



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

January 27, 2010

Gregory Smith, Chief Operating Officer
and Chief Nuclear Officer
National Enrichment Facility
P.O. Box 1789
Eunice, NM 88231

SUBJECT: NRC INSPECTION REPORT NO. 70-3103/2009-007 AND NOTICE OF VIOLATION

Dear Mr. Smith:

The U.S. Nuclear Regulatory Commission (NRC) conducted an inspection associated with the construction activities of the Louisiana Energy Services, L. L. C., National Enrichment Facility (LES NEF). The inspection was conducted on December 7-10, 2009, and continued in-office through January 14, 2010. The purpose of the inspection was to evaluate the implementation of the LES NEF Commercial Grade Dedication (CGD) Program with emphasis on the procurement and installation of IROFS 41 mechanical components. The enclosed inspection report, which documents the inspection results, was discussed with you and other members of your staff on January 14, 2010.

Based on the results of this inspection, the NRC has determined that a Severity Level IV violation of NRC requirements occurred. This violation was evaluated in accordance with the NRC Enforcement Policy. The current Enforcement Policy is available on the NRC's Web site at www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html. The violation is cited in the enclosed Notice of Violation (Notice), and the circumstances surrounding it are described in the subject inspection report. The violation is being cited in the Notice because it was identified by the NRC.

Except as noted in the following paragraph, you are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. For your consideration, NRC Information Notice 96-28, "SUGGESTED GUIDANCE RELATING TO DEVELOPMENT AND IMPLEMENTATION OF CORRECTIVE ACTION," is available on the NRC's Web site. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

The NRC has concluded that information regarding the reason for Example 6 of the enclosed Notice of Violation, the corrective actions taken and planned to be taken to correct the violation and prevent recurrence, and the date when full compliance will be achieved, is already adequately addressed on the docket in Inspection Report No. 70-3013/2009-007, therefore no response for Example 6 is required.

If you contest this violation or its significance, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to: (1)

the Regional Administrator, Region II; and (2) the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," this document may be accessed through the NRC's public electronic reading room, Agency-Wide Document Access and Management System (ADAMS) on the internet at <http://www.nrc.gov/readingrm/adams.html>.

Should you have any questions concerning this letter, please contact me at (404) 562-4647.

Sincerely,

/RA/

James H. Moorman III, Chief
Construction Inspection Branch 3
Division of Construction Inspection

Docket No. 70-3103
License No. SNM-2010

Enclosure: 1. Notice of Violation
 2. NRC Inspection Report 70-3103/2009-007 w/attachments

cc w/encls: (See next page)

the Regional Administrator, Region II; and (2) the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC.

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Should you have any questions concerning this letter, please contact me at (404) 562-4647.

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SIGNATURE	Snt via email	JH	J. Calle	DAS	Per telecom with JOC		
NAME	B. Adkins	J. Heisserer	J. Calle	D. Seymour	D. Arroyo		
DATE	1/22/2010	1/22/2010	11/22/2010	1/22/10	1/22/10		
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES	YES

Letter to Gregory Smith from James H. Moorman III, dated January 27, 2010

SUBJECT: NRC INSPECTION REPORT NO. 70-3103/2009-007

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B. Smith, NMSS
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J. McCoppin, RII
J. Moorman, RII
M. Lesser, RII
C. Taylor, RII
J. Calle, RII
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LES NEF

3

cc w/encls:

Gary Sanford, Quality and Regulatory
Affairs Director
National Enrichment Facility
P.O. Box 1789
Eunice, NM 88231

Daniel F. Stenger, Counsel
Hogan & Hartson
555 13th Street, NW
Washington, DC 20004

John Parker, Chief
Radiation Control Bureau
Field Operations Division
Environment Department
Harold S. Runnels Building
1190 St. Francis Drive, Room S 2100
P. O. Box 26110
Santa Fe, NM 87502

Richard A. Ratliff, PE, LMP
Radiation Program Officer
Bureau of Radiation Control
Department of State Health Services
Division for Regulatory Services
1100 West 49th Street
Austin, TX 78756-3189

John Goldstein, Deputy Secretary
New Mexico Department of Environment
Office of the Secretary
1190 St. Francis Drive
P. O. Box 26110
Sante Fe, NM 87502-0157

Matt White, Mayor
City of Eunice
P. O. Box 147/1106 Ave J
Eunice, NM 88231

Gary Don Reagan, Mayor
City of Hobbs
200 E. Broadway
Hobbs, NM 88240

Gary Schubert, Chairman
Lea County Commissioners
100 North Main
Lovington, NM 88260

Alton Dunn, Mayor of Jal
P.O. Box Drawer 340
Jal, NM 88252

cc email distribution w/encls:

Reinhard Hinterreither, President
National Enrichment Facility
Electronic Mail Distribution

Brenda Brooks, Director
Community Affairs and Government
Relations
National Enrichment Facility
Electronic Mail Distribution

Gary Sanford, Quality & Regulatory
Affairs Director
National Enrichment Facility
Electronic Mail Distribution

Daniel F. Stenger, Counsel
Hogan & Hartson
555 13th Street, NW
Washington, DC 20004

NOTICE OF VIOLATION

Louisiana Energy Services, L.L.C.
Eunice, N.M.

Docket No. 70-3103
License No. SNM-2010

During a Nuclear Regulatory Commission (NRC) inspection conducted on December 7, 2009 – January 14, 2010, a violation of NRC requirements was identified.

In accordance with the NRC Enforcement Policy, the violation is listed below:

Special Nuclear Material (SNM) License No. 2010 requires, in part, that the licensee shall conduct authorized activities at the Louisiana Energy Services, L. L. C., National Enrichment Facility (LES NEF) in accordance with statements, representations, and conditions in the approved Quality Assurance Program Description (QAPD), dated April 9, 2004, and supplements thereto.

Additionally, SNM License No. 2010, License Condition 28, defines “Dedication” in part, as “an acceptance process undertaken to provide reasonable assurance that a commercial grade item to be used as a basic component will perform its intended IROFS function and, in this respect, is deemed equivalent to an item designed and manufactured under a 10 CFR 50, Appendix B, quality assurance program. This assurance is achieved by identifying the critical characteristics of the item and verifying their acceptability by inspections, tests, or analyses performed by the purchaser or third-party dedicating entity...In all cases, the dedication process must be conducted in accordance with the applicable provisions of 10 CFR Part 50, Appendix B.”

Section 3, Design Control, of the LES NEF QAPD states, in part, that “Measures are established in procedures to ensure that applicable requirements are correctly translated into design documents. Controls are established for the selection and suitability of application of materials, parts, equipment and processes that are essential to the functions of structures, systems and components.”

Contrary to Section 3 of the LES NEF QAPD, prior to December 7, 2009, the licensee failed to establish measures in procedures to ensure that applicable requirements were correctly translated into design documents. The licensee failed to establish controls to ensure the selection and suitability of application of materials, parts, equipment and processes associated with the cascade components and supports designated as Items Relied on for Safety (IROFS) 41 as evidenced by the examples below. The controls established by LES NEF for the selection and suitability of applications of materials, parts, equipment and processes that are essential to the functions of IROFS 41 include Commercial Grade Dedication (CGD) Plans D-2009-006 and D-2008-044, as well as other implementing procedures.

1. As the entity performing the commercial grade dedication of cascade components and supports employing Method 2 (Commercial Grade Surveys), LES NEF was directly responsible for verifying the capability of all suppliers and sub-suppliers to adequately control the critical characteristics associated with their specific scope of supply. However, instead of conducting the actual verification, in some cases LES NEF credited the audits and surveillances of various sub-suppliers performed by its primary supplier, Enrichment Technology Corporation (ETC). ETC is a commercial grade supplier that does not have a 10 CFR Part 50 Appendix B quality assurance program. Therefore, ETC was not qualified to perform the dedication activity of Method 2 verification of a sub-supplier’s capability to control critical characteristics, in

- that those dedication activities were not conducted in accordance with the applicable provisions of 10 CFR Part 50, Appendix B. The failure of LES NEF to directly verify the capability of all suppliers and sub-suppliers to adequately control applicable critical characteristics was not in compliance with the commercial grade dedication process as defined in SNM-2010.
2. As the entity performing the commercial grade dedication of cascade components and supports employing Method 2 (Commercial Grade Surveys), LES NEF was directly responsible for verifying the validity of vendor-supplied material certifications or certificates of conformance/compliance used as the bases for verification of critical characteristics. These vendor-supplied material certifications or certificates of conformance/compliance were submitted to ETC and forwarded to LES NEF. LES NEF failed to perform these verifications and was therefore not in compliance with the commercial grade dedication process.
 3. LES NEF failed to provide technical documentation verifying compliance to the applicable requirements of United States (US) industry codes and standards American Welding Society (AWS) D1.1, American Society of Mechanical Engineers (ASME) B31.3, American Society of Nondestructive Testing (ASNT) SNT-TC-1a and American Concrete Institute (ACI)-349, in compliance with the IROFS 41 CGD Plans D-2008-044 and D-2009-006 and the associated License Amendment Request (LAR) 08-07.
 4. LES NEF failed to provide technical documentation verifying compliance to the design acceptance criteria in the conduct of the required leakage test for IROFS 41 cascade header piping welds identified as a critical characteristic in CGD Plan D-2009-006.
 5. LES NEF failed to provide key inspection records associated with the verification of critical characteristics for IROFS 41 cascade supports as required by the LES NEF CGD Plan D-2008-044.
 6. LES NEF failed to meet critical characteristic requirements for IROFS 41 cascade component welds as described in CGD Plan D-2009-006 as evidenced by ASME B31.3 code violations identified by the NRC in April 2009.

