

<h2 style="margin: 0;">DOCUMENT RELEASE AND CHANGE FORM</h2> <p style="font-size: small; margin: 5px 0;">Prepared For the U.S. Department of Energy, Assistant Secretary for Environmental Management By Washington River Protection Solutions, LLC., PO Box 850, Richland, WA 99352 Contractor For U.S. Department of Energy, Office of River Protection, under Contract DE-AC27-08RV14800</p> <p style="font-size: x-small; margin: 5px 0;">TRADEMARK DISCLAIMER: Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States government or any agency thereof or its contractors or subcontractors. Printed in the United States of America.</p>	<p>Release Stamp</p> <div style="border: 2px solid red; padding: 10px; margin: 10px auto; width: 80%;"> <p style="color: red; font-size: 1.2em; font-weight: bold;">DATE:</p> <p style="color: red; font-size: 1.5em; font-weight: bold;">Aug 24, 2017</p> </div> <p style="margin-top: 20px;">Clearance Review Restriction Type: public</p>
<p>1. Doc No: RPP-SPEC-61615 Rev. 00</p>	
<p>2. Title: Conceptual Specification for Repairing, Inspecting, and Testing Tank 241-AY-102</p>	
<p>3. Project Number: T1P97 <input type="checkbox"/> N/A</p>	<p>4. Design Verification Required: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>
<p>5. USQ Number: <input checked="" type="checkbox"/> N/A N/A-9</p>	<p>6. PrHA Number PRHA-02025 Rev. 00 <input type="checkbox"/> N/A</p>

7. Approvals			
Title	Name	Signature	Date
Clearance Review	RAYMER, JULIA R	RAYMER, JULIA R	08/24/2017
Design Authority	BUCHANAN, JOSEPH R	BUCHANAN, JOSEPH R	08/15/2017
Checker	ERHART, MICHAEL F	ERHART, MICHAEL F	08/14/2017
Document Control Approval	PORTER, MARY	PORTER, MARY	08/24/2017
Originator	MELOY, BOB T	MELOY, BOB T	08/14/2017
Other Approver	SCOTT, MARK A	SCOTT, MARK A	08/15/2017
Other Approver	BERKEY, JAMES	BERKEY, JAMES	07/25/2017
Other Approver	LANEY, TERANCE (TERRY)	LANEY, TERANCE (TERRY)	07/25/2017
PrHA Lead	KOZLOWSKI, STEPHEN D	KOZLOWSKI, STEPHEN D	08/15/2017
Responsible Engineering Manager	HANSON, CARL E	HANSON, CARL E	08/23/2017
USQ Evaluator	HIGUERA, MAURICE	HIGUERA, MAURICE	08/15/2017

8. Description of Change and Justification
Initial Release of Document

9. TBDs or Holds N/A

10. Related Structures, Systems, and Components		
a. Related Building/Facilities <input type="checkbox"/> N/A	b. Related Systems <input type="checkbox"/> N/A	c. Related Equipment ID Nos. (EIN) <input type="checkbox"/> N/A
241-AY-102	241-WST	241-AY-102

11. Impacted Documents – Engineering N/A

Document Number	Rev.	Title

12. Impacted Documents (Outside SPF):
N/A

13. Related Documents N/A

Document Number	Rev.	Title
RPP-PLAN-61646	00	Preliminary Inspection Plan for Double Shell Tank AY-102
RPP-RPT-60224	00	Conceptual Design Report – Tank Cleaning for AY-102 Recovery Inspection and Repair

14. Distribution

Name	Organization
BUCHANAN, JOSEPH R	HANFORD TOC
ERHART, MICHAEL F	MARS-BASED RETRIEVAL ENGRNG
HANSON, CARL E	AY-102 RETRIEVAL ENGRNG
LANEY, TERANCE (TERRY)	WASTE STORAGE & TECH SUPPORT ENGINEERING
MELOY, BOB T	

