241-AN Tank Farm Construction Extent of Condition Review for Tank Integrity

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Abstract: This report provides the results of an extent of condition construction history review for the 241-AN tank farm. The construction history of the 241-AN tank farm has been reviewed to identify issues similar to those experienced during tank AY-102 construction. Those issues and others impacting integrity are discussed based on information found in available construction records, using tank AY-102 as the comparison benchmark. In the 241-AN tank farm, the fifth double-shell tank farm constructed, tank bottom flatness, refractory material quality, post-weld stress relieving, and primary tank bottom weld rejection were improved.

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EXECUTIVE SUMMARY

The construction history of the 241-AN tank farm has been reviewed to identify any concerns for the long-term integrity of the tanks. This initial review was prompted by construction issues identified during the formal leak assessment for tank 241-AY-102 (AY-102), RPP-ASMT-53793, *Tank 241-AY-102 Leak Assessment Report.* In tank AY-102, bulges in the secondary liner, deterioration of castable refractory (refractory) during post-weld stress relieving (post-weld heat treatment), and primary tank floor plate welding rework during construction left residual stresses in the tank that may have accelerated corrosion and contributed to the primary tank failure. The main purpose of this review was to determine whether the construction methods utilized after completion of the 241-AY tank farm either improved the quality and integrity of the fifth double-shell tank farm built (241-AN tank farm) or produced similar reduced margins.

The secondary liner bottom thickness was increased from 1/4 in. in the 241-AY tank farm to 3/8 in. in the 241-AN tank farm and the primary tank bottom thickness was increased from 3/8 in. to 1/2 in. The American Society for Testing and Materials (ASTM) A537-75 carbon steel plate material utilized in the 241-AN tank farm also varied from the ASTM A515-65 carbon steel used in the 241-AY tank farm. ASTM A537-75 represents a higher yield strength.

During construction of the 241-AN tank farm, there was approximately 50% less weld rejection when compared to tank AY-102. However, 9% to 20% weld rejection rates leave cause for concern. While high weld rejection rates and subsequent repairs are thought to be a contributor to out-of-tolerance distortions, or bulges, there were no out-of-specification bulges found in the 241-AN tank farm primary tank or secondary liner bottoms. All 241-AN tank stress relief processes were completed successfully using the alternate requirement of 1000° F for three hours per inch and were accepted. No post-weld stress relieving deficiencies similar to those that occurred during construction of the 241-AY tank farm were noted.

Lite Wate 70 (LW70) was the refractory material utilized in the 241-AN tank farm tanks. A void between the secondary liner bottom and refractory was found near the center of tank AN-104. Holes were drilled in the refractory and pourable grout was used to fill the void. The holes were then filled with LW70, and the refractory was accepted.

Tank bottom bulging, refractory material quality, post-weld stress relieving, and primary tank bottom weld rejection in the 241-AN tank farm were improved when compared to tank AY-102. While these issues, along with others that were judged to be minor (e.g., tank dome deformations and pitting), leave room for uncertainty of long-term tank integrity, the overall condition of the 241-AN tank farm following construction is judged to be better than that of tank AY-102.

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Abbreviations and Acronyms

AEC	Atomic Energy Commission
ARHCO	Atlantic Richfield Hanford Company
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BNWL	Battelle Northwest Laboratory
DST	Double-Shell Tank
LDP	Leak Detection Pit
LW70	Lite Wate 70 castable refractory
NCR	Non-Conformance Report
NDE	Non-Destructive Examination
WRPS	Washington River Protections Solutions LLC

Units

ft	Feet
in	Inch
h	Hour
lb	Pound
Mgal	Million Gallons

TRADEMARK DISCLOSURE

ASME is a registered trademark of American Society of Mechanical Engineers
ASTM is a registered trademark of American Society for Testing and Materials
Kaolite is a registered trademark of Babcock & Wilcox Company

1.0 INTRODUCTION

This document provides an overview of the construction history noting any difficulties encountered for the 241-AN tank farm, the fifth double-shell tank (DST) farm constructed. In October 2012, it was determined that the primary tank of DST 241-AY-102 (AY-102) was leaking (RPP-ASMT-53793, Rev. 0, *Tank 241-AY-102 Leak Assessment Report*). Bulges in the secondary liner, deterioration of refractory during post-weld stress relieving, and primary tank floor plate welding rework during construction compromised the intended robustness and corrosion resistance of the tank AY-102 design and probably contributed to the primary tank's failure.

Following identification of the tank AY-102 probable leak cause, an Extent of Condition (EOC) evaluation was prepared using U.S. Department of Energy's Energy Facilities Contractors Group (EFCOG) *Guidance for Extent of Conditions Evaluations*. The EFCOG process was used to identify other DSTs with construction, waste storage, or thermal histories similar to that of tank AY-102 (Interoffice MemorandumWRPS-1204931, *Double-Shell Tank 241-AY-102 Primary Tank Leak Extent of Condition Evaluation and Recommended Annulus Visual Inspection Intervals*). The EOC evaluation identified six tanks with similar construction and operating histories for additional evaluation which included: 241-AY-101, 241-AZ-101, 241-AZ-102, 241-SY-101, 241-SY-102, and 241-SY-103.

One evaluation was to identify any similarities in construction that could be a precursor for accelerated corrosion and premature failure. Analysis of these tanks was considered to be the first phase and was documented in the following reports:

- RPP-RPT-54817, *241-AY-101 Tank Construction Extent of Condition Review for Tank Integrity*
- RPP-RPT-54818, *241-AZ Tank Farm Construction Extent of Condition Review for Tank Integrity*
- RPP-RPT-54819, *241-SY Tank Farm Construction Extent of Condition Review for Tank Integrity*

Upon completion of the first phase of construction history review, a recommendation to proceed with reviews of the 241-AW, 241-AN, and 241-AP tank farms was provided in external letter WRPS-1302595, *Washington River Protection Solutions LLC Submittal of Recommended Modifications to Double-Shell Tank Visual Inspections.* Phase two of the DST Construction extent of condition review includes the twenty-one tanks contained in the 241-AW, 241-AN, and 241-AP tank farms.

1.1 PURPOSE

The construction history of the 241-AN tank farm has been reviewed to identify issues similar to those experienced during tank AY-102 construction. In this document, those issues and others impacting integrity are discussed based on information found in available construction records, using tank AY-102 as the comparison benchmark.

1.2 OVERVIEW

Six double-shell tank (DST) farms were constructed over a period of roughly 18 years (from 1968 to 1986), with a design life of 20 to 50 years. The 241-AN tank farm was the fifth farm to be constructed and is the focus of this report. Table 1-1, "Double-Shell Construction and Age as of 2013," provides the construction dates, year of initial service, and the expected service life for the DSTs.

Table 1-1. Double-Shell Construction and Age as of 2013

Tank Farm	Number of Tanks	Construction Period	Construction Project	Initial Operation	Service Life	Current Age
241-AY	2	1968 – 1970	IAP-614	1971	40	42
241-AZ	2	1970 – 1974	HAP-647	1976	20	37
241-SY	3	1974 – 1977	B-101	1977	50	36
241-AW	6	1976 – 1979	B-120	1980	50	33
241-AN	7	1977 – 1980	B-130, B-170	1981	50	32
241-AP	8	1982 – 1986	B-340	1986	50	27
Total	28					

1.3 DOUBLE-SHELL TANK DESCRIPTION

Each DST consists of a primary carbon steel tank inside of a secondary carbon steel liner, which is surrounded by a reinforced-concrete shell. The primary steel tank rests atop an 8-in. insulating concrete slab, separating it from the secondary steel liner, and providing for air circulation/leak detection channels under the primary tank bottom plate. An annular space of 2-1/2 ft. exists between the secondary liners and primary tanks, allowing for visual examination of the tank wall and secondary liner annular surfaces. The annular space also allows for ultrasonic volumetric inspections of the primary tank walls and secondary liners.

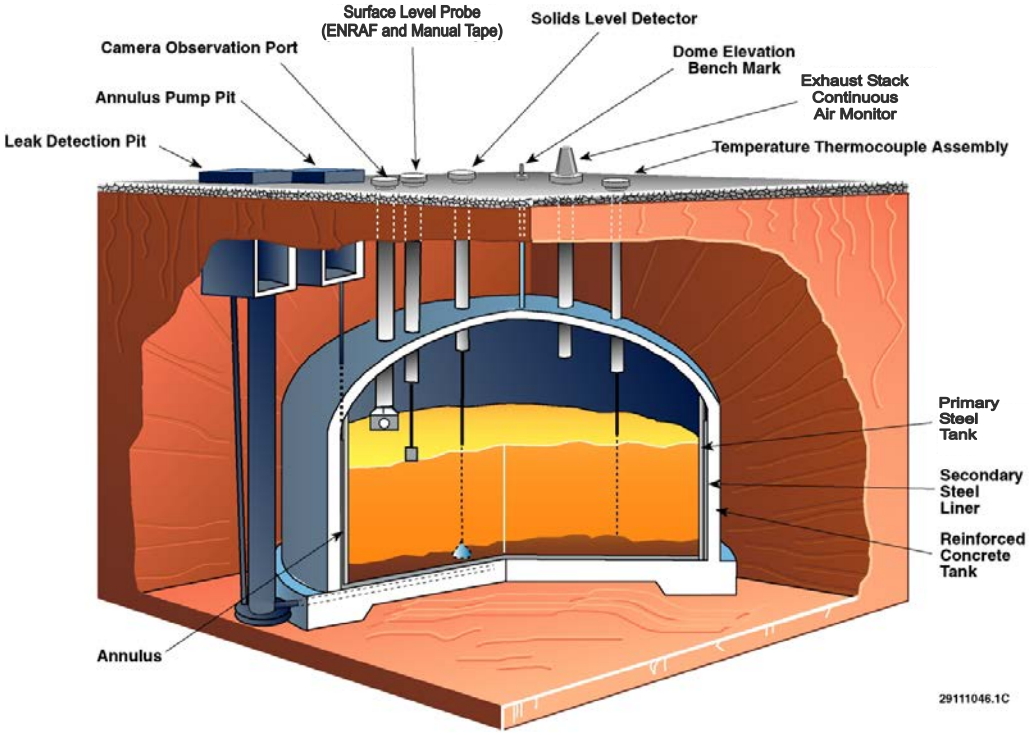

Figure 1-1. Double-Shell Tank Construction

Each tank in the 241-AN tank farm has between 59 and 80 risers as shown in Table 1-2. These risers provide access for video cameras, ultrasonic inspection devices, waste sampling devices, mixer pumps, and other equipment requiring access to either the primary tank interior or annular space.

Table 1-2. 241-AN Tank Farm Riser Detail

Tank	Number of Risers
241-AN-101	61
241-AN-102	59
241-AN-103	59
241-AN-104	59
241-AN-105	61
241-AN-106	59
241-AN-107	80

2.0 241-AN TANK FARM CONSTRUCTION INFORMATION

The 241-AN tank farm was constructed between 1977 and 1980. It was designated as Project B-130, *241-AN-Tank Farm*, and Project B-170, *Tank 241-AN-107*. The Atlantic Richfield Hanford Company (ARHCO) and Rockwell Hanford Operations (RHO) built the tank farm for the Energy Research and Development Administration (ERDA) and the Department of Energy (DOE)[1]. The 241-AN tank farm contains seven tanks and ancillary equipment. American Bridge Company was contracted to build the farm. Construction management was provided by Vitro Engineering.

Tanks AN-101 through AN-106 (Project B-130) were built according to ARH-CD-304, *Functional Design Criteria Additional High-Level Waste Storage and Handling Facilities*. Tank AN-107 (Project B-170) was built according to ARH-CD-549 Rev. 1, *Functional Design Criteria, Additional High-Level Waste Handling and Storage Facilities*. The following construction specifications were also used:

- B-130-D1, *Design Specification for Primary and Secondary Steel Tanks Project B-130 241-AN Tank Farm*
- B-130-C1, *Construction Specification for the 241-AN Tank Farm Site Preparation*
- B-130-C2, *Construction Specification for the 241-AN Tank Farm Excavation*
- B-130-C3, *Construction Specification for the 241-AN Tank Farm Foundations*
- B-130-C4, *Construction Specification for the 241-AN Tank Farm Primary and Secondary Steel Tanks*
- B-130-C5, *Construction Specification for the 241-AN Tank Farm Concrete Shell*
- B-130-C6, *Construction Specification for the 241-AN Tank Farm Backfill*
- B-130-C7, *Construction Specification for the 241-AN Tank Farm Completion*

Tank AN-107 (Project B-170) was built as an aging waste tank spare and has a combination of design features from previous tanks. The foundation design is similar to that used in the 241-AW tank farm, the tank itself is designed like an AN-101 through AN-106 tank, and it contains air lift circulators like a 241-AY or 241-AZ tank.

To obtain information about the construction history, the Record Holding Area (RHA) and Integrated Data Management System (IDMS) were queried for boxes containing files from Project B-130, *241-AN Tank Farm*, and Project B-170, *Tank 241-AN-107*.

This information includes:

1. Radiographic Examination Reports
2. Materials Certifications
3. Non-conformance reports
4. Quality Assurance construction logbooks

[1] The Department of Energy replaced the Energy Research and Development Administration on October 1, 1977. Rockwell Hanford Operations replaced the Atlantic Richfield Hanford Company on October 1, 1977.

5. Project reports, correspondence, and meeting minutes

Daily logbook entries, which describe key construction events and issues, are summarized in Appendix A. The following sections provide an aggregation of the information collected, highlighting important events and information relevant to leak integrity. The resulting quality of construction and any issues or difficulties noted are discussed in this document.

3.0 MATERIALS OF CONSTRUCTION

The materials of construction evolved from the construction of 241-AY tank farm to the construction of the 241-AN tank farm. The primary change in material selection was to use American Society for Testing and Materials (ASTM[2]) A537-75, *Pressure Vessel Plates, Heat Treated, Carbon-Manganese-Silicon* (Specification B-130-C4), for construction of the primary and secondary liner instead of ASTM A515, *Pressure Vessel Plates, Carbon Steel, for Intermediate and Higher Temperature Service*, Grade 60, used in the 241-AY tank farm.

The thickness of the secondary liner bottom plates was increased starting with the 241-AZ tank farm, from 1/4 in. to 3/8 in. for the secondary bottom sections. The primary bottom was increased from 3/8-in. to 1/2-in. sections. The refractory material was changed from Kaolite[3] 2200LI castable refractory to Lite Wate 70 castable refractory (LW70) and, in addition, the refractory pour pattern was modified. Table 3-1 provides a comparison of the construction materials used in the 241-AY and 241-AN tank farms.

Table 3-1. Materials Comparison

Material	241-AY Tank Farm	241-AN Tank Farm
Concrete	3000 psi Type V for the walls Type III for the haunch and dome	4500 psi Type II for the foundations 5000 psi Type II for the walls, domes, and haunches
Reinforcing Bar	ASTM A432 for the walls, dome and haunch ASTM A15 for the foundation	A615, Grade 60, except #3 ties shall be Grade 40
Steel Plate	ASTM A515-65	ASTM A537-75, Class 1
Refractory	Kaolite 2200LI	Lite Wate 70

3.1 CONCRETE

The structural concrete used in the foundations of the 241-AN tank farm tanks was required to have a 28-day compressive strength of 4500 psi, while the concrete used in the concrete shells required a 28-day compressive strength of 5000 psi. Concrete samples were taken and tested at 7-days, 28-days, and 90-days to confirm the compressive strength. The cement for the concrete shell and foundation conformed to American Society for Testing and Materials (ASTM) C150 Type II (refer to B-130-C3 and B-130-C5).

In the 241-AY tank farm, HWS-7791, *Specification for Side Walls and Dome Nuclear Waste Storage Tank Project IAP-614 Purex Tank Expansion*, specifies concrete made with Type V cement for tank walls and Type III cement for haunch and dome portions of the tank. From

[2] ASTM is a registered trademark of American Society for Testing and Materials.
[3] Kaolite is a registered trademark of Babcock & Wilcox Company.

ASTM C150, *Standard Specification for Portland Cement,* Type II cement is for general use with moderate sulfate resistance and moderate heat of hydration. Type III cement is high early strength cement, and Type V cement is high sulfate resistant cement.

3.2 REINFORCING BAR

In the 241-AN tank farm, the tank foundations were reinforced with ASTM A615, Grade 60, reinforcing steel for everything but the ties, which were ASTM A615, Grade 40. ASTM A615, Grade 60, specified minimum yield strength of 60,000 psi, while ASTM A615, Grade 40, specified minimum yield strength of 40,000 psi (see drawing H-2-71907, *Concrete Tank Section and Haunch Reinforcement* and specification B-130-C5 for tanks 241-AN-101 through AN-106, and see drawing H-2-71106, *Concrete Tank Section and Haunch Reinforcement* for tank 241-AN-107). Rebar used to reinforce the tank foundation was #5, #6, #8, and #10 (see drawing H-2-71904, *Structural Tank Foundation Plan and Details* for tanks 241-AN-101 through AN-106 details, and see drawing H-2-71103, *Structural Concrete Tank Foundation Plan and Details* for tank AN-107 details), while #4, #6, #8, and #9 rebar was used to reinforce the concrete haunch and dome sections (see H-2-71907 and H-2-71106 for details).

In the 241-AY tank farm, the reinforcing bar was manufactured to ASTM A15 specifications with minimum yield strength of 40,000 psi. The tank foundation was reinforced with #5, #6, and #7 rebar (see H-2-64306, *Tank Foundation Plan*, for details). The concrete walls and dome sections were reinforced with #4, #6, #8, and #9 rebar (see H-2-64310, *Concrete Tank Section and Details*, for details).

3.3 STEEL PLATE

All primary tank and secondary liner plates used in the 241-AN tank farm were shipped from the United States Steel Corporation and were manufactured to ASTM A537-75 *Pressure Vessel Plates, Heat Treated, Carbon-Manganese-Silicon,* Class 1. The selection of ASTM A537 was a change from ASTM A515 used in the 241-AY tank farm. ASTM A537 is austenitic steel with fine grain size produced for pressurized service due to its increased yield and tensile strength relative to ASTM A515 or ASTM A516. ASTM A515 is a coarse grain size metal produced for moderate and higher temperature service. The smaller grain size in ASTM A537 increases the notch toughness and resistance to stress corrosion cracking over ASTM A515 used in the 241-AY tank farm and ASTM A516 used in the 241-SY tank farm. The 241-AN tank farm tanks were erected using the American Society of Mechanical Engineers (ASME[4]), *Boiler and Pressure Vessel Code,* 1974 through summer 1976 Edition and Addenda of the code.

3.3.1 Secondary Plate

The secondary liner plates consisted of 3/8-in. and 1/2-in. sections (see H-2-71975, *Tank Cross Section 241-AN Tanks*, and H-2-71160, *Tank Cross Section 241-AN-107 Tank,* for details). The 1/2-in. plate was used in the lower knuckle of the liner. The 3/8-in. plate was used for the liner floor, walls, and upper haunch. Figure 3-1 shows the configuration of the secondary tank and the

[4] ASME is a registered trademark of American Society of Mechanical Engineers

thickness of each region. The 241-AY tank farm utilized 1/4-in. plate for the majority of the secondary liner with the exception of the top knuckle at 3/8 in. thick.

3.3.2 Primary Plate

The primary tank bottom utilizes primarily 1/2-in. carbon steel plates, except that a 4-ft. diameter by 1-in. thick carbon steel plate is located at the center of the primary tank bottom, and a 7/8-in. carbon steel plate is used for the primary bottom knuckle. The carbon steel primary tank wall thickness varies from 7/8 in. thick at the bottom knuckle to 1/2 in. thick at the course four plate. The first course is 3/4 in. thick, and the next three courses are 1/2 in. thick. The dome of the tank was constructed of 3/8-in. plate welded to the 3/8-in. thick top knuckle and closed with a 1/2-in. thick top dollar plate. Figure 3-1 shows the configuration of the primary tank and the thickness of each region.

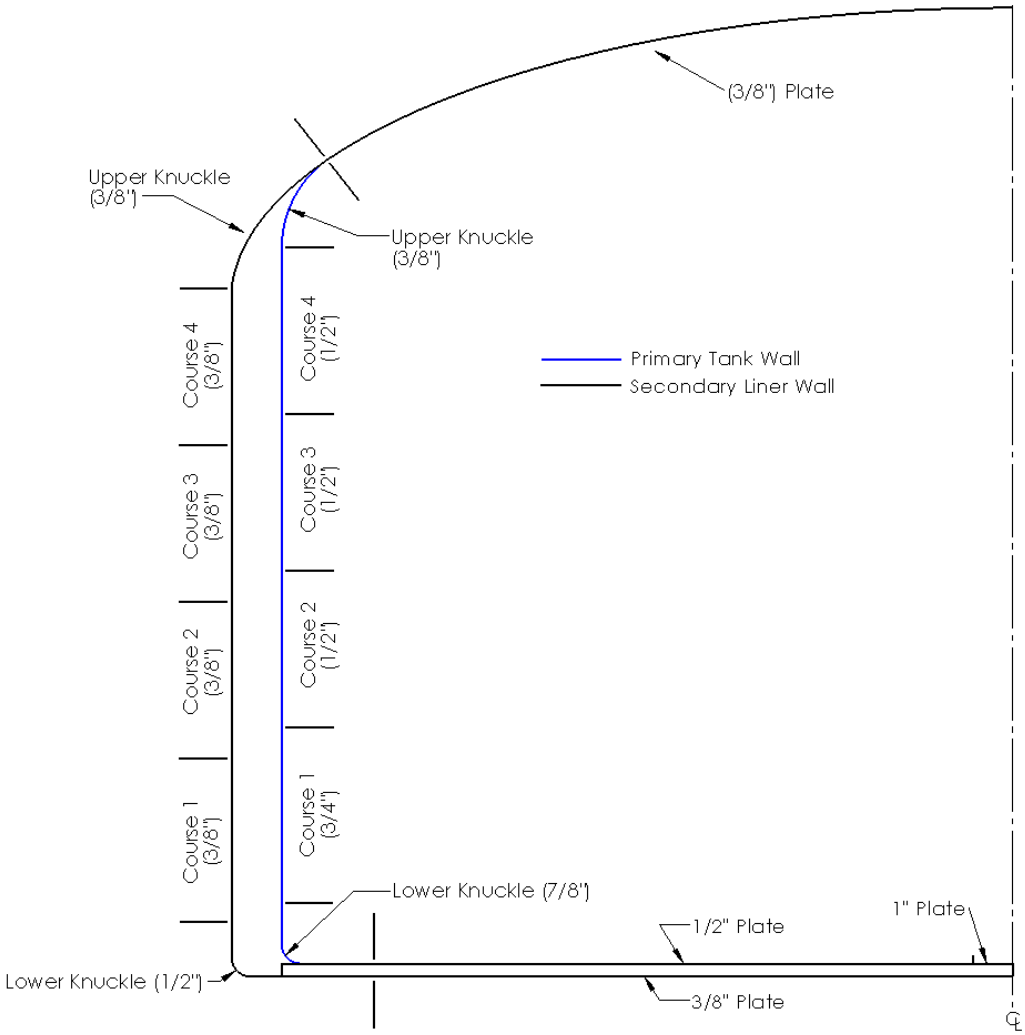

Figure 3-1. Primary Tank Wall Configuration and Thickness

Figure 3-2. View of Shell Plate Courses (Photo 83472-13) (Taken 9/21/1978)

3.3.3 Material Certification

Material certifications and chemical and physical test reports containing the heat and slab number were required for each steel plate. Material certifications contained yield strength and tensile strength information along with percent elongation for each specific heat and slab number. The chemical and physical test reports identify the percent of each element (i.e., carbon, manganese, phosphorus, etc.) contained within a sample of the material as well as properties such as yield point, tensile strength, percent elongation, and information gathered from bend test results. Additionally, Specification B-130-C4 identifies that each plate was to be ultrasonic tested per ASTM A578-75, acceptance standard Level II.