This is a Severity Level (SL) IV violation (Supplement II)

Pursuant to the provisions of 10 CFR 2.201, Louisiana Energy Services, LLC is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555, with copies to the Chief, Technical Support Group, Division of Fuel Cycle Safety and Safeguards, NMSS, and the Regional Administrator, Region II, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation;" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. 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. Where good cause is shown, consideration will be given to extending the response time.

In addition, the NRC has concluded that information regarding the reason for Example 6 of the violation, the corrective actions taken and planned to correct the violation and prevent recurrence and the date when full compliance was achieved is already adequately addressed on the docket in this letter and as documented in NRC Inspection Report No. 70-3103/2009-007. However, you are required to submit a written statement or explanation pursuant to 10 CFR 2.201 if the description therein does not accurately reflect your corrective actions or your position. In that case, or if you choose to respond, clearly mark your response as a "Reply to a Notice of Violation," and send it to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555 with a copy to the Resident Inspector and the Regional Administrator, Region II, within 30 days of the date of the letter transmitting this Notice.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web Site at <http://www.nrc.gov/reading-rm/adams/html> to the extent possible, it should not include any personal privacy, proprietary, classified, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days. Dated at Atlanta, Georgia this 27th day of January 2010

**U.S. NUCLEAR REGULATORY COMMISSION
REGION II**

Docket: 70-3103

License: SNM-2010

Report: 70-3103/2009-007

Licensee: Louisiana Energy Services, L. L. C.

Location: National Enrichment Facility (LES NEF)
Eunice, New Mexico

Inspection Dates: December 7-10, 2009 (on-site inspection) through January 14, 2010 (in-office inspection)

Inspectors: J. Calle, Sr. Construction Inspector, Construction Inspection Branch 3 (CIB3), Division of Construction Inspection (DCI), Region II (RII)
B. Adkins, Construction Project Inspector, Construction Projects Branch 4 (CPB4), Division of Construction Projects (DCP), RII
J. Heisserer, Construction Inspector, CIB3, DCI, RII
D. Arroyo, Quality Assurance Engineer, Office of Nuclear Materials Safety and Safeguards (NMSS)

Accompanying Personnel: A. Artayet, Sr. Construction Inspector, CIB3, DCI, RII

Approved: James H. Moorman III, Chief
Construction Inspection Branch 3
Division of Construction Inspection

EXECUTIVE SUMMARY

Louisiana Energy Services, L.L.C., National Enrichment Facility (LES NEF)
Nuclear Regulatory Commission (NRC) Inspection Report 70-3103/2009-007

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine inspection associated with the construction activities of the Louisiana Energy Services, L. L. C., National Enrichment Facility (LES NEF). The inspection was conducted on December 7-10, 2009. A continued in-office inspection was conducted through January 14, 2010. On January 14, 2010, a formal exit was held with the licensee to discuss the inspection findings. The purpose of the inspection was to evaluate the implementation of the LES NEF Commercial Grade Dedication (CGD) Program with emphasis on the procurement and installation of Items Relied On for Safety (IROFS 41) mechanical components.

Quality Assurance: Control of Materials, Equipment, and Services (IP 88108)

NRC inspectors conducted a commercial grade dedication inspection at the LES NEF with a focus on IROFS 41 mechanical components comprised primarily of the cascade centrifuges and associated piping and supports. This inspection was performed to evaluate the implementation of the LES NEF CGD program and verify that adequate controls were established for the selection and suitability of application of materials, parts, equipment and processes that were essential to the functions of structures, systems and components. Specifically, the NRC inspectors reviewed programmatic CGD documents, procedures, and plans to ensure that LES NEF has adequately identified the necessary critical characteristics. The NRC inspectors performed document reviews and conducted interviews with LES NEF and Enrichment Technology Corporation (ETC) personnel to assess the ability of commercial grade suppliers to control and verify critical characteristics. The NRC inspectors conducted field observations of CGD activities and reviewed the LES system for reporting and correcting non-conformances. Training and qualification of personnel involved in CGD activities was also assessed.

One Severity Level (SL) IV Violation of Section 3, Design Control, of the licensee Quality Assurance Program Description (QAPD) was identified for failure to establish measures in procedures to ensure that applicable requirements were correctly translated into design documents. The licensee failed to establish controls to ensure the selection and suitability of application of materials, parts, equipment and processes associated with the cascade components and supports designated as Items Relied on for Safety (IROFS) 41. This was identified as Violation (VIO) 70-3103/2009-007-001 (Section 2.0).

Unresolved Item (URI) 70-3103/2009-002-001, Failure to Implement American Society of Mechanical Engineers (ASME) B31.3 Welding and Nondestructive Examination, was reviewed and closed to VIO 70-3103/2009-007-001 (Section 2.0, Section 4.0).

Mechanical Components (IP 88136)

NRC inspectors reviewed construction documentation (specifications, drawings, and work procedures) to determine whether specific activities associated with Quality Level (QL) -1 mechanical components were controlled and performed in accordance with NRC requirements, license commitments, and the approved QAPD. The NRC inspectors conducted direct observation of work performance to determine whether activities associated with receipt inspection; storage, handling, and protection; and equipment installation met applicable NRC

requirements. The NRC inspectors reviewed training and qualification records to assess whether personnel performing work on QL-1 mechanical components were qualified to perform their assigned duties. The NRC inspectors determined that LES NEF and its sub-contractors complied with applicable requirements. (Section 3.0)

Follow-up of Previously Identified Items

VIO 70-3103/2009-001-001, Four Examples of Failure to Correct Conditions Adverse to Quality Related QL-1, was reviewed and closed (Section 4.0).

VIO 70-3103/2009-006-001, Failure to Perform Site Audits, was reviewed and closed (Section 4.0).

VIO 70-3103/2009-006-002, Failure to Control Design Change Activities, was reviewed and closed (Section 4.0).

Attachment:

Persons Contacted

Inspection Procedures Used

List of Items Opened, Closed, and Discussed

List of Acronyms Used

List of Documents Reviewed

REPORT DETAILS

1. Summary of Site Activities

The licensee continued to perform ongoing construction activities for Separations Building Module (SBM) 1001 and the Cylinder Receipt and Dispatch Building (CRDB), at the Louisiana Energy Services, L.L.C., National Enrichment Facility (LES NEF).

2. Quality Assurance: Control of Materials, Equipment, and Services (Pre-Licensing and Construction) Inspection Procedure (IP) 88108

a. Scope and Observations

On December 7-10, 2009, the U.S. Nuclear Regulatory Commission (NRC) inspectors conducted an inspection at LES NEF to assess the implementation of the LES Commercial Grade Dedication (CGD) program including compliance with LES NEF licensing basis documents and NRC and industry standards regarding CGD. The inspection focused on the CGD of Items Relied on For Safety (IROFS) 41 mechanical components for SBM-1001 for Cascade 1 and associated supports.

The NRC inspectors reviewed Special Nuclear Material (SNM)-2010, "U.S. Nuclear Regulatory Commission Materials License," and LES NEF licensing documents including "LES Safety Analysis Report" and "Safety Analysis Report Appendix A, Quality Assurance Program Description" (QAPD) to identify licensing commitments regarding CGD including specific commitments associated with design control, procurement, and control of purchased items and services. The NRC inspectors reviewed the CGD Plans D-2009-006 (Cascade Components) and D-2008-044 (Flomels: Cascade Supports), as well as other implementing procedures to determine if they met the intent of Section 3, "Design Control," of the QAPD, as well as applicable NRC and industry guidance regarding CGD, including Electric Power Research Institute (EPRI) NP-5652 and NRC Generic Letters (GL) 89-02 and 91-05. The NRC inspectors reviewed CGD Plans D-2008-044 and D-2009-006, applicable procedures and various supporting documents to determine if the plans adequately identified the critical characteristics necessary to ensure that IROFS 41 components (e.g., flomels, cascade piping, upper steelworks, and centrifuges) were capable of performing their intended IROFS function. The NRC inspectors reviewed the acceptance methods selected by LES NEF for verification of critical characteristics. The acceptance methods selected by LES NEF were Acceptance Method 1, "Special Tests/Inspections and Standard Receipt Practices," and Acceptance Method 2, "Commercial Grade Survey." The NRC inspectors reviewed completed Quality Assurance (QA) audit, surveillance, and CGD survey reports to assess the ability of LES NEF to verify the capability of suppliers and sub-suppliers to control and verify critical characteristics.

