



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

May 11, 2009

Mr. David Stinson  
President and Chief Operating Officer  
Shaw AREVA MOX Services  
Savannah River Site  
P.O. Box 7097  
Aiken, SC 29804-7097

SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORTS  
70-3098/2009-007 and 008 AND NOTICE OF VIOLATION

Dear Mr. Stinson:

During the period of March 16 through March 27, 2009, the U. S. Nuclear Regulatory Commission (NRC) completed team inspections of fabrication activities related to the construction of the Mixed Oxide Fuel Fabrication Facility (MFFF). The purpose of the inspections was to determine whether Shaw AREVA MOX Services was conducting the required oversight of the fabrication and related activities of procured components in accordance with NRC requirements. The enclosed inspection report documents the inspection results. At the conclusion of the inspections, the findings were discussed with those members of your staff identified in the enclosed report.

The inspections examined activities conducted under your construction authorization as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your authorization. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of these inspections, one violation of NRC requirements was identified regarding the failure to implement the MOX Project Quality Assurance Plan (MPQAP), Section 7, Control of Purchased Material, Equipment and Services. The violation was evaluated in accordance with the NRC Enforcement Policy available on the NRC's Web site at [www.nrc.gov](http://www.nrc.gov). The violation is cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding it are described in detail in the subject inspection report.

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.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and 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>.

D. Stinson

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To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

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

Sincerely,

**/RA/**

M. Scott Freeman, Acting Chief  
Construction Inspection Branch 3  
Division of Construction Inspections

Docket No. 70-3098  
Construction Authorization No. CAMOX-001

Enclosures:   1. Notice of Violation  
                  2. NRC Inspection Reports 70-3098/2009-007 and 008  
                      w/attachment

cc w/encls: (See next page)

D. Stinson

2

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cc w/encls: (See next page)

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D. Stinson

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cc w/encl:

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Letter to D. Stinson from M. Scott Freeman dated May 11, 2009

SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY – NRC INSPECTION REPORT  
70-3098/2009-007 AND 008 AND NOTICE OF VIOLATION

Distribution w/encl:

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PUBLIC

## NOTICE OF VIOLATION

Shaw AREVA MOX Services (MOX Services)  
Aiken, South Carolina

Docket No. 70-3098  
Construction Authorization No. CAMOX-001

During NRC team inspections conducted March 16 through March 27, 2009, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Condition 3.A of NRC Construction Authorization No. CAMOX-001, Revision 2, dated June 12, 2008, authorizes, in part, the applicant to construct a plutonium processing and mixed oxide fuel fabrication plant, known as the Mixed Oxide Fuel Fabrication Facility located at the Department of Energy's Savannah River Site, in accordance with the statements, representations, and conditions of the MOX Project Quality Assurance Plan (MPQAP) dated March 26, 2002, and supplements thereto (MPQAP, Revision 6, Change 1, dated July 28, 2008).

MPQAP, Revision 6, Change 1, Section 7.1, states, in part, that services are controlled to assure conformance with specified technical and QA requirements. In addition, MPQAP, Section 4.2.1.C.1, requires the applicable supplier/subcontractor's QA Program to comply with the requirements of the American Society of Mechanical Engineers (ASME) Quality Assurance (QA) standard NQA-1-1994, Quality Assurance Program Requirements for Nuclear Facilities, including supplements as revised by the ASME NQA-1a-1995 Addenda (NQA-1).

Contrary to the above, prior to March 27, 2009, MOX Services failed to ensure that services were controlled to assure conformance with specified technical and QA requirements, as evidenced by the following examples where the individual suppliers failed to meet a basic requirement of NQA-1.

### BF Shaw Activities:

1. Inadequate disposition of "Use-As-Is" for nonconformance Reports V2382 and V2389. These reports were submitted to MOX Services for their review and approval. In both cases, MOX Services approved the nonconformance with the disposition of "Use-As-Is" without the required technical justification provided. This represented a noncompliance to the requirements of NQA-1, Basic Requirement 15, Nonconforming Materials, Parts or Components.
2. BF Shaw procedure BFS-8754-VT-1, Visual Inspection Procedure, Revision 0, did not meet the requirements of ASME Boiler and Pressure Vessel Code (BPVC), Section V, Article 9, Visual Examination. This procedure was to be used for inspections during the fabrication of Quality Level (QL)-1 piping and was reviewed and accepted by MOX

Services. This represented a noncompliance to the requirements of NQA-1, Basic Requirement 9, Control of Processes.

3. One BF Shaw Level II examiner did not meet the minimum passing score for a certified Level II examiner in visual examination and in magnetic particle examination. This represented a noncompliance with Supplement 2S-2 of NQA-1, Basic Requirement 2, Quality Assurance Program. This NDE examiner was to be used for inspections during the fabrication of QL-1 piping and the examiners was authorized for the MFFF project.
4. MOX Services failed to review the BF Shaw implementation and use of weld repair/rework memos and quality control (QC) memos. These documents were described in the BF Shaw Quality Manual. And, while they were adequate for documenting weld defects that require repair, MOX Services failed to identify that the BF Shaw program was not in compliance with Section 3.7 of the specification DCS01-KKJ-DS-SPE-M-15120-1, Shop Fabrication of Piping, Revision 1. Audit BFS-08-VE37 did not sample the vendor's use of either the QC memo or the weld repair/rework memo. This represented a noncompliance to the requirements of NQA-1, Basic Requirement 9, Control of Processes.
5. BF Shaw failed to enter and track the disposition of the Supplier Deficiency Reports (SDRs) resulting from the MOX Services audit findings of June 8, 2008 into their corrective action program. These SDRs contained several findings that were conditions adverse to quality. This represented a noncompliance to the requirements of NQA-1, Basic Requirement 16, Corrective Action.

#### Joseph Oat Corporation (JOC) Activities:

1. JOC was not in compliance with the requirements of MOX Services Specification DCS01-KKJ-DS-SPE-L-16265-3, Section 4.6, and MOX RFI-1415-057, dated August 13, 2009, which specified requirements for reporting of weld defects and repairs to MOX services. JOC fabricated tanks without a formal weld repair/rework procedure in place. This represented a noncompliance to the requirements of NQA-1, Basic Requirement 5, Instructions, Procedures and Drawings. MOX Services accepted QL-1 and QL-2 tanks with this deficiency.
2. MOX Services reviewed the applicable welder qualifications and failed to identify that a welder, who had welded on Mixed Oxide Fuel Fabrication Facility (MFFF) small diameter piping, was not qualified in accordance with ASME Section IX QW-302.2 requirements. Specifically, the welder qualification was performed on 5 ¼ inch (") length of test coupons for a Nominal Pipe Size (NPS) that required a minimum of 6". This represented a noncompliance to the requirements of NQA-1, Basic Requirement 9, Control of Processes.
3. While observing an in-process liquid penetrant examination and visual examination of QL-1 Tank 31, weld No.100, a level II examiner failed to perform the examination in accordance with the approved procedures. This represented a noncompliance to the requirements of NQA-1, Basic Requirement 9, Control of Processes.
4. JOC had not performed liquid penetrant testing of repair welds following radiography as dictated by the MFFF procurement specification, DCS01-KKJ-DS-SPE-L-16265-3.

Section 4.6, of this specification, Repairs While in Fabrication, stated in part, "All weld repairs to process boundary materials and completed welding shall be fully radiographed and PT tested." This represented a noncompliance to the requirements of NQA-1, Basic Requirement 5, Instruction, Procedures, and Drawings.

This is a Severity Level IV violation (Supplement II)

Pursuant to the provisions of 10 CFR 2.201, Shaw AREVA MOX Services is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, Region II, and a copy to the NRC Resident Inspector at the Mixed Oxide Fuel Fabrication Facility construction project, 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: (1) the reason for the violation, or, if contested, the basis for disputing the violation, (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. Your response may reference or include previously 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 Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other actions as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room (PDR), or from the NRC's document system (ADAMS), which is accessible from the NRC web site at <http://www.nrc.fob/reading-rm/adams.html>, to the extent possible, it should not include any personal privacy, proprietary, 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 the information that should be protected and a redacted copy of your response that deletes 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 CRR 19.11, you may be required to post this Notice within two working days. Dated at Atlanta, Georgia this 11th day of May 2009.