3.4 REFRACTORY

The refractory was required to limit the structural concrete base slab to a maximum temperature of 500° F during the post-weld stress relief. In contrast to the refractory material for the 241-AY farm, which required a compressive strength of 200 psi, the material for the refractories in the 241-AN farm had to have a minimum compressive strength of 130 psi after heating, either wet or dry. In addition, the material had to be compatible with the chemicals found in the tank waste. Lite Wate 70 (LW70) was chosen as the material to be used for the 241-AN tank farm refractory. While the refractory material used in the 241-AY and 241-AZ farms was tested to ensure waste compatibility, no simulant testing was performed on LW70. Vendor statements asserted that LW70 was compatible with the waste.

3.5 PIPING

All pipe used for permanent risers was manufactured to ASTM A106, Grade A or B specifications, except pipe larger than 24 in. was manufactured to ASTM A134 made from ASTM A285 plate, Grade A or B. Flanges conform to ASTM A181 specifications. Coal tar enamel wrapped in kraft paper was used on carbon steel pipe exposed to earth.

4.0 CONSTRUCTION SEQUENCE

Construction of the seven 241-AN tanks was awarded to American Bridge Division of United States Steel Corporation (American Bridge). Excavation began in 1977 and the project was completed in (1980). Vitro Engineering provided construction management for the project.

While the seven tanks are named numerically, they were constructed simultaneously, with varying order depending upon the stage of the project. In terms of completion, the tanks were finished in the following order: AN-106, AN-107, AN-102, AN-103, AN-105, AN-104, AN-101.

Tank AN-107 was built as a separate project and was begun a few months after the other tanks. A listing of the general construction sequence follows:

1. Install reinforced structural concrete foundation for each of the seven tanks. The foundation has a tertiary leak detection system, which includes a waffle grid in the structural concrete, collection pipes, and the leak detection pit.
2. Install plywood protective layer over the tank foundations.
3. Install cribbing and jack stands for secondary liner bottom fabrication.
4. Fabricate secondary liner bottom on top of cribbing and jack stands.
5. Inspect secondary liner bottom.
6. Lower the secondary liner bottom onto the concrete foundation or move the liner from its construction location to its permanent location.
7. Install air distribution piping and thermocouple conduits to be embedded in the tank bottom refractory, as well as the retainer ring used as a form for the perimeter of the refractory.
8. Pour the refractory in five pour sections.
9. Cut air distribution channels into the refractory.
10. Install protective layer of plywood on the refractory.
11. Install cribbing and jack stands for primary tank bottom fabrication.
12. Fabricate primary tank bottom on top of cribbing and jack stands.
13. Inspect primary tank bottom.
14. Lower the primary tank bottom onto the refractory or move the tank bottom from its construction location to its permanent location.
15. Weld the first, second, third, and fourth plate courses to the primary tank.
16. Weld the secondary liner course plates up to the last course (not including the upper knuckle).
17. Fabricate tank dome and penetrations inside the primary tank.
18. Weld primary tank upper knuckle in place.
19. Raise tank dome into place and weld it to the primary tank upper knuckle.
20. Install insulation around the primary tank walls and dome in preparation for stress relief.
21. Conduct stress relief of the primary tank.
22. Conduct hydrostatic test of the primary tank.
23. Install upper knuckle and attach metal flashing between secondary upper knuckle and primary tank dome.
24. Install annulus penetrations.
25. Place the concrete in four sections, including two vertical lifts, a haunch pour, and a dome pour.

26. Install the leak detection system, including the leak detection drain, sump, and well.
27. Start backfilling the tank farm area.
28. Install appurtenances
29. Backfill to the top of the domes
30. Install the waste transfer system of piping, pump pits, and valve pits.
31. Complete backfill.

4.1 CONCRETE FOUNDATION

The foundation is composed of reinforcing steel and concrete, requiring a 4500 psi, 28-day compressive strength (see drawings H-2-71904, *Structural Concrete Tank Foundation Plan and Details,* and H-2-71103, *Structural Concrete Tank Foundation Plan and Details,* for details).

In June 1977, a design change, B-130-15, was made to the foundations of tanks AN-101 through AN-106 (see App. Figure B-1). As described above, this change incorporated the addition of a 4-in. shoulder to the tank foundations, seen in Figure 4-1. The purpose of the shoulder was to resist inward lateral displacement of the concrete wall. Tank AN-107, built as Project B-170, was not included in this design change and its foundation has no such shoulder (Figure 4-2).

The structural reinforced concrete foundations for tanks AN-101 through AN-106 are 89 ft. 6 in. in diameter and designed to distribute all loads uniformly. The circular center portion of the foundations is 6 ft. in diameter and 2 ft. thick. From the circular center portion, the foundation thickness of tanks AN-101 through AN-106 decreases linearly out to 1 ft. 4-1/4 in. thick at the 12-ft. 8-in. diameter and maintains that thickness out to approximately 45 ft. 6 in. in diameter. The foundation thickness of tanks AN-101 through AN-106 then increases linearly to 3 ft. 1 in. over the next 24 ft. in diameter. For tanks AN-101 through AN-106, the thickness drops 4 in. to 2 ft. 9 in. after the next 12 ft. in diameter. This foundation thickness of 2 ft. 9 in. is then maintained to the perimeter of the tank foundations at the 89-ft. 6-in. diameter.

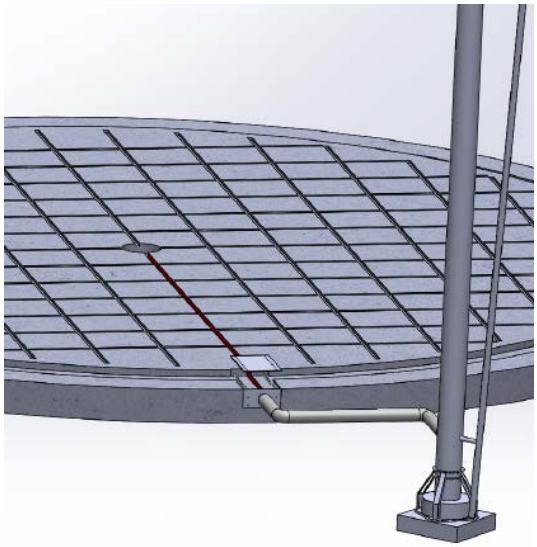

Figure 4-1. Tanks AN-101 through AN-106 Concrete Foundation

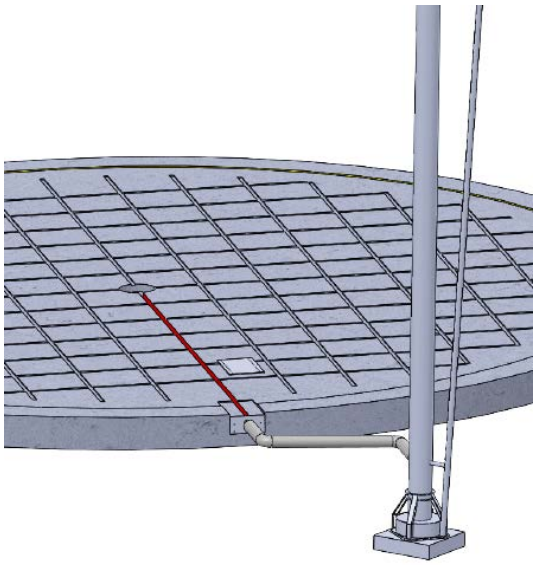

Figure 4-2. Tank AN-107 Concrete Foundation

The structural reinforced concrete foundation for tank AN-107 is 89 ft. 6 in. in diameter and designed to distribute all loads uniformly. The circular center portion of the foundations is 6 ft. in diameter and 2 ft. thick. The foundation of tank AN-107 decreases linearly from the circular center portion out to 1 ft. 1/4 in. thick at the 12-ft. 8-in. diameter and maintains that thickness out to approximately 45 ft. 6 in. in diameter. The foundation thickness of tank AN-107 then increases linearly to 2 ft. 9 in. over the next 24 ft. in diameter. For tank AN-107, the 2-ft. 9-in. thickness is maintained to the perimeter of the tank foundation at the 89-ft. 6-in. diameter.

The structural foundations for all tanks in the 241-AN tank farm contain drain slots to direct any leakage to the leak detection drain slot. This leak detection drain slot is a change from the configuration seen in the 241-AY tank farm. In the 241-AY tank farm, a drain pipe was used to drain the foundation at three different locations as seen in Figure 4-3, and the drain pipe drained to the leak detection sump.

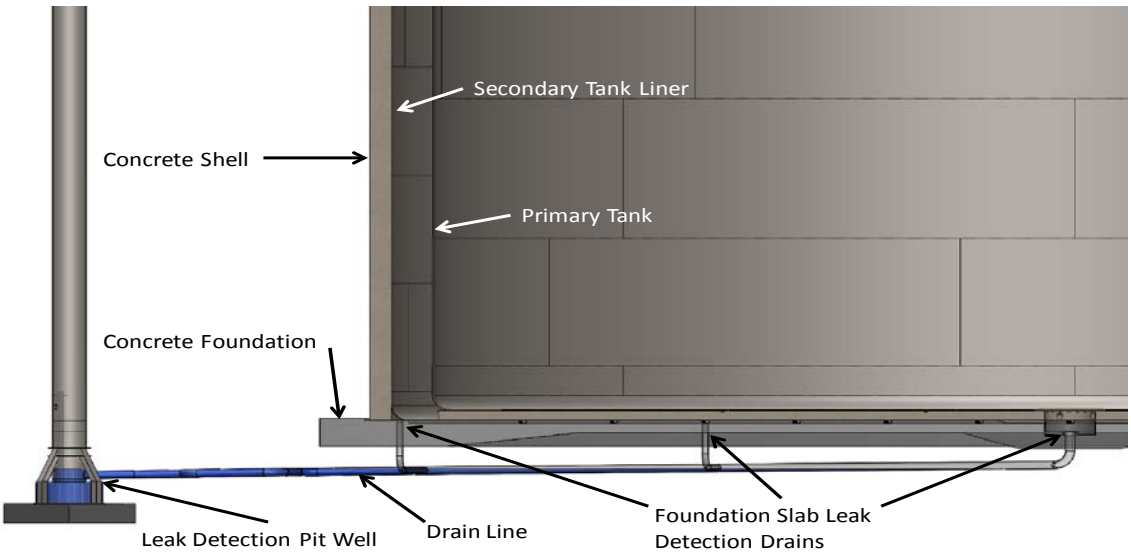

Figure 4-3. Diagram of 241-AY Tank Farm Leak Detection Pit Drain Line

The change in design was made because a pipefitter strike during construction of the 241-AW tank farm threatened to delay the project as noted in RPP-RPT-55981, *241-AW Tank Farm Construction Extent of Condition Review for Tank Integrity*.

The design change was carried over to the 241-AN tank farm, which was being built during the same time. The leak detection drain slot connects to a drain pipe at the foundation perimeter. The drain pipe then flows to the leak detection pit (LDP). Figure 4-4 is a diagram showing the leak detection drain slot, and the drain pipe into the leak detection well.

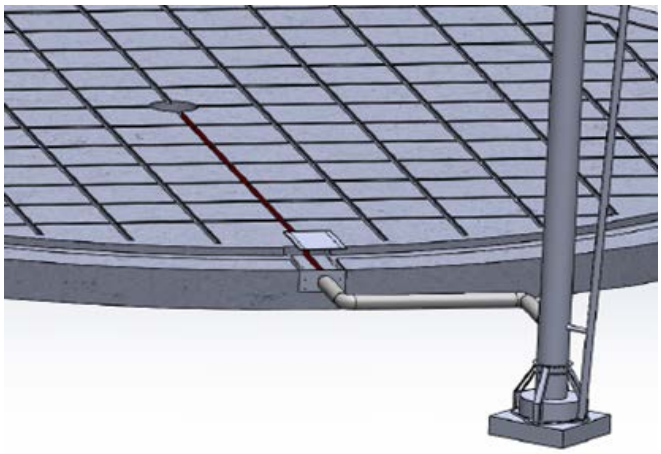

Figure 4-4. Diagram of 241-AN Tank Farm Leak Detection Drain System

After backfill and compaction, two rebar mats were installed, followed by instrumentation conduit. Concrete forms were then installed, including those for drain slots in the top of the foundation. The concrete was then poured and set. Figure 4-5 shows the rebar and wood used to form drain slots in the foundation prior to concrete placement. Following concrete cure, forms were removed and high spots on the foundation were ground down. Figure 4-6 shows the completed tank foundations, including the slots that direct any accumulation of liquid to the drain lines.

Figure 4-5. Tank Foundation Preparation (Photo 79464-10) (Taken 8/25/1977)

Figure 4-6. 241-AN Tank Farm Completed Tank Foundations, Tanks AN-101 through AN-106 (Photo 80853-13) (Taken 12/16/1977)

4.2 SECONDARY LINER BOTTOM

The secondary liner measures 80 ft. in diameter. The plates in the liner bottom are 3/8-in. thick carbon steel and the bottom knuckles are 1/2-in. thick carbon steel. This thickness is increased from the 1/4-in. thick bottoms and bottom knuckles of the 241-AY tank farm secondary liners.

The secondary liner bottoms for the 241-AN tank farm were constructed onsite. In this tank farm, only the secondary liner bottom for tank AN-107 was constructed on its corresponding concrete foundation and lowered into place after fabrication, while the rest were constructed in neighboring locations and moved into place after fabrication. Table 4-1 provides the locations of construction for the secondary tank bottoms.

Before beginning the fabrication of a secondary liner bottom, crews would place a protective layer of plywood over the reinforced concrete foundation. Staging was then erected on top of the plywood to provide an elevated structure on which to fabricate the tank bottom. Elevating the tank bottom allowed access its underside for fabrication purposes. During construction of the 241-AN tank farm, crews made use of unused level space to the north of tank AN-105 when constructing both secondary and primary tank bottoms.

Table 4-1. Secondary Tank Bottom Construction Locations

Secondary Tank Bottom	Constructed On
AN-101	AN-102
AN-102	AN-103
AN-103	AN-106
AN-104	AN-105
AN-105	North of AN-105
AN-106	AN-105
AN-107	AN-107

Individual plates were installed using fit-up tools to secure the plates within allowable tolerance for proper welding. The secondary liner bottom knuckles, which are 1/2-in. thick carbon steel, were fabricated offsite at an American Bridge fabrication facility in San Francisco, California, prior to being shipped to the worksite for welding to join the knuckles with the adjacent plates. Figure 4-7 shows secondary liner bottoms in various stages of construction.

Figure 4-7. Secondary Liner Bottoms in Various Stages of Completion. (Photo 81443-23) (Taken 2/23/1978)

After completion and inspection of the welds, the secondary liner bottom was lowered or moved onto its foundation using two cranes. Lifting lugs were installed as part of a superstructure used to support the tank liner from above to limit deformation during the move.

4.3 REFRACTORY

The refractory design used for the seven 241-AN tank farm tanks specified a nominal 8-in. thick layer of refractory material to be located between the primary tank bottom and secondary liner bottom. Lite Wate 70 (LW70) was specified as the refractory material to be used in the 241-AN tank farm tanks. The primary purpose of the refractory was to act as an insulating barrier between the primary tank and the concrete foundation during post-weld stress relieving where temperatures of up to 1100° F were required in the primary tank. The refractory would prevent the structural concrete temperature from rising above 500°F.

Figure 4-8. Aerial View of 241-AN Tank Farm (Photo 81762-19) (Taken 4/17/1978)

The refractory pad housed air ventilation piping, thermocouple conduit, and air distribution slots. The air distribution slots allowed airflow to cool the primary tank bottom and to direct potential leaks to the tank annulus where leak detectors are located (see H-2-71906, *Structural Insulating Concrete Plan and Details*, for tanks AN-101 through AN-106, and H-2-71105, *Structural Insulating Concrete Plan and Details*, for tank AN-107). The eight ventilation supply pipes terminate at the center of the tank at an air distribution ring. Air is drawn through this supply piping and out through the air distribution slots in the refractory. Figure 4-8 shows an aerial view of the 241-AN tank farm, including two finished refractories with air distribution slots (tanks AN-101 and AN-106) and one secondary tank bottom with refractory pour forms and air ventilation pipes installed (tank AN-105).

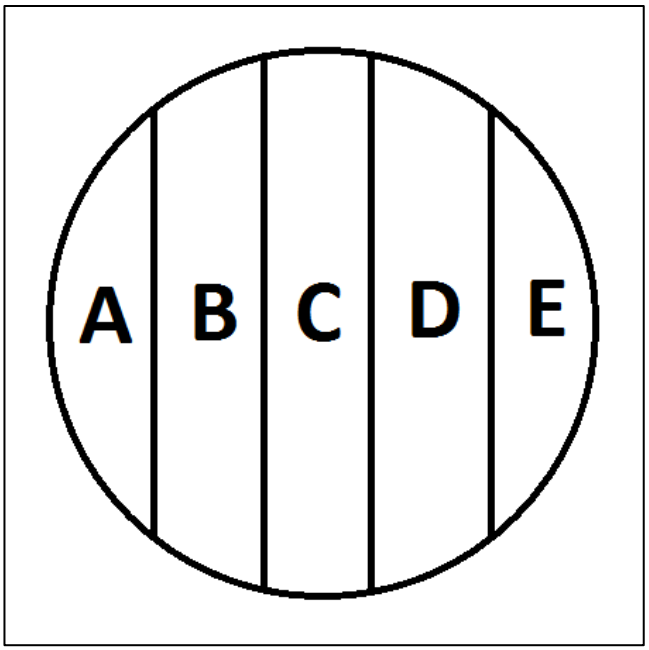

Figure 4-9. Refractory Placement Sections

Prior to pouring the refractory, a 7-in. by 3/4-in. carbon steel stiffener ring was installed around the perimeter of the pour and thermocouple conduits were installed. The stiffener ring was used

as a refractory form. Thermocouples allowed temperature monitoring of the refractory and primary tank bottom during post-weld stress relieving. The refractory was placed in five sections (sections “A” through “E”) with air ventilation piping embedded in the refractory material. Figure 4-9 shows the orientation of the five refractory placement sections. Air distribution slots were cut instead of cast into the refractory.

Refractory was placed during the warmer months between March and October and plastic sheeting was placed over the refractories for rain protection. This protection was utilized to prevent degradation of the refractory material as a result of excess moisture and freezing. Damage to refractory as a result of excess moisture and freezing had occurred during previous tank farm constructions projects.

4.4 PRIMARY TANK BOTTOM

The primary tank measures 75-ft. in diameter. The 4-ft. diameter center plate of the liner bottom is 1-in. thick carbon steel, while the bottom knuckles are 7/8-in. thick carbon steel. The remainder of the plates in the primary tank bottom are 1/2-in. thick carbon steel, an increase in thickness over the 3/8-in. thick bottoms of the 241-AY tank farm primary tanks.

Following completion of refractory installation, the primary tank bottom was fabricated using a sequence similar to that used for the secondary liner bottom. For the primary tank bottoms not using the previously erected staging north of tank AN-105, a protective layer of plywood was placed on the refractory and staging was erected to support the liner during construction. The bottom plates of the tank were installed on the staging using fit-up tools to allow proper welding. Once the top and bottom sides of the primary tank bottom were completely welded, the knuckle was welded on to the bottom plate. After inspection of the welds, the primary tank was then transferred to its final location and lowered onto the refractory. In the 241-AN tank farm, all but one of the primary tank bottoms were constructed on neighboring sites and moved into place using cranes and a stabilizing superstructure. Table 4-2 provides the locations of construction for the primary tank bottoms. Figure 4-10 shows the fabrication of tank AN-104 primary bottom.

Table 4-2. Primary Tank Bottom Construction Locations

Primary Tank Bottom	Constructed On
AN-101	AN-102
AN-102	AN-103
AN-103	AN-106
AN-104	AN-104
AN-105	North of AN-105
AN-106	AN-105
AN-107	North of AN-105

Figure 4-10. Tank AN-104 Primary Bottom Fabrication. (Photo 81689-6) (Taken 3/23/1978)

4.5 PRIMARY TANK WALL AND TANK DOME

The primary tank measures 75 ft. in diameter to the center of the vertical plate. The primary tank wall is made up of four courses of carbon steel plates between the lower and upper knuckles. The plates in the first course are 3/4 in. thick and the next three courses are 1/2 in. thick. Each course was set in place and welded to the previous course. The first course plates are welded to the 7/8-in. thick lower knuckle, while the fourth course plates are welded to the 3/8-in. thick upper knuckle. Figure 3-1 shows the configuration of the primary tank wall and the thickness of each course. Figure 4-11 shows the completed tank dome of tank AN-101, and the secondary liner upper knuckles can be seen staged around the bottom of tank AN-101.

Figure 4-11. Completed Primary Dome of Tank AN-101 Can Be Seen in the Foreground (Photo 83797-8) (Taken 10/20/1978)

The dome of the tank is constructed of two courses of 3/8-in. thick carbon steel plate welded to the upper knuckle and closed with an 11-ft. diameter 1/2-in. thick top dollar plate. To facilitate the installation of tank dome plates, staging was erected inside the primary tank. This staging provided a resting place for the tank dome plates for proper fit-up and welding. Once the dome was welded together, riser penetration holes were cut and pipes were welded to the tank dome plates. These penetrations served as access points for the remainder of construction and they supported the installation of permanent and temporary equipment during operation. Once the penetrations were installed on the dome, it was lifted by crane and set on the upper knuckle, where it was welded in place.

Figure 4-12. Representative Photo from 241-AW Tank Farm of Tank Door Sheet Access (Photo 79677-39) (Taken 9/20/1977)

Once construction of the primary tank was completed, the surfaces were cleaned. At this time, the door sheet, a plate left out of a lower course to allow tank access, was welded into place in preparation for stress relief and hydrostatic testing. While no photographs from 241-AN tank farm construction of a door sheet could be located, a representative photograph from the 241-AW tank farm is included as Figure 4-12.

4.6 SECONDARY LINER WALL

Once the primary tank wall was constructed, the secondary liner wall was begun. The secondary liner wall is made up of four courses of 3/8-in. thick carbon steel plates between the lower and upper knuckles. Each course was set in place and welded to the previous course. The first course plates are welded to the 1/2-in. thick lower knuckle, while the fourth course plates are welded to the 3/8-in. thick upper knuckle.

In order to maintain access to the annulus, the upper knuckle was not installed on the secondary tank liner until after stress relieving and hydrostatic testing of the primary tank.

4.7 PRIMARY TANK STRESS RELIEVING

After the primary tank was completed, it was prepared for post-weld stress relief. Insulation was installed on the outer surface of the primary tank, including the dome penetrations, to help regulate the heating of the primary tank. The concrete foundation was protected from high stress relief temperatures by the refractory.

Propane gas was supplied from three 1000-gal. storage tanks, passed through vaporizers, and ignited at high velocity burners mounted on four of the risers at the top of each tank. The approximate flame length of each was 12 inches. Figure 4-13 shows the burner layout.