LES NEF Flomel CGD Plan D-2008-044 listed a total of 13 critical characteristics including centrifuge anchor bolt dimensions, anchor bolt material, flomel dimensions and rebar placement. The Cascade CGD Plan D-2009-006 listed a total of 32 critical characteristics separated into two groups associated with the cascade centrifuges and the cascade pipework and steelwork. The critical characteristics for the cascade centrifuge included centrifuge subcomponent dimensions and materials. The critical characteristics for the cascade pipework and steelwork included piping and steelwork

material, piping dimensions, piping and steelwork weld quality, and bolting material and tightening torque. The majority of suppliers involved in the fabrication and pre-assembly of the cascade components and supports and directly responsible for controlling the various critical characteristics were located in Europe and qualified by LES NEF as commercial grade suppliers. Of the various European commercial grade suppliers, Enrichment Technology Corporation (ETC) served as the primary supplier responsible for the overall scope of supply. In addition, several European testing organizations were utilized by ETC for verification of material properties identified as critical characteristics for various subcomponents identified in the Flomel CGD Plan Q-2008-044 and the Cascade CGD Plan D-2009-006.

Special Nuclear Material (SNM) License No. 2010 requires, in part, that the licensee shall conduct authorized activities at the Louisiana Energy Services, L. L. C., National Enrichment Facility (LES NEF) in accordance with statements, representations, and conditions in the approved Quality Assurance Program Description (QAPD), dated April 9, 2004, and supplements thereto.

Additionally, SNM License No. 2010, License Condition 28, defines "Dedication" in part, as "an acceptance process undertaken to provide reasonable assurance that a commercial grade item to be used as a basic component will perform its intended IROFS function and, in this respect, is deemed equivalent to an item designed and manufactured under a 10 CFR 50, Appendix B, quality assurance program. This assurance is achieved by identifying the critical characteristics of the item and verifying their acceptability by inspections, tests, or analyses performed by the purchaser or third-party dedicating entity...In all cases, the dedication process must be conducted in accordance with the applicable provisions of 10 CFR Part 50, Appendix B."

Section 3, Design Control, of the LES NEF QAPD states, in part, that "Measures are established in procedures to ensure that applicable requirements are correctly translated into design documents. Controls are established for the selection and suitability of application of materials, parts, equipment and processes that are essential to the functions of structures, systems and components."

Contrary to the above, prior to December 10, 2009, the licensee failed to establish measures in procedures to ensure that applicable requirements were correctly translated into design documents. The licensee failed to establish controls to ensure the selection and suitability of application of materials, parts, equipment and processes associated with the cascade components and supports designated as Items Relied on for Safety (IROFS) 41 as evidenced by the examples below. The controls established by LES NEF for the selection and suitability of applications of materials, parts, equipment and processes that are essential to the functions of IROFS 41 include Commercial Grade Dedication (CGD) Plans D-2009-006 and D-2008-044, as well as other implementing procedures. A description of each example follows:

- (1) LES NEF did not directly verify the capability of suppliers and sub-suppliers to adequately control applicable critical characteristics.

The acceptance methods selected by LES NEF in CGD Plan D-2008-044 were Acceptance Method 1, "Special Tests/Inspections and Standard Receipt Practices," and Acceptance Method 2, "Commercial Grade Survey." The key suppliers involved in the Flomel CGD process included ETC, Voorbij and ENEV.

LES NEF referenced at least six separate audits and surveillances as verification of the suppliers' capability to control the applicable critical characteristics. The acceptance method selected for CGD Plan D-2009-006 was limited to Method 2. The key suppliers involved in the Cascade CGD process included ETC, IMI, Aluminum Unna, Buigistahl, Form Fabrications, and May-Lachnicht. LES NEF provided more than 25 different audits and surveillances to the NRC inspectors to document their verification of the various suppliers' capability to control the applicable critical characteristics.

The NRC inspectors reviewed the various audits and surveillances referenced in the CGD plans to assess compliance with the commercial grade dedication process applicable to Acceptance Method 2. The inspectors determined that LES NEF did not directly verify the capability of several suppliers, including ENEV, Aluminum Unna and Buigistahl, in controlling the critical characteristics for their scope of supply.

As the entity performing the commercial grade dedication of cascade components and supports employing Method 2 (Commercial Grade Surveys), LES NEF was directly responsible for verifying the capability of all suppliers and sub-suppliers to adequately control the critical characteristics associated with their specific scope of supply. However, instead of conducting the actual verification, in some cases LES NEF credited the audits and surveillances of various sub-suppliers performed by its primary supplier, ETC. ETC is a commercial grade supplier that does not have a 10 CFR Part 50 Appendix B quality assurance program. Therefore, ETC was not qualified to perform the dedication activity of Method 2 verification of a sub-supplier's capability to control critical characteristics, in that those dedication activities were not conducted in accordance with the applicable provisions of 10 CFR Part 50, Appendix B. The failure of LES NEF to directly verify the capability of all suppliers and sub-suppliers to adequately control applicable critical characteristics was not in compliance with the commercial grade dedication process as defined in SNM-2010.

(2) LES NEF did not directly verify the validity of vendor-supplied material certifications.

The NRC inspectors reviewed material certifications as required by the Flomel and Cascade CGD Plans D-2008-044 and D-2009-006, respectively, for the verification of critical characteristics. The NRC inspectors determined that the CGD Plans required the issuance of European DIN 10204 Type 2.1 and Type 3.1 material certifications to provide objective evidence for the verification of critical characteristics. LES Surveillance 2009-S-03-033, "Surveillance of Flomel Manufacture at Voorbij," defined a Type 3.1 material certification as a material certification from a vendor with a recognized ISO program audited by ETC. The Flomel CGD Plan and the Cascade CGD Plan both state that a Type 3.1 material certification is similar to a Certified Material Test Report (CMTR). Further, both of the CGD Plans and LES Surveillance 2009-S-03-033 defined a Type 2.1 material certification as a generic document designating that the testing was performed, but does not denote the specifics of the testing and does not guarantee lot traceability. In order to assess the validity of material certifications, the NRC inspectors reviewed completed QA audits, surveillances, and CGD

survey reports (CGD Acceptance Method 2) to determine if LES NEF, as the dedicating entity, adequately evaluated the capability of the suppliers providing the material certifications to verify critical characteristics and for the applicable suppliers to maintain heat/lot traceability. The inspectors determined that LES NEF did not directly evaluate any of the testing facilities and verify their capabilities. Instead, LES NEF accepted the material certifications generated by the European testing facilities based primarily on ETC's earlier evaluations of the said organizations.

As the entity performing the dedication of cascade components and supports employing Method 2 (Commercial Grade Surveys), LES NEF was responsible for directly verifying the validity of vendor-supplied material certifications or certificates of conformance/compliance used as the bases for verification of critical characteristics. These vendor-supplied material certifications or certificates of conformance/compliance were submitted to ETC and forwarded by ETC to LES NEF. LES NEF failed to perform these verifications and was therefore not in compliance with the commercial grade dedication process. The following specific material certifications were reviewed:

- (a) LES NEF was relying on Type 2.1 material certifications for cascade steel turnbuckle, and upper steelwork and weld metal to ensure adequacy of strength to resist loading caused by a seismic event.
 - (b) LES NEF was relying on Type 3.1 material certifications for flomel anchor bolt, fixed clamps, UF₆ piping and pipe-supporting elements, weld metal, and steelwork bolts, nuts and material to ensure adequacy of strength to resist loading caused by a seismic event.
 - (c) LES NEF was relying on Type 3.1 material certifications for pump, skid rings, mounting bolts, top/bottom connections to recipient, and weld metal to ensure adequacy of strength to survive a centrifuge crash
- (3) LES NEF failed to provide technical documentation verifying compliance to the applicable requirements of United States (US) industry codes and standards.

The NRC inspectors reviewed documentation provided by LES regarding Americanization of the flomel concrete and anchor bolts including compliance with U.S. Codes and Standards such as the American Concrete Institute (ACI), American National Standards Institute (ANSI), American Society for Testing of Materials (ASTM) and American Society for Mechanical Engineers (ASME). The NRC reviewed 51-9044003-002, "Americanization of LES NEF Flomel Units Functional Specification UPD/9801072," and 51-9044023-002, "Americanization of NEF Functional Specification for the Manufacture and Delivery of Flomel Anchor Bolts UPD/9801109-03," to assess compliance with U.S. Codes and Standards.