RPP-SPEC-61615
Revision 0

Conceptual Specification for the Repair, Inspection and Testing of Tank AY-102

Prepared by

RT Meloy
Washington River Protection Solutions, LLC

Date Published
August 2017



Prepared for the U.S. Department of Energy
Office of River Protection

Contract No. DE-AC27-08RV14800

Approved for Public Release;
Further Dissemination Unlimited

RPP-SPEC-61615, Rev. 0

**CONCEPTUAL SPECIFICATION FOR REPAIRING, INSPECTING,
AND TESTING TANK 241-AY-102**

August 2017

prepared by

RT Meloy

**Washington River Protection Solutions, LLC
Richland, WA 99352**

prepared for

**Washington River Protection Solutions, LLC
Richland, WA 99352**

TABLE OF CONTENTS

1.0	SCOPE	1
2.0	BACKGROUND	1
2.1	In Tank Environment	2
2.2	Repair Design Criteria	2
3.0	APPLICABLE DOCUMENTS	3
3.1	Government Documents	3
3.2	Non-Government Documents	4
4.0	TECHNICAL REQUIREMENTS	5
5.0	TEST AND INSPECTION REQUIREMENTS	6
5.1	Quality Assurance Program	6
5.2	Qualifications	6
5.2.1	Welding Personnel and Procedures	6
5.2.2	Performance Demonstration	6
5.2.3	Welding Inspectors and Procedures	6
5.3	Execution	7
5.3.1	Location	7
5.3.2	Preparation	7
5.3.3	Process Monitoring	8
5.3.4	Post Weld Heat Treat	8
5.4	Inspections And Tests	8
5.4.1	Weld Inspection and Examination	8
5.4.2	Hydrostatic Test	9
6.0	DOCUMENT SUBMITTAL	9
6.1	Approval of Submittals	10
6.2	List of Submittals	11
	Appendix 1	12
	Figure 2-1 Tank Internals	3
	Figure A-1 Repair Plan	13

LIST OF TABLES

Table 3-1.	Government Documents	4
Table 3-2.	Non-Government Documents	4
Table 5-1	Patch Locations	7
Table 6-1.	Summary of Submittals	9
Table A-1	Chemical Constituents	12

LIST OF TERMS

Abbreviations and Acronyms

ALC	Air Lift Circulator
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASNT	American Society of Nondestructive Testing
AWS	American Welding Society
AY-102	Double Shell Tank 241-AY-102
COR	Code of Record
DST	Double Shell Tank
GMAW	Gas Metal Arc Welding
M&TE	Measuring and Test Equipment
MSR	Master Submittal Register
R	Roentgen
STI	Steel Tank Institute
TOC	Tank Operating Contractor
WAC	Washington Administrative Code

Units

ft.	foot
gpm	gallons per minute
Hg	Mercury
hr	hour
in.	inch
psig	pounds per square inch
WG	Water Gauge

1.0 SCOPE

This Specification defines requirements for repairing the floor of double shell tank (DST) 241-AY-102 (AY-102) by welded patch plate. Since at least August 2012, underground double shell tank AY-102 has been leaking from its primary tank into its secondary containment. Tank AY-102 is located on the Hanford site a 520 square mile complex in south eastern Washington State that was used for production of strategic nuclear material during the Manhattan Project and the Cold War. The site is currently undergoing environmental restoration. Contents of the tank that was used to store chemical waste by-products from Special Material production have been removed as necessary to provide access for deployment of robotic tools to locations on the tank floor where repairs are to be made. It is anticipated that all repair work inside of AY-102 will be remotely performed using cart mounted robotic means. Excluded from this scope are other activities needed to return tank AY-102 to service, for example cleaning the AY-102 annulus and restoring leak detection in the secondary tank.

Note: At the time this version (Revision 0) of this specification is being written the tank has not been fully examined. It is anticipated once the tank examination is complete and an API fitness for service evaluation is performed that this specification will be revised.

2.0 BACKGROUND

Contents of tank AY-102 have been removed by sluicing. At the time retrieval was completed approximately 18,700 gallons of waste remain residing in both the tank and its annulus. Of that 14,000 remained in the primary tank consisting of both liquid and sludge. As liquid waste continues to evaporate the tank bottom is exposed revealing areas of tank bottom as well as piles of sludge. In addition to sludge video examination of the tank shows corrosion products, mill scale, rust, and dried tank waste adhering to the floor.

Primary Tank

The primary tank of the DST is 75-ft in diameter, and measures approximately 46 ft-9 in. in height at the dome center. At the center of the bottom of the primary tank is a 1-in. thick steel plate, 4 ft. in diameter. The bottom plate thins to 0.375 in. at the interfacing weld and extends to a curved, formed section of 0.875-in. thick plate, commonly referred to as the "bottom knuckle." The bottom knuckle is formed to make a curved transition from the horizontal floor to the vertical side walls.

