Accepted for Use

TEST REPORT

REPORT NUMBER: 100982213SAT-001D
ORIGINAL ISSUE DATE: July 25, 2014
REVISED DATE: N/A

EVALUATION CENTER
16015 Shady Falls Road
Elmendorf, TX 78112
(voice) 210-635-8100
(fax) 210-635-8101
www.intertek.com

RENDERED TO

AREVA NP Inc.
4100 International Plaza
Fort Worth, TX 76109

AREVA NP Inc.
58-9222547-000

PRODUCTS EVALUATED: Quantum Silicones QSil 5558MC Silicone Elastomer

EVALUATION PROPERTY: Pressure Resistance (Pressure Test 4)

Report of Testing pressure resistance capabilities for compliance with the applicable requirements of AREVA NP Inc. Test Plan, Document No. 51-9199513-003

1 Table of Contents

2 Introduction

Intertek Testing Services NA (Intertek) has conducted testing for AREVA NP Inc., on the pressure resistance capabilities of Quantum Silicones QSil 5558MC Silicone Elastomer (QSil 5558MC) in a 12" thick concrete deck for compliance with the applicable requirements of and in accordance with AREVA NP Inc. Document No. 51-9199513-003, *Detailed Test Plan for Conducting MOX Pressure Test 4.* This evaluation took place on September 25 and 26, 2013.

This project was undertaken to evaluate the pressure resistance capabilities of an 8" thick silicone elastomer seal when installed in and around various metallic electrical commodities at five different air pressure increments above atmospheric pressure.

3 Test Samples

3.1 SAMPLE SELECTION

The sealant material was not independently selected for testing; it was supplied by AREVA NP Inc., and was received on June 19, 2013. The samples were received with Certificates of Conformance and are considered traceable. Basic information on sealant material(s) is presented in the table below.

Sealant Material	Lot /Batch#	Expiration Date
QSil 5558 MC	130606	6/14/2014

Information regarding receiving dates and origin can be found in Appendix F: Quality Documents. All samples were received in good condition at the Evaluation Center.

3.2 SAMPLE AND ASSEMBLY DESCRIPTION

The test deck was used to simulate a confinement zone or HVAC boundary in which the penetration seal assemblies may be installed. The test deck was not considered an integral part of the penetration seal assembly being tested and therefore was not intended to replicate MOX-specific plant conditions and not considered integral in bounding the performance of the penetration seal assemblies (e.g., concrete blend, compressive strength, rebar size and spacing). The test deck was comprised of normal weight reinforced concrete.

The opening cast into the test deck simulated certain features consistent with MOX penetrations (e.g., chamfered edges when deemed relevant, relatively smooth interior finishes, etc.).

The test deck consisted of nominal 96" x 96" x 12" thick normal weight concrete constructed using 1/4" thick perimeter steel channel and reinforced with #7 steel rebar spaced 12" o.c. with minimum 3" embedment. Within the test deck, a precast opening was formed as described below.

The deck was the same deck originally tested as Pressure Test 2 (Intertek Report Number G100982213SAT-001A,B,C or AREVA NP, Inc. document number 58-9222833-000). The opening that was sealed and tested in Pressure Test 4 was a 48" x 34" blockout containing electrical raceways (e.g., cable trays, conduits, wireways). A detailed description of each penetration can be found in Appendix D, AREVA NP Inc. Engineering Information Record,

Document No. 51-9199513-003. Included in that document is a table of revision history with a description of changes made to the approved plan. The installation and documentation of penetration seal assemblies contained within the test slab was performed by AREVA under AREVA's Quality Assurance Program [Reference 12.4 in the test plan found in Appendix D]. The test deck used for Pressure Test 4 was the same deck previously tested under Pressure Test 2.

Note: The Nox-crete and Keeler & Long KL 3500 Kolor-Poxy Self Priming Surfacing Enamel were installed on the slab during construction of Pressure Test 2. Keeler & Long KL 3500 Kolor-Poxy Self Priming Surfacing Enamel removal and subsequent penetration seal material adherence was evaluated by this test.

The opening was sealed with an eight (8) inch thick Quantum Silicones QSil 5558MC Silicone Elastomer (QSil 5558MC) penetration seal with no permanent damming installed in and around the various penetrating commodities.

The test was performed with the test deck oriented in the horizontal position.

Drawings showing the general layout of the test deck (test slab) for this pressure test can be found in Appendix A.

4 Testing and Evaluation Methods

The Test Plan in Appendix D defines the test methods, acceptance criteria and test report documentation requirements for penetration seal Pressure Test 4. Additionally, the detailed Test Plan defines the roles and responsibilities of MOX Services, AREVA, the selected testing laboratory, and any other subcontracted entity engaged in support of pressure testing efforts.

The detailed Test Plan also describes the procurement plan for materials associated with penetration seal Pressure Test 4, and identifies the entities responsible for procuring the various components of the test assemblies based on the quality level assigned to each component.

The Test Plan also establishes minimum quality requirements for the penetration seal materials used in the test assemblies and links quality requirements in the AREVA Quality Assurance (QA) program to customer/project quality requirements.

4.1 TEST APPARATUS

In the absence of any consensus codes or standards related to the pressure testing of penetration seal assemblies, the MOX Penetration Seal Program has developed a standardized method for conducting pressure testing of MOX penetration seal designs. In support of this effort, Intertek assisted in the design and construction of a pressure test apparatus to be used in the conduct of MOX penetration seal pressure tests.

The pressure chamber apparatus consists of two hemispherical 72" diameter steel pressure vessels, calibrated equipment and a data acquisition system. The apparatus accurately maintains the desired air pressure, using one of two sensitive, manually adjustable pressure regulators; a high (0-15 psi) and a low (0-2 psi) range. The sealed collection chamber feeds

any leakage air back to the test device, where it is channeled through one of two calibrated flow meters, once again, a high (0-200 L/min) and a low (0-20 L/min) range. A calibrated electronic pressure transducer (0-5 psi) measures the differential pressure between the two chambers and the data acquisition software determines the net pressure drop across the test seal and the leakage through the seal. The chambers are interchangeable and the direction can be reversed very quickly so both can serve as the pressure or the collection chamber.

The primary components described above include the following devices:

Pressure Chamber	2-piece hemispherical 72” diameter steel vessel 3 connection ports per piece 16 flange attachment points per piece Flange attachment via 3/8” diameter holes @ 22-1/2° spacing

Pressure Cart	Stainless steel rolling cart with control equipment and associated Data Acquisition System

Regulator (low)	Control Air, Inc., Amherst, NH Type 700 0-2 psi
Regulator (high)	Control Air, Inc., Amherst, NH Type 700 0-15 psi

Mass Flow Meter Omega Engineering, Inc., Stamford, CT

Model No. FMA-872A-V-NIST
Serial No. 4270050001001
0-20 lpm

Mass Flow Meter Omega Engineering, Inc., Stamford, CT
Model No. FMA-875A-V-NIST
Serial No. 4270050003001
0-200 lpm

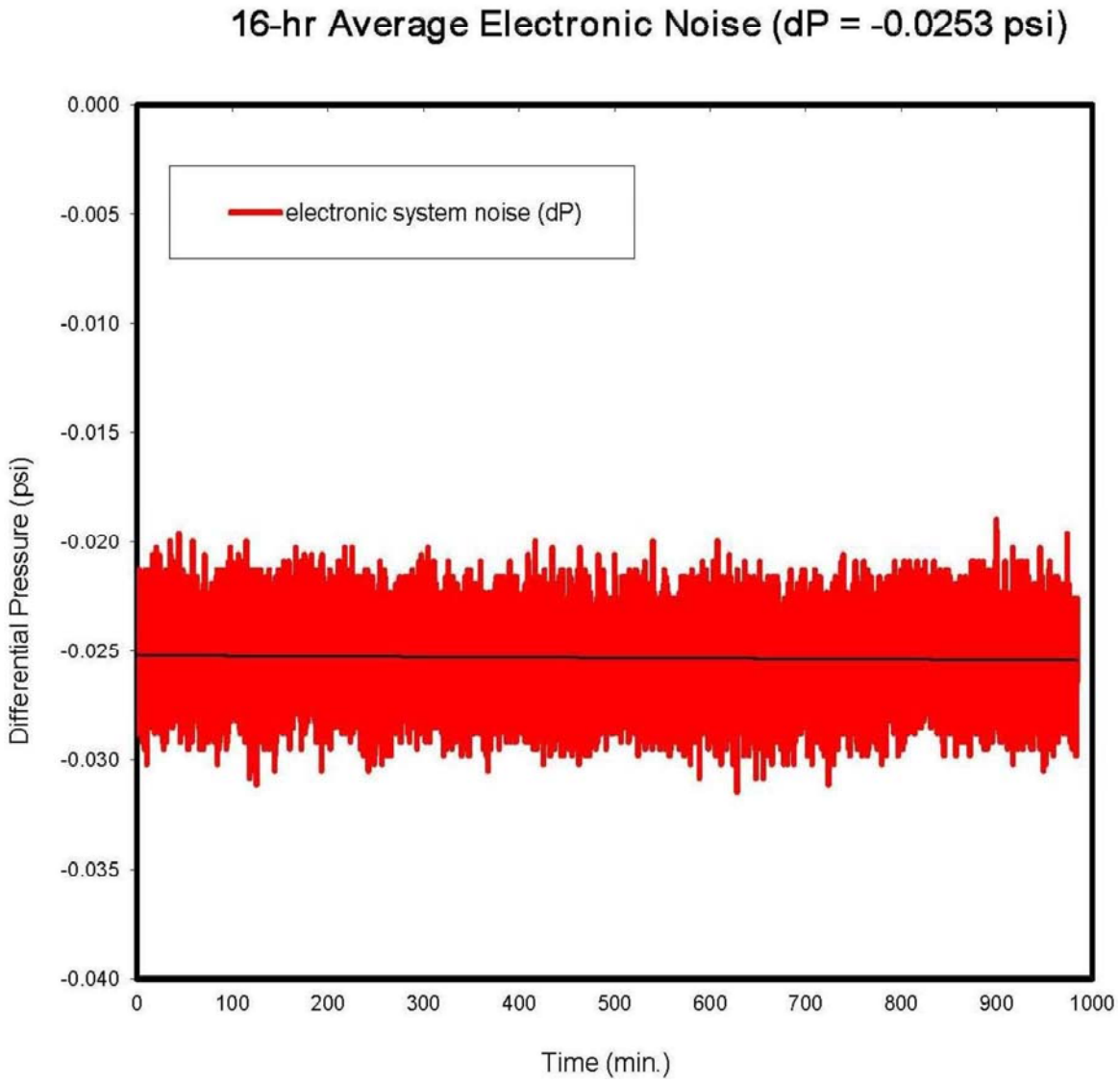
Pressure Transducer	Omegadyne Inc., Sunbury, OH Model No. PX409-005 DWUV Serial No. 406707 Pressure Range: 0-5 psi Input 0-100mVdc

Power Supply	Omega Engineering, Inc., Stamford, CT Model No. PSS-10 +10V @ 400 mA Input 115 VAC 50/60 Hz
Multifunction DAQ	National Instruments, Model No. NI USB-6210 16 Input, 16-bit, 250 kS/s, Multifunction I/O

Dedicated CPU

HP Compaq Pro-6300 Microtower
Serial No. MXL3090LN6
OS Windows 7 Pro

Additionally, during initial system start-up testing and verification, it was discovered that the data acquisition system (DAQ) was so sensitive that "signal noise" resulted in data fluctuations for reported differential pressure even when the system was at equilibrium (i.e., both high side and low side pressure chambers were at atmospheric conditions). After collecting data for 16 hours overnight, the average fluctuation was -0.025 psi.



Since the initial pressure stage prescribed by the AREVA NP Test Plan is 1.0 inches of water (0.0361 psi) and the average data fluctuation due to "signal noise" was almost 70% of this value (-0.025 psi), it was decided that an inclined-plane manometer would be used to ensure that the Stage 1 differential pressure was applied at precisely 1.0 inches of water.

For subsequent pressure stages (i.e., Stages 2-5), the Test Plan required pressure was applied and maintained using the DAQ reported differential pressure without consideration for any "signal noise". Since the "signal noise" always reported some level of negative pressure at the beginning of the test, this method assured that the tests were conducted with additional margin,

as the actual differential pressure that the test specimen was subjected to was equal to the DAQ reported differential pressure plus the additional pressure needed to overcome the negative "signal noise" reported at the beginning of the test when both pressure chambers were at atmospheric conditions.

4.2 TEST STANDARD

AREVA NP Inc. Document No. 51-9199513-003

Pressure rated penetration seals at the MOX facility are required to remain "sufficiently leak-tight" at various pressure levels in order to support the functional goals of the various pressure rating requirements (i.e., confinement, suppression system clean agent concentration, fire induced pressure loads or HVAC pressure boundary loads). The term "sufficiently leak-tight" indicates that the penetration seal meets the predetermined acceptance criteria for the pressure level(s) being tested.

The acceptance criteria that constitutes "sufficiently leak-tight" varies based on the pressure requirement and the operating mode of the plant. For most pressure conditions and operating modes, "sufficiently leak-tight" means that the penetration seal assembly must remain in place but is allowed to leak (i.e., the penetration seal cannot become dislodged from the opening or otherwise catastrophically fail such that a substantial leakage path is created).
Per MOX Services Calculation "Confinement Boundary Air Leakage Criteria" (Test Plan Reference 12.1) penetration seals that function as confinement zone 3b boundary components must maintain a leakage rate less than 0.01 cfm/sq. ft. of penetration area when tested at a pressure that bounds C3b to non-C3b zone pressures during normal operating conditions.

The table below identifies the differential pressure levels (stages) for conducting pressures tests, as well as, the acceptance criteria in order to be considered "sufficiently leak-tight".

Differential Pressure Test Levels

Test Stage	Differential Pressure (inch w.g.)	Required Hold Time (minutes)	Acceptance Criteria	Basis for the Selected Differential Pressure
1	1.0	30	Leakage $\leq$ 0.01 cfm/sq. ft. of penetration area	Testing at this differential pressure bounds the 0.51 inches w.g. pressure for C3b to C2 areas during normal operation [Test Plan Reference 12.9]
2	5.0	30	Seal Remains In Place	Testing at this differential pressure bounds the 4.0 inches w.g. pressure anticipated as a result of clean agent suppression system discharge [Test Plan Reference 12.7].
3	10.0	30	Seal Remains In Place	Testing at this differential pressure bounds the 7.0 inches w.g. pressure used as the screening pressure cutoff for fire induced pressures [Test Plan References 12.7 and 12.8] and some of the HVAC pressure boundaries [Test Plan Reference 12.9].

Test Stage	Differential Pressure (inch w.g.)	Required Hold Time (minutes)	Acceptance Criteria	Basis for the Selected Differential Pressure
4	20.0	30	Seal Remains In Place	Testing at this differential pressure bounds all of the calculated fire induced pressures [Test Plan Reference 12.8] and many of the HVAC pressure boundaries [Test Plan Reference 12.9].
5	40.0	30	Seal Remains In Place	Testing at this differential pressure bounds all of the HVAC pressure boundaries [Test Plan Reference 12.9].

Each test assembly shall be attached to the pressure test apparatus and subjected to air pressure tests at the select pressure levels identified in the table above, beginning with the Stage 1 pressure of 1.0 inch w.g. Once this pressure has been obtained, the pressure shall be maintained for the hold time specified. The maximum leakage rate observed during the hold time shall be recorded. If the leakage rate exceeds the acceptance criteria during Stage 1 testing, the time of failure shall be noted and the test shall be continued, since leakage alone does not constitute failure after Stage 1.

Once the designated hold time has been achieved, the pressure shall be increased to the next pressure level identified (Stage 2, then Stage 3, then Stage 4 and finally Stage 5) and held for the designated hold time. The maximum leakage rate observed during each hold time shall be recorded.

Following completion of Stage 5 pressure testing, the test may continue at the discretion of the AREVA test engineer and the testing laboratory manager in charge. Subsequent pressures, hold times and maximum leakage rates shall be recorded as directed by the AREVA test engineer.

If at any pressure level (or test stage) the penetration seal becomes dislodged from the opening or otherwise catastrophically fails, the pressure test shall be terminated and the time to failure and pressure at which the failure occurred shall be recorded.

5 Testing and Evaluation Results

5.1 RESULTS AND OBSERVATIONS

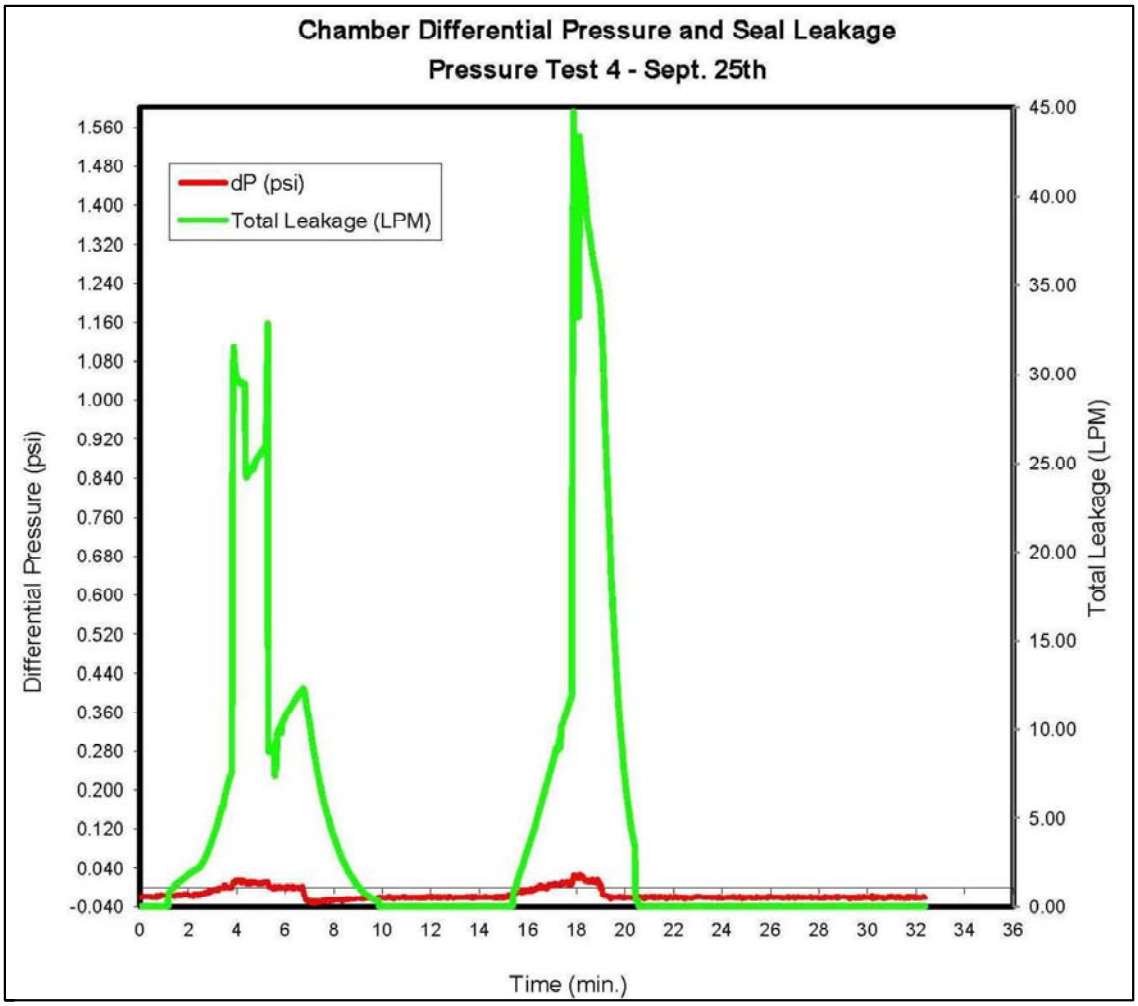
The test deck was mounted horizontally between two 72" diameter hemispherical pressure vessels. The deck was fixed to the pressure chamber using (16) 5/16" x 2-1/2" long sleeve anchors (Red Head) through 16 pre-drilled holes. Silicone II caulk (GE) was used to create a pressure tight seal between the pressure chamber and the test deck.

The test was initiated at 3:21 p.m. on September 25, 2013. Scott Groesbeck representing AREVA NP Inc. was present to witness the test. The ambient temperature at the start of the test was 99°F, with a relative humidity of 23%.

The test procedure followed that presented in Section 9.0 of the Test Plan. Soon after pressure was introduced into the chamber, the seal began to leak. Within 3 minutes of starting the test, the leakage rated exceeded the allowable leakage rated based on the test plan. The pressure in the chamber had not yet been stabilized at 1.0 inches w.g. (~0.036 psi). The input air was increased and the chamber pressurized to 1.0 inches w.g. per the incline-plane manometer. Accounting for the negative differential pressure displayed by the DAQ at the beginning of the test due to noise (~-0.025 psi), the DAQ reported a differential pressure of ~0.01 psi when the incline-plane manometer read 1.0 inch w.g. (reported as Ch 1 dP (psi) in Appendix B).

With the chamber pressure maintained at 1.0 inch w.g., the recorded leakage rate varied between 25-32 cfm. The chamber pressure was allowed to drop as the AREVA Test Engineer assessed the unexpected events. After about 10-12 minutes the input air was increased again to achieve the 1.0 inch w.g. pressure differential. The pressure was held for 1-2 minutes and the recorded leakage ranged from 33-44 cfm. At this point the chamber pressure was allowed to drop and after another 10-15 minutes of consideration, a decision was made to stop the test.

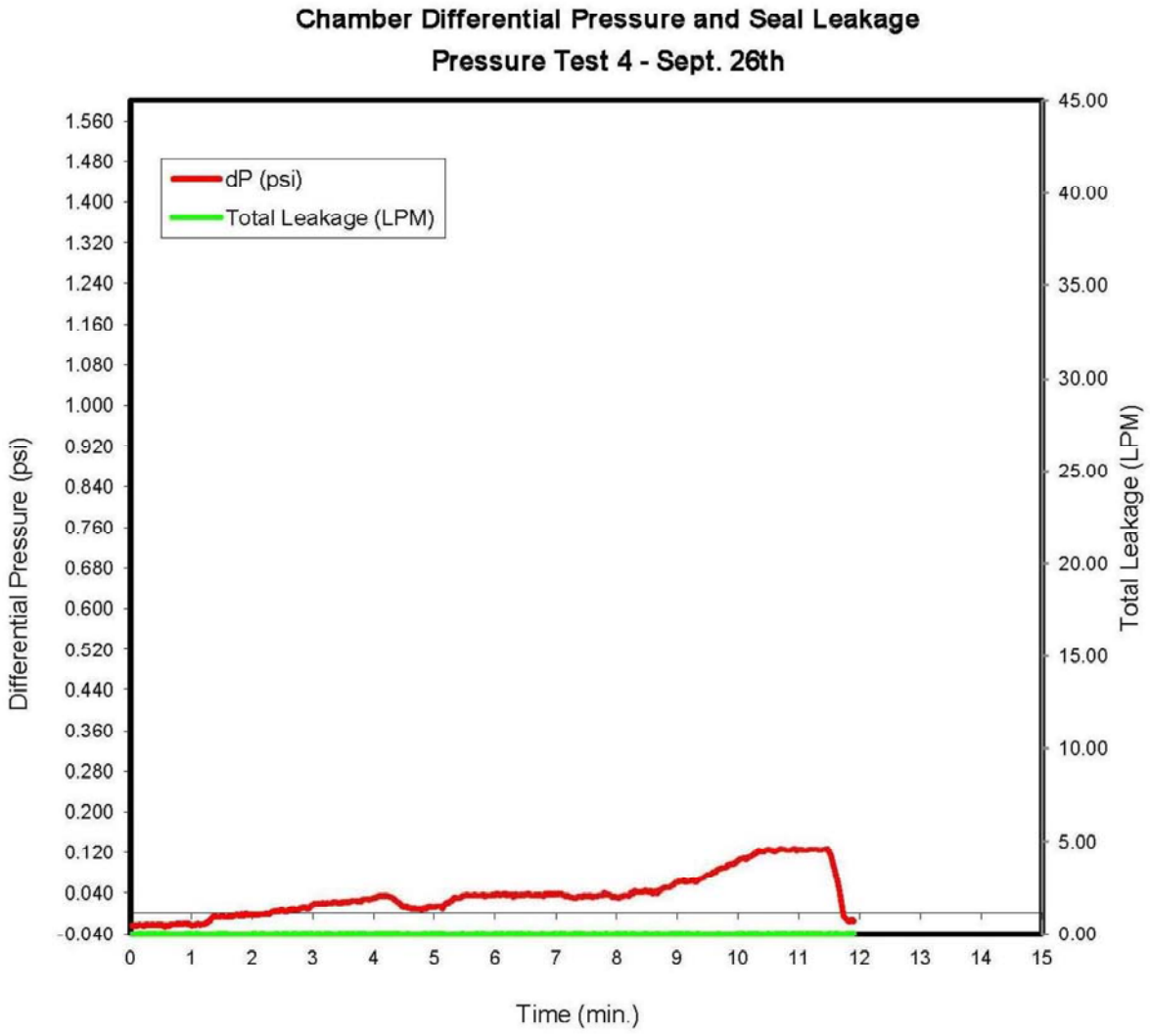
The graph on the following page depicts the above described events.