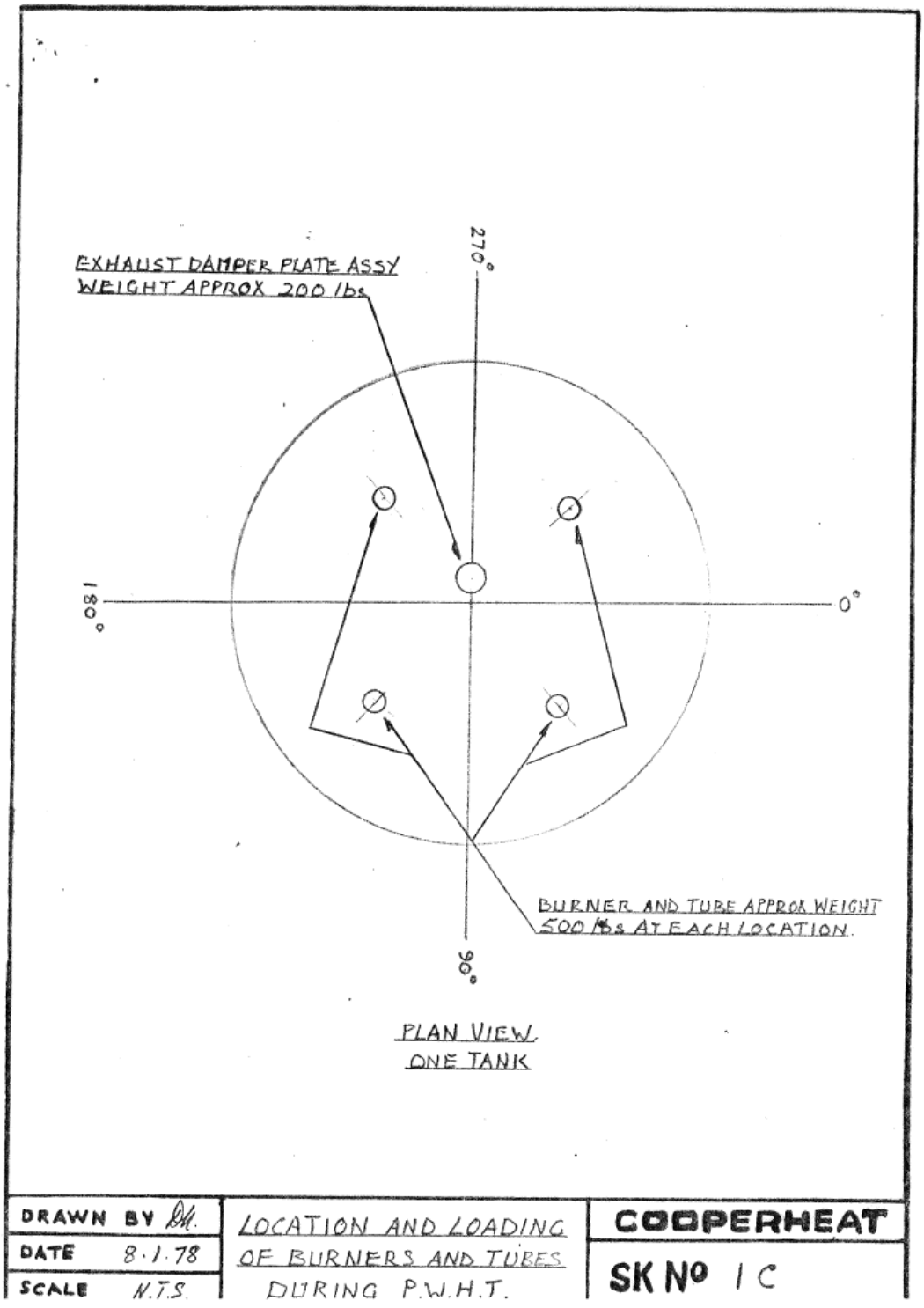

Figure 4-13. Location and Loading of Burners and Tubes during Stress Relief

Figure 4-14 shows the post-weld stress relief in progress on the AN-104 primary tank.

The requirements for stress relieving were in accordance with *ASME Boiler and Pressure Vessel Code, Section VIII (1974)*, which specified a preferred holding, or "soaking," temperature of 1100° F for one hour per inch of metal thickness. Alternate requirements of 1000° F for three hours were allowed.

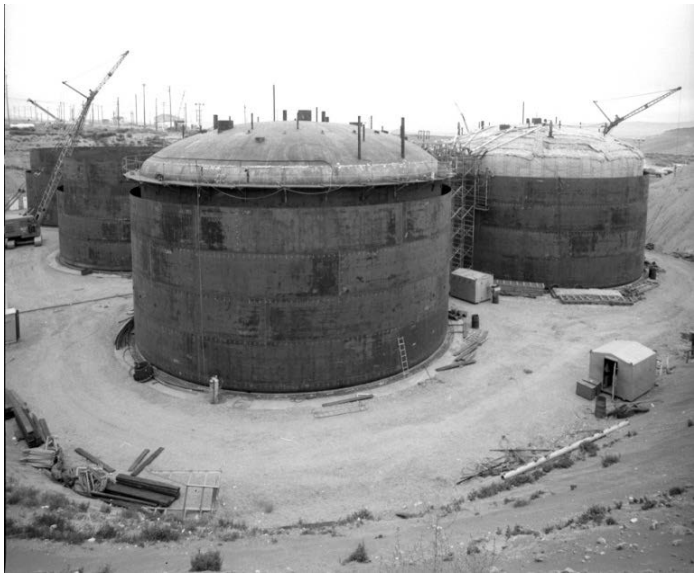

Figure 4-14. Tank AN-104 (right) during Post-Weld Stress Relieving (Photo 83472-13) (Taken 9/21/1978)

Section 15H, paragraph 3.04.B, "Stress Relieving," of B-130-C4, *Construction Specification for Primary and Secondary Steel Tanks Project B-130 241-AN Tank Farm*, provided the following direction for stress relieving:

> *B. "Perform stress relief in accordance with ASME, Section VIII, Division 2, Article F-4, except that:*
>
> 1. *The maximum allowable decrease in temperature below the specified temperature of 1100° F shall not exceed 100° F.*
>
> 2. *The rate of temperature rise and reduction between 600° F and 1100° F shall be no more than 100° F/hr.*
>
> 3. *The period of heating from 600° F to 1100° F shall consume no more than 12 hours.*
>
> 4. *During the heating-up period, after any recorded temperature reaches 600° F, the temperature of all parts of the tank being heated shall be uniform with a maximum temperature differential at any time of 200° F."*

Although the construction specification specifies a stress relief temperature of 1100° F, dome deformations in tank AW-101 due to stress relieving at 1100° F triggered a change in the stress relieving procedure (see RPP-RPT-55981, *241-AW Tank Farm Construction Extent of Condition Review for Tank Integrity*, for details). To prevent similar dome distortions in tank AW-102 during stress relieving, the requirement was changed to a soak temperature of 1000° F for three hours (see App. Figure B-2). Dome distortions due to stress relieving in tank AW-102 were significantly less severe than those in tank AW-101 (see App. Figure B-3), so the new requirement became procedure for the remaining 241-AW tank farm tanks and all of the 241-AN tank farm tanks.

Thermocouples were installed throughout the tank to measure the temperature on the inside. Thermocouples installed during the insulating refractory pour were used to monitor the post-weld stress relieving temperatures in the primary tank bottom during the operation. In order to support the tank during post-weld stress relieving, the internal air pressure was to be maintained above 3 in. of water.

Heating occurred in several stages and key events were captured in daily field reports. Important entries from these reports have been included in Appendix A. See Table 4-3 for significant post-weld stress relieving highlights.

Table 4-3. Post-Weld Stress Relieving in the 241-AN Tank Farm

Tank	Burners Turned On	Completed Final 3-hr Hold Time at 1000° F	All Thermocouples Reading below 600° F, Recorders Turned Off
AN-101	8:30 a.m. October 10, 1978	10:30 p.m. October 10, 1978	6:00 a.m. October 11, 1978
AN-102	9:00 a.m. October 27, 1978	10:00 p.m. October 27, 1978	3:00 a.m. October 28, 1978
AN-103	12:00 p.m. November 15, 1978	2:00 a.m. November 16, 1978	8:20 a.m. November 16, 1978
AN-104	2:00 p.m. September 21, 1978	11:15 a.m. September 22, 1978	5:30 p.m. September 22, 1978
AN-105	12:00 p.m. December 7, 1978	8:00 a.m. December 8, 1978	4:00 p.m. December 8, 1978
AN-106	11:00 a.m. January 4, 1979	10:00 a.m. January 5, 1979	5:00 p.m. January 5, 1979
AN-107	12:00 p.m. February 14, 1979	5:00 a.m. February 15, 1979	12:15 p.m. February 15, 1979

4.8 PRIMARY TANK HYDROSTATIC TEST

After completion of post-weld stress relieving, the heating equipment and temporary insulation were removed in preparation for hydrostatic testing to begin.

Division 15, Section 3.05, "Hydrostatic Test," of B-130-C4, *Construction Specification for Primary and Secondary Steel Tanks Project B-130 241-AN Tank Farm*, provided the following direction for hydrostatic testing:

> *(1) "After the tank has been stress relieved, apply a full hydrostatic test to the primary tanks by filling with water to a depth of 35 feet from the bottom of the tank plus or minus 1 inch. Use one of the vertical risers near the center of the tank dome for introduction of water. To allow air to escape from the tank during the test, provide*

air bleed ports in the other vertical risers. Coat all accessible welded joints below the water level with a mixture of blue chalk and water or alcohol.

(2) Maintain the hydrostatic pressure for a minimum of 24 hours.

(3) Leak detection shall be by visual inspection of each welded joint previously coated with a mixture of blue chalk and water or alcohol."

After the hydrostatic test for each tank was finished, more water was pumped into the tank to fill it to the dome. The water would then act as support for the dome while the dome concrete was being poured. The water remained in the tanks for several months before being pumped out. This long term water storage is believed to have contributed to discovered pitting in tank AN-107 during an inspection in October 1980. This pitting is discussed further in Section 5.5.4. Table 4-4 shows the duration of hydrostatic test water retention in each tank.

Table 4-4. Duration of Hydrostatic Test Water Storage

Tank	Began Filling for Testing	Test Accepted	Tank Filled to Dome	Water Pumped from Tank	Approximate Duration (Months)
AN-101	12/5/1978	Unavailable	Unavailable	8/7/1979	8
AN-102	12/13/1978*	1/8/1979*	Unavailable	7/27/1979*	7
AN-103	1/4/1979	1/5/1979	1/16/1979	7/25/1979	7
AN-104	10/11/1978	10/20/1978	11/22/1978*	8/6/1979	10
AN-105	1/31/1979	2/8/1979	Unavailable	8/1/1979	6
AN-106	2/14/1979*	2/22/1979	Unavailable	7/26/1979*	5
AN-107	2/26/1979	3/5/1979*	Unavailable	7/30/1979	5

Note: Dates marked with an asterisk are approximate.

4.8.1 Tank AN-101

Crews began filling tank AN-101 with water for hydrostatic testing on December 5, 1978. There is no available information on when the hydrostatic test for tank AN-101 was accepted. Water was pumped from the tank on August 7, 1979.

4.8.2 Tank AN-102

An inspection report from December 13, 1978, states that the hydrostatic test for tank AN-102 was in progress that day (App. Figure B-4). However, the daily logbook states that crews began filling the tank with water on December 20. An inspection report from December 27 states that the 24-hour retention period for the hydrostatic test began on December 22 and the test was completed on December 26 (App. Figure B-5). The daily logbook and an inspection report note that the hydrostatic test was inspected on the afternoon of January 8, 1979, and no leaks were found (App. Figure B-6). The dome was drained on July 27, 1979.

Inspection reports from December 27, 1978, and January 8, 1979, state that the conditions for inspection of the hydrostatic test were inadequate; NCR B-130-56 (App. Figure B-7) was written to document the issue and it is discussed in Section 5.5.3.

4.8.3 Tank AN-103

Crews began filling tank AN-103 with water for hydrostatic testing at 2:00 a.m. on January 4, 1979. The log notes that Vitro accepted the hydro test on January 5. The tank was completely filled for dome pour support on January 16 and 17. The dome was drained on July 23, 1979, and the water was completely pumped from the tank on July 25, 1979.

4.8.4 Tank AN-104

Crews chalked the primary shell and began filling tank AN-104 with water for hydrostatic testing on October 11, 1978, and the daily log notes that testing was completed on October 19. Crews prepared to fill the tank to the top with water on November 22. The water was pumped from tank AN-104 on August 6, 1979.

4.8.5 Tank AN-105

Chalking had been applied to the weld seams on tank AN-105 on January 5, 1979, but re-chalking was requested for all welds per the construction specification (App. Figure B-8). An inspection report states that chalking was completed on January 15 (App. Figure B-9). Crews began filling tank AN-105 with water for hydrostatic testing on January 31 and finished filling it on February 5. An inspection report states that all weld seams required re-chalking on February 2 (App. Figure B-10). An inspection report from February 6 states that the hydrostatic test for this tank was rejected due to moisture and inadequate chalking on the exterior of the primary tank (App. Figure B-11). Welds were re-chalked on February 6 and 7. Hydrostatic testing was completed on February 8. The water was pumped from tank AN-105 on August 1, 1979.

Figure 4-15. Piping Used to Pump Water into Tank AN-107 can be seen in the Foreground. (Photo 86173-1cn) (Taken 3/2/1979)

4.8.6 Tank AN-106

An inspection report from February 14, 1979, states that the author witnessed the hydrostatic testing of tank AN-106 (App. Figure B-12). He notes that there were two small wet areas on weld seams that would require further inspection the next day to ensure that they were not indicative of a leak in the joint. An inspection report by another author from February 15 states that the hydrostatic test was in progress at that time (App. Figure B-13); the hydrostatic test for tank AN-106 was accepted on February 22. On July 24,

1979, crews opened a riser in order to drain the dome; they began setting pumps in the tank on July 26.

4.8.7 Tank AN-107

Crews began filling tank AN-107 with water for hydrostatic testing on February 26, 1979, and finished on March 2. Weld joints were chalked on March 2, 1979. The hydrostatic test was inspected and accepted on March 5. The water was pumped from tank AN-107 on July 30, 1979. Piping used to pump hydrostatic test water into tank AN-107 can be seen in Figure 4-15.

4.9 COMPLETE SECONDARY LINER WALL AND TANK PENETRATIONS

Once the hydrostatic testing was completed, the secondary liner top knuckle was installed and welded to the secondary liner vertical wall section. The secondary liner knuckle is not welded to the primary tank. By design, a 1-in. maximum allowed gap exists between the primary tank dome and the edge of the secondary liner knuckle. To cover the gap and prevent the collection of debris or concrete in the annulus during the remaining construction, metal flashing was tack welded to the primary tank over the outside of the secondary top knuckle, as shown in Figure 4-16.

In order to retain access to the annulus space, penetrations were installed in the upper knuckle of the secondary liner. These penetrations were used for tank annulus processing and monitoring activities, such as ventilation, annular inspection, instrument leads, and construction access.

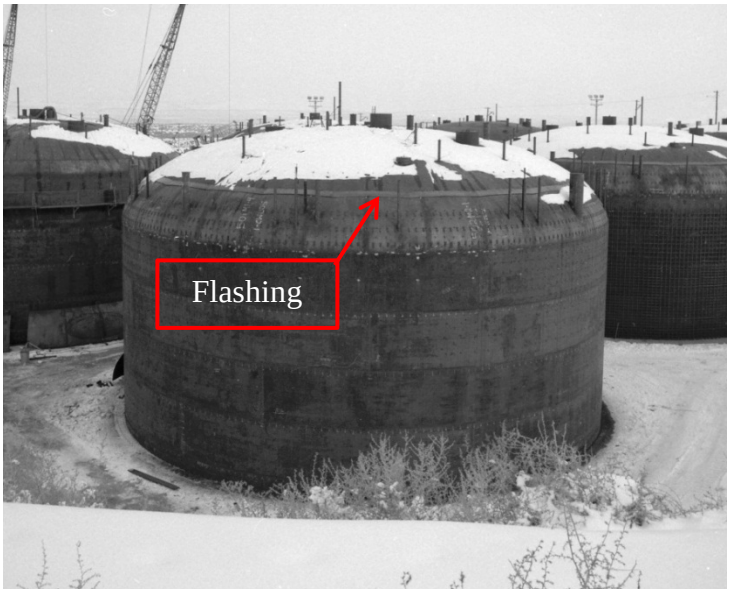

Figure 4-16. Tank AN-103 with Flashing Installed (Photo 85192-1) (Taken 1/22/1979)

4.10 CONCRETE POUR

The concrete shell measures 83 ft. in outside diameter and is 1 ft. 5-5/8 in. thick; it rests on a 3/8-in. thick steel slide plate and a 1/4-in. thick bearing plate that are supported by the tank foundation (see Figure 4-17). These plates ran the full circumference of the wall and two sets of anchor studs were mounted on the slide plate to help anchor the concrete wall.

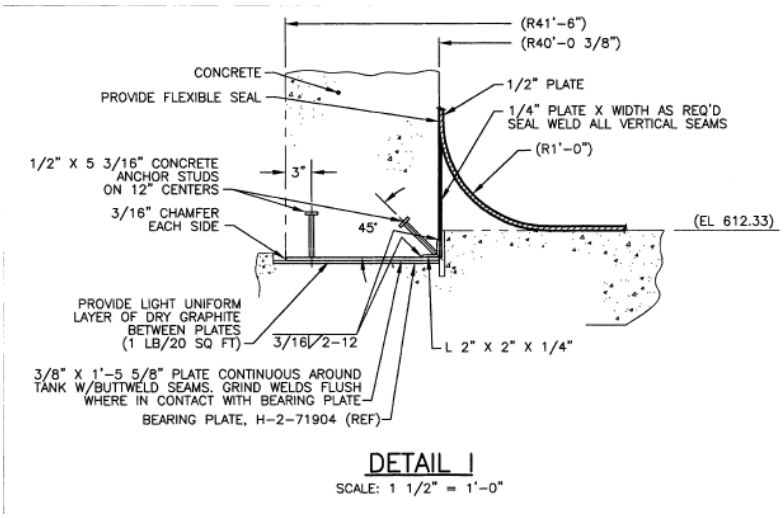

Figure 4-17. Concrete Wall to Concrete Foundation Interface (see Drawing H-2-71975, Sht. 2)

A significant amount of rebar, used to reinforce the concrete, was installed around the tank and over the dome before the concrete was poured. Once the rebar skirts were installed, the outer forms were set in place; the secondary liner's outer wall acted as the inner concrete form. The shell was poured in four parts: two vertical lifts on the sides of the tank, one on the haunch that covered the upper knuckles of the primary and secondary tanks, and one pour to cover the dome. Keyed construction joints connected each new pour to the previous section. After the hydrostatic testing was finished, more water was added to the tank to fill it to the top of the dome. The water supported the dome during the concrete dome pour and was pumped out after the concrete was set. Figure 4-18 shows the tanks in the 241-AN tank farm in various stages of concrete placement.

Figure 4-18. 241-AN Tanks in Various Stages of Concrete Placement (Photo 86343-18) (Taken 4/20/1979)

Division 3, Part 3, Section 3.04, Paragraph B, "Rate of Placement," of B-130-C5, *Construction Specification for the 241-AN Tank Farm Project B-130 Concrete Shell*, provided the following direction for concrete placement:

1. *"Limit the rate of placement of concrete to not more than 2 feet in elevation per hour from the bottom of the tank sidewall to an elevation 2 feet above the tangent line of the dome.*

2. *Limit the rate of placement of concrete to not more than 1 foot in elevation per hour in the haunch area from an elevation 2 feet above the tangent line of the dome to the construction joint approximately 9 feet in from the outer wall form.*
3. *After the concrete in the haunch area has cured a minimum of 3 days, place the concrete in the remainder of the dome in one continuous pour."*

Once the concrete was poured and had cured for at least seven days, any temporary supports inside the tank could be removed, although the center of the dome needed support for 14 days (Specification B-130-C4).

4.11 LEAK DETECTION SYSTEM

Once the vertical sections of concrete had been placed, the leak detection system was installed. The leak detection system consisted of a leak detection drain coming from the foundation of the tank, a leak detection sump, and leak detection well which extended from the sump up to ground level.

4.12 TANK APPURTENANCES

After completing the concrete pours, the water used to support the steel dome during concrete pouring was pumped out. The equipment to be placed in the interior of the tank was then installed. These pieces of equipment were welded to the existing penetrations that had been installed on the tank dome prior to the tank stress relief. Air lift circulators were installed in tank AN-107 since it was designated to be an aging waste tank spare, allowing it to hold higher heat waste.

5.0 CONSTRUCTION ISSUES

This section provides a detailed view of the construction issues identified during the fabrication of tanks AN-101, AN-102, AN-103, AN-104, AN-105, AN-106, and AN-107. This information has been compiled from a review of the Quality Assurance (QA) construction daily logbooks, inspection sheets, memos, drawings, photos, and other construction records.

5.1 WELDING AND NON-DESTRUCTIVE EXAMINATION

5.1.1 Non-Destructive Examination Methods Utilized

Throughout construction of the primary tank and secondary liner, non-destructive examination (NDE) was required. The level of NDE varied between the primary tank and secondary liner and with elevation on the tank wall. The change in NDE relative to elevation was based on the planned use of the tank to contain waste up to a specific elevation. Table 5-1 provides a summary of the NDE used to ensure the pedigree of the primary tank and secondary liner. Further information regarding NDE use can be found in the construction specification for the primary tank and secondary liner, B-130-C4.

Table 5-1. 241-AN Tank Farm Non-Destructive Examinations Used During Construction[5]

	Primary Tank Inspections	Secondary Liner Inspections
Tank Bottom	• 100% Radiography • 100% Magnetic particle • 100% Liquid penetrant • 100% Visual • Hydrostatic leak test	• 100% Radiography • 100% Magnetic Particle • 100% Liquid penetrant • 100% Visual
Bottom Knuckle	• 100% Radiography • 100% Magnetic particle • 100% Liquid penetrant • 100% Visual • Hydrostatic leak test	• 100% Radiography • 100% Magnetic Particle • 100% Liquid penetrant • 100% Visual
Vertical Wall	• 100% Radiography, not including tank wall to upper knuckle • Magnetic particle inspect areas where clips, lugs, etc. have been removed • 100% Visual • Hydrostatic leak test	• 100% Radiography not including tank wall to upper knuckle • 100% Visual
Upper Knuckle and Tank Dome	• 100% Visual • Hydrostatic leak test of tank wall to upper knuckle	• 100% Visual

[5] Tank NDE inspection reference documents: Specification B-130-C4 and Drawing H-2-71160

5.1.2 Primary Tank Bottom Weld Film Rejection Rates

Overall primary tank bottom radiographic film rejection rates for the 241-AN tank farm are summarized below in Table 5-2. A quantitative comparison of welding success on the 241-AN tanks is shown in Table 5-3, Table 5-4, Table 5-5, and Table 5-6. This same comparison was completed and included within RPP-ASMT-53793, for the 241-AY tank farm. Analysis of the tank AY-101 and tank AY-102 primary bottom radiographic test diagrams (weld maps) was completed for a second time as a part of this extent of condition effort to ensure accuracy and consistency. Those results are provided in Table 5-7 and are nearly identical to those previously tabulated, with some minor discrepancies resulting from omission of the center dollar plate welds in the primary tank bottom within RPP-ASMT-53793.

