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OCT 17 2016

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Date: OCT 14 2016
Symbol: EPC-DO-16-299
LA-UR: 16-27727
Locates Action No.: U1601822

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Dear Ms. Hunter:

SUBJECT: Proposed Test Method, Distribution Piping, Discharge Permit DP-1835, Class V Underground Injection Control Wells

In accordance with Condition No. 3 of Discharge Permit DP-1835, the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) are submitting a proposed mechanical integrity test method for review and approval by the New Mexico Environment Department for the Chromium Pipeline and Infrastructure Project. The test method for distribution piping is specified in the documents listed below and provided as Enclosures 1, 2, and 3:

1. Los Alamos National Laboratory (LANL) Project Specification Section No. 33 4101: High-Density Polyethylene (HDPE) Pipe

2. LANL Project Specification Section No. 22 0813: Testing Piping Systems

3. San Ildefonso Services, LLC Inspection and Testing Plan

Please contact Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding the proposed mechanical integrity test method.

Sincerely,

John C. Bretzke
Division Leader
Environmental Protection & Compliance Division
Los Alamos National Security LLC

Sincerely,

Douglas E. Hintze
Manager, Environmental Management
Los Alamos Field Office

JCB:DEH:MTS:RSB/lm

Enclosures:

(1) Section No. 33 4101: High-Density Polyethylene (HDPE) Pipe
(2) Section No. 22 0813: Testing Piping Systems
(3) San Ildefonso Services, LLC Inspection and Testing Plan

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ENCLOSURE 1

Los Alamos National Laboratory (LANL) Project
Specification Section No. 33 4101:
High-Density Polyethylene (HDPE) Pipe

EPC-DO-16-299

LA-UR-16-27727

Locates Action No.: U1601822

Date: OCT 14 2016

SECTION 33 4101

HIGH-DENSITY POLYETHYLENE (HDPE) PIPE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section includes single wall and double wall high-density polyethylene pipe for conveyance of untreated and treated groundwater. Construction may include surface preparation, trench excavation, shoring, dewatering, lay, align, and join pipe, installation of appurtenances, bedding and backfilling, surface restoration, and other related work.

1.2 RELATED SECTIONS

A. The following is a list of Specifications, which may be related to this section:
   1. Section 33 1000, Water Utilities

1.3 REFERENCES

A. The following is a list of standards, which may be referenced in this section. The most recent revision year applies.
   1. ASTM International (ASTM):
      a. F714-Polyethylene Plastic Pipe Based on Outside Diameter (3" to 63")
      b. C-1147-Practice for Determining Short Term Tensile Weld Strength of Chemical Resistance
      c. D-638-Test Method of Tensile Properties of Plastics
      d. D-790-Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
      e. D-1238-Test Method for Flow Rates of Thermal Plastics by Extrusion Plastometer
      f. D-1248-Specification for Polyethylene Plastics Molding and Extrusion Materials
      g. F-1248-Determination of Environmental Stress Crack Resistance (ESCR) of Polyethylene Pipe
      h. D-1505-Test Method for Density of Plastics by the Density Gradient Technique
      i. D-1599-Test Method for Short Time Hydraulic Failure Pressure of Plastic Pipe, Tubing and Fittings
      j. D-1693-Test Method for Environmental Stress Cracking of Ethylene Plastics
      k. D-2122-Method for Determining Dimensions of Thermal Plastic Pipe and Fittings
      l. D-2239-Polyethylene Plastic Pipe (SIDR-PR). (Iron Pipe Size; Inside Diameter)
      m. D-2657-Guideline for Polyolefin Thermoplastic Butt Fusion Heat Welding

n. D-2737-Polyethylene Plastic Tubing (Copper Tube Size; Outside Diameter)
o. D-2837- Method for Obtaining Hydrostatic Design Basis for Thermal Plastic Pipe Materials
p. D-3035-Polyethylene (PE) Plastic (DR-PR) Based on Controlled Outside Diameter (1/2" to 24")
q. D-3350-Specification for Polyethylene Plastics Pipe and Fittings Material
r. D-4218-Test Method for Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique

2. AWWA
   a. C906-Polyethylene (PE) Pressure Pipe and Fittings, 4" through 63" for Water Distribution.
3. Plastic Pipe Institute (PPI):
   a. Handbook of Polyethylene Pipe.
   b. TR-33, Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe.
4. ASME
   a. B31.3 Hydrostatic Testing Guidelines

1.4 DEFINITIONS

A. Product pipe - Inside pipe or carrier pipe, or single wall pipe

B. Containment Pipe – Outer pipe

1.5 WARRANTY

A. Warranty period is one year after date of substantial completion of installation.

1.6 SUBMITTALS

A. Details of pipe, fittings, and specials, including dimensions of spacers.

B. Certified laboratory test certificates for all items required in this section.

C. Product data for each type of double containment specified including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

D. Product certificates signed by manufacturer of double containment product stating compliance with stated requirements.

E. Welder certificates certifying that welders comply with the installation procedures as outlined by ASTM D 2657 Section 9 prior to construction.

F. Qualifications of firms supplying double containment piping.

G. Warranty information.

1.7 QUALITY ASSURANCE

A. All HDPE pipe and fittings shall be from a manufacturer with a minimum of 10 years experience in the design, installation, and operation of a thermoplastic double-wall piping system.

B. All HDPE pipe to be installed may be inspected at the factory for compliance with these Specifications by an independent testing laboratory. The cost of these plant inspections of all pipe approved, plus the cost of inspection of a reasonable amount of disapproved pipe, will be borne by the Manufacturer.

C. Inspection of the pipe shall also be made by the Engineer or other representatives of the Owner after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall immediately be removed from the job.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Responsibility for Material:
   1. Shipping: Material shall be shipped so to not cut, kink, or otherwise damage pipe during transport.
   2. Subcontractor shall be responsible for all materials intended for the Work that are delivered to the construction site and accepted by Subcontractor. Payment shall not be made for materials found to be defective or damaged in handling after delivery and acceptance. Defective or damaged materials shall be removed and replaced with acceptable materials at Subcontractor's expense.
   3. Subcontractor shall be responsible for the safe and proper storage of such materials.
      a. Limit stacking of pipe to a height that will not cause excessive deformation of bottom layers of pipes under anticipated temperature conditions.
      b. Where necessary, because of ground conditions, store pipe on wooden sleepers, spaced suitably and of such widths as not to allow deformation of pipe at point of contact with sleeper or between supports.
      c. Keep pipe shaded from direct sunlight prior to installation in the trench.

