



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
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April 24, 2008

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

SUBJECT: NRC INSPECTION REPORT NO. 70-3103/2008-001

Dear Mr. Smith:

During the period from January 1 through March 31, 2008, the U.S. Nuclear Regulatory Commission (NRC) conducted inspections associated with the construction activities of the Louisiana Energy Services gas centrifuge facility. The purpose of the inspections was to evaluate Quality Assurance Program implementation and construction activities. The enclosed inspection report, which documents the inspection results, was discussed with you and other members of your staff on January 25, February 25, and March 26, 2008.

These routine, announced inspections were an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspections consisted of examinations of selected calculations, drawings, procedures, and interviews with personnel. Based on the results of these inspections, no findings of significance or violations of regulatory requirements were identified.

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 us.

Sincerely,

**/RA/**

Deborah A. Seymour, Chief  
Construction Projects Branch 1  
Division of Construction Projects

Docket No. 70-3103

License No. SNM-2010

Enclosure: NRC Inspection Report 70-3103/2008-001  
w/attachments

cc: w/encl: (See next page)

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Letter to Gregory Smith from Deborah A. Seymour dated April 24, 2008

SUBJECT: NRC INSPECTION REPORT NO. 70-3103/2008-001

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PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION  
REGION II

Docket: 70-3103

License: SNM-2010

Report: 70-3103/2007-004

Licensee: Louisiana Energy Services, L.P.

Location: Louisiana Energy Services, L.P. National Enrichment Facility  
Eunice, New Mexico  
  
Consolidated Power Supply, Trussville, Alabama

Inspection Dates: January 14-18, 2008  
February 25-28, 2008  
March 17-19, 2008

Inspectors: Joseph I. Tapia, P.E., Senior Construction Inspector, Construction  
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Approved: Deborah A. Seymour, Chief  
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Division of Construction Projects

Enclosure

## EXECUTIVE SUMMARY

Louisiana Energy Services, L.P., National Enrichment Facility (LES NEF)  
NRC Inspection Report 70-3103/2008-001

This report covers a three-month period of announced inspections by regional inspectors at LES NEF. The inspections involved the observation and evaluation of selected aspects of the licensee's quality assurance (QA) construction activities. During this inspection period the following inspections were performed: on January 14-18, 2008, an inspection was performed on structural concrete activities and structural steel and support activities; on February 25-28, 2008, an inspection was performed in the areas of program development and implementation, control of materials, equipment and services, inspection test control, control of measuring equipment, problem identification, problem resolution, corrective action, Title 10 Part 21 of the Code of Federal Regulations (10 CFR 21), facility construction, and control of electronic management of data; and on March 17-19, 2008, a vendor oversight inspection was performed on LES NEF's contractor, Washington Group International, in Trussville, Alabama.

### **Quality Assurance: Program Development and Implementation (Pre-licensing and Construction)**

The licensee was properly implementing the Quality Assurance Program Description (QAPD) requirements related to qualification and certification of inspection and test personnel (Section 2).

### **Quality Assurance: Control of Materials, Equipment and Services (Pre-licensing and Construction)**

The licensee's approved procedures adequately implemented the QAPD requirements with regard to the procurement process (Section 3).

### **Quality Assurance: Inspection, Test Control & Control of Measuring Equipment (Pre-licensing and Construction)**

Ongoing work and oversight activities related to inspection, test control, and control of measuring equipment, were performed in accordance with the project procedures and specifications. The records demonstrated proper implementation of the QA program. No items of safety significance were identified (Section 4).

### **Quality Assurance: Problem Identification, Resolution, and Corrective Action**

LES NEF implemented their corrective action program in accordance with its license requirements. Issues previously identified by the licensee's internal assessments were appropriately addressed (Section 5).

### **10 CFR Part 21, Inspection-Facility Construction**

The licensee properly implemented the QAPD requirements related to 10 CFR Part 21, "Reporting of Defects and Noncompliance (Section 6).

**Control of Electronic Management of Data**

Procedures for receipt, retrieval, and disposition of QA records were adequate. LES NEF adequately addressed issues in the condition reports and took appropriate corrective actions (Section 7).

**Structural Concrete Activities**

Geotechnical specifications and procedures were adequately and properly implemented in the field. Field and laboratory testing activities were consistent with technical requirements. Records associated with these activities were properly maintained in accordance with project procedures. Quality oversight of observed activities was effective and in conformance with licensee commitments (Section 9.a).