Table 5-2. 241-AN Tank Farm Primary Tank Bottom Weld Rejection Rate Summary

Tank	Total Weld Reject Rate (%)
AN-101	**13%**
AN-102	**13%**
AN-103	**9%**
AN-104	**9%**
AN-105	**15%**
AN-106	**10%**
AN-107	**20%**

Table 5-3. Tanks AN-101 and AN-102 Primary Bottom Welding Success Comparison

	Tank AN-101			Tank AN-102		
	Length of Weld (ft)	Reject Rate per Repair Cycle (%)	Total Reject Rate (%)	Length of Weld (ft)	Reject Rate per Repair Cycle (%)	Total Reject Rate (%)
Weld prior to inspection	735	N/A	N/A	735	N/A	N/A
Weld rejected after original weld	99	13%	13%	96	13%	13%
Weld rejected after first repair	12	12%	13%	7	7%	12%
Weld rejected after second repair	1	8%	13%	3	43%	13%
Weld rejected after third repair	0	N/A	N/A	0	N/A	N/A
Total weld rejections	**112**			**106**		
Total weld	**847**			**841**		
Overall weld rejection rate	**13%**			**13%**		

Table 5-4. Tanks AN-103 and AN-104 Primary Bottom Welding Success Comparison

	Tank AN-103			Tank AN-104		
	Length of Weld (ft)	Reject Rate per Repair Cycle (%)	Total Reject Rate (%)	Length of Weld (ft)	Reject Rate per Repair Cycle (%)	Total Reject Rate (%)
Weld prior to inspection	735	N/A	N/A	735	N/A	N/A
Weld rejected after original weld	64	9%	9%	63	9%	9%
Weld rejected after first repair	7	11%	9%	4	6%	8%
Weld rejected after second repair	1	14%	9%	1	25%	8%
Weld rejected after third repair	1	100%	9%	0	N/A	N/A
Weld rejected after fourth repair	1	100%	9%	0	N/A	N/A
Weld rejected after fifth repair	0	N/A	N/A	0	N/A	N/A
Total weld rejections	**74**			**68**		
Total weld	**809**			**803**		
Overall weld rejection rate	**9%**			**8%**		

Table 5-5. Tanks AN-105 and AN-106 Primary Bottom Welding Success Comparison

	Tank AN-105			Tank AN-106		
	Length of Weld (ft)	Reject Rate per Repair Cycle (%)	Total Reject Rate (%)	Length of Weld (ft)	Reject Rate per Repair Cycle (%)	Total Reject Rate (%)
Weld prior to inspection	735	N/A	N/A	735	N/A	N/A
Weld rejected after original weld	111	15%	15%	78	11%	11%
Weld rejected after first repair	21	19%	16%	5	6%	10%
Weld rejected after second repair	1	5%	15%	1	20%	10%
Weld rejected after third repair	0	N/A	N/A	0	N/A	N/A
Total weld rejections	**133**			**84**		
Total weld	**868**			**819**		
Overall weld rejection rate	**15%**			**10%**		

Table 5-6. Tank AN-107 Primary Bottom Welding Success Comparison

	Tank AN-107		
	Length of Weld (ft)	Reject Rate per Repair Cycle (%)	Total Reject Rate (%)
Weld prior to inspection	734	N/A	N/A
Weld rejected after original weld	155	21%	21%
Weld rejected after first repair	25	16%	20%
Weld rejected after second repair	1	4%	20%
Weld rejected after third repair	0	N/A	N/A
Total weld rejections	**181**		
Total weld	**915**		
Overall weld rejection rate	**20%**		

Table 5-7. 241-AY Tank Farm Primary Tank Bottom Welding Success Comparison

	Tank AY-101			Tank AY-102		
	Length of Weld (ft)	Reject Rate per Repair Cycle (%)	Total Reject Rate (%)	Length of Weld (ft)	Reject Rate per Repair Cycle (%)	Total Reject Rate (%)
Weld prior to inspection	672	N/A	N/A	673	N/A	N/A
Weld rejected after original weld	67	10%	10%	229	34%	34%
Weld rejected after first repair	7	10%	10%	86	38%	35%
Weld rejected after second repair	1	14%	10%	27	31%	35%
Weld rejected after third repair	1	100%	10%	1	4%	34%
Weld rejected after fourth repair	0	N/A	N/A	0	N/A	N/A
Total weld rejections	**76**			**343**		
Total weld	**748**			**1016**		
Overall weld rejection rate	**10%**			**34%**		

When compared to the 241-AN tank farm, the overall radiographic film rejection rate for tank AY-102 was higher, at 33.8%. Weld rejections were a noted issue in RPP-RPT-53793, leading to repeated re-welding, a contributing factor to bottom flatness out-of-tolerance conditions. The maximum number of times a weld section was repaired during 241-AY tank farm construction was four, with one weld section in tank AY-101 and one weld section in tank AY-102. It should be noted that a weld section is defined within this report as a one foot section. During 241-AN tank farm construction, one weld section in tank AN-103 was repaired four times.

5.2 TANK BOTTOM FLATNESS

Only one instance of tank bottom flatness in the 241-AN tank farm was reported. An inspection report from May 16, 1978, (App. Figure C-1) notes that one area on the tank AN-102 primary tank bottom exceeded the specified tolerance of 3/8 in. per foot. NCR B-130-32 (App. Figure C-2) states that the initial survey of the tank AN-102 primary tank bottom indicated that the out-of-tolerance area of the tank bottom exceeded the specified tolerance by approximately 1/16 in. The NCR was voided when the tank bottom was re-surveyed a few days later and the deformations were deemed to be within tolerance.

5.3 REFRACTORY

On March 21, 1978, Vitro informed American Bridge that there was most likely a void between the refractory and the secondary liner of tank AN-104. Notes from American Bridge (App. Figure C-3) show that the void was reported to be near the center of the tank bottom. Four 1-in. exploratory holes were drilled through the refractory near the center as shown in Figure 5-1. The exploratory holes determined that a maximum void depth of 5/8 in. existed between the refractory and the secondary bottom liner. Four more exploratory holes were drilled to determine the extent of the void. The void was found to extend 8 ft. in each of four directions from the center of the refractory. NCR B-130-29 was generated to record the void issue. Sketches showing the exploratory drill locations and the void area are attached to NCR B-130-29, shown in App. Figure C-4.

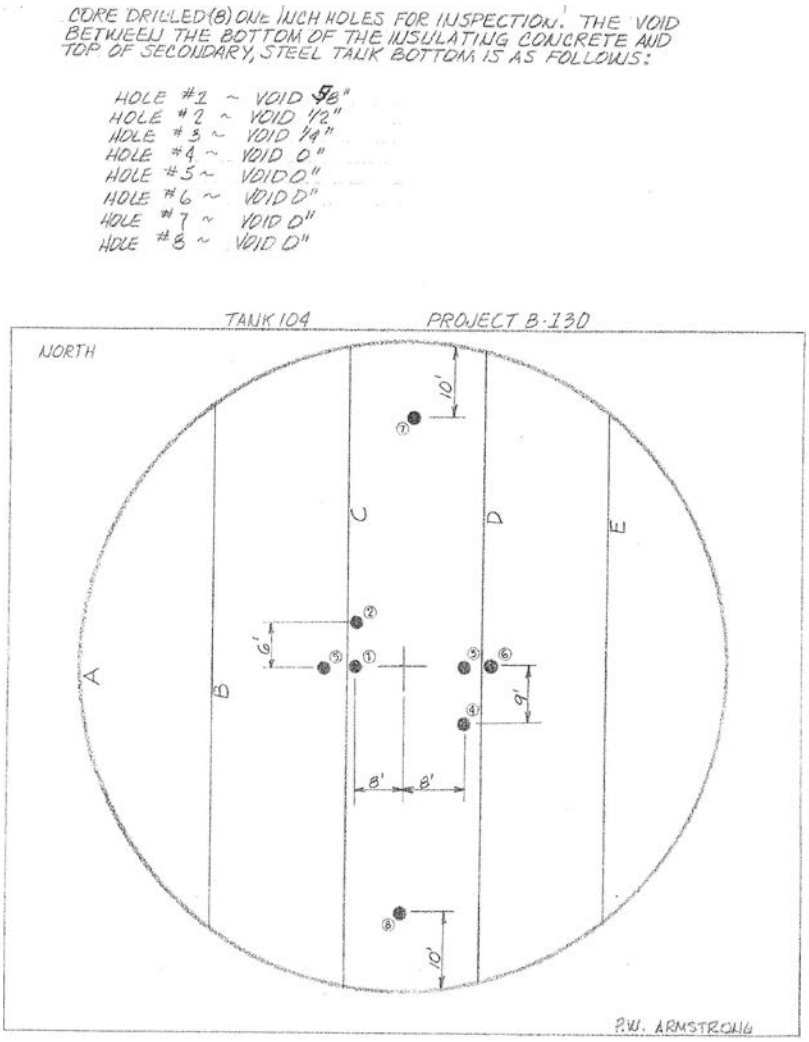

Figure 5-1. Tank AW-104 Drilled Refractory Drill Sequence and Location

A Statement of Fact from April 21, 1978 (see App. Figure C-5), identified two possible methods for repairing the void:

> "*Two methods of repairing the deficiency were discussed: (1) Entailing the removal of all of the poured refractory over the void and replacing it, or (2) drilling holes through the refractory, then grouting the void and holes using the same material that was poured in the secondary bottom. The grouting method was selected on the basis of less cost and time to perform the work.*"

The procedure, shown in App. Figure C-6, specified 2-in. holes to be drilled on 2-ft. centers in each direction from the void center, and the void was specified to be filled with pourable grout mix. Removed portions of refractory (drilled holes) were to be replaced with new LW70 refractory material. These repairs were made on the afternoon of April 24, 1978 and the primary bottom was lowered once the grouting was finished.

5.4 POST-WELD STRESS RELIEVING

During stress relieving operations in the 241-AN tank farm, there were several recurring temperature-related issues:

- Erratic thermocouple readings,
- Some thermocouple locations not reaching the required soak temperature of 1000° F,
- A temperature differential in the tanks of more than the specified 200° F limit, and
- A rate of temperature rise or drop in the tanks of more than 100° F.

These issues, along with one instance of thermocouples not recording the temperatures in a tank foundation during stress relief, were documented in the NCRs that are outlined in Table 5-8.

Table 5-8. Post-Weld Stress Relieving Nonconformance Reports

NCR #[a]	Tank	Description	Disposition
B-130-41	AN-101	The specification for building the tanks required nine thermocouples to be installed in the concrete foundation and connected to a recorder during stress relief operations. The recorders in the tank AN-101 foundation were not connected to recorders at the time of stress relief.	Accept As Is – Past history of heat transfer from the primary vessel to the base concrete for the tanks constructed at AY, AZ, SY and AW tank farms shows little danger of secondary liner overheating. See App. Figure C-7.
B-130-43	AN-104	Trace #15 on recorder #3 in Tank AN-104 gave erratic readings and open circuited during the soak period. This trace also exceeded the 200° maximum temperature differential and did not maintain the required 1100° F[b] soak temperature for the required length of time.	Accept As Is – Erratic readings from this thermocouple are being disregarded. Consistent readings from all other thermocouples indicate that a satisfactory stress relief was performed. See App. Figure C-8.
B-130-45	AN-102	Trace #1 on recorder #2 of Tank AN-102 did not maintain the required 1100° F[b] temperature during the soak period. The rate of temperature reduction after the soak period was completed exceeded the specified 100° per hour.	Accept As Is – Review of the thermocouple data indicates that it was probably malfunctioning. Although the specification for rate of temperature reduction after the soak was not met, American Bridge engineers expressed the opinion that the rate of temperature reduction did not compromise the tank's integrity. See App. Figure C-9.

Table 5-8. Post-Weld Stress Relieving Nonconformance Reports

NCR #[a]	Tank	Description	Disposition
B-130-46	AN-103	The rates of temperature rise and reduction in Tank AN-103 exceeded the specified rate of 100° per hour, as exhibited by recorders #1, #2, #3, and #4.	Accept As Is – Review of the thermocouple data indicates that it was probably malfunctioning. Although the specification for rate of temperature reduction after the soak was not met, American Bridge engineers expressed the opinion that the rate of temperature reduction did not compromise the tank's integrity. See App. Figure C-10.
B-130-47	AN-104	During the stress relieving operation on Tank AN-104, the rate of temperature reduction exceeded the specified rate of 100° per hour.	Accept As Is – Review of the thermocouple data indicates that it was probably malfunctioning. Although the specification for rate of temperature reduction after the soak was not met, American Bridge engineers expressed the opinion that the rate of temperature reduction did not compromise the tank's integrity. See App. Figure C-11.
B-130-48	AN-105	Traces #3 and #4 on recorder #2 and traces #1, #2, and #4 on recorders #3 and #4 in Tank AN-105 gave erratic readings and failed to achieve the specified 1100° F[b] soak temperature. Trace #3 on recorders #3 and #2 and trace #2 on recorder #4 exceeded the 200° maximum temperature differential during the stress relieving operation.	Accept As Is – Review of the thermocouple data indicates that it was probably malfunctioning due to excessive moisture. Review of all temperature data indicates an acceptable stress relief was performed. See App. Figure C-12.
B-130-57	AN-106	Trace #2 on recorder #3 in Tank AN-106 exceeded the 200° maximum temperature differential during the stress relieving operation. Trace #4 on recorder #3 and traces #1 and #2 on recorder #4 did not maintain the required 1000° F[b] temperature during the soak period.	Accept As Is – Discrepancies were thought to be a result of excessive moisture and steam. Review of all thermocouple data indicates an adequate stress relief was performed. See App. Figure C-13.

Table 5-8. Post-Weld Stress Relieving Nonconformance Reports

NCR #[a]	Tank	Description	Disposition
B-170-3	AN-107	Thermocouples 1, 4, and 5 on recorder 1, thermocouples 2 and 4 on recorder 2, thermocouple 1 on recorder 3, and thermocouples 1, 2, and 3 on recorder 4 did not achieve the required 1000° F[b] temperature during the soak period.	Accept As Is – Erratic readings were thought to be due to moisture in the refractory. Review of all the thermocouple data indicates the tank had an acceptable stress relief. See App. Figure C-14.

a. NCRs included as App. Figure C-7 through App. Figure C-14.
b. Although the NCR specifies the 1100° F requirement, the alternate criterion of 1000° F for three hours was used for all tanks in the 241-AN tank farm. Problematic thermocouples failed to achieve or maintain 1000° F.

Erratic thermocouple readings in several of the 241-AN tank farm tanks during stress relieving were linked to other temperature-related issues, such as tanks not reaching the required soak temperature of 1000° F[6] and a temperature differential in the tanks of more than the specified 200° F. The erratic readings and subsequent temperature issues were attributed to excess moisture and steam from the refractory. The amount of moisture in the 241-AN tank farm tanks did not cause delays in the stress relief process and is therefore judged to be minor compared to the moisture in the AY-102 refractory, which took days to remove. A rate of temperature rise or drop of more than the specified 100° F per hour was also observed in some of the tanks. American Bridge produced justification to show that this deviation from specifications was not detrimental to the stress relieving operations as was consistent with ASME Section VIII, Division 2 code permitted rates (see App. Figure C-11).

There was one instance of thermocouples not recording the temperatures in the foundation of tank AN-101 during stress relief. Based on data from previous stress relief operations in the 241-AW farm and in tank AN-104, it was decided that there was little chance of the foundation overheating.

5.5 ISSUES UNIQUE TO 241-AN TANK FARM

5.5.1 Steel Plate Damages

During tank and liner inspections, some plate damage was discovered, including laminations and plate cracking due to welding. These issues were repaired per approved methods noted below.

5.5.1.1. Plate Laminations

During inspection of the tank AN-102 primary tank bottom on May 16, 1978, a lamination was found in one of the steel plates (see App. Figure C-1). The area was ground out and repaired in accordance with paragraph 3.A.(8) of Division 15 in Construction Specification B-130-C4:

[6] Specification B-130-C4 specified a soak temperature of 1100° F for one hour. Soaking at 1000° F for three hours was an alternate process allowable per ASME's *Boiler and Pressure Vessel Code*. See Section 4.7 for details.

> *"8. Sharp gouges or deep scratches on all inner surfaces of the primary tank cylindrical section or bottom, and secondary tank bottom, will be unacceptable when in excess of 1/32 inch in depth. Fill any imperfections exceeding 1/32 inch in depth with weld metal and inspect in accordance with Paragraph 3.03.D."*

Paragraph 3.03.D of Specification B-130-C4 outlines the requirements for magnetic particle examination, which was to be performed on all areas where plate damage had been repaired by filing, welding, grinding, etc.

5.5.1.2. Plate Cracking

During penetrant testing of the tank AN-103 secondary liner bottom on March 15, 1978, nine indications of cracks in the 3/8-in. bottom plate were found. A March 15, 1978, inspection report (App. Figure C-15) states the following:

> *"The cracks were ~1/2" long, adjacent to and perpendicular to the weld. Each was ground out until no further indication, welded and rechecked. This condition was not found in 104S, 101S, or 103S*[sic]*."*

The behavior of this cracking is indicative of transverse cracking of the weld. Transverse cracks can be caused by excessive hydrogen in the weld, an excessively strong weld metal, or high levels of residual stress. Excessive hydrogen in the weld can be caused by welding with wet electrodes or welding in the rain or snow. These practices were noted during 241-AW tank farm construction by American Bridge. No other indications of cracking were found.

5.5.2 Tank Dome Distortions

Four of the seven tanks in the 241-AN tank farm exhibited areas of flat spots or reverse curvatures. These dome distortions in tanks AN-101 and AN-104 were documented in NCR B-130-37 (App. Figure C-16), while the same issues in tanks AN-102 and AN-103 were documented in NCR B-130-42 (App. Figure C-17). Both of these NCRs were dispositioned "Accept As Is" because the flat spots and reverse curvature areas were not considered critical enough to cause structural problems during construction and operational loading conditions.

5.5.3 Hydrostatic Testing Issues

An inspection report (App. Figure B-5) from December 27, 1978, remarks that the interior staging had been removed from tank AN-102, making it impossible to perform an adequate inspection of the primary tank welds after the hydrostatic test. An inspection report (App. Figure B-6) from January 8, 1979, notes that the author had witnessed the tank AN-102 hydrostatic test from ground level and with inadequate lighting because no platform or lighting was made available for him. The author also states that the seams had to be re-chalked because the original coating of chalk had been worn away by weather conditions. NCR B-130-56 documents the inadequate access, lighting, and chalking for 100% visual inspection (App. Figure B-7). The justification for its disposition of "Accept As Is" was that personnel from JA Jones and Vitro Title III would coordinate to ensure adequate inspection conditions for tank AN-102 and all subsequent tanks.

The author of the January 8 inspection report adds that, because the temperature had been around 0° F for approximately two weeks prior to his inspection, any small leaks might have been frozen and not visible. This issue was not addressed in any available documentation. Temperature data from the Hanford Meteorological Station show that the area experienced temperatures below freezing for approximately five weeks in the winter of 1978-79. Five of the tanks in the 241-AN tank farm were partially or completely full of water during this time. Once the hydrostatic test water was added, it remained in the tanks for several months so that it could be used to support the dome concrete pour. Figure 5-2 shows the minimum and maximum temperatures at Hanford from October 1978 through March 1979, as well as a bar showing the period when each tank in the 241-AN tank farm was filled with water during and following the hydrostatic testing. Tanks AN-101 through AN-104 remained full of hydrostatic test water during a period of time where temperatures were consistently below freezing.

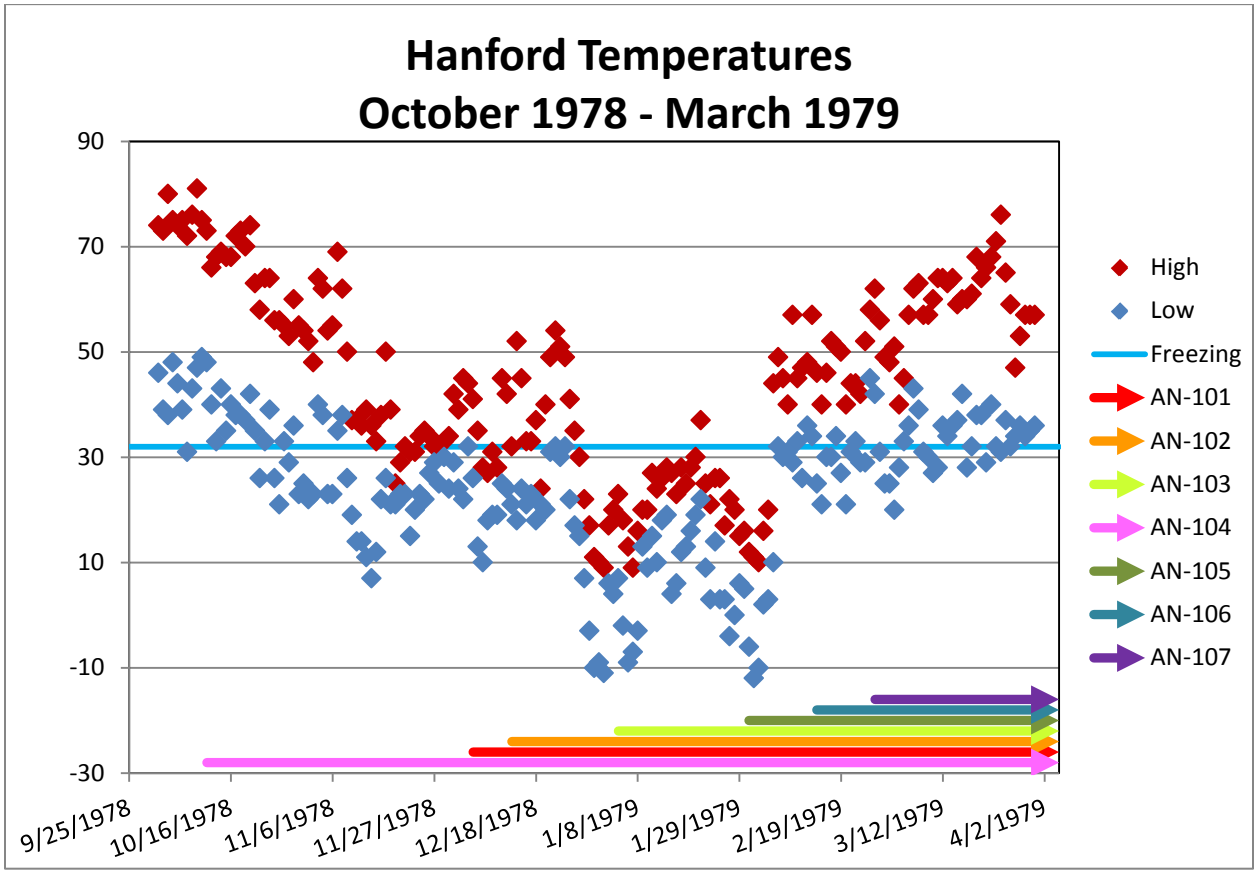

Figure 5-2. Hanford Temperatures (October 1978 through March 1979) and Periods When Tanks Were Filled with Water

5.5.4 Primary Tank Pitting

The 241-AN tank farm primary tanks were filled with raw water for hydrostatic testing. Once a tank's hydrostatic test was accepted, more raw water was pumped into the tank to fill it to the dome. The water would then act as support for the dome while the dome concrete was being poured. After the concrete was set, the water was pumped out. From Table 4-4, the shortest

period of time a primary tank contained water was 5 months (tanks AN-106 and AN-107), while the longest time period was 10 months (tank AN-104).

Raw water was introduced to tank AN-107 on February 26, 1979, for hydrostatic testing, and was not removed until July 30, 1979, or approximately 5 months later. The interior of primary tank AN-107 was visually inspected on October 20, 1980. An October 27, 1980, letter (App. Figure C-18) regarding the condition of tank AN-107 cites the existence of several areas of localized corrosion. These sites measured approximately 20 to 30 mils deep or less and approximately 1/4 in. in diameter. A portion of the depth of these corrosion sites was attributed to the mill scale covering the tank walls (seen in Figure 5-3). Division 15, Section 3.01.A.8, "Erection," of Construction Specification B-130-C4 allows sharp gouges or deep scratches up to 31 mils (1/32 in.) deep on the inner surfaces of the primary tank.

Further observations on the corrosion were made in the October 27, 1980, letter:

1. *"The majority of the tank is corroded to some extent and is covered with loose red/orange/brown oxide which is expected to be Fe_2O_3 or one of its hydrated forerunners,*
2. *In many locations the corrosion products have formed tubercules* [sic] *or "puff ball" structures (particularly true of the lower three feet on the wall),*
3. *The scale over and to each side of the welds, particularly the vertical welds, is loose, and*
4. *The surface surrounding the localized corrosion on the tank bottom still appears to be a well-adherent layer of mill scale."*

Figure 5-3. Mill Scale Discovered in Tank AN-107 (Photo 093266-31cn) (Taken 10/20/1980)

Engineers who examined the tank were concerned that these conditions could result in increased corrosion due to depletion of corrosion-inhibiting ions in the crevices or a large cathode to anode ratio involving the large amount of mill scale on the tank bottom and the small corroded areas therein. To address these concerns, engineers recommended removing the tubercles from the

tank walls and removing the mill scale from the area around the welds and from the tank bottom. In order to minimize the recurrence of these problems in other tanks, it was also suggested that all solution in the tanks should contain corrosion-inhibiting concentrations of hydroxide (OH^-) and nitrite (NO_2^-).

