits of 0.03 gU/l.

This is a Severity Level III violation (Supplement VI).
Civil Penalty - \$12,500.

II. Violations Not Assessed A Civil Penalty

Condition 9 of SNM-124 requires that licensed materials be used in accordance with statements, representations, and conditions contained in Chapters 1 through 8 of the license application dated August 15, 1989 (submitted by letter dated August 11, 1989), and supplements dated October 15, 1990; and May 15, July 31, December 15 and 31, 1991; and June 30 and July 8, 1992, except as modified by conditions of the license.

Chapter 2, Section 2.7 of the license application specifies that "SNM operations and safety function activities are conducted in accordance with written procedures as defined in Section 1.7.4 and 1.7.5."

Section 1.7.4, "Operating Procedure," states that "an operating procedure is a written set of instructions for production and support groups used in the handling, processing and storage of Special Nuclear Material. Operating procedures contain the limits and controls set up by the Safety Discipline."

Section 1.7.5, "Safety Procedure," states that "a safety procedure is a written approved instruction used for the conduct of safety function activities required by this license. Safety procedures are approved by the safety discipline manager."

- A. Chapter 2, Section 2.7, Subsection 2.7.1 of the license application requires that "Operating procedures will be prepared by the appropriate discipline manager and approved by the safety discipline manager. These operating procedures will incorporate limits and controls established by the safety functions."

Contrary to the above, SOP 266, Section 3, Revision 20, paragraph 3.12.3, an operating procedure prepared by the licensee for processing small amounts of solution removed from the Building 303 non-product boildown system, did not incorporate appropriate limits and controls. Specifically, the procedure required that specified non-product material be processed in accordance with SOP 266, Section A. However, SOP 266, Section A, had been revised on April 3, 1992, and no longer contained the necessary process instructions.

This is a Severity Level IV violation (Supplement VI).

- B. SOP 266, Section MF.C, Step MF.C.4.8, requires the operation staff to label cylinders of solution removed from the non-product boildown system.

Contrary to the above, on August 24, 1992 two operators drained approximately 11 liters of solution from the Building 303 non-product boildown system into two 11-liter cylinders and incorrectly labelled cylinder number 1004423 as "BL" material which is the code for Building 302 waste boildown solution, instead of "BK."

This is a Severity Level IV violation (Supplement VI).

- C. Training Procedure NFS-Q-96, Revision 11, Section 4.0, "Production Operator Training", Step 4.1, requires that "Training for an operator on a new job will include classroom training, individual training, on-the-job training, and additional guided work experience on the job." Step 4.2 requires that "procedures are

read and the new operator goes over the work performed as it occurs in the process stream. These steps will be repeated by the new operator...until the process step can be performed satisfactorily by the new operator, or the new operator can demonstrate that he or she has the knowledge and ability to complete the job task." Step 4.3 requires that "Applicable sections of the Standard Operating Procedure shall be read by the operator, then attested to having been read by signing a sign-off sheet (Attachment I)...."

Contrary to the above, on August 31, 1992, an operator in the fuel manufacturing facility was assigned 300 Complex boildown operational duties for which he had not been trained in accordance with Training Procedure NFS-Q-96. Consequently, the operator added solution from 11-liter cylinder number 1621218 which was correctly labelled as "BK" material and solution from 11-liter cylinder number 1004423 which was incorrectly labelled as "BL" material to the waste boildown system. Although neither cylinder of solution should have been added to that system, the "BK" code on 11-liter cylinder number 1621218 should have alerted a trained operator to the inappropriateness of the action.

This is a Severity Level IV violation (Supplement VI).

- D. Chapter 2, Section 2.8 of the license application requires that "Audits are performed to assure Plant operations are conducted in accordance with established regulatory requirements and standard industry practice.

Inspections are performed to assure that operations are conducted according to approved procedures."

Contrary to the above, as of September 9, 1992, the licensee failed to perform adequate audits and/or inspections to assure that plant operations were conducted in accordance with established regulatory requirements and approved procedures. Adequate audits and/or inspections would have identified numerous examples of operators incorrectly labelling containers of boildown solution. This practice of incorrectly labelling solution existed for at least seven months.

This is a Severity Level IV violation (Supplement VI).

Pursuant to the provisions of 10 CFR 2.201, Nuclear Fuel Services, Inc. (Licensee) is hereby required to submit a written statement or explanation to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, within 30 days of the date of this Notice of Violation and Proposed Imposition of Civil Penalties (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each alleged violation: (1) admission or denial of the alleged violation, (2) the reasons for the violation if admitted, and if denied, the reasons why, (3) the corrective

steps that have been taken and the results achieved, (4) the corrective steps that will be taken to avoid further violations, and (5) the date when full compliance will be achieved. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked or why such other action as may be proper should not be taken. Consideration may be given to extending the response time for good cause shown. Under the authority of Section 182 of the Act, 42 U.S.C. 2232, this response shall be submitted under oath or affirmation.

Within the same time as provided for the response required above under 10 CFR 2.201, the Licensee may pay the civil penalties by letter addressed to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, with a check, draft, money order, or electronic transfer payable to the Treasurer of the United States in the amount of the civil penalties proposed above, or may protest imposition of the civil penalties in whole or in part, by a written answer addressed to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission. Should the Licensee fail to answer within the time specified, an order imposing the civil penalties will be issued. Should the Licensee elect to file an answer in accordance with 10 CFR 2.205 protesting the civil penalties, in whole or in part, such answer should be clearly marked as an "Answer to a Notice of Violation" and may: (1) deny the violation listed in this Notice in whole or in part, (2) demonstrate extenuating circumstances, (3) show error in this Notice, or (4) show other reasons why the penalties should not be imposed. In addition to protesting the civil penalties in whole or in part, such answer may request remission or mitigation of the civil penalty.

In requesting mitigation of the proposed penalties, the factors addressed in Section VI.B.2 of 10 CFR Part 2, Appendix C (57 FR 5791, February 18, 1992), should be addressed. Any written answer in accordance with 10 CFR 2.205 should be set forth separately from the statement or explanation in reply pursuant to 10 CFR 2.201, but may incorporate parts of the 10 CFR 2.201 reply by specific reference (e.g., citing page and paragraph numbers) to avoid repetition. The attention of the Licensee is directed to the other provisions of 10 CFR 2.205 regarding the procedure for imposing civil penalties.

Upon failure to pay any civil penalties due which subsequently has been determined in accordance with the applicable provisions of 10 CFR 2.205, this matter may be referred to the Attorney General, and the penalties, unless compromised, remitted, or mitigated, may be collected by civil action pursuant to Section 234c of the Act, 42 U.S.C. 2282(c).

The response noted above (Reply to Notice of Violation, letter with payment of civil penalties, and Answer to a Notice of Violation) should be addressed to: Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region II, and a copy to the NRC Resident Inspector at the NFS facility, Erwin, Tennessee.

Notice of Violation

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Security or safeguards information should be submitted as an enclosure to facilitate withholding it from public disclosure as required by 10 CFR 2.790(d) or 10 CFR 73.21.

Dated at Atlanta, Georgia
this ⁴/_{th} day of January, 1993