**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket No.: 70-3098

Construction  
Authorization No.: CAMOX-001

Report No.: 70-3098/2009-007 and -008

Applicant: Shaw AREVA MOX Services

Location: BF Shaw Facility – Laurens, SC  
Joseph Oat Corporation Facility – Camden, NJ

Inspection Dates: March 16 - March 18, 2009  
March 23 - March 27, 2009

Inspectors: J. Calle, Senior Construction Inspector, Construction Inspection  
Branch 3, (CIB3), Division of Construction Inspection (DCI),  
Region II (RII)  
J. Fuller, Senior Construction Inspector, CIB3, DCI, RII  
C. Taylor, Senior Project Inspector, Construction Project Branch 1,  
(CPB1), Division of Construction Projects, (DCP), RII  
W. Gloersen, Senior Project Inspector, CPB1, DCP, RII

Accompanying  
Personnel: A. Artayet, Senior Construction Inspector, Trainee, CIB3, DCI, RII  
D. Harmon, Construction Inspector, Trainee, CIB3, DCI, RII  
J. Kent, Construction Inspector Trainee, Construction Inspection 1, DCI,  
RII  
D. Arroyo, Quality Assurance Engineer, Nuclear Materials Safety and  
Safeguards  
S. Freeman, Acting Chief, CIB3, DCI, RII

Approved: Scott Freeman, Acting Chief, CIB3, DCI

## **EXECUTIVE SUMMARY**

Shaw AREVA MOX Services (MOX Services)  
Mixed Oxide Fuel Fabrication Facility (MFFF)  
NRC Inspection Report No. 70-3098/2009-007 and 008

These team inspections included activities conducted by specialists from the Region II and the Office of Nuclear Material Safety and Safeguards from March 16 through 27, 2009. These inspections involved the observation and evaluation of MOX Services', the applicant, programs for oversight of supplier fabrication activities related to principle structures, systems, and components (PSSCs) which included quality assurance (QA) activities related to problem identification, resolution, and corrective actions; special processes; and 10 CFR 21 reporting requirements.

On March 16-18, 2009, NRC inspectors conducted an on-site inspection at the B.F. Shaw, Incorporated, facility in Laurens, South Carolina, to determine if the applicant was providing acceptable oversight of the vendor's quality assurance activities as related to the supply of Quality Level (QL)-1 piping (PSSC-053) for future installation at the MFFF. The inspectors reviewed portions of the vendor's quality assurance program to verify that it adequately implemented the requirements of the American Society of Mechanical Engineers (ASME) Quality Assurance (QA) standard NQA-1-1994, Quality Assurance Program Requirements for Nuclear Facilities, including supplements as revised by the ASME NQA-1a-1995 Addenda (NQA-1). Additionally, the inspectors reviewed applicable piping material and fabrication specifications to verify that the applicant had adequately communicated the applicable code and quality requirements to the vendor, and that the vendor had established measures to ensure that the supply of piping and the shop fabrication of piping assemblies were performed in accordance with an approved quality assurance program (QAP) and applicable technical requirements.

On March 23-27, 2009, NRC inspectors conducted an on-site inspection at the Joseph Oat Corporation facility in Camden, New Jersey, to determine if the applicant was providing acceptable oversight of the vendor's QA activities as they relate to the supply of QL-1 conventional tanks (PSSC-007 and PSSC-045) for future installations at the MFFF. The inspectors reviewed portions of the vendor's quality assurance program to verify that it adequately implemented the requirements of NQA-1. Additionally, the inspectors reviewed applicable tank material and fabrication specifications to verify that the applicant had adequately communicated the applicable code and quality requirements to the vendor, and that the vendor has established measures to ensure that the supply of tanks and the shop fabrication of tanks are performed in accordance with an approved QAP and applicable technical requirements.

The inspections identified the following aspects of the applicant's programs as outlined below:

### **Quality Assurance: Supplier / Vendor Inspection (Construction Phase) (Inspection Procedure (IP) 88115)**

Violation 70-3098/2009-007-001 was identified in that MOX Services failed to ensure that services were controlled to assure conformance with specified technical and QA requirements related to QL-1 scope of supply (PSSC-007, PSSC-045 and PSSC-053). Several examples were identified for both BF Shaw Incorporated and the Joseph Oat Corporation.

**Quality Assurance: 10 CFR 21 Inspection-Facility Construction (IP 88111)**

The applicant and its vendors, BF Shaw and Joseph Oat Corporation, have adequately implemented provisions to address identified problems and the required reportability determinations. However, the inspectors identified another example for Violation 70-3098/2009-007-001 in that MOX Services failed to ensure that services were controlled with regards to the “use-as-is” disposition for nonconforming items.

**Attachment:**

Persons Contacted

Inspection Procedures

List of Items Opened, Closed, and Discussed

List of Acronyms Used

List of Documents Reviewed

## REPORT DETAILS

### 1. Summary of Facility Status

The applicant continued to perform ongoing concrete, structural steel, and construction activities at the Mixed Oxide Fuel Fabrication Facility (MFFF).

### 2. Quality Assurance: Supplier / Vendor Inspection (Construction Phase) (Inspection Procedure (IP)88115)

#### a. BF Shaw Incorporated (BF Shaw) (Principle Structure, System, and Component (PSSC)-053, Quality Level (QL)-1 Piping)

##### (1) Special Processes

##### (a) Scope and Observations

The inspectors reviewed the vendor's Quality Assurance Program (QAP) requirements for the control of special processes, such as: welding, weld defect repair, nondestructive examination (NDE) procedures, NDE personnel qualification and certification, bend testing, and hydrostatic testing, to ensure compliance with the applicable quality and technical requirements established by the applicant's quality manual, MFFF construction specifications, and applicable American Society of Mechanical Engineers (ASME) B31.3-1998 code requirements (Process Piping Code).

The inspector's activities consisted of an on-site record review and observation of in-process NDE and welding activities to determine compliance with the 1998 edition of the ASME B31.3 Process Piping Code. Additionally, the inspectors reviewed a sample of NDE reports and corrective action documents to verify that weld related indications, defects, nonconformances, and other related conditions adverse to quality, if present, were appropriately evaluated and dispositioned in accordance with the QAP and applicable code acceptance standards. The inspectors reviewed the vendor's process and procedures for weld repairs.

The inspector's observation and/or review of NDE activities specifically covered, NDE reports, equipment and consumables certification records, personnel qualification records, and calibration reports (as applicable) for the following examinations:

- Radiographic testing (RT) examination of weld 8763-40-176, ASME B31.3 stainless steel – film review
- RT examination of weld 8763-40-183, ASME B31.3 stainless steel – film review
- Liquid dye penetrant (PT) examination of weld 8745-42-414, ASME B31.3 piping sub-assembly – direct observation

The inspectors reviewed applicable NDE procedures to ensure that they met the requirements of the 2007 ASME Boiler and Pressure Vessel Code (BPVC), Section V, Nondestructive Examination, and other applicable codes and standards.

The inspectors reviewed the vendor's written practice SP-PQ-1, NDE Personnel Certification Practice, Revision 8, to verify that it was in accordance with the approved

QAP and the requirements of the American Society of Nondestructive Testing (ASNT) Recommended Practice Number (No.) SNT-TC-1a, 2001 edition.

The inspectors reviewed welding procedure specifications (WPS), associated procedure qualification records (PQRs), and welder performance qualification records, to verify that welding procedures and welders were qualified in accordance with the ASME BPVC, Section IX, Welding and Brazing Qualifications. Additionally, the inspectors observed in-process welding for job No. 8692. As applicable, the inspectors reviewed base metal and weld filler metal certified material test reports, and purchase order specifications.

The vendor's program for the control of weld filler metal was reviewed, and compared to Procedure BFS-8754-WC-1, Welding Material Control. The inspectors determined that this procedure met the requirements of ASME B31.3, Specification DCS07-KKJ-DS-SPE-M-15120-1, Division 15, Shop Fabrication of Piping, and the vendor's quality assurance manual (QAM). Additionally, a walk down of the stainless steel fabrication bay was performed. Welders were interviewed and found knowledgeable of, and in conformance with, welding material controls. The inspectors verified that the actual chemical and mechanical properties provided on the certified material test reports (CMTRs) for heat numbers CP7863 and 508859 were compliant with the requirements of ASME BPVC Section II, Part C, for weld filler metal specification SFA-5.9. Additionally, the inspectors determined that the procurement packages for the filler materials adequately imposed the reporting requirements of 10 CFR Part 21. No weld filler material was found uncontrolled in the shop. Finally the tool room which houses the weld filler material was inspected, and the foremen with access to the tool room were interviewed and controls were found to be adequate.