A November 3, 1980, letter (App. Figure C-19) also discussed the rust and pitting found on the tank bottom:

> *"These* [pits] *appeared to have been caused by preferential corrosive attack as the result of galvanic action between the adherent mill scale and base metal. Absence of significant pitting in the areas examined, however, provides a measure of confidence that the condition of the tank has not been compromised by the presence of the hydro-test water."*

Following analysis of the gathered rust and pitting data for tank AN-107, the following statement from letter 10130-80-130 was made with regard to the integrity and capability of the tank:

> *"Further examination of the inside surface of the primary tank wall revealed the presence of agglomerations of corrosion product (rust) scattered over the surface in the form of knoblike mounds. Many of those probed had formed over small fractured 'blisters' developed by loosening of the mill scale during stress relief. (Existence of 'blisters' was verified by inspection of the outside surface of the primary liner from the annulus). Although no significant attack of the metal was evident beneath the agglomerates probed, these are suspect areas for the occurrence of pitting as the 'blisters' or voids fill with waste solution."*

An internal letter (App. Figure C-20) from November 13, 1980, states that, following discussion of the issue with metallurgists at the Savannah River Plant, it was decided that the presence of nitrite and the alkalinity of the solution in the tanks should provide a reasonable amount of pitting prevention. The letter also states that the removal of the mill scale in tank AN-107 was not economically justifiable, but the recommendation was made to remove mill scale from tank plates prior to fabrication when building tanks in the future.

It is believed that tank AN-107 was the only tank in the 241-AN tank farm to be inspected following the pump-out of water. Based on the amount of time that other 241-AN tank farm tanks contained raw water, it is hypothesized that all tanks in the 241-AN tank farm would have similar rust and pitting (shown in Figure 5-4) as a result.

Figure 5-4. Rust and Pitting on the Tank Bottom and Walls of Tank AN-107. (Photo 94572-43) (Taken 8/26/1980)

5.5.5 Contaminated Backfill

During backfill operations for the 241-AN tank farm, additional backfill material was being obtained from a borrow area to the east of the 200-East perimeter fence, north of crib 216-A-24, and south of a ditch. The subcontractor was excavating approximately 100 ft. north of the fence surrounding the crib at a depth of approximately 15 ft. On June 13, 1979, moisture in the soil was encountered which was later discovered to be contaminated material. Some of this material had already been transported and placed in the tank farm along the north side. The material was placed between 33 ft. and 66 ft. north of tank AN-107 and tank AN-104 with some spillage from the scrappers in between the tanks and along the haul road. A crew dressed in protective clothing is seen removing contaminated backfill from the 241-AN tank farm in Figure 5-5.

Figure 5-5. Removing Contaminated Soil from the 241-AN Tank Farm (Photo 87008-2) (Taken 6/14/1979)

Following discovery of the contamination, a memorandum (see App. Figure C-21) was written on June 15, 1979, to document the beginning of the investigation. This memorandum stated in part:

> *"On June 8th, the area designated for additional fill materials was surveyed and released by RHO/RM and the subcontractor was authorized to proceed with excavation. J.J. Welcome Construction Company at this time began to clear the area of vegetation and proceed with backfill operations.…*
>
> *Per D. Olney, he instructed this subcontractor to excavate in an area south of the designated area. Being there were no radiation boundary markers posted, the area was surveyed by the RHO/RM's and the excavation permit and drawings were not as well defined as they could have been.…*

This does not conclude our investigation. We will be continuing to discuss this matter with concerned parties during the week of June 18, 1979."

In further inter-office correspondence from D.R. Olney to R.B. Gates (see App. Figure C-22) on June 18, 1979, a path forward to address the contamination was explained and detail of the work performance was provided. The plan was described as follows:

"The Rockwell programmatic recommendation is to remove the contaminated soil only from the tank farm. They further stated that this would be acceptable to remove the contaminated backfill from the tank farm proper and leave the contaminated backfill on the north side. This would require extension of the tank farm to the north so that the contaminated soil could be covered with clean dirt. This would result in removal of only approximately 500 yards of contaminated soil which could be accomplished using dump trucks and a front-end loader as proposed on Thursday. Mr. Saueressig stated that first consideration must be given to the haul road to preclude any further contamination being spread by the trucks. He stated this could be accomplished by either blading off the surface of the haul road or keeping it wet. It was decided that J.A. Jones CPAF would be requested to commence removal of the contaminated soil in the tank farm proper to a depth of 12" where it appeared the contamination ended."

The correspondence continued on to address the apparent cause of the incident as a breakdown of communication between D.R. Olney and Rockwell. Inadequate explanation of supplied documentation, combined with an environment of urgency, created the conditions necessary for this incident. Occurrence Report 79-19 (see App. Figure C-23) was written by D.R. Olney on July 2, 1979, to formally document corrective actions and recommendations. Temporary corrective actions from the report provide additional description of the path forward that was implemented to deal with the discovered contamination. These actions were as follows:

"A. Suspend work at the Tank Farm until contaminated dirt is either removed or covered and the subcontractor can resume work. Rockwell will core drill in the tank farm to characterize the extent of the contamination. The area outside the fence, East of Canton Road will also be core drilled by Rockwell.

B. Surface contamination between tanks to a depth of approximately 12" to 24" is to be removed by JAJ CPAF under SWP conditions. Material to be replaced with clean backfill from an area to be designated by RHO. Area along Northern edge of Tank Farm is to be covered by clean material in accordance with the attached Rockwell Plan of Action for Contaminated Soil Removal and/or Stabilization of 241-AN Tank Farm, Project B-130."

As a result of the action taken to address the contaminated backfill within the 241-AN tank farm, localized areas of contamination likely still exist in the north region of the farm. Figure 5-6 shows the tank farm location relative to designated borrow area and identifies the key landmarks discussed within the description of the occurrence. Figure 5-7 shows core sample results from around various regions of the farm and provides an overview of the level of contamination discovered.

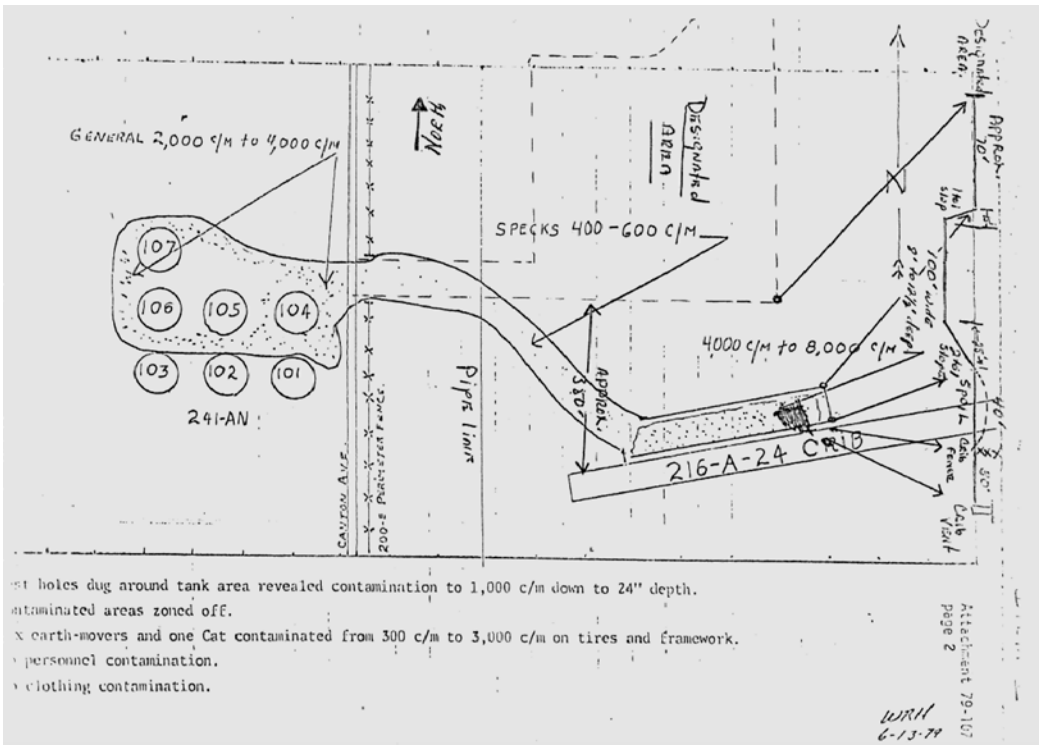

Figure 5-6. Backfilling Map with Key Locations Identified

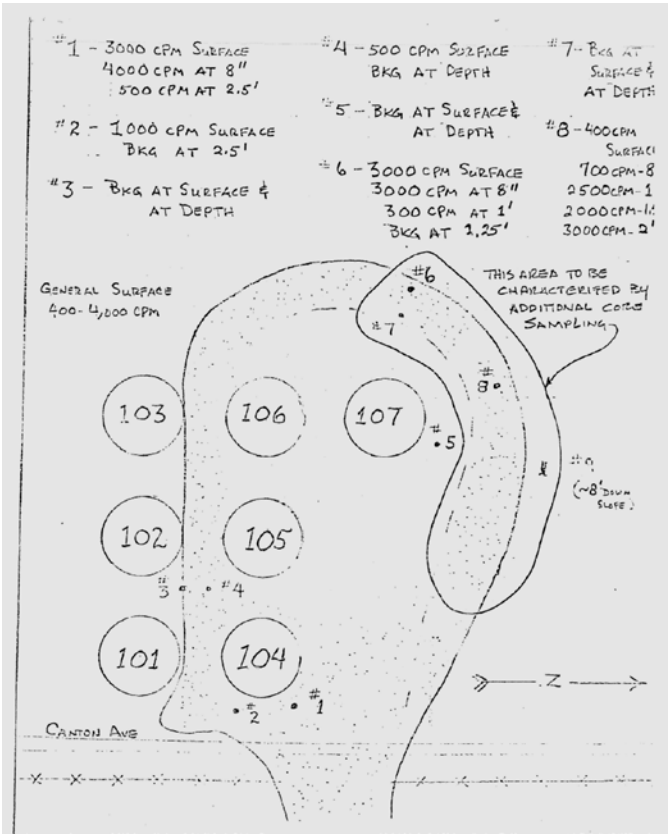

Figure 5-7. 241-AN Tank Farm Contaminated Backfill Core Sample Results

6.0 CONCLUSION

The leak assessment report for tank AY-102, RPP-ASMT-53793, identified first-of-a-kind construction difficulties and trial-and-error repairs as major contributing factors in the failure of that tank. To determine whether improvements in DST construction continued and whether similar or other difficulties were present, a review and evaluation of the construction records for the 241-AN tank farm were completed.

After review of the construction history of the 241-AN tank farm, it is concluded that, during construction of the 241-AN tank farm, there were fewer construction difficulties. Table 6-1 includes a summary and comparison of the issues seen in tank AY-102 and the 241-AN tank farm, focusing on the critical difficulties that were identified in RPP-ASMT-53793.

The 241-AN tank farm experienced high primary tank bottom weld rejection rates ranging between 9% and 20%. High weld rejection rates and subsequent repairs are thought to be a contributor to out-of-tolerance distortions or bulges, found during previous tank farm tank construction, such as in the 241-AY and 241-SY tank farms. In the 241-AN tank farm, no out-of-specification tank bottom bulging was noted. All rejected welds were eventually approved, following acceptable repair, and post-weld stress relief of the primary tank was successfully completed and accepted.

The construction specification of 1100° F for one hour per one inch thickness was not met, but the alternate code requirement of 1000° F for three hours per one inch thickness was adopted as standard practice after problems with dome deformation were seen in the previous tank farm (241-AW).

Lite Wate 70 castable refractory material was selected for use in the 241-AN tank farm. As such, there were no issues with meeting the specified compressive strength of 130 psi. However, a void between the refractory and secondary liner of tank AN-104 was discovered. The void was repaired by drilling holes in the refractory and using pourable grout to fill the void. The drilled holes were then filled using Lite Wate 70 refractory material.

Other issues, unique to the 241-AN tank farm, were noted. Various surface defects and plate damage discovered during inspection of the material were noted and dispositioned to be repaired. These defects included laminations and transverse cracking near a weld seam. Minor pitting (20 mils to 30 mils in depth) as a result of extended raw water storage was found in tank AN-107 and is expected in all tanks in the 241-AN tank farm. Tank dome distortions were observed on the dome of tanks AN-101, AN-102, AN-103, and AN-104. The distortions were not considered critical enough to cause structural problems during construction and operational loading conditions, and were accepted as is. Contaminated backfill was introduced to the 241-AN tank farm accidentally and the majority of it was later removed; however, some of the contaminated backfill remains. The remaining contamination should not affect the integrity of the tanks, but it could impact future tank leak investigations.

The 241-AN tank farm was the fifth DST farm constructed; American Bridge was chosen to construct the tank farm, as they were already constructing the 241-AW tank farm. Tank bottom

bulging out-of-tolerance conditions were non-existent, and refractory material quality and post weld stress relief were much improved over that seen in tank AY-102. Although lower weld rejection rates occurred in the 241-AN tank farm compared to tank AY-102, weld rejection rates were still considered to be high. While these issues, along with others that were judged to be minor (e.g. hydrostatic testing in cold weather, and pitting), leave room for uncertainty of long-term integrity, the overall condition of the 241-AN tank farm following construction is judged to be better than that of tank AY-102.

Table 6-1. Summary Comparison 241-AN Tank Farm Construction to Tank AY-102

Tank	AY-102	AN-101	AN-102	AN-103	AN-104	AN-105	AN-106	AN-107
Evaluation Document	RPP-ASMT-53793, *Tank 241-AY-102 Leak Assessment Report*	RPP-RPT-55982, *241-AN Tank Farm Construction Extent of Condition Review for Tank Integrity*						
Construction Order	1st DST constructed	7th DST in 5th Farm (based on completion date)	3rd DST in 5th Farm (based on completion date)	4th DST in 5th Farm (based on completion date)	6th DST in 5th Farm (based on completion date)	5th DST in 5th Farm (based on completion date)	1st DST in 5th Farm (based on completion date)	2nd DST in 5th Farm (based on completion date)
Construction Contractor	Pittsburgh-Des Moines (PDM)Steel Company	American Bridge Division of United States Steel						
Secondary Bottom Material	0.25-in. plate, ASTM A515, Gr 60	0.375-in. plate, ASTM A537, Class 1, Gr 75						
Secondary Liner Bottom Bulges	Excessive distortion and bulges noted throughout. Maximum slope noted as much as 1-in./ft. 22 places exceed 2-in. peak-to-valley tolerance.	No out-of-tolerance bulges identified						
Primary Bottom Material	0.375-in. plate, ASTM 515, Gr 60	0.5-in. plate, ASTM A537, Class 1, Gr 75						
Primary Bottom Weld Rework	33.8%	13%	13%	9%	8%	15%	10%	20%
	Ultimately all welds were accepted and stress relieved, although problems with that process were noted.	Ultimately all welds were accepted and stress relieved.						
Primary Liner Bottom Bulges	Primary bottom flatness described as “generally good.”	No out-of-tolerance bulges identified.	Initial inspection found the tank bottom to have one out-of –tolerance location. NCR B-130-32 was generated. The NCR was later voided, as a resurvey of the tank bottom found it to be within tolerance	No out-of-tolerance bulges identified.				
Stress Relieving Process	Required 2 days to remove all the water in the refractory and temperature recorder just prior to initiating 3 hour hold time was 915°F (accepted as being 1000°F).	Three-hour hold at 1000°F. Excessive moisture and steaming was noted in NCRs B-130-48 (AN-105) and B-130-57 (AN-106); NCRs note these conditions also existed for other tanks. However, these conditions were not as extreme as those noted in tank AY-102, and the stress relief operations were not delayed by the excessive moisture and steaming noted.						
Refractory	Kaolite 2200-LI	Lite Wate 70						
Refractory Protection	Allowed to saturate with rain water, not protected from freezing.	Refractory placed during the warmer months between March and October. Plastic sheeting was placed over the refractories for rain protection.						

Tank	AY-102	AN-101	AN-102	AN-103	AN-104	AN-105	AN-106	AN-107
Refractory Condition	After hydro test refractory found to be degraded, extensively cracked and spalled. Samples showed excessive carbonation.	No reports on post-hydrostatic test inspection were found.						
Refractory Repair	21 inches of perimeter removed and replaced with concrete and rebar	None reported			An 8-ft. radius by 3/4-in. void between refractory and secondary liner was discovered. The void was filled with pourable grout.	None reported		
Other Issues	Unsupported areas of primary bottom filled with foam.	Dome distortions or reverse curvatures were discovered in the tank dome. The distortions were not considered critical enough to cause structural concerns.	Plate lamination in primary tank plate. It was repaired by grinding it down, filling the area with weld metal and grinding it flat and smooth per specification B-130-C4.	Plate cracking occurred perpendicular to a weld seam in secondary liner. Cracks were repaired by grinding until no further indications remained and the seam was welded and rechecked. Dome distortions or reverse curvatures were discovered. The distortions were not considered critical enough to cause structural concerns.	Dome distortions or reverse curvatures were discovered in the tank dome. The distortions were not considered critical enough to cause structural concerns.	Plate lamination in primary tank plate. It was repaired by grinding it down, filling the area with weld metal and grinding it flat and smooth per specification B-130-C4.	Plate cracking occurred perpendicular to a weld seam in secondary liner. Cracks were repaired by grinding until no further indications remained and the seam was welded and rechecked. Dome distortions or reverse curvatures were discovered. The distortions were not considered critical enough to cause structural concerns.	Rust and pitting were found inside the primary tank after hydrostatic test water was left in the tank for a prolonged period of time.
		Minor pitting as a result of extended raw water storage was found in tank AN-107 and is expected in all tanks in the 241-AN tank farm.						
Overall Conclusion on Construction Difficulties	Difficultly with liner fabrication and the castable refractory left the tank with unsupported areas in the tank bottom and unexpected residual stresses in the tank bottom that probably contributed to failure.	A void between the refractory and secondary liner was discovered in tank AN-104. Holes were drilled in the refractory and pourable grout was used to fill the void. The holes were then filled with Lite Wate 70 refractory material. No tank bottom flatness issues were found in the 241-AN tank farm. However, weld rejection rates were still considered high. The 241-AN tank farm was the second tank farm built by a new contractor, American Bridge. Many problems seen during tank AY-102 construction were avoided. Weld rejection was lower, heat treatment and refractory protection were better, and there were no major refractory repairs required.						

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APPENDIX A 241-AN FARM KEY EVENT TABLE

Number	Date	Tank	Comments	Event Type[7]
1.	5/16/1977		McMillin Brothers moved their semi-trailer onsite and began foundation layout.	CM
2.	5/17/1977		McMillin Brothers continued tank foundation layout.	CM
3.	5/18/1977		McMillin Brothers continued tank foundation layout.	CM
4.	5/19/1977	101	Excavation of stabilization material from elevation 611.5' and sand to the bottom of the tank foundation grade was begun at tank 101.	CM
5.	5/20/1977		Excavating for tank foundations.	CM
6.	5/20/1977		Excavating for tank foundations.	CM
7.	5/23/1977	101, 102, 103, 104,	Excavating tank foundation subgrades for tanks 103 and 104. Grading subgrades for tanks 101 and 102.	CM
8.	5/25/1977	102, 105, 106	Hand excavating, grading, and compacting, of foundation subgrade for tank 102 is continued. Excavation of stabilization layer for tanks 105 and 105 foundations in progress.	CM
9.	5/26/1977	101, 103, 104	Excavation of tank bases complete. Backfilling bases for tanks 101, 103, and 104 to foundation subgrade.	CM
10.	5/27/1977	101, 103	Fine grading and compacting subgrades for tanks 101 and 103. Fabricating concrete forms for foundations. Final load of reinforcing steel arrived at the jobsite.	CM
11.	5/31/1977	101, 103, 105, 106	Grading and compacting subgrades for tanks 105 and 106. Fine grading subgrades for tanks 101 and 103. Fabricating concrete forms.	CM

[7] CM: General Construction Milestone, CI: Construction Issue

Number	Date	Tank	Comments	Event Type[7]
12.	6/1/1977	101, 102, 104, 105, 106	Grading bases for tanks 104, 105, and 106. Fine grading bases for tank 101 foundation. Recompacting of tank 102 foundation subgrade in the areas of elevated inner ring and the depression at the tank center after 3 out of 4 compaction retests failed to meet 95% density.	CM
13.	6/2/1977	101, 102, 104, 105	Grading of bases for tanks 104 and 105. Base for tank 101 foundation being fine graded. Building perimeter for tank 102 foundation.	CM
14.	6/3/1977	101, 102, 103	Compacting base for tank 101 foundation. Setting perimeter forms for tank 102 foundation. Fine grading foundation subgrade for tank 103. All three compaction retests (4th time) on the higher inner ring of tank 102 subgrade were a fraction of a percentage point less than specified 95%.	CM
15.	6/4/1977		Reinforcing steel for 3 tanks was moved from site storage to foundation locations.	CM
16.	6/6/1977	101, 102	Compacting subgrade for tank 101 foundation. Perimeter concrete form for tank 102 foundation closed and backfilled. Reinforcing steel placing subcontractor continued preparation for placing rebar for tank 102.	CM
17.	6/7/1977	101	Compaction of tank 101 foundation subgrade continued. Fabricating concrete forms.	CM
18.	6/8/1977	101, 103	Compacting subgrade for tank 101 foundation. Six samples were taken for testing. Fabricating the main drain trough concrete forms. Fine grading tank 103 foundation subgrade.	CM
19.	6/9/1977	101, 103, 106	Four of six compaction tests taken on the subgrade of tank 101 exceeded the required 95% max density. Fine grading bases for tanks 103 and 106. Fabricating forms and drain trough block-outs.	CM

Number	Date	Tank	Comments	Event Type[7]
20.	6/10/1977	101, 102, 103	Placing of reinforcing steel was begun at tank 102 foundation. Compacting the subgrade for tank 103 foundation. All compaction tests of retest of tank 101 subgrade have exceeded the specified 95% density. Erecting perimeter form panels for tank 101 foundation. A preliminary copy of DFC B-120-15 was received calling for a change in all tank foundations. The subcontractor was stopped in the afternoon from placing additional reinforcing steel.	CM/CI
21.	6/13/1977	102, 103, 106	Removed foundation perimeter form for tank 102 in preparation for additional excavation. Compacting subgrade for tank 103 foundation. Fine grading subgrade for tank 106 foundation.	CM
22.	6/14/1977	102, 103, 106	Compacting base for tank 103 foundation. Test samples taken from high inner elevation. Resetting perimeter concrete form panels for tank 102 using modified brackets to accommodate the added forming proposed in DFC B-130-15. Fine grading base for tank 106.	CM
23.	6/15/1977	101, 102, 103	Compaction of subgrade for tank 103 completed for testing. One of eight tests failed to meet the required 95% density. The area will be recompacted and retested. Perimeter concrete form erection for tank 102 foundation is complete. Form erection begun for tank 101. The ironworker subcontractor was requested to resume installing reinforcing steel for the tank 102 foundation.	CM/CI
24.	6/16/1977	101, 103, 105	Erecting perimeter form for tank 101. Compaction of tank 103 subgrade is now complete. Area recompacted and retested exceeds specified minimum density. Fine grading base for tank 105 foundation.	CM