Tank Internals

There are 22 air lift circulator (ALC) assemblies suspended from dome penetrating pipes. These ALCs are equally spaced there being 7 arrayed at 14'-6" and 14 arrayed at 21' from the tank

center with the remaining ALC being located at the tank center. The ALCs' prominent feature is a 30" diameter vertical pipe that terminates 30" above the tank floor. Each ALC is accompanied with a 3/4" diameter thermocouple that extends to 3" above the tank floor. In addition to the ALC-thermocouple arrangement there are a steam coil and 7 radiation monitoring wells. The steam coil is 40" in diameter and extends to the tank floor. The radiation wells are 6" diameter pipe extending to 3" above the tank floor. The radiation wells also are equally spaced radially with 3 at 12'-6" from tank center and 4 at 34'-9" from tank center. Figure 2-1 illustrates ALC placement.

2.1 IN TANK ENVIRONMENT

The in-tank components shall be designed to operate in the following environment:

- The estimated radiation exposure for the in-tank components is 1000 rad/hour.
- The chemical constituents of the tank waste are as listed on Table A-1 in Appendix A.
- In-tank humidity from 5% to 100%.
- Waste pH 10 or greater.
- Bulk waste temperature 70°F to 90°F. Vapor space air temperatures may experience a wider range because of the influx of ambient (outside the tank) air due to active or passive ventilation.

2.2 REPAIR DESIGN CRITERIA

For planning purposes this tank repair specification is based on the following parameters:

- Design life of 40 years after return to service
- Service temperature of 50° to 100°F
- Hydrostatic Load of 655" WG
- Corrosion Allowance 0.001"/year
- Radiation Exposure 1,000 rad/hour
- ≤ 50 thermal cycles
- ≤ 50 fill and drain cycles