EG-3-3100-04-F-1, "QA Level Requirements Determination for Cascade Hall Components," Section 6.2 states in part, "During the development of plans to construct the NEF, LES NEF conducted an effort to adapt ETC's designs and specifications to reflect the codes and standards cited in their licensing basis documents. This effort is referred to as "Americanization." LES reviewed ETC's

designs and specifications and interfaced with identified changes to the codes and standards invoked therein to satisfy the LES Code of Record.”

Additionally, LAR 08-07 Section 2.3.3, “Technical Requirements for Seismic Qualification of UF₆ Process Systems,” required that all concrete supports meet the requirements of American Society of Civil Engineers (ASCE) 43-05 and ACI 349-01.

Specific to the flomels, the NRC inspectors determined that LES NEF failed to provide technical documentation verifying compliance to the applicable requirements of United States (US) industry codes and standards ACI-349-01, in compliance with EG-3-3100-04-F-1, “QA Level Requirements Determination” and LAR 08-07. The following specifics are provided:

- (a) The Americanization and code reconciliation report for the flomel concrete was performed to ACI-318 instead of ACI-349. Section 2.3.3 of LAR 08-07, required concrete supports for IROFS 41 mechanical components to meet the code requirements of ACI-349-01. The Americanization and code reconciliation for the flomels was documented in Engineering Information Record 51-9044003-002, “Americanization of the Flomel Units Functional Specification UPD/9801072.”
- (b) ASTM A615 required performance of one tension test and one bend test for each heat of rebar material. LES was unable to produce tensile and bend test records for the flomel rebar material.
- (c) Appendix D, “Code Reconciliation,” of Engineering Information Record 51-9044003-002 failed to specifically address how European standards addressed materials/cement, durability, concrete quality, evaluation and acceptance of concrete, minimum cover over reinforcement, and aggregate quality as identified in Section 6.4.1 of 51-9044003-002 (Flomel CGD Plan) and ACI-349, Chapter 4, “Durability Requirements,” and Chapter 5, “Concrete Quality, Mixing, and Placing.”

Similarly, NRC inspectors assessed the ability of LES NEF and its sub-contractors to comply with US codes and standards in the areas of fabrication, welding, and nondestructive examination (Americanization).

Section 2.3.3, “Technical Requirements for Seismic Qualification of UF₆ Process Systems, Pipe” of LAR 08-07 states in part, “The piping design code of record is ASME B31.3, *Process Piping*, 2004 Edition. The UF₆ piping shall meet the additional requirements of ASME B31.3, Chapter VIII, *Piping for Category M Fluid Service*.” In addition, ASME B31.3 paragraph 328.2.1(a) required conformance to ASME B&PV Section IX for the qualification of welding procedures and welders/welding operators. In addition, Cascade CGD Plan D-2009-006 states, in part, that pipe welding must meet the requirements of ASME B31.3.

The NRC inspectors reviewed the contents of European welding records for the cascade piping to assess compliance with the applicable ASME B31.3

requirements. The NRC inspectors determined that LES NEF failed to provide technical documentation verifying compliance with the applicable requirements of US industry codes and standards. During the selective review, the following non-compliances to the applicable ASME B31.3 code requirements were identified by the NRC inspectors:

- (a) ETC-Gronau Welding Procedure Specification (WPS) did not reference the supporting Procedure Qualification Record (PQR), contrary to the last paragraph of ASME Section IX, QW-200.1b. In addition, the contents of WPS and PQR that were presented were not aligned. For instance, the actual base metal combinations (looking at European designation for chemical constituents) used during qualification and recorded on the PQR were not consistent with the base metal specified in the WPS. By looking at the indicated base metals, the inspector could not discern that the contents of the PQR supported the accompanying WPS.
- (b) ETC-Gronau WPSs did not adequately describe essential and nonessential variables (such as amperage range or wire feed speed, as applicable per QW-409.8), as required by ASME Section IX, QW-200.1(a) and (b) and QW-256 to provide directions to the welders or welding operators, as applicable. Similarly, essential variables for welder and welding operator performance qualification records (WPQ) must comply with ASME Section IX, QW-304/350 and 305/360, respectively. Compliance to ASME Section IX shall be verified by certification signature in accordance QW-103.2 and QW-300.3, and suggested format provided in QW-483 and QW-484A/B.
- (c) As a result of inspecting European Type 3.1 material certification documents (describing chemical and mechanical properties per the DIN EN 10204:2004 standard) of base metals for CGD, it was determined that the alloy, type or grade did not appear in the ASME Section IX, QW-420 grouping of base metals. Therefore, European base metals are considered unassigned. IMI-Birmingham and IMI-US WPSs inadequately used a P-Number designation contrary to that described by ASME Section IX, QW-424.

European base metals used for Cascade 1 are deemed unassigned because the ASME/ASTM specification, UNS-No., and/or specifically the alloy, type or grade of alloy metal does not appear in ASME Section IX, Table QW-422. Contrary to ASME Section IX, QW-424, P-Number designations to unassigned base metals were specified in WPS-No. 108 for weld-no. V04/34 and WPS-No. 42 for weld-no. V01/36 by IMI-US, and WPS-001 and -002 for IMI-Birmingham.

QW-424.1 states that "base metals that do not appear in table QW-422 are considered to be unassigned metals, except as otherwise described in QW-420.1 for base metals having the same UNS numbers." Unassigned base metals shall be identified in the WPS and on the supporting PQR(s) by specification, type and grade, or by chemical analysis and mechanical properties. Furthermore, QW-424 describes that any unassigned metal welded to the same unassigned metal during procedure qualification is qualified for production welding the unassigned metal to itself. For dissimilar

welds, QW-424 further describes that any unassigned metal welded to any other unassigned metal during procedure qualification is qualified for production welding the first unassigned metal to the second unassigned metal.

With regards to steelwork welds, CGD Plan D-2009-006 states, in part, that steelwork welding was to be performed to American Welding Society (AWS) D1.1 and to European standard DIN 18800. Any welding to DIN 18800 must be Americanized to ensure it complied with AWS D1.1. The NRC inspectors asked LES to provide the technical documentation verifying compliance of the steelwork welds to AWS D1.1. As of December 10, 2009, LES NEF could not provide the technical documentation.

Previously, the NRC identified Unresolved Item (URI) 70-3103/2009-002-001, Failure to Implement ASME B31.3 Welding and Nondestructive Examination (NDE) Requirements Related to IROFS 41. Example (e) of URI 70-3103/2009-002-001 related to the fact that ETC did not have an NDE written practice that met the requirements of American Society of Nondestructive Testing (ASNT) SNT-TC-1a. At the time of that inspection, the commercial grade dedication plan was not in place, and it was not known if ETC was required to meet SNT-TC-1a. During this inspection, CGD Plan D-2009-006 was reviewed and it states, in part:

“The Supplier will have personnel qualification processes which provide training and verify personnel compliance with required training by position or specific process. These processes must meet regulatory requirements for specific types of process activities such as welding to ASME B31.3 or Non-Destructive Examination to ASNT-TC-1a.”

LES NEF did not provide adequate technical documentation to demonstrate that ETC met the requirements of SNT-TC-1a.

As discussed in the preceding paragraphs, LES NEF failed to provide technical documentation verifying compliance to the applicable requirements of US industry codes and standards AWS D1.1, ASME B31.3, ASNT SNT-TC-1a, and ACI-349, in compliance with the IROFS 41 CGD Plans D-2008-044 and D-2009-006 and the associated LAR 08-07.

(4) LES NEF failed to verify design acceptance criteria in the conduct of leakage test.

Previously, the NRC identified URI 70-3103/2009-002-001, Failure to Implement ASME B31.3 Welding and NDE Requirements Related to IROFS 41. Example (c) of that URI related to Sensitive Leak Testing on cascade header piping conducted by IMI-US. Specifically, the NRC inspectors identified that the helium leak test (hood method) conducted on cascade header piping modules was not performed in accordance with a procedure. The procedure that IMI-US originally referenced for this test described testing individual welds, up to a maximum of three welds with small plastic bags instead of testing an entire module containing hundreds of welds under a large plastic hood. No procedure existed for the test as performed by IMI-US on cascade header piping modules. Additionally, the assumptions made in calculating the results of the test were improper in that IMI-

US assumed a helium concentration of 100% without properly estimating or determining the actual concentration of helium in the hood, as required in Article 10 of ASME Section V. This assumption was important since any tracer gas percentage below 100% results in a non-conservative change to the system measured leakage. The equation used to calculate the system measured leakage was based on Article 10 of ASME Section V for the hood test method.