B. Pipe Acceptance:
   1. In addition to any deficiencies not covered by the applicable ASTM Specifications, pipe that has any of the following visual defects will not be accepted.
      a. Cracks, bubbles, pinholes, inclusions, or occlusions, which, because of their nature, degree, or extent, detrimentally affect the strength and serviceability of the pipe.

C. Pipe Handling:

1. Pipe and accessories shall be delivered to, unloaded, and distributed at the site by Subcontractor. Each pipe shall be unloaded adjacent to or near the intended laying location.
2. Pipe fittings, specials, valves, and appurtenances shall be unloaded and stored in a manner that precludes shock or damage. Such materials shall not be dropped.
3. Pipe shall be handled to prevent damage to the pipe ends or to any coating or lining. Pipe shall not be skidded or rolled against adjacent pipe. Damaged coatings or lining shall be repaired or replaced by Contractor, at Contractor's expense in accordance with the recommendations of the manufacturer and in a manner satisfactory to Engineer. Physical damage to the pipe or accessory shall be repaired or replaced by Contractor at Contractor's expense, and in a manner satisfactory to Engineer.

D. Gasket Storage: All gaskets shall be stored in a cool place, preferably at a temperature of less than 70°F, and in no case shall the gaskets be stored in the open or exposed to the direct rays of the sun.

PART 2 PRODUCTS

2.1 MATERIALS

A. The pipe used to fabricate the system supplied under this specification shall be high density, extra high molecular weight polyethylene pipe. The pipe and fittings shall conform to ASTM D-3350 with minimum cell classification values of 345464C. The pipe and fittings shall be made from the same polyethylene resin base which meets this specification. Allowable pipe diameters for this specification shall be between 4 and 18 inches unless approved by Engineer and Owner.

B. Allowable ASTM Specifications: All material, manufacturing operations, testing, inspection, and making of HDPE pipe shall conform to the requirements of the appropriate allowable ASTM Standard Specifications, latest revision thereof, listed in Article References.

C. Marking:
1. The following shall be clearly marked on both the interior and exterior surface of the pipe:
   a. Class and size.
   b. Date of manufacture.
   c. Name or trademark of manufacturer.
   d. Deflection angle for bends.

D. Diameter of Pipe: Pipe supplied under this specification shall have IPS (Iron Pipe Size) OD and shall meet ASTM D 3035. Provide pipe sizes of nominal diameter as shown on Drawings.

E. Pipe Dimension Ratio (DR)
1. Single wall pipe shall be DR 11.

2. Double-wall pipe comprising carrier pipe of DR11 and containment pipe of DR17.

F. Joints shall be heat fused.

G. Fittings
1. Fittings shall be manufactured to the same IPS ID and OD as the pipe.
2. All molded and fabricated fittings shall meet the pressure requirements of the system as specified and based on ASTM D2837 Hydrostatic Design Basis for Thermoplastic Pipes.
3. All molded fittings shall be manufactured per ASTM D3261.
4. Pipe joints and fittings shall be supplied to the job site ready for simultaneous butt-fusion.

PART 3 EXECUTION

3.1 GENERAL

A. Install piping to comply with manufacturer's recommended procedures.

B. Installers shall be pre-qualified through sufficient training in butt fusion techniques according to ASTM D2657 Section 9.

C. Hot gas welding shall not be allowed for wetted components.

D. Manufacturer/Manufacturer's Representative shall provide on-site training in the assembly, installation, and operation of double-containment systems.

E. Install continuous running pull rope for installation of leak detection cable if required. Manufacturer shall supply pipe spools with pull rope in place.

3.2 DEWATERING

A. All pipe trenches and excavation for structures and appurtenances shall be kept free of water during pipe laying and other related work. Water shall be disposed of in a manner that does not inconvenience the public or result in a menace to public health. Pipe trenches shall contain enough backfill to prevent pipe flotation before dewatering is discontinued. Dewatering shall continue until such time as it is safe to allow the water to rise in the excavation.

3.3 TESTING

A. Test piping per Section 22 0813, Testing Piping Systems.

END OF SECTION

ENCLOSURE 2

LANL Project Specification Section No. 22 0813:
Testing Piping Systems

EPC-DO-16-299

LA-UR-16-27727

Locates Action No.: U1601822

Date: OCT 14 2016

SECTION 22 0813

TESTING PIPING SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pressure testing of the following systems:
   1. Plumbing piping (water lines)

1.2 SUBCONTRACTOR REQUIREMENTS

A. Notify LANL Subcontract Technical Representative (STR) at least 24 hours (1 working day) in advance to arrange for onsite witnessing by LANL inspector of the piping test (a hold/witness point).

B. For discharge requirements of water used for pressure testing, comply with Exhibit F, Requisition No. 404097.

C. Notify LANL STR immediately in the event of any accidental discharge.

1.3 SUBMITTALS

A. Action Submittals
   1. Test plan for approval that includes:
      a. Material of construction
      b. Design pressure
      c. Test pressure and duration of test
      d. Test medium and method of achieving the test pressure
      e. Certification on calibration of pressure gauges
      f. Method to exclude personnel from the area containing the system to be tested.
      g. Overpressurization protection/prevention: Device make/model number, certification, pressure relief set point, point of installation in system.

B. Informational Submittals
   1. Test Reports: Submit within 10 working days of successful test.

PART 2 PRODUCTS

2.1 MATERIALS

A. Furnish instruments, equipment, material, and labor necessary to conduct tests.

B. Calibrate testing equipment at reasonable intervals with devices of accuracy traceable to National Institute of Standards and Technology (NIST).

C. Test gauges used in conducting test shall be in accordance with IAPMO UPC.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Piping being tested shall remain exposed until LANL has approved the piping test results.

B. Trenches may be backfilled between joints before testing to prevent movement of pipe during testing. Ensure that thrust blocks are sufficiently hardened before testing.

C. Piping being tested shall not leak nor show any loss in test pressure for duration specified unless otherwise noted.

D. Where portion of piping system is to be concealed before completion, the portion shall be tested separately as specified for the entire system.