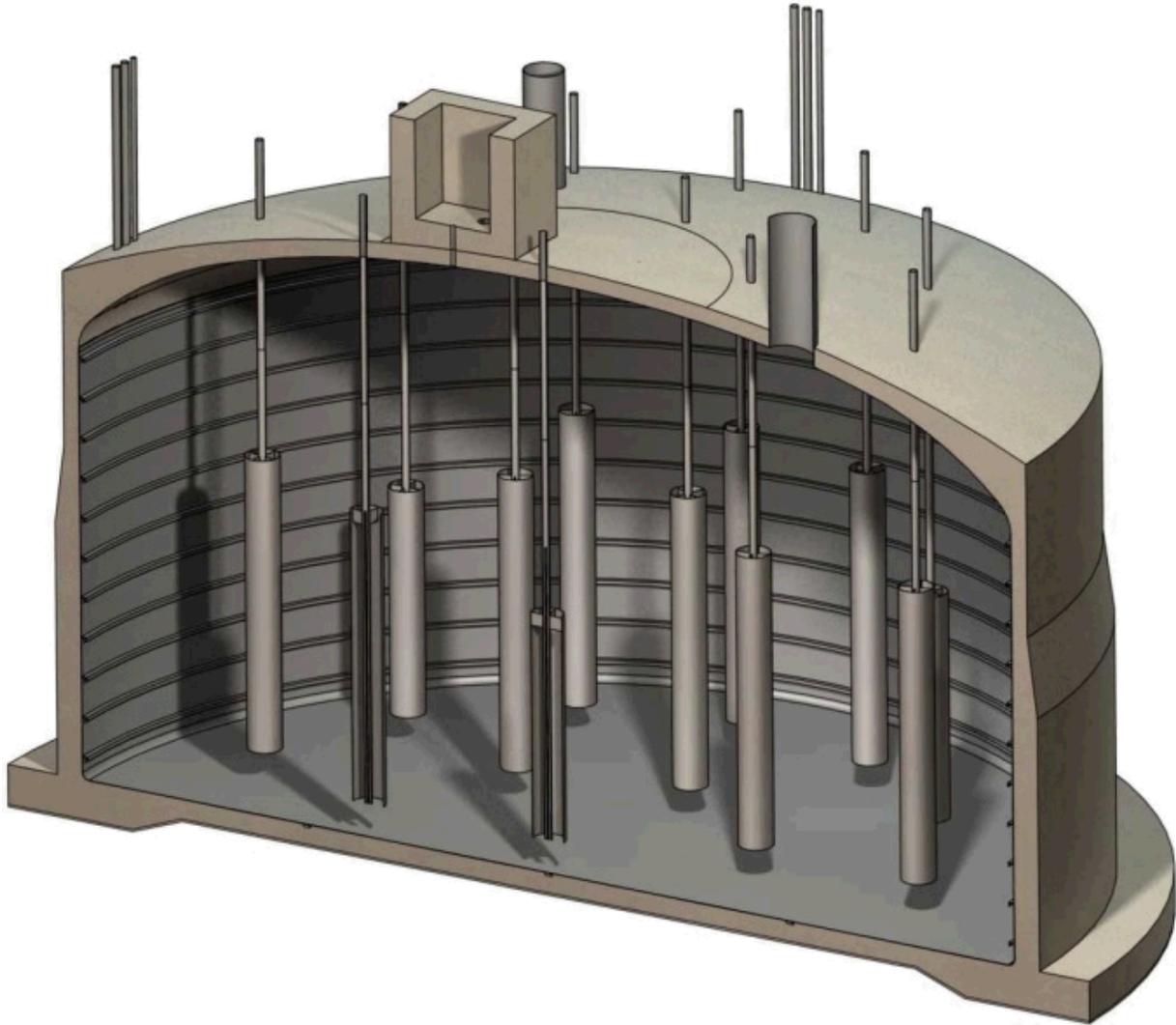


Figure 2-Error! No text of specified style in document.-1 Tank Internals

3.0 APPLICABLE DOCUMENTS

The following documents form a part of the basis of design to the extent specified in the applicable sections of this Specification. In the event that the requirements of this Specification are more restrictive than the requirements of the documents referenced herein, the requirements of this Specification take precedence. The Specification for Double Shell Tanks HNF-SD-WM-TDR-007 defines technical design criteria for tank AY-102.

3.1 GOVERNMENT DOCUMENTS

Documents listed in Table 3-1 constitute a part of this Specification to the extent specified herein. Current version shall be used unless otherwise noted.

Table 3-1. Government Documents.

Document Number	Title
HNF-SD-WM-TDR-007	<i>Double Shell Tank System Specification</i> , Washington River Protection Solutions, LLC, Richland, Washington.
TFC-BSM-IRM_DC-C-07	<i>Vendor Processes</i> , Washington River Protection Solutions, LLC, Richland, Washington.
TFC-ENG-STD-42	<i>Tank Farms Waste Transfer System Fitness-for-Service Evaluation</i> , Washington River Protection Solutions, LLC, Richland, Washington.
TFC-ESHQ-S_SAF-C-02	<i>Job Hazard Analysis</i> , Washington River Protection Solutions, LLC, Richland, Washington.
TFC-ESHQ-S_SAF-CD-11	<i>Worker Safety and Health Program Requirements Implementation Matrix</i> , Washington River Protection Solutions, LLC, Richland, Washington.
WAC 173-303-640	<i>Tank Systems</i>
H-14-010506	<i>Dome Penetration Schedules (WST/WSTA) Tank 241-ay-102</i> , Washington River Protection Solutions, LLC, Richland, Washington.

3.2 NON-GOVERNMENT DOCUMENTS

National codes and standards listed in Table 3-2 constitute a part of this Specification to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this Specification, the contents of this Specification shall be considered a superseding requirement.

Table 3-2. Non-Government Documents.

Document Number	Title
Industry Consensus Codes and Standards	
API 575 2014	<i>Inspection Practices for Atmospheric and Low-Pressure Storage Tanks</i> , American Petroleum Institute, Washington, D.C.
API 579 2016	<i>Fitness for Service</i> , American Petroleum Institute, Washington, D.C.
API 653 2014	<i>Tank Inspection, Repair, Alteration, and Reconstruction</i> , American Petroleum Institute, Washington, D.C.
ASME B31.3, 2012	<i>Process Piping</i> , American Society of Mechanical Engineers (ASME), New York, New York.
ASME B&PVC, Section IX, 2013	<i>Boiler and Pressure Vessel Code (B&PVC) – “Welding and Brazing Qualifications,”</i> American Society of Mechanical Engineers, New York, New York.
ASME NQA-1, 2008, with 2009 Addenda	<i>Quality Assurance Requirements for Nuclear Facility Applications</i> , American Society of Mechanical Engineers, New York, New York.
ASME PCC-2 2015	<i>Repair of Pressure Equipment and Piping</i> , ASME, New York, New York.
ASNT SNT-TC-1A	<i>Recommended Practice</i> , The American Society of Nondestructive Testing (ASNT), Columbus, Ohio.