Ongoing work and oversight activities related to structural concrete work were performed in accordance with the project procedures and specifications. The structural concrete records reviewed demonstrated appropriate implementation of the QA program. No items of safety significance were identified (Section 9.b).

**Structural Steel and Support Activities**

The licensee's structural steel installation activities did not appear to conform to the specified turn-of-the-nut method. Additional review is required to ascertain conformance (Section 10).

**Attachment:**

Persons Contacted

Inspection Procedures

List of Items, Opened, Closed and Discussed

List of Acronyms Used

List of Documents Reviewed



## REPORT DETAILS

### 1.0 **Summary of Site Activities**

The licensee continued to perform ongoing geotechnical, concrete and structural steel activities at the LES NEF site.

### 2.0 **Quality Assurance: Program Development and Implementation (Pre-licensing and Construction) (Inspection Procedure (IP) 88106)**

#### a. Scope and Observations

The inspectors reviewed implementing procedures for training to verify they were in accordance with Section 2 of the licensee's Quality Assurance Program Description (QAPD) and Section 1 of Washington Group International (WGI) Nuclear Quality System Manual (NQSM). The inspectors specifically verified inspection and test personnel were qualified and had certifications on file in accordance with the QAPD requirements.

WGI was the organization responsible for inspection and test personnel. Procedure Project Specific (PSP) 04.01, Revision 0, "Indoctrination and Training Requirements," described the requirements and methods for project specific indoctrination and training for personnel performing quality-affecting work. The inspectors reviewed WGI Procedure PSP 2.3, Revision 4, "Qualification/Certification of Inspection and Test Personnel," which described the minimum requirements for qualification and certification of inspection and test personnel. This procedure also described the minimum levels of capability for each project function, the discipline certification categories, and a method for determining how prior experience would be credited. The inspectors evaluated a sample of personnel training records for WGI individuals authorized to perform tests and inspections to verify personnel were adequately certified and their records were current and periodically reevaluated. No significant issues were identified.

#### b. Conclusion

LES NEF was properly implementing the QAPD requirements related to qualification and certification of inspection and test personnel.

### 3.0 **Quality Assurance: Control of Materials, Equipment, and Services (Pre-licensing and Construction) (IP 88108)**

#### a. Scope and Observations

The inspectors reviewed procurement implementing procedures to determine whether they were in accordance with Section 1, Section 4, Section 7, and Section 8 of the licensee's QAPD. The inspectors' review of procedures and records focused on verifying whether the licensee's program requirements were consistent with the QAPD and regulatory requirements of American Society of Mechanical Engineers (ASME) NQA-1-1994, "Quality Assurance Program Requirements for Nuclear Facilities," including supplements as revised by the ASME NQA-1a-1995 Addenda.

The inspectors specifically verified that Procedure PR-3-2000-01, Revision 0, "LES Control of Procurement," and PR-3-2000-02, Revision 0, "Purchase Requisitions," adequately contained provisions for identifying responsibilities, for procurement documents content, and for supporting documents such as identification of test, inspection, and acceptance requirements. The inspectors verified that these procedures also contained guidance related to suppliers and that such guidance included provisions for suppliers to incorporate an appropriate quality assurance program. The inspectors noted that the licensee's implementing procedures contained guidance on purchaser's requirements for reporting non-conformances, identification of appropriate spare and replacement parts, procurement planning, procurement document changes, and procurement document control.

The inspectors reviewed procedural requirements for using and evaluating commercial grade items. The inspectors specifically reviewed Procedure EG-101-104, Revision 3, "Commercial Grade Dedication Process." Specifically, the inspectors reviewed the procurement package for purchasing reinforcing steel and steel and compared the package to the requirements in the QAPD. WGI was the organization responsible for procuring these two materials. The inspectors reviewed WGI Procedure PSP 09.01, Revision 2E1, "Procurement," which provided guidance regarding the procurement process, and Procedure PSP 09.04, Revision 3, "Commercial Grade Dedication," to verify whether the licensee's contractor's procedures adequately controlled the procurement of Quality Level 1 (QL-1) material, equipment, and services.

The inspectors noted minor inconsistencies in Procedure PR-3-2000-02, "Purchase Requisitions," involving identification of spare and replacement parts. As a result, the licensee issued condition report (CR) 2008-356 to take corrective actions, including revision of the procedure.