Number	Date	Tank	Comments	Event Type[7]
25.	6/17/1977	102, 103, 105	Placing reinforcing steel for tank 102. Building forms for tank 103. Fine grading base for tank 105.	CM
26.	6/18/1977	102	Placing reinforcing steel in the tank 102 form.	CM
27.	6/20/1977	101, 103, 105	Placing reinforcing steel in the tank 101 form. Building concrete form for the perimeter of tank 103 foundation. Fine grading base for tank 105 foundation.	CM
28.	6/21/1977	101, 103, 104	Reinforcing steel for tank 101 foundation placed. Work begun placing that for tank 103. Perimeter concrete form for tank 103 foundation is complete. Fine grading of subgrade for tank 104 begun.	CM
29.	6/22/1977	102, 104	Work begun on installation of 3"x6" drain trough forms for tank 102 foundation. Find grading tank 104 subgrade.	CM
30.	6/23/1977	102, 103	Setting foundation top drain trough block-out forms to grade for tank 102 foundation. Placing reinforcing steel for tank 103 foundation.	CM
31.	6/24/1977	102, 103, 106	Setting drain trough forms for tank 102. Placing reinforcing steel for tank 103 foundation. Fine grading tank 106 base.	CM
32.	6/25/1977	103	Placing of reinforcing steel for tank 103 completed.	CM
33.	6/28/1977	102, 105, 106	Fine grading foundation subgrades for tanks 105 and 106. Perimeter form for tank 102 foundation being checked by the subcontractor for location.	CM
34.	6/29/1977	101, 102, 104, 105	Work on installation of drain trough forms for tank 101 foundation begun. Setting drain trough form grid to grade for tank 102. Find grading subgrade for tanks 104 and 105.	CM

Number	Date	Tank	Comments	Event Type[7]
35.	6/30/1977	101, 102, 103, 104, 105	Drain trough form grid set to grade in tank 102. Installation of drain trough forms continuing in tank 101 form and work begun on tank 103 trough forms. Fine grading subgrade for tanks 104 and 105.	CM
36.	7/1/1977	101, 103, 106	Installing drain trough forms in tank 101 and 103 foundations. Fine grading subgrade for tank 106 foundation.	CM
37.	7/5/1977	101, 103, 106	Installing drain trough forms for tank 101 foundation. Setting jacking rods for drain trough forms tank 103. Fine grading subgrade for tank 106.	CM
38.	7/6/1977	103, 104	Drain trough forms for tank 103 set in place. Compaction of subgrade for tank 104 begun.	CM
39.	7/7/1977	103, 104	Setting drain trough forms for tank 103. Compacting subgrade for tank 104 foundation.	CM
40.	7/8/1977	103, 104, 105	Setting drain trough forms for tank 103. Compacting subgrade for tanks 104 and 105. Compaction test samples were taken from 104 subgrade.	CM
41.	7/11/1977	101, 103, 104	Leveling drain trough forms for tanks 101 and 104. Compacting subgrade for tank 104 foundation. Four of six compaction tests failed to meet 95% of maximum density required.	CM
42.	7/12/1977	103, 104	Leveling drain trough forms for tank 103. Compacting subgrade for tank 104 foundation. Compaction test samples were taken.	CM
43.	7/13/1977	104	Compaction work is continuing on the subgrade for tank 104 foundation. All areas of it have not yet been brought to the minimum 95% density.	CM

Number	Date	Tank	Comments	Event Type[7]
44.	7/14/1977	101, 102, 104, 105	Settling 1/2" x 7" steel should ring for tanks 101 and 102 foundations. Compacting subgrade for tanks 104 and 105. Some areas of tank 104 subgrade are not compacted to at least 95% density as yet.	CM
45.	7/15/1977	101, 102, 104, 105	Setting 1/2" x 7" steel shoulder ring for raised portion of the foundation taps on tanks 101 and 102. Compacting subgrade for tanks 104 and 105.	CM
46.	7/18/1977	101, 102, 102, 105	Welding rebar to 1/2" x 7" steel should ring for tank 101. Raising top mat to elevation on tanks 101, 102, and 103. Checking radius of perimeter forms. Compacting subgrade for tank 105. Subgrade for tank 104 has been compacted to 95% of max density or above per latest tests.	CM
47.	7/19/1977	101, 102, 105	Installation of 1/2" x 7" shoulder ring and attached rebar complete for tank 101. Assembly and welding underway in tank 102 form. The first compaction tests taken of tank 105 subgrade were satisfactory for density and moisture. Compaction is continuing. Tank 106 subgrade is being irrigated.	CM
48.	7/20/1977	102, 104, 105	Setting 1/2" x 7" steel shoulder ring for tank 102. All of the subgrade for tank 105 has met the compaction requirement. Checking forms for tanks 102 and 103 and setting perimeter forms for tank 104 foundation.	CM
49.	7/21/1977	101, 102, 103	Rebar placing subcontractor set the top mat to elevation on tanks 101, 102, and 103. Compaction of subgrade on tank 106 began.	CM
50.	7/22/1977	104	Setting perimeter form panels for tank 104 foundation.	CM

Number	Date	Tank	Comments	Event Type[7]
51.	7/25/1977	101, 104	Erecting perimeter form for tank 104 foundation. Cleaning up tank 101 foundation form in preparation for pouring. The pouring of the first tank foundation was rescheduled for Wednesday morning. The construction crew was reduced as a result of the carpenters strike threat.	CM
52.	7/26/1977	102, 104	Preparing form for tank 102 foundation; clean-up and checking dimensions. Erecting perimeter form for tank 104. Pouring of the tank 101 foundation was postponed again to Thursday morning of July 28th.	CM
53.	7/28/1977	101	The foundation of tank 101 was poured beginning at 6:00 a.m. and ended at 5:40 p.m. The subcontractor experienced some delays in the morning caused by an inadequate number of trucks being assigned to the job, improperly badged drivers, and uncertified truck in use, and malfunctioning recording equipment at the batch plan.	CM
54.	7/29/1977	101, 102, 104, 105	Stripped drain trough laterals forming from tank 101 foundation. Sprayed the exposed concrete with approved curing compound and covered the foundation with insulating blankets. Checkout of tank 102 foundation complete and pour slip signed. Erecting perimeter form for tank 105 foundation. Began placing the bottom mat for tank 104 foundation.	CM
55.	7/30/1977	104	Placing reinforcing steel for tank 104 foundation.	CM
56.	7/31/1977	104	Completed placing reinforcing steel mats for tank 104 foundation.	CM

Number	Date	Tank	Comments	Event Type[7]
57.	8/1/1977	102, 105	Pouring of concrete for tank 102 foundation begun at 6 a.m. and completed at 12 noon. 410 cubic yards were poured. The subcontractor sprayed on the approved curing compound and covered the exposed top surface with wet curing blankets after the concrete had set. Erection of the tank 105 perimeter form continued.	CM
58.	8/2/1977	102, 103	Pouring of concrete for tank 103 foundation began at 6:00 a.m. and was completed at 12:10 p.m. After the concrete set, the subcontractor sprayed exposed surfaces with curing compound and covered the foundation with wet curing blankets. Curing blankets were removed from tank 102 foundation and an impact sprinkler was placed in operation on it. Forming work was resumed for tank 105 foundation.	CM
59.	8/3/1977	103, 105	Stripping and reclaiming drain trough forms from tank 103 foundation. Erecting perimeter form for tank 105.	CM
60.	8/4/1977	102, 104	Drain trough forms stripped from tank 102 foundation. Work begun on the setting of drain trough forms for tank 104 foundation.	CM
61.	8/5/1977	104, 105, 106	Setting of drain trough forms in tank 104 foundation continued. Rebar West began placing reinforcing steel for the structural mats for tank 105. Erection of perimeter form for tank 106 was begun. Compaction of subgrade for tank 106 was accepted.	CM
62.	8/6/1977	105	Reinforcing steel for top and bottom mats placed tank 105.	CM
63.	8/8/1977	101, 104, 106	Finishing and cleanup of the top surface of the tank 101 bottom began. Setting drain trough forms for tank 104 foundation. Erecting perimeter form for tank 106.	CM

Number	Date	Tank	Comments	Event Type[7]
64.	8/9/1977	101, 104, 106	Repairing top surface of foundation for tank 101. Setting drain trough forms for tank 104 foundation. Erecting perimeter forms for tank 106.	CM
65.	8/10/1977	101, 104, 106	The slip plate for the concrete wall base for tank 101 was delivered to the jobsite. Setting drain trough forms for tank 104 foundation. Perimeter form for tank 106 is complete.	CM
66.	8/11/1977	101, 103, 104, 105, 106	Installing slide plate for concrete wall on tank 101. Sandblasting drain troughs on tank 103 foundation. Setting main drain trough form for tank 104. Stated lateral drain forms for tank 105. Placement of reinforcing steel begun in tank 106 farm.	CM
67.	8/15/1977	101, 102, 104, 105,	Installing slide plate on tank 101. Installed ring in tank 104. Installed drain slots in tank 105 and stripped drain slots from tank 102. Adjusted slots in tank 104.	CM
68.	8/16/1977	101, 103, 104, 105	Continued installing slide plates on tank 101. Started repairs on tank 103 foundation. Adjusted drain slot forms in tank 104 and continued installing drain slot forms in tank 105.	CM
69.	8/17/1977	101, 102, 103, 104, 105	Completed installation of the slide plate in tank 101 and started install of slide plates on tank 102. Grouted drain slot form pins in tank 104. Continued installing drain slot forms in tank 105. Installed wall plate in tank 105.	CM
70.	8/18/1977	103, 105, 106	McMillin patched the East-West slots on tank 103, completed installation of drain slot forms in tank 105, and laid out and drove drain slot support pins in tank 106. Sturdyweld welded the retainer plate in tank 105 and continued installation of the tank 102 slide plates.	CM

Number	Date	Tank	Comments	Event Type[7]
71.	8/19/1977	102, 105, 106	McMillin installed drain slot forms in tank 106, adjusted perimeter angle on tank 105, and continued patching tank 103. Sturdyweld completed installation of retainer ring in tank 105 and continued installing the slide plate in tank 102.	CM
72.	8/22/1977	101, 102, 105, 106	McMillin continued installing drain slot forms in tank 106, grouted support pins in tank 105, and patched tank 101. Sturdyweld completed welding rebar to the retainer ring in tank 105 and continued installing the slide plates in tank 102.	CM
73.	8/23/1977	101, 103, 106	McMillin acid etched and prepared to patch tank 101, and continued installing drain slot forms in tank 106. Sturdyweld installed and welded the retainer ring in tank 106 and installed slide plates in tank 103.	CM
74.	8/24/1977	105, 106	McMillin leveled drain slot forms in tank 105, leveled retainer ring in tank 106.	CM
75.	8/25/1977	101, 102, 104	McMillin adjusted rebar in tank 104 and sandblasted tanks 101 and 102 foundations.	CM
76.	8/26/1977	101, 104, 105, 106	McMillin patched drain slots in tank 101, adjusted slots and rebar and removed areas of high subgrade in tanks 104 and 105. Sturdyweld continued welding rebar to the retainer ring and welded joints of the retainer in tank 106.	CM
77.	8/29/1977	101, 106	Backfilling around the outside of tank 101 foundation. Checking forms for tank 106 foundation.	CM
78.	8/31/1977	102	Foundations subcontractor excavated for 2 drain sump foundations and started forming for them. Tank 102 foundation top surface repair is continuing.	CM

Number	Date	Tank	Comments	Event Type[7]
79.	9/1/1977	101, 102	Completing subgrade and forming for drain sump footings at tanks 101 and 102. Repairing top surface of tank 102 foundation and backfilling perimeter of foundations.	CM
80.	9/2/1977		Compacting of the subgrade for drain sump footings is continuing - all compaction tests taken yesterday failed to meet minimum density requirements. The subcontractor is continuing form fabrication and has tied the reinforcing steel mats for the footings.	CM
81.	9/6/1977	104	McMillin poured the tank 104 foundation. Pouring began at 7:15 a.m. and was completed at 2:55 p.m.	CM
82.	9/7/1977	101, 102, 105	McMillin poured the tank 105 foundation. Pouring began at 7:05 a.m. and was completed at 3:15 p.m. 418 cubic yards of concrete were poured. Forms for the leak detection sump footings were placed for tanks 101 and 102.	CM
83.	9/8/1977	101, 102, 106	McMillin poured the tank 106 foundation and leak detection sump footings for tanks 101 and 102. Pouring began at 7:05 a.m. and was completed at 2:55 p.m. A total of 422 cubic yards of concrete were poured. Curing of the concrete is being accomplished by placing wet blankets over exposed surfaces for the first 24 hours then employing impact sprinklers for the remainder of the curing period.	CM
84.	9/9/1977	104, 105	Stripping of form material from tanks 104 and 105.	CM
85.	9/12/1977	103, 104, 105	Sturdyweld began installing the weld slide plate for tank 103. Continued removing form hardware and bracing from tanks 104 and 105.	CM

Number	Date	Tank	Comments	Event Type[7]
86.	9/13/1977	104, 105	Stripped perimeter forms from tanks 104 and 105 foundations. Excavations were made for leak detection sump footings for tanks 104 and 105.	CM
87.	9/14/1977	103, 104, 105, 106	Compaction of subgrade for leak detection sump footings at tanks 103, 104, and 105 is complete. The excavation was made for the leak detection sump footing at tank 106.	CM
88.	9/15/1977	103, 104, 105, 106	Backfilling around the perimeter of tanks 105 and 106 foundations. Setting of forms for leak detection sumps at tanks 103, 104, and 105 continues. Grinding the top surface of the tank foundation at tank 103 to remove irregularities with a terrazzo grinder. Installation of wall slide plate was completed for tank 103 and continued for tank 104.	CM
89.	9/16/1977	101, 104, 105	McMillin is continuing compacting backfill around the perimeter of tank 101 foundation. Drain trough forms being stripped from tank 105 foundation. Studyweld worked on slide plate for tank 104.	CM
90.	9/19/1977	102, 104, 105, 106	The perimeter of tank 102 foundation is being backfilled and compacted. Drain trough forms were stripped from tank 105 foundation and work was started on those in tank 106 foundation. Studyweld installed slide plate on tank 104 foundation.	CM
91.	9/20/1977	102, 103, 104, 105, 106	Leak detection sump footings for tanks 103, 104, 105, 106 and the second temporary bench mark were poured. Stripping of the drain trough forms from tank 106 foundation and backfilling and compacting around the perimeter of tank 102 foundation are continuing. The slide plate is being fitted and welded on tank 104 foundation.	CM

Number	Date	Tank	Comments	Event Type[7]
92.	9/21/1977	102, 104, 105	McMillin is backfilling and compacting around perimeter of tank 102 foundation. Etching and blasting of the drain troughs and irregularities on the top surface of tanks 104 and 105 foundations has been completed and refinishing begun. Studyweld completed installation of the slide plate on tank 104 foundation and started on the plate on tank 105. Sturdyweld also hung the 1"x18"x36" bulkhead plates on the anchor bolts at the end of each main drain trough.	CM
93.	9/22/1977	104, 105	The leak detection sump footings were inspected and covered to grade. Finishing of the drain troughs and other irregularities for tank 104 is continuing. Tank 102 foundation is being backfilled. Sturdyweld was stopped from further welding on the tank 105 slide plate because the welder was using a filler rod which was not qualified by procedure. He continued fitting plate, however.	CM/CI
94.	9/23/1977	101, 102, 103, 105	McMillin continued compacting backfill around the perimeter of tanks 102 and 103. Foundations for tanks 101, 102, and 103 were checked for flatness. Sturdyweld fit and trimmed slide plates for tank 105 foundation.	CM
95.	9/26/1977	101, 102, 103, 104, 105, 106	Hauled in additional fine soil to mix with sand in place in order to obtain the required compacted density around the perimeter of tanks 102 and 103 foundations. The finishing of drain troughs and irregularities in the top surface of tank 104 foundation is complete and repair of tank 105 has begun. Etching and sand blasting of the top surface of tank 106 foundation is complete. Vitro checked out the top surface of tank 101 foundation for elevation.	CM

Number	Date	Tank	Comments	Event Type[7]
96.	9/27/1977	101, 102, 103	Compaction of backfill around the perimeter of tanks 102 and 103 foundations continued. The subcontractor has been unable to achieve 95% density of the backfill around tank 102 as yet. The top surface of tank foundation 105 is being repaired and finished.	CM
97.	9/28/1977	102, 103, 104, 105	Hauling in soil containing more silt than that in the bottom of the excavation in an attempt to get greater density from compaction. The perimeters of foundations for tanks 104 and 105 are being backfilled and compacted. Elevations of the top surfaces of tanks 102 and 103 have been checked by Vitro.	CM
98.	9/29/1977	104, 106	McMillin continued backfilling and compacting around the foundation perimeters. Compaction of backfill around tank 106 was accepted. Refinishing of drain troughs and irregularities has begun again at tank 106 foundation. The top surface elevation of tank 104 was checked by Vitro.	CM
99.	9/30/1977	104, 105	McMillin compacted backfill around the perimeter of tank 104 foundation and resumed finishing of the top surface of tank 105 foundation.	CM
100.	10/3/1977	105, 106	McMillin continued finishing the top surface of tank 105 foundation. Sturdyweld resumed fitting the slide plate to the wall recess on tank 106 foundation.	CM
101.	10/4/1977	101, 102, 103, 105, 106	McMillin is refinishing bottoms of drain troughs on tank 105 foundation and bushing off high spots as a result of flatness checks on foundations for tanks 101, 102, and 103. Sturdyweld is fitting slide plate on tank 106 foundation. Grinding welds smooth on slide plates for foundations 101, 102, and 103.	CM

Number	Date	Tank	Comments	Event Type[7]
102.	10/5/1977	105, 106	Studyweld resumed welding on the slide plate on foundation 105. McMillin is grinding off burrs and peaks for the tank 106 foundation and bush hammering high spots that are out of flatness tolerance.	CM/CI
103.	10/6/1977	105, 106	Studyweld tacked in and welded the slide plate for tank 106. McMillin is bush hammering high spots on tank 105 foundation and grinding burrs off the foundation of tank 106.	CM
104.	10/7/1977	104, 106	McMillin is grinding on high spots of tank 104 foundation and bush hammering areas out of flatness tolerance for tank 106. Studyweld completed fitting and welding slide plate on tank 106.	CM
105.	10/10/1977		Patching and finishing of the top surfaces of all tank foundations is complete. Cleanup of the foundations and area was begun. Vitro checked the tank foundations.	CM
106.	11/10/1977		Steel plate was delivered to the site and unleaded by ABD.	CM
107.	11/11/1977		ABD unloaded steel.	CM
108.	11/14/1977		ABD unloaded steel.	
109.	11/29/1977		American Bridge unloaded steel.	CM
110.	11/30/1977		American Bridge unloaded steel.	CM
111.	12/1/1977		American Bridge unloaded steel.	CM
112.	12/6/1977		American Bridge unloaded steel.	CM
113.	12/7/1977		American Bridge unloaded steel.	CM
114.	12/14/1977		American Bridge began checking foundations.	CM
115.	12/15/1977		Site inspection for the tank AN-107 foundation bid was held.	CM

Number	Date	Tank	Comments	Event Type[7]
116.	1/5/1978		American Bridge unloaded steel.	CM
117.	1/6/1978		American Bridge unloaded steel.	CM
118.	1/9/1978		American Bridge unloaded steel and equipment.	CM
119.	1/10/1978	102	American Bridge unloaded steel and began laying plywood on tank 102 foundation in preparation for erecting scaffolding to support a secondary bottom.	CM
120.	1/11/1978	102	American Bridge continued laying plywood on tank 102 foundation.	CM
121.	1/12/1978	102	American Bridge began setting scaffold for a secondary tank bottom platform on the foundation for tank 102.	CM
122.	1/13/1978	101, 102, 104, 105	American Bridge continued erecting secondary bottom support scaffolding on tanks 102 and 105 foundations for tanks 101 and 104 secondary bottoms.	CM
123.	1/16/1978	103, 105	American Bridge laid plywood over the concrete foundation for tank 103 and continued erecting scaffolding on the tank 105 foundation.	CM
124.	1/17/1978	102	American Bridge laid the bottom plates for a secondary tank on the scaffold on tank 102 foundation.	CM
125.	1/18/1978	101	American Bridge began welding the secondary bottom plate for tank 101. The flat plate for the second secondary bottom was laid out on top of the scaffolding.	CM
126.	1/20/1978	101, 104	American Bridge continued welding plate end seams by machine and plate longitudinal seams backup manual on tank 101 secondary bottom. Fitting up of the flat bottom plate for tank 104 secondary bottom in progress.	CM

Number	Date	Tank	Comments	Event Type[7]
127.	1/23/1978	103, 104	American Bridge laid plate for the third secondary bottom on the scaffolding on tank 103 foundation. Welding of the short seams on the tank 101 bottom is complete and that work is progressing on tank 104 bottom.	CM
128.	1/24/1978	101, 102, 103, 104	American Bridge completed welding the short seams on the secondary bottom for tank 104 and is continuing fit-up of tank 101 bottom plate. Flat bottom plate for tank 102 was laid out on the scaffolding set up on the tank 103 foundation.	CM
129.	1/25/1978	101, 104	American Bridge is welding longitudinal seams on flat plate for the tank 104 secondary bottom and fitting plate for the tank 101 secondary bottom.	CM
130.	1/26/1978	101, 104	American Bridge continued welding the long seams on the tank 104 secondary bottom plate and fitting up the long seams on the tank 101 secondary bottom. The tank 104 lower knuckles were placed.	CM
131.	1/27/1978	102, 104	American Bridge placed knuckle sections for tank 101 secondary bottom and continued welding on tank 104 flat plate. Fit-up of flat plates for tank 102 secondary bottom was begun.	CM
132.	1/30/1978	101, 102, 104	American Bridge worked on tank 101 secondary bottom flat plate welding. Back-up manual welding on seams of the flat bottom and fitting bottom knuckle sections together for tank 102. Liquid penetrant testing of the welds in the tank 104 bottom plate was begun.	CM
133.	1/31/1978	101, 102	American Bridge is welding flat plate for tanks 101 and 102 secondary bottoms. Liquid penetrant testing of field welding is underway.	CM

Number	Date	Tank	Comments	Event Type[7]
134.	2/1/1978	101, 102	American Bridge began fitting knuckle on tank 101 secondary bottom. Welding long seams on tank 101 secondary bottom flat plates and short seams on tank 102.	CM
135.	2/2/1978	101, 102, 104	Continued welding long seams and fitting the knuckle sections on tank 101 secondary bottom. Welding of the backup beads on the long seams of tank 102 flat bottom in progress. Fitting of the knuckle ring to the flat plate of secondary bottom of tank 104 was begun.	CM
136.	2/3/1978	101, 102	Welding of long seams on the tank 101 secondary bottom continued and the knuckle has been fit up and tacked. The back-up welding on the long seams of tank 102 is in progress. Welding of the transverse seams of the 104 knuckle has begun and trimming of the flat bottom plate is being done on the joint between the knuckle assembly and the bottom.	CM
137.	2/6/1978	101, 102, 104	American Bridge is fitting the round seam of the tank 104 secondary bottom. Welding of butt joints on tank 101 knuckle is proceeding and back-up welding on the longitudinal seams of the tank 102 bottom is in progress.	CM
138.	2/7/1978	101, 104	American Bridge is welding the butt joints of the knuckle and has completed fitting the circular joint between the flat plate and the knuckle assembly of tank 104 secondary bottom. The knuckle assembly and the bottom plate are being welded for tank 101 secondary. ABD is unloading a shipment of steel.	CM