On March 17, 2009, the inspectors reviewed the vendor's program and procedures for weld defect removal. The inspectors reviewed a sample of completed weld repair/rework memos that were previously reviewed by MOX Services.

During the review of the above activities, the inspectors identified the following vendor nonconformances:

#### NDE Procedures Were Not in Compliance With ASME BPVC Section V

The inspectors determined that NDE procedure BFS-8754-VT-1, Visual Inspection Procedure, Revision 0, did not meet the requirements of Section T-921, Written Procedure Requirements, of ASME BPVC Section V, Article 9, Visual Examination, which states, "Visual examinations shall be performed in accordance with a written procedure, which shall, as a minimum, contain the requirements listed in Table T-921." The inspectors identified that procedure BFS-8754-VT-1 did not contain the requirements of T-921 such as, visual examination technique, remote visual aids, lighting intensity, lighting equipment, methods or tools used for surface preparation, equipment or devices used for a direct technique, or personnel qualifications. Additionally, MOX Services had previously reviewed and approved this procedure for the visual inspection of code piping.

ASME B31.3 states that visual and liquid penetrant examinations shall be performed in accordance with ASME BPVC Section V, Nondestructive Examination. The inspectors noted that section 9.2.1 of the vendor's quality manual states that "NDE shall be performed in accordance with NDE procedures, qualified in accordance with ASME

Section V and the applicable construction code.” The inspectors determined that this represented a noncompliance with NQA-1, Basic Requirement 9, Control of Processes and ASME B31.3 and was a condition adverse to quality. The vendor initiated a procedure revision to include ASME BPVC Section V code requirements for VT. The vendors initiated corrective preventative action request (CPAR) No. 219 to document and correct this condition adverse to quality.

The above is an example of the failure, by MOX Services, to ensure that services were controlled regarding NDE procedures to be used on the MFFF project. This is contrary to the requirements of the MOX Project Quality Assurance Plan (MPQAP), Section 7, Control of Purchased Material, Equipment and Services. This is an example of VIO 70-3098/2009-007-001.

#### NDE Personnel Not Qualified In Accordance with ASME B31.3

The inspectors reviewed a sample of qualification and certification records for Level II and Level III NDE personnel. The inspectors identified that a Level II NDE examiner did not meet the minimum passing score for a certified Level II in VT and in magnetic particle examination.

NQA-1, Supplement 2S-2, Supplementary Requirements for the Qualification of Nondestructive Personnel, and the applicant’s construction specification for the shop fabrication of piping (DCS01-KKJ-DS-SPE-M-15120-1) require that SNT-TC-1a be met for all personnel performing nondestructive examination activities. Section 9.2.4 of the vendor quality manual requires that NDE examination shall be conducted and evaluated by personnel qualified and certified in accordance with their written practice (SP-PQ-1, NDE Personnel Certification Practice) which meets the requirements of SNT-TC-1a. Section 6.3, General Examination (for Level I and II), of SP-PQ-1, describes the “general examination,” which is required to be taken for level II examiners. Section 6.1.2 of the above procedure requires that the examiner score at least a 70% on each of the three examinations required for certification. The inspectors noted that the examiner did not obtain the required passing score of 70% on either General Examinations for VT and magnetic particle examination. The vendor informed the inspectors that the NDE examiner who failed the written examinations was authorized for the MFFF project. The vendor suspended the certification of the affected examiner until re-testing can be performed. The vendor initiated CPAR No. 221 to document and correct this condition adverse to quality.

The inspectors determined that this represented a noncompliance with Supplement 2S-2 of NQA-1, Basic Requirement 2, Quality Assurance Program, Section 9.2.4 of the vendor’s QAM, and Section 6.1.2 of vendor procedure SP-PQ-1, NDE Personnel Certification Practice, Revision 8.

The above is an example of the failure, by MOX Services, to ensure that services were controlled regarding the certification of the vendor’s NDE personnel scheduled to be used on the MFFF scope of QL-1 supply. This is contrary to the requirements of MPQAP, Section 7, Control of Purchased Material, Equipment and Services. This is an example of VIO 70-3098/2009-007-001.

### Inadequate Documentation of Weld Repair / Weld Rework Activities

On March 17, 2009, the inspectors reviewed the vendor's program and procedures for weld defect removal. The inspectors reviewed a sample of completed weld repair/rework memos that had previously been reviewed by Shaw Areva MOX Services (MOX Services).

The inspectors identified that the vendor failed to adequately document weld repair/rework activities associated with two job sketches. With respect to the first job Sketch, No. 8666-38-75, the vendor had identified that incomplete penetration was present during a VT, and therefore initiated a weld repair/rework memo. The memo did not document whether grinding or welding or any other repair work was performed to restore the weld to an acceptable condition. The inspectors identified a deficiency with a second repair/rework memo. The second repair/rework memo was associated with Sketch No. 8738-40-165. This memo documented a VT rejection for weld misalignment. The weld was cut out, but the weld removal method was not documented as required on the repair/rework memo.

The inspectors determined that these weld repair/rework memos did not comply with the attachment to vendor procedure SP-WR-1A, Standard Operating Procedure for Making Weld Repairs, Revision 5, and Section 9.3.10 of the vendor's QAM, which stated that weld defects that require repair shall be documented on a repair/rework memo and NQA-1, Basic Requirement 9, Control of Processes. The vendor initiated CPAR No.s 225 and 228 to document and correct these conditions adverse to quality.

The above is an example of the failure, by MOX Services, to ensure that services were controlled regarding the vendor's QAM, specifically, special processes related to weld defect repairs and the correction of in-process weld deficiencies. The applicant failed to adequately review the vendor's implementation and use of weld repair/rework memos and Quality Control (QC) Memos. These documents were described in the vendor's QAM. The inspectors determined that the measures the vendor established for documenting weld defects that required repair were adequate; however, the applicant failed to review this aspect of the vendor's QAP. Interviews with MOX quality assurance (QA) personnel revealed that they were not aware that the vendor used the QC memos and weld repair/rework memos to document weld related nonconformances. Additionally, the inspectors noted that MOX Services QA Audit Report BFS-08-VE37 dated June 3, 2008, did not sample the vendor's use of either the QC memo or the weld repair/rework memo.

Further, the inspectors reviewed Section 3.7, Quality Control, of Construction Specification – Shop Fabrication of Piping (DCS01-KKJ-DS-SPE-M-15120-1), which states that “verification results documentation is to be submitted to MOX Services as project record.” The specification states that the results of prefabrication, in-process, post-fabrication, and repair, rework, and replacement inspections, are to be submitted as project record. The inspectors identified that the vendor's process for documenting these verification results does not ensure that this information will be provided to MOX Services, in that the vendor documents this information on QC memos, and these QC memos are discarded and not retained as part of the record.

The above is an example of the failure, by MOX Services, to ensure that services were controlled regarding the vendor's QAM, in that the applicant had not evaluated the

vendor's use of QC memos and weld repair/rework memos to document and disposition fabrication related nonconformances. This is contrary to the requirements of MPQAP, Section 7, Control of Purchased Material, Equipment and Services. This is an example of VIO 70-3098/2009-007-001.

(b) Conclusions

Overall, the inspectors concluded that BF Shaw control, and MOX Services oversight, of special processes was acceptable. However, the inspectors identified three examples of a violation of the requirements of the MPQAP, Section 7, Control of Purchased Material, Equipment and Services, and NQA-1, Basic Requirement 7, Control of Purchased Items and Services.

(2) Corrective Action Program (CAP)

(a) Scope and Observations

The inspectors reviewed selected procedures and specifications to determine (1) that MOX Services was providing acceptable oversight of the vendor's QA activities as they related to their CAP, (2) that BF Shaw had established and adequately implemented a CAP.

The inspectors determined that BF Shaw had recently started physical work (within the last six months) on the MOX Services contract and therefore a small number of CPARs related to the MOX Services contract were generated in 2008 and the beginning of 2009.

The inspectors reviewed all of the CPARs generated from nonconformance items and determined that BF Shaw adequately tracked and entered these issues into their CAP for disposition. The CPARs identified the issues and proposed corrective and preventive actions for disposition. The QA was required to sign off on all CPARs before disposition. The inspectors determined that BF Shaw generated quarterly trend reports for senior management that tracked non-conformance reports including the names of the suppliers and number of issues generated per supplier.