To follow-up on URI 70-3103/2009-002-001, the NRC inspectors reviewed CR-2009-949, which LES NEF initiated in response to the URI. CR-2009-949 noted that the IMI-US procedure was updated to reflect how the test was actually being performed, including a measured helium concentration of 5% instead of an assumed concentration of 100%.

The NRC inspectors reviewed the revised procedure, QSWI-82-04.1, "Sensitive Leak Testing of Header Pipework Modules," Rev. 1, dated May 7, 2009. The acceptance criterion cited in the procedure for the maximum permissible leak rate changed from QSWI-82-04.1, Rev. 0. The revised acceptance criterion allowed significantly greater leakage than the previous revision of the procedure. The NRC inspectors also reviewed QSWI-82-03.5, "Cascade Sensitive Leak Test," Rev. 0, dated July 13, 2009, which describes the process for helium leak testing of individual welds. The acceptance criterion in QSWI-82-03.5 was the same as the acceptance criterion in QSWI-82-04.1, Rev. 1.

The NRC inspectors then reviewed the governing ETC design specification documents, including UPD/9801143, "Helium Leak Testing," Issue 3, dated April 18, 2007 and UPD/9801142, "Fabrication and Welding of Aluminum, Stainless Steel, Austenitic Alloys and Monel Piping/Components for UF₆ and Vacuum Service," Issue 5, dated March 6, 2008. UPD/9801143 was the specification which detailed the "technical requirements relating to the procedures for helium leak testing of UF₆ and vacuum piping systems and components." UPD/981142 contained the maximum allowable leak rates for single weld/flange joints and prefabricated systems containing multiple welds or flanged connections. The maximum permissible leak rates in the design documents were significantly less for a single weld or flange and for a prefabricated system, such as a cascade header piping module or unit, compared to QSWI-82-04.1, Rev. 1 and QSWI-82-03.5, Rev. 0. The acceptance criteria in the implementing procedures were less conservative than the design requirements in UPD/981142 and therefore unacceptable. When the inspectors interviewed LES NEF and IMI-US personnel, they indicated that the revised acceptance criteria met the requirements of ASME B31.3-2004. While ASME B31.3 sets a minimum standard for permissible leak rate, engineering design requirements, if more stringent, must be followed. The introduction of the LES NEF QAPD states, in part, that LES "maintains full responsibility for ensuring that the enrichment facility is designed, constructed, operated, and decommissioned in conformance with...specified design requirements." Additionally, Paragraph 340.2 of ASME B31.3-2004 states, in part: "It is the owner's responsibility...to verify that all required examinations and testing have been completed and to inspect the piping to the extent necessary to be satisfied that it conforms to all applicable examination requirements of the Code and of the engineering design." This was an example of failure to properly translate design requirements into procedures QSWI-82-04.1 and QSWI-82-03.5.

In addition, the NRC inspectors noted that the time in which helium is discharged from the tank to the hood was increased in QSWI-82-04.1, Rev. 1 to three minutes from 90 seconds which was previously observed by inspectors and was the practice prior to the procedure revision. The procedure also described the method used to determine helium concentration in the hood, and stated that the "helium concentration achieved under the conditions outlined in this procedure" is 5%. The NRC inspectors interviewed IMI-US personnel and determined that the 5% helium concentration was determined for a 3 minute helium discharge time and that the helium concentration had not been determined for those modules which were tested with a 90 second helium discharge time. Affected modules included all modules in Cascade 1, and 12 modules in Cascade 2 which were tested prior to the May 7, 2009 revision to the QSWI-82-04.1.

On December 8, 2009, IMI-US personnel conducted an initial evaluation of helium concentration in the hood with a 90 second discharge time. That preliminary evaluation indicated that 0.6% helium was present in the hood. Based on that preliminary concentration, 50% of the modules in cascade 1 exceeded the maximum permissible leak rate in the design acceptance criteria.

When asked about the acceptability of those results, IMI-US and LES personnel provided a memo dated December 8, 2009 stating that those results met the B31.3 required leak rate. The NRC inspectors asked about the acceptability as it relates to the design criteria, and IMI-US and LES personnel provided a November 17, 2009 memo that states "assuming a helium concentration of 100% within the hood at the time of the test...the results comply with the requirements of ETC UPD/9801142." This technical justification was inadequate as multiple documents have been provided to the NRC indicating that significantly less than 100% helium is present in the hood during the test. At the time the NRC inspectors left the site, this was a violation since the completion of this test was being credited for code compliance and to meet critical characteristic 6e of the CGD Plan D-2009-006; based on the data received by the NRC, 50% of the modules in Cascade 1 did not meet the design acceptance criteria.

Subsequent to returning to Region II, on December 23, 2009, the NRC inspectors received test reports for all modules tested to date. In these test reports, the system leak rates differed from previously documented results, although the test dates were the same. LES and IMI-US indicated that QSWI-82-04.1 had been revised and that the system leak rates had been recalculated.

The NRC inspectors reviewed QSWI-82-04.1, "Sensitive Leak Testing of Header Pipework Modules," Rev. 2, dated December 10, 2009. The acceptance criterion in the procedure was revised to once again match the design acceptance criteria. Additionally, references to helium concentration and ASME Section V were removed. Also, the method establishing the timing parameter of the test changed as follows:

Response time: In QSWI-82-04.1 Rev. 1, which was written to meet the requirements of ASME Section V Article 10, during preliminary system

calibration, a "response time" was established which was equal to the elapsed time between opening the valve of the calibrated leak standard and the time required for the signal increase on the helium mass spectrometer to stabilize. That response time established the test duration time, and impacted variables which went into the final system measured leakage rate and preliminary and final system calibration factors.

Detection time: In QSWI-82-04.1 Rev. 2, all references to response time were removed, and a "detection time" was established during system calibration. The detection time was equal to the elapsed time between opening the valve of the calibrated leak standard and the time required for the helium mass spectrometer to detect any leakage. The procedure noted that "it is desirable to keep this time as short as possible to reduce the time required to locate detected leakage." The detection time established the test duration time, and impacted variables which went into the preliminary and final system calibration factors.

The procedure, QSWI-82-04.1, Rev. 2, was inadequate in that it did not contain sufficient information to determine how the revised final system leak rates were calculated. Additionally, with the change in method of establishing the timing parameter of the test, it is not clear how data gathered using a "response time" under QSWI-82-04.1, Rev. 1 can be accurately conveyed to a calculation that uses "detection time" under QSWI-82-04.1, Rev. 2.

Further, the NRC inspectors noted that the revised procedure does not meet UPD/9801143, "Helium Leak Testing," Issue 3, dated April 18, 2007, which states that a system calibration "is required before and after each examination and shall be carried out in accordance with Article 10 of ASME Boiler and Pressure Vessel Code Section V (latest edition)." Paragraph IX-1062 of Article 10 of ASME Section V describes system calibration using a response time as detailed above. QSWI-82-04.1, Rev. 2 does not establish a response time in accordance with Paragraph IX-1062 of Article 10 of ASME Section V. Therefore QSWI-82-04.1, Rev. 2 does not meet specification UPD/9801143 to conduct system calibration before and after each test in accordance with Article 10 of ASME Section V.

The NRC inspectors also reviewed operation manual 699909942 for the helium mass spectrometer being used by IMI-US in the conduct of these tests. The manual is available on the equipment manufacturer's website. The manual states, in part, "If a diluted helium mixture is used, the helium signal is diminished proportionally. For example, if a mixture of 10% helium and 90% nitrogen is used, the signal reads 10% of the actual value of the leak, or a decade lower. This may be acceptable in many cases as system leak checking is usually to locate rather than quantify leaks." For the quantification of system leakage, helium concentration must be factored in since the equipment signal output diminishes proportional to the helium concentration. Based on the documents that have been provided to the NRC to date, for tests conducted prior to May 7, 2009, there was a 0.6% helium/air mixture in the hood, meaning the output signal displayed on the mass spectrometer was 0.6% of the actual value. Following May 7, 2009, there was a 5% helium/air mixture in the hood, meaning the output

signal displayed on the mass spectrometer was 5% of the actual. To calculate the actual leak rate, helium concentration must be taken into account.

While onsite, the NRC inspectors held conversations with LES, IMI-US, and ETC about the requirements for the helium leak test. IMI-US stated that the helium leak tests conducted in Europe did not take into account helium concentration, and that IMI-US should not be required to factor helium concentration into their equations. The NRC inspectors learned that IMI-Birmingham (IMI-B) does not factor helium concentration into an equation to determine leakage rate, but they have evaluated that 30-40% helium is inserted into the hood. As described to the NRC inspectors, in the IMI-B test, helium is introduced into the hood, the reading on the detector is noted, and after a predetermined waiting period (20 minutes), if the reading on the detector has increased, the test is unacceptable. If the reading on the detector has remained stable, the test passes. As described to the NRC inspectors, IMI-B is not quantifying a leak rate, but the test is conservative in that if any leakage is measured, the test is unacceptable, and retests are conducted in accordance with ETC specifications and applicable procedures. The revised IMI-US procedure is not similar to the IMI-B procedure since the IMI-US is not a "go/no-go" test and the leak is being quantified.