Document Number	Title
AWS D1.1, 2010	<i>Structural Welding Code Steel</i> , American Welding Society (AWS), Miami, Florida.
AWS QC1	<i>Qualification and Certification of Welding Inspectors</i> , American Welding Society (AWS), Miami, Florida.
NIST H143-2007	<i>State Weights and Measures Laboratories Program Handbook</i> , National Institute of Standards and Technology (NIST), Oppermann, H.V., Taylor, J.
STI/SPFA SP030 4 th Edition	<i>Standard for Repair of Shop-Fabricated Aboveground Tanks for Storage of Flammable and Combustible Liquids</i> , Steel Tank Institute Lake Zurich, Illinois
ASTM A 515	<i>Standard Specification for Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service</i> , ASTM International, West Conshohocken, Pennsylvania.
NFPA 70 (NEC) 2014	<i>National Electrical Code®I</i> , National Fire Protection Association (NFPA), Quincy, Massachusetts.
UL 508A, 2001	<i>Industrial Control Panels</i> , Underwriters Laboratories (UL), Northbrook, Illinois.

4.0 TECHNICAL REQUIREMENTS

Repair

Tank AY-102 bottom repair will be by welded patch plate. The location and details for repairs will be as shown in section 5-3 based on a comprehensive examination and evaluation of the tank floor using methods consistent with API 579.

Material

Existing tank bottom material is 3/8" ASTM A 515 Gr. 60. Material for patch plates will also be ASTM A 515 Gr 60 0.25" thick. Sizes shall be as shown on project drawings. Certified material test reports shall be provided for all plate and filler material used for this work.

5.0 TEST AND INSPECTION REQUIREMENTS

5.1 QUALITY ASSURANCE PROGRAM

The Seller shall comply with the quality assurance requirements stated in the Procurement Documents.

5.2 QUALIFICATIONS

5.2.1 Welding Personnel and Procedures

All welding will be in accordance with procedures that have been qualified in accordance with ASME B&PVC Section IX. Operators and equipment used in remote welding operations will also undergo rigorous testing to assure quality can be achieved when it is operated remotely in the tank environment. Weld Procedure Specifications, Procedure Qualification Records, and Supporting Demonstration Records, as applicable, shall be submitted to the Buyer in accordance with section 6 of this specification.

5.2.2 Performance Demonstration

The tank floor is expected to be distorted having slopes between peaks and valleys of up to 3/8" per foot. It is also expected that there will be minor craters in the floor plate up to 1/8" deep. The welding apparatus shall be able to accommodate these variations. Prior to being deployed in the tank the welding apparatus shall demonstrate it is capable of making quality welds on test plates that simulate the tank floor profile. The welding apparatus shall make a minimum of 20 consecutive acceptable test plate welds. Each of these welds will be subject to 100% magnetic particle examination and a pressure leak test. For the pressure leak test the space between the patch plate and base plate shall be pressurized to 40 psi and the weld examined for leaks. Test acceptance criterion will be no visible leaks. The leak check may be with air or water at the supplier's discretion. Test procedures will be submitted to the buyer for approval. Qualification and performance demonstration will be done using the same equipment and configuration as will be used for the in-tank repair work. Documentation of this configuration will be submitted to the Buyer for approval. Records of tests and examinations for performance demonstration will be submitted to the Buyer for review.

5.2.3 Welding Inspectors and Procedures

Visual weld examinations shall be performed and appropriate documentation prepared by Certified Welding Inspectors who have received certification in accordance with AWS QC1. Certified Associate Welding Inspectors, certified in accordance with AWS QC1, may perform examinations when under direction of Certified Welding Inspectors.

The Seller shall submit personnel certifications and nondestructive examination performance procedures as applicable to the Buyer in accordance with section 6 of this specification.

Personnel performing nondestructive examination shall be certified in accordance with Seller's written practice, which shall meet requirements of ASNT SNT-TC-1A. Level II or III personnel shall be used to interpret test results. Personnel qualification records shall be submitted to the Buyer for review.

5.3 EXECUTION

5.3.1 Location

Repair welding will be performed inside of the primary tank of DST AY-102 on its bottom plate. Access to the tank is through risers that penetrate the tank roof. These risers are at grade 57 feet above the tank floor. The location of each patch plate is specified in Table 5-1 using radial coordinates with north being 0°. The patches shall be 30" diameter circles made of ¼" thick steel plate. They shall be welded to the tank floor completely around their perimeter with a full size (¼") fillet weld.

Table 5-1 Patch Locations

Patch # ID	Radius from Center	Angle
1	24'-6" ± 2"	1° ± 1°
2	30'-6" ± 2"	119° ± 1°
3	12'-0" ± 2"	180° ± 1°
4	17'-0" ± 2"	264° ± 1°
5	15'-9" ± 2"	340° ± 1°

NOTE: Weld repair locations as shown in this revision are for planning purposes only. Actual repair locations and patch sizes will be based on examination and analysis of the tank floor. See RPP-PLAN-61646.