The inspectors noted that the licensee had identified issues with bent reinforcing steel supplied by one of its subcontractors and reinforcing steel installed in embed plates from another subcontractor. Preliminary findings indicated that the reinforcing steel in both instances did not meet the 318 and 349 American Concrete Institute specifications for minimum bend diameter. From discussions with the licensee, the inspectors noted that an undetermined amount of non-conforming reinforcing steel had been installed in the Separations Buildings Module 1001 building, a QL-1 structure. The licensee had determined that the embed plates had not been installed in a QL-1 structure. WGI generated non-conformance reports (NCRs) 102 and 108 on February 15, 2008, and the licensee generated a corrective action request CR-2008-268 on February 19, 2008, for these issues. LES NEF review of this issue was ongoing. The Nuclear Regulatory Commission (NRC) follow-up to this item will be tracked as Unresolved Item (URI) 07003103/2008-001-001, Reinforcing Steel Minimum Bend Diameter Issue.

b. Conclusion

The licensee's approved procedures adequately implemented the QAPD requirements with regard to the procurement process.

#### **4.0 Quality Assurance: Inspection, Test Control and Control of Measuring Equipment (Pre-licensing and Construction) (IP 88109)**

##### **a. Scope and Observations**

The inspectors reviewed the licensee's implementing procedures pertaining to this area to determine whether they were in accordance with the licensee's QAPD. The inspectors noted that the licensee was still developing procedures for inspection test control and control of measuring equipment.

The inspectors noted that the licensee used WGI procedures to comply with the licensee's QAPD. The procedures used by the licensee were PSP 12.02, "Conduct and Control of Inspection and Surveillance Activities," PSP 12.01, "Inspection and Surveillance Planning," and PSP 14.01, "Control and Use of Measuring and Test Equipment." These procedures were reviewed during past inspections. The inspection included site tour observations of ongoing work activities and discussions with workers to verify that material was tested, inspected, controlled, handled, and stored properly and that activities were accomplished in accordance with design specifications, drawings, and procedures.

##### **b. Conclusion**

Ongoing work and oversight activities related to inspection, test control, and control of measuring equipment, were performed in accordance with the project procedures and specifications. The records demonstrated proper implementation of the QA program. No items of safety significance were identified.

#### **5.0 Quality Assurance: Problem Identification, Resolution, and Corrective Action (IP88110)**

##### **a. Scope and Observations**

The inspectors reviewed Procedure CA-101, Revision 4, "Corrective Action Program," and determined that it adequately contained provisions for identifying, documenting, and correcting conditions adverse to quality (CAQ). The inspectors noted that the licensee had an appropriate threshold for identifying and documenting CAQ that included nonconforming items and procedure noncompliances.

The procedure also provided guidance on screening condition reports as significant CAQ requiring root cause and corrective actions to prevent recurrence (Level 1), CAQ requiring common cause and corrective actions to correct the condition (Level 2), CAQ requiring correcting and/or trending (Level 3), or non-CAQs (Level 4). The inspectors observed selected screening committee meetings and noted that condition reports were properly screened for significance. The inspectors also reviewed a sample of condition reports screened as Level 2 and verified that causes were determined and the appropriate corrective actions were taken to correct the conditions.

The inspectors noted that the licensee evaluated significant CAQ to determine if stopping work was warranted as required by Procedure AD-201, "Stop Work." The

inspectors also verified that Procedure CA-101 required a root cause investigation be conducted for CAQ and actions taken to preclude recurrence.

The inspectors noted that the licensee's QA program performed periodic assessments of follow-up actions by the corrective action program to verify implementation. An independent assessment performed by the licensee in September 2007, identified that Procedure CA-101 did not include requirements for management to take follow-up action to verify implementation of corrective actions to address significant conditions adverse to quality (SCAQs). The inspectors verified that Procedure CA-101 was subsequently revised to require that the effectiveness reviews be performed. The inspectors also reviewed the one SCAQ that had been completed and verified that an adequate effectiveness review was performed.

The licensee's independent assessment also identified that adequate trending activities were not performed and that an excessive number of corrective actions were not closed by their original scheduled due date. The inspectors reviewed the licensee's first six-month trend report issued in February 2008, which documented that adverse trends were identified, indicating that the condition report screening report system continued to mature. The inspectors also reviewed the most recent status of corrective actions that were extended and noted that the number of extended and overdue corrective actions were trending down. The inspectors also noted that the numbers of overdue items was minimal.

b. Conclusion

The licensee was implementing its corrective action program in accordance with its license requirements. Issues previously identified by the licensee's internal assessments were appropriately addressed.