The inspectors reviewed the previous MOX Services audit report, Shaw AREVA MOX Services Quality Assurance Audit Report BFS-08-VE37, dated June 3, 2008. The inspectors determined the comprehensive programmatic audit to be detailed and thorough. MOX Services generated several supplier deficiency reports (SDRs) as a result of the audit.

At the time of the NRC inspection, MOX Services had closed all but one of the SDRs. However, the inspectors determined that BF Shaw failed to enter and track the disposition of the SDRs in their CAP. The inspectors reviewed the SDRs and determined that several findings were conditions adverse to quality. This was identified by the inspectors as a nonconformance by BF Shaw and was contrary to the requirements of NQA-1, 1994, Basic Requirement 16. This nonconformance by BF Shaw was identified by the NRC subsequent to MOX Services' review of BF Shaw's CAP. BF Shaw generated CPAR No. 222 in response to this issue.

The above is an example of the failure, by MOX Services, to ensure that services were controlled regarding the vendor's CAP in that the applicant did not identify BF Shaw's



failure to enter MOX Services audit findings into their CAP. This is contrary to the requirements of the MPQAP, Section 7, Control of Purchased Material, Equipment and Services. This is an example of VIO 70-3098/2009-007-001.

(b) Conclusions

Overall, the inspectors concluded that the BF Shaw, and MOX Services oversight of, CAP was acceptable. However, the inspectors identified one example of a violation of the requirements of the MPQAP, Section 7, Control of Purchased Material, Equipment and Services, and NQA-1, 1994, Basic Requirement 7, Control of Purchased Items and Services.

b. **Joseph Oat Corporation (JOC) (PSSC-007, Chemical Safety Controls, and PSSC-045, Process Safety Control Subsystem)**

(1) Special Processes

(a) Scope and Observations

The inspector's activities consisted of an on-site record review and/or observation of in-process NDE and welding activities to determine compliance with the 2007 edition of the ASME BPVC, Section VIII, Rules for Construction of Pressure Vessels. Additionally, the inspectors reviewed a sample of NDE reports and corrective action documents to verify that indication, defects, nonconformances, and other related conditions adverse to quality, if present, were appropriately evaluated and dispositioned in accordance with the JOC QAM and applicable code acceptance standards.

The inspector's observation and/or review of NDE and testing activities specifically covered, NDE reports, equipment and consumables certification records, personnel qualification records, and calibration reports (as applicable) for several examinations.

The inspectors reviewed applicable NDE procedures to ensure that they met the requirements of the 2007 ASME BPVC, Section V, Nondestructive Examination, and other applicable codes and standards.

The inspectors reviewed the vendor's written practice, Standard Procedure SP-1579, Requirements for the Qualification and Certification of Nondestructive Examination Personnel, Revision 13, to verify that it was in accordance with the approved QAP and the requirements of the ASNT Recommended Practice No. SNT-TC-1a, 2001 edition.

The inspectors reviewed applicable WPS, associated procedure qualification records, and welder performance qualification records, to verify that welding procedures and welders were qualified in accordance with the latest edition of the ASME BPVC, Section IX, Welding and Brazing Qualifications.

The inspectors observed and/or reviewed a sample of welding activities associated with QL-1 activities in order to evaluate compliance with QAP procedures, ASME codes, and other technical requirements. The inspectors reviewed CMTRs for base metals and weld filler metals, purchase order specifications, NDE, etc., including the following welding activities.

The inspectors verified that gas tungsten arc welding (GTAW) solid welding rods were properly identified, used, controlled, and documented during fabrication of piping and pressure vessels. CMTRs of these welding rods (such as heat No. 510569, CT8816-735857, DT8816-735857, YT8780-735456, and CT8660-734816) were dual certified in compliance with ASME Section II – Part C SFA-5.9 Specification for Bare Stainless Steel Welding Electrodes and Rods, with respect to the actual values for chemical analysis and typical values for mechanical properties. These weld filler metal CMTRs also made reference to the applicability of 10 CFR 21 and 10 CFR 50 Appendix B. It was determined that base and weld filler metal heat number traceability were adequate. Weld filler metal control slips were adequately documented and used for proper distribution and control of welding rods during fabrication.

The inspectors reviewed welding procedure specifications WPS-4303, -8303, -7303 and -6301 and supporting procedure qualification records that applied to the MFFF. The manual GTAW process was mostly used for the MOX fabrication, and it was determined that shielded metal arc welding, flux-core arc welding, gas metal arc welding, and machine GTAW processes were not used during the inspection. The inspectors noted that these welding procedures appropriately addressed the essential variables for the welding process and were available for use by the welders on a table located in the fabrication shop. The WPS adequately included welding parameters regarding amperage, travel speed, and preheat and interpass temperatures, as applicable. During interview of the welders, the welders had a clear understanding of the requirements for proper control of preheat and interpass temperatures for stainless steel fabrication. The welders also adequately documented their welder identification number in the fabrication documents for each production weld.

Base metal cutting, cleanliness, fit-up, and alignment of butt and corner weld joints were observed to be adequate for pressure vessel fabrication. Spin-holes at the center of weld heads were properly welded with full penetration using equivalent plate material and examined by radiography. It was observed that double-welded circumferential butt joints were properly prepped from the second side by grinding to sound metal with subsequent acceptable penetrant testing prior to welding from the second side. Corner weld joints for nozzle connections were properly welded with adequate weld reinforcement in accordance with ASME BPVC Section VIII-1, Subsection B, figure UW-16c for acceptable types of welded nozzle connections whereby holes in the head/shell were properly prepared by grinding with a single-bevel groove for insertion of the nozzle. It was verified that the following inspection hold points were properly established and completed for welding to the heads and shell:

- 1) dimensional inspections prior to release for assembly,
- 2) material verification,
- 3) lay-out for nozzle openings,
- 4) fit-up and tack (including for fit-up/welding of lifting lugs per drawing), and
- 5) final NDE, as applicable, of production welds was performed, as indicated on fabrication drawings for each applicable weld.

Completed packages for pressure vessels 2656-12 and -22 were reviewed for adequacy with respect to proper completion of ASME Manufacturer's Data Report U-1A and

Certification of Compliance for seismic qualification. The material records adequately identified heat/lot numbers of base metals for heads, shell, nozzle penetration piping and fittings, plate material (such as brackets and lifting lugs). The weld and heat records adequately identified the heat numbers of weld rods and welder identification numbers for each weld number and description. It was verified that radiography of production welds was performed, as indicated on fabrication drawings for each applicable weld. NDE records (including radiography reports for weld repairs) were included in the final package. In addition, pressure testing records were reviewed for adequacy on air testing of reinforcement pads, and hydrostatic testing and helium mass-spectrometer testing of the completed pressure vessel. The calibration program for measuring and testing of instruments (such as a temperature contact pyrometer and pressure test gauges) were verified and deemed adequate.

The inspectors reviewed the vendor's program and procedures for weld defect removal and weld repair/rework activities. The inspectors reviewed the following weld repair / rework activities / records to verify that these activities were consistent with the QAM and the ASME BPVC Section VIII-1, and B31.3 Codes:

- RT Reader Sheets for Tank 12, welds 121R1, 121R2, 142R4, 143R1,
- RT Reader Sheets for Tank 4, weld 121R1
- RT Reader Sheets for Tank 11, weld 122R1 and 120R

During the review of the above activities, the inspectors identified the following vendor nonconformances:

#### No Weld Repair Procedure Established for QL-1 Tank Fabrication

The inspectors identified that the vendor had not established a procedure to control weld repair activities associated with the fabrication of the QL-1 MFFF conventional tanks. The inspectors noted that MOX Services procurement specification, DCS01-KKJ-DS-SPE-L-16265-3, Section 4.6, Repairs While in Fabrication, stated in part, "The repair procedure shall define the extent of repair with regard to location, size, type of defect, and the weld procedure intended to be used in making the repair." The vendor was unable to show that they had a procedure to satisfy this requirement. The inspectors determined that this was a nonconformance with NQA-1, Basic Requirement 5. XXX

The above is an example of the failure, by MOX Services, to ensure that services were controlled regarding the vendor's quality program, in that the applicant allowed the vendor to conduct activities affecting quality without documented procedures. This is contrary to the requirements of the MPQAP, Chapter 7, Control of Purchased Material, Equipment and Services. This is an example of VIO 70-3098/2009-007-001.