Next, the top chamber was removed and soapy water was applied to the seal surface, then the bottom chamber was pressurized. At first, there was no apparent leakage around the conduits or pipes, but there was significant leakage around the wire ways and cable trays, especially along the bottom of the stainless steel solid bottom tray.

The following day (September 26, 2013), with the top bonnet still off, it was decided to see if the assembly could be pressurized up to the Stage 2 requirement of 5.0 inches w.g., since Stages 2-5 do not have the amount of leakage stipulated as a condition of acceptance. The 0-15 psi regulator was fully opened to see if the Stage 2 pressure could be achieved. The leakage was so significant that even with the input air at full flow the Stage 2 pressure could not be reached. At this point a decision was made to terminate the test.

The following graph displays the data associated with the attempt to reach the Stage 2 pressure using the larger pressure regulator. Because the top bonnet was off, leakage data was not being recorded.


Chamber Differential Pressure and Seal Leakage
Pressure Test 4 - Sept. 26th
dP (psi)
Total Leakage (LPM)
Differential Pressure (psi)
Total Leakage (LPM)
Time (min.)
1.560
1.480
1.400
1.320
1.240
1.160
1.080
1.000
0.920
0.840
0.760
0.680
0.600
0.520
0.440
0.360
0.280
0.200
0.120
0.040
-0.040
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

Test Results and Observations

Test Stage	Differential Pressure inch w.g. (psi)	Required Hold Time (minutes)	Acceptance Criteria	PASS/ FAIL	Max Leakage (Total LPM)	Max Leakage (Total cfm)
1	1.0 (0.036)	30	Leakage $\leq$ 0.01 cfm/sq. ft. of penetration area	FAIL[1]	44.7	1.58
2	5.0 (0.181)	30	Seal Remains In Place	N/A[2]	N/A	N/A
3	10.0 (0.361)	30	Seal Remains In Place	N/A[2]	N/A	N/A
4	20.0 (0.722)	30	Seal Remains In Place	N/A[2]	N/A	N/A
5	40.0 (1.44)	30	Seal Remains In Place	N/A[2]	N/A	N/A

[1] Based on the table above and the allowable leakage for Pressure Test 4 per the Test Plan, the test specimen was allowed to have up to 0.113 cfm of leakage at Stage 1 vs. 1.58 cfm of actual leakage. Therefore, the seal was leaking almost 14 times the allowable leak rate at a differential pressure of 1.0 inch w.g. Additionally, the test specimen was not held at the Stage 1 pressure for the required 30 minute hold time. For these reasons, the test assembly is considered to have failed the Stage 1 test.

[2] Because there was insufficient supply air to overcome the amount of leakage such that Stage 2-5 pressures could be achieved, the test specimen is considered to be indeterminate for these stages.

5.2 POST TEST EXAMINATION

Following completion of the pressure test, visual and destructive (where necessary) post-test examinations were performed. These examinations included, but were not limited to, the following:

- Integrity of seal and conditions on the exposed side of the penetration
  - ➢ No visual changes were observed.
- Integrity of seal and conditions on the unexposed side of the penetration
  - ➢ No visual changes were observed.
- Location of any penetration seal degradation
  - ➢ No visual changes were observed.
- Condition of seal to barrier interface
  - ➢ No visual changes were observed.

- Condition of seal to penetrating item interfaces
  - The maximum air input from the control system was not great enough to produce the differential pressure required for Stage 2. This was due to leakage around all but the 3/4" diameter conduits. The maximum leakage occurred along the bottom of the solid bottom stainless steel cable tray.

6 Conclusion

Intertek Testing Services NA (Intertek) has conducted testing for AREVA NP Inc., on the pressure resistance capabilities of Quantum Silicones QSil 5558MC Silicone Elastomer (QSil 5558MC) in a 12" thick concrete deck for compliance with the applicable requirements of and in accordance with AREVA NP Inc. Document No. 51-9199513-003, *Detailed Test Plan for Conducting MOX Pressure Test 4.*This evaluation took place on September 25 and 26, 2013.

The seal in Pressure Test 4 failed to meet the Stage 1 acceptance criteria for leakage as defined in the Test Plan. Additionally, the leakage rate was so significant that even with the input air at full flow it was not possible to achieve the Stage 2 differential pressure. Even though the seal remained in place with no visible signs of damage or degradation, this test assembly is considered to have failed Stage 1, and its pressure retaining capabilities are indeterminate for Stages 2-5.

This project was undertaken to evaluate the pressure resistance capabilities of an 8" thick silicone elastomer seal when installed in and around various metallic electrical commodities at five different air pressure increments above atmospheric pressure.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK TESTING SERVICES NA

Reported by: [redacted]
Mike Dey
Staff Engineer

Reviewed by: [redacted]
Juan Manuel Flores, P.E.
Assistant Chief Engineer

Reviewed by: [redacted]
Michael A. Brown
Quality Supervisor

APPENDIX A
Assembly Drawings

APPENDIX A: TEST DECK/TEST SLAB DRAWINGS

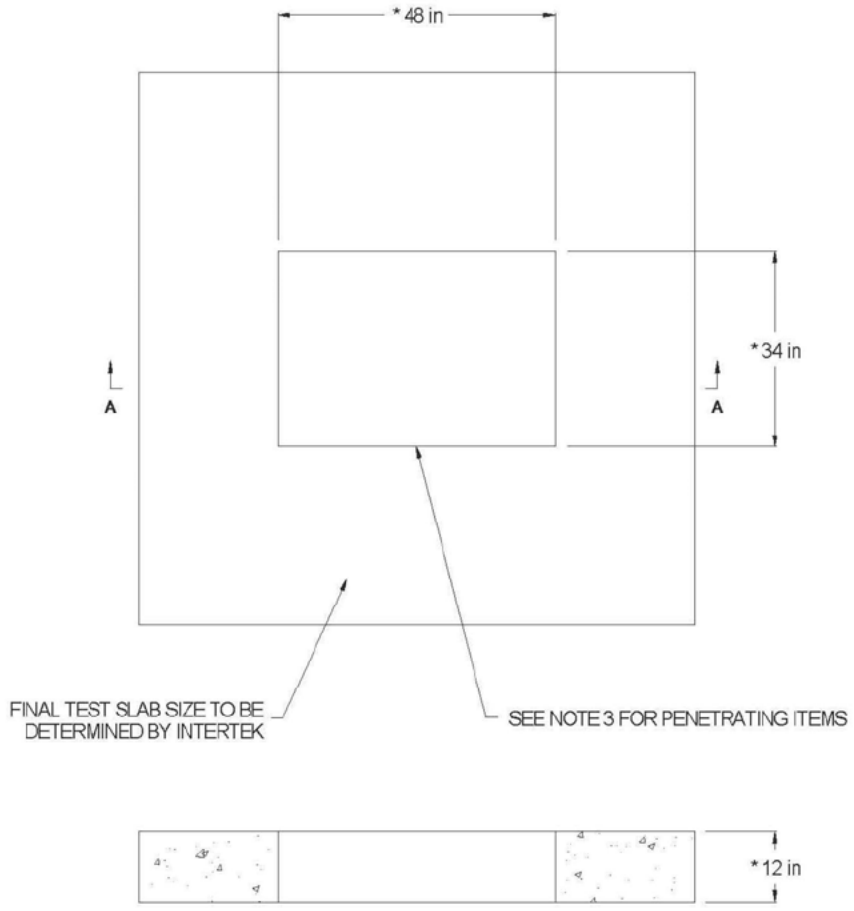
This appendix contains a drawing outlining the basic layout of the test deck/test slab to be used for this pressure test. Concrete reinforcement details and additional test deck features, such as perimeter framing details and lug locations for lifting the test deck, are the responsibility of the testing laboratory. Additionally, this appendix contains notes that are to be used in conjunction with the layout drawing to construct the test deck.

AREVA

Document No.: 51-9199513-003

Detailed Test Plan for Conducting MOX Pressure Test 4

Figure A-1: Pressure Test P4 Test Deck



SECTION A-A

NOTES:

1. TOLERANCE ON ALL SLAB DIMENSIONS IS +/- 1/4"
2. * INDICATES DIMENSIONS TO BE VERIFIED BY AREVA QC (OR APPROVED DESIGNEE).
3. SEE APPENDIX B FOR PENETRATING ITEMS AND PENETRATION SEAL DESIGN.

Intertek

APPENDIX B: TEST PENETRATION DRAWINGS

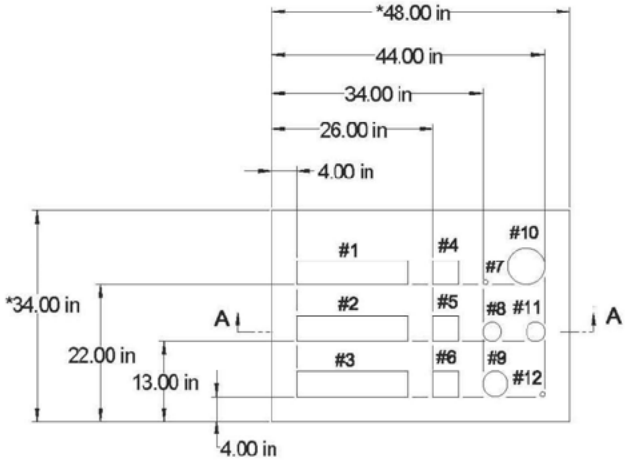
This appendix contains drawings for the test penetration for Pressure Test 4. These drawings identify penetrating item locations within the test penetration, as well as, the penetration seal design for the test penetration.

AREVA

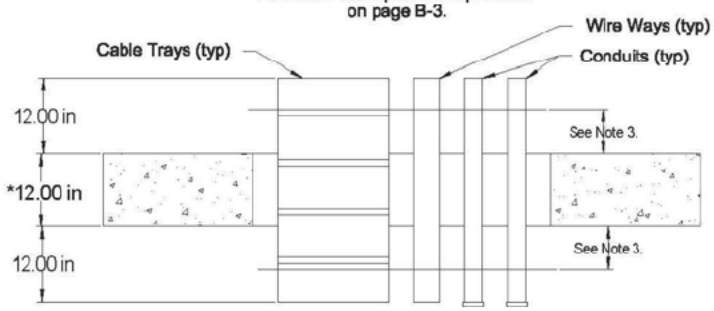
Document No.: 51-9199513-003

Detailed Test Plan for Conducting MOX Pressure Test 4

Pressure Test P4
Penetrating Item Locations



Penetrant descriptions are provided on page B-3.



Section A-A

NOTES:

1. TOLERANCE ON ALL SLAB DIMENSIONS IS +/- 1/4"
2. * INDICATES DIMENSIONS TO BE VERIFIED BY AREVA QC.
3. INSTALL SUPPORT APPROXIMATELY 6" TO 8" ABOVE AND BELOW SLAB.

AREVA

Document No.: 51-9199513-003

Detailed Test Plan for Conducting MOX Pressure Test 4

Pressure P4

Penetrant Description:

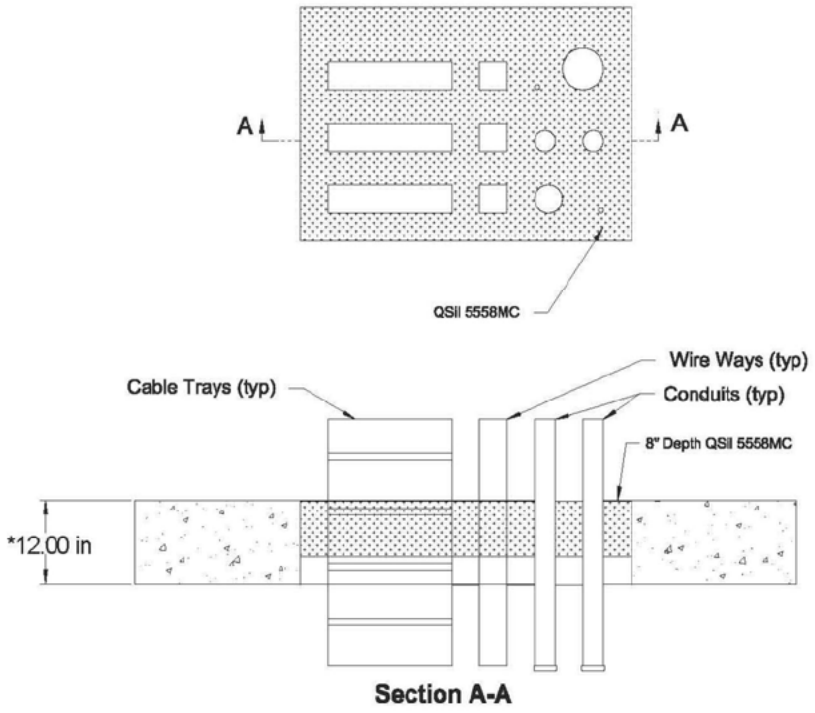
Penetrating Item #1 = 18"x4" galvanized steel, solid-bottom (GSB) cable tray without cables or cover
Penetrating Item #2 = 18"x4" galvanized steel, ladder-back (GLB) cable tray without cables or cover
Penetrating Item #3 = 18"x4" stainless steel, solid-bottom (SSSB) cable tray without cables or cover
Penetrating Item #4 = 4"x4" powder-coated carbon steel (PCCS) wire way without cables or cover
Penetrating Item #5 = 4"x4" galvanized steel (GS) wire way without cables or cover
Penetrating Item #6 = 4"x4" stainless steel (SS) wire way without cables or cover
Penetrating Item #7 = ¾" diameter empty stainless steel (SS) conduit capped on bottom side
Penetrating Item #8 = 3" diameter empty stainless steel (SS) conduit capped on bottom side
Penetrating Item #9 = 4" diameter empty stainless steel (SS) conduit capped on bottom side
Penetrating Item #10 = 6" diameter empty rigid galvanized steel (RGS) conduit capped on bottom side
Penetrating Item #11 = 3" diameter empty rigid galvanized steel (RGS) conduit capped on bottom side
Penetrating Item #12 = ¾" diameter empty rigid galvanized steel (RGS) conduit capped on bottom side

AREVA

Document No.: 51-9199513-003

Detailed Test Plan for Conducting MOX Pressure Test 4

Pressure Test P4
Penetration Seal Material Installation



Section A-A

NOTES:

1. TOLERANCE ON ALL SLAB DIMENSIONS IS +/- 1/4"
2. * INDICATES DIMENSIONS TO BE VERIFIED BY AREVA QC.

Intertek

APPENDIX B
Test Data

((First Test))

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
0	-0.0193	0.0311	0	0.0311
0.0333	-0.0213	0.0179	0	0.0179
0.0667	-0.0209	0	0	0
0.1	-0.018	0.0179	0	0.0179
0.1333	-0.02	0.0179	0	0.0179
0.1667	-0.019	0.0048	0	0.0048
0.2	-0.0167	0.0179	0.0006	0.0185
0.2333	-0.0183	0.0048	0	0.0048
0.2667	-0.019	0.0048	0.0006	0.0054
0.3	-0.019	0.0048	0	0.0048
0.3333	-0.019	0	0	0
0.3667	-0.0193	0.0048	0.0006	0.0054
0.4	-0.0167	0.0179	0.0006	0.0185
0.4333	-0.017	0.0179	0	0.0179
0.4667	-0.0213	0.0179	0	0.0179
0.5	-0.0196	0.0179	0.0006	0.0185
0.5333	-0.0206	0.0048	0.0006	0.0054
0.5667	-0.0193	0.0048	0.0006	0.0054
0.6	-0.0176	0.0179	0.0006	0.0185
0.6333	-0.0183	0.0048	0	0.0048
0.6667	-0.0157	0.0179	0	0.0179
0.7	-0.0209	0.0048	0	0.0048
0.7333	-0.0153	0.0048	0	0.0048
0.7667	-0.0186	0.0179	0.0006	0.0185
0.8	-0.019	0.0048	0	0.0048
0.8333	-0.0173	0.0311	0	0.0311
0.8667	-0.0134	0.0179	0	0.0179
0.9	-0.0163	0.0048	0	0.0048
0.9333	-0.0176	0.0179	0	0.0179
0.9667	-0.0167	0.0048	0	0.0048
1	-0.0176	0	0	0
1.0333	-0.0147	0.0048	0	0.0048
1.0667	-0.0167	0.0048	0	0.0048
1.1	-0.015	0.0179	0.0006	0.0185
1.1333	-0.0157	0.0311	0	0.0311
1.1667	-0.0147	0.0179	0.0006	0.0185
1.2	-0.019	0.0179	0.8474	0.8654
1.2333	-0.0137	0.0048	0.9014	0.9061
1.2667	-0.018	0.0179	0.9487	0.9666
1.3	-0.015	0	0.9895	0.9895
1.3333	-0.018	0.0048	1.0407	1.0455
1.3667	-0.0163	0.0179	1.0881	1.106
1.4	-0.0163	0.0048	1.1341	1.1389

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
1.4333	-0.019	0.0179	1.1788	1.1967
1.4667	-0.0163	0.0179	1.2262	1.2441
1.5	-0.0134	0.0179	1.2682	1.2862
1.5333	-0.017	0.0179	1.3116	1.3296
1.5667	-0.014	0.0311	1.3498	1.3808
1.6	-0.013	0.0179	1.3866	1.4045
1.6333	-0.0173	0.0179	1.4352	1.4532
1.6667	-0.014	0.0179	1.4681	1.486
1.7	-0.0173	0.0048	1.5049	1.5097
1.7333	-0.0163	0.0048	1.5444	1.5492
1.7667	-0.0167	0.0179	1.5773	1.5952
1.8	-0.0144	0.0179	1.618	1.6359
1.8333	-0.0153	0.0048	1.6483	1.653
1.8667	-0.0117	0.0048	1.6903	1.6951
1.9	-0.0144	0.0179	1.7258	1.7438
1.9333	-0.0127	0.0179	1.7574	1.7753
1.9667	-0.0147	0.0048	1.7942	1.799
2	-0.0137	0.0048	1.8271	1.8319
2.0333	-0.0167	0.0048	1.856	1.8608
2.0667	-0.0173	0.0311	1.8889	1.92
2.1	-0.0157	0.0179	1.9165	1.9344
2.1333	-0.0163	0.0179	1.9494	1.9673
2.1667	-0.0147	0.0179	1.9783	1.9962
2.2	-0.0183	0.0048	2.0125	2.0173
2.2333	-0.0144	0.0179	2.0388	2.0567
2.2667	-0.0111	0.0179	2.0677	2.0857
2.3	-0.0163	0.0048	2.0967	2.1014
2.3333	-0.0173	0.0048	2.1256	2.1304
2.3667	-0.0127	0.0048	2.1479	2.1527
2.4	-0.0153	0.0311	2.1716	2.2027
2.4333	-0.0137	0.0311	2.2098	2.2408
2.4667	-0.0163	0	2.2597	2.2597
2.5	-0.0134	0.0048	2.3018	2.3066
2.5333	-0.0107	0.0048	2.3794	2.3842
2.5667	-0.0124	0.0048	2.4504	2.4552
2.6	-0.0137	0.0311	2.5424	2.5735
2.6333	-0.0111	0.0179	2.6227	2.6406
2.6667	-0.0117	0.0048	2.7068	2.7116
2.7	-0.0088	0.0179	2.7989	2.8168
2.7333	-0.0121	0.0048	2.8843	2.8891
2.7667	-0.0097	0.0048	2.9777	2.9825
2.8	-0.0088	0.0179	3.0789	3.0969
2.8333	-0.0055	0.0179	3.1894	3.2073

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
2.8667	-0.0097	0.0179	3.3038	3.3217
2.9	-0.0081	0.0179	3.4222	3.4401
2.9333	-0.0038	0.0179	3.5497	3.5676
2.9667	-0.0048	0.0311	3.6773	3.7083
3	-0.0051	0.0179	3.8114	3.8293
3.0333	-0.0055	0.0048	3.9429	3.9477
3.0667	-0.0042	0.0311	4.0823	4.1134
3.1	-0.0042	0.0048	4.2243	4.2291
3.1333	-0.0022	0.0179	4.3742	4.3921
3.1667	-0.0035	0.0311	4.5215	4.5526
3.2	-0.0045	0.0179	4.6648	4.6827
3.2333	-0.0042	0.0048	4.8121	4.8169
3.2667	-0.0002	0.0179	4.9607	4.9786
3.3	-0.0002	0.0311	5.1185	5.1496
3.3333	0.0008	0.0179	5.2828	5.3008
3.3667	-0.0002	0.0179	5.4722	5.4901
3.4	0.0005	0.0179	5.6524	5.6703
3.4333	0.0008	0.0179	5.609	5.6269
3.4667	0.0054	0.0048	5.9574	5.9622
3.5	-0.0002	0.0048	6.2244	6.2291
3.5333	0.0051	0.0048	6.3953	6.4001
3.5667	0.0041	0.0311	6.561	6.5921
3.6	0.0021	0.0179	6.7293	6.7472
3.6333	0.0021	0.0311	6.8845	6.9156
3.6667	0.0008	0.0048	7.0462	7.051
3.7	-0.0005	0	7.2053	7.2053
3.7333	0.0008	0	7.3447	7.3447
3.7667	0.0008	0.0048	7.5051	7.5099
3.8	0.0011	0.0048	7.6445	7.6493
3.8333	0.008	20.2028	6.803	27.0057
3.8667	0.0123	25.0813	6.4058	31.4871
3.9	0.0103	24.2923	6.4058	30.6982
3.9333	0.0123	23.8452	6.3901	30.2353
3.9667	0.0166	23.6085	6.3743	29.9828
4	0.0146	23.3981	6.3572	29.7553
4.0333	0.0133	23.3718	6.3414	29.7132
4.0667	0.0159	23.2798	6.3309	29.6107
4.1	0.0139	23.2666	6.3217	29.5883
4.1333	0.0149	23.2141	6.3033	29.5173
4.1667	0.0149	23.1483	6.2914	29.4397
4.2	0.0103	23.2404	6.2809	29.5213
4.2333	0.012	23.1483	6.2756	29.424
4.2667	0.0153	23.1746	6.2638	29.4384

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
4.3	0.0126	23.1878	6.2625	29.4502
4.3333	0.0133	23.1483	6.2507	29.399
4.3667	0.0116	23.8847	0.449	24.3337
4.4	0.009	24.1608	0	24.1608
4.4333	0.0097	24.266	0.0006	24.2666
4.4667	0.012	24.3186	0.0006	24.3192
4.5	0.0093	24.4633	0.0006	24.4639
4.5333	0.0087	24.5422	0.0006	24.5428
4.5667	0.0107	24.5685	0.0006	24.5691
4.6	0.013	24.6737	0	24.6737
4.6333	0.0113	24.7526	0.0006	24.7532
4.6667	0.0103	24.8446	0	24.8446
4.7	0.0113	24.6342	0	24.6342
4.7333	0.0113	25.0682	0.0006	25.0688
4.7667	0.0113	25.055	0	25.055
4.8	0.011	25.1997	0.0006	25.2003
4.8333	0.0107	25.2786	0	25.2786
4.8667	0.0103	25.3706	0	25.3706
4.9	0.0093	25.3969	0	25.3969
4.9333	0.0087	25.4495	0	25.4495
4.9667	0.0093	25.4627	0	25.4627
5	0.011	25.5679	0	25.5679
5.0333	0.01	25.6468	0	25.6468
5.0667	0.0093	25.6993	0.0006	25.6999
5.1	0.0107	25.7782	0	25.7782
5.1333	0.0126	25.8045	0	25.8045
5.1667	0.0123	25.8834	0	25.8834
5.2	0.01	25.9229	0.0019	25.9248
5.2333	0.012	25.5679	2.908	28.4759
5.2667	0.013	24.9367	7.9075	32.8442
5.3	0.0087	0.0048	8.7846	8.7894
5.3333	0.0018	0.0048	8.7386	8.7434
5.3667	0.0014	0.0179	8.7162	8.7342
5.4	0.0018	0.0179	8.782	8.7999
5.4333	0.0018	0.0048	8.8609	8.8657
5.4667	-0.0009	0	8.949	8.949
5.5	0.0024	0	9.0029	9.0029
5.5333	0.0024	0.0048	8.9332	8.938
5.5667	0.0034	0	7.3618	7.3618
5.6	-0.0015	0.0048	9.3172	9.322
5.6333	0.0014	0.0048	7.851	7.8558
5.6667	0.0021	0.0179	9.8432	9.8611
5.7	0.0001	0	9.9076	9.9076