5.3.2 Preparation

Preparing the tank bottom for welding will require all rust, corrosion, mill scale etc. to be removed to clean bare sound metal. Any welds to be covered by a patch plate will be removed to flush with existing base metal. This may be accomplished by mechanical means such as grinding or milling. Cleaning may be accomplished by mechanical means or other methods that can be demonstrated to provide cleaning sufficient for the production of quality welds. Cleaning

tools for weld preparation are discussed in RPP-RPT-60224 *Conceptual Design Report – Tank Cleaning for AY-102 Recovery Inspection and Repair*.

The fit between patch plates and the tank floor shall result in a gap of no more than 1/8". When the gap between the patch plate and the tank floor exceeds 1/16" the fillet weld size shall be increased by the size of the gap. Prior to repairs the profile of the tank at the repair location shall be determined and the patch plate will be shaped to match the tank bottom. Patch plates may be shaped by cold forming or machining. Prior to welding the patch plate will be fitted to the tank floor and tack welded in place to prevent movement during welding. Welding shall be sequenced to minimize distortion of the tank bottom.

5.3.3 Process Monitoring

The robotic welder will be equipped with instruments to continuously monitor and record welding process variables including current, voltage, filter metal feed rate and travel speed. As appropriate instrumentation will be calibrated using standards traceable to NIST. All Welding will also be recorded using suitable video equipment. Records of processing monitoring and weld videos will be submitted with inspection records as part of final documentation records.

5.3.4 Post Weld Heat Treat

After completion all welds will be receive post weld heat treatment to relieve stresses caused by welding. Welds shall be held at 1100° for a minimum of one hour. Temperatures of the welds during stress relieving process shall be monitored and recorded. Temperature records shall be submitted with weld inspection records.

5.4 Inspections And Tests

The Buyer reserves the right to witness all tests and shall be given a minimum of five working days written notice prior to each test date.

Prior to the performance of these tests, the Seller shall submit a procedure for each test to the Buyer for review and approval (not required for weld inspection and examination). Test information recorded or calculated shall be documented and submitted to the Buyer.

Measuring and Test Equipment (M&TE) used in the tests shall have been calibrated within the last six months by a laboratory which complies with the requirements of NIST H143. Calibration records will be submitted to the Buyer for information.

5.4.1 Weld Inspection and Examination

Weld inspection and examination of pressure-retaining components shall be performed in accordance with AWS QC1.

All welds shall be visually inspected as a minimum. Weld maps shall be prepared and submitted. Nondestructive examinations, including visual examinations, shall be recorded and submitted.

5.4.2 Hydrostatic Test

A static head leak test shall be conducted and documented on the tank. For this test the tank will be filled to the bottom of process fill lines approximately 31 ft. above the tank bottom. The completed test procedure and test records shall be submitted.

6.0 DOCUMENT SUBMITTAL

Required submittals are identified and listed on the procurement Master Submittal Register (MSR) in addition to Table 6-1. The MSR identifies the minimum submittals required by this Specification and identifies when the submittals are required to be submitted in the procurement process. The MSR included with the purchase order will constitute the governing MSR.

Table 6-1. Summary of Submittals.

Item	Title	Copies	Purpose	When required
1	Qualification records	1	Approval	Per MSR
2	Weld Procedures	1	Approval	Per MSR
3	Equipment configuration	1	Approval	Per MSR
4	Performance Test Procedures	1	Approval	Per MSR
5	Performance Test Data and Reports	1	Approval	Per MSR
6	Process Monitoring Data	1	Approval	Per MSR
7	Inspection and Examination Documentation	1	Approval	Per MSR
8	Post Weld Heat Treat Records	1	Approval	Per MSR
9	Inspector Qualification Records Certified Material Test Reports	1	Approval	Per MSR
10	Certified Material Test Reports	1	Approval	Per MSR
11	Leak Test Reports	1	Approval	Per MSR
12	Calibration Records	1	Approval	Per MSR

Submittals shall be provided using the Tank Operations Contractor (TOC) Incoming Letter of Transmittal form (A-6005-315). All transmittal subject headings shall contain, at a minimum, the subcontract number, submittal number identified by the MSR, and submittal description.