Based on the information provided to the NRC inspectors to date, the acceptability of the helium leak test results which are being credited for code compliance and to meet critical characteristic 6e of the CGD Plan D-2009-006 is indeterminate. The revised procedure does not meet the specification requirements, and there is not sufficient technical information to determine how the leak rates were calculated, or if the re-calculation of leaks based on a different test method is appropriate and accurate. Based on the test procedure that was written to meet UPD/9801143 and Article 10 of ASME Section V, the design acceptance criteria established in UPD/9801142, and preliminary helium concentration analyses, multiple modules do not meet the design acceptance criteria.

LES NEF failed to provide technical documentation verifying compliance to the design acceptance criteria in the conduct of the required leakage test for IROFS 41 cascade header piping welds identified as a critical characteristic in CGD Plan D-2009-006.

- (5) LES failed to provide key inspection records associated with the verification of critical characteristics for IROFS 41 cascade supports.

The NRC inspectors performed a "vertical slice" review of the Flomel CDG Plan D-2008-044 by selecting a SBM-1001 flomel at random to verify the availability of the required Method 1 and Method 2 documentation for verification of critical characteristics including completed inspection reports and material certifications. Also, as part of the "vertical slice" review of the flomels, the NRC inspectors requested LES NEF to provide receipt inspection documentation for a specific SBM-1001 flomel as required by Acceptance Method 1 of the Flomel CGD Plan D-2008-044. The Cascade CGD Plan D-2009-006 did not use Acceptance Method 1 for verification of critical characteristics.

The Flomel CGD Plan, Section J, "Selection of Critical Characteristics and Acceptance Criteria/Method, Method 1, "Special Tests/Inspections and Standard Receipt Practices," listed "flomel mould number and manufacturing date" as a critical characteristic. The acceptance criteria required that mould numbers and manufacturing dates match those listed in the provided documentation and that a certificate of conformance stating that the flomels were manufactured in accordance with the Voorbij "Quality Plan Flomels" be provided. The test method listed for verification of the critical characteristic was "Receipt Inspection."

As part of the "vertical slice" review, the NRC inspectors requested LES NEF to provide completed inspection documentation performed by Voorbij and its sub-suppliers regarding the verification of critical characteristics for a specific flomel. LES NEF provided the majority of the requested documentation required by the Flomel CGD Plan with the exception of (1) completed centrifuge anchor bolt inspection documentation performed by ENEV, a sub-contractor to Voorbij and (2) completed Voorbij receipt inspection documentation for the steelworks inserts.

Section H, "Engineering Evaluation, Critical Characteristics," of the Flomel CGD Plan credited ENEV anchor bolt inspections for the following critical characteristics related to flomel anchor bolts: (1) centrifuge anchor bolt internal threads, (2) centrifuge anchor bolt outer diameter, (3) and centrifuge anchor bolt shoulder diameter." Specifically, Section H, "Engineering Evaluation, Critical Characteristics," states in part "This critical characteristic was verified by crediting the ENEV anchor bolt inspections." Section H, Engineering Evaluation, Critical Characteristics," of the Flomel CGD Plan also credited receipt inspection of the steelworks insert part number and associated documentation. Specifically, Section H states in part, "The part number must be verified for all steelworks inserts to ensure the correct part is installed. Receipt inspections are performed on each order of inserts which includes verification of documentation. This critical characteristic is verified by the Voorbij receipt inspection of material documentation for the steelworks inserts."

Contrary to the above, LES NEF failed to provide completed inspection documentation for a specific flomel as required by the Flomel CGD Plan. These inspections were required for verification of critical characteristics associated with centrifuge anchor bolts and steelworks inserts to ensure the components were capable of performing their IROFS function.

The NRC inspectors also reviewed the results from independent inspections, methods, and testing performed by LES to provide an additional technical basis for acceptance of SBM components as QL-1. The additional inspections performed by LES are documented in QA-09-0931, "Inspection Report for Flomels for use in SBM 1001." The NRC inspectors determined that in certain instances, QA-09-0931 was incomplete in that the document did not provide sufficient details such as the vendors who performed the independent measurements, M&TE serial numbers and description, and a certificate of calibration. Specific examples include: (1) Section 9.2 failed to provide the name

of the entity (vendor, LES, etc...) that performed the concrete testing as well as a description of the M&TE used including a certificate of calibration, (2) Section 9.2.2 failed to provide name of the technician who performed the testing in Appendix I, name of the entity that performed the testing, description of M&TE used including a certificate of calibration, (3) Section 11 failed to reference the vendor and M&TE used for the steelworks pull tests. As discussed above, LES NEF failed to produce key inspection records associated with the verification of critical characteristics for IROFS 41 cascade supports as required by the LES NEF CGD Plan D-2008-044.

(6) LES failed to meet critical characteristics requirements for IROFS 41 cascade component welds.

Previously, the NRC identified URI 70-3103/2009-002-001, Failure to Implement ASME B31.3 Welding and NDE Requirements Related to IROFS 41. Three of the examples from that URI relate directly to critical characteristics as defined in CGD Plan D-2009-006. For full details of the URI, refer to inspection report 70-3103/2009-002 (ADAMS ML091770643).

Example (a) of URI 70-3103/2009-002-001 relates to the failure of IMI-US to proceduralize progressive radiography sampling requirements of ASME B31.3, Chapter VI, Paragraph 341.3.4. The NRC inspectors also reviewed weld records and identified examples where the radiography sample was not expanded as required by B31.3 when random examination revealed a weld defect for work performed by a welder/welding operator. Critical characteristic 6d of Commercial Grade Dedication Plan D-2009-006 states:

“6d. UF₆ Pipework welds, NDE testing (process control) – Proper welding ensures leak tight integrity of the welds. All weld programs must meet the NDE requirements of ASME B31.3 for service M fluid system. This is verified by a review of the NDE program and to ensure programmatic requirements are met.”

The NRC inspectors reviewed the corrective actions associated with CR-2009-931, CR-2009-970 with Stop Work Order, and CR-2009-3687 and determined that the corrective actions were adequate. Based on the corrective actions taken, progressive sampling by radiography of additional production welds was adequately performed by ETC-Gronau, IMI-Birmingham, and IMI-US, as required by ASME B31.3-2004 Chapter VI paragraph 341.3.4 when a designated lot of random radiography revealed unacceptable welds. Additionally, the quantity of random radiography on a designated lot of production welds was adequately performed by ETC-Gronau, IMI-Birmingham, and IMI-US, as required by ASME B31.3-2004 Chapter VIII paragraph M341.4(b)(1) for Category M Fluid Service. No response is required for this example.

Example (b) of URI 70-3103/2009-002-001 relates to the failure of welders to be qualified to perform manual tack welds as required by ASME B31.3, Chapter V,

Paragraphs 328.5.1(c) and 328.2.1(a). Critical characteristic 6a of Commercial Grade Dedication Plan D-2009-006 states:

“6a. UF₆ Pipework welds, qualification of welders (process control) – Proper welding ensures leak tight integrity of the welds. All welders must be qualified for the applicable welds in accordance with ASME B31.3. This is verified by a review of the welder qualifications.”

The NRC inspectors reviewed the corrective actions associated with CR-2009-947 (including additional radiography of field welds with fused tacks that were not previously selected for random radiography) and determined that the corrective actions were adequate. In addition, IMI-US requalified welders to perform manual tack welding. The NRC inspectors reviewed a sample of four welder performance qualification records (for welders I.D.-No. 008, 013, 018, and 020) and verified compliance with B31.3 and ASME Section IX, including QW-423.2. No response is required for this example.

Example (d) of URI 70-3103/2009-002-001 relates to weld reinforcement height exceeding the maximum allowed by ASME B31.3, Chapter VI, Table 341.3.2. Critical characteristic 6g of Commercial Grade Dedication Plan D-2009-006 states:

“6g. UF₆ Pipework welds (by subcontractors), procedural compliance and documentation (process control) – All UF₆ pipework welds must meet the requirements of B31.3 regardless of who performs the weld. This attribute applies to both subcontractors and ET-D-Gronau. All UF₆ welding must be performed using appropriate procedures and documentation that meets the requirements of B31.3. This attribute is confirmed by verifying that ET-D-Gronau and its subvendors comply with the requirements of ASME B31.3.”

The NRC inspectors reviewed the corrective actions associated with CR-2009-930 and determined that the corrective actions were adequate. Corrective actions included a re-inspection of all welds to ensure compliance with B31.3 maximum height of weld reinforcement. Any welds that exceeded the maximum criteria were repaired. No response is required for this example.