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
5.7333	0.0034	0	9.9904	9.9904
5.7667	0.0028	0.0048	10.0693	10.0741
5.8	0.0014	0.0048	10.1693	10.1741
5.8333	0.0008	0.0048	9.8077	9.8124
5.8667	0.0011	0.0048	10.3363	10.3411
5.9	0.0024	0.0179	10.4257	10.4436
5.9333	0.0021	0.0179	10.5861	10.6041
5.9667	0.0021	0.0048	10.6111	10.6159
6	-0.0018	0.0048	10.7886	10.7934
6.0333	-0.0005	0.0048	10.8531	10.8579
6.0667	0.0028	0.0179	10.9241	10.942
6.1	0.0044	0.0179	11.0017	11.0196
6.1333	-0.0005	0.0179	11.0753	11.0932
6.1667	0.0008	0.0048	11.1503	11.155
6.2	-0.0005	0.0179	11.2239	11.2418
6.2333	-0.0002	0	11.3015	11.3015
6.2667	0.0011	0.0048	11.3777	11.3825
6.3	0.0044	0	11.4461	11.4461
6.3333	-0.0018	0	11.525	11.525
6.3667	-0.0009	0.0048	11.5802	11.585
6.4	0.0005	0	11.6486	11.6486
6.4333	0.0005	0.0179	11.7275	11.7455
6.4667	0.0008	0	11.7709	11.7709
6.5	0.0018	0.0179	11.8538	11.8717
6.5333	0.0024	0.0048	11.9182	11.923
6.5667	-0.0009	0.0048	11.9708	11.9756
6.6	0.0011	0.0179	12.0352	12.0532
6.6333	-0.0002	0.0048	12.1023	12.1071
6.6667	-0.0009	0	12.1496	12.1496
6.7	0.0028	0.0048	12.2101	12.2149
6.7333	-0.0032	0.0179	12.2561	12.2741
6.7667	-0.0137	0.0048	12.1786	12.1833
6.8	-0.0173	0.0048	12.0221	12.0269
6.8333	-0.0236	0.0179	11.7591	11.777
6.8667	-0.0275	0.0179	11.4501	11.468
6.9	-0.0255	0	11.1568	11.1568
6.9333	-0.0292	0.0048	10.8978	10.9026
6.9667	-0.0292	0	10.6282	10.6282
7	-0.0282	0.0048	10.3126	10.3174
7.0333	-0.0282	0.0179	10.0075	10.0255
7.0667	-0.0308	0.0048	9.6919	9.6967
7.1	-0.0321	0.0179	9.4053	9.4232
7.1333	-0.0269	0.0048	9.1199	9.1247

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
7.1667	-0.0305	0.0048	8.8398	8.8446
7.2	-0.0308	0.0048	8.569	8.5737
7.2333	-0.0328	0.0179	8.3033	8.3213
7.2667	-0.0272	0.0179	8.0509	8.0688
7.3	-0.0315	0.0048	7.8129	7.8176
7.3333	-0.0288	0	7.5551	7.5551
7.3667	-0.0295	0.0179	7.3211	7.339
7.4	-0.0302	0.0048	7.0936	7.0983
7.4333	-0.0308	0.0179	6.8674	6.8853
7.4667	-0.0269	0.0179	6.6596	6.6776
7.5	-0.0288	0.0179	6.4558	6.4737
7.5333	-0.0265	0.0048	6.2678	6.2725
7.5667	-0.0298	0.0179	6.0666	6.0845
7.6	-0.0295	0.0179	5.8627	5.8807
7.6333	-0.0275	0.0048	5.6734	5.6782
7.6667	-0.0295	0.0179	5.5024	5.5204
7.7	-0.0249	0	5.3341	5.3341
7.7333	-0.0275	0.0179	5.1579	5.1759
7.7667	-0.0269	0.0048	4.9922	4.997
7.8	-0.0292	0.0179	4.8358	4.8537
7.8333	-0.0252	0.0048	4.6793	4.6841
7.8667	-0.0288	0.0179	4.5254	4.5434
7.9	-0.0249	0.0048	4.3703	4.375
7.9333	-0.0275	0.0048	4.2243	4.2291
7.9667	-0.0282	0.0048	4.0915	4.0963
8	-0.0262	0.0179	3.9468	3.9648
8.0333	-0.0252	0.0179	3.8074	3.8254
8.0667	-0.0262	0	3.6746	3.6746
8.1	-0.0239	0.0048	3.5537	3.5584
8.1333	-0.0255	0.0048	3.4274	3.4322
8.1667	-0.0239	0.0179	3.3038	3.3217
8.2	-0.0252	0.0048	3.1894	3.1942
8.2333	-0.0239	0.0179	3.0711	3.089
8.2667	-0.0252	0.0311	2.9659	2.9969
8.3	-0.0255	0.0179	2.8501	2.8681
8.3333	-0.0288	0.0048	2.7436	2.7484
8.3667	-0.0239	0.0048	2.649	2.6537
8.4	-0.0242	0.0048	2.553	2.5577
8.4333	-0.0242	0	2.4491	2.4491
8.4667	-0.0259	0.0311	2.3531	2.3842
8.5	-0.0232	0.0048	2.2584	2.2632
8.5333	-0.0259	0	2.1742	2.1742
8.5667	-0.0262	0.0048	2.0901	2.0949

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
8.6	-0.0226	0.0179	2.0086	2.0265
8.6333	-0.0229	0.0179	1.9297	1.9476
8.6667	-0.0232	0.0179	1.8494	1.8674
8.7	-0.0232	0.0311	1.7732	1.8043
8.7333	-0.0239	0.0179	1.6982	1.7162
8.7667	-0.0239	0.0179	1.622	1.6399
8.8	-0.0242	0	1.5523	1.5523
8.8333	-0.0239	0.0179	1.4826	1.5005
8.8667	-0.0242	0.0048	1.426	1.4308
8.9	-0.0229	0.0048	1.3576	1.3624
8.9333	-0.0223	0	1.2906	1.2906
8.9667	-0.0219	0.0048	1.2327	1.2375
9	-0.0226	0.0311	1.1709	1.202
9.0333	-0.0232	0.0311	1.121	1.152
9.0667	-0.0226	0.0311	1.071	1.1021
9.1	-0.0236	0.0048	1.0223	1.0271
9.1333	-0.0209	0.0311	0.9737	1.0048
9.1667	-0.0232	0.0048	0.9224	0.9272
9.2	-0.0209	0.0179	0.8777	0.8956
9.2333	-0.0242	0.0311	0.8343	0.8654
9.2667	-0.0213	0.0179	0.7896	0.8075
9.3	-0.0232	0.0048	0.7514	0.7562
9.3333	-0.0223	0.0048	0.7067	0.7115
9.3667	-0.0216	0.0048	0.6752	0.68
9.4	-0.0216	0.0048	0.641	0.6458
9.4333	-0.0203	0.0179	0.6068	0.6247
9.4667	-0.0206	0.0179	0.5752	0.5932
9.5	-0.0203	0.0048	0.5384	0.5432
9.5333	-0.0232	0.0179	0.5161	0.534
9.5667	-0.0216	0.0179	0.4898	0.5077
9.6	-0.0223	0.0179	0.4648	0.4827
9.6333	-0.0219	0.0179	0.4359	0.4538
9.6667	-0.0236	0.0048	0.4082	0.413
9.7	-0.0232	0.0179	0.3898	0.4078
9.7333	-0.0223	0.0048	0.3648	0.3696
9.7667	-0.0209	0.0179	0.3464	0.3644
9.8	-0.0223	0.0048	0.3188	0.3236
9.8333	-0.0203	0.0179	0.3044	0.3223
9.8667	-0.0186	0.0048	0.0006	0.0054
9.9	-0.02	0.0048	0	0.0048
9.9333	-0.0193	0.0179	0.0006	0.0185
9.9667	-0.0183	0	0	0
10	-0.0203	0.0179	0.0006	0.0185

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
10.0333	-0.0203	0.0048	0.0006	0.0054
10.0667	-0.0206	0.0311	0	0.0311
10.1	-0.0223	0.0048	0.0006	0.0054
10.1333	-0.0232	0.0179	0	0.0179
10.1667	-0.0196	0.0179	0	0.0179
10.2	-0.02	0.0179	0	0.0179
10.2333	-0.0183	0.0179	0.0006	0.0185
10.2667	-0.0167	0.0179	0	0.0179
10.3	-0.0193	0.0048	0.0019	0.0067
10.3333	-0.0183	0.0179	0	0.0179
10.3667	-0.0223	0	0	0
10.4	-0.0196	0.0179	0.0006	0.0185
10.4333	-0.02	0.0179	0.0006	0.0185
10.4667	-0.0246	0.0048	0	0.0048
10.5	-0.0226	0.0179	0	0.0179
10.5333	-0.0209	0.0179	0	0.0179
10.5667	-0.019	0.0048	0	0.0048
10.6	-0.0213	0.0179	0.0006	0.0185
10.6333	-0.02	0.0048	0	0.0048
10.6667	-0.0209	0.0048	0.0006	0.0054
10.7	-0.0216	0.0048	0.0006	0.0054
10.7333	-0.02	0.0179	0.0006	0.0185
10.7667	-0.0186	0.0311	0.0006	0.0317
10.8	-0.02	0.0048	0.0006	0.0054
10.8333	-0.018	0.0048	0.0006	0.0054
10.8667	-0.0176	0.0179	0	0.0179
10.9	-0.019	0.0048	0.0006	0.0054
10.9333	-0.0216	0.0048	0.0006	0.0054
10.9667	-0.0176	0.0048	0.0006	0.0054
11	-0.0193	0	0	0
11.0333	-0.0213	0.0048	0.0006	0.0054
11.0667	-0.0213	0.0179	0.0006	0.0185
11.1	-0.0203	0.0048	0	0.0048
11.1333	-0.02	0.0179	0	0.0179
11.1667	-0.0196	0.0048	0.0019	0.0067
11.2	-0.0216	0.0179	0.0006	0.0185
11.2333	-0.0219	0.0048	0.0006	0.0054
11.2667	-0.0203	0.0048	0	0.0048
11.3	-0.0193	0.0048	0.0006	0.0054
11.3333	-0.0183	0.0311	0.0006	0.0317
11.3667	-0.0219	0	0	0
11.4	-0.0203	0.0179	0	0.0179
11.4333	-0.0213	0.0179	0	0.0179

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
11.4667	-0.0186	0.0311	0.0006	0.0317
11.5	-0.0216	0.0048	0	0.0048
11.5333	-0.02	0	0	0
11.5667	-0.0193	0.0048	0	0.0048
11.6	-0.0183	0.0048	0	0.0048
11.6333	-0.0223	0.0311	0	0.0311
11.6667	-0.019	0.0048	0	0.0048
11.7	-0.0206	0.0179	0.0006	0.0185
11.7333	-0.0203	0.0048	0.0006	0.0054
11.7667	-0.0216	0.0179	0.0006	0.0185
11.8	-0.0203	0.0179	0.0006	0.0185
11.8333	-0.0203	0.0048	0.0006	0.0054
11.8667	-0.0167	0.0179	0.0006	0.0185
11.9	-0.0193	0.0179	0	0.0179
11.9333	-0.0213	0.0179	0	0.0179
11.9667	-0.018	0.0048	0	0.0048
12	-0.0183	0.0179	0.0006	0.0185
12.0333	-0.0226	0.0179	0.0006	0.0185
12.0667	-0.0173	0.0048	0	0.0048
12.1	-0.02	0.0179	0	0.0179
12.1333	-0.0183	0	0	0
12.1667	-0.0209	0.0048	0	0.0048
12.2	-0.0203	0	0	0
12.2333	-0.0216	0.0311	0.0019	0.033
12.2667	-0.018	0.0048	0	0.0048
12.3	-0.0229	0.0048	0	0.0048
12.3333	-0.0196	0.0048	0	0.0048
12.3667	-0.0183	0.0179	0.0006	0.0185
12.4	-0.0183	0.0179	0.0006	0.0185
12.4333	-0.0223	0	0.0006	0.0006
12.4667	-0.0203	0.0048	0	0.0048
12.5	-0.0193	0.0048	0.0006	0.0054
12.5333	-0.0203	0.0048	0	0.0048
12.5667	-0.018	0.0048	0.0006	0.0054
12.6	-0.02	0.0179	0.0006	0.0185
12.6333	-0.0209	0.0179	0	0.0179
12.6667	-0.0226	0.0179	0	0.0179
12.7	-0.0209	0.0048	0.0006	0.0054
12.7333	-0.0173	0.0311	0	0.0311
12.7667	-0.0196	0.0048	0	0.0048
12.8	-0.0167	0.0179	0	0.0179
12.8333	-0.019	0	0.0006	0.0006
12.8667	-0.02	0.0048	0.0019	0.0067

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
12.9	-0.0206	0.0048	0.0006	0.0054
12.9333	-0.0216	0.0311	0	0.0311
12.9667	-0.0203	0.0179	0	0.0179
13	-0.0196	0.0311	0.0006	0.0317
13.0333	-0.0213	0.0048	0	0.0048
13.0667	-0.019	0.0048	0.0006	0.0054
13.1	-0.0203	0.0179	0	0.0179
13.1333	-0.0213	0.0179	0.0006	0.0185
13.1667	-0.0196	0.0311	0.0006	0.0317
13.2	-0.019	0	0.0006	0.0006
13.2333	-0.0209	0.0048	0.0006	0.0054
13.2667	-0.019	0	0.0006	0.0006
13.3	-0.0193	0.0179	0	0.0179
13.3333	-0.0213	0.0179	0.0006	0.0185
13.3667	-0.0193	0.0311	0.0006	0.0317
13.4	-0.0183	0.0179	0	0.0179
13.4333	-0.0206	0.0311	0.0006	0.0317
13.4667	-0.0173	0.0048	0.0006	0.0054
13.5	-0.0196	0.0048	0	0.0048
13.5333	-0.02	0.0048	0	0.0048
13.5667	-0.0203	0.0179	0	0.0179
13.6	-0.019	0.0048	0	0.0048
13.6333	-0.018	0.0311	0	0.0311
13.6667	-0.0216	0.0179	0.0006	0.0185
13.7	-0.0213	0.0048	0	0.0048
13.7333	-0.018	0.0048	0	0.0048
13.7667	-0.0216	0.0048	0.0006	0.0054
13.8	-0.0216	0.0048	0	0.0048
13.8333	-0.019	0.0179	0	0.0179
13.8667	-0.0176	0.0179	0.0006	0.0185
13.9	-0.02	0.0048	0	0.0048
13.9333	-0.0193	0	0	0
13.9667	-0.0209	0.0179	0.0006	0.0185
14	-0.019	0.0179	0	0.0179
14.0333	-0.02	0.0179	0	0.0179
14.0667	-0.0193	0.0179	0.0006	0.0185
14.1	-0.0193	0.0179	0.0006	0.0185
14.1333	-0.019	0	0.0019	0.0019
14.1667	-0.0206	0.0048	0	0.0048
14.2	-0.018	0.0048	0.0019	0.0067
14.2333	-0.018	0.0048	0	0.0048
14.2667	-0.018	0.0311	0.0006	0.0317
14.3	-0.0203	0.0179	0	0.0179

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
14.3333	-0.0203	0.0179	0	0.0179
14.3667	-0.0213	0.0048	0.0006	0.0054
14.4	-0.0206	0.0048	0	0.0048
14.4333	-0.019	0.0048	0	0.0048
14.4667	-0.0203	0.0179	0	0.0179
14.5	-0.0183	0.0048	0.0006	0.0054
14.5333	-0.0206	0.0048	0	0.0048
14.5667	-0.0216	0.0179	0	0.0179
14.6	-0.0209	0.0179	0	0.0179
14.6333	-0.0219	0.0048	0	0.0048
14.6667	-0.0193	0.0179	0.0006	0.0185
14.7	-0.0167	0.0179	0.0006	0.0185
14.7333	-0.0186	0.0048	0	0.0048
14.7667	-0.0223	0.0179	0	0.0179
14.8	-0.0176	0.0048	0	0.0048
14.8333	-0.0167	0.0179	0.0006	0.0185
14.8667	-0.02	0.0048	0.0019	0.0067
14.9	-0.0206	0.0048	0.0006	0.0054
14.9333	-0.0186	0.0179	0	0.0179
14.9667	-0.0223	0.0048	0	0.0048
15	-0.0163	0.0048	0.0006	0.0054
15.0333	-0.0196	0.0048	0.0019	0.0067
15.0667	-0.0173	0.0048	0.0006	0.0054
15.1	-0.0193	0.0311	0.0006	0.0317
15.1333	-0.0209	0.0048	0.0006	0.0054
15.1667	-0.0203	0.0048	0.0006	0.0054
15.2	-0.014	0.0179	0.0006	0.0185
15.2333	-0.0137	0.0048	0	0.0048
15.2667	-0.0137	0.0048	0	0.0048
15.3	-0.015	0.0179	0	0.0179
15.3333	-0.015	0.0179	0	0.0179
15.3667	-0.0111	0.0179	0	0.0179
15.4	-0.0147	0.0179	0.8632	0.8812
15.4333	-0.0121	0.0048	0.9461	0.9508
15.4667	-0.0117	0.0048	1.0513	1.056
15.5	-0.0097	0.0179	1.1867	1.2046
15.5333	-0.0094	0.0048	1.3169	1.3217
15.5667	-0.0074	0.0048	1.4668	1.4716
15.6	-0.0074	0.0048	1.6193	1.6241
15.6333	-0.0065	0.0179	1.7706	1.7885
15.6667	-0.0084	0.0048	1.9126	1.9173
15.7	-0.0074	0	2.052	2.052
15.7333	-0.0094	0.0048	2.1835	2.1882

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
15.7667	-0.0081	0	2.3044	2.3044
15.8	-0.0032	0.0179	2.4543	2.4723
15.8333	-0.0058	0.0179	2.6029	2.6209
15.8667	-0.0084	0	2.7581	2.7581
15.9	-0.0025	0.0179	2.9027	2.9207
15.9333	-0.0058	0.0048	3.0329	3.0377
15.9667	-0.0032	0.0311	3.1697	3.2008
16	-0.0055	0.0048	3.3012	3.306
16.0333	-0.0061	0.0048	3.4406	3.4453
16.0667	-0.0058	0.0048	3.5615	3.5663
16.1	-0.0051	0.0048	3.697	3.7018
16.1333	-0.0012	0.0179	3.8337	3.8517
16.1667	-0.0061	0.0311	3.981	4.0121
16.2	-0.0032	0.0048	4.1362	4.141
16.2333	-0.0045	0.0179	4.2795	4.2975
16.2667	-0.0009	0.0048	4.4189	4.4237
16.3	-0.0038	0.0179	4.5622	4.5802
16.3333	0.0005	0.0048	4.7213	4.7261
16.3667	0.0001	0.0179	4.8857	4.9037
16.4	0.0021	0	5.0632	5.0632
16.4333	0.0014	0.0179	5.2434	5.2613
16.4667	0.0001	0.0179	5.4183	5.4362
16.5	0.0051	0.0179	5.6024	5.6203
16.5333	-0.0002	0.0179	5.7746	5.7926
16.5667	0.0034	0.0179	5.9443	5.9622
16.6	0.0005	0.0048	6.1165	6.1213
16.6333	0.0018	0.0048	6.2783	6.2831
16.6667	0.0028	0.0048	6.4413	6.4461
16.7	0.0014	0.0048	6.5781	6.5829
16.7333	-0.0005	0.0311	6.728	6.7591
16.7667	-0.0015	0.0179	6.8858	6.9037
16.8	0.0008	0.0179	7.0475	7.0655
16.8333	0.0031	0.0179	7.2159	7.2338
16.8667	0.0064	0.0048	7.3881	7.3929
16.9	0.007	0.0048	7.5591	7.5638
16.9333	0.0054	0.0048	7.73	7.7348
16.9667	0.0064	0.0179	7.9036	7.9215
17	0.006	0.0179	8.0745	8.0925
17.0333	0.0054	0	8.2494	8.2494
17.0667	0.0047	0	8.4191	8.4191
17.1	0.0093	0.0179	8.5926	8.6106
17.1333	0.0074	0	8.7504	8.7504
17.1667	0.009	0.0048	8.9187	8.9235

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
17.2	0.0057	0.0179	8.7675	8.7855
17.2333	0.0047	0.0048	9.0608	9.0655
17.2667	0.0077	0.0048	8.9056	8.9104
17.3	0.0064	0.0179	9.496	9.5139
17.3333	0.008	0.0311	8.9674	8.9985
17.3667	0.0074	0.0048	10.0759	10.0807
17.4	0.011	0	10.2193	10.2193
17.4333	0.011	0.0048	10.3389	10.3437
17.4667	0.009	0	10.477	10.477
17.5	0.01	0.0179	10.6256	10.6435
17.5333	0.0103	0.0179	10.7807	10.7987
17.5667	0.0097	0.0048	10.907	10.9118
17.6	0.013	0.0048	11.0622	11.0669
17.6333	0.0097	0.0048	11.1936	11.1984
17.6667	0.0107	0.0179	11.337	11.3549
17.7	0.0067	0.0179	11.458	11.4759
17.7333	0.0113	0.0048	11.5947	11.5995
17.7667	0.0074	0.0179	11.7275	11.7455
17.8	0.008	0.0179	11.8511	11.8691
17.8333	0.0116	19.6505	11.0937	30.7442
17.8667	0.0225	34.7332	10.0089	44.7421
17.9	0.0261	33.4971	9.9602	43.4573
17.9333	0.0265	32.8002	9.9418	42.742
17.9667	0.0235	32.2742	9.9089	42.1831
18	0.0251	33.3788	0.0006	33.3794
18.0333	0.0245	33.313	0	33.313
18.0667	0.0195	33.221	0.0006	33.2216
18.1	0.0192	33.2867	0.0006	33.2873
18.1333	0.0268	31.7745	11.5776	43.3521
18.1667	0.0271	31.6562	10.9017	42.5579
18.2	0.0255	31.5773	10.4139	41.9911
18.2333	0.0245	31.5247	10.0983	41.623
18.2667	0.0225	31.3932	9.8708	41.264
18.3	0.0192	31.1828	9.6788	40.8616
18.3333	0.0166	30.9066	9.4789	40.3856
18.3667	0.0153	30.5779	9.2948	39.8727
18.4	0.0136	30.3544	9.0529	39.4072
18.4333	0.0133	30.0125	8.7899	38.8023
18.4667	0.0149	29.7363	8.6636	38.4
18.5	0.0123	29.5522	8.5321	38.0844
18.5333	0.0156	29.3024	8.6834	37.9857
18.5667	0.0166	28.9999	8.5611	37.561
18.6	0.0146	28.8158	8.4546	37.2704

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
18.6333	0.0176	28.566	8.3625	36.9285
18.6667	0.0116	28.3293	8.2757	36.605
18.7	0.0159	28.1846	8.1942	36.3788
18.7333	0.0126	27.9743	8.1179	36.0922
18.7667	0.0126	27.8296	8.0325	35.8621
18.8	0.0146	27.6718	7.9588	35.6306
18.8333	0.0103	27.4877	7.8957	35.3834
18.8667	0.0169	27.3036	7.8247	35.1283
18.9	0.0116	27.0932	7.7445	34.8377
18.9333	0.013	26.9749	7.6748	34.6497
18.9667	0.0044	26.7382	7.5643	34.3025
19	-0.0018	26.2779	7.3737	33.6516
19.0333	0.0041	25.7256	7.1448	32.8705
19.0667	-0.0111	25.0419	6.8634	31.9053
19.1	-0.0153	24.0819	6.4729	30.5548
19.1333	-0.0163	23.0431	6.0955	29.1386
19.1667	-0.0167	22.1226	5.7234	27.846
19.2	-0.0167	21.1232	5.3907	26.5139
19.2333	-0.015	20.2554	5.0803	25.3357
19.2667	-0.0176	19.3217	4.791	24.1128
19.3	-0.0173	18.4933	4.5044	22.9977
19.3333	-0.0193	17.678	4.2466	21.9247
19.3667	-0.0163	16.889	3.9758	20.8648
19.4	-0.0242	15.9423	3.6957	19.6379
19.4333	-0.0219	15.1533	3.4432	18.5965
19.4667	-0.0213	14.4695	3.2289	17.6983
19.5	-0.0183	13.7068	3.0316	16.7384
19.5333	-0.0203	13.1282	2.8449	15.9731
19.5667	-0.02	12.3787	2.666	15.0447
19.6	-0.0193	11.8132	2.4912	14.3044
19.6333	-0.0206	11.1426	2.3347	13.4773
19.6667	-0.0206	10.564	2.1821	12.7462
19.7	-0.02	10.038	2.0428	12.0808
19.7333	-0.018	9.4726	1.9034	11.3759
19.7667	-0.0203	9.0255	1.7811	10.8066
19.8	-0.018	8.5521	1.6575	10.2096
19.8333	-0.0196	8.0656	1.5457	9.6113
19.8667	-0.0219	7.6842	1.4339	9.1181
19.9	-0.0219	7.2371	1.3366	8.5737
19.9333	-0.018	6.8295	1.2419	8.0714
19.9667	-0.0226	6.4613	1.1486	7.6099
20	-0.019	6.0931	1.0697	7.1628
20.0333	-0.0203	5.7118	0.9921	6.7039