E. Ensure piping supports are in place.

F. Isolate system gages, sensors, etc., from pressure tests so instruments and devices are not damaged. Test pressure shall not exceed the maximum allowable test pressure for any vessel, pump, valves, or other component in the system.

G. Hydrostatic (Water) Testing:
   1. Use potable water as test medium. Do not fill system until the LANL STR has approved the source of water supply.
   2. Provide vents at high points to release trapped air while filling system.
   3. Provide drains at low points for complete removal of test liquid.
   4. Drain system if there is a potential for freezing (i.e., no heat in building, coil in outside air stream, or other similar situations).

H. If leaks are found, they shall be eliminated by tightening, repair, or replacement, as appropriate and test repeated until no leakage is found. Depressurize system prior to repair.

I. Where repairs or additions are made to piping system following the pressure test, the affected piping shall be tested. Testing will not be required in cases where it does not include addition to, replacement, alteration, or relocation of, any piping, or in any cases where piping is set up temporarily for exhibition purposes.

3.2 PRESSURE TESTING

A. HDPE Water Piping : Perform hydrostatic a testing in accordance with ASTM International F 2164, Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure. Hydrostatic testing (150% of design pressure) at 225 psig for 90 minutes .
   1. For double wall (containment) piping:
      a. Inner piping: at 225 psig for 90 minutes.
      b. Outer piping: Gravity drains must be tested at 5 psig (or 10 feet of head) for 15 minutes with water.

2. Unless noted otherwise, water shall be used for hydrostatic tests.
3. Other leak tests such as pressure/vacuum decay may be performed, but shall not be used as a substitute for sensitive leak tests required for Category M fluid service.
4. For new construction attachment to existing systems, the final weld connecting piping systems or components which have been successfully tested need not be leak tested, but shall be examined in-progress and 100% radiographic or 100% ultrasonic examined.

3.3 RETESTING

A. If piping does not pass test, locate and repair leaks and repeat testing procedure until satisfactory results are obtained. Relieve pressure prior to repair.

B. Make repairs to piping with new materials. Caulking on screwed joints, cracks, or holes is not acceptable.

C. Notify LANL Subcontract Technical Representative (STR) at least 24 hours (1 working day) in advance to arrange for onsite witnessing by LANL inspector of the piping retesting (a hold/witness point).

END OF SECTION

THE FOLLOWING REFERENCE IS FOR LANL USE ONLY

This project spec section is based on LANL Master Specification Section 22 0813 Rev. 7, dated July 8, 2015.

ENCLOSURE 3

San Ildefonso Services, LLC
Inspection and Testing Plan

EPC-DO-16-299

LA-UR-16-27727

Locates Action No.: U1601822

Date: OCT 14 2016

Inspection and Testing Plan

FOR

San Ildefonso Services, LLC

3005 South Saint Francis Drive
Suite 1D-222
Santa Fe, NM 87505-7004

Revision: 0

APPROVALS:

Project Manager: _____ Acting PM Date: 9/19/16

Health & Safety Manager: _____ Date: 9/15/2016

Quality Assurance Manager: _____ Date: 9/15/16

REVISION LOG

Revision	Description of Change	Pages Affected
0	Initial Issuance	ALL

ACRONYMS

AHA	activity hazard analysis
CAR	Corrective Action Report
CWI	Certified Welding Inspector
CFR	Code of Federal Regulations
EOR	Engineer of Record
ESM	Engineering Standards Manual
ES&H	Environment, Safety and Health
HDPE	High Density Poly Ethylene
LANL	Los Alamos National Lab
MA	Management Assessment
NCR	Nonconformance Report
PM	Project Manager
PTP	Pressure Test Plan
QA	Quality Assurance
QAM	Quality Assurance Manager
QAP	Quality Assurance Plan
QAPP	Quality Assurance Project Plan
QAPP	Quality Assurance Program Plan (also referred to as QAPmP)
QC	Quality Control
S/CI	Suspect/Counterfeit Item
SIS	San Ildefonso Services
SOP	Standard Operating Procedure
SOW	Statement of Work
SME	subject matter expert

Contents

1.0 Purpose and Scope

This plan is specific to the Chromium Piping and Infrastructure Project; a design/build contract being performed in Mortandad Canyon at the Los Alamos National Laboratory. This document is provided to define the construction activities that require specialized testing and inspections by a qualified, designated inspector. Inspectors and inspector qualifications vary based on the specific activity requiring inspection and are found in the Table of Tests and Inspections. The plan is implemented to assure that construction meets the design criteria of the project plans and specifications, and provides guidance to the construction team regarding when to order an inspection, the purpose of the inspection, the acceptance criteria for specific individual activities and who shall perform each test or inspection. This plan is limited in scope to those activities being performed on-site and excludes inspection and testing of pre-fabricated components such as the Package Booster Pump Station and the pre-cast concrete components.

2.0 Roles and Responsibilities

The specialized inspectors are comprised of individuals designated by the client (Los Alamos National Security), by the construction subcontractor team lead by San Ildefonso Services, and third party subcontractors.

3.0 Project Specifications

Project plans and technical specifications are defined by Daniel B. Stephens and Associates, the engineering firm, and specifically Ms. Jennifer Hill, P.E. the Engineer of Record (EOR). Technical specification 01 4000, Quality Requirements, Paragraph 1.4, C. outlines requirements for the TIP. The technical specifications are guide specifications, edited by the EOR, and provided in the LANL Engineering Standards Manual (ESM). Where necessary to fully describe the work, custom specification sections are prepared by the EOR. For example, concrete specifications are defined in the LANL ESM while pipe fusing specifications are defined by the HDPE pipe and fitting manufacturer. The disciplines of construction defined throughout this document identify the associated specifications.

4.0 Materials List and Procurement

A complete materials list shall be provided as part of the project submittals prior to procurement. The materials list shall identify the component, part number and relevant industry or standard to which the part is manufactured. The material list shall also be incorporated as the document required by LANL ESM. The subcontractor team-assigned Quality Assurance Manager (QAM) or Superintendent is responsible for reviewing procurements prior to ordering to assure components meet the design specifications.

5.0 Material Receipt Inspections, Marking and Inventory

The QAM or Superintendent shall perform documented receipt inspections of all incoming orders. These inspections will be in accordance with documentation requirements of receipt inspections. The inspections will verify that materials received are consistent with the order, meet the projects design criteria, are labeled in accordance with the manufacturers' data and the applicable industry standards, and are free from damage or deformation. A materials inventory shall be maintained to verify that quantities ordered are consistent with the purchase order, and that components are in stock, on site, and available for installation when scheduled.