Submittals shall be provided in electronic format unless available only as a hard copy. Electronic submittals may be sent to TOCVND@rl.gov or delivered via a WRPS-designated File

Transfer Protocol (FTP) site. Electronic formats must be non-password protected in one of the following formats:

- Microsoft®¹ Office Compatible
- Portable Document Format (.PDF)
- Tagged Image File Format (.TIFF)
- Graphics Interchange Format (.GIF)
- Joint Photographic Experts Group (.JPEG)
- Windows Media Video (.WMV)
- Moving Picture Expert Group (.MPEG)
- Extensible Markup Language (.XML)
- HyperText Markup Language (HTML)
- Comma Separated Values (.CSV)
- Text (.TXT)

All deliverable documentation shall be complete, accurate, legible, and reproducible. Before delivery, design media and documents shall be reviewed by qualified Subcontractor personnel for technical adequacy and appropriate content in accordance with the Subcontractor's Quality Assurance Program/procedures. The Subcontractor shall attest, in writing, to the accuracy and completeness of the information contained in the final deliverables.

Deliverables shall be subject to approval by the Buyer's Technical Representative. Deliverables shall comply with this Specification and technical basis documents and other requirements identified herein.

6.1 APPROVAL OF SUBMITTALS

All submittals transmitted shall include the designation in the MSR per TOC Vendor Processes stated in TFC-BSM-IRM_DC-C-07. Submittals are divided into two types: 1) those requiring "approval" (e.g., approval data or pre-purchase evaluation data); and 2) those "not requiring approval" (e.g., vendor information data). Submittals "not requiring approval" will be reviewed to verify completeness and adequacy for their intended purposes. A submittal requiring approval that is not approved is identified as: 1) "Not Approved Revise and Resubmit." The submittal is considered technically deficient, or incomplete, and therefore unacceptable. Resubmittal is required, hence the fabrication, procurement, or performance of procedures shall not proceed; or 2) "Approved with Exception." Fabrication, procurement, and performance may proceed, and resubmittal is required to verify incorporation of the exception. Submittals "not requiring approval" that are determined to be incomplete or inadequate will be marked "Resubmit." An explanation of the deficiencies will be included for corrective action by the Seller.

Approval by the Buyer does not relieve the Seller of responsibility for accuracy or adequacy of design under this Specification.

If any revision has been made to previously submitted items, the Seller shall resubmit updated versions of said items for approval, in addition to the items listed above.

Certified data shall be defined to mean that the design adequacy of a given item (document, drawing, calculation, etc.) be verified by persons other than those who prepared the item. Each

¹ Microsoft is a registered trademark of Microsoft Corporation in the United States and/or other countries.

deliverable (drawing, calculation, etc.) shall have at least an originator's/preparer's signature and a checked-by or approved-by signature.

6.2 LIST OF SUBMITTALS

This list of submittals along with relevant dates shall be kept as part of the MSR.

(Item 1) Weld qualification records (see Section 5.2.1).

(Item 2) Weld Procedures (see Section 5.2.1).

(Item 3) Equipment Configuration (see Section 5.2.2)

(Item 4) Performance Test Procedures (see Section 5.2.2)

(Item 5) Performance Test Records (see Section 5.2.2)

(Item 6) Weld Parameter Data (see Section 5.2.6)

(Item 7) Inspection Records (see Section 5.3.1)

(Item 8) Post Weld Heat Treat Temperature Records (see Section 5.3.4)

(Item 9) Personnel Qualification Records (see Section 5.2.3)

(Item 10) Certified Material Test Reports (see Section 4.0).

(Item 10) Leak Test Reports (see Section 5.3.2).

(Item 11) Measuring and Test Equipment Instrument Calibration Data (see Section 5.2.6).

The Seller shall submit the specified documents (as a minimum) to the Buyer at the address specified in the procurement documentation. Each submittal shall be marked with this Specification number, the item number, the purchase order number, and the Seller's identification number. Three copies of each document shall be submitted, along with a transmittal letter. All of this information shall become the property of the Buyer.

All data shall be sufficiently clear to allow legible copies to be made on standard reproduction equipment after microfilming.