#### Inadequate Liquid Penetrant Examination and Visual Examination of Tank 31, Weld 100

While observing in-process PT and VT of QL-1 Tank 31, weld No.100, the inspectors identified that the vendor's NDE level II examiner failed to perform the examination in accordance with the approved NDE procedures.

The inspectors noted that the vendor's VT procedure, QC-2656-60, Revision 3, Step 5.1, states that "Accessible weld surfaces and base material shall be examined. The weld and base metal shall be examined for weld spatter, slag, and arc strikes." The inspectors determined that the NDE examiner failed to identify two location of weld spatter on the inside surface of the tank. These locations of weld spatter were required to be removed by grinding, and reexamined by PT.

The inspectors noted that the vendor's PT procedure, QC-2656-10, Revision 3, Section 4.0, Surface Preparation Prior to Examination, states that "The area to be examined and adjacent areas within at least 1 inch shall be cleaned with detergent or solvent to remove any dirt, grease, lint, oil, or other contaminants which might interfere with the examination." During the conduct of the examination the inspectors noted that the tank was placed on rubber rollers to better facilitate the conduct of the examination. After the penetrant had been applied, and the excess removed, but before the developer was applied, the inspectors observed that weld No. 100 was rolled over these wheels, which were dirty. By rolling the weld over these rubber wheels, a defect could have been masked such that the penetrant would not have been removed by the developer.

The inspectors determined that these issues, if left uncorrected, would render the quality of the QL-1 tank indeterminate. The vendor took corrective actions to repair the locations of weld spatter, and reexamined the weld. The inspectors determined that these issues represent a nonconformance with NQA-1, Basic Requirement 9, Control of Processes.

The above is an example of the failure, by MOX Services, to ensure that services were controlled regarding the vendor's quality program with respect to NDE implementation. This is contrary to the requirements of MPQAP, Chapter 7, Control of Purchased Material, Equipment and Services. This is an example of VIO 70-3098/2009-007-001.

#### Liquid Penetrant Examination of Repair Welds Not Performed as Required by Procurement Specification

The inspectors identified that the vendor had not performed PT of repair welds following radiography as dictated by the MFFF procurement specification, DCS01-KKJ-DS-SPE-L-16265-3. Section 4.6, Repairs While in Fabrication, of this specification, stated in part, "All weld repairs to process boundary materials and completed welding shall be fully radiographed and PT tested."

The inspectors noted that repairs were made on a total of 15 welds for 10 different tanks and accepted without the required PT performed. Four of the affected tanks were classified as QL-1, four were classified as QL-2, and two were classified as QL-4. The inspectors identified that this is a nonconformance with NQA-1, Basic Requirement 5, Instructions, Procedures and Drawings.

The above is an example of the failure, by MOX Services, to ensure that services were controlled regarding the vendor's quality program with respect to technical specification compliance. This is contrary to the requirements of the MPQAP, Chapter 7, Control of Purchased Material, Equipment and Services. This is an example of VIO 70-3098/2009-007-001.

### Unqualified Welder Fabricated QL-1 Tank Welds

The inspectors reviewed the vendor's welder qualification program to determine if welders were qualified to perform the welds which they were fabricating. Specifically the inspectors interviewed several welders, reviewed a sample of welder qualification records, reviewed the welder maintenance log, and observed in-process welding.

After interviews with several welders on how each was tested for fabrication, the inspectors reviewed records and identified that one welder was not properly qualified to weld on ½ inch (") nominal pipe size piping. A review of the welder's qualification test records, for small diameter piping, revealed that the welder should have welded a minimum of 6" length by using three test coupons, but instead only welded on two test coupons for an actual length of 5 ¼". This was substantiated by reviewing the welder qualification log with the welding specialist. It was verified that this particular welder was not qualified to weld on single-welded butt joints of 1/2" NPS in accordance with Article III of ASME BPVC Section IX for Welding Performance Qualifications, provisions QW-302.2, QW-356, QW-403.16, and QW-452.3.

Additionally, the welder tested for ½" small diameter piping in October 2008, but the vendor failed to certify the documentation, as required by ASME BPVC Section IX, QW-103.2. The inspectors determined that was not in compliance with ASME BPVC Section IX; the vendor's QAM, paragraph 5.1.3; and Standard Procedure SP-1520, Maintaining Welder Performance Qualifications and Continuity of Performance Records, Paragraph 2.0; the MPQAP; and NQA-1, Basic Requirement 9, Control of Special Processes. During the NRC inspection, the welder was manually welding with the GTAW process using single-V groove butt joints on 1 ½" diameter stainless steel piping of the internal spray ring for the MOX pressure vessel Job No. 2656-14.

The above is an example of the failure, by MOX Services, to ensure that services were controlled regarding the vendor's quality program, in that a welder had performed production welds on MOX QL-1 tanks without the proper qualification testing. This is contrary to the requirements of the MPQAP, Section 7, Control of Purchased Material, Equipment and Services. This is an example of VIO 70-3098/2009-007-001.

(b) Conclusion

Overall, the inspectors concluded that JOC's control, and MOX Services oversight, of special processes was acceptable. However, the inspectors identified four examples of a violation of the requirements of the MPQAP, Section 7, Control of Purchased Material, Equipment and Services, and NQA-1, Basic Requirement 7, Control of Purchased Items and Services.

(2) Document Control

(a) Scope and Observations

The inspectors examined the documents governing JOC's document control processes to evaluate the adequacy of the program to meet the requirements of the MOX Project Quality Assurance Plan, Section 6, Document Control. These documents established the measures required to ensure that the correct documents were being used for activities affecting quality. The documents reviewed included the QAM and quality implementing procedures. In addition, the inspectors verified the storage of associated records to assure that records were stored in a manner that met the requirements of the MOX Project Quality Assurance Plan, Section 17, Records. The inspectors also examined forms and controlled documents to verify overall implementation and effectiveness of JOC's control of manuals and procedures.

The inspectors verified that the JOC records were appropriately stored to prevent damage from moisture, temperature and air. They were firmly attached on binders and inside 1-hour fire rating file cabinets.

(b) Conclusions

The inspectors concluded that the document control and QA records storage process appropriately met the requirements of the MOX Project Quality Assurance Plan for the MFFF Conventional Tanks Project. No findings of significance were identified.

(3) Training and Qualifications

(a) Scope and Observations

The inspectors examined the documents governing JOC's training and qualification processes to evaluate the adequacy of its program for meeting the requirements of the MOX Project Quality Assurance Plan, Section 2, Quality Assurance Program and to assure that proficiency was achieved and maintained. These documents established the measures to assure that JOC personnel and selected external personnel were indoctrinated, trained and qualified to perform activities affecting quality. The inspectors also examined completed records that provided evidence of indoctrination and training of personnel to verify implementation and effectiveness of JOC's training and qualification program. Records examined included qualification records, training attendance records, and examinations.

Within the scope of this area, the inspectors examined the following documents:

- SP-1556, Training Personnel in Quality Areas, Revision 1, dated March 19, 1981
- SP-1560, Training and Qualification of Auditors, Revision 5, dated April 27, 2005
- Lead Auditor qualifications
- Training records for QC Inspectors

SP-1556 established the requirements for training in order to maintain proficiency in quality-related activities. This procedure established the groups and frequencies of the minimum training qualification to fulfill the scope of this procedure and other

requirements. The inspectors verified the training records for five QC inspectors to determine if JOC adequately implemented the QAM and standard procedures. These records were maintained by the QA manager in separate files for each employee.

SP-1560 established the requirements regarding the responsibilities, training, examination, and qualifications of auditors and lead auditors. The inspector verified the training records for JOC's lead auditor. The file included documentation of education, experience, professional accomplishments, audit communications skills, audit training courses and audit participation.

(b) Conclusion

The inspectors concluded that the vendor's training and qualification processes appropriately met the requirements of the MOX Project Quality Assurance Plan for the MFFF Conventional Tanks Project. No findings of significance were identified.

(4) Handling, Storage, Shipping, and Preservation

(a) Scope and Observations

The inspectors reviewed the JOC process for the handling, storage, shipping, and preservation of QL-1 conventional chemical processing tanks to evaluate the adequacy of its program to meet the requirements of the MOX Project Quality Assurance Plan, Section 13, Handling, Storage and Shipping. These conventional tanks were associated with two PSSCs as specified in Table 5.6-1 of the MFFF Construction Authorization Request (CAR) which lists the 53 PSSCs and their associated safety functions. The two PSSCs associated with the conventional tanks were PSSC-045 (Process Safety Control Subsystem) and PSSC-007 (Chemical Safety Controls).