Number	Date	Tank	Comments	Event Type[7]
139.	2/8/1978	101, 104	American Bridge is welding back-up on the secondary bottom round seam and butt joints in the knuckle for tank 104. ABD is fitting the knuckle and welding bottom plate for tank 101 secondary. They are welding back-up for the long seams on tank 102 secondary bottom plate. There is a damaged steel plate in the latest shipment of steel.	CM/CI
140.	2/9/1978	101, 104	American Bridge is machine welding the round seam on tank 104 secondary bottom. The edge of the flat bottom plate is being trimmed to fit the knuckle assembly on tank 101 secondary. Knuckle sections for tank 102 secondary bottom were erected.	CM
141.	2/10/1978	101, 102, 104	Welding bottom plate, completed trimming round seam, and fitting round seam on tank 101 secondary. Welding bottom plate and fitting knuckle on tank 102 secondary. Welding knuckle, welding round seam, and weld repair on tank 104 secondary.	CM
142.	2/13/1978	101, 102, 104	Weld round seam and knuckle on tank 101 secondary. Weld bottom plate and knuckle on tank 102 secondary. X-ray of welding has begun, defective welds are being repaired, and lift lugs were welded to the bottom on tank 104 secondary.	CM/CI
143.	2/14/1978	101, 102, 104	Weld secondary tank bottom and knuckle for tank 101. Weld secondary tank bottom and knuckle for tank 102. Weld repair and began installing lifting ring for tank 104.	CM/CI
144.	2/15/1978	101, 102, 103, 104	Weld secondary bottom and knuckle and weld repair begun on tank 101. Weld secondary bottom and knuckle for tank 102. Erection of scaffold for tank 103 secondary bottom was begun on tank 106 foundation. Weld secondary bottom and knuckle (repair) for tank 104.	CM

Number	Date	Tank	Comments	Event Type[7]
145.	2/16/1978	101, 102, 103, 104	Weld secondary bottom and knuckle for tank 101. Weld secondary bottom and knuckle, trim round seam (bottom plate section), and fit round seam for tank 102. Erect scaffold for secondary bottom for tank 103 (on tank 106 foundation). Weld repair and fit lifting hardware for tank 104.	CM
146.	2/17/1978	101, 102, 103, 104	Weld secondary bottom and knuckle for tank 102. Weld knuckle and bevel round seam for tank 102. Lay bottom plate on erection scaffold for tank 103. Repair welds and remove fit-up hardware for tank 104.	CM
147.	2/21/1978	101, 102, 103, 104	Repair welds on tank 101. Weld round seam knuckle on tank 102. Fit and weld short seams in bottom plate for tank 103. Weld repair and prepare for setting on foundation for tank 104.	CM
148.	2/22/1978	101, 102, 103, 104	Repair welds and install center ring for tank 101 secondary. Weld round seam for tank 102. Fitting welding short seams on bottom plate for tank 103. Repairing welds, grinding crown on round seam, and continuing preparation to set bottom on foundation for tank 104. The second truckload of LW-70 refractory arrived at the jobsite.	CM
149.	2/24/1978	101, 102, 103, 104	Weld repair for tank 101 secondary. Weld repair and remove fitting hardware for tank 102 secondary. Fit and weld bottom plate and erect knuckle for tank 103 secondary. Repair welds and prepare to lower bottom for tank 104 secondary. Western Industrial X-Ray (WIX) worked Sat 25th and Sunday 26th radiographing welds on tank 101 and 104 secondary.	CM

Number	Date	Tank	Comments	Event Type[7]
150.	2/27/1978	101, 102, 103, 104	Weld repair on tank 101 secondary bottom. Weld repair on tank 102 secondary bottom. Weld bottom long seams and fit knuckle on tank 103 secondary bottom. Weld repair and preparation for lowering for tank 104 secondary bottom. Two truckloads of LW-70 arrived at the jobsite and were unloaded.	CM
151.	2/28/1978	101, 102, 103, 104	Repair and grind welds for tank 101 secondary bottom. Repair welds for tank 102 secondary bottom. Weld long seams on bottom plate and fit and weld knuckle on for tank 103 secondary bottom. The tank 104 secondary bottom was lifted and sat on its foundation.	CM
152.	3/1/1978	101, 102, 103, 104	Repair and grind welds for tank 101 secondary bottom. Weld repair for tank 102 secondary bottom. Weld bottom plate and fit and weld knuckle for tank 103. Began installing refractory retaining ring for tank 104. One truckload of LW-70 arrived at the jobsite.	CM
153.	3/2/1978	101, 102, 103, 104, 106	Installed center ring for tank 101 secondary bottom. Ground overhead weld seams for tank 102 secondary bottom. Weld bottom seams and fit and weld knuckle for tank 103 secondary bottom. Placed refractory perimeter retaining ring for tank 104. Fit and weld bottom plate for tank 106 secondary bottom.	CM
154.	3/3/1978	101, 102, 103, 104, 106	Set temporary perimeter lifting ring for tank 101 secondary. Grinding and testing welds for tank 102 secondary bottom. Fitting and welding knuckle for tank 103 secondary bottom. Fitting and welding air distribution piping and conduit for tank 104. Fitting and welding air distribution piping and conduit for tank 106.	CM

Number	Date	Tank	Comments	Event Type[7]
155.	3/6/1978	102, 103, 104, 106	Weld repair is complete to date and grind welds for tank 102 secondary bottom. Fit and weld knuckle and trimming bottom plate side of round seam for tank 103 secondary bottom. Fitting pipe and conduit and placing wood forms for castable refractory pour for tank 104. Fit and weld bottom and erecting knuckle for tank 106. A meeting was held to discuss the upcoming refractory pour in tank 104. A meeting was held to discuss the interpretation of radiography film.	CM
156.	3/7/1978	102, 103, 104, 106	Repair welds and grind welds for tank 102 secondary bottom. Grind welds for tank 103 secondary bottom. Set screed for the first LW-70 pour (Sections A, C, E) in tank 104. Fit knuckle for tank 106 secondary bottom.	CM
157.	3/8/1978	102, 103, 104, 106	Grinding welds for tank 102 secondary bottom. Grinding welds for tank 103 secondary bottom. Forming checkout complete and pouring was begun for tank 104 refractory. Permission was given with the temperature at 38 degrees F, but it soon rose above 40 degrees F. Operations ceased, however, at noon because of rain. Fit-up and weld bottom for tank 106 secondary bottom. ABD employees left the jobsite at noon because of rain.	CM/CI
158.	3/9/1978	102, 103, 104, 106	Weld repair and grind welds for tank 102 secondary bottom. Grind welds for tank 103 secondary bottom. Vertecs completed pouring insulating concrete in the secondary bottom sections A, C, and E for tank 104. Pouring began this AM with the temperature slightly below 40 degrees F. Fit-up and weld knuckle for tank 106 secondary bottom.	CM

Number	Date	Tank	Comments	Event Type[7]
159.	3/10/1978	101, 102, 103, 104, 106	Tank 101 secondary bottom was rigged to be moved to its foundation. Weld repair on tank 102 secondary bottom. Weld round seam on tank 103 secondary bottom. Completed pouring insulating concrete for tank 104. Weld bottom plate and fit and weld knuckle for tank 106.	CM
160.	3/13/1978	101, 102, 103, 104, 106	Approval of all tank 101 secondary bottom radiographic examination films was received. Preparations to set the bottom on its foundation continued. Weld repair for tank 102 secondary bottom. Weld round seam for tank 103 secondary bottom. Laying out for drain slots in castable refractory for tank 104. Weld knuckle for tank 106 secondary bottom. Three loads of LW-70 refractory arrived at the jobsite.	CM
161.	3/14/1978	101, 102, 103, 104, 105, 106	Set secondary bottom on foundation for tank 101. Weld repair and rigged secondary bottom for lifting for tank 102. Weld round seam for tank 103. Grind surface of refractory for elevation and cut drain channels in refractory for tank 104. Began setting scaffolding for secondary bottom in gravel north of tank 105 foundation for tank 105. Welded knuckle and trimmed bottom plate for round seam for tank 106 secondary bottom. One truckload of LW-70 arrived at the jobsite.	CM
162.	3/15/1978	101, 102, 103, 104, 105, 106	Installing air distribution piping, installing thermocouple conduit, installing retaining ring, and the bottom was checked for level by Vitro for tank 101. Tank 102 is being rigged to set on the foundation. Removing fitting hardware from the round seam for tank 103 secondary bottom. Cutting drain channels and grinding the surface of the refractory to obtain elevation tolerance for tank 104. Setting support scaffolding for tank 105 secondary. Trimmed bottom plate for round seam and began fitting the knuckle to bottom plate for tank 106 secondary bottom.	CM

Number	Date	Tank	Comments	Event Type[7]
163.	3/16/1978	101, 102, 103, 104, 105, 106	The retaining ring for the castable refractory was installed, conduit and air piping was installed, and the bottom was checked out for pouring for tank 101. The tank 102 secondary bottom was set on its foundation. Fitting hardware was removed and the tacks repaired on the tank 103 secondary bottom. Cutting of the drain channels was completed and Vitro checked out the top surface of the refractory for tank 104. Setting erection scaffolding for tank 105 secondary bottom. Fitting round seam and bottom plate to the knuckle for tank 106 secondary bottom. One truckload of refractory arrived at the jobsite.	CM
164.	3/17/1978	101, 102, 103, 104, 105, 106	Vertecs poured refractory sections A, C, and E after Vitro checked out the form for tank 101. The refractory retaining ring was installed for tank 102. Repairing welds and removing fitting hardware LPT tacks for tank 103 secondary bottom. Completed grinding surface of refractory for elevation tolerance and began laying plywood on refractory for primary bottom false work for tank 104. Laying bottom plate for tank 105 secondary bottom. Fit-up round seam for tank 106 secondary bottom.	CM
165.	3/20/1978	101, 102, 103, 104, 105, 106	Completed pouring refractory for tank 101. Refractory retaining ring, air distribution piping, and conduit were installed for tank 102. Repairing welding for tank 103 secondary bottom. Setting up scaffolding on refractory for primary bottom erection and fabrication for tank 104. Machine weld short seams in bottom plate for tank 105. Weld round seam for tank 106 secondary bottom. Two truckloads of LW-70 arrived at the jobsite. Vertecs worked on the weekend to remove the Styrofoam insulation from the first half of the castable refractory pour in tank 101 bottom.	CM

Number	Date	Tank	Comments	Event Type[7]
166.	3/21/1978	101, 102, 103, 104, 105, 106	Layout and begin cutting drain slots in the refractory for tank 101. Install air distribution piping and steel retaining band for refractory for tank 102. Weld repair for tank 103 secondary bottom. Erect construction scaffolding for tank 104. Weld bottom plate for tank 105 secondary bottom. Liquid penetrant tested welds and grind welds and remove fit-up hardware for tank 106.	CM
167.	3/22/1978	101, 102, 103, 104, 105, 106	Cut drain slots in refractory for tank 101. Poured castable refractory in sections A, C, and E for tank 102. Weld repair with some radiographic films to be cleared still for tank 103. Laying plate for the primary bottom for tank 104. Welding bottom plate for tank 105 secondary. Weld round seam for tank 106 secondary bottom. Two loads of LW-70 arrived at the jobsite.	CM
168.	3/23/1978	101, 102, 103, 104, 105, 106	Cut slots in refractory for tank 101. No refractory pour for tank 102 as a result of rain. Continued weld repair for tank 103. Fit and welded bottom plate for the primary of tank 104. Welded bottom plate for the tank 105 secondary bottom. Weld repair for the tank 106 secondary bottom.	CM
169.	3/24/1978	101, 102, 103, 104, 105, 106	Slots cut in castable refractory for tank 101. Poured one section only for tank 102 refractory. One mixer broke down at noon or shortly afterward. ABD furnished the P&H crane for pouring. Welding repair completed and the bottom was picked up and set on its foundation for tank 103. Fit-up and weld flat plate for primary bottom of tank 104. Weld bottom plate for tank 105 secondary bottom. Weld repair for tank 106 secondary bottom. One truckload of LW-70 arrived at the jobsite.	CM

Number	Date	Tank	Comments	Event Type[7]
170.	3/27/1978	101, 102, 103, 104, 105, 106	Finishing slots in refractory for tank 101. Completed pouring castable refractory using one mixer for tank 102. Set the secondary bottom on its foundation for tank 103. Welded primary bottom plate for tank 105. Weld repair for tank 106 secondary bottom. One truckload of LW-70 arrived at the jobsite.	CM
171.	3/28/1978	101, 102, 103, 104, 105, 106	Finishing slot bottoms in refractory for tank 101. Layout and cut slots for tank 102 refractory. Installing air piping, electrical conduit, and retaining ring for tank 103. Weld flat plate for the primary bottom of tank 104. Weld secondary bottom for tank 105. Weld repair on secondary bottom for tank 106.	CM
172.	3/29/1978	101, 102, 103, 104, 105, 106	Finishing bottoms of refractory air slots for tank 101. Laid out and cut slots in refractory for tank 102. Installing refractory retaining ring and screeds for tank 103. The pipe and conduit were installed and the pipe had to be reset as it was off in orientation for tank 103. Welding primary bottom plate for tank 104. Welding secondary bottom knuckle for tank 105. Weld repair for tank 106.	CM
173.	3/30/1978	102, 103, 104, 105, 106	Layout and cut refractory air slots for tank 102. Corrected forms and piping in secondary bottom and Vertecs began pouring refractory in 3 sections (A, C, and E) of the secondary bottom at noon in tank 103. The second mixer wasn't repaired until that time. Pouring of the 3 sections was completed at 5:15 p.m. Welded primary bottom plate and began erecting primary knuckle for tank 104. Weld repair and rigging bottom to move and lower it for tank 105. Fitting knuckle on the secondary for tank 106.	CM

Number	Date	Tank	Comments	Event Type[7]
174.	3/31/1978	102, 103, 104, 105, 106	Finish bottom of air slots for tank 102. Pour castable refractory beginning at noon for tank 103. One mixer broke down shortly after starting and was not available for the rest of the day. Only one section of refractory was poured for tank 103. A crane furnished by Lampson was used for pouring. Erecting and fitting knuckle for tank 104 primary. Fit and welded secondary knuckle for tank 105. Picked tank 106 secondary bottom up and set it on its foundation.	CM
175.	4/3/1978	101, 103, 104, 105, 106	Set up falsework for tank 101 primary bottom on tank 102 secondary. Completed refractory pour and began laying out and cutting air slots for tank 103. Welded on tank 104 primary knuckle. Welded on tank 105 secondary knuckle. Grinding on lifting lug tacks and setting refractory retaining ring for tank 106.	CM
176.	4/4/1978	101, 103, 104, 105, 106	Began laying bottom plate for the tank 101 primary bottom on tank 102 secondary. Cut air slots I n the refractory for tank 103. Welded the primary tank knuckle for tank 104. Welded the secondary liner knuckle for tank 105. Installed pipe and conduit in the secondary bottom of tank 106. One truckload of refractory arrived at the jobsite.	CM
177.	4/5/1978	101, 103, 104, 105, 106	Fit and welded primary bottom plates for tank 101 (over the tank 102 secondary). Finishing bottoms of air slots in tank 103 refractory. Welding primary knuckle for tank 104. Trimming round seam on secondary bottom for tank 105. Set the refractory retaining ring, installed piping, and installed instrument conduit for tank 106. Two truckloads of LW-70 refractory arrived at the jobsite. Vertecs replacement refractory mixer was returned to the jobsite that evening.	CM

Number	Date	Tank	Comments	Event Type[7]
178.	4/6/1978	101, 104, 105, 106	Weld and fit the primary bottom for tank 101. Welding the primary knuckle for tank 104. Fit and tacked the round seam for the tank 105 secondary bottom. Poured refractory in half of section C, then both mixers broke down. One truckload of castable refractory arrived at the jobsite.	CM/CI
179.	4/7/1978	101, 102, 104, 105, 106	Fit and welded primary bottom for tank 101. Began setting scaffolding for tank 102 primary bottom on tank 103 secondary. Trimming round seam on primary bottom. Fit, tack, and weld round seam on tank 105 secondary bottom. Completed pouring castable refractory in sections A, C, and E. J.A. Jones drilled four exploratory holes through the castable refractory in the tank 104 bottom near its center.	CM
180.	4/10/1978	101, 102, 104, 105, 106	Welding flat bottom plate for tank 101 primary bottom. Placed flat plate for tank 102 primary bottom on scaffolding sitting on the tank 103 secondary. Welding on primary knuckle for tank 104. Welding round seam in the secondary bottom for tank 105. Completed pouring refractory for tank 106.	CM
181.	4/11/1978	101, 102, 104, 105, 106	Erect primary knuckle for tank 101. Fit primary bottom plate for tank 102. Weld primary knuckle and test and repair welding for tank 104. Complete welding round seam and test and repair welds on it for tank 105. Laying out and cutting air slots in refractory.	CM
182.	4/12/1978	101, 102, 104, 105, 106	Weld primary bottom plate and fit and weld primary knuckle for tank 101. Weld primary bottom plate for tank 102. Weld repair and weld on primary knuckle for tank 104. Prepared to set tank 105 secondary bottom on its foundation. Cutting of refractory air slots for tank 106.	CM

Number	Date	Tank	Comments	Event Type[7]
183.	4/13/1978	101, 102, 104, 105, 106	Fit and weld primary knuckle for tank 101. Weld primary knuckle for tank 102. Test and repair weld and weld primary knuckle for tank 104. Set secondary tank 105 secondary bottom on its foundation. Cut and finish air slots in tank 106 refractory. J.A. Jones cored 4 additional holes through the refractory in the tank 104 bottom per the direction of Vitro Engineering.	CM
184.	4/14/1978	101, 102, 104, 105	Weld primary knuckle for tank 101. Weld primary bottom plate for tank 102. Weld primary knuckle and test and repair welds for tank 104. Install air distribution piping, conduit, and retaining ring in the secondary bottom of tank 105. One truckload of LW-70 arrived at the jobsite.	CM
185.	4/17/1978	101, 102, 104, 105	Welding bottom of primary and also fit-up and welding knuckle for tank 101. Continued welding the bottom on primary and erected knuckle for tank 102. Repair welding and some grinding on tank 104 primary bottom. Vertecs installed forms, surveyed the secondary bottom, and set-up for refractory pour for tank 105.	CM
186.	4/18/1978	101, 102, 104	Welding knuckle and fit-up of it as well as dye penetrant testing bottom of primary for tank 101. Some weld repair and welding of the knuckle to the bottom on primary of tank 104.	CM

Number	Date	Tank	Comments	Event Type[7]
187.	4/19/1978	101, 102, 104, 105	Welded on primary bottom knuckle for tank 101. Fit-up the primary bottom knuckle for tank 102. Weld repair on primary knuckle for tank 104. Completed pouring refractory in the secondary bottom of tank 105. A meeting was held with representatives of American Bridge, Pryor-Giggey, Vertecs, and J.A. Jones and American Bridge was directed to proceed with grouting of the void between the castable refractory and the secondary bottom of tank 104 using LW-70 screened to 1/8" (-) and poured with a minimum gravity head. J.A. Jones will drill the 1" diameter hole through the existing refractory.	CM/CI
188.	4/20/1978	101, 102, 104, 105	Continued to weld and fit up knuckle, cutting knuckle to bottom on primary bottom, and dye-penetrant testing for tank 101. Welding bottom and fit and weld of knuckle on primary bottom of tank 102. Repair welds on bottom, some grinding of seams, and rigged for moving primary bottom of tank 104. Vertecs is grinding bottom to smooth it out and obtain flatness. Vertecs also is doing general clean-up of excess refractory around all tank bottoms. Holes have been drilled by J.A. Jones for grouting tank 104 to fill gap between secondary bottom and refractory slab. Vertecs will place grout on Friday.	CM/CI
189.	4/21/1978	101, 102, 104, 105	Continued to weld bottom and knuckle, beveled round seam, and continued to dye-penetrant test for tank 101. J.A. Jones on site drilling holes in refractory for grouting purposes. Vertecs is grinding refractory for flatness and also began layout and cutting of slots for tank 105.	CM/CI

Number	Date	Tank	Comments	Event Type[7]
190.	4/24/1978	101, 102, 104, 105	Weld manual overhead on round seam, primary bottom for tank 101. Weld knuckle on primary bottom for tank 102. Test and repair welds and grouted refractory for tank 104. Cutting grooves in refractory for tank 105. The void in the 104 secondary bottom was filled with LW-70 grout. The material was first screened to No. 8 size (-).	CM/CI
191.	4/25/1978	101, 102, 104, 105	Weld repair for tank 101 primary. Weld primary bottom plate and knuckle for tank 102. The American Bridge crew stayed late Monday evening and set the primary bottom for tank 104. Vertecs completed cutting and finishing the air slots, in the refractory for tank 105 and American Bridge began erection the tank 105 primary bottom on the scaffolding set on subgrade-north of the tank location.	CM
192.	4/26/1978	101, 102, 103, 104, 105, 106	Weld repair for tank 101 primary. Weld primary bottom plate and knuckle for tank 102. Laid plywood on the tank 106 refractory and began erecting scaffolding preparatory to placing steel for the primary bottom. Fitting and welding overhead on primary bottom plate for tank 105.	CM
193.	4/27/1978		Due to rain, there was no work done on any of the tank bottoms.	CI
194.	4/28/1978	101, 102, 103, 104, 105	American Bridge is doing some weld repair and welding center plate for tank 101. Welding knuckle and die penetrant testing for tank 102. Started to set falsework for starting the tank 103 primary bottom. Continued to remove rigging and lifting clips from tank 104. Welding long seams on primary bottom for tank 105.	CM

Number	Date	Tank	Comments	Event Type[7]
195.	5/1/1978	101, 102, 103, 104, 105	American Bridge welded round seam knuckle to bottom with some repair welding on knuckles for tank 101. American Bridge continued to weld knuckle and cut round seam knuckle to fit with the bottom for tank 102 primary. Finished erecting falsework and began laying bottom plate for tank 103 primary bottom on the station at tank 106. Continued to weld the primary bottom for tank 105.	CM
196.	5/2/1978	101, 102, 103, 104, 105	American Bridge continued to make weld repairs and dye penetrant test the primary bottom for tank 101. Welding lifting rigs to the primary bottom of tank 101. Continued to weld the knuckle on tank 102 and did some weld repair. Continued to weld the primary bottom plate for tank 103. Magnetic Particle testing on the tank 104 primary bottom. Continued to weld the primary bottom plate for tank 105.	CM
197.	5/3/1978	101, 102, 103, 105	American Bridge continued to rig up for moving the tank 101 primary bottom. Dye penetrant testing round secondary bottom to knuckle and some repair welding. Welding knuckle and dye penetrant testing knuckle seams for tank 102. Welding and fit-up of bottom plates for tank 103. Weld and fit-up of bottom plate for tank 105 and laying of plywood on tank 105 refractory for falsework set-up.	CM
198.	5/4/1978	101, 102, 103, 104, 105	Moved the tank 101 primary bottom into location and set it on the tank 101 station (refractory). Started welding the round seam of the primary knuckle and bottom and dye penetrant testing for tank 102. American Bridge continued to weld and fit-up bottom plate for the tank 103 primary. Began to square off the edge on primary knuckle for tank 104. American Bridge continued to weld-up bottom plate of the tank 105 primary bottom.	CM