Appendix 1

TABLE OF CHEMICAL CONSTITUENTS OF WASTE

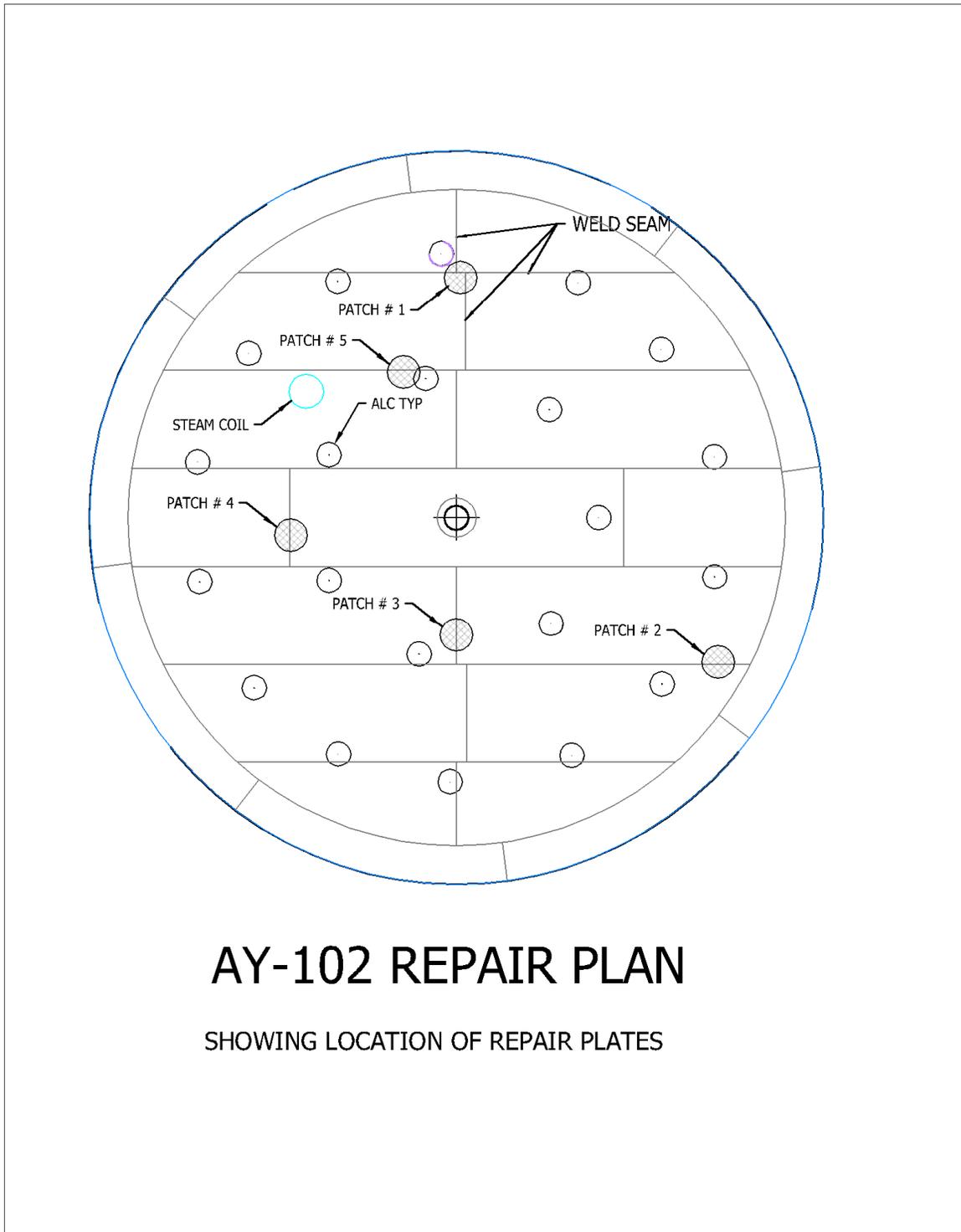
Table A-1 Chemical Constituents

	Solids (AY-102) ¹	
Chemical Constituent	Concentration (mg/L)	Concentration (mg/kg)
Inorganic Constituents		
Al	114399	66900
Bi	168	98
Ca	6926	4050
Cl	126	110
Cr	3352	1960
F	66	57
Fe	186390	109000
Hg	345	202
K	1194	698
La	1412	826
Mn	30609	17900
Na	70400	61217
Ni	5130	3000
NO ₂	7250	6304
NO ₃	387	337
Pb	9456	5530
PO ₄	17271	10100
Si	18981	11100
SO ₄	3506	2050
Sr	392	229
TIC as CO ₃	82500	71739
Zr	163	96
Organic Constituents		
Oxalate	2790	2426
TOC	9149	5350

¹ Tank Waste Information Network System (TWINS) data obtained April 14, 2014. Represents maximum concentrations from sludge or interstitial liquid layers in AY-102.

² Tank Waste Information Network System (TWINS) data obtained April 14, 2014. Represents maximum concentrations from supernatant layers in any of the 28 DSTs.

Figure A-1 Repair Plan



Note: Repair patch locations are for planning purposes only. Actual repair locations will be based on future inspections and evaluation of the tank floor.