**6.0 10 CFR Part 21, Inspection – Facility Construction (IP 88111)**

a. Scope and Observations

The inspectors reviewed Section 16, "Corrective Action," of the licensee's QAPD, Section 15, "Control of Nonconforming Items," and Section 4, "Procurement Document Control," of WGI's Project Quality Assurance Plan (PQAD), and LS-3-1001-01, "Implementation of 10 CFR 21." The associated implementing procedures for each section of LES NEF's QAPD and WGI's PQAD were reviewed to verify that the requirements of 10 CFR Part 21 were properly implemented. The licensee had revised the screening form to better define when a component was accepted at the site and, if not, ensuring that the supplier reported the defect if required.

From discussions with the licensee, the inspectors determined that the licensee was initiating a Part 21 evaluation concerning the installation of non-conforming reinforcing steel and embed plates (see Section 3 of this inspection report). The inspectors toured the areas where the non-conforming steel and embed plates were quarantined and observed that the posting and segregation was adequate. The inspectors also witnessed testing of the nonconforming embed plates and verified storage

and segregation of the non-conforming reinforcing steel in those areas. Some of the embed plates were conditionally released for measurement purposes. No issues of significance were identified.

b. Conclusion

The licensee properly implemented the QAPD requirements related to 10 CFR Part 21, "Reporting of Defects and Noncompliance."

**7.0 Control of the Electronic Management of Data (IP 88113)**

a. Scope and Observations

The inspectors reviewed implementing procedures for QA records to verify they were in accordance with Section 17 of the licensee's QAPD. The inspectors also reviewed the record management program described in Section 17 of the WGI's NQSM. The inspectors focused on records pertaining to receiving, retrieving, and dispositioning of QA records, and followed up on issues identified during past inspections.

The inspectors reviewed the applicable QA implementing procedures for LES NEF and WGI. LES Procedure RM-3-2000-01, Revision 0, "Records Management Program," defines the requirements and processes for managing records including generation, approval, receipt, transmittal, retention, storage, retrieval, and disposition of records. WGI Procedure PSP 17.01, Revision 0E1, "Quality Assurance Records," described the method for document storage, indexing, and the conversion process to a quality record. This procedure also described the requirements for transmitting Quality Records to the customer. Additionally, the inspectors reviewed access controls to records, and observed how records were stored, received, and retrieved. No significant issues were identified.

The inspectors followed up on issues from the previous QA inspection. Condition Report, CR 07-0273, documented an issue where WGI's document storage and retrieval may not have been in accordance with NQA-1 requirements. NQA-1, Criterion 17, requires in part, that documents shall be considered valid records only if validated by the authorized personnel or otherwise authenticated.

During a previous inspection, inspectors observed that completed documents were stored in non-rated metal cabinets in WGI trailers, and expressed a concern for the potential loss of the documents in the event of a fire. LES NEF evaluated this issue and determined that they were in compliance with the NQA-1 requirements because the documents were not considered quality records until they were validated. During this inspection, LES NEF was developing a plan and schedule to start transitioning and validating completed documents to quality documents.

CR 07-0274 documented an issue where an information technology technician was observed backing up documentum without an approved procedure. Procedure IT-3-2000-07, Revision 0, "System Data Backup," was written to address this deficiency. The inspectors reviewed the procedure and determined that the corrective actions were adequate.

b. Conclusion

Procedures for receipt, retrieval, and disposition of QA records were adequate. LES NEF adequately addressed issues in the condition reports and took appropriate corrective actions.

**8.0 Supplier/Vendor Inspection (Construction Phase) (IP 88115)**

On March 17-19, 2008 NRC inspectors observed WGI's surveillance of Consolidated Power Supply's (CPS) activities. WGI is LES NEF's construction contractor; CPS is located in Trussville, Alabama. CPS and its subcontractors supply reinforcing steel to the LES NEF construction project. During this surveillance, WGI followed up on issues they identified in their surveillance of CPS conducted on February 19-20, 2008. The issues concerned nonconforming Type 7 U reinforcing steel supplied to LES NEF by CPS. WGI was verifying that CPS had identified and implemented appropriate corrective actions for this issue.