The inspectors' assessment included a review of the fabricator's SPs for handling, preservation, and storage; and specific job procedures (JPs) associated with the MFFF for cleaning, packaging, and shipping the conventional tanks. The inspectors verified that the procedures stated any prohibited contaminants and other restrictions as specified in the MOX design specification with regard to cleaning, preservation, storage, packaging, and shipping. The inspectors also toured the conventional tank storage area observed the following three tanks that had been packaged: (1) KPC-TK-3000 (Serial number 2656-11); (2) KPB-TK-5000 (Serial number 2656-8); and (3) KPB-TK-4000 (Serial number 2656-7). In addition, the inspectors toured the fabrication shop and chemical stores area and did not observe any of the prohibited contaminants.

(b) Conclusions

The inspectors concluded that the handling, storage, shipping, and preservation of QL-1 conventional chemical processing tanks (PSSC-007, PSSC-045) appropriately met the requirements of the MOX Project Quality Assurance Plan. The vendor's procedures adequately specified any prohibited contaminants and other restrictions as specified in the MOX design specification. No findings of significance were identified.

(5) Audits

(a) Scope and Observations

The inspectors assessed the applicant's oversight of the JOC's internal audit program and vendor survey, audit, and qualification processes. JOC's audit program was specified in Section 10 of the JOC QAM, Revision 19.

The inspectors reviewed the applicant's audit of JOC (JOC-07-VE35, Supply of ASME III and ASME VIII Vessels, Tanks, and Appurtenances), performed July 9-12, 2007. The applicant did not identify any audit findings of JOC's QAP. At the time of that audit, JOC had not started tank fabrication. The applicant's next audit of JOC was tentatively scheduled to occur between May and July 2009.

Section 10.1.11 of JOC's QAM requires the vendor to perform yearly management assessments of its QAP. The inspectors reviewed the JOC Management Review, dated September 23, 2008 and verified that it covered document control, engineering, manufacturing, purchasing, and QA. The results of the assessment were adequately documented and the report was issued to the QA Manager. No findings were identified.

Section 10.2 of JOC's QAM specifies the requirements for the execution of vendor surveys, qualification, and, as applicable, source surveillance. The inspectors selected a sample of the suppliers and vendors who were providing material and services to JOC for fabrication of the MOX project conventional tanks (PSSC-007, PSSC-045). The inspectors verified that the sample of suppliers selected were on JOC's Active Qualified Suppliers List (AQSL). The inspectors also verified that the sample of suppliers selected were qualified in accordance with Section 10.2.7 of the JOC QAP. The inspectors also verified that the JOC lead auditor was qualified in accordance with Section 10.2.6 of the JOC QAP and SP-1560, Procedure for Training and Qualification of Auditors, Revision 5, dated April 27, 2005. The inspectors did observe minor inconsistencies, including whether a supplier was qualified as an NQA-1 supplier of materials for the MFFF. This inconsistency was determined to be an administrative error and the AQSL was immediately corrected by JOC.

(b) Conclusions

The inspectors concluded that the applicant provided adequate oversight of the JOC auditing and supplier qualification processes. The vendor's audit program provided an adequate qualification process of its suppliers who were providing materials, supplies, or services to JOC for fabrication of the MOX project conventional tanks (PSSC-007, PSSC-045). No findings of significance were identified.

(6) Control of Items

(a) Inspection Scope and Observations

The inspectors reviewed the JOC process for controlling the receipt of items that do not conform to specified requirements and to prevent inadvertent installation or use of these items. The inspectors also verified that adequate controls were in place to identify, evaluate, segregate, document, and disposition non-conforming items.



The inspectors observed material receipt activities in the shipping/receiving area and interviewed shipping/receiving staff. The inspectors verified that the current controlled copies of the SP-1529 series of receipt inspection procedures were available to shipping/receiving personnel. The inspectors also verified that the Receiving Office maintained copies of purchase orders and bills of material, as these documents were also used as the inspection documents to determine the acceptance of items. SP-1529 specified that if receipt inspection identified a non-conforming item, then a deviation notice would be written and documented on the receiving record. The inspectors reviewed DNs covering the period from December 2007 to January 2009 and selected three DNs that pertained to either receipt of materials or services associated with the MFFF and verified that the DNs were documented on the appropriate receiving record. No problem areas were identified. The inspectors also verified that for the receipt of non-conforming items, adequate controls were in place, including segregation and tagging, to prevent inadvertent use. The observed non-conforming items, however, were not associated with the MFFF.

(b) Conclusions

The inspectors concluded that the applicant provided adequate oversight of the JOC process for controlling the receipt of items that do not conform to specified requirements. The vendor's process to prevent inadvertent installation or use of non-conforming items was adequate. Adequate controls were in place to identify, evaluate, segregate, document, and disposition non-conforming items. No findings of significance were identified.

3. **Quality Assurance: 10 CFR 21 Inspection – Facility Construction (IP 88111)**

a. **BF Shaw (PSSC-053)**

(1) Scope and Observations

The inspectors reviewed the following procedures and specifications to determine (1) whether MOX Services was providing acceptable oversight of the vendor's QA activities related to 10 CFR Part 21 requirements; (2) whether BF Shaw's program for handling, storage, cleaning, packaging, shipping and preservation of items were controlled in accordance with requirements of an established QA program; (3) whether BF Shaw's processes controlled items that did not conform to specified requirements and prevent inadvertent installation or use.

The inspectors reviewed the vendor's procedures, purchase orders, nonconformances, and design specifications to ensure 10 CFR Part 21 requirements were a part of the vendor's approved quality assurance program.

The inspectors performed walk-downs of BF Shaw's receipt and storage areas and reviewed documentation for 10 CFR Part 21 instructions and requirements. The inspectors determined that BF Shaw had established a process that controlled handling, storage, packaging, cleaning, and shipping of purchased and product items. The inspectors observed that nonconforming items for the MOX Services contract, specifically a thrust bearing plate identified in purchase order 8754-005, a BW cap and TXB nipple identified in purchase order 8754-003-01 were properly segregated and labeled to control their inadvertent installation or use. BF Shaw concluded that a Part 21

evaluation was not needed for the items. The inspectors reviewed BF Shaw's screening process for Part 21 determination and concluded that the screening process was adequate. The inspectors observed that items were adequately stored and packaged as required by MOX specifications. The receipt and log checklist that BF Shaw's QC inspectors used was adequate. The inspectors reviewed purchase order contracts 8754-005 and 8754-003-01 to verify that 10 CFR Part 21 requirements were included in the orders. The inspectors determined that the purchase order contracts included appropriate language for 10 CFR Part 21 requirements.

With regards to nonconformances, the inspectors identified two examples where the applicant conducted a less than adequate review of vendor submitted documents and failed to adequately disposition and provide technical evaluations for conditions adverse to quality.

MOX Services reviewed and approved two nonconformances (V2382 and V2389) submitted by BF Shaw and dispositioned as "use as is" without documenting the required technical justification for the disposition. V2382 authorized the performance of ultrasonic testing per SA-745 in lieu of SA-388. V2389 authorized NDE of piping material via SA-999, Section 22.3, in lieu of hydrostatic testing. The original technical requirements for the piping fabrication were derived from the MOX Construction Specification, DCSO1-KKJ-DS-SPE-M-15120-1.

Section 15.2.4 (b), Disposition of Nonconforming Items, of the MPQAP states that, "the technical justification for the acceptability of a nonconforming item that has been dispositioned "repair" or "use-as-is" shall be documented." Section 15.2.9 (a), Control of Nonconformities, of BF Shaw's Quality Manual states that, "the "use-as-is" condition shall not deviate from the code requirements and the disposition shall include a technical justification from the engineering manager or quality assurance or quality control manager. The inspectors determined this was also not in compliance with NQA-1, Basic Requirement 15, Control of Nonconforming Items.

The above is an example of the failure, by MOX Services, to ensure that services were controlled regarding the control of nonconformities on the MFFF project. This is contrary to the requirements of MPQAP, Section 7, Control of Purchased Material, Equipment and Services. This is an example of VIO 70-3098/2009-007-001.