LES NEF failed to meet critical characteristic requirements for IROFS 41 cascade component welds as described in CGD Plan D-2009-006 as evidenced by ASME B31.3 code violations identified by the NRC in April 2009.

b. Conclusions

One Severity Level (SL) IV violation of the LES NEF Quality Assurance Program Description (QAPD) was identified for failure to establish measures in procedures to ensure that applicable requirements were correctly translated into design documents. The licensee failed to establish controls to ensure the selection and suitability of application of materials, parts, equipment and processes associated with the cascade components and supports designated as Items Relied on for Safety (IROFS) 41. This was identified as VIO 70-3103/2009-007-001.

3. Mechanical Components (IP) 88136

a. Scope and Observations:

On December 7-10, 2009, the NRC inspectors conducted an inspection at LES NEF to assess the manufacture and installation of IROFS 41 mechanical components for SBM-1001.

The NRC inspectors reviewed construction documentation (specifications, drawings, and work procedures) to determine whether specific activities associated with QL-1 mechanical components are controlled and performed in accordance with NRC requirements, license commitments, and the approved Quality Assurance (QA) Plan. NRC inspectors conducted direct observation of work performance to determine whether activities associated with receipt inspection; storage, handling, and protection; and equipment installation met applicable NRC requirements. The NRC inspectors reviewed training and qualification records to assess whether personnel performing work on QL-1 mechanical components were qualified to perform their assigned duties.

The NRC inspectors determined that piping and mechanical components (such as pipes, tubes, fittings, flanges, and centrifuges), pipe-supporting fixtures (such as hangers, turnbuckles, anchors, and supports), and structural attachments (such as clamps and straps) were bolted or welded with adequate workmanship in the proper orientations, elevations and locations in accordance with engineering drawings. It was observed that hold points were appropriately assigned, observed and signed-off as acceptable on work directing documents (such as weld travelers). Traceability of said components was adequate in that markings associated with piping and centrifuges were consistent with engineering and installation documents for materials, parts, and components. Bolts were marked after completion of torquing on flanges, component base plates, and structural steel. IMI-US and subcontractor NDE personnel qualifications were randomly reviewed for compliance to ASNT SNT-TC-1A, including continuity of visual acuity.

In addition, the NRC inspectors focused on pressure-retaining welds using a "vertical slice" inspection method to randomly select from various European IMI-Birmingham and ETC-Gronau fabrication welds and IMI-US field welds and verify compliance to ASME B31.3. Documentation traceability for these welds was verified by reviewing applicable records. Documentation records included:

1. Drawings for fabrication and field weld maps,
2. Weld travelers (with pertinent acceptable visual inspection results),
3. Material certifications for base metals and weld filler metals,
4. Welding Procedure Specifications (WPS),
5. Welder Performance Qualifications (WPQ) for unique identification stamp,
6. NDE personnel qualifications,
7. Radiographic films and reports

b. Conclusion

The NRC inspectors verified that construction documentation (specifications, drawings, and work procedures) associated with QL-1 mechanical components were controlled and performed in accordance with NRC requirements, license commitments, and the approved Quality Assurance (QA) Plan. Activities associated with receipt inspection; storage, handling, and protection; and equipment installation met applicable NRC requirements. Training and qualification records of personnel performing work on QL-1 mechanical components were qualified to perform their assigned duties. No findings of significance were identified.

4. **Follow-up of Previously Identified Items**

Follow-up of VIO 70-3103/2009-001-001

The NRC inspectors reviewed licensee activities to restore compliance with NRC regulations, for VIO 70-3103/2009-001-001, Four Examples of Failure to Correct Conditions Adverse to Quality Related QL-1.

The NRC inspectors reviewed CR-2009-0478 and CR-2009-0373 and the prescribed corrective actions. Licensee corrective actions included a revision to RM-3-2000-01, conducting training classes on how to validate quality records before submitting for storage to the records management department and the generation of a self assessment report submitted in CR-2009-0357. Proper accreditation of site contractors providing concrete was obtained. With regards to ensuring that workers do not improperly disconnect power to concrete curing boxes, a bulletin was distributed at an All-Hands Meeting and additional information was incorporated into General Employee Training.

The NRC inspectors also reviewed the licensee's reply to the violation and determined that the licensee had appropriately restored compliance with NRC regulations and the conditions of their license. Based on this review the violation is closed.

Follow-up of VIO 70-3103/2009-006-001

The NRC inspectors reviewed licensee activities to restore compliance with NRC regulations, for VIO 70-3103/2009-006-001, Failure to Perform Site Audits.

Licensee corrective actions included the performance and documentation of Records Management Audit 2009-A-08-054 and Startup Test Program Audit 2009-A-09-059 as well as the generation of a Quality Assurance surveillance report 2009-S-10-268 discussing the performance of internal audits for 2009. LES NEF procedure QA-3-2000-01, Quality Assurance Audit, was revised to reflect required audits and scheduling including additional responsibilities for QA supervision.

The NRC inspectors also reviewed the licensee's reply to the violation and determined that the licensee had appropriately restored compliance with NRC regulations and the conditions of their license. Based on this review the violation is closed.

Follow-up of VIO 70-3103/2009-006-002

The NRC inspectors reviewed licensee activities to restore compliance with NRC regulations, for VIO 70-3103/2009-006-002, Failure to Control Design Change Activities.

The NRC inspectors reviewed the evaluations for CR-2009-2961 and the prescribed corrective actions. The NRC inspectors determined that the corrective actions were adequate. Licensee corrective actions included additional communications to management regarding the change management process. In addition, a desktop guideline on how to verify documents being put into the electronic document control system, RM-4-3000-09, was issued and document control staff received training on that procedure. Additional training was provided to document control staff on updates to various document control procedures. The document control system software program was also updated, and staff received training on those updates. A self-assessment of the document control process showed that errors were significantly reduced as a result of actions taken by the licensee. The NRC inspectors also reviewed the commercial grade dedication plans and procedures.

The NRC inspectors also reviewed the licensee's reply to the violation and determined that the licensee had appropriately restored compliance with NRC regulations and the conditions of their license. Based on this review the violation is closed.

Follow-up of URI 70-3103/2009-002-001

Previously, the NRC identified URI 70-3103/2009-002-001, Failure to Implement ASME B31.3 Welding and Nondestructive Examination Requirements Related to IROFS 41. The examples from that URI relate directly to critical characteristics and/or technical requirements as defined in CGD Plan D-2009-006. The NRC inspectors determined that all of the examples previously identified in URI 70-3103/2009-002-001 were valid examples of non-compliance to Section 3.0 of the LES NEF QAPD and have been incorporated and closed to VIO 70-3103/2009-007-001.

5. Exit Meeting

The preliminary inspection results were presented to the licensee on December 10, 2009. The NRC inspectors described the areas inspected and discussed the inspection results in detail with licensee staff. The formal exit meeting was held on January 14, 2010. The licensee was receptive to the preliminary findings discussed. Although proprietary documents were reviewed during this inspection, the proprietary nature of these documents was not included in this report.

SUPPLEMENTAL INFORMATION

1. List of Persons Contacted

Louisiana Energy Services, L. L. C., National Enrichment Facility (LES NEF):

M. Brown, CGD Manager
W. Dotson, Licensing Manager
P. McCasland, Licensing Engineer
J. Gearhardt, Quality Assurance Consultant
M. Boden, Core/Non-Core Equipment Director
E. Ontiveros, Field Installation
G. Johnson, QC Receipt Inspection
S. Miltonberger, Engineering Manager
R. Cogar, Information Services Manager
G. Sergent, QA Manager
G. Schultz, Engineering Manager
J. Wisniewski, Procurement Director

MPR Associates:

B. Keating, Engineering Consultant
J. Simons, Engineering Consultant
B. Frazier, Engineering Consultant

IMI-US

J. Lloyd, QA Manager

2. Inspection Procedures Used

IP 88108 Commercial Grade Item Dedication Process
IP 88136 Mechanical Components

3. List of Items Opened, Closed, and Discussed

VIO 70-3103/2009-001-001	Closed	VIO: Failure to Correct Conditions Adverse to Quality (Section 2.0)
VIO 70-3103/2009-006-001	Closed	VIO: Failure to Perform Site Audits (Section 2.0)
VIO 70-3103/2009-006-002	Closed	VIO: Failure to Control Design Change Activities (Section 2.0)
URI 70-3103/2009-002-001	Closed	URI: Failure to Implement ASME B31.3 Welding and Nondestructive Examination (Section 2.0 & 3.0)
VIO 70-3103/2009-007-001	Opened	VIO: Failure to Meet Design