5.1 Suspect and Counterfeit Materials

Installation of counterfeit materials may be detrimental to the performance of the system. The QAM shall perform documented incoming inspections of fasteners and associated hardware to identify suspect or counterfeit materials, and to assure that no suspect or counterfeit materials are installed in the system. The QAM will have DOE SCI training and understanding of the SCI Program.

5.2 Acceptance Criteria

Incoming inspections reinforce that components ordered and received meet the project design specifications. Acceptance of materials is based on components specified in the 100% design submittals, review and approval by the EOR, LANL approval, as required; of the proposed components, markings and performance characteristics, and that the materials and components are free from damage, deformation or deterioration.

6.0 Material Storage

Improper storage of system components may lead to damage, deformation, environmental contaminants entering the components, premature degradation of components and potential system failures after installation. Component storage shall conform to the manufacturer recommendations and varies based on the component.

6.1 Pipe

HDPE pipe shall be stored with manufacturer provided caps in place until fabrication or installation. Upon receipt each section of pipe shall be inspected to determine the general condition, to identify any gouges greater than 10% of the wall thickness, for straightness and for roundness. When possible sections of pipe shall be un-banded and laid flat on a stable, flat ground surface. Some slight curvature of pipe may be present due to manufacturer packaging and banding techniques and cribbing orientation. For long term storage, cribbing shall be placed linearly at intervals no greater than 4 feet.

6.2 Valves, HDPE Fittings, etc.

Valves and HDPE fittings shall be stored in the original manufacturer inner packaging until such time that component installation will occur. If a packaging is opened to perform inspection, the packaging shall be re-sealed to prevent dusts and other environmental contaminants from entering the component. Components shall be stored in closed land/sea containers to prevent exposure to the elements, to assist with inventory maintenance and for secure storage. Users shall be cognizant of temperature extremes and make provisions to prevent environmental heat deformation.

6.3 Instrumentation Components

Instrumentation and electrical components shall be stored in closed sea/land containers to prevent exposure to the elements, to assist with inventory management and for secure storage. Sensitive instrumentation and electrical components such as variable frequency drives, pressure transducers and radio transmitters may be stored at the subcontractor facility until such time that installation will occur. Storage will be in accordance with temperatures, humidity, weather protection etc. pursuant to manufacturers' requirements.

7.0 Thermal Fusion and Electrofusion

7.1 Operator Qualifications

Each operator responsible for the fusion (thermal or electro fusion) will be trained and certified prior to commencement of the project by a manufacturers authorized representative. All welders are required to perform welder qualification training and competency per ESM Chapter 13. These certifications expire every 6 months and will be renewed as required by LANL. At no time shall the training or certification be allowed to expire during the project. The SIS QAM shall verify and document that fusion welding operators have current training and certification. Training will be approved equivalent training and certification by an authorized manufacturer as previously mentioned.

7.2 Test Coupons and Records

At the beginning of each week the welding machine shall be set up according to the manufacturers' specifications and a test weld shall be performed to ensure that there are no anomalies with the welding instrument. The test weld verifies that the machine weld parameters are sufficient to provide uniform and integral performance. A test coupon is cut from the test weld section of pipe and subjected to a bend test. Bend tests verify that visual inspections are capable of identifying deficiencies with the weld process.

7.3 Cleaning and Preparation

Weld operators are solely responsible for the cleaning and preparation of pipe and fitting weld surfaces. Pipes and fittings shall be capped or shall remain in the manufacturer

provided packaging until the time of use. The operator shall uncap or unpack the component only prior to performing fusion. Components shall be free from moisture, dirt and foreign debris. The operator shall clean the interior and exterior surfaces of the components using alcohol and a lint free cloth, again to prevent introducing foreign material. The surfaces of butt fusion welds shall be faced using the welding machine per the manufacturer's recommendation.

7.4 Acceptance Criteria

The evaluation and acceptance of fusion welds is achieved by visual observation of the welds. With single wall HDPE fusion, the exterior surface weld bead is inspected. The quality of the exterior weld bead is indicative of the interior weld bead. With double walled HDPE fusion, the exterior surface weld bead inspection is indicative of the containment pipes inner weld bead and is also indicative of the containment (interior) pipes inner and outer surface beads. Acceptance of HDPE fusion welds is achieved by consensus of the acceptance criteria and the LANL welding inspector. The assigned Welding Inspectors shall meet the qualification criteria defined in the LANL ESM Chapter 13, Welding, Joining and NDE.

8.0 Mechanical Connections

8.1 Preparation

Each mechanical joint shall be prepared by first performing a visual observation to determine the component is not damaged, and that sealing surfaces are free from defects which could compromise the seal. Threaded and gasketed surfaces shall be cleaned to remove any foreign media, machine oils, packing materials, etc. prior to assembly. Gaskets, O-rings and other seals shall be visually and tactilely inspected for defects, and pliability as recommended by the manufacturer.

8.2 Torque Specifications

Torque wrenches shall be calibrated prior to their use on-site. This will be done at the time of purchase by the manufacturer. Certificates of Calibration will be provided and kept on site. Each component requiring a torque to be applied shall be identified on the materials list and shall identify the specified torque, or torque range. The manufacturer sequence of tightening shall be available at the installation location and personnel actively participating in the installation shall be familiar with both the tightening sequence and the torque specification. Prior to completion of project, recalibrations records showing "as found" and "as left" will be provided as required.

8.3 Acceptance Criteria

The SIS QAM shall witness each torque required installation and shall record the final torque value on the appropriate checklist, or logbook.

9.0 Hydro and Pneumatic Testing

9.1 System Pressure Specifications

The Chromium piping and infrastructure system is designed for a maximum operating pressure of 150 psi.

Hydrostatic leak testing of piping shall be performed in accordance with Specification Section 22 0813 at 150 % of the design pressure of 150 psi, for a test pressure of 225 psig at the lowest elevation of the pipe segment to be tested. Included in the hydrostatic leak test are all single wall HDPE piping and fittings and the carrier (interior) pipe of all double wall HDPE pipe. Pneumatic pressure tests shall be performed on the double wall containment (exterior) pipe. Containment pipe will be air-tested at 10 psi. Down hole well components are excluded from the pressure tests. Testing will be subject to the manufacturer's recommendations; if test media or ambient temperatures exceed 80°F, test durations and/or pressures must be reduced.