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
20.0667	-0.0193	5.4356	0.9224	6.358
20.1	-0.019	5.1069	0.8619	5.9688
20.1333	-0.02	4.7913	0.7922	5.5835
20.1667	-0.019	4.5677	0.7317	5.2995
20.2	-0.0209	4.239	0.6831	4.9221
20.2333	-0.019	4.0286	0.6292	4.6578
20.2667	-0.0209	3.7788	0.5779	4.3566
20.3	-0.0203	3.5947	0.5371	4.1318
20.3333	-0.0229	3.3448	0.5003	3.8451
20.3667	-0.0216	3.187	0.4648	3.6518
20.4	-0.0203	2.9898	0.4319	3.4217
20.4333	-0.0186	0.0048	0.399	0.4038
20.4667	-0.0209	0.0179	0.3727	0.3907
20.5	-0.0216	0.0048	0.3438	0.3486
20.5333	-0.0206	0.0048	0.3149	0.3197
20.5667	-0.018	0.0179	0	0.0179
20.6	-0.0209	0.0048	0.0019	0.0067
20.6333	-0.018	0.0179	0.0006	0.0185
20.6667	-0.0203	0.0048	0.0006	0.0054
20.7	-0.0193	0.0179	0.0006	0.0185
20.7333	-0.0216	0.0048	0	0.0048
20.7667	-0.02	0.0179	0.0006	0.0185
20.8	-0.0236	0.0048	0	0.0048
20.8333	-0.0173	0.0179	0	0.0179
20.8667	-0.0206	0.0179	0	0.0179
20.9	-0.0203	0.0048	0	0.0048
20.9333	-0.0186	0.0179	0.0006	0.0185
20.9667	-0.0186	0.0048	0	0.0048
21	-0.0183	0.0048	0	0.0048
21.0333	-0.02	0.0048	0	0.0048
21.0667	-0.017	0.0179	0.0019	0.0198
21.1	-0.0176	0.0048	0.0006	0.0054
21.1333	-0.0213	0.0311	0.0019	0.033
21.1667	-0.0213	0.0179	0	0.0179
21.2	-0.017	0.0048	0	0.0048
21.2333	-0.0219	0.0179	0	0.0179
21.2667	-0.018	0.0179	0.0006	0.0185
21.3	-0.02	0.0048	0.0006	0.0054
21.3333	-0.0196	0.0048	0	0.0048
21.3667	-0.0213	0.0179	0	0.0179
21.4	-0.0209	0.0179	0	0.0179
21.4333	-0.0176	0.0179	0.0006	0.0185
21.4667	-0.018	0.0048	0	0.0048

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
21.5	-0.0206	0.0179	0	0.0179
21.5333	-0.0186	0.0048	0	0.0048
21.5667	-0.0193	0.0179	0	0.0179
21.6	-0.0213	0.0179	0.0019	0.0198
21.6333	-0.018	0.0048	0	0.0048
21.6667	-0.02	0.0179	0	0.0179
21.7	-0.0236	0.0311	0	0.0311
21.7333	-0.0183	0.0048	0	0.0048
21.7667	-0.0193	0.0311	0	0.0311
21.8	-0.0219	0.0048	0	0.0048
21.8333	-0.0213	0.0048	0.0006	0.0054
21.8667	-0.018	0	0	0
21.9	-0.0209	0.0179	0.0006	0.0185
21.9333	-0.0196	0.0179	0	0.0179
21.9667	-0.0226	0.0179	0	0.0179
22	-0.02	0.0179	0	0.0179
22.0333	-0.0193	0.0048	0.0006	0.0054
22.0667	-0.0183	0	0	0
22.1	-0.0176	0.0048	0.0006	0.0054
22.1333	-0.0203	0.0179	0.0006	0.0185
22.1667	-0.0223	0.0048	0	0.0048
22.2	-0.0196	0.0311	0.0006	0.0317
22.2333	-0.0213	0.0179	0.0006	0.0185
22.2667	-0.0196	0.0048	0.0006	0.0054
22.3	-0.0203	0.0048	0.0006	0.0054
22.3333	-0.019	0.0048	0.0006	0.0054
22.3667	-0.019	0.0048	0.0006	0.0054
22.4	-0.0196	0.0179	0	0.0179
22.4333	-0.0249	0.0179	0.0006	0.0185
22.4667	-0.0236	0	0	0
22.5	-0.019	0.0048	0.0019	0.0067
22.5333	-0.02	0	0	0
22.5667	-0.0209	0.0048	0	0.0048
22.6	-0.0213	0.0048	0.0006	0.0054
22.6333	-0.0203	0.0179	0.0019	0.0198
22.6667	-0.0206	0.0311	0	0.0311
22.7	-0.0206	0.0048	0.0006	0.0054
22.7333	-0.0232	0.0048	0	0.0048
22.7667	-0.0203	0.0311	0.0006	0.0317
22.8	-0.019	0	0.0006	0.0006
22.8333	-0.02	0.0179	0.0019	0.0198
22.8667	-0.0213	0.0179	0.0006	0.0185
22.9	-0.0183	0.0179	0.0006	0.0185

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
22.9333	-0.0176	0.0179	0	0.0179
22.9667	-0.0193	0.0048	0	0.0048
23	-0.017	0.0048	0.0006	0.0054
23.0333	-0.019	0.0048	0.0006	0.0054
23.0667	-0.019	0.0048	0	0.0048
23.1	-0.0183	0.0048	0	0.0048
23.1333	-0.0183	0.0048	0	0.0048
23.1667	-0.0193	0	0.0006	0.0006
23.2	-0.0203	0.0179	0	0.0179
23.2333	-0.0186	0.0048	0	0.0048
23.2667	-0.0193	0.0048	0.0019	0.0067
23.3	-0.0209	0.0311	0	0.0311
23.3333	-0.0203	0.0179	0	0.0179
23.3667	-0.019	0.0048	0	0.0048
23.4	-0.02	0.0179	0.0006	0.0185
23.4333	-0.0196	0.0048	0.0006	0.0054
23.4667	-0.0193	0.0048	0.0019	0.0067
23.5	-0.02	0.0311	0	0.0311
23.5333	-0.02	0.0048	0.0006	0.0054
23.5667	-0.0209	0.0048	0	0.0048
23.6	-0.0209	0.0179	0	0.0179
23.6333	-0.0183	0.0048	0	0.0048
23.6667	-0.0206	0	0	0
23.7	-0.02	0.0048	0	0.0048
23.7333	-0.0209	0.0048	0	0.0048
23.7667	-0.0183	0.0179	0	0.0179
23.8	-0.0226	0.0179	0	0.0179
23.8333	-0.019	0	0.0006	0.0006
23.8667	-0.0176	0.0048	0	0.0048
23.9	-0.0226	0.0048	0	0.0048
23.9333	-0.0193	0.0179	0	0.0179
23.9667	-0.0186	0.0179	0.0006	0.0185
24	-0.0209	0.0179	0	0.0179
24.0333	-0.0216	0.0179	0.0006	0.0185
24.0667	-0.0209	0.0048	0.0006	0.0054
24.1	-0.0209	0.0048	0.0006	0.0054
24.1333	-0.0206	0.0048	0.0006	0.0054
24.1667	-0.0206	0	0.0006	0.0006
24.2	-0.0196	0.0179	0	0.0179
24.2333	-0.019	0.0048	0.0019	0.0067
24.2667	-0.019	0.0048	0.0006	0.0054
24.3	-0.0203	0.0048	0.0006	0.0054
24.3333	-0.0213	0.0179	0	0.0179

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
24.3667	-0.0203	0.0179	0	0.0179
24.4	-0.0206	0.0048	0	0.0048
24.4333	-0.0186	0.0179	0	0.0179
24.4667	-0.017	0.0179	0.0006	0.0185
24.5	-0.0193	0.0179	0.0006	0.0185
24.5333	-0.0216	0.0048	0	0.0048
24.5667	-0.0196	0.0048	0	0.0048
24.6	-0.0193	0.0179	0.0019	0.0198
24.6333	-0.0219	0.0179	0.0006	0.0185
24.6667	-0.019	0	0.0006	0.0006
24.7	-0.0209	0.0179	0.0006	0.0185
24.7333	-0.018	0.0179	0.0006	0.0185
24.7667	-0.0196	0.0311	0.0006	0.0317
24.8	-0.0206	0.0048	0.0006	0.0054
24.8333	-0.0239	0.0311	0.0006	0.0317
24.8667	-0.0226	0.0048	0.0019	0.0067
24.9	-0.0193	0.0179	0.0006	0.0185
24.9333	-0.0219	0.0179	0.0006	0.0185
24.9667	-0.0216	0	0	0
25	-0.0203	0.0048	0	0.0048
25.0333	-0.0203	0.0179	0	0.0179
25.0667	-0.0209	0.0048	0.0006	0.0054
25.1	-0.0196	0	0.0006	0.0006
25.1333	-0.02	0.0179	0.0006	0.0185
25.1667	-0.02	0.0179	0	0.0179
25.2	-0.0196	0	0	0
25.2333	-0.0219	0.0311	0	0.0311
25.2667	-0.0213	0.0048	0.0006	0.0054
25.3	-0.02	0.0048	0	0.0048
25.3333	-0.0209	0.0048	0	0.0048
25.3667	-0.0209	0.0179	0	0.0179
25.4	-0.0223	0.0048	0.0006	0.0054
25.4333	-0.018	0.0179	0	0.0179
25.4667	-0.0196	0.0048	0.0006	0.0054
25.5	-0.0196	0.0179	0.0019	0.0198
25.5333	-0.019	0.0179	0	0.0179
25.5667	-0.0216	0.0048	0.0006	0.0054
25.6	-0.0219	0.0179	0.0006	0.0185
25.6333	-0.0213	0.0048	0.0006	0.0054
25.6667	-0.0193	0.0048	0.0006	0.0054
25.7	-0.0203	0.0048	0.0006	0.0054
25.7333	-0.0206	0.0179	0.0006	0.0185
25.7667	-0.0213	0.0179	0	0.0179

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
25.8	-0.02	0.0179	0	0.0179
25.8333	-0.0183	0.0048	0.0006	0.0054
25.8667	-0.0219	0.0048	0.0006	0.0054
25.9	-0.018	0.0048	0.0006	0.0054
25.9333	-0.0183	0.0179	0.0006	0.0185
25.9667	-0.0193	0.0048	0	0.0048
26	-0.018	0.0048	0.0006	0.0054
26.0333	-0.0176	0.0311	0	0.0311
26.0667	-0.0206	0.0048	0.0006	0.0054
26.1	-0.0196	0.0048	0.0006	0.0054
26.1333	-0.02	0.0048	0.0006	0.0054
26.1667	-0.0196	0.0048	0.0006	0.0054
26.2	-0.0193	0.0048	0	0.0048
26.2333	-0.0193	0	0.0006	0.0006
26.2667	-0.0186	0.0179	0	0.0179
26.3	-0.019	0.0179	0.0019	0.0198
26.3333	-0.0203	0.0179	0	0.0179
26.3667	-0.0186	0.0311	0	0.0311
26.4	-0.0203	0.0179	0	0.0179
26.4333	-0.0209	0.0311	0	0.0311
26.4667	-0.0196	0.0179	0.0006	0.0185
26.5	-0.0232	0.0179	0	0.0179
26.5333	-0.0219	0.0048	0.0006	0.0054
26.5667	-0.0213	0.0179	0.0019	0.0198
26.6	-0.02	0.0048	0	0.0048
26.6333	-0.0203	0.0048	0.0006	0.0054
26.6667	-0.0193	0.0179	0	0.0179
26.7	-0.02	0.0179	0	0.0179
26.7333	-0.0173	0.0179	0.0006	0.0185
26.7667	-0.0219	0.0048	0	0.0048
26.8	-0.0216	0.0048	0.0006	0.0054
26.8333	-0.0196	0	0.0006	0.0006
26.8667	-0.0206	0.0048	0	0.0048
26.9	-0.0213	0.0179	0	0.0179
26.9333	-0.0176	0.0179	0.0019	0.0198
26.9667	-0.0196	0.0048	0.0006	0.0054
27	-0.0229	0.0179	0.0006	0.0185
27.0333	-0.0203	0.0048	0	0.0048
27.0667	-0.0183	0.0311	0.0019	0.033
27.1	-0.0209	0.0179	0	0.0179
27.1333	-0.018	0.0179	0.0006	0.0185
27.1667	-0.0183	0.0311	0.0006	0.0317
27.2	-0.0203	0.0179	0.0006	0.0185

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
27.2333	-0.019	0.0048	0	0.0048
27.2667	-0.0186	0.0048	0.0006	0.0054
27.3	-0.0209	0.0048	0	0.0048
27.3333	-0.019	0.0179	0.0006	0.0185
27.3667	-0.0203	0.0179	0	0.0179
27.4	-0.019	0.0179	0.0006	0.0185
27.4333	-0.02	0.0179	0	0.0179
27.4667	-0.0203	0.0048	0.0006	0.0054
27.5	-0.0206	0.0048	0.0019	0.0067
27.5333	-0.0203	0.0048	0.0006	0.0054
27.5667	-0.0203	0.0048	0.0006	0.0054
27.6	-0.0186	0.0048	0	0.0048
27.6333	-0.0176	0.0048	0.0006	0.0054
27.6667	-0.0209	0.0048	0	0.0048
27.7	-0.0219	0.0179	0.0019	0.0198
27.7333	-0.0193	0.0311	0	0.0311
27.7667	-0.0206	0.0179	0.0006	0.0185
27.8	-0.0193	0.0179	0.0006	0.0185
27.8333	-0.0203	0.0179	0	0.0179
27.8667	-0.0193	0.0048	0	0.0048
27.9	-0.0196	0.0048	0	0.0048
27.9333	-0.019	0	0.0019	0.0019
27.9667	-0.0213	0.0048	0	0.0048
28	-0.0223	0.0179	0.0006	0.0185
28.0333	-0.0206	0.0179	0.0006	0.0185
28.0667	-0.0223	0.0179	0.0006	0.0185
28.1	-0.02	0.0311	0	0.0311
28.1333	-0.0232	0.0179	0	0.0179
28.1667	-0.019	0.0311	0.0006	0.0317
28.2	-0.0229	0.0179	0	0.0179
28.2333	-0.0216	0.0179	0	0.0179
28.2667	-0.0173	0.0048	0.0006	0.0054
28.3	-0.0206	0.0048	0.0006	0.0054
28.3333	-0.0193	0.0179	0	0.0179
28.3667	-0.0213	0.0048	0	0.0048
28.4	-0.0183	0.0048	0.0006	0.0054
28.4333	-0.019	0	0	0
28.4667	-0.0186	0.0048	0.0006	0.0054
28.5	-0.0209	0.0179	0.0032	0.0212
28.5333	-0.0209	0	0	0
28.5667	-0.0206	0.0179	0	0.0179
28.6	-0.0183	0.0179	0	0.0179
28.6333	-0.02	0.0179	0	0.0179

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
28.6667	-0.0206	0.0179	0.0006	0.0185
28.7	-0.0219	0.0311	0	0.0311
28.7333	-0.017	0.0048	0.0006	0.0054
28.7667	-0.0226	0.0048	0.0006	0.0054
28.8	-0.018	0.0179	0.0006	0.0185
28.8333	-0.0183	0.0048	0	0.0048
28.8667	-0.019	0.0179	0	0.0179
28.9	-0.0186	0.0179	0	0.0179
28.9333	-0.0183	0.0179	0	0.0179
28.9667	-0.0186	0.0048	0	0.0048
29	-0.0183	0.0048	0	0.0048
29.0333	-0.0183	0.0048	0.0006	0.0054
29.0667	-0.019	0.0179	0.0006	0.0185
29.1	-0.0186	0.0179	0.0006	0.0185
29.1333	-0.0196	0.0179	0	0.0179
29.1667	-0.0213	0.0048	0	0.0048
29.2	-0.0183	0.0048	0.0006	0.0054
29.2333	-0.0216	0	0	0
29.2667	-0.0236	0.0179	0	0.0179
29.3	-0.0226	0.0179	0.0006	0.0185
29.3333	-0.0193	0.0048	0	0.0048
29.3667	-0.019	0.0179	0.0006	0.0185
29.4	-0.0196	0.0048	0	0.0048
29.4333	-0.0186	0.0048	0.0019	0.0067
29.4667	-0.0213	0.0048	0	0.0048
29.5	-0.0223	0.0048	0	0.0048
29.5333	-0.0226	0.0179	0	0.0179
29.5667	-0.0196	0.0179	0.0006	0.0185
29.6	-0.0226	0.0179	0	0.0179
29.6333	-0.0173	0.0311	0	0.0311
29.6667	-0.0196	0.0048	0.0019	0.0067
29.7	-0.0223	0.0179	0	0.0179
29.7333	-0.0196	0.0179	0.0006	0.0185
29.7667	-0.0186	0.0048	0.0006	0.0054
29.8	-0.018	0.0048	0	0.0048
29.8333	-0.0209	0.0179	0	0.0179
29.8667	-0.017	0.0179	0	0.0179
29.9	-0.019	0.0179	0	0.0179
29.9333	-0.02	0.0048	0	0.0048
29.9667	-0.0203	0.0179	0	0.0179
30	-0.0196	0.0179	0.0006	0.0185
30.0333	-0.0203	0.0179	0.0006	0.0185
30.0667	-0.0206	0.0179	0	0.0179

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
30.1	-0.0203	0.0179	0	0.0179
30.1333	-0.0183	0.0179	0	0.0179
30.1667	-0.0157	0.0311	0	0.0311
30.2	-0.0229	0.0179	0.0006	0.0185
30.2333	-0.0163	0.0179	0.0006	0.0185
30.2667	-0.0176	0.0048	0.0006	0.0054
30.3	-0.0196	0.0048	0.0006	0.0054
30.3333	-0.0226	0.0311	0	0.0311
30.3667	-0.0213	0	0	0
30.4	-0.018	0.0179	0	0.0179
30.4333	-0.0193	0.0048	0.0006	0.0054
30.4667	-0.019	0.0048	0	0.0048
30.5	-0.0203	0.0179	0.0006	0.0185
30.5333	-0.019	0.0048	0	0.0048
30.5667	-0.0196	0.0179	0	0.0179
30.6	-0.0183	0.0048	0.0006	0.0054
30.6333	-0.0209	0.0048	0	0.0048
30.6667	-0.0236	0.0048	0	0.0048
30.7	-0.0216	0	0	0
30.7333	-0.02	0.0179	0.0006	0.0185
30.7667	-0.0223	0.0179	0.0019	0.0198
30.8	-0.0206	0	0.0006	0.0006
30.8333	-0.02	0.0179	0	0.0179
30.8667	-0.018	0.0048	0	0.0048
30.9	-0.0186	0.0311	0.0006	0.0317
30.9333	-0.0209	0.0179	0	0.0179
30.9667	-0.0196	0.0179	0.0006	0.0185
31	-0.0167	0.0179	0.0006	0.0185
31.0333	-0.0206	0.0179	0.0019	0.0198
31.0667	-0.0203	0.0048	0	0.0048
31.1	-0.0206	0.0048	0	0.0048
31.1333	-0.0183	0.0311	0.0019	0.033
31.1667	-0.0216	0.0048	0	0.0048
31.2	-0.0176	0.0179	0	0.0179
31.2333	-0.0213	0	0.0019	0.0019
31.2667	-0.0173	0.0048	0.0006	0.0054
31.3	-0.0173	0.0179	0.0006	0.0185
31.3333	-0.0219	0.0179	0.0006	0.0185
31.3667	-0.0209	0.0179	0	0.0179
31.4	-0.019	0.0179	0.0019	0.0198
31.4333	-0.0213	0.0179	0	0.0179
31.4667	-0.0203	0.0179	0.0006	0.0185
31.5	-0.0232	0.0179	0.0006	0.0185

Areva NP Inc. Project No. G100982213SAT-001D September 25, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
31.5333	-0.0213	0.0179	0.0019	0.0198
31.5667	-0.0203	0.0311	0	0.0311
31.6	-0.0229	0.0048	0	0.0048
31.6333	-0.018	0	0	0
31.6667	-0.0216	0.0048	0.0006	0.0054
31.7	-0.0223	0.0048	0.0006	0.0054
31.7333	-0.017	0.0048	0	0.0048
31.7667	-0.0183	0.0048	0	0.0048
31.8	-0.0183	0.0048	0	0.0048
31.8333	-0.0206	0.0048	0	0.0048
31.8667	-0.0209	0	0	0
31.9	-0.0203	0.0048	0.0006	0.0054
31.9333	-0.0173	0.0048	0.0019	0.0067
31.9667	-0.0226	0.0048	0.0006	0.0054
32	-0.019	0.0048	0	0.0048
32.0333	-0.0196	0.0048	0.0019	0.0067
32.0667	-0.0216	0.0179	0.0019	0.0198
32.1	-0.0196	0.0311	0.0006	0.0317
32.1333	-0.0196	0.0048	0.0006	0.0054
32.1667	-0.0219	0.0048	0.0006	0.0054
32.2	-0.0206	0.0048	0.0006	0.0054
32.2333	-0.0193	0	0	0
32.2667	-0.0186	0.0048	0	0.0048
32.3	-0.0173	0	0	0
32.3333	-0.019	0.0179	0.0006	0.0185
32.3667	-0.0203	0	0	0

((Second Test))

Areva NP Inc. Project No. G100982213SAT-001D September 26, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
0	-0.0226	0	0.0013	0.0013
0.0333	-0.0249	0	0	0
0.0667	-0.0219	0	0.0013	0.0013
0.1	-0.0246	0	0	0
0.1333	-0.0213	0	0	0
0.1667	-0.0223	0	0.0026	0.0026
0.2	-0.0232	0.0127	0	0.0127
0.2333	-0.0242	0	0	0
0.2667	-0.02	0	0	0
0.3	-0.0223	0.0127	0	0.0127
0.3333	-0.0226	0.0127	0	0.0127
0.3667	-0.0203	0	0	0
0.4	-0.0236	0.0127	0.0013	0.014
0.4333	-0.0209	0	0	0
0.4667	-0.0213	0	0	0
0.5	-0.0213	0.0127	0	0.0127
0.5333	-0.0209	0.0127	0.0026	0.0153
0.5667	-0.0252	0	0	0
0.6	-0.0229	0.0127	0	0.0127
0.6333	-0.0242	0	0	0
0.6667	-0.0206	0	0.0013	0.0013
0.7	-0.0206	0	0	0
0.7333	-0.0213	0	0	0
0.7667	-0.0203	0	0.0013	0.0013
0.8	-0.0196	0	0	0
0.8333	-0.0203	0	0	0
0.8667	-0.0206	0	0	0
0.9	-0.0183	0	0	0
0.9333	-0.02	0.0127	0	0.0127
0.9667	-0.0196	0.0127	0	0.0127
1	-0.0236	0.0127	0	0.0127
1.0333	-0.0219	0	0	0
1.0667	-0.0226	0	0.0013	0.0013
1.1	-0.0196	0.0127	0.0013	0.014
1.1333	-0.0209	0	0	0
1.1667	-0.0209	0	0	0
1.2	-0.0206	0	0.0013	0.0013
1.2333	-0.019	0	0	0
1.2667	-0.0173	0	0	0
1.3	-0.0144	0	0	0
1.3333	-0.0094	0	0	0
1.3667	-0.0055	0	0	0
1.4	-0.0048	0	0	0

Areva NP Inc. Project No. G100982213SAT-001D September 26, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
1.4333	-0.0071	0	0	0
1.4667	-0.0065	0.0127	0	0.0127
1.5	-0.0042	0	0	0
1.5333	-0.0058	0.0127	0	0.0127
1.5667	-0.0065	0.0127	0	0.0127
1.6	-0.0061	0	0	0
1.6333	-0.0038	0	0	0
1.6667	-0.0065	0	0.0013	0.0013
1.7	-0.0055	0	0	0
1.7333	-0.0022	0	0	0
1.7667	-0.0028	0	0.0013	0.0013
1.8	-0.0055	0	0	0
1.8333	-0.0009	0	0	0
1.8667	-0.0051	0	0	0
1.9	0.0001	0	0	0
1.9333	-0.0028	0	0	0
1.9667	-0.0028	0	0	0
2	-0.0018	0	0	0
2.0333	-0.0032	0.0127	0	0.0127
2.0667	-0.0015	0	0.0013	0.0013
2.1	-0.0035	0	0.0013	0.0013
2.1333	-0.0012	0	0	0
2.1667	-0.0018	0.0127	0.0013	0.014
2.2	-0.0018	0	0	0
2.2333	-0.0005	0	0	0
2.2667	-0.0025	0	0	0
2.3	0.0005	0	0	0
2.3333	0.0028	0	0	0
2.3667	0.0041	0	0	0
2.4	0.0057	0.0127	0	0.0127
2.4333	0.0028	0	0	0
2.4667	0.006	0	0	0
2.5	0.0077	0	0	0
2.5333	0.0037	0.0127	0.0013	0.014
2.5667	0.0031	0.0127	0	0.0127
2.6	0.0064	0	0	0
2.6333	0.0064	0	0	0
2.6667	0.0093	0	0	0
2.7	0.008	0.0127	0	0.0127
2.7333	0.0064	0	0	0
2.7667	0.0074	0	0.0013	0.0013
2.8	0.0103	0	0	0
2.8333	0.012	0.0127	0.0013	0.014