The inspectors reviewed and discussed, with the WGI auditor (a member of WGI's QA organization), the surveillance plan, scope, overall surveillance objectives, and information on the previously identified deficiencies. The inspectors noted that a LES NEF qualified lead auditor was auditing WGI's surveillance. Because LES NEF has not completed their review of the nonconforming reinforcing steel issue (see Section 3 of this inspection report), the results of this NRC vendor oversight inspection will be detailed in the next NRC quarterly inspection report. URI 07003103/2008-001-001, Reinforcing Steel Minimum Bend Diameter Issue, was identified to follow-up on this issue.

**9. Structural Concrete Activities (IP 88132)**

a. Foundation Activities

1. Inspection Scope

This inspection focused on the licensee's implementation of QL-1 backfill activities to verify that the activities were accomplished in accordance with design specifications, drawings, and procedures. Backfilling and compaction of material for the base mat of the Cylinder Receipt and Dispatch Building (CRDB) was ongoing during this inspection. The inspection included direct observation of ongoing backfill and compaction activities, and soil testing to verify that the required density was achieved. In addition to the observations, the inspectors also held discussions with personnel performing the backfill, compaction and testing activities.

The inspectors reviewed the requirements and hold points delineated in the applicable work instruction: Work Plan 1100-1/39-CI-006, "Site Excavation and Backfill – Building 1100/1200 CRDB." This work plan referenced, PSP 11.05, Revision 1, "Soil Inspection and Testing," and Specification 114489-S-S-02300, Revision 6, "Clearing, Grading, and Earthwork Material, Construction and Testing." These documents were also reviewed by the inspectors to determine the technical requirements associated with the observed activities.

The observation of backfill placement and compaction activities for the CRDB foundation confirmed that work plan instructions and related procedures were followed. The inspectors also observed Quality Inspection Services Inc. (QISI) personnel conducting sand cone and nuclear density tests in conjunction with WGI Quality Control inspector surveillance activities. The records for modified proctor and sand cone test results for the most recent soil placements were reviewed to verify that compaction density requirements contained in the specification were achieved and properly documented. Calibration of equipment, qualification of test personnel, and records retention were also assessed during the inspection.

During the review of documentation associated with geotechnical activities, the inspectors determined that concrete was used in lieu of soil backfill in selected areas of the Separations Building Module (SBM). While the use of the concrete was properly authorized in an Engineering & Design Coordination Report (E&DCR C-0168), the confirmatory analysis to ensure that the seismic design of the building was not negatively impacted was not completed. Inspection Follow-up Item (IFI) 70-3103/2008-001-002, Review of Soil Structure Interaction Analysis Related to Use of Concrete in Lieu of Backfill, was identified to review and verify the adequacy of calculations related to the use of concrete in lieu of soil backfill. No items of safety significance were identified.

## 2. Conclusion

Geotechnical specifications and procedures were adequately and properly implemented in the field. Field and laboratory testing activities were consistent with technical requirements. Records associated with these activities were properly maintained in accordance with project procedures. Quality oversight of observed activities was effective and in conformance with licensee commitments.

### b. Concrete Activities

#### 1. Inspection Scope

The inspectors evaluated the adequacy of the ongoing QL-1 concrete activities conducted by LES NEF, WGI, and relevant sub-contractors. The inspection of these activities focused on reinforcing steel installation, preplacement preparation, materials testing, and a review of preplacement procedures.

Nuclear Technology Solutions (NTS), Project Specifications, 114489-S-S-03312-4, Revision 4, "Placing Concrete and Reinforcing Steel," and 114489-S-S-03310-3, Revision 3, "Mixing and Delivering of Concrete," were reviewed for adequacy. These specification requirements were delineated in WGI PSP 11.03, Revision 0, "Concrete and Grout Placement," dated December 17, 2007, and PSP 11.08, Revision 1, "Concrete Batch Plant Inspection and Testing," dated June 19, 2007. Both procedures were also reviewed by the inspectors.

The inspectors observed two concrete placements in the SBM during the inspection: the first lift of wall 13 along grid line F, and wall 22 along grid line 5.8. The work and testing activities related to these placements were evaluated for adequacy of implementation

through direct inspection of both concrete placements. Specific implementing requirements were contained in WGI Work Plan Documentation 1001-Rust-001, Revision 4, dated December 27, 2007. The inspectors observed preplacement testing of concrete (slump, air content, density, and temperature), formwork cleanliness and alignment, and reinforcing steel installation related to both placements. The QC staff was observed conducting surveillances of concrete activities as required by the QA program.