The package booster pump station components and system will be tested by the manufacturer in accordance with requirements of specification section 22 1123 Package Booster Pumping System. Connections to the booster station shall be tested at 225 psig (150% of the 150 psi design pressure).

10.0 Pressure Indicators and Relief Device Calibrations and Certifications

Pressure gauges and relief devices used for pressure testing shall have current calibrations available on-site during testing. The calibration certificates shall be submitted along with the pressure test records.

10.1 Ambient and System Temperatures

Ambient air temperatures and temperatures of the test water and system components affect the accuracy of the pressure test readings. A record of temperatures (ambient, water and system) shall be recorded by the SIS QAM during the test procedure. The temperature records shall be submitted along with the pressure test records. All instruments associated with testing will be purchased calibrated and all calibration documentation will be kept on the project site.

10.2 Acceptance Criteria

Pressure gages and pressure relief devices shall be accepted as part of the work of this contract if no leakage is observed during pressure testing of the pipe, and factory testing and calibration records have been received.

11.0 Excavation, Bedding and Backfill

Several criteria affect the quality of excavations for the piping systems. Excavation dimension verifications assure the minimum coverage of 48" is maintained throughout the excavation. Inspections are necessary to verify coverage as well as the installation of the conductive tracer wire and the utility warning tape. Testing is necessary to document the continuity of the tracer wire and visual inspections shall document that no splices are present and that the wire is terminated correctly, in accordance with the standard details on the Drawings.

12.0 Concrete Products

Three types of concrete products will be used on the project; pre-cast concrete, miscellaneous cast-in-place concrete, and flowable fill.

Pre-cast concrete will be used for the vaults located at extraction and injection well locations and for valve vaults on the double walled pipe. Due to the off-site fabrication of the vaults, construction inspections will be performed by the fabricator at the fabricator's facility and in accordance with their production QA process. Documentation of concrete batch tickets shall be obtained and reviewed by the SIS QA Manager. In addition, visual receipt inspections will be performed.

Miscellaneous cast-in-place concrete will be used for bollards, collars for valves, and foundations for the injection well vaults. For the vaults, inspections will be performed to verify formwork dimensions, and reinforcing steel installation prior to pour. Slump tests and a review of batch tickets will occur upon delivery, prior to the pour for all concrete.

Flowable fill will be used as backfill material for the buried sections of HDPE pipeline. Flowable fill will follow the specifications as outlined in specification section 31 2323. The mix design for flow fill shall be submitted for review and approval. A review of batch tickets will occur prior to the pour.

12.1 Minimum Temperatures

Minimum temperature for both cast-in-place concrete and flowable fill shall be 35 degrees F and rising. Hot and cold weather plans will be followed as needed. All associated plans will be submitted for review.

13.0 Inspection and Test Checklists

The SIS Team QA Manager shall develop activity specific checklists to be completed for documenting inspections and tests. A summary of applicable checklists is as follows:

- Procurement
- Receiving
- Fusion
- Mechanical Connections
- Hydro and Pneumatic Testing
- Excavation, Backfill and Compaction
- Concrete and Concrete Products
- Electrical Testing Components as needed

14.0 Table of Tests and Inspections

The requirements for the TIP are given in specification section 01 4000 Quality Requirements and include the following:

1. Specification section and number.
2. Description, type and periodicity of test and inspection.
3. Applicable standards.
4. Test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-controls service.

14.0 Table of Tests and Inspections

Specification	Activity	Notification	Type of Inspection	Inspector	Inspector Qualification	Supporting Documents	Comments
33 4101 HDPE Pipe	Material Procurement	Prior to Procurement	Document Review	QA Manager or Superintendent	Pre-Qualified Resume accepted submittal to LANL	Cut sheets	QA Manager to verify components meet design specs
33 4101 HDPE Pipe	Material Receipt	Upon Receipt	Visual Inspection	QA Manager or Superintendent	Pre-Qualified Resume accepted submittal to LANL	Purchase order	Incoming inspections of all system components
33 4101 HDPE Pipe	Material Storage	In-Process	Visual Inspection	QA Manager or Superintendent	Qualified as listed for materials storage, testing piping systems, etc.	Manufacturer specs	Stored per manufacturer recommendations
33 4101 HDPE Pipe	HDPE Pipe Fabrication	In Process	Visual Inspection of Weld	QA Manager	LANL Trained and Certified	Certifications	Inspect for bead thickness and uniformity
22 0813 Testing Piping Systems	System Pressure Test	48-hour Advance	Document Review	QA Manager	Pre-Qualified Resume accepted submittal to LANL	Calibrations	Gauges, temp indicators, relief devices

14.0 Table of Tests and Inspections (Testing Piping Systems)

22 0813	System Pressure Test	48-hour Advance	Measurement (Pressure and temperature)	Engineer	PE, Engineer of Record	Certificates of Calibration	Review for currency and applicability Perform hydrostatic leak test on each segment of HDPE pipe per ASTM F2164; perform air test on each segment of double walled pipe.
31 2000 Earth Moving	Excavation	In Process	Measurement (dimensions)	Operator	Designated Individual	DWG	Verify width and depth
31 2323 Flowable Fill	Pipe Backfill	48-hour Advance	Field Test (generally not required)	Third Party (when required)	(LANL Listed Test Agency)	Field Log Spec 31 2323	Spec requires minimum 48-hour advance notice to STR. Field testing not required.
31 2323 Flowable Fill	Pipe Backfill	In-process	Document Review	QA Manager	Pre- Qualified Resume accepted submittal to LANL	Batch Ticket	Review batch ticket for correct mix design