Areva NP Inc. Project No. G100982213SAT-001D September 26, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
2.8667	0.013	0	0	0
2.9	0.0093	0.0127	0	0.0127
2.9333	0.0087	0	0	0
2.9667	0.0146	0.0127	0.0026	0.0153
3	0.0163	0	0.0013	0.0013
3.0333	0.0192	0	0	0
3.0667	0.0172	0	0	0
3.1	0.0186	0.0127	0.0013	0.014
3.1333	0.0172	0	0	0
3.1667	0.0202	0	0	0
3.2	0.0172	0	0.0013	0.0013
3.2333	0.0202	0.0127	0	0.0127
3.2667	0.0192	0.0127	0	0.0127
3.3	0.0186	0	0.0013	0.0013
3.3333	0.0218	0	0	0
3.3667	0.0235	0	0	0
3.4	0.0199	0	0.0013	0.0013
3.4333	0.0212	0	0	0
3.4667	0.0186	0.0127	0.0013	0.014
3.5	0.0232	0	0.0013	0.0013
3.5333	0.0202	0	0.0013	0.0013
3.5667	0.0235	0.0127	0	0.0127
3.6	0.0218	0.0127	0	0.0127
3.6333	0.0238	0	0	0
3.6667	0.0245	0.0127	0	0.0127
3.7	0.0251	0	0	0
3.7333	0.0232	0	0	0
3.7667	0.0251	0.0258	0	0.0258
3.8	0.0225	0.0127	0.0013	0.014
3.8333	0.0281	0.0127	0	0.0127
3.8667	0.0271	0	0	0
3.9	0.0274	0	0	0
3.9333	0.0268	0	0.0013	0.0013
3.9667	0.0284	0	0.0013	0.0013
4	0.0301	0	0	0
4.0333	0.0304	0.0127	0	0.0127
4.0667	0.0327	0.0127	0.0013	0.014
4.1	0.034	0.0127	0	0.0127
4.1333	0.033	0	0	0
4.1667	0.035	0.0127	0	0.0127
4.2	0.0334	0	0	0
4.2333	0.0337	0.0127	0	0.0127
4.2667	0.0321	0.0127	0.0013	0.014

Areva NP Inc. Project No. G100982213SAT-001D September 26, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
4.3	0.0311	0	0	0
4.3333	0.0281	0.0127	0.0039	0.0166
4.3667	0.0258	0	0	0
4.4	0.0215	0.0127	0	0.0127
4.4333	0.0195	0	0	0
4.4667	0.0139	0	0	0
4.5	0.0116	0	0.0013	0.0013
4.5333	0.0149	0	0	0
4.5667	0.0103	0.0127	0	0.0127
4.6	0.01	0	0.0013	0.0013
4.6333	0.0087	0	0.0013	0.0013
4.6667	0.011	0	0.0013	0.0013
4.7	0.0087	0	0	0
4.7333	0.0087	0	0	0
4.7667	0.0084	0	0	0
4.8	0.0074	0	0	0
4.8333	0.0113	0.0127	0.0013	0.014
4.8667	0.0084	0	0	0
4.9	0.0143	0	0	0
4.9333	0.0133	0	0	0
4.9667	0.0126	0.0127	0.0013	0.014
5	0.0116	0	0	0
5.0333	0.0143	0.0258	0	0.0258
5.0667	0.0136	0.0127	0	0.0127
5.1	0.0146	0	0.0013	0.0013
5.1333	0.009	0.0127	0.0013	0.014
5.1667	0.0169	0	0.0013	0.0013
5.2	0.0209	0	0	0
5.2333	0.0195	0	0	0
5.2667	0.0238	0	0	0
5.3	0.0258	0	0.0013	0.0013
5.3333	0.0311	0	0.0013	0.0013
5.3667	0.0294	0	0	0
5.4	0.0294	0	0	0
5.4333	0.0304	0	0	0
5.4667	0.034	0.0127	0.0013	0.014
5.5	0.0344	0	0	0
5.5333	0.036	0	0.0013	0.0013
5.5667	0.0347	0	0	0
5.6	0.0353	0	0.0013	0.0013
5.6333	0.0347	0	0	0
5.6667	0.036	0	0	0
5.7	0.0347	0.0127	0	0.0127

Areva NP Inc. Project No. G100982213SAT-001D September 26, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
5.7333	0.0353	0	0	0
5.7667	0.0344	0	0	0
5.8	0.0363	0.0127	0	0.0127
5.8333	0.033	0	0	0
5.8667	0.0347	0	0.0013	0.0013
5.9	0.0357	0	0	0
5.9333	0.035	0	0	0
5.9667	0.0373	0	0	0
6	0.035	0.0127	0	0.0127
6.0333	0.0386	0	0	0
6.0667	0.0353	0	0	0
6.1	0.0363	0.0127	0	0.0127
6.1333	0.0373	0	0.0013	0.0013
6.1667	0.0383	0	0	0
6.2	0.0347	0	0	0
6.2333	0.0363	0.0127	0	0.0127
6.2667	0.0363	0	0	0
6.3	0.0311	0	0	0
6.3333	0.037	0.0127	0	0.0127
6.3667	0.035	0.0127	0	0.0127
6.4	0.034	0	0	0
6.4333	0.0373	0.0127	0	0.0127
6.4667	0.035	0	0	0
6.5	0.036	0	0	0
6.5333	0.038	0	0	0
6.5667	0.037	0.0127	0.0013	0.014
6.6	0.0344	0	0	0
6.6333	0.0344	0	0	0
6.6667	0.0363	0	0	0
6.7	0.0353	0	0	0
6.7333	0.0357	0	0	0
6.7667	0.0353	0.0258	0.0013	0.0271
6.8	0.0337	0	0	0
6.8333	0.039	0	0	0
6.8667	0.038	0	0	0
6.9	0.0373	0	0	0
6.9333	0.038	0	0	0
6.9667	0.037	0.0127	0.0013	0.014
7	0.038	0	0	0
7.0333	0.0373	0	0	0
7.0667	0.0383	0.0127	0	0.0127
7.1	0.0373	0	0	0
7.1333	0.035	0.0127	0	0.0127

Areva NP Inc. Project No. G100982213SAT-001D September 26, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
7.1667	0.0334	0	0.0013	0.0013
7.2	0.0344	0	0	0
7.2333	0.0311	0	0	0
7.2667	0.0314	0	0	0
7.3	0.0297	0.0127	0	0.0127
7.3333	0.0297	0.0127	0.0013	0.014
7.3667	0.0327	0.0127	0.0013	0.014
7.4	0.0337	0	0.0013	0.0013
7.4333	0.0307	0.0127	0.0013	0.014
7.4667	0.035	0	0	0
7.5	0.0317	0	0	0
7.5333	0.0344	0	0	0
7.5667	0.035	0	0	0
7.6	0.0314	0	0	0
7.6333	0.0337	0.0127	0	0.0127
7.6667	0.0327	0	0	0
7.7	0.035	0	0.0013	0.0013
7.7333	0.0353	0	0	0
7.7667	0.0344	0	0.0013	0.0013
7.8	0.0399	0	0	0
7.8333	0.037	0.0127	0.0013	0.014
7.8667	0.0367	0	0.0013	0.0013
7.9	0.035	0	0	0
7.9333	0.0311	0	0	0
7.9667	0.0334	0	0	0
8	0.0314	0.0127	0	0.0127
8.0333	0.0304	0.0258	0.0013	0.0271
8.0667	0.0324	0	0.0013	0.0013
8.1	0.033	0	0	0
8.1333	0.0357	0.0127	0	0.0127
8.1667	0.035	0	0	0
8.2	0.0337	0	0	0
8.2333	0.0393	0	0	0
8.2667	0.0376	0.0127	0.0013	0.014
8.3	0.0439	0	0	0
8.3333	0.0419	0	0	0
8.3667	0.0426	0	0.0013	0.0013
8.4	0.0413	0	0	0
8.4333	0.0416	0	0	0
8.4667	0.0446	0.0127	0	0.0127
8.5	0.0429	0.0127	0.0013	0.014
8.5333	0.0423	0	0.0013	0.0013
8.5667	0.0442	0	0	0

Areva NP Inc. Project No. G100982213SAT-001D September 26, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
8.6	0.0383	0	0	0
8.6333	0.0432	0	0.0013	0.0013
8.6667	0.039	0.0127	0.0013	0.014
8.7	0.0452	0	0	0
8.7333	0.0459	0	0.0013	0.0013
8.7667	0.0495	0	0.0013	0.0013
8.8	0.0505	0	0	0
8.8333	0.0498	0	0.0013	0.0013
8.8667	0.0502	0	0	0
8.9	0.0534	0.0127	0.0013	0.014
8.9333	0.0551	0.0127	0	0.0127
8.9667	0.0594	0.0127	0	0.0127
9	0.0613	0.0127	0	0.0127
9.0333	0.062	0.0127	0	0.0127
9.0667	0.0627	0.0127	0	0.0127
9.1	0.0656	0	0	0
9.1333	0.061	0	0	0
9.1667	0.062	0.0127	0	0.0127
9.2	0.063	0	0	0
9.2333	0.064	0	0	0
9.2667	0.0653	0	0.0013	0.0013
9.3	0.061	0	0	0
9.3333	0.0636	0	0.0026	0.0026
9.3667	0.0679	0	0	0
9.4	0.0696	0	0	0
9.4333	0.0709	0	0	0
9.4667	0.0735	0	0	0
9.5	0.0758	0	0	0
9.5333	0.0765	0	0	0
9.5667	0.0791	0	0	0
9.6	0.0824	0	0	0
9.6333	0.0817	0	0.0013	0.0013
9.6667	0.0877	0.0127	0.0013	0.014
9.7	0.0877	0	0	0
9.7333	0.0903	0	0	0
9.7667	0.0903	0	0	0
9.8	0.091	0	0.0013	0.0013
9.8333	0.0949	0	0	0
9.8667	0.0969	0	0.0013	0.0013
9.9	0.0966	0	0	0
9.9333	0.0982	0	0	0
9.9667	0.1015	0	0.0013	0.0013
10	0.1041	0.0127	0	0.0127

Areva NP Inc. Project No. G100982213SAT-001D September 26, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
10.0333	0.1071	0	0.0013	0.0013
10.0667	0.1074	0.0127	0.0013	0.014
10.1	0.1094	0	0	0
10.1333	0.1064	0	0.0013	0.0013
10.1667	0.111	0	0.0013	0.0013
10.2	0.1114	0.0258	0.0026	0.0284
10.2333	0.1133	0	0	0
10.2667	0.1173	0	0	0
10.3	0.1186	0.0127	0	0.0127
10.3333	0.1242	0	0.0013	0.0013
10.3667	0.1229	0	0	0
10.4	0.1212	0	0	0
10.4333	0.1222	0	0	0
10.4667	0.1255	0	0	0
10.5	0.1268	0.0127	0	0.0127
10.5333	0.1239	0	0	0
10.5667	0.1252	0	0	0
10.6	0.1216	0	0	0
10.6333	0.1245	0.0127	0	0.0127
10.6667	0.1255	0.0127	0	0.0127
10.7	0.1278	0	0	0
10.7333	0.1265	0.0127	0.0013	0.014
10.7667	0.1262	0.0127	0	0.0127
10.8	0.1245	0	0	0
10.8333	0.1249	0	0	0
10.8667	0.1255	0	0	0
10.9	0.1268	0.0127	0	0.0127
10.9333	0.1282	0.0127	0.0013	0.014
10.9667	0.1232	0	0	0
11	0.1268	0.0127	0	0.0127
11.0333	0.1265	0.0127	0.0013	0.014
11.0667	0.1252	0	0.0013	0.0013
11.1	0.1252	0	0.0013	0.0013
11.1333	0.1249	0.0127	0	0.0127
11.1667	0.1259	0	0	0
11.2	0.1265	0.0127	0	0.0127
11.2333	0.1259	0.0127	0.0013	0.014
11.2667	0.1262	0	0	0
11.3	0.1265	0	0	0
11.3333	0.1249	0.0127	0	0.0127
11.3667	0.1249	0	0	0
11.4	0.1265	0	0.0013	0.0013
11.4333	0.1272	0	0.0013	0.0013

Areva NP Inc. Project No. G100982213SAT-001D September 26, 2013

Time (min)	Ch 1 dP (psi)	Ch 2 High Flow (LPM)	Ch 3 Low Flow (LPM)	Total Flow (LPM)
11.4667	0.1278	0	0	0
11.5	0.1206	0.0127	0	0.0127
11.5333	0.1107	0	0	0
11.5667	0.0969	0	0	0
11.6	0.0811	0	0.0026	0.0026
11.6333	0.064	0.0127	0	0.0127
11.6667	0.0449	0	0	0
11.7	0.0202	0	0	0
11.7333	-0.0051	0	0	0
11.7667	-0.0094	0	0	0
11.8	-0.0134	0.0127	0	0.0127
11.8333	-0.0153	0.0127	0	0.0127
11.8667	-0.0117	0.0127	0	0.0127
11.9	-0.0147	0.0127	0	0.0127

APPENDIX C
Photographs


09/16/2013 13:17


09/16/2013 13:17


09/16/2013 13:17


09/16/2013 13:17


09/16/2013 13:17


09/16/2013 13:17


09/16/2013 13:18


09/16/2013 13:18


09/16/2013 13:18


09/16/2013 13:18


09/16/2013 13:18


2013/09/23


2013/09/23


2013/09/23


2013/09/23


2013/09/23


2013/09/23


09/25/2013 16:43


09/25/2013 16:43


09/25/2013 16:44


09/25/2013 16:44


09/25/2013 16:45


09/25/2013 16:46


09/26/2013 12:57


09/26/2013 12:57


09/26/2013 12:57


9199513-P1
(PRESSURE TEST 4)
2013/09/23

APPENDIX D
Test Plan

20004-019 (11/20/2012)

AREVA

AREVA NP Inc.

Engineering Information Record

Document No.: 51 - 9199513 - 003

Detailed Test Plan for Conducting MOX Pressure Test 4

[redacted]
Mike Dey
Staff Engineer, Intertek

[redacted]
Michael A. Brown
Quality Supervisor, Intertek

Intertek

AREVA

20004-019 (11/20/2012)
Document No.: 51-9199513-003

Detailed Test Plan for Conducting MOX Pressure Test 4

Safety Related? ☒ YES ☐ NO

Does this document establish design or technical requirements? ☐ YES ☒ NO

Does this document contain assumptions requiring verification? ☐ YES ☒ NO

Does this document contain Customer Required Format? ☐ YES ☒ NO

Signature Block

Name and Title/Discipline	Signature	P/LP, R/LR, A-CRF, A	Date	Pages/Sections Prepared/Reviewed/ Approved or Comments
Aaron Adrian Prine Des Eng Spec II / PEYF1-A	[redacted]	P	9-17-13	All
Vic Kaldenbach Prine Des Eng Spec II / PEYF1-A	[redacted]	R	09/17/2013	All
Scott Groesbeck Manager Tech Ops / PEYF1-A	[redacted]	A	9/17/13	All
Perry Gales Project Manager / IBL-A	[redacted]	A	9/17/13	All

Note: P/LP designates Preparer (P), Lead Preparer (LP)
R/LR designates Reviewer (R), Lead Reviewer (LR)
A-CRF designates Project Manager Approver of Customer Required Format (A-CRF)
A designates Approver/RTM – Verification of Reviewer Independence

MOX Services concurrence: [redacted] neer — 17Sep13
Name / Title — Date

AREVA

Document No.: 51-9199513-003

Detailed Test Plan for Conducting MOX Pressure Test 4

Record of Revision

Revision No.	Pages/Sections/ Paragraphs Changed	Brief Description / Change Authorization
000	All	Initial Issue. This document contains the main body of the report (pages 1-18), Appendix A (2 pages), Appendix B (3 pages), Appendix C (4 pages), Appendix D (2 pages) for a total of 29 pages.
001	Page 7	Added penetration seal material acronyms.
001	Section 2.1	Corrected orientation to be consistent.
001	Section 2.2 and 2.3	Modified penetration descriptions to update penetration seal material.
001	Section 5.1	Added penetration seal materials to procurement plan.
001	Section 8.2	Removed material selection hold.
001	Appendix B	Modified description and division of penetration seal material.
001	Appendix C	Modified penetration seal material Bill of Materials.
001	General	This document contains the main body of the report (pages 1-18), Appendix A (2 pages), Appendix B (4 pages), Appendix C (4 pages), and Appendix D (2 pages), for a total of 30 pages.
002 002	Page 8 Page 9	Added note stating that slab from Pressure Test 1 is to be reused for this test. Added notes stating that slab from Pressure Test 1 is to be reused for this test.
002	Page 16	Deleted Section 9.2.1 as this step is unnecessary for the testing equipment being used.
002	General	This document contains the main body of the report (pages 1-18), Appendix A (2 pages), Appendix B (4 pages), Appendix C (4 pages), and Appendix D (2 pages), for a total of 30 pages.
003	Section 2.1 (Boxed Notes)	Changed referenced test from Pressure Test 1 to Pressure Test 2 and added reference to removal of surface coatings.
003	Section 2.2	Changed test description to detail the use of the Pressure Test 2 slab in lieu of the Pressure Test 1 slab.
003	Section 2.3	Added SSLB tray and enamel removal adherence to critical parameters.
003	Section 5.1	Corrected typo
003	Table 9.1	Added footnote for allowable leakage.
003	Section 11	Deleted event log requirement.
003	Section 12	Updated reference document revisions as necessary.
003	General	All references to SF-60-IR and DC-170 have been replaced with QSil 5558MC throughout. A project decision was made to use only 1 material in this pressure test.
003	General	Conduits capped on bottom side only. Commodity lengths extended to three feet overall.
003	General	This document contains the main body of the report (pages 1-18), Appendix A (2 pages), Appendix B (4 pages), Appendix C (4 pages), and Appendix D (2 pages), for a total of 30 pages.

Table of Contents

(continued)

List of Tables

Page

ACRONYMS

CGD	Commercial Grade Dedication
CGI	Commercial Grade Item
GLB	Galvanized Ladder Back
GS	Galvanized Steel
GSB	Galvanized Solid Bottom
IROFS	Items Relied On For Safety
MOX	Mixed Oxide
MFFF	Mixed Oxide Fuel Fabrication Facility
PCCS	Powder Coated Carbon Steel
QA	Quality Assurance
QL	Quality Level
RGS	Rigid Galvanized Steel
SS	Stainless Steel
SSC	Structures, Systems and Components
SSSB	Stainless Steel Solid Bottom
w.g.	Water Gauge

Penetration Seal Materials

QSil 5558MC	Quantum Silicones QSil 5558MC Silicone Elastomer

BACKGROUND

AREVA NP (AREVA) is assisting Shaw AREVA MOX Services (MOX Services) in the development and implementation of a penetration seal program for the Mixed Oxide Fuel Fabrication Facility (MFFF). One aspect of the MOX penetration seal program includes conducting various types of qualification tests of penetration seal assemblies to substantiate the performance capabilities of specific penetration seal designs. Pressure testing is one type of qualification testing that needs to be performed in order to demonstrate the pressure retaining capability of MOX penetration seal designs. The data collected during pressure testing is needed to determine acceptable levels of leakage to maintain the necessary pressure differentials between confinement zones within the MFFF under various conditions, such as normal operation or inadvertent clean agent discharge. Other types of qualification testing, such as fire testing and testing for seismic qualification of penetration seal assemblies, are addressed by other test plans.

1.0 PURPOSE

The purpose of this test plan is to define the test assembly, test methods and acceptance criteria for conducting pressure test in support of the MOX penetration seal program.

This test plan defines the test methods, acceptance criteria and test report documentation requirements for penetration seal pressure test 4. Additionally, this detailed test plan defines the roles and responsibilities of MOX Services, AREVA, the selected testing laboratory, and any other subcontracted entity engaged in support of pressure testing efforts.

This detailed test plan also describes the procurement plan for materials associated with penetration seal pressure test 4 and identifies the entities responsible for procuring the various components of the test assemblies based on the quality level assigned to each component.

This test plan also establishes minimum quality requirements for the penetration seal materials used in the test assemblies and links quality requirements in the AREVA Quality Assurance (QA) program to customer/project quality requirements.

2.0 OBJECTIVE

The primary objective of this test plan is to evaluate the pressure resistance capability of an 8" thick silicone elastomer seal when installed in and around various metallic electrical commodities at air pressure increments above atmospheric pressure provided in Section 9.2.

The specific configuration to be tested is described below. Critical characteristics and the associated limiting parameters that will be substantiated by a successful test are also provided.

2.1 Test Deck Description

The test deck will consist of a 12" thick concrete slab measuring approximately 96" x 96" (8' x 8') [Note: Final test slab size to be determined by Intertek and documented in the final test report]. Within this slab will be one (1) precast 48" x 34" opening sized to replicate penetrations found in the MOX facility. The test deck will be horizontally oriented with a hemispherical 72" diameter steel pressure vessel mounted above and below the precast opening in the slab.

> **Note:** It is anticipated that the slab with the silicone elastomer seal material used for Pressure Test 2 will not be damaged during Pressure Test 2 and will be available for reuse in this pressure test. For the purpose of Pressure Test 4, the silicone elastomers and surface coatings installed for Pressure Test 2 are to be removed, the electrical commodities for Pressure Test 4 are to be installed in the existing opening and the silicone elastomers for Pressure Test 4 are to be installed around the electrical commodities in accordance with Document 01-9198306 (latest

revision), *"Installation Instruction Manual for MOX Penetration Seal Test Program"* [Reference 12.1].

Additionally, most of the openings (penetrations) in the MOX facility have been cast with a ¾" bevel on both sides of the opening. For testing and qualification purposes, this feature is considered aesthetic, and it has no adverse effect on the functional performance of the penetration seal installation. In fact for some applications, such as in the case of pressure resistant penetrations seals, the bevel provides a benefit over non-beveled openings. Therefore, for the purposes of the penetration seal test program, the bevel feature will not be included for pressure tests covered in this test plan.

Drawings showing the general layout of the test deck (test slab) for this pressure test can be found in Appendix A.

Note: If the slab from Pressure Test 2 was damaged during testing or is otherwise not available, this test plan will require revision.

2.2 Test Description

The opening to be sealed and tested in Pressure Test 4 is a 48" x 34" blockout containing electrical raceways (e.g., cable trays, conduits, wireways). Three sides of the opening will be unrepaired concrete while the remaining side will have three small repairs with a maximum area of less than one (1) square inch and a maximum depth of 3/16". The repairs will be made using Panel Patch by Nox-crete. All sides of the opening will then be coated with Keeler & Long KL 3500 *Kolor-Poxy Self Priming Surfacing Enamel*. The Keeler & Long KL 3500 *Kolor-Poxy Self Priming Surfacing Enamel* will then be mechanically removed on two adjacent sides with a needle gun scaler and on the other two sides with a masonry grinding wheel until all coating material has been visually eliminated. The test will be performed with the test deck oriented in the horizontal position, and pressurized on the top side.

Note: The Nox-crete and Keeler & Long KL 3500 Kolor-Poxy Self Priming Surfacing Enamel were installed on the slab during construction of Pressure Test 2. Keeler & Long KL 3500 Kolor-Poxy Self Priming Surfacing Enamel removal and subsequent penetration seal material adherence will be evaluated in this test.

An opening size of 34" x 48" was selected because it represents the largest opening size that can be tested with the current pressure chamber design, when considering that the most challenging geometric shape for a flat plate with respect to flexural response occurs when the Length is ≈1.4 times the Width (34" x 1.4 = 47.6").

All sides of the opening will be unlined, with the previously installed enamel surface coating removed. The penetrating items for this blockout will include the following:

- (1) 6" diameter empty rigid galvanized steel (RGS) conduit to be capped on bottom side
- (1) 3" diameter empty rigid galvanized steel (RGS) conduit to be capped on bottom side
- (1) ¾" diameter empty rigid galvanized steel (RGS) conduit to be capped on bottom side
- (1) 4" diameter empty stainless steel (SS) conduit to be capped on bottom side
- (1) 3" diameter empty stainless steel (SS) conduit to be capped on bottom side
- (1) ¾" diameter empty stainless steel (SS) conduit to be capped on bottom side
- (1) 4"x4" powder-coated carbon steel (PCCS) wire way without cables or cover
- (1) 4"x4" galvanized steel (GS) wire way without cables or cover
- (1) 4"x4" stainless steel (SS) wire way without cables or cover
- (1) 18"x4" galvanized steel, solid-bottom (GSB) cable tray without cables or cover

- (1) 18"x4" galvanized steel, ladder-back (GLB) cable tray without cables or cover
- (1) 18"x4" stainless steel, solid-bottom (SSSB) cable tray without cables or cover

The opening will be sealed with an eight (8) inch thick Quantum Silicones QSil 5558MC Silicone Elastomer (QSil 5558MC) penetration seal with no permanent damming installed in and around the various penetrating commodities.

The test will be performed with the test deck oriented in the horizontal position.

2.3 Critical Characteristics and Limiting Parameters Being Tested

The specific critical characteristics and associated limiting parameters being tested for Pressure Test 4 are as follows.

This test will evaluate pressure resistance capabilities of an eight (8) inch thick Quantum Silicones QSil 5558MC Silicone Elastomer (QSil 5558MC) seal with no permanent damming installed in an unlined (bare concrete) penetration. The various sized galvanized, powder coated, and stainless steel conduits, wire ways and cable trays are being included to evaluate the pressure resistance capability of the silicone elastomer seal material at the interface of these commodities. A successful test will substantiate the acceptability of this seal configuration to function as a pressure seal when installed in and around the following types of commodities, regardless of commodity size:

- RGS conduits
- SS conduits
- SS wire ways
- GS wire ways
- PCCS wire ways
- GSB cable trays
- GLB cable trays
- SSSB cable trays
- SSLB cable trays (SS cable tray material is being tested and ladder back and solid back configurations are being tested)

Additionally, this test will evaluate pressure resistance capabilities of seal to concrete interface after Keeler & Long KL 3500 *Kolor-Poxy Self Priming Surfacing Enamel* is mechanically removed on two adjacent sides with a needle gun scaler and on the other two sides with a masonry grinding wheel.