4. List of Acronyms Used

ACI	American Concrete Institute
AWS	American Welding Society
ADAMS	Agency-Wide Document Access and Management System
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASNT	American Society of Nondestructive Testing
ASTM	American Society for Testing of Materials
CFR	Code of Federal Regulations
CGD	Commercial Grade Dedication
CMTR	Certified Material Test Report
ETC	Enrichment Technology Corporation
IP	Inspection Procedure
IROFS	Item Relied on for Safety
LAR	License Amendment Request
LES NEF	Louisiana Energy Services, L. L. C., National Enrichment Facility
M&TE	Measuring and Test Equipment
NDE	Non-destructive Examination
NOV	Notice of Violation
NRC	Nuclear Regulatory Commission
PQR	Procedure Qualification Record
QA	Quality Assurance
QAPD	Quality Assurance Program Description
QL	Quality Level
RII	Region 2
SL	Severity Level
URI	Unresolved Item
SBM	Separations Building Module
SNM	Source and/or Special Nuclear Materials
VIO	Violation
WPS	Welding Procedure Specification

5. Records and Documents ReviewedProcedures

LES EG-3-2100-05, "Commercial Grade Dedication Process,"
 LES EG-3-3100-04-F-1, "QA Level Requirements Determination for Cascade Hall
 Components, Revision 4
 QSWI-82-03.5, "Cascade Sensitive Leak Test," Revision 0
 QSWI-82-04.1, "Sensitive Leak Testing of Header Pipework Modules," Revision 1 & 2
 LES EG-3-6000-24, "Grouting of Flomels," Revision 0
 LES EG-3-6000-03, "Concrete and Grout Placement," Revision 3
 LES EG-3-6000-25, "Concrete Infill of Flomels," Revision 0

Enrichment Technology ETC-WI-98, "Key Attributes", Issue 2

Enrichment Technology ETC-WI-134, "Control of ETC Commercial Grade Dedication Procedures," Issue 1
 Enrichment Technology ETC-WI-131, "Technical Controlling Reporting to CTG"
 Enrichment Technology ETC4023957, "Flomel Manufacture"

Engineering Documents, Calculations, Specifications and Plans

Dedication No. D2008-044, Revision 3 (Flomel CGD Plan)
 Dedication No. D2009-006, Revision 2 (Cascade CGD Plan)
 LES EG-DCR-2009-040
 LES EG-DCR-2009-064
 LES EG-DCR-2009-0171
 LES Cascade Supply Agreement
 UPD/9801072, "Functional Specification Flomels," Revision 7, 11/08/07
 UPD/9801109, "Specification for the Manufacture and Delivery of Flomel Anchor Bolts",
 Revision 5, 02/26/07
 UPD/9801142, "Fabrication and Welding of Aluminum, Stainless Steel, Austenitic Alloys
 and Monel Piping/Components for UF₆ and Vacuum Service," Revision 5, 05/6/08
 UPD/9801143, Helium Leak Test, Revision 3, 04/18/07
 LES EG-EVAL-01, "Evaluation of SBM1001 Flomels for Acceptance as QL-1," Revision
 1
 Areva Engineering Information Record, 51-9044023-002, "Americanization of NEF Areva
 Engineering Information Record 51-9044003-002, "Americanization of LES NEF
 Flomel Units Functional Specification UPD/9801072, dated January 09, 2008
 QPS/SK/09/019 Issue 1, Agreement on Key Attributes for the NEF Cascade Header
 Pipework and Upper Steelwork
 QPS/Kar/09/003, Issue 1, Agreement on Key Attributes for TC 12 Centrifuges
 ETC4048261, Issue 1, "Static & Dynamic Design of NEF-CS for Operation & DBE Loads
 – Basics for Design"
 ETC4054564, Issue 1, "Static & Dynamic Design of NEF-CS for Operation & DBE Loads
 – Analysis of Connections of Steelworks and Special Points"
 ETC4054545, Issue 1, "Data for Pre-Stressing of Bolts"
 ETC4023957, Issue 1, "Flomel Manufacture"
 CC-EG-2008-0086, Revision 0, "Seismic Designed UF₆ Process Systems and SBM QA
 Downgrade"
 CC-EG-2008-0139, Revision 1, "SBM IROFS Redesignation"
 MPR 3131, Revision 1

Field/Construction Records

Quality Inspection Services Concrete Field Observation Report Mix # 4000-F4
 Quality Inspection Services Report of Compression Test Results, "Building 1001 Mini
 Hall #1, 1st Floor flomel infill between Row #1 and Row #8, Cast Date 10/16/2008, Lab
 ID 10691, 10692, 10693, 1769B, 1770B, 1771B1, 1771B2
 Washington Group International Commercial Grade Dedication Plan CGDP Number
 28683-28 R/1, "Ready Mix Concrete", 4/5/08
 Washington Group International Work Plan Index, 1001-RUST-MH1-Flomels-004,
 "Flomel Installation and Infill Floors/Coatings"
 Washington Group International Receipt Inspection Report, PO Number 29275-01-PO-
 10184, "Date Received 07-01-08"
 BWS Blankstahl Centrifuge Anchor Bolt Material Certification

Voorbij Concrete Strength Test Report, March 18, 2008

Quality Assurance Audits, Surveillances, and Surveys

LES Audit Report LES-ETUK-2007-001
 LES Audit Report LES-ETUK-2007-002
 LES Audit Report LES-ETUK-2007-003
 LES Audit Report LESEYTC-DE-NL-2007-002
 LES QA Audit Report 2008-877-EXT-AUD, "ET-US Program Audit"
 LES QA Audit Report 2008-2876-EXT-AUD, "ET-Almelo/Gronau/Julich"
 LES QA Audit Report 2009-A-04-025, "Audit of IMI-US"
 LES QA Audit Report 2009-A-03-016, "Audit of ETC-Julich"
 LES QA Audit Report 2009-A-03-017, "Audit of ETC-Almelo/Julich"
 LES QA Audit Report 2009-A-03-019, "Audit of ETC-Gronau"
 LES QA Audit Report 2009-A-04-027, "Audit of ET-US"
 LES Surveillance Report 2007-029, "ETUK Software Controls"
 LES Surveillance Report 2008-2880-EXT-SURV, "Surveillance of Tech Controlling"
 LES Surveillance Report 2008-2516-EXT-SURV, "Voorbij Prefab Beton B.V. Siciliweg
 61 1045 AX Amsterdam Netherlands"
 LES Surveillance Report 2009-S-03-022, "Surveillance of Flomel Manufacture at Voorbij"
 LES Surveillance Report 2009-S-04-057, "Surveillance of IMI Birmingham"
 LES Surveillance Report 2009-S-06-140, "Surveillance of Flomel Receipt Inspection"
 LES Surveillance Report 2009-S-07-153 and 153, Revision 1, "Surveillance of IMI
 Pipework Installation"
 LES Surveillance Report 2009-S-07-164, "Surveillance of Helium Leak Test"
 LES Surveillance Report 2009-S-08-182, "Surveillance of ET-US Leak Testing"
 LES Surveillance Report 2009-S-07-184, "ETC Documentation and Vendor
 Management"
 LES Surveillance Report 2009-S-08-180, "IMI Pipework Welding"
 LES Surveillance Report 2009-S-08-192, "Surveillance of Upper Steel Turnbuckles"
 LES Surveillance Report 2009-S-09-216, "Review of Flomel Documentation Packages"
 LES Surveillance Report 2009-S-09-219, "May-Lachnicht Welding"
 LES Surveillance Report 2009-S-09-233, "IMI QA Inspector Training"
 LES Surveillance Report 2009-S-09-236, "Helium Leak Test"
 LES Surveillance Report 2009-S-09-241, "Cascade 1 Centrifuge Placement"
 LES Surveillance Report 2009-S-11-274, "IMI-US Critical Characteristics Verification"
 LES Surveillance Report 2009-S-11-278, "Centrifuge Mechanical Installation"
 LES Surveillance Report 2009-S-11-294, "ETC Handover Package and Documentation"
 Surveillance TC 2009-063
 Surveillance TC 2009-067
 Surveillance TC 2009-070
 Surveillance TC 2009-071
 LES Commercial Survey Report GQA/LES/Voorbij/5-8-2009
 LES QA-09-0931, "Inspection Report of Flomels for use in SBM1001," Revision 0

Condition Reports

CR-2009-0357
 CR-2009-0373
 CR-2009-0478

CR-2009-0813
CR-2009-0930
CR-2009-0931
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CR-2009-4072

Drawings

1UC111119-5, "Flomel Type A General Arrangement System B 52 Separation Plant"
OUC111120-4, "Flomel Type A Reinforcement Arrangement System 52 Separation Plant"
1UC111124-5, "Flomel Type B Combined Arrangement System 852 Separation Plant"
1UC111121-5, "Flomel Type A Combined Arrangement System 852 Separation Plant"
1UC111122-4, "Flomel Type B General Arrangement System 852 Separation Plant"
OUC111123-4, "Flomel Type B Reinforcement Arrangement System 852 Separation Plant"