(2) Conclusion

Overall, the inspectors concluded that BF Shaw established and adequately implemented the requirements of 10 CFR Part 21 into their NQA-1 quality assurance program. MOX Services oversight of the program was acceptable. However, the inspectors identified one example of a violation of the requirements of the MPQAP, Section 7, Control of Purchased Material, Equipment and Services and NQA-1, Basic Requirement 7, Control of Purchased Items and Services.

**b. Joseph Oat Corporation (PSSC-007 and PSSC-045)**

**(1) Scope and Observations**

The inspectors reviewed the implementing policies and procedures that govern the JOC 10 CFR Part 21 process to verify compliance with 10 CFR Part 21.

The inspectors reviewed JOC's log for DNs and corrective actions, as well as a sample of DNs and CARs generated by JOC to ensure that processes were effective in identifying and evaluating conditions adverse to quality that may require entry into the 10 CFR Part 21 process. The inspectors reviewed a sample of DNs initiated by JOC to verify that JOC had adopted adequate measures to evaluate deviations and failures to comply that could result in a substantial safety hazard. The inspectors also reviewed a sample of notifications sent to purchasers or affected licensees, in addition to purchaser's records to ensure that JOC's procedures maintain legible, retrievable, and safely stored records in accordance with 10 CFR Part 21 requirements.

The NRC inspectors sampled and reviewed JOC's 10 CFR Part 21 program implementation activities related to 10 CFR Part 21 postings and procurement documents.

**10 CFR Part 21 Policies and Procedures**

SP-1527 described the process for identifying, documenting, evaluating, dispositioning, and controlling non-conforming items. In accordance with SP-1527 all non-conformances shall be documented on DNs and identified in the Fabrication/Inspection Plan. The QA Manager shall determine if the nonconforming condition could create a substantial safety hazard and report the nonconforming condition per 10 CFR Part 21, in accordance with SP-1552. SP-1552 provided the timeframes for notifications sent to the NRC and the purchasers. It also provided the definitions specified in 10 CFR Part 21. SP-1552 specified that purchase orders that are subject to 10 CFR Part 21 shall state that 10 CFR Part 21 applies. SP-1552-1 provided additional guidance to pass down 10 CFR Part 21 requirements to all suppliers for contracts invoking 10 CFR 21. The inspectors verified that SP-1552 contained the appropriate records retention times per 10 CFR Part 21 for evaluation of deviations, notifications to purchasers, and other records.

SP-1528 described the implementation of JOC corrective action program requirements, including the responsibilities and procedural steps for the initiation, evaluation, and closure of the corrective actions. The procedure also provided a link to the 10 CFR Part 21 program.

The inspectors also verified that JOC identified the applicability of 10 CFR Part 21 when issuing safety-related procurement documents to its suppliers. The inspectors found that all of the safety-related purchase orders sampled by the inspectors that were issued by JOC identified Part 21 applicability.

The inspectors verified the 10 CFR Part 21 posting requirements by a sampling of two locations at JOC's shop and QC Manager's office. Both locations include a copy of the Part 21 regulations, SP-1552 and Section 206 of the Energy Reorganization Act.

### 10 CFR Part 21 Implementation

The inspectors verified that any deviations discovered during manufacturing which could not be dispositioned by JOC were reported to the customer within five days of discovery as required. The NRC inspectors also verified that JOC identified the applicability of 10 CFR Part 21 when issuing safety-related procurement documents to its suppliers. The NRC inspectors found that all of the safety-related purchase orders issued by JOC identified Part 21 applicability.

The inspectors verified that the JOC audits provided objective evidence of the adequacy, effectiveness, and implementation of safety-related suppliers' QA programs used to ensure compliance with the requirements specified in 10 CFR Part 21

#### (2) Conclusions

The inspectors concluded that the JOC 10 CFR Part 21 program requirements were consistent with the regulatory requirements of 10 CFR Part 21 and were being implemented effectively. No findings of significance were identified.

#### 4. Exit Interviews

The inspection scope and results were summarized by the inspectors on March 18, 2009, at the BF Shaw facility, and on March 27, 2009, at the Joseph Oat facility with those persons indicated in the attachment. Additionally at the March 27 meeting, the inspectors discussed with the applicant the apparent violation concerning MOX Services' failure to ensure that services were controlled to assure conformance with technical and QA requirements related to MOX FFF scope of supply. The applicant was receptive to the inspection findings providing no dissenting comments. Although proprietary documents and processes may have been reviewed during this inspection, the proprietary nature of these documents or processes was deleted from this report.

**1. PARTIAL LIST OF PERSONS CONTACTED**

Applicant Personnel

B. Bezanson, Lead Auditor  
R. Daniels, Mechanical/Chemical Manager  
W. Elliott, Engineering Vice-President  
D. Gwyn, Regulatory Affairs Manager  
D. Harper, Quality Assurance (QA) Shop Inspector  
D. Kehoe, QA Engineer  
M. Mohundro, Supplier Quality Manager  
C. Murray, STR  
B. Parks, Procurement Engineering Group Manager  
R. Phillips, Materials/Metallurgical Engineer  
T. Ritt, QA Lead Auditor  
G. Shell, QA Manager  
R. Whitley, Supply Quality Manager  
R. Justice, Quality Assurance Inspector

Vendor Personnel – BF Shaw

T. Bates, Project Manager  
J. Duncan, Quality Control  
J. Harrison, General Manager  
G. Hyatt, Purchasing Manager  
R. Martin, Quality Manager  
S. Sherbert, Project Engineer  
K. Tollison, Production Manager

Vendor Personnel – Joseph Oat Corporation

P. Bell, Document Controller  
S. Castelli, Shop Receiving  
F. Crute, Quality Control (QC) Inspector  
M. Holtz, President Engineering  
C. Leonard, QC Manager  
J. Reader, Operations Manager  
R. Slebodnick, Project Engineer  
E. Stankiewicz, QA Manager

Other individuals contacted included supervisors, engineers, and inspection, measurement, and testing technicians.

**2. INSPECTION PROCEDURES (IPs) USED**

IP 88108	Quality Assurance: Control of Materials, Equipment, and Services
IP 88110	Quality Assurance: Problem Identification, Resolution, and Corrective Action (Construction, Pre-Operation, and Operation)
IP 88111	Quality Assurance: 10 CFR 21 Inspection – Facility Construction
IP 88115	Quality Assurance: Supplier/Vendor Inspection (Construction Phase)
IP 55050	Construction: Nuclear Welding General Inspection Procedure

### 3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

<u>Item Number</u>	<u>Status</u>	<u>Description</u>
70-3098/2009-007-001	Open	VIO Several Examples of MOX Services to Verify Supplier and Subcontractor Performance

### 4. LIST OF ACRONYMS USED

ADAMS	Agency-Wide Document Access and Management System
AQSL	Active Qualified Suppliers List
ASME	American Society of Mechanical Engineers
ASNT	American Society of Nondestructive Testing
ASTM	American Society for Testing and Materials
BPVC	Boiler and Pressure Vessel Code
CAP	Corrective Action Program
CAR	Construction Authorization Request
CFR	Code of Federal Regulations
CMTR	Certified Material Test Record
CPAR	Corrective Preventive Action Requests
CR	Condition Report
DAR	Deficiency Action Request
DN	Deviation Notice
GTAW	Gas Tungsten Arc Welding
IP	Inspection Procedure
IROFS	Item Relied on for Safety
JOC	Joseph Oat Corporation
JP	Job Procedures
LAP	List of Approved Procedures
MOX	Mixed Oxide
MFFF	MOX Fuel Fabrication Facility
MPQAP	MOX Project Quality Assurance Plan
NCR	Nonconformance Report
NDE	Nondestructive Examination
NDT	Nondestructive Testing
No.	Number
NPS	Nominal Pipe Size
PO	Purchase Order
PQR	Procedure Qualification Record
PSSCs	Principle Structures, Systems, and Components
PT	Liquid Dye Penetrant Examination
QA	Quality Assurance
QAM	Quality Assurance Manual
QAP	Quality Assurance Program
QC	Quality Control
QL	Quality Level
RT	Radiographic Examination
SC-1	Seismic Category
SDR	Supplier Deficiency Report
SPs	Manufacturing Procedures

SR	Surveillance Report
UL	Underwriters' laboratories label
UT	Ultrasonic Examination
VIO	Violation
VT	Visual Examination
WPs	Weld Procedures

## 5. **LIST OF DOCUMENTS REVIEWED**

### **MOX FFF**

MOX Project Quality Assurance Plan, Revision 6, Change 1  
 MOX Services Approved Vendors List, Revision O, dated November 17, 2008