3.0 ACCEPTANCE CRITERIA

Pressure rated penetration seals at the MOX facility are required to remain "sufficiently leak-tight" at various pressure levels in order to support the functional goals of the various pressure rating requirements (i.e., confinement, suppression system clean agent concentration, fire induced pressure loads or HVAC pressure boundary loads). The term "sufficiently leak-tight" indicated that the penetration seal meets the predetermined acceptance criteria for the pressure level(s) being tested.

The acceptance criteria that constitutes "sufficiently leak-tight" varies based on the pressure requirement and the operating mode of the plant. For most pressure conditions and operating modes, "sufficiently leak-tight" means that the penetration seal assembly must remain in place but is allowed to leak (i.e., the penetration seal cannot become dislodged from the opening or otherwise catastrophically fail such that a substantial leakage path is created).

Per MOX Services Calculation "Confinement Boundary Air Leakage Criteria" [Reference 12.1], penetration seals that function as confinement zone 3b boundary components must maintain a leakage rate less than 0.01 cfm/sq. ft. of penetration area when tested at a pressure that bounds C3b to non-C3b zone pressures during normal operating conditions.

Table 9-1 identifies the differential pressure levels (stages) for conducting pressure tests, as well as, the acceptance criteria in order to be considered "sufficiently leak-tight".

4.0 RESPONSIBILITIES

The following roles and responsibilities apply to this test plan.

4.1 MOX Services

4.1.1 Provide review and concurrence of this detailed pressure test plan.

4.1.2 Provide concurrence for any revisions made to this test plan during test specimen construction activities.

4.1.3 Provide some of the materials for test assembly construction from MOX Services surplus or scrap (if available).

4.1.4 Witness pressure tests (if desired).

4.2 AREVA

4.2.1 Develop and revise (if necessary) this detailed pressure test plan.

4.2.2 Provide management and oversight of all aspects of the MOX penetration seal test program.

4.2.3 Select the pressure testing facility and establish sub-contract agreements. The testing laboratory selected for performance of this pressure test is Intertek Testing Services NA, Inc., Elmendorf, TX.

4.2.4 Provide engineering instructions to the testing laboratory for performance of the test including test parameters, acceptance criteria, requirements for documenting the test results in a final test report, etc.

4.2.5 Procure all primary penetration seal materials, devices and components (i.e., any materials, devices and components intended to replicate future Safety Related (QL-1) designs to be installed in the MOX facility) as designated in the procurement plan section (Section 5.0) of this test plan.

4.2.6 Notify MOX Services at least 10 days prior to test date to facilitate MOX Services decision to witness the pressure test.

4.2.7 Witness pressure test.

4.2.8 Perform post-test examinations.

4.2.9 Review, approve and issue final test reports.

4.3 Testing Laboratory (Intertek Testing Services NA, Inc.)

4.3.1 Notify AREVA at least 5 days prior to the start of test assembly construction activities.

4.3.2 Construct test decks in accordance with this test plan and AREVA direction.

4.3.3 Procure test deck materials and any other test assembly components identified under the Testing Laboratory scope in the procurement plan section (Section 5.0) of this test plan.

4.3.4 Procure testing equipment necessary for pressure testing services in accordance with this test plan and verify that the testing equipment is properly calibrated.

4.3.5 Provide pressure testing services in accordance with this test plan.

4.3.6 Assist AREVA, as necessary, in conducting detailed post-test destructive examinations of the test assemblies.

4.3.7 Dispose of test assemblies upon completion of the pressure tests.

4.3.8 Generate final test reports in accordance with test plan requirements (Section 11.0).

4.4 Other Subcontracted Entities

There are no other Subcontractors for this pressure test plan.

5.0 PROCUREMENT PLAN

This penetration seal pressure test plan involves many elements beyond the penetration seal material being qualified. Some of these elements include the test deck or test slab, various fasteners for securing laboratory instrumentation to the test assembly, etc. Not all elements of the test assembly are required to be procured to the same quality level as the penetration seal material, which must be capable of satisfying the quality requirements of the end product (i.e., QL-1 qualified penetration seal assemblies for plant applications). The following procurement plan takes into consideration the required quality level of the various materials required for these penetration seal pressure tests and prescribes an approach for material procurement which considers cost, schedule and quality requirements.

5.1 Penetration Seal Materials

The vast majority of penetration seals that will be installed throughout the MFFF are designated QL-1. MOX Services defines QL-1 in PP9-1, "SSC Quality Levels & Marking Design Documents" [Reference 12.2] as follows:

QL-1 SSCs are typically IROFS (all IROFS are QL-1 and may be either SSCs or Administrative Controls) credited in the Integrated Safety Analysis with a required function to prevent or mitigate design basis events such that high-consequence events are made highly unlikely; intermediate-consequence events are made unlikely; or to prevent criticality. For example, the failure of an IROFS item could cause:

1. *Loss of a primary confinement feature leading to release of material resulting in exceeding 10CFR70.61 performance requirements;*
2. *Failure to satisfy the double contingency principle for the prevention of a criticality accident; or*
3. *Loss of other safety function required to meet 10CFR70.61 performance requirements.*

This definition correlates with the following definition of "Nuclear Safety Related" in AREVA Administrative Procedure (AP) 1702-25, "Assignment of Nuclear Safety Classification to Products and Services" [Reference 12.3]:

Definition of "Nuclear Safety Related"

Company products and services are considered to be nuclear safety related if they involve the evaluation, specification, design or change in design, operation, or performance of structures, systems, and components which must function directly, or must support other systems which function, to ensure any of the following:

- *The integrity of the reactor coolant pressure boundary*
- *The capability to shut down the reactor and maintain it in a safe shutdown condition*

- *The capability to prevent or mitigate the consequences of accidents which could result in potential offsite radiation exposures greater than accepted limits.*

On this basis, permanent penetration seal materials used in this test program shall be procured by AREVA or supplied by MOX Services and suitably base-lined so that future procurements of the same commercial materials can undergo the commercial grade dedication process in support of Nuclear Safety Related (i.e., MOX QL-1) plant installations. Only the primary seal material specified as a part of the final seal design and which are left in place during testing become an integral part of the seal assembly and need to be base-lined for future dedication of similarly procured materials.

The quality level of the penetration seal materials procured for this test plan is **Non-Safety**.

Note: Commercial Grade Dedication (CGD) must be performed for Commercial Grade Items (CGIs) used in Safety Related applications when procured from suppliers where specific quality controls for nuclear applications cannot be imposed in a practical manner in accordance with 56-9141754-001, "AREVA NP Inc. Quality Assurance Program" [Reference 12.4]. However, none of the seal materials to be procured and used in the test program are intended or approved for installation in the MOX facility. Therefore, CGD of penetration seal materials used for test purposes is not required.

For this pressure test, the following materials shall be procured by AREVA and base-lined for future dedication activities.

1. Quantum Silicones QSil 5558MC Silicone Elastomer

5.2 Test Deck/Test Slab

The test deck will be used to simulate a confinement zone or HVAC boundary in which the penetration seal assemblies may be installed. The test deck is not considered an integral part of the penetration seal assembly being tested and therefore is not intended to replicate MOX-specific plant conditions and not considered integral in bounding the performance of the penetration seal assemblies (e.g., concrete blend, compressive strength, rebar size and spacing). The test deck will be comprised of normal weight reinforced concrete.

The opening cast into the test deck will simulate certain features consistent with MOX penetrations (e.g., chamfered edges when deemed relevant, relatively smooth interior finishes, etc.) as defined by detailed test plan drawings contained in Appendix A.

The testing laboratory shall be responsible for procuring all materials and components associated with the construction of the test deck, unless otherwise specified below. The test deck shall comply with the requirements of the approved detailed test plan drawings contained in Appendix A, and in accordance with the testing facility's Quality Assurance Program.

The quality level of the test deck is **Non-safety**.

5.3 Penetrating Items

Penetrating items (e.g., conduits, cable trays and wire ways) will be used in this pressure test to simulate MOX-specific plant commodities during the pressure test but are not considered an integral part of the penetration seal assembly being tested. Therefore, the quality level of the penetrating items is **Non-safety**.

Penetrating items for this pressure test will come from one of two sources: MOX Services or the testing laboratory. MOX Services supplied items are identified on the MOX Services Bill of Materials in Section C.2 of Appendix C. Items provided by the testing laboratory are identified on the Testing Laboratory Bill of Materials in Section C.3 of Appendix C.

6.0 SPECIAL PRECAUTIONS

6.1 Precautions for Construction of Test Assemblies

Observe testing facilities safe work practices for construction, lifting, and moving of test assemblies.

6.2 Precautions for Installation of Seal Assemblies

Observe specific precautions recommended by seal material manufacturer as noted on product literature and material safety data sheets contained in AREVA NP Inc. Document 01-9198306, *Installation Instruction Manual for MOX Penetration Seal Test Program* [Reference 12.5].

6.3 Precautions for Conducting Pressure Tests

Proper safety precautions shall be exercised to preclude personnel from direct exposure to loss of pressure events, unexpected disengaging of testing equipment from the test deck, and all other related hazards.

7.0 PREREQUISITES

7.1 General Test Configuration Requirements

The test assembly, including slab layout and penetration seal configurations shall be as specified by AREVA and in accordance with the drawings and information contained in Appendix A of this test plan, and AREVA NP Inc. Document 01-9198306, *Installation Instruction Manual for MOX Penetration Seal Test Program* [Reference 12.5].

7.2 Safety Related Materials

Penetration seal materials that are purchased **Non-Safety** for this test program but are to be base-lined for future Nuclear Safety Related via the Commercial Grade Dedication process are indicated on the AREVA Bill of Materials (Appendix C.1).

7.3 Dimensioned Drawings

All test articles shall conform to the dimensioned drawings supplied by AREVA and contained in Appendix A and B of this test plan. Any differences between designed and constructed/tested assemblies shall be noted in final drawings contained within the test report.

7.4 Test Configuration

All test articles shall be securely fastened to the test apparatus by the laboratory. All openings shall be sealed in accordance with test plan instructions, drawings (Appendix A and B) and AREVA Document 01-9198306 [Reference 12.5].

8.0 TEST ASSEMBLY CONSTRUCTION

8.1 Test Slab Construction

The Testing Laboratory shall construct the test slab, including location and size of openings and placement of penetrating items, in accordance with the drawings contained in Appendix A of this Test Plan.

AREVA QC (or approved designee) shall conduct an inspection of the test slab for compliance with the approved Test Plan drawings prior to installation of individual penetration seal test assemblies. Any differences between the approved Test Plan drawings and the as-built test slab configuration shall be corrected (if deemed necessary by the ARVEA Test Engineer) or noted by the QC Inspector (if correction is not required). Completion of this verification shall be documented as required by AREVA Document 01-9198306, *Installation Instruction Manual for MOX Penetration Seal Test Program*.

8.2 Penetration Seal Installation

AREVA (or approved designee) shall install the penetration seal test assemblies in accordance with the drawings contained in Appendix A of this Test Plan and in accordance with AREVA Document 01-9198306, *Installation Instruction Manual for MOX Penetration Seal Test Program*.

QA/QC verification of penetration seal installations shall be documented as required by AREVA Document 01-9198306, *Installation Instruction Manual for MOX Penetration Seal Test Program*.

8.3 Pre-Test Verifications

Prior to conducting the pressure test for each test assembly, the AREVA Test Engineer shall sign-off indicating that the test article (test penetration) is complete and ready for testing as required by AREVA Document 01-9198306, *Installation Instruction Manual for MOX Penetration Seal Test Program*.

9.0 PROCEDURE

9.1 Pressure Test Apparatus

The pressure test apparatus to be used for these pressure tests shall be constructed and maintained by the testing laboratory. Two hemispherical 72" diameter steel pressure vessels shall be used to construct the assembly. One side shall be used to induce the testing pressures above atmospheric pressure based on Table 9-1, while the other side shall measure the pressure increase or "leakage" through the penetration. The test apparatus shall be "leak-tight" and substantial enough to withstand the pressures created for test purposes. Attachment shall be sufficient to withstand the forces imposed on the pressure vessels during the test.

9.2 Process

The anticipated differential pressures, as they apply to MFFF penetration seal designs, are discussed in DCS01-BRA-DS-TRD-B-01365-0 [Reference 12.6]. Depending upon its location in the plant, a penetration seal may be subjected to differential pressures from one or more of the following sources:

- Clean agent suppression system discharge (inadvertent or in response to a fire)
- Normal HVAC operation in support of facility confinement zone separation
- Fire induced pressure
- HVAC pressure boundary

The full range of differential pressures under various conditions is identified in Calculations DCS01-XGA-DS-CAL-B-01105-0 [Reference 12.7], DCS01-ASI-DS-CAL-R-10552-0 [Reference 12.8], and DCS01-QJJ-DS-CAL-V-10421-0 [Reference 12.9].

The pressure levels specified in Table 9-1 are to be used in the pressure tests. These pressures are intended to bound a range of calculated differential pressures anticipated based on the various pressure conditions described above and detailed in the referenced calculations, with additional margin. The bounding differential pressures to be used for each penetration seal pressure test, the test hold time at

each pressure, the acceptance criteria to be considered "sufficiently leak-tight", and the basis for each pressure, are identified in Table 9-1.

A hold time of 30 minutes has been established for each pressure level to ensure that sufficient time at pressure is maintained to; 1) confirm that no leakage occurs at that pressure, or 2) stabilize make up air and attain reasonably accurate leakage rate information for those configurations where leakage is detected.

Table 9-1: Differential Pressure Test Levels

Test Stage	Differential Pressure (inch w.g.)	Required Hold Time (minutes)	Acceptance Criteria	Basis for the Selected Differential Pressure
1	1.0	30	Leakage ≤ 0.01 cfm/sq. ft. of penetration area - Note [1]	Testing at this differential pressure bounds the 0.51 inches w.g. pressure for C3b to C2 areas during normal operation [Reference 12.9]
2	5.0	30	Seal Remains In Place	Testing at this differential pressure bounds the 4.0 inches w.g. pressure anticipated as a result of clean agent suppression system discharge [Reference 12.7].
3	10.0	30	Seal Remains In Place	Testing at this differential pressure bounds the 7.0 inches w.g. pressure used as the screening pressure cutoff for fire induced pressures [References 12.7 and 12.8] and some of the HVAC pressure boundaries [Reference 12.9].
4	20.0	30	Seal Remains In Place	Testing at this differential pressure bounds all of the calculated fire induced pressures [Reference 12.8] and many of the HVAC pressure boundaries [Reference 12.9].
5	40.0	30	Seal Remains In Place	Testing at this differential pressure bounds all of the HVAC pressure boundaries [Reference 12.9].

Note [1]: 34" x 48" seal area @ ≤ 0.01 cfm/sq. ft. leakage = maximum leakage of 0.113 cfm.

Each test assembly shall be attached to the pressure test apparatus and subjected to the pressures identified in Table 9-1 as described below.

9.2.1 The test assembly shall be attached to the pressure test apparatus and subjected to air pressure tests at the select pressure levels identified in Table 9-1, beginning with the Stage 1 pressure of 1.0 inches w.g. Once this pressure has been obtained, the pressure shall be maintained for the hold time specified in Table 9-1. The maximum leakage rate observed during the hold time shall be recorded. If the leakage rate exceeds the acceptance criteria during Stage 1 testing, the time of failure shall be noted and the test shall be continued, since leakage alone does not constitute failure after Stage 1.

9.2.2 Once the designated hold time has been achieved, the pressure shall be increased to the next pressure level identified in Table 9-1 (Stage 2, then Stage 3, then Stage 4 and finally Stage 5) and held for the designated hold time. The maximum leakage rate observed during each hold time shall be recorded.

9.2.3 Following completion of Stage 5 pressure testing, the test may continue at the discretion of the AREVA test engineer and the testing laboratory manager in charge. Subsequent

pressures, hold times and maximum leakage rates shall be recorded as directed by the AREVA test engineer.

9.2.4 If at any pressure level (or test stage) the penetration seal becomes dislodged from the opening or otherwise catastrophically fails, the pressure test shall be terminated and the time to failure and pressure at which the failure occurred shall be recorded.

9.3 Post Test Examination

Following completion of the pressure test, visual and destructive (if deemed necessary) post-test examinations shall be performed. These examinations shall include, but not necessarily be limited to, the following:

Visual observations of penetration seal condition including:

- Integrity of seal and conditions on the exposed and unexposed side of the penetration
- Location of any penetration seal degradation
- Condition of seal to barrier interface
- Condition of seal to penetrating item interfaces

Once visual observations are complete, destructive examinations may be used to obtain additional information or gain extra insights into penetration seal performance during the pressure tests.

10.0 DATA SYSTEMS

During the pressure tests, the various data systems connected to the test apparatus (blowers, anemometers, manometers, etc.) shall be controlled and monitored by the testing laboratory. Data recorded for these components shall be compiled and contained in the pressure test report.

11.0 TEST REPORT

The testing laboratory shall submit a report on the results of the test. The test report shall contain the collected data and required quality control documentation. The final test report shall be prepared in sufficient detail to summarize the total testing activity. The final report shall include as a minimum:

- Date of test
- Location of test
- Description of test apparatus and test articles
- Calibration documentation for all data systems connected to the test apparatus
- Test procedures used
- Acceptance criteria
- Provide quality control records
- Results of the pressure test
- Color digital photographs of the test project

12.0 REFERENCES

12.1 Shaw AREVA MOX Services Calculation DCS01-QJJ-DS-CAL-V-13312-0, "*Confinement Boundary Air Leakage Criteria*"

12.2 Shaw AREVA MOX Services Procedure PP9-1, Revision 14, SSC "*Quality Levels & Marking Design Documents*"

12.3 AREVA NP Inc. Procedure 1702-25, Revision 018, "*Assignment of Nuclear Safety Classification to Products and Services*"

12.4 AREVA NP Inc. Document 56-9111754-001, "*AREVA NP Inc. Quality Assurance Program*"

12.5 AREVA NP Inc. Document 01-9198306 (latest revision), "*Installation Instruction Manual for MOX Penetration Seal Test Program*"

12.6 Shaw AREVA MOX Services Document DCS01-BRA-DS-TRD-B-01365-0, "*Technical Requirements Document for MFFF Penetration Seals*"

12.7 Shaw AREVA MOX Services Calculation DCS01-XGA-DS-CAL-B-01105-0, "*BMF HVAC and Fire Induced Pressure Loads*"

12.8 Shaw AREVA MOX Services Calculation DCS01-ASI-DS-CAL-R-10552-0, "*Fire Induced Room Pressure Analysis*"

12.9 Shaw AREVA MOX Services Calculation DCS01-QJJ-DS-CAL-V-10421-0, "*Pressure Differentials Across Internal Barriers within the MOX Facility*"

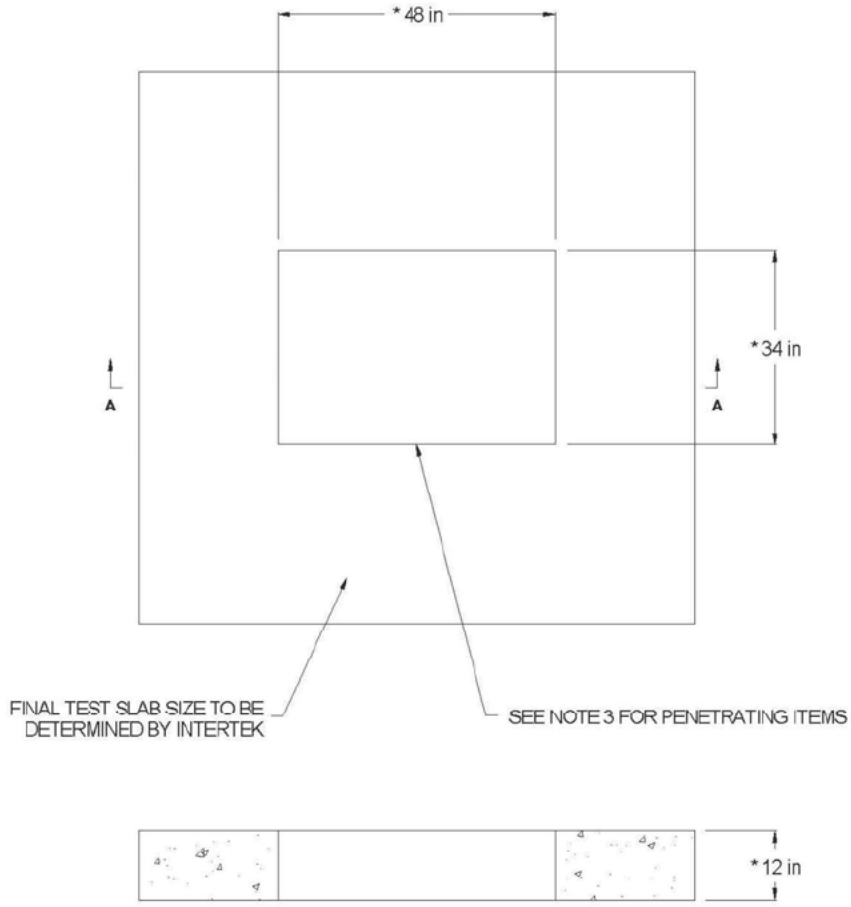
Retrieval of Reference Documents

References 12.1, 12.2, 12.6, 12.7, 12.8 and 12.9 of this document were not entered into the AREVA NP Records Management system because they can be retrieved using the Shaw AREVA MOX Services Records Management system. These documents have been authorized for use as design information in this document with the AREVA NP Project Manager's written authorization as indicated by the PM's signature on Page 2.

APPENDIX A: TEST DECK/TEST SLAB DRAWINGS

This appendix contains a drawing outlining the basic layout of the test deck/test slab to be used for this pressure test. Concrete reinforcement details and additional test deck features, such as perimeter framing details and lug locations for lifting the test deck, are the responsibility of the testing laboratory. Additionally, this appendix contains notes that are to be used in conjunction with the layout drawing to construct the test deck.

Figure A-1: Pressure Test P4 Test Deck



SECTION A-A

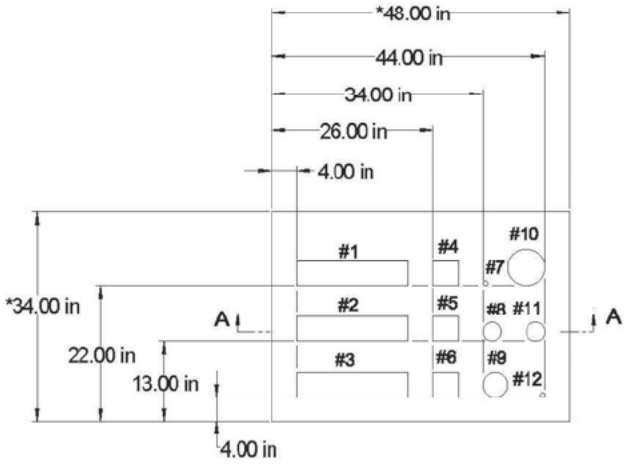
NOTES:

1. TOLERANCE ON ALL SLAB DIMENSIONS IS +/- 1/4"
2. * INDICATES DIMENSIONS TO BE VERIFIED BY AREVA QC (OR APPROVED DESIGNEE).
3. SEE APPENDIX B FOR PENETRATING ITEMS AND PENETRATION SEAL DESIGN.

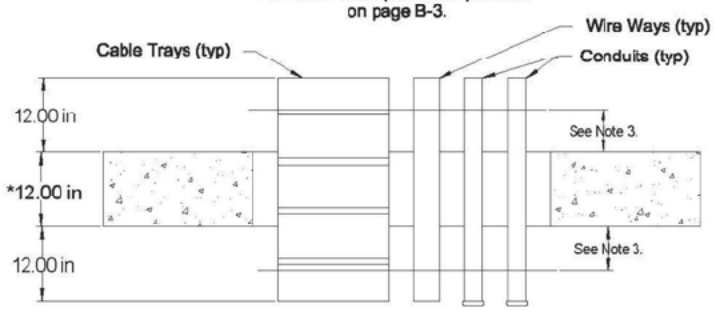
APPENDIX B: TEST PENETRATION DRAWINGS

This appendix contains drawings for the test penetration for Pressure Test 4. These drawings identify penetrating item locations within the test penetration, as well as, the penetration seal design for the test penetration.

Pressure Test P4
Penetrating Item Locations



Penetrant descriptions are provided on page B-3.