Concrete cylinder compression test results for the most recent 28-day old concrete placement were reviewed by the inspectors. These tests were for the third lift of the SBM wall located along grid line A. The concrete mix used in this placement (4000F-1) had a specified required strength of 4000 pounds per square inch (psi). One 7-day old test was conducted and resulted in 4850 psi. Two 28-day old tests resulted in 6700 and 6650 psi, well above the required strength.

During the inspection of installed reinforcing steel, the inspectors noted the use of mechanical couplers in lieu of traditional lap splices. The WGI Daily Inspection Log (DIL) PD/12-14-07/01, "Receipt Inspection Report for Threaded Grip-Twist Bar Splice Couplers," was reviewed to confirm that the proper Certificate of Compliance and testing certification for qualification were provided. The mechanical splices were used in areas where the development length of splices was not feasible due to reinforcing steel congestion and where temporary openings were required.

Nonconformance Reports (NCR) related to structural concrete were reviewed to verify the proper documentation and resolution of problems. The dispositions of the NCRs reviewed by the inspectors were adequately resolved in a timely manner by the licensee.

## 2. Conclusion

Ongoing work and oversight activities related to structural concrete work were performed in accordance with the project procedures and specifications. The records reviewed demonstrated proper implementation of the QA program related to structural concrete. No items of safety significance were identified.

## 10.0 **Structural Steel and Support Activities (IP 88133)**

### a. Inspection Scope

The installation of structural steel roof trusses for the SBM was observed during this inspection. Each truss was composed of three sections that were assembled on the ground using splice plates and the American Standard of Testing and Material (ASTM) A325 high strength bolts. The bolts were tightened with the turn-of-the-nut method in accordance with WGI Work Plan No. 1001-HSG-001, "Structural Steel Erection for Mini Hall 1 Building 1001 Cascade Halls 1 & 2," and with Procedure PSP 11.04, Revision 0, "Erection of Structural Steel and Miscellaneous Steel." Section 3.3 of the procedure required that field connections use fully pre-tensioned high-strength bolts installed in accordance with NTS Specification 114489-S-S-05131-1, "Specification for Erection of



Structural and Miscellaneous Steel.” Attachment 9 to the work plan was Hirschfeld Steel Group (the steel fabricator) Drawing 12045-E315, Revision E, “Location for Field Splice Diagonal.” This drawing further specified that all bolted truss connections be pre-tensioned using either direct-tension-indicating-washers or the turn-of-the-nut-method.

The American Institute of Steel Construction (AISC) “Specification for Structural Joints Using ASTM A325 or A490 Bolts - Section 8 “Installation and Tightening,” requires that for joint assemblies and tightening of connections requiring full pre-tensioning, fasteners be tightened to at least the minimum tension specified in Table 4 for turn-of-the-nut method. The specification further requires that a representative sample of not less than three bolts and nuts of each diameter and length be checked at the start of work in a device capable of indicating bolt tension. The test is intended to demonstrate that the method of estimating the starting or ‘snug-tight’ condition and controlling turns from ‘snug-tight’ to be used by the bolting crews, develops a tension not less than 5 percent greater than the tension required by Table 4, Section 9 of the AISC Specification, “Inspection.” Table 4, Section 9 of the AISC Specification, “Inspection” requires that a determination shall be made that the requirements of Section 8 are met while the work is in progress. This section further states that inspection of bolted connections and verification of pretension is intended to be made at the time of tensioning the joint.

The inspectors requested documentation providing evidence that the turn-of-the-nut method had been verified to ensure that the tension requirements in Table 4 of the specification had been met. The licensee informed the inspectors that the required verification had not been done because the required tension indicating device was off site for calibration and not available at the time of bolt tensioning. The licensee further indicated that verification of tension in the bolts was intended to be performed after the trusses were installed and when the necessary devices were on site.

The AISC Specification notes that the inspection technique giving the best assurance that bolts are properly installed and tensioned is direct observation of the calibration testing of the fasteners using the appropriate installation procedure. Monitoring the work in progress to assure that procedure adherence occurs provides additional confidence that the specified tension requirements are met. If testing for bolt tension using torque wrenches is conducted subsequent to the time the work of installation and tightening of the bolts is performed, the test procedure is subject to the uncertainties of torque controlled calibrated wrench installation. Furthermore, the recognition of the calibrated wrench method of tightening was removed from the Specification with the 1980 edition because it was recognized as the least reliable of all the methods of installation. If testing for bolt tension using torque wrenches is conducted subsequent to the time the work of installation and tightening of the bolts is performed, the test procedure is subject to the uncertainties of torque controlled calibrated wrench installation. Furthermore, the recognition of the calibrated wrench method of tightening was removed from the 1980 edition of the Specification because it was recognized as the least reliable of all the methods of installation.