14.0 Table of Tests and Inspections - continued

31 2000 Earth Moving	Soil Compaction	1-week Advance	Off Site Material Proctor	Engineer	PE, Engineer of Record	Proctor Documents	Review proctor results to verify meets specs Provide proctor for each soil type encountered. ASTM D1557 (modified proctor)
31 2000 Earth Moving	Soil Compaction	72-hour Advance	Measurement (density and moisture)	Third Party	(LANL Listed Test Agency)	Field Log	Field measurements to verify install meets specifications; In place density using nuclear method (ASTM D6938); one test per 2,000 SF for each lift
31 2000 Earth Moving	Fill Material	1-week Advance	Off Site Material Proctor	Engineer Review	PE, Engineer of Record	Proctor Documents	Review proctor results to verify meets specs
31 2000 Earth Moving	Fill Material	72-hour Advance	Measurement (density and moisture)	Third Party	(LANL Listed Test Agency)	Field Log	Field measurements to verify install meets specifications
31 2000 Earth Moving	Tracer Wire	In Process	Visual Inspection	QA Manager	Pre-Qualified Resume accepted submittal to LANL	Field Log	Verify no splices between terminals, verify installation
31 2000 Earth Moving	Tracer Wire	72-hour Advance	Measurement (continuity test)	LANL	Qualified Electrician or I&C	Field Log	Verify continuity between terminals
03 3053 Miscellaneous Cast-In-Place Concrete	Formwork	Prior to pour	Measurement (dimensions)	QA Manager	Pre-Qualified Resume accepted submittal to LANL	DWG Spec 03 3053	Verify formwork dimensions, bracing, application of release agent
03 3053 Miscellaneous Cast-In-Place Concrete	Reinforcing steel	Prior to pour	Visual Inspection	Engineer	PE, Engineer of Record	DWG Spec 03 3053	Verify accurately placed and securely positions.

Miscellaneous Cast-In-Place Concrete	Miscellaneous Cast-In-Place Concrete	Field Test	Third Party	(LANL Listed Test Agency)	Field Log	Spec requires minimum 48-hour advance notice to STR.	Field Test; one batch of cylinders to be taken for each 50 CY of concrete placed, or once per day
03 3053 Miscellaneous Cast-In-Place Concrete	Miscellaneous Cast-In-Place Concrete	In-process	Document Review	QA Manager	Pre-Qualified Resume accepted submittal to LANL	Batch Ticket	Review batch ticket for correct mix design
22 0548 Vibration and Seismic Controls for Plumbing Piping and Equipment	Mechanical Connections	In Process	Visual Inspection	Engineer	EOR	Daily Inspection Form	Examine surfaces to receive hangers and supports and installation.
26 0519 Low Voltage Electrical Power Conductors and Cables	Conductors	2-week Advance	Measured & Visual (Pre-installation Inspection & Tests)	QA Manager	Pre-Qualified Resume accepted submittal to LANL	Field Quality Control and Field Log	LANL STR shall be given 2-week notice of date to witness any tests or inspections
26 0519 Low Voltage Electrical Power Conductors and Cables	Material Storage	In Process	Visual Inspection	QA Manager	Pre-Qualified Resume accepted submittal to LANL	NECA 1 Standard Practices for Good Workmanship in Electrical Construction	
26 0519 Low Voltage Electrical Power Conductors and Cables	Conductors Testing	In Process	Measured & Visual (Installation, Post Installation, & Testing)	QA Manager	Pre-Qualified Resume accepted submittal to LANL	Closeout Submittals	Verify proper color coding, verify components meet design specification
26 0813 Electrical Acceptance Testing	Conductors Acceptance Testing	45-day Advance	Acceptance Testing	Third Party Electrical Testing Agency	5-year experience, ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians or NICET ET-grade certified engineering technician	Submittals	

26 0526 Grounding and Bonding for Electrical Systems	Material Storage	In Process	Visual Inspection	QA Manager	Pre-Qualified Resume accepted submittal to LANL	NECA 1 Standard Practices for Good Workmanship in Electrical Construction	
26 0526 Grounding and Bonding for Electrical Systems	Grounding Testing	In process	Measured & Visual	QA Manager	Pre-Qualified Resume accepted submittal to LANL	Field Quality Control and Field Log	LANL STR shall be given 10-day notice of date of expected completion. Verification and testing can be scheduled in parts based on schedule
26 0813 Electrical Acceptance Testing	Grounding Acceptance Testing	45-day Advance	Acceptance Testing	Third Party Electrical Testing Agency	5-year experience, ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians or NICET ET-grade certified engineering technician	Submittals	
26 0529 Hangers and Supports for Electrical Systems	Material Procurement	Prior to Procurement	Document Review	Engineer Review	PE, Engineer of Record	Submittals	
26 0529 Hangers and Supports for Electrical Systems	Material Storage	In Process	Visual Inspection	QA Manager	Pre-Qualified Resume accepted submittal to LANL	NECA 1 Standard Practices for Good Workmanship in Electrical Construction	
26 0533 Raceways and Boxes for Electrical Systems	Material Procurement	Prior to Procurement	Document Review	Engineer Review	PE, Engineer of Record	Submittals	
26 0533 Raceways and Boxes for Electrical Systems	Material Storage	In Process	Visual Inspection	QA Manager	Pre-Qualified Resume accepted submittal to LANL	NECA 1 Standard Practices for Good Workmanship in Electrical Construction	
26 0533	Raceways and Boxes	In Process	Visual	QA Manager	Pre-Qualified	Field Quality	LANL STR shall be given 2-day

Raceways and Boxes for Electrical Systems	Inspection				Resume accepted submittal to LANL	Control	notice of date for inspection points
26 0553 Identification for Electrical Systems	Material Procurement	Prior to Procurement	Document Review	Engineer Review	PE, Engineer of Record	Submittals	
26 2213 Low Voltage Distribution Transformers	Material Procurement	Prior to Procurement	Document Review	Engineer Review	PE, Engineer of Record	Submittals	
26 2213 Low Voltage Distribution Transformers	Material Storage	In Process	Visual Inspection	QA Manager	Pre-Qualified Resume accepted submittal to LANL	NECA 1 Standard Practices for Good Workmanship in Electrical Construction	NECA 409 Recommended Practice for Installing and Maintaining Dry-Type Transformers
26 2213 Low Voltage Distribution Transformers	Transformers Testing	In Process	Testing & Visual	QA Manager	Pre-Qualified Resume accepted submittal to LANL	Field Quality Control	
26 0813 Electrical Acceptance Testing	Transformer Acceptance Testing	45-day Advance	Acceptance Testing	Third Party Electrical Testing Agency	5-year experience, ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians or NICET ET-grade certified engineering technician	Submittals	
26 2416 Panel boards	Material Procurement	Prior to Procurement	Document Review	Engineer Review	PE, Engineer of Record	Submittals	
26 2416 Panel boards	Panel boards Testing	In Process	Testing & Visual	QA Manager	Pre-Qualified Resume accepted submittal to LANL	Field Quality Control	After substantial completion, but not more than two month after final acceptance, conduct load balancing
26 2416 Panel boards	Material Storage	In Process	Visual Inspection	QA Manager	Pre-Qualified	NECA 1 Standard Practices for Good	NECA 407 Recommended Practice for Installing and