Section A-A

NOTES:

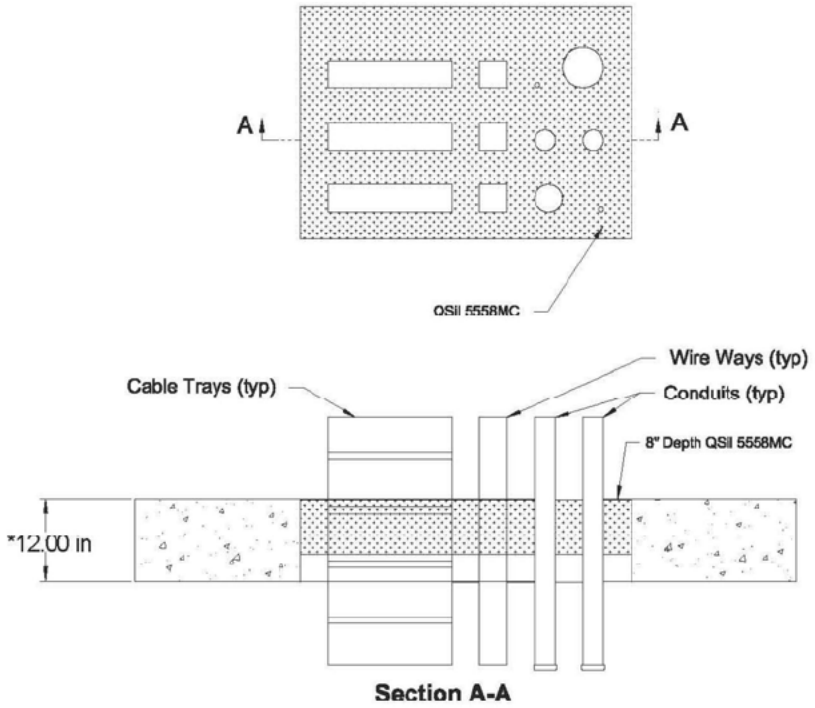
1. TOLERANCE ON ALL SLAB DIMENSIONS IS +/- 1/4"
2. * INDICATES DIMENSIONS TO BE VERIFIED BY AREVA QC.
3. INSTALL SUPPORT APPROXIMATELY 6" TO 8" ABOVE AND BELOW SLAB.

Pressure P4

Penetrant Description:

Penetrating Item #1 = 18"x4" galvanized steel, solid-bottom (GSB) cable tray without cables or cover
Penetrating Item #2 = 18"x4" galvanized steel, ladder-back (GLB) cable tray without cables or cover
Penetrating Item #3 = 18"x4" stainless steel, solid-bottom (SSSB) cable tray without cables or cover
Penetrating Item #4 = 4"x4" powder-coated carbon steel (PCCS) wire way without cables or cover
Penetrating Item #5 = 4"x4" galvanized steel (GS) wire way without cables or cover
Penetrating Item #6 = 4"x4" stainless steel (SS) wire way without cables or cover
Penetrating Item #7 = ¾" diameter empty stainless steel (SS) conduit capped on bottom side
Penetrating Item #8 = 3" diameter empty stainless steel (SS) conduit capped on bottom side
Penetrating Item #9 = 4" diameter empty stainless steel (SS) conduit capped on bottom side
Penetrating Item #10 = 6" diameter empty rigid galvanized steel (RGS) conduit capped on bottom side
Penetrating Item #11 = 3" diameter empty rigid galvanized steel (RGS) conduit capped on bottom side
Penetrating Item #12 = ¾" diameter empty rigid galvanized steel (RGS) conduit capped on bottom side

Pressure Test P4
Penetration Seal Material Installation



Section A-A

NOTES:

1. TOLERANCE ON ALL SLAB DIMENSIONS IS +/- 1/4"
2. * INDICATES DIMENSIONS TO BE VERIFIED BY AREVA QC.

APPENDIX C: BILL OF MATERIALS

This appendix contains the Bill of Materials for this pressure test. The Bill of Materials in Section C.1 identifies materials to be provided by AREVA. The Bill of Materials in Section C.2 identifies materials to be provided by MOX Services. The Bill of Materials in Section C.3 identifies materials to be provided by Intertek.

C.1 Table Bill of Materials for AREVA Supplied Items

Bill of Material for AREVA Supplied Items					
Item	**Description**	**Part Number**	**Quantity**	**Units**	**Total**
1	Quantum Silicones QSil 5558MC (50lb part A, 50lb part B, 100lb set)	N/A	9	Set	9 Sets

C.2 Bill of Materials for MOX Services Supplied Items

Bill of Material for MOX Services Supplied Items					
Item	**Description**	**Part Number**	**Quantity**	**Units**	**Total**
1	3/4" Diameter Stainless Steel Conduit– Calbrite Stainless Steel Conduit Systems, Type 304, or Equal with Cap (Need 1 @ 3 LF w/1 Cap)	S40710CT00	10	Ft.	10 Ft.
2	3/4" Diameter Galvanized Conduit– Calconduit or Equal with Cap (Need 1 @ 3 LF w/1 Cap)	ST0710CT00	10	Ft.	10 Ft.
3	3" Diameter Stainless Steel Conduit– Calbrite Stainless Steel Conduit Systems, Type 304, or Equal with Cap (Need 1 @ 3 LF w/1 Cap)	S43010CT00	10	Ft.	10 Ft.
4	3" Diameter Galvanized Conduit– Calconduit or Equal with Cap (Need 1 @ 3 LF w/1 Cap)	ST3010CT00	10	Ft.	10 Ft.
5	4" Diameter Stainless Steel Conduit –Calbrite Stainless Steel Conduit Systems, Type 304, or Equal with Cap (Need 1 @ 3 FL w/1 Cap)	S44010CT00	10	Ft.	10 Ft.
6					
7					
8					
9					

C.3 Bill of Materials for Intertek Supplied Items

Bill of Material for Intertek Supplied Items*					
Item	**Description**	**Part Number**	**Quantity**	**Units**	**Total**
1	6" Diameter Galvanized Conduit – Calconduit or Equal with Cap (Need 1 @ 3 LF w/1 Cap)	ST6010CT00	10	Ft.	10 Ft.
2	4"x4" Painted Wire Way – Cooper B-Line or Equal (Need 1 @ 3 LF)	4460 G NK	5	Ft.	5 Ft.
3	4"x4" Galvanized Wire Way – Cooper B-Line or Equal (Need 1 @ 3 LF)	4460 GGV NK	5	Ft.	5 Ft.
4	4"x4" Stainless Steel Wire Way – Cooper B-Line or Equal (Need 1 @ 3 LF)	4460-4XSFW	5	Ft.	5 Ft.
5	18"x4" Galvanized Solid Bottom Cable Tray – Cooper B-Line or Equal (Need 1 @ 3 LF)	444 G ST 18 120	10	Ft.	10 Ft.
6	18"x4" Galvanized Ladder Back Cable Tray – Cooper B-Line or Equal (Need 1 @ 3 LF)	444 G 09 18 120	10	Ft.	10 Ft.
7	18"x4" Stainless Steel Solid Bottom Cable Tray – Cooper B-Line or Equal (Need 1 @ 3 LF)	348 SS4 SB 18 120	10	Ft.	10 Ft.

* *This BOM applies to Intertek Supplied Items other than materials required to construct the test slab. Construction of the test slab, including procurement of any materials required for the test slab and commodity supports, is the responsibility of Intertek.*

AREVA

Document No.: 51-9199513-003

Detailed Test Plan for Conducting MOX Pressure Test 4

APPENDIX D: DESIGN VERIFICATION CHECKLIST

22410-8 (02/25/2013) Page 1 of 2

AREVA

DESIGN VERIFICATION CHECKLIST

Document Identifier 51 - 9199513 - 003

Title Detailed Test Plan for Conducting MOX Pressure Test 4

1.	Were the inputs correctly selected and incorporated into design or analysis?	☒ Y	☐ N	☐ N/A
2.	Are assumptions necessary to perform the design or analysis activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent re-verifications when the detailed design activities are completed? Note: If there are no assumptions (of any type), then N/A shall be checked.	☐ Y	☐ N	☒ N/A
3.	Are the appropriate quality and quality assurance requirements specified? Or, for documents prepared per AREVA NP Inc. procedures, have the procedural requirements been met?	☒ Y	☐ N	☐ N/A
4.	If the design or analysis cites or is required to cite requirements or criteria based upon applicable codes, standards, specific regulatory requirements, including issue and addenda, are these properly identified, and are the requirements/criteria for design or analysis met?	☒ Y	☐ N	☐ N/A
5.	Have applicable construction and operating experience been considered?	☒ Y	☐ N	☐ N/A
6.	Have the design interface requirements been satisfied?	☒ Y	☐ N	☐ N/A
7.	Was an appropriate design or analytical method used?	☒ Y	☐ N	☐ N/A
8.	Is the output reasonable compared to inputs?	☒ Y	☐ N	☐ N/A
9.	Are the specified parts, equipment and processes suitable for the required application?	☒ Y	☐ N	☐ N/A
10.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?	☒ Y	☐ N	☐ N/A
11.	Have adequate maintenance features and requirements been specified?	☐ Y	☐ N	☒ N/A
12.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?	☐ Y	☐ N	☒ N/A
13.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?	☐ Y	☐ N	☒ N/A
14.	Has the design properly considered radiation exposure to the public and plant personnel?	☐ Y	☐ N	☒ N/A
15.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?	☒ Y	☐ N	☐ N/A
16.	Have adequate preoperational and subsequent periodic test requirements been appropriately specified?	☐ Y	☐ N	☒ N/A
17.	Are adequate handling, storage, cleaning and shipping requirements specified?	☒ Y	☐ N	☐ N/A
18.	Are adequate identification requirements specified?	☒ Y	☐ N	☐ N/A
19.	Is the document prepared and being released under the AREVA NP Inc. Quality Assurance Program? If not, are requirements for record preparation review, approval, retention, etc., adequately specified?	☒ Y	☐ N	☐ N/A

AREVA

Document No.: 51-9199513-003

Detailed Test Plan for Conducting MOX Pressure Test 4

22410-8 (02/25/2013) *Page 2 of 2*

AREVA

DESIGN VERIFICATION CHECKLIST

Document Identifier 51 - 9199513 - 003

Comments on the preceding responses:
N/A

Verified By:	Victor E. Kaldenbach	[redacted]	09/16/2013
(First, MI, Last)	Printed / Typed Name	Signature	Date

APPENDIX E
Commercial Grade Dedication-Related Documents

The vast majority of penetration seals that will be installed throughout the MFFF will be designated as quality level QL-1. For this reason, permanent penetration seal materials used in this test program were procured by AREVA or supplied by MOX Services and suitably base-lined so that future procurements of the same commercial materials can undergo the Commercial Grade Dedication process in support Nuclear Safety Related (i.e., MOX QL-1) plant installations.

Only the primary seal material(s) that were specified as a part of the final penetration seal design and left in place during the test needed to be base-lined for future dedication of similarly procured materials. For this pressure test, the following AREVA document contains information associated with materials that underwent the base-lining process. This document establishes material critical characteristics as a baseline for future Commercial Grade Dedication.

- AREVA Document 51-9212663-000, "Quantum Silicones QSil 5558MC Silicone Elastomer Critical Characteristics"

This document is available from the AREVA Records Management System or the MOX Records Management System.

APPENDIX F
Quality Documents

Controlled Document

AREVA

Document No.: 01-9198306-002

Installation Instruction Manual for MOX Penetration Seal Test Program

A.1 Quality Verification for Installation of Silicone Elastomer Penetration Seals

PRESSURE TEST 4

Page 1 of 3

01-9198306-F01 (QC-F01)

Attribute	Requirement	Initial / Date
7.1.2	Test Penetration Number 9199513-P1	[redacted] 9-18-13
QC	Verify critical attributes of the test slab and the applicable penetration are correct. Critical attributes are identified in the test plan (i.e., dimensions marked with an asterisk).	[redacted] 9-18-13
QC	Verify the dam depth is as specified in the test plan and confirm that the penetration is clean and free of dirt, oil, and any other foreign materials.	[redacted] 9-18-13
7.2.1.1	Record material type, lot number and shelf life for batch on Form QC-F01, Table A-1	Attached
7.2.1.3	Record the batch number on Form QC-F01, Table A-1	Attached
7.2.12	Record sample weight and sample density on Form QC-F01, Table A-1	Attached
QC	Verify the total sample weight recorded on the cup label, the sample weight recorded on the cup label and Form QC-F01, Table A-1, and sample density recorded on the cup label and Form QC-F01, Table A-1. Record acceptance on Form QC-F01, Table A-1.	Attached
7.3.2	Remove all temporary damming per Section 6.3	[redacted] 9-19-13
QC	Verify that the completed seal assembly is in accordance with the test plan design (i.e., temporary damming has been removed, and the installed seal configuration(s) and depth(s) are per the test plan. **Any approved deviations from the test plan shall be clearly noted below.**	[redacted] 9-20-13

Comments (can be continued on back):

Penetration Seal Assembly Complete: [redacted] 9-24-13
AREVA Quality Control — Date

Penetration Ready for Testing: [redacted] 9/24/13
AREVA Test Engineer — Date

AREVA

Document No.: 01-9198306-002

Installation Instruction Manual for MOX Penetration Seal Test Program

Test Penetration Number 9199513-P1

Form QC-F01, Table A-1: Silicone Elastomer Batch Sample Quality Control

Product Name	Lot Number	Shelf Life (Expiration)	Batch Number	Sample Weight (g)	Sample Density (lbs/ft³)	QC Initial / Date
QSIL 5558MC	130606	6-14-14	130606-ALA-030	143.2	80.8	[redacted] / 9-19-13
"	"	6-14-14	130606-ALA-031	140.2	79.1	/ 9-19-13
"	"	6-14-14	130606-ALA-032	140.9	79.5	/ 9-19-13
"	"	6-14-14	130606-ALA-033	140.1	79.0	/ 9-19-13
"	"	6-14-14	130606-ALA-034	142.3	80.3	/ 9-19-13
"	"	6-14-14	130606-ALA-035	139.2	78.5	9-19-13
"	"	6-14-14	130606-ALA-036	139.3	78.6	9-19-13
"	"	6-14-14	130606-ALA-037	139.8	78.9	9-19-13
"	"	6-14-14	130606-ALA-038	140.1	79.0	9-19-13
"	"	6-14-14	130606-ALA-039	139.3	78.6	9-19-13
"	"	6-14-14	130606-ALA-040	140.0	79.0	9-19-13
"	"	6-14-14	130606-ALA-041	140.0	79.0	9-19-13
"	"	6-14-14	130606-ALA-042	139.8	78.9	9-19-13

Intertek

AREVA

Document No.: 01-9198306-002

Installation Instruction Manual for MOX Penetration Seal Test Program

Test Penetration Number 9199513-P1

Page 3 of 3

Form QC-F01, Table A-1: Silicone Elastomer Batch Sample Quality Control

Product Name	Lot Number	Shelf Life (Expiration)	Batch Number	Sample Weight (g)	Sample Density (lbs/ft³)	QC Initial / Date
7/18/13 QSIL 5558MC	130606	6-14-14	130606-ALA-043	140.4	79.2	[redacted] 9-19-13 *
~~7/18/13~~ ~~QSIL5558MC~~	~~130606~~		~~130606-ALA-044~~	NOT USED	[redacted] 9-19-13	
~~7/18/13~~ ~~QSIL5558MC~~	130606		~~130606-ALA-045~~	NOT USED	[redacted] 9-19-13	

* LAST BATCH WAS MOSTLY POURED INTO CONDUITS TO ENSURE AN AIR-TIGHT SEAL.

Page A-3

Intertek

QSil 5558MC Certificate of Conformance

Product	QSil 5558MC
Batch Identification	130606

Final Batch Physicals

Tests	Specifications	Results
Appearance "A"	Black	Black
Appearance "B"	Beige	Beige
Viscosity "A" component, cps #5 Spindle @ 20rpm	<4,000	3,160 cps
Viscosity "B" component, cps # 5 Spindle @ 20 rpm	<4,000	1,980 cps
Specific Gravity "A" component (g/cm^3)	1.35-1.40	1.37
Specific Gravity "B" component (g/cm^3)	1.35-1.40	1.36
Catalyzed Properties 1:1 Mix Ratio		
Work Time, (snap time), minutes	20-40	25min.
Shore A, 24 hour	>45	57
QSi Heat Cured Method 15 min. @ 150°C		
Tensile strength, psi	>400	472
Elongation, %	>75	106
Young's Modulus	Report	478
General Product Information		
Date of Manufacture	6/6/13	
Shelf Life, months	12 months from date of shipment if stored at ≤38C (100F).	

Storage Conditions: This material should be stored in the original, unopened container at less than 100F. Under these conditions, the material will be useful for a period of 12 months.

QSi Batch Release Authorization: [redacted]
Quality Control
QSi, LLC

Quantum Silicones certifies that the [material described above] has been tested in accordance with the company's standard lot acceptance procedures and complies (except as stated above) with the specifications associated with such material's Quantum Silicones Product Reference Number. This certification applies only to the material lot tested. Lot acceptance data are available for examination. This material has not been subjected to tests appropriate for medical device or pharmaceutical applications. QUANTUM SILICONES MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MECHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE WITH RESPECT TO THE PRODUCT TO WHICH THE ABOVE INFORMATION REFERS. [This Certificate is valid unsigned.]

Quantum Silicones, LLC
8021 Reycan Road
Richmond, VA 23237
(804)271-9010
Fax (804)271-9055
www.quantumsilicones.com

Date of shipment 6/14/2013

REV-1
11/29/12

Intertek

Q/A RECEIVING REPORT

Client/Project Name: Areva NP
Client or Project No.: G101147165SAT-001
Received From: c/o Quantum Silicones
Project Location: INTERTEK –Elmendorf, TX

Report No: 11-G101147165SAT-001
Date Received: 6/19/2013
Date Inspected: 6/19/2013
Inspected By: MABrown [redacted]

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B/O	I.D. NO.	Cont Mat'l Y/N	Cert. Rec'd Y/N	Safety Rel'd Y/N	Con. Integrity	ACCEPTANCE Accpt.	Rej.	Hold	REMARKS
QSIL 5558 MC Part A 50 5gal pails Lot # 130606	Client	50	50	–	SAT1306191104-001	Y	Y	Y	G	✓			Receiving Only: Materials stored in the Conditioning Room
QSIL 5558 MC Part B 50 5gal pails Lot # 130606	Client	50	50	–	SAT1306191104-002	Y	Y	Y	G	✓			

9/12-NQAP-005.7.1

Intertek

Q/A RECEIVING REPORT

Client/Project Name: Areva NP
Client or Project No.: G101147165SAT-001
Received From: Texas Specialty Steel
Project Location: INTERTEK –Elmendorf, TX

Report No: 20-G101147165SAT-001
Date Received: 8/12/2013
Date Inspected: 8/12/2013
Inspected By: MABrown [redacted]

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B/O	I.D. NO.	Cont Mat'l Y/N	Cert. Rec'd Y/N	Safety Ref'd Y/N	Con. Integrity	ACCEPTANCE Accpt.	Rej.	Hold	REMARKS
18" x 4" x 10' stainless steel solid bottom cable tray	217862	1	1	–	SAT1308121554-001	Y	N	N	G	✓			Receiving Only: Stored in the Conditioning Room
18" x 4" x 10' galvanized steel solid bottom cable tray	217862	1	1	–	SAT1308121554-002	Y	N	N	G	✓			
36" x 4" x 10' stainless steel ladder back cable tray	217699	1	1	–	SAT1308121554-003	Y	N	N	G	✓			
36" x 4" x 10' galvanized steel ladder back cable tray	217699	1	1	–	SAT1308121554-004	Y	N	N	G	✓			
2" x 5' pipe, Sch 80 A106B	217699	1	1	–	SAT1308121554-005	Y	N	N	G	✓			
3" x 5' pipe Sch 40 SS-304	217699	1	2	–	SAT1308121554-006	Y	N	N	G	✓			
4" x 5' pipe Sch 80 A106B	217699	1	1	–	SAT1308121554-007	Y	N	N	G	✓			
6" x 5' pipe, Sch 80 A106B	217699	1	1	–	SAT1308121554-008	Y	N	N	G	✓			
8" x 5' pipe, Sch 40 A-106B	217699	1	1	–	SAT1308121554-009	Y	N	N	G	✓			
12" x 3' pipe, .375 wall, A106B	217699	1	1	–	SAT1308121554-010	Y	N	N	G	✓			
2" x 18"' stainless steel pipe 304	217700	2	2	–	SAT1308121554-011	Y	N	N	G	✓			
2" x 3' 16 GA Stainless steel sleeve	217700	1	1	–	SAT1308121554-012	Y	N	N	G	✓			
1/2" x 5' stainless steel pipe	217700	27	27	–	SAT1308121554-013	Y	N	N	G	✓			
2" x 5' pipe, Sch 80 A106B	217700	1	1	–	SAT1308121554-014	Y	N	N	G	✓			
2" x 5' stainless steel pipe, Sch 40	217700	3	3	–	SAT1308121554-015	Y	N	N	G	✓			
6" x 5' pipe, Sch 80 A106B	217700	3	3	–	SAT1308121554-016	Y	N	N	G	✓			
6" x 5' stainless steel pipe, Sch 10	217700	2	2	–	SAT1308121554-017	Y	N	N	G	✓			
2" x 5' pipe, Sch 80 A106B (Extra)			1		SAT1308121554-018								

9/12-N0AP-005.7.1

Q/A RECEIVING REPORT

Intertek

Client/Project Name: Areva NP
Client or Project No.: G101276459SAT-001D
Received From: Areva NP c/o Texas Specialty Steel
Project Location: INTERTEK –Elmendorf, TX

Report No: 01-G101276459SAT-001D
Date Received: 9/18/2013
Date Inspected: 9/19/2013
Inspected By: MABrow[redacted]

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	QUANTITY Rec'd	QUANTITY B/O	I.D. NO.	Cont Matl Y/N	Cert. Rec'd Y/N	Safety Rel'd Y/N	Con. Integrity	ACCEPTANCE Accpt.	ACCEPTANCE Rej.	ACCEPTANCE Held	REMARKS
3in Cap Black - Threaded	218686Q		1		SAT1309181454-001	Y	N	N	G	✓			Receiving Only:
3in Cap Galvanized - Threaded	218686Q		1		SAT1309181454-002	Y	N	N	G	✓			

9/12-NQAP-005.7.1

Intertek

Q/A RECEIVING REPORT

Intertek

Client/Project Name: Areva NP
Client or Project No.: G101147165SAT-001
Received From: Areva NP c/oTexas Specialty Steel
Project Location: INTERTEK –Elmendorf, TX

Report No: 31-G101147165SAT-001
Date Received: 8/28/2013
Date Inspected: 8/28/2013
Inspected By: MABrown [redacted]

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B/O	I.D. NO.	Cont Mat'l Y/N	Cert. Rec'd Y/N	Safety Rel'd Y/N	Con. Integrity	ACCEPTANCE Accpt.	Rej.	Hold	REMARKS
4" x 4" Galv Wire Way	217862	1	1		SAT1308281113-001	Y	N	N	G	✓			Receiving Only:

9/12-NQAP-005.7.1

Q/A RECEIVING REPORT

Intertek

Client/Project Name: Areva NP
Client or Project No.: G101147165SAT-001
Received From: Areva NP c/o Texas Specialty Steel
Project Location: INTERTEK –Elmendorf, TX

Report No: 32-G101147165SAT-001
Date Received: 9/6/2013
Date Inspected: 9/9/2013
Inspected By: MABrown [redacted]

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	QUANTITY Rec'd	QUANTITY B/O	I.D. NO.	Cont Matl Y/N	Cert. Rec'd Y/N	Safety Rel'd Y/N	Con. Integrity	ACCEPTANCE Accpt.	ACCEPTANCE Rej.	ACCEPTANCE Hold	REMARKS
12" x 12" x 5' Painted Wire Way	218315	1 pc	1 pc	–	SAT1309061237-001	Y	N	N	G	✓			Receiving Only: Stored with other Areva NP materials
18" x 4" x 5' Galvanized Ladder Back Cable Tray	217862Q - PT4	1 pc	1 pc 10'	–	SAT1309061255-001	Y	N	N	G	✓			

9/12-NQAP-005.7.1

Q/A RECEIVING REPORT

Intertek

Client/Project Name: Areva NP
Client or Project No.: G101147165SAT-001
Received From: Areva NP c/oTexas Specialty Steel
Project Location: INTERTEK –Elmendorf, TX

Report No: 30-G101147165SAT-001
Date Received: 8/23/2013
Date Inspected: 8/23/2013
Inspected By: MABrown [redacted]

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	QUANTITY Rec'd	QUANTITY B/O	I.D. NO.	Cont Matl Y/N	Cert. Rec'd Y/N	Safety Rel'd Y/N	Com. Integrity	ACCEPTANCE Accpt	ACCEPTANCE Rej.	ACCEPTANCE Hold	REMARKS
4" Stainless steel cap	217700	1	1		SAT1308261714-001	Y	N	N	G	✓			Receiving Only:
4" x 4" painted Wire Way	217862	1	1		SAT1308261714-002	Y	N	N	G	✓			
4" x 4" SS Wire Way	217862	1	1		SAT1308261714-003	Y	N	N	G	✓			
8"diam x 5' pipe, A106b	218315	1	1		SAT1308261714-004	Y	N	N	G	✓			

9/12-NQAP-005.7.1

Q/A RECEIVING REPORT

Intertek

Client/Project Name:	Areva NP	Report No:	05-G101147165SAT-001
Client or Project No.:	G101147165SAT-001	Date Received:	6/13/2013
Received From:	Areva Federal Services	Date Inspected:	6/17/2013
Project Location:	INTERTEK –Elmendorf, TX	Inspected By:	MAB [redacted]