Nevertheless, the Specification contains a provision if verification of bolt tension is required after a passage of time and exposure of the completed joints. For this case, ‘Arbitration Inspection’ is defined in the Specification and is intended to provide

indication of the bolt tension. The process involves establishing a job inspection torque in a tension measuring device and an increased sample size. Because the licensee had not performed verification of the turn-of-the-nut method during bolt tightening, this process was applicable. Consequently, the required Arbitration Inspection had not been performed at the time of this inspection and required further review. IFI 70-3103/2008-001-003, Review of Structural Steel Bolt Inspections, was identified to verify the adequacy of bolting inspections.

b. Conclusion

The licensee's structural steel installation activities did not appear to conform to the specified turn-of-the-nut method. Additional review is required to ascertain conformance.

**11.0 Exit Meeting**

The preliminary inspection results were presented to the licensee on the following dates: January 17, January 25, February 21, March 19, and March 26, 2008. The lead inspectors described the areas inspected and discussed the inspection results in detail with licensee staff. The licensee acknowledged the findings during each meeting and no dissenting comments were received. Although proprietary documents and processes were reviewed during this inspection, the proprietary nature of these documents or processes was not included in this report.

## SUPPLEMENTAL INFORMATION

### 1. List of Persons Contacted

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

M. Bogre, Construction and Project Implementation  
R. Cogar, Information Management Manager  
D. Copeland, Construction Manager  
S. Cowne, Licensing Manager  
J. Gearhart, Quality Assurance Director  
T. Harney, Licensing Engineer  
D. Lakin, Performance Assessment  
P. McCasland, Licensing Engineer  
J. Potrier, Construction  
B. Robinson, Field Engineering Manager  
G. Sergent, Assistant Quality Assurance Director  
M. Scanlan, Infrastructure Project Manager  
D. Sexton, Vice President Engineering  
E. Wenzinger, Licensing Engineer  
L. Wetherell, Health Safety Environment Director

#### Other Personnel:

M. Boden, Washington Group International (WGI) Engineering  
S. Cotney, WGI Business Operations  
G. Hansrote, WGI Project Management  
S. Kalat, WGI Field Engineer  
T. McClain, Rust Projects  
B. Melvin, WGI Construction Management  
M. Melvin, WGI Engineering  
G. Robinson, WGI QA Supervisor  
K. Wolfcale, WGI Quality

### 2. Inspection Procedures Used

IP 88106	Quality Assurance: Program Development and Implementation (Pre-licensing and Construction)
IP 88108	Quality Assurance: Control of Materials, Equipment and Services (Pre-licensing and Construction)
IP88109	Quality Assurance: Inspection, Test Control & Control of Measuring Equipment (Pre-licensing and Construction)
IP88110	Quality Assurance: Problem Identification, Resolution, and Corrective Action (Construction, Pre-Operation, and Operation)
IP 88111	10 CFR Part 21, Inspection-Facility Construction
IP 88113	Control of Electronic Management of Data
IP 88115	Supplier/Vendor Inspection (Construction Phase)
IP 88132	Structural Concrete Activities
IP 88133	Structural Steel and Supports Activities

3. List of Items Opened, Closed, and Discussed

<u>Item Number</u>	<u>Status</u>	<u>Description</u>
2008-001-001	Open	URI: Follow-up on Results of LES' Investigation into Nonconforming Reinforced Steel (Sections 3 and 8)
2008-001-002	Open	IFI: Review of Soil Structure Interaction Analysis Related to Use of Concrete in Lieu of Backfill (Section 9)
2008-001-003	Open	IFI: Review of Structural Steel Bolt Inspections (Section 10)