					Resume accepted submittal to LANL	Workmanship in Electrical Construction	Maintaining Panel boards, Perform Receipt Inspection
26 0813 Electrical Acceptance Testing	Panel board Acceptance Testing	45-day Advance	Acceptance Testing	Third Party Electrical Testing Agency	5-year experience, ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians or NICET ET-grade certified engineering technician	Submittals	
26 2726 Wiring Devices	Material Procurement	Prior to Procurement	Document Review	Engineer Review	PE, Engineer of Record	Submittals	
26 2726 Wiring Devices	Material Storage	In Process	Visual Inspection	QA Manager	Pre-Qualified Resume accepted submittal to LANL	NECA 1 Standard Practices for Good Workmanship in Electrical Construction	
26 2726 Wiring Devices	Wiring Devices Inspection	In Process	Testing & Visual	QA Manager	Pre-Qualified Resume accepted submittal to LANL	Field Quality Control	
26 2816 Enclosed Switches and Circuit Breakers	Material Procurement	Prior to Procurement	Document Review	Engineer Review	PE, Engineer of Record	Submittals	
26 2816 Enclosed Switches and Circuit Breakers	Material Storage	In Process	Visual Inspection	QA Manager	Pre-Qualified Resume accepted submittal to LANL	NECA 1 Standard Practices for Good Workmanship in Electrical Construction	Perm receipt inspection
26 2816 Enclosed Switches and Circuit Breakers	Enclosed Switches and Circuit Breakers Testing	In Process	Testing & Visual	QA Manager	Pre-Qualified Resume accepted submittal to LANL	Field Quality Control	
26 0813 Electrical Acceptance Testing	Enclosed Switches and Circuit Breakers	45-day Advance	Acceptance Testing	Third Party Electrical Testing Agency		Submittals	
26 2923 Variable Frequency Motor	Material Procurement	Prior to Procurement	Document Review	Engineer Review	PE, Engineer of Record	Submittals	

Controllers							
26 2923 Variable Frequency Motor Controllers	Material Storage	In Process	Visual Inspection	QA Manager	Pre-Qualified Resume accepted submittal to LANL	NECA 1 Standard Practices for Good Workmanship in Electrical Construction	
26 2923 Variable Frequency Motor Controllers	Variable Frequency Motor Controllers Inspection	In Process	Testing & Visual	QA Manager	Pre-Qualified Resume accepted submittal to LANL	Quality Assurance	
26 2923 Variable Frequency Motor Controllers	Variable Frequency Motor Controllers Inspection	In Process	Testing & Visual	QA Manager	Pre-Qualified Resume accepted submittal to LANL	Field Quality Control	
26 2923 Variable Frequency Motor Controllers	Variable Frequency Motor Controllers	In Process	Testing & Visual	Manufactures Representative	Factory Trained	Training	
26 0813 Electrical Acceptance Testing	Variable Frequency Motor Controllers	45-day Advance	Acceptance Testing	Third Party Electrical Testing Agency	5-year experience, ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians or NICET ET-grade certified engineering technician	Submittals	
26 4300 Surge Protective Devices	Material Procurement	Prior to Procurement	Document Review	Engineer Review	PE, Engineer of Record	Submittals	
26 4300 Surge Protective Devices	Material Storage	In Process	Visual Inspection	QA Manager	Pre-Qualified Resume accepted submittal to LANL	NECA 1 Standard Practices for Good Workmanship in Electrical Construction	
26 4300 Surge Protective Devices	Surge Protective Devices Inspection	In Process	Testing & Visual	QA Manager	Pre-Qualified Resume accepted submittal to	Field Quality Control	

	and Testing				LANL		
26 0813 Electrical Acceptance Testing	Surge Protective Devices	45-day Advance	Acceptance Testing	Third Party Electrical Testing Agency	5-year experience, ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians or NICET ET-grade certified engineering technician	Submittals	
40 9620 Instrumentation and Controls	Procurement	Prior to Procurement	Document Review	Engineer Review	PE, Engineer of Record	Submittals	
40 9620 Instrumentation and Controls	Instrumentation and Controls Inspection and Testing	In Process		STR		Quality Management Plan and Logs	
26 0813 Electrical Acceptance Testing	System Function Tests	45-day Advance	Acceptance Testing	Third Party Electrical Testing Agency	5-year experience, ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians or NICET ET-grade certified engineering technician		Panel boards, Enclosed Switches and Circuit Breakers, Enclosed Controllers, Variable Frequency Motor Controllers
26 0813 Electrical Acceptance Testing	Power System Studies	45-day Advance	Acceptance Testing	Third Party Electrical Testing Agency	5-year experience, ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians or NICET ET-grade certified engineering technician		Final short-circuit study, Final Coordination Study, Arc-Flash Hazard Analysis, Load Flow Study, Stability Study, Harmonic Analysis Study
26 0813 Electrical Acceptance Testing	Test Report	45-day Advance	Acceptance Testing	Third Party Electrical Testing Agency	5-year experience, ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians or NICET ET-grade certified engineering technician	Field Reports	Submit 6 copies to STR
26 0813 Electrical Acceptance Testing	Field Quality Control	45-day Advance	Acceptance Testing	Third Party Electrical Testing Agency	5-year experience, ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians or NICET ET-grade certified engineering technician	Field reports	Submit to STR reports for defective, rework, repair, replacement, and re-testing requirements

15.0 Pressure Test Procedure

Purpose

This document provides the framework for performing pressure tests of the Chromium Pipeline and Infrastructure Project's pressure system components. The procedure is designed to assure the system and components are leak free, structurally sound, and do not pose a safety hazard to personnel or an environmental hazard during conveyance of chromium contaminated ground water to the associated treatment system. Implementing this procedure during construction and prior to placing the system into service will assure compliance with the Los Alamos National Laboratory (LANL) Engineering Standards Manual (ESM) STD-342-100, Chapter 17 Pressure Safety requirements, and follows the technical specifications defined in Section 22 0813 "Testing Piping Systems" of the Chromium Pipeline and Infrastructure Project design documents.