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	QUANTITY Rec'd	QUANTITY B/O	I.D. NO.	Cont Matl Y/N	Cert. Rec'd Y/N	Safety Rel'd Y/N	Cer. Integrity	ACCEPTANCE Accpt.	ACCEPTANCE Rej.	ACCEPTANCE Hold	REMARKS
Power Cable 1C#750 KCMIL 61/S TC 70'	Client	70	70	–	SAT1306131038-001	Y	N	N	G	✓			Receiving Only
Power Cable 3C#1/OAWG 19/S TC 80'	Client	80	80	–	SAT1306131038-002	Y	N	N	G	✓			
Control Cable 2/C#20AWG 7/S TC 50'	Client	50	50	–	SAT1306131038-003	Y	N	N	G	✓			
Power Cable 2C#6AWG 7/S TC 100'	Client	100	100	–	SAT1306131038-004	Y	N	N	G	✓			
Instr Cable 2STP 16AWG 7S TC 15'	Client	15	15	–	SAT1306131038-005	Y	N	N	G	✓			
Power Cable 9C#12AWG 7/S TC 250'	Client	250	250	–	SAT1306131038-006	Y	N	N	G	✓			
Control Cable 1/C#8AWG 7/S TC 10'	Client	10	10	–	SAT1306131038-007	Y	N	N	G	✓			
Power Cable 2/C#10AWG 7/S TC 10'	Client	10	10	–	SAT1306131038-008	Y	N	N	G	✓			
Control Cable 37/C#10AWG 7/S TC 10'	Client	10	10	–	SAT1306131038-009	Y	N	N	G	✓			
Control Cable 5/C#22AWG 7/.010 SP 10'	Client	10	10	–	SAT1306131038-010	Y	N	N	G	✓			
SIS Cable 1/C 6AWG 7/S TC 10'	Client	10	10	–	SAT1306131038-011	Y	N	N	G	✓			
Coax Cable RG Type 59/U 22AWG 10'	Client	10	10	–	SAT1306131038-012	Y	N	N	G	✓			
Coax Cable 16AWG 75 OHMS 10'	Client	10	10	–	SAT1306131038-013	Y	N	N	G	✓			
Power Cable 3C# 10AWG 7/S TC 10'	Client	10	10	–	SAT1306131038-014	Y	N	N	G	✓			
Power Cable Halogen Free 3C#AWG 10'	Client	10	10	–	SAT1306131038-015	Y	N	N	G	✓			
8" Dia Nominal Pipe 10'	Client	10	10	–	SAT1306131038-016	Y	N	N	G	✓			
3/8 Inch Tubing SS 304L 60'	Client	60	3x20	–	SAT1306131038-017	Y	N	N	G	✓			
3" Galvanized Conduit 30'	Client	30	3x10	–	SAT1306131038-018	Y	N	N	G	✓			
3/4" SS Conduit 10'	Client	10	10	–	SAT1306131038-019	Y	N	N	G	✓			
3/4" Galvanized Conduit 10'	Client	10	10	–	SAT1306131038-020	Y	N	N	G	✓			
3"Conduit 10'	Client	10	10	–	SAT1306131038-021	Y	N	N	G	✓			
3" Galvanized Conduit 10'	Client	10	10	–	SAT1306131038-022	Y	N	N	G	✓			
4" SS Conduit 10'	Client	10	10	–	SAT1306131038-023	Y	N	N	G	✓			

9/12-NQAP-005.7.1

Intertek

Q/A RECEIVING REPORT

Intertek

Client/Project Name: Areva NP
Client or Project No.: G101147165SAT-001
Received From: Texas Specialty Steel
Project Location: INTERTEK –Elmendorf, TX

Report No: 24-G101147165SAT-001
Date Received: 8/15/2013
Date Inspected: 8/15/2013
Inspected By: MABrown [redacted]

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	QUANTITY Rec'd	QUANTITY B/O	I.D NO.	Cont Matl Y/N	Cert. Rec'd Y/N	Safety Rel'd Y/N	Con. Integrity	ACCEPTANCE Accpt.	ACCEPTANCE Rej.	ACCEPTANCE Hold	REMARKS
1pc. -6" x 10ft. Galvanized Conduit	218315	1	1	–	SAT1308151752-001	Y	N	N	G	✓			Receiving Only:
3pc. -3/4" x 10ft. Galvanized Conduit	217700	3	3	–	SAT1308151752-002	Y	N	N	G	✓			
3pcs. - 3/4" Galvanized Caps	217700	3	3	–	SAT1308151752-003	Y	N	N	G	✓			
3pcs. - 3/4" Galvanized Couplings	217700	3	3	–	SAT1308151752-004	Y	N	N	G	✓			
3pcs. - 6" x 10ft. Galvanized Conduit (rec'd w/o caps)	217700	3	3	–	SAT1308151752-005	Y	N	N	G	✓			
3pcs. - 6" Couplings	217700	3	3	–	SAT1308151752-006	Y	N	N	G	✓			
1pc. -3/4" x 10ft. SS conduit	217700	1	1	–	SAT1308151752-007	Y	N	N	G	✓			
1pc. -3/4" SS cap	217700	1	1	–	SAT1308151752-008	Y	N	N	G	✓			
1pc. -3/4" SS Coupling	217700	1	1	–	SAT1308151752-009	Y	N	N	G	✓			
2pcs. - 1/8" x 5ft.SS pipe Sch.80	217700	2	2	–	SAT1308151752-010	Y	N	N	G	✓			
1pc. 6" x 10ft. Gal. Conduit	217862	1	1	–	SAT1308151752-011	Y	N	N	G	✓			
3pcs. - 4" x 5ft. Sch 80 A106 pipe	218315	3	3	–	SAT1308151752-012	Y	N	N	G	✓			
1pc. -4" x 5ft. SS pipe	218315	1	1	–	SAT1308151752-013	Y	N	N	G	✓			
1pc. -8" x 5ft. SS pipe	218315	1	1	–	SAT1308151752-014	Y	N	N	G	✓			
1 pc. -4" x 10' Stainless Steel Pipe	217700	1	1	–	SAT1308290932-001	Y	N	N	G	✓			

9/12-N0AP-005.7.1

Intertek

LIST OF CALIBRATED EQUIPMENT

Description	Serial No.	Calibration Due Date
Thermo-Hygrometer	111901142	11/2/2013
Data Acquisition System	18041FE	1/16/2014*
Pressure Transducer	3588750	3/26/2014*
Mass Flowmeter	4270050001001	2/1/2014*
Mass Flowmeter	4270050003001	2/1/2014*
Stop watch	122601005	10/23/2014

*See Intertek Corrective Action Request (CAR) 51-AMER-SAT-2014-INT and AREVA Contract Variation Approval Request (CVAR) 87-9224669-000

J2 [redacted]

ilac-MRA ACCREDITED
Calibration
Certificate No. 1750.01

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Cert. No.: 4094-3993529

Traceable® Certificate of Calibration for Digital Humidity/Temp. Meter

Manufactured for and distributed by: Fisher Scientific, 300 Industry Drive, Pittsburgh, PA 15275-1001

Instrument Identification:

Model Numbers: 11-661-11, FB61252, 255TB S/N: 111901142 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Chilled Mirror Hygrometer	31874/H2048MCR	5/12/12	9193
Digital Thermometer	90969500	9/14/12	4000-3893285

Certificate Information:

Technician: 104 Procedure: CAL-17 Cal Date: 11/02/11 **Cal Due: 11/02/13**

Test Conditions: 22.5°C 45.0 %RH 1017 mBar

Calibration Data: (New Instrument)

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C		N.A.		23.667	23	Y	23	25	0.590	1.7:1
%RH		N.A.		41.450	41	Y	37	45	0.000	0.0:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditons are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ±U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio; Accuracy=±(Max-Min)/2; Min = Nominal(Rounded) - Tolerance; Max = Nominal(Rounded) + Tolerance; Date=MM/DD/YY

[redacted]
Nicol Rodriguez, Quality Manager

[redacted]
Wallace Berry, Technical Manager

Maintaining Accuracy:

In our opinion once calibrated your Digital Humidity/Temp. Meter should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Digital Humidity/Temp. Meters change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

Certificate of Calibration

Certificate Number:	2994344	**Date:**	28-MAY-2014
Serial Number: **Description:**	18041FE CCA,USB-6210	**Part Number:**	194710E-04L
Calibration Date:	06-DEC-2012	**Shelf Life:**	0 Days
Calibration Due Date*:	-	**Recommended Calibration Interval:**	12 Months
Temperature:	22.26 °C	**Humidity:**	40.7% RH

Standards Used

Manufacturer	Model	Tracking Number	Calibration Date	Calibration Due
NATIONAL INSTRUMENTS	PXI-4070	6712	26-JUN-12	26-JUN-13
NATIONAL INSTRUMENTS	PXI-6259	6871	27-JUN-12	27-JUN-13
NATIONAL INSTRUMENTS	PXI-5421	7591	25-JUN-12	25-JUN-13
VAISALA	HMT331	7885	24-MAY-12	24-MAY-13

National Instruments certifies that at the time of test, the above product was calibrated in accordance with applicable National Instruments procedures. Th procedures are designed to ensure that the product listed above meets or exceeds National Instruments specifications.

We further certify that the environment in which this product was calibrated is maintained within the operating specifications of the instrument(s) standards. The measurement standards used during calibration are traceable to NIST and/or other International Measurement Institutes (NMI's) tha signatories of the International Committee of Weights and Measure (CIPM) Mutual Recognition Agreement (MRA).

The information shown on this certificate applies only to the instrument identified above and this certificate may not be reproduced, except in full, withou prior written consent of National Instruments.

*Optional field. ***Calibration Due Date***, may be established by combining the *Recommended Calibration Interval*, *Calibration Date* and, when applic accounting for *Shelf Life*. Shelf life defines how long an instrument may be stored, after calibration, without impact to its specifications.

The instrument's Calibration Due Date can be calculated using the following methods:

a) If date placed in service is within *Calibration Date + Shelf Life*: *Calibration Due Date* = date placed in service + *Recommended Calibration Interval*

b) If date placed in service is outside *Calibration Date + Shelf Life*: *Calibration Due Date = Calibration Date + Shelf Life + Recommended Calibration Interval*

For questions or comments, please contact National Instruments Technical Support.

[redacted]

Andrew Krupp
Vice President, Quality and Continuous Improvement

Flowmeter Ser. No. 4270050001001

OMEGA ENGINEERING, INC.
An OMEGA Technologies Company
ONE OMEGA DRIVE, BOX 4047, STAMFORD, CT, U.S.A. 06907-0047
(203) 359-1660 TELEX: 996404 CABLE: OMEGA FAX: (203) 359-7700
http://www.omega.com e-mail: info@omega.com

CERTIFICATE OF ACCURACY

This is to certify that meter serial number 4270050001001 is certified to an accuracy of +/- 1 % of 20 SCFM of N2 and has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology (N.I.S.T.) according to our procedures.

All traceable certifications and related procedures for the equipment used are on file.

Barometer Number:	N/A
Vol-U-Meter Number:	Base 1920 Cell 1898
Type of Gas:	N2
Gas Used for Calibration:	N2
Pressure Gauge Number:	1122
Timer Number:	N/A
Thermometer Number:	N/A
Voltmeter:	NA
Calibrated By:	[redacted]
Date Calibrated:	9-1-13

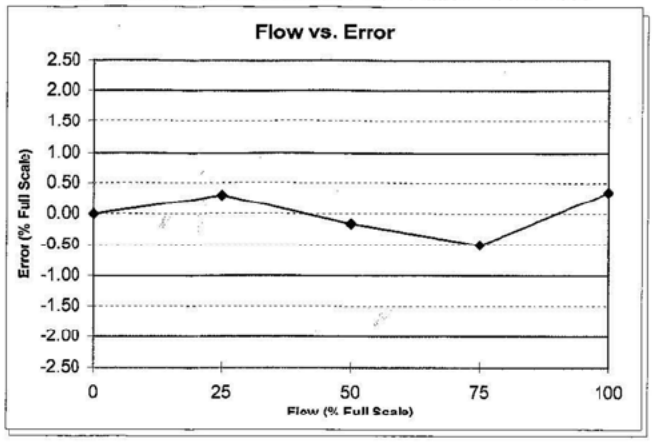
Uncertainty of measurements: +/- 0.3 % of reading

Calibrations were performed under a controlled Quality System Manual, which incorporates the requirements of ISO Guide 25, ISO 10012-1, ISO 9001 (1994) and ISO 13485. The released ISO 13485 registration (Medical Devices – Quality Management Systems – System Requirements for Regulatory Purposes) includes Design Controls and Metrology Systems.

0122220B FM-1011 REV B

OMEGA ENGINEERING, INC.
An OMEGA Technologies Company
ONE OMEGA DRIVE, BOX 4047, STAMFORD, CT, U.S.A. 06907-0047
(203) 359-1660 TELEX: 996404 CABLE OMEGA FAX: (203) 359-7700
http://www.omega.com e-mail: info@omega.com

Mass Flowmeter/Flow Controller Calibration Data Sheet



DATE	2/1/2013
TIME	7:59:59 AM
Shop Order No.	427005
Serial No.	4270050001001

GAS

Nameplate (Actual)	Nitrogen
Surrogate (Calibration)	Nitrogen (N2)

STANDARD CONDITIONS

Std. Pressure	101.32 kPa (760 Torr)
Std. Temperature	21.1 °C

PRESSURE

Inlet (P_1)	20 PSIG
Outlet (P_2)	N/A

TEMPERATURE

Calib. Temperature	21.9 °C
Oper. Temperature	70 °F

Max. Flow Rate	20 SLPM
Gas Factor	1
Calibrator	MT
Flow Standard	PICO 1898-1
Unit Accuracy	1.0 FS & 0.0 Rate
Calib. Attitude	Horizontal (base down)

LEAK TEST DATA

Inboard (Externally Pressurized) Helium Leak Rate: < 1 x 10^{-8} atm cc/sec
Vacuum Pressure: < 5 milliTorr

Tested By: [redacted] **Date:** 1-1-13

Calibration Data

Setpoint (SLPM)	Flow Signal (Volts)	Device Flow (SLPM)	Actual Flow (SLPM)	% FS Error * (%)
00.00	0.000	00.00	00.00	0.00
05.00	1.253	05.01	05.07	0.30
10.00	2.502	10.01	09.98	-0.16
15.00	3.752	15.01	14.91	-0.50
20.00	5.000	20.00	20.07	0.35

* % Full Scale (FS) Error = (100)(Actual Flow - Device Flow) / Full Scale Flow

FM-1119 Rev. K

Flowmeter Ser. No. 4270050003001

OMEGA ENGINEERING, INC.
An OMEGA Technologies Company
ONE OMEGA DRIVE, BOX 4047, STAMFORD, CT, U.S.A. 06907-0047
(203) 359-1660 TELEX: 996404 CABLE: OMEGA FAX: (203) 359-7700
http://www.omega.com e-mail: info@omega.com

CERTIFICATE OF ACCURACY

This is to certify that meter serial number 4270050003001 is certified to an accuracy of +/- 1 % of 200 slpm of N2 and has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology (N.I.S.T.) according to our procedures.

All traceable certifications and related procedures for the equipment used are on file.

Barometer Number:	1667
Vol-U-Meter Number:	613
Type of Gas:	N2
Gas Used for Calibration:	N2
Pressure Gauge Number:	1950
Timer Number:	1876
Thermometer Number:	985
Voltmeter:	NA
Calibrated By:	[redacted]
Date Calibrated:	2-7-13

Uncertainty of measurements: +/- 0.3 % of reading

Calibrations were performed under a controlled Quality System Manual, which incorporates the requirements of ISO Guide 25, ISO 10012-1, ISO 9001 (1994) and ISO 13485. The released ISO 13485 registration (Medical Devices – Quality Management Systems – System Requirements for Regulatory Purposes) includes Design Controls and Metrology Systems.

0122220B FM-1011 REV B

OMEGA ENGINEERING, INC.
An OMEGA Technologies Company
ONE OMEGA DRIVE, BOX 4047, STAMFORD, CT, U.S.A. 06907-0047
(203) 359-1660 TELEX: 996404 CABLE: OMEGA FAX: (203) 359-7700
http://www.omega.com e-mail: info@omega.com

MASS FLOWMETER/FLOW CONTROLLER CALIBRATION DATA SHEET

SPECIFICATIONS

MODEL #: FMA-875A-V-NIST

SERIAL #: 4270050003001

FLOW RANGE: 200 SLPM

OPERATING TEMPERATURE: 70 F

NAMEPLATE (PROCESS) GAS: N2

SURROGATE (CALIBRATION) GAS: N2

STANDARD TEMPERATURE: 21.1 C

STANDARD PRESSURE: 101.32 kPa (760 Torr)

P1 (INLET PRESSURE): 20 PSIG

P2 (OUTLET PRESSURE): N/A

CALIBRATION TEMPERATURE: 18.7 C

CALIBRATION ATTITUDE (calibration attitude checked):

- ☒ Horizontal (base down)
- ☐ Horizontal (upside down)
- ☐ Horizontal (front down)
- ☐ Horizontal (back down)
- ☐ Vertical (inlet up)
- ☐ Vertical (inlet down)

CALIBRATION ACCURACY: ± 1 % OF FULL SCALE FLOW

CALIBRATION DATA

% FULL SCALE (Nominal)	FLOW SIGNAL OUTPUT (signal type checked) ☒ Vdc ☐ mAdc	STANDARD VOLUMETRIC FLOW (Units: SLPM)		ERROR * (% Full Scale)
		DEVICE	MEASURED	
100	5.000	200.000	200.079	.5395
75	3.750	150.000	149.317	-.3415
50	2.500	100.000	100.488	.2440
25	1.250	50.000	50.852	.4260
0	0.00	0.000	0.000	------

* % FULL SCALE ERROR = (100) (MEASURED FLOW - DEVICE FLOW) ÷ FULL SCALE FLOW

CALIBRATED BY: [redacted] DATE: 2-7-13

LEAK TEST DATA

INBOARD (EXTERNALLY-PRESSURIZED) HELIUM LEAK RATE: $\leq 1 \times 10^{-8}$ atm cc/sec

VACUUM PRESSURE: ≤5 millitorr

TESTED BY: [redacted] DATE: 2-1-13

FM-355-OE Rev. 0

OMEGADYNE INC.
CERTIFICATE OF CALIBRATION

Model Number: PX409-005DWUV
Serial Number: 406707
Date: 7/15/2011
Job: R3274

Capacity: 5.00 PSID
Excitation: 10.00 Vdc
Technician: KAPOME

Pressure Connection: 1/4-18 NPT Male

WIRING CODE

Electrical Connection: Integral Cable 4-Cond
BLACK = - EXCITATION
WHITE = + SIGNAL
GREEN = - SIGNAL
RED = + EXCITATION

CALIBRATION WORKSHEET

NOTES

Pressure PSID	OUTPUT mVdc
0.00	0.007
2.50	50.008
5.00	100.016
2.50	50.007
0.00	0.007

NIST Traceable Number(s): C-1954, C-1289

Omegadyne Inc. certifies that the above instrumentation has been calibrated and tested to meet or to exceed the published specifications. This calibration was performed using instrumentation and standards that are traceable to the National Institute of Standards and Technology. This document also ensures that all testing performed complies with MIL-STD 45662-A, ISO 10012-1, and ANSI/NCSL Z540-1-1994 requirements. After Final Calibration our products are stored in an environmentally controlled stock room and are considered in bonded storage. Depending on environmental conditions and severity of use, factory calibration is recommended every one to three years after the initial service installation date.

[redacted]
Accepted and Certified By

7/15/2011
Date

[redacted] 5/15/13

ilac-MRA ACCREDITED
Calibration
Certificate No. 1750.01

Calibration complies with ISO 9001
ISO/IEC 17025 AND ANSI/NCSL Z540-1

Cert. No.: 1042-4689088

Traceable® Certificate of Calibration for Waterproof Stopwatch

Manufactured for and distributed by: Fisher Scientific, 300 Industry Drive, Pittsburgh, PA 15275-1001

Instrument Identification:

Model Numbers: 0666256, FB70240 S/N: 122601005 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Non-contact Frequency Counter	26.6 2025	3/06/13	1000313632

Certificate Information:

Technician: 67 Procedure: CAL-01 Cal Date: 10/23/12 **Cal Due: 10/23/14**

Test Conditions: 22.5°C 45.0 %RH 1015 mBar

Calibration Data: (New Instrument)

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
Sec/24hr		N.A.		0.000	-0.600	Y	-8.640	8.640	0.130	>4:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ±U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio; Accuracy=±(Max-Min)/2; Min = Nominal(Rounded) - Tolerance; Max = Nominal(Rounded) + Tolerance; Date=MM/DD/YY

[redacted]
Nicol Rodriguez, Quality Manager

[redacted]
Wallace Berry, Technical Manager

Maintaining Accuracy:

In our opinion once calibrated your Waterproof Stopwatch should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Waterproof Stopwatchs change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

TEST ARTICLE ATTRIBUTE CHECKLIST

PROJECT NO: 6100982213-001D **CLIENT :** AREVA

Project Description PRESSURE TEST #4

		SAT	UNSAT
I.	**ASSEMBLY**		
	Proper materials used	X	
	Material documentation complete	X	
	Configuration/dimensions in accordance w/ approved drawings	X	
	Description of assembly: MOX PRESSURE TEST #4		
II.	**ELECTRICAL CABLE**		
	Correct material used	N/A	
	Material documentation complete		
	Correct cable lay-in and fill requirements		
	Description of electrical cable:		
III.	**THERMOCOUPLES**		
	Correct thermocouple type, certs received	N/A	
	Thermocouples positioned in accordance with test plan		
	Adequately labeled and secured		
	Quality Assurance verification done		
	Description of thermocouples:		
IV.	**FIRE BARRIER**		
	Name or type of material GSIL 5558MC		
	INTERTEK received material documentation provided by Client	X	
	Materials provided by INTERTEK properly documented	X	
	Materials installed by INTERTEK in accordance with test plan	X	
	INTERTEK Quality Assurance responsibilities determined	X	
	QA responsibilities of Client installation determined		
	Moisture check required ..... Yes ___ No X		
	Special requirements		

V. FINAL PREBURN VERIFICATION

Final visual inspection & approval (initials) INTERTEK [redacted] Client [redacted]

CALIBRATION DOCUMENTATION (S/N and calibration due date)

Data Acquisition Equipment: ~~SEE TEST DATA PACKAGE~~

Other Measurement Devices:

Temperature 97 Humidity 26 Date 9.25.13 Time of Test start 3:21P

INTERTEK pre-burn checklist performed by [redacted]

Client representative present to witness test [redacted]

Note: Verification to be made using initials by INTERTEK Quality Assurance or test personnel.

09-013-12/30/03

Intertek

TEST ACTIVITIES EVENT LOG

Note:

This Log is used to document the date and note the significant events during the completion of Test Project #G100982213SAT-001D for Areva NP, Inc.

Page 1 of 1

ITEM	DATE	INIT'L
Concrete poured by Alamo Concrete	7/12/13	MD
Concrete conditioned	7/19/13	MD
Critical attributes of test deck and test samples verified	9/18/13	MD
Completed seal assembly verified against the test plan	9/20/13	MD
First test conducted (terminated due to leakage)	9/25/13	MD
Second test conducted (terminated due to leakage)	9/26/13	MD

9/12 NQAP-007.7.3

Certificate of Conformance

Client Name: AREVA NP Inc. Date: July 25, 2014
Project No: G100982213SAT-001D

Intertek Testing Services NA (Intertek) has conducted testing for Areva NP Inc., on the pressure resistance capabilities of Quantum Silicones QSil 5558MC Silicone Elastomer (QSil 5558MC) in a 12" thick concrete deck for compliance with the applicable requirements of and in accordance with Areva NP Inc. Document No. 51-9199513-003, *Detailed Test Plan for Conducting MOX Pressure Test 4 (Test Plan)*. This evaluation took place on September 25 and 26, 2013.

The materials, processes), and deliverable(s) in this project were managed under and conform to the test laboratory's 10CFR50 Appendix B Quality Assurance Program.

[redacted]

Michael A Brown
Quality Supervisor

July 25, 2014
Date

Intertek Testing Laboratory
16015 Shady Falls Road, Elmendorf TX 78112
210-635-8100

Quality Assurance Statement

Intertek is devoted to engineering, inspection, quality assurance and testing of building materials, products and assemblies. Intertek has developed and implemented a Quality Assurance Program designed to provide its clients with a planned procedure of order and document processing for inspection and testing services it provides to assure conformity to requirements, codes, standards and specifications. The Program is designed to meet the intent of ANSI 45.2 Quality Assurance Program Requirements for Nuclear Power Plants, and complies with the requirements of the ASME Code, SPPE, Military Standards and other less stringent programs. It is the Laboratory's intention to adhere strictly to this Program, to assure that the services offered to its clients remains of the highest quality and accuracy possible.

All QA Surveillance documents remain on file at the Laboratory, and are available for inspection by authorized personnel in the performance of an on-site QA Audit. All materials, services and supplies used herein were obtained with appropriate QA Certifications of Compliance.

REVISION SUMMARY

DATE	SUMMARY
July 25, 2014	Original Issue Date