### **BF Shaw**

#### Procedures:

SP-WR-1A, Standard Operating Procedure For Making Repairs, Revision 5  
 SP-PQ-1, NDE Personnel Certification Practice, Revision 8  
 BFS-8754-PQ-3, Training and Qualification Procedure for Special Processes Personnel, Revision 0  
 BFS-8754-VT-1, Visual Inspection Procedure, Revision 0  
 SP-VT-1, Visual Examination Procedure, Revision 1  
 SP-PT-1, Liquid Penetrant Examination Procedure, Revision 10  
 SP-RT-1, Radiographic Examination Procedure, Revision 10  
 SP-WT-1, Hydrostatic Testing, Revision 5  
 BFS-8754-BD-3, Cold Bending of Pipe  
 BFS-8754-BDQ-3 Rev 2, Cold Bending Qualification Procedure  
 SP-WT-1 Rev 5 Hydrostatic Testing addendum  
 BFS-8754-WC-1 Rev 0, Welding Material Control  
 SP-BD-8 Rev 0, Standard practice for Induction Bending of High Alloy Steels  
 BFS-8754-PQ-3 Rev 0, Training and Qualification Procedure for Special Process Personnel  
 BFS-8754-CL-1 Rev 0, Cleaning and Coating Procedure for Completed Piping Subassemblies  
 BFS-8754-MCM-1 Rev 0  
 WPSs: Gen Rev 11, 807P Rev 0, 801 Rev 4, 803 Rev 5, 804 Rev 2

#### Specifications:

DCS01-KKJ-DS-SPE-M-15120-1, Construction Specification Division No. 15 – Mechanical Shop Fabrication of Piping, Quality Level 1 (IROFS)  
 DCS01-UFJ-DS-SPE-T-16252-1, Piping Material Specification, Quality Level 1 (IROFS)  
 DCS01-KKJ-DS-NTE-L-16279-4, Welded Equipment and Piping General Specification for 316L Stainless Steel Material, Quality Level 1 (IROFS)  
 Transmittal No DCS-Vendor-006385, MOX Approval of Hot Bending

Quality Control Documents and Records:

BF Shaw Quality Manual for the Manufacturer and Supply of Boiler Parts, Pressure Vessels, Piping Components, Piping Sub Assemblies and Supports dated April 25, 2007.

Shaw AREVA MOX Services Quality Assurance Audit Report BFS-08-VE37 dated June 3, 2008

Non Conformance Reports, V2389, V2385, V2356, V2382, V2382,  
BF Shaw Vendor Corrective /Preventive Action Request Log dated March 17, 2009  
Purchase Orders 8754-003 (Addendums 01-02-06, and 03), 8754-005  
Management Report Non-Conformance Report Summary ( January-December 2008)  
dated February 17, 2009

**Joseph Oat Corporation**Standard Procedures (SP):

SP-1510, Document Control, Revision 4 dated 9/11/2003  
SP-1526, Customer Returned Items, Revision 0, 2/18/02  
SP-1527, Non-conformances, Revision 6, 11/12/2007  
SP-1528, Corrective and Preventative Action, Revision 5, 11/12/2007  
SP-1529, Receiving Inspection, Revision 3, 10/31/07  
SP-1548, Procedure Review, Revision 1 dated 7/10/2000  
SP-1552, Reporting Defects and Non-compliances, 11/28/2007  
SP-1552-1, Procedure for Passing Down 10 CFR 21 to Suppliers, Revision 0, 6/11/2008  
SP-1556, Training Personnel in Quality Areas, Revision 1 dated 3/19/1981  
SP-1560, Procedure for Training and Qualification of Auditors, Revision 5, 4/27/05  
SP-1567, Requirements for the Performance and Documentation of Audits, Revision 4, 8/14/01  
SP-1577, Storage of Quality Assurance Records, Revision 3 dated 9/21/1994  
SP-1577-2, Standard Procedure for Receipt of Quality Assurance Records, Revision 0 dated 5/2/01  
SP-1579, Requirements for the Qualification and Certification of Nondestructive Examination Personnel, Revision 13

Job Procedures (JP):

JP 2656-40, Cleaning Conventional Tanks, Revision 2, 7/22/08  
JP 2656-45, Packaging and Shipping Conventional Tanks, Revision 3, 12/5/08

Quality Control Procedures (QC):

QC-2656-10, Liquid Penetrant Examination Solvent Removable Method, Revision 3  
QC-2656-80, Ultrasonic Examination, Revision 2 and Revision 3  
QC-2656-40, Hydrostatic Pressure Testing, Revision 5  
QC-2656-60, Visual Examination of Welds, Revision 1, 2, and 3  
QC-2656-34, Helium Mass Spectrometer Testing, Revision 2  
QC-2656-20, Radiographic Examination Procedure, Revision 1 and Revision 0



Specifications:

DCS01-KKJ-DS-SPE-L-16265-3, Procurement Specification for Conventional Tanks

Records:

Active Qualified Suppliers List, dated 3/16/09 and 3/26/09

Training records for 5 QC Inspectors

Travelers for the following Conventional Tanks: KPB-TK-3000; KPB-TK-4000; KPB-TK-5000

Receiving Record Numbers: 25342, 25792, 25793, 25794, 25795, 25820

DN No. 06536, No Heat Number on Part, 4/1/08

DN No. 06538, No Heat Number on Parts, 4/11/08

DN No. 06735, Item Failed Testing, 12/4/07

Corrective Action Forms (CAF) 207, 208, 209, 210, 211, 212, 214, 216

Documentation Package for ASME Section VIII, Div.1 Nitric Acid Recovery: Recovered Acid Reception Tank, KPC-TK-4000 (Tank 12)

Duke Cogema Stone and Webster, LLC.

DOE Contract No.: DE-AC02-99CH10888

- Section A, Solicitation/Award for Design-Build
- Section E, Terms and Conditions for Design-Build Subcontracts
- Section F, Special Conditions for Design-Build Subcontracts
- Section G, SOW/Specifications Drawings

Audits:MOX

JOC-07-VE35, Supply of ASME III and ASME VIII Vessels, Tanks, and Appurtenances, July 9-12, 2007

JOC-08-VS76, Dated June 17, 2008; Audit related to Radiographic Film quality and weld acceptance

JOC

JOC Management Review (Document Control, Engineering, Manufacturing, Purchasing, Quality Assurance), 9/23/08

JOC Vendors and Suppliers

Audit 08-20, Team Industrial Services, Inc., 9/11/08

Audit 08-16, Philadelphia Pipe Bending Company, 3/17/08

Audit 08-08, Outokumpu Stainless, Inc., 11/3/08

Audit 07-12, Penn Stainless Products, 4/18/07

Audit 06-19, Tioga Pipe Supply, Inc. 9/26/06

Audit 06-04, The ESAB Group, Inc., 9/29/06

QA Related:

Joseph Oat Corporation Quality Assurance Manual, Revision 19 and Revision 20

Purchase Orders:

PO No. 060041-00 – Stork MMA Testing Laboratories dated 7/06/07  
PO No. 061649-00 - Stork MMA Testing Laboratories dated 5/27/08  
PO No. 061233-00 – Penn Stainless Steel Products dated 2/11/08  
PO No. 061706-00 – Penn Stainless Steel Products dated 6/17/08  
PO No. 061345-00 – Trust Manufacturing, LLC dated 3/10/08  
PO No. 060848-00 – Brighton Tru-Edge Heads dated 11/02/07  
PO No. 060021-00 – Outokumpu Stainless Plate, Inc dated 9/24/07  
PO No. 061854-00 – South Jersey Welding Supply Co. dated 7/31/08

Examinations:

PT and VT examinations of weld 100 of Tank 31 - Direct Observation  
PT and VT examinations of: Tank 22 welds 120 and 200; Tank 31 welds 100 and clip removal areas; Tank 12 welds 200, 201, 202 and arc strike removal areas – Record Review  
UT examination of weld 121 of Tank 11 - Record Review  
Helium Mass Spectrometer Test of Tank 11, and the Tank 11 coil assembly, weld 153 – Record Review  
Hydrostatic Test for Tank 11, Welds 153, 151, and 152 – Record Review  
RT Reader Sheets for Tank 12, welds 100, 120, 121, 121R1, 121R2, 122, 142R4, 143R1, 149 – Record Review