Scope

This document was developed based on the HDPE pipe and fitting manufacturer's recommended pressure test requirements, and accepted best commercial practices. The plan encompasses requirements as set forth in the LANL ESM Chapter 17 to test the HDPE single and double walled piping and associated valves, fittings and components, and includes:

a. Pre-test notifications
b. Establishing safe perimeters
c. Pre-test visual inspection
d. Double walled "carrier" pipe and single walled pipe hydrostatic test process
    a. Isolating sensitive instrumentation
    b. Filling and venting air from the system
    c. Incremental pressure increases and hold times
    d. Water discharge requirements
    e. Successful test parameters
e. Double walled "containment" pipe low pressure pneumatic test process
    a. Pressures and hold times
    b. Successful test parameters
f. Test documentation

Notifications and Witnessing

At least 24 hours prior to performing a pressure test on the system, or completed portions of the system, notification shall be provided to the Subcontractor Technical Representative. This notification is necessary for LANL to assign a Pressure Safety Officer or another qualified representative to witness the test.

System Design and Established Test Pressures

The test pressure is intended to be 150% of the pipeline operating pressure. The pressure along the pipeline for this project varies from 10 to 150 psi depending on location and on system operation. Under any operating scenario, the pressure will vary based on elevation with lower elevations experiencing higher pressures (1 psi = 2.31 ft). For this reason, a maximum test pressure of 225 psi at the low end of the pipe segment to be tested in considered sufficiently conservative for pressure testing. The double wall carrier pipe and the single wall pipe hydrostatic pressure tests shall be conducted at 1.5 times the operating pressure, or 225 psig, as measured at the low end of the test section. The double wall containment pipe (exterior pipe) shall be pneumatically tested to 10 psig.

Relief Device

A relief device shall be installed in each section of the system to be tested. The relief shall be located such that it cannot be isolated from the system section being tested (i.e there shall be no valves between section to be tested and relief device). The relief device for double wall carrier pipe (interior pipe) and single wall pipe shall be set to no greater than 250 psi, which is the lesser of 50 psi or 10% above the test pressure of 225 psig. The relief device for the containment pipe pneumatic test shall be set at 11 psi which is the lesser of 50 psi or 10% above the pneumatic test pressure of 10 psig.

Relief device summary table

System to be tested	Design Pressure	System Test Pressure	Relief device Setting
Double wall carrier pipe (internal pipe)	150 psi	225 psig at low point	250 psi
Double wall containment pipe (exterior pipe)	N/A	10 psig	11 psi
Single wall pipe	150 psi	225 psig at low point	250 psi

Pressure test documentation

Each pressure test shall be recorded on the corresponding checklist.

1. Hydrostatic Pressure Checklist
    a. HDPE single wall piping
    b. HDPE double wall pipe carrier (interior) pipe
    c. All other system components
2. Low Pressure Pneumatic Pressure Test Checklist
    a. Double wall pipe containment (exterior) pipe

Makeup Water
Hydrostatic pressure tests may be performed with either previously treated groundwater from active treatment systems or from either potable or non-potable water. All water sources shall be approved by the STR prior to use.

Post Test Water Discharge

Discharge of water used during hydrostatic testing shall be managed in accordance with Section 01 3545 "Water Discharge Requirements" of the Chromium Pipeline and Infrastructure Project Technical Specifications.

Hydrostatic Pressure Test Checklist				
Description of section or system being tested (include as much detail as possible to define the system)				
Activity	**Date**	**Time (military)**	**Initials**	**Z Number**
24-hour written notification provided to STR via email				
Verifier				
Visual inspection of all welds, connections and joints				
Verifier				
Safe perimeter established around all above ground systems and components				
Verifier				
Pressure gauge calibration current and available on-site				
Verifier				
Pressure relief device calibration current and available on-site				
Verifier				
High point air vents, flanges, etc. open to vent air during filling				
Verifier				
Sensitive instrumentation components isolated from system to be tested				
Verifier				

Hydrostatic Pressure Test Checklist				
Inline valves in open position				
Verifier				
System filled from lowest point and air vented				
Verifier				
Air vent points closed and tightened per specifications				
Verifier				
Notification to site personnel that pressure test is being initiated				
Verifier				
Raise pressure in 10 psi increments until test pressure of 225 psig is achieved				
Verifier				
Record initial pressure _____ **psig**				
Verifier				
Hold test pressure for 1 hour				
Verifier				
Record post wait time pressure _____ **psig**				
Verifier				
If pressure decreased without evidence of leakage, re-pump to test pressure of 225 psig				
Verifier				
Hold pressure for 90 minutes				
Verifier				
Record post wait time pressure _____ **psig**				
Verifier				
If pressure drops more than 10% (22.5 psig) test is failure, discontinue test				
Test Failed				

Hydrostatic Pressure Test Checklist				
Test Passed				
Verifier				

Low Pressure Pneumatic (Containment Pipe) Pressure Test Checklist				
Description of section or system being tested (include as much detail as possible to define the system)				
Activity	**Date**	**Time (military)**	**Initials**	**Z Number**
24-hour written notification provided to STR via email				
Verifier				
Visual inspection of all welds, connections and joints				
Verifier				
Safe perimeter established around all systems and components				
Verifier				
Pressure gauge calibrations current and available on-site				
Verifier				
Inline valves in open position				
Verifier				
Calibrated pressure gauges installed on carrier pipe and containment pipe				
Verifier				
Notification to site personnel that pressure test is being initiated				
Verifier				
Using low pressure compressed air raise pressure to 10 psig				

Low Pressure Pneumatic (Containment Pipe) Pressure Test Checklist				
Verifier				
Record initial pressure _____psig				
Verifier				
Hold pressure for 2 hours and observe gauges				
Record containment pressure _____psig				
Record carrier pressure _____psig				
If containment pressure remains steady and carrier pressure remains zero psig, the test passes				
Verifier				
If containment pressure drops but carrier pressure remains zero psig the containment is leaking and test is a failure				
Verifier				
If containment pressure drops and carrier pressure increases the carrier is leaking and the test is a failure.				
Verifier				
Test Failed				
Verifier				
Test Passed				
Verifier				