4. List of Acronyms Used

ADAMS	Agency-Wide Document Access and Management System
ACI	American Concrete Institute
AISC	American Institute for Steel Construction
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
CAQ	Conditions Adverse to Quality
CFR	Code of Federal Regulations
CPS	Consolidated Power Supply
CR	Condition Report
CRDB	Cylinder Receipt and Dispatch Building
DIL	Daily Inspection Log
E&DCR	Engineering and Design Coordination Report
IFI	Inspection Follow-up Item
IP	Inspection Procedure
IROFS	Item Relied on for Safety
LES	Louisiana Energy Services, L. P.
NCR	Nonconformance Report
NEF	National Enrichment Facility
NQA-1	Quality Assurance Program Requirements for Nuclear Facilities
NQASM	Nuclear Quality System Manual
NRC	Nuclear Regulatory Commission
NTS	Nuclear Technology Solutions, LLP
No.	Number
PE	Professional Engineer
PQAD	Project Quality Assurance Plan
PSI	Pounds per Square Inch
PSP	Project Specific Procedure
QA	Quality Assurance
QC	Quality Control

QAPD	Quality Assurance Program Description
QISI	Quality Inspection Services Inc.
QL	Quality Level
RII	Region 2
SAR	Safety Analysis Report
SBM	Separations Building Module
SCAQ	Significant Conditions Adverse to Quality
SER	Safety Evaluation Report
URI	Unresolved Item
WGI	Washington Group International

## 5. Documents Reviewed

### Procedures

EG-101-104, "Commercial Grade Dedication Process"  
 RM-1, "Records Management and Document Control Policy," Revision 1  
 RM-10, "Records Management/Document Control Program Description"  
 RM-3-2000-01, "Records Management Program"  
 PR-3-2000-01, "LES Control of Procurement"  
 PR-3-2000-02, "Purchase Requisitions"  
 Procedure CA-101, "Corrective Action Program"  
 Procedure LS-101, "Implementation of 10 CFR 21"  
 Procedure AD-201, "Stop Work"  
 PSP 04.01, "Indoctrination and Training Requirements"  
 PSP 08.01, "Document Control," Revision 1  
 PSP 17.01, "Quality Assurance Records"  
 PSP 2.3, "Qualification/Certification of Inspection and Test Personnel"  
 PSP 09.01, "Procurement"  
 PSP 09.04, "Commercial Grade Dedication"  
 PSP 11.04, "Erection of Structural and Miscellaneous Steel"  
 PSP 11.05, "Soil Inspection and Testing"  
 PSP 11.03, "Concrete and Grout Placement"  
 PSP 11.08, "Concrete Batch Plant Inspection and Testing"  
 PSP 17.01, "Quality Assurance Records"

### Condition Reports

CR 2008-356  
 CR 2008-268  
 CR 07-0273  
 CR 07-0274  
 CR 07-0272  
 CR 07-0032  
 CR 07-0241  
 CR 07-0240  
 CR 07-0196

Specifications

NTS 114489-S-S-05131-1, "Specification for Erection of Structural and Miscellaneous Steel."

NTS 114489-S-S-03312-4, "Placing Concrete and Reinforcing Steel."

NTS 114489-S-S-03310-3, "Mixing and Delivering of Concrete."

NTS 114489-S-S-02300-6, "Clearing, Grading, and Earthwork Material, Construction and Testing."

Engineering & Design Change Requests:

E&DCR C-0168

Nonconformance Reports:

NCR 28683-017

NCR 28683-023

NCR 28683-102

NCR 28683-108

Drawings:

114489-1001-C-STL-008-01-1, "Steel - UF6 Area and Cascade Halls 1 & 2 Sections and Details," Sheets 1, 2 and 3

114489-1001-C-STL-005-01-1, "Steel - UF6 Area and Cascade Halls 1 & 2 Roof Plan Top Chord Framing," Sheets 1 & 2

Hirschfeld Steel Group Drawing 12045-E315, "Location for Field Splice Diagonal," Revision E

Miscellaneous:

Corrective Action Program Performance Assessment Trend Report 08-0001

2007 Annual Assessment of LES QA Program Effectiveness

WGI Work Plan 110-1/39-CI-006, Revision 5

WGI Work Plan 1001-Rust-001, Revision. 4

WGI Daily Inspection Log (DIL) PD/12-14-07/01, "Receipt Inspection Report for Threaded Grip-Twist Bar Splice Couplers."

WGI Work Plan 1001-HSG-001, "Structural Steel Erection for Mini Hall 1 Building 1001 Cascade Halls 1 & 2"

Field Density Test Reports (Nuclear Method), January 9, 2007

Receipt Inspection Report, PO#2927501PO10008 CHG#6, December 14, 2007

Sand Cone Field Density Test Reports, January 9, 2007

QISI, Compaction Test Report, October 24, 2007

QISI, Moisture Density Test Data, October 24, 2007

QISI Report of Compression Test Results, December 12, 2007