Number	Date	Tank	Comments	Event Type[7]
199.	5/5/1978	101, 102, 103, 104, 105, 106	American Bridge removing lifting rigs from the tank 101 primary bottom. Continued to weld round seam bottom to knuckle and dye penetrant test for tank 102. Repair welding also for tank 102. Begin to set knuckle and fit-up for tank 103. Continued to square off top edge of primary knuckle for shell plate for tank 104. Continued welding bottom plate for tank 105. Setting falsework on 105 base for tank 105 primary bottom fabrication	CM
200.	5/8/1978	101, 102, 103, 104, 105, 106	American Bridge grinding knobs and burrs from the knuckle on the primary bottom of tank 101. Removing plywood from the base and continue to weld round seam knuckle to the bottom for tank 102. Also dye penetrant testing and some repair welding for tank 102. Fit-up and weld knuckle and continue to weld the primary bottom for tank 103. Set 1st course of primary shell for tank 104. Continued to weld bottom plate for tank 105. Finished erecting falsework for tank 106.	CM
201.	5/9/1978	101, 102, 103, 104, 106	American Bridge magnetic particle testing primary tank bottom and square off cutting RD. SM. of primary bottom knuckle for tank 101. Continued to dye penetrant test, repair weld and weld RD. SM. knuckle to bottom on primary bottom for tank 102. American Bridge welding primary bottom and knuckle for tank 103. Welding course one verticals for tank 104. Laid bottom plate of tank 106 primary bottom.	CM
202.	5/10/1978	101, 102, 103, 104, 106	Finished square off of primary knuckle and continued magnetic particle testing the tank 101 primary bottom. Repair welding and dye penetrant testing for tank 102 primary bottom and began to weld on lifting lugs. Continued to weld the primary bottom and knuckle for tank 103. Continued to weld verticals on the first primary shell course of tank 104. Welding and fit-up of tank 106 primary bottom.	CM

Number	Date	Tank	Comments	Event Type[7]
203.	5/11/1978	101, 102, 103, 104, 106	American Bridge laying plywood on tank 101 bottom for protection. Also welded shell clips on for tank 101. Completed all x-raying, rigged bottom for lift, moved, and set primary bottom for tank 102. Continued to weld bottom and fit-up and weld knuckle for tank 103. American Bridge continuing to weld course one primary verticals. Welding bottom plate on tank 106 primary.	CM
204.	5/12/1978	101, 102, 103, 104, 106	Erected the first course of primary shell for tank 101. Began removing lifting rigs and general preparation of primary bottom for tank 102 as well as tear down of falsework. Continued to weld bottom and fit-up and weld knuckle for tank 103. American Bridge continued to weld verticals and began tack welding round seam of first course for tank 104. Continued to weld primary bottom for tank 106.	
205.	5/15/1978	101, 102, 103, 104, 105, 106	American Bridge continued to weld verticals on primary shell first course for tank 101. Completing bottom, magnetic particle testing, and grinding of joints and seams for tank 102. Continued to weld knuckle on primary bottom of tank 103. Continued to weld first course verticals of primary shell for tank 104. Welding bottom plate of primary for tank 105. Continued to weld and fit-up bottom and also erected knuckle and began fit-up work for tank 106.	CM

Number	Date	Tank	Comments	Event Type[7]
206.	5/16/1978	101, 102, 103, 104, 105, 106	Weld vertical joints in first course of primary shell for tank 101. Magnetic particle test welded joints in tank bottom and remove lifting lugs for tank 102. Weld vertical joints in knuckles and trim bottom plate at round seam for tank 103 primary. Weld vertical joints in first course of shell and weld horizontal joint between knuckle and first course of shell plate for tank 104. Weld flat seams on bottom plate for tank 105. Erect and fit knuckle for tank 106. A small laminated area was discovered in tank 102 primary bottom plate adjacent to a welded joint.	CM/CI
207.	5/17/1978	101, 102, 103, 104, 105, 106	Continued to weld verticals on tank 101 primary shell. Finished magnetic particle testing and removal of lifting lugs for tank 102. Tack knuckle to bottom and continue to fit-up and weld knuckle for tank 103 primary. Continued to weld round seam on tank 104 primary shell, also some repair welding on verticals. Continued to weld up bottom for tank 105. Welding up primary bottom and fit-up and weld of knuckle for tank 106.	CM
208.	5/18/1978	101, 102, 103, 104, 105,106	Continued to weld verticals on tank 101 primary shell first course. Cutting round seam (square off) of primary bottom knuckle for tank 102. Continued to weld knuckle and tacking knuckle to primary for tank 103. Finished welding RD. SM. of first primary course and began repair welding of seams and joints for tank 104. Small amount of work on bottom for tank 105. Continued to weld knuckle and dye penetrant testing seams on bottom for tank 106.	CM

Number	Date	Tank	Comments	Event Type[7]
209.	5/19/1978	101, 102, 103, 104, 105,106	American Bridge continued to weld course one of tank 101 primary shell, welding verticals and start-up for round seam welding. Continued to square off RD. SM. of primary knuckle for first course shell for tank 102. Grinding RD. seam for round seam welding for tank 103. Also continued to fit-up and weld knuckle and dye penetrant test for tank 103. Some repair welding and set clips in place for 2nd course primary shell for tank 104. Continued to weld primary bottom plate for tank 105. Continued to weld knuckle and dye penetrant test for tank 106.	CM
210.	5/22/1978	101, 103, 104, 105,106	American Bridge continued to weld verticals and began some round seam weld for tank 101. round seam welding knuckle to bottom for tank 103 along with weld repair and dye penetrant testing. Some repair welding to the primary shell course one for tank 104. Erected primary knuckle to bottom for tank 105. Continued to weld and fit-up knuckle for tank 106 primary.	CM
211.	5/23/1978	101, 102, 103, 104, 105,106	RS welding primary shell course one for tank 101. Set primary shell course one for tank 102. Dye penetrant test of round seam and repair welding for tank 103. Set primary shell second course and began vertical welding for tank 104. Continued to weld and fit-up knuckle for tank 105. Cut and trim round seam of knuckle/bottom and continued to weld up knuckle for tank 106.	CM
212.	5/24/1978	101, 102, 103, 104, 105,106	Weld the horizontal joint between the knuckle and the first course of the shell plate for tank 101. Weld vertical joints in the first course of the primary shell plate for tank 102. Repair welding in the primary bottom of tank 103. Weld vertical joints for the second course of the primary shell for tank 104. Fit the primary knuckle for tank 105. Weld knuckle joints and the manual on the primary bottom round seam for tank 106.	CM

Number	Date	Tank	Comments	Event Type[7]
213.	5/25/1978	101, 102, 103, 104, 105,106	Weld round seam in primary bottom of tank 101. Weld vertical joints in first course of shell plate for tank 102. Weld lift lugs and prepare to move the bottom for tank 103. Weld vertical joints in second course of primary shell plate for tank 104. Fit knuckle for tank 105 primary. Weld round seam in bottom of tank 106 primary.	CM
214.	5/26/1978	101, 102, 103, 104, 105,106	Weld horizontal joint between the knuckle and the first course of shell plate for tank 101. Fit and tack the first course of the shell plate for tank 102. Set the primary bottom in place for tank 103. Weld vertical joints in second course of primary shell plates for tank 104. Fit and weld knuckle for the tank 105 primary. Fit and tack round seam in bottom of tank 106 primary.	CM
215.	5/30/1978	101, 102, 103, 104, 106	Set scaffolding for course two of the tank 101 primary shell. Welding verticals of course one of the tank 102 primary shell. Completing bottom trim and square round seam of primary knuckle for tank 103. Also removing lifting lugs and buffing seams for tank 103 primary. Continued work on course two of the tank 104 primary shell (RS welding). American Bridge repairing welds and dye penetrant testing tank 106 primary bottom.	CM
216.	5/31/1978	101, 102, 103, 104, 106	Finished scaffolding for second course of primary shell welding for tank 101. Continued welding verticals of course one for the tank 102 primary shell. Magnetic particle testing bottom and trim and grind bottom for tank 102. Continued knuckle seam weld for course two of the primary shell for tank 104. Repair welding and dye penetrant testing tank 106 primary bottom.	CM

Number	Date	Tank	Comments	Event Type[7]
217.	6/1/1978	101, 102, 103, 104, 105, 106	Erected second course of shell plate for tank 101 primary. Fit first course of shell plate for the tank 102 primary. Trim upper edge of knuckle plate for tank 103 primary bottom. Weld horizontal joint between first and second courses of shell plates for tank 104. Weld knuckle transverse joints for tank 105. Repair welding for tank 106.	CM
218.	6/2/1978	101, 102, 103, 104, 105, 106	Fit second course of shell plates for tank 101. Weld vertical joints in first course of shell plates for tank 102. Erect first course of primary shell plates for tank 103. Grind and repair welding in the second course of shell plates for tank 104 primary. Weld knuckle joints in the bottom of tank 105 primary. Repair welding in the tank 106 primary bottom.	CM
219.	6/5/1978	101, 102, 103, 104, 105, 106	Weld vertical joints in the second course of shell plates for tank 101. Weld vertical joints in the first course of shell plates for tank 102. Erection of first course of shell plates is complete for tank 103. Repair welding in horizontal joint between the first and second course of shell plate for tank 104. Weld butt joints between knuckle sections for tank 105. Weld lift lugs and prepare bottom for lowering from erection falsework to its permanent position.	CM
220.	6/6/1978	101, 102, 103, 104, 105, 106	Some round seam welding on course two primary of tank 101. Some vertical welding on course one primary of tank 102. Some fit-up and vertical welding on course one primary of tank 103. Repair welding round seam of course two primary of tank 104 and also installing weld clips/scaffolding for the primary shell course three. Finished cutting round seam and beveled knuckle to bottom and also welding on knuckle for tank 105. Continued to rig for moving the primary bottom of tank 106.	CM

Number	Date	Tank	Comments	Event Type[7]
221.	6/7/1978	101, 102, 103, 104, 105, 106	Weld repair on second horizontal seam in shell plate for tank 101. Weld vertical joints in the first course of the primary shell plate for tank 102. Fit the first course of primary shell plate for tank 103. Weld repair on second joint of primary shell plate for tank 104. Welded round seam on tank bottom section and weld repair on knuckle for tank 105 primary. Set tank 106 primary bottom from falsework on tank 105 foundation to its permanent position.	CM
222.	6/8/1978	101, 102, 104, 105, 106	American Bridge continued working the primary shell course two and did some round seam welding on tank 101. Welding verticals on tank 102 primary course one. American Bridge continued to repair weld on tank 104 primary course two and rigged door sheet for removal. Continued to weld round seam knuckle to bottom and dye penetrant test tank 105 primary bottom. Removing rigging, began cutting round seam knuckle for square-off, and magnetic particle testing for tank 106 primary.	CM/CI
223.	6/9/1978	101, 102, 104, 105, 106	Columbia Basin Steel & Iron began delivering reinforcing steel to the jobsite for the tank encasement walls. Four semitrailer loads of steel were delivered. American Bridge continued to round seam weld the tank 101 primary course two. Some vertical welding on tank 102 primary course one. Continued work on tank 104 primary shell course two (mostly repair welding). Prep for course three primary shell for tank 102. American Bridge continued to weld and tack round seam of knuckle to bottom and do some repair welding for tank 105. Continued to square off round seam on primary knuckle for tank 106 and finished magnetic particle testing and removing lifting plates.	CM

Number	Date	Tank	Comments	Event Type[7]
224.	6/12/1978	101, 102, 103, 104, 105, 106	Continued repair welds on tank 101 primary course two. Round seam welding tank 102 primary course one. Welding verticals and fit-up for first course primary of tank 103. Continued repair work on course two primary of tank 104 and continued preparation for primary course three. round seam welding knuckle to bottom for tank 105 and doing weld repair and dye penetrant testing. Set the first course of the primary shell for tank 106.	CM
225.	6/13/1978	101, 102, 103, 104, 105, 106	Continued repair work on course two of the tank 101 primary and preparing for course three. Round seam welding on course one of the tank 102 primary. Continued to fit-up and weld verticals on the tank 103 primary course one. Set primary course three and began fit-up work for tank 104. Repair welding, dye penetrant testing, and finished round seam knuckle to bottom for tank 105. Fit-up course one primary for tank 106 and prepared for vertical welding.	CM
226.	6/14/1978	101, 102, 103, 104, 105, 106	Continued to repair welds on primary course one for tank 101. Round seam welding tank 102 primary course one. Welding and fit-up of tank 103 primary course one. Some fit-up for tank 104 primary course three4 and begin layout for vertical welds for secondary course one. Dye penetrant testing bottom, repair welding, and begging rigging for placing bottom for tank 105.	CM

Number	Date	Tank	Comments	Event Type[7]
227.	6/15/1978	101, 102, 104, 105, 106	Repair welds on the tank 101 primary shell course two. Finish round seam welding primary course one and being repair welding of round seam for tank 102 primary. Have removed primary door sheet for tank 104. Some fit-up of primary course three and secondary course one for tank 104. Began cutting access hole in the secondary for tank 104. Layout and start of falsework for the tank 104 dome. Continued to dye penetrant test and repair weld for tank 105 and some rigging for placing the bottom was done.	CM
228.	6/16/1978	101, 102, 104, 105, 106	Repair welding on course two of primary shell plates for tank 101. Repair welding on course one of primary shell plates for tank 102. Repair welding on course two of primary shell plate for tank 104. Fit and weld first course of secondary shell plate for tank 104. Erect falsework for tank dome inside the primary tank for tank 104. Weld repair to complete yet (1 film) before lowering the primary bottom for tank 105. One load of reinforcing steel for tank encasement was delivered to the jobsite.	CM
229.	6/19/1978	101, 102, 103, 104, 105, 106	Repair welding on primary shell plate for tank 101 and tank 102. Weld vertical joints in primary shell plate course one for tank 103. Fit and weld vertical joints secondary shell plate course one for tank 104. Weld vertical joints primary shell plate course three for tank 104. Lowered the primary bottom from the falsework to its position on the secondary bottom for tank 105.	CM
230.	6/20/1978	101, 102, 103, 104, 105, 106	Weld repair on the primary shell plate for tank 101 and 102. Weld vertical joints in primary shell plate for tank 103 and 104. Weld repair on the primary shell plates for tank 104 and welding on secondary shell. Magnetic particle testing welding on tank 105 primary bottom. Fit course one of primary shell plate for tank 106.	CM

Number	Date	Tank	Comments	Event Type[7]
231.	6/21/1978	101, 102, 103, 104, 105, 106	Weld repair on primary shell plate for tank 101 and 102. Weld vertical joints in tank 103 primary shell course one. Repair welds in course three of primary shell plate, erect dome sections on falsework in the bottom of the primary tank, and weld horizontal joint in course one of the secondary shell plate for tank 104. Layout for trim of upper edge of knuckle on primary bottom of tank 105. Weld vertical joints in first course of primary shell plate for tank 106.	CM
232.	6/26/1978	101, 103, 104, 105, 106	Weld vertical joints in the course one of the secondary shell and set falsework inside the primary tank in preparation for dome erection for tank 101. Begin welding of horizontal joint between course one of the primary shell plate and the knuckle for tank 103. Welding primary dome for tank 104. Complete trim of the upper edge of the primary knuckle and began erection of course one of the primary shell plate for tank 105. Weld vertical joints in course one of primary shell plate and fit horizontal joint in the first course for tank 106.	CM
233.	6/27/1978	101, 102, 103, 104, 105, 106	American Bridge continued to set up falsework for dome in tank 101 and continued welding verticals on the primary shell course three. Some repair work on tank 102. Round seam welding primary shell course one for tank 103. American Bridge continued to fit up and weld the primary dome inside tank 104 and set course two of the secondary shell. Some vertical welding on the primary shell course three for tank 104. Welding verticals on tank 105 primary course one. Welding verticals on tank 106 primary course one.	CM

Number	Date	Tank	Comments	Event Type[7]
234.	6/28/1978	101, 103, 104, 105, 106	Working on tank 101 primary course three repair welding and welding and fit-up of verticals on primary course three. Welding verticals and fit-up on tank 101 secondary course one. Round seam welding tank 103 primary course one and repair welding. Some repair welding to round seam primary course three for tank 104. Moving scaffolding up for fourth course of the tank 104 primary shell. Setting inside plates for dome assembly and continued to weld on plates for the tank 104 dome (outside). Welding verticals for the tank 105 primary course one. Welding verticals for the tank 106 primary course one.	CM
235.	6/29/1978	101, 103, 104, 105, 106	Continued to repair weld and fit up secondary course one for tank 101. Welding verticals for tank 101 primary course three and begin layout for dome assembly. Round seam weld repair for tank 103. Continued to weld inside plates of dome and fit-up of inside to outside plates for tank 104. Set primary shell course four for tank 104. Welding verticals on tank 105 primary course one. Round seam welding knuckle to primary course one for tank 106.	CM
236.	6/30/1978	101, 103, 104, 105, 106	Continued to set falsework for dome, weld repair of the primary course three, and round seam welding of secondary course one for tank 101. Raise scaffolding for tank 103 primary course two. Continued to weld dome inside plates for tank 104. Weld verticals on primary course one for tank 105. Round seam welding primary course one and weld repair for tank 106.	CM

Number	Date	Tank	Comments	Event Type[7]
237.	7/5/1978	101, 103, 104, 105, 106	Began dome assembly, finished erecting falsework, and round seam weld primary shell course three for tank 101. Set course two primary and began fit-up and verticals welding for tank 103. Vertical welding primary shell course four and continued to assemble dome for tank 104. Verticals welding for tank 105 primary course one. Completed round seam of tank 106 primary course one and did some repair welding.	CM
238.	7/6/1978	101, 104, 105, 106	Round seam welding tank 101 primary shell course three and vertical welding secondary shell course one (and repair). Vertical welding tank 104 primary shell course four and welding on dome inner plates. Continued to fit-up and weld verticals for tank 105 primary course one. Repair weld on primary course one and moved scaffolding up for primary shell course two for tank 106.	CM
239.	7/7/1978	101, 104, 105, 106	Continued round seam welding on tank 101 primary shell course three and repair welding on round seam. Vertical welding on primary course three and secondary course one for tank 101. Setting outside plates for dome assembly for tank 101. Continued assembly on dome inside plates and vertical welding on primary shell course four for tank 104. Vertical welding on tank 105 primary course one and repair. Repair welding round seam for tank 106 primary shell course one.	CM

Number	Date	Tank	Comments	Event Type[7]
240.	7/10/1978	101, 102, 104, 105	Continued to weld up tank 101 primary course three and tank 101 secondary course one repairs. Assembly of dome outer plates for tank 101. Welding verticals for tank 102 primary shell course two. Continued to weld inside plates of dome for tank 104. Vertical welding and repair of tank 104 primary shell course four and prep for round seam weld. Some work on primary course two of tank 104. Continued repair to verticals and began round seam welding primary course one and trimming round seam of secondary knuckle for secondary shell course one on tank 105.	CM
241.	7/11/1978	101, 102, 104, 105	Prepared for tank 101 primary course four and repaired on tank 101 primary course three. Continued work on dome assembly and some work on secondary course one for tank 101. Repair and weld verticals on tank 102 primary course two. Continued to weld up dome inside plates, repair weld verticals and round seam of primary course four and fit secondary course two for tank 104. Round seam weld primary course one and repair for tank 105.	CM
242.	7/12/1978	101, 102, 104, 105, 106	Continued fit-up and weld of verticals on secondary course one, jumped scaffolding for primary course four, and continued work on the dome for tank 101. Welding verticals on tank 102 primary shell course two. Continued welding seam on dome between inside and outside plates and repairing verticals on primary course four for tank 104. Continued round seam weld of primary course one for tank 105. Set tank 106 primary course two and began fit-up.	CM

Number	Date	Tank	Comments	Event Type[7]
243.	7/13/1978	101, 102, 104, 105, 106	Begin welding radial joints on outer ring of dome assembly, repair welding on course three of primary shell plate, and erection of course two of secondary shell plate for tank 101. Weld vertical joints in course two of primary shell for tank 102. Fit closure plate in dome, weld horizontal joint in primary shell course four, weld intermediate round seam on dome, and repair welding on course four of primary shell for tank 104. Repair welding on course one of primary shell for tank 105. Fit-up of tank 106 primary shell course two completed.	CM
244.	7/14/1978	101, 103, 104, 106	Sat tank 101 primary shell course four and began fit-up of verticals. Vertical welding on tank 101 secondary course two and some work on the dome. Vertical welding tank 103 primary course two and fit-up. Continued work on welding the tank 104 dollar plate on dome. Vertical welding on tank 104 secondary course two and completing round seam welding on primary course four. Vertical welding the tank 106 primary course two and fit-up.	CM
245.	7/17/1978	101, 102, 103, 104, 105, 106	Continued work on dome outside plates and did some repair welding on shell courses for tank 101. Repair welding on tank 102 primary course two verticals and preparing for round seam welding. Inspection and some repair work for tank 103. Continued work on dome (welding the dollar plate) and round seam welding secondary course two for tank 104. Preparing for tank 105 primary course two. Vertical welding tank 106 primary course two.	CM

Number	Date	Tank	Comments	Event Type[7]
246.	7/18/1978	101, 102, 103, 104, 105, 106	Welding verticals on primary course four and continued welding on dome plates for tank 101. Weld repair to verticals and preparation for round seam welding primary course two for tank 102. Began round seam welding tank 102 primary course two. Vertical welding tank 103 primary course two and preparation for round seam welding. Finish round seam welding secondary course two and continued welding horizontal dome plates for tank 104. Erected primary course two and began fit-up for tank 105. Vertical welding primary course two for tank 106.	CM
247.	7/19/1978	101, 102, 103, 104, 105, 106	Vertical welding primary course four and set inside plates on dome and began fit-up for tank 101. round seam welding primary course two and repair of round seam also have begun to set falsework for dome assembly for tank 102. Prepared for round seam welding on tank 103 primary shell. Continued welding in dollar plate on tank 104 dome. Vertical welding tank 106 primary course two and tacking round seam.	CM
248.	7/20/1978	101, 102, 103, 104, 106, 107	American Bridge continued to work on dome (welding inside plates) and repair to verticals on primary course four for tank 101. Round seam welding tank 102 primary course two and continued to set falsework for dome assembly. Prepared for round seam welding on tank 103 primary course two. Repair welding on secondary course two and jumped scaffolding for secondary course three for tank 104. Continued dome welding for tank 104. Final fit-up of tank 106 primary course two and vertical repair. Laid plywood down for falsework erection for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
249.	7/21/1978	101, 102, 103, 104, 105, 106, 107	Vertical welding and repair welding tank 101 primary course four. Continued to weld plates for the tank 101 dome. Finished welding round seam and began repair to round seam for tank 102 primary course two. Continued to set dome falsework for tank 102. Round seam welding for tank 103 primary course two. Began layout studs and penetrations on tank 104 dome. Set secondary course three and repair weld on various round seam and verticals for tank 104. Vertical welding tank 105 primary course two. Vertical welding tank 106 primary course two and fit-up. Began setting falsework for tank 107 secondary bottom.	CM
250.	7/24/1978	101, 102, 103, 104, 105, 106, 107	Vertical repair to tank 101 secondary course two and primary course four. Continued to weld inside plates on dome for tank 101. Repair welding tank 102 primary course two round seam. Repair verticals and round seam on tank 103 primary course two. Continued to layout studs and penetrations on dome and repair weld verticals on secondary course three for tank 104. Vertical welding primary course two for tank 105. Preparation for round seam welding primary course two tank 106. Continued to assemble falsework for tank 107 secondary bottom.	CM
251.	7/25/1978	101, 102, 103, 104, 105, 106, 107	American Bridge continued to vertical weld tank 101 primary course four and repair secondary course two. Weld up of tank 101 dome. Repair weld primary course two round seam for tank 102. Continued to erect falsework for tank 101 dome assembly. Finished tank 103 course two round seam and making repairs to round seam and verticals. American Bridge continued to layout penetrations and studs on tank 104 dome. Welding verticals on tank secondary course three.	CM

Number	Date	Tank	Comments	Event Type[7]
252.	7/26/1978	101, 102, 103, 104, 107	American Bridge began round seam welding the tank 101 primary course four with some repair welding to the secondary course two and primary course four. Began setting scaffolding and preparing for tank 102 primary course three. Repairing verticals and round seams on tank 103 primary course two. Cutting penetrations and continuing to layout studs for tank 104. Vertical welding tank 104 secondary course three and repairing welds on it. Fit-up and weld of primary bottom and also set bottom plates for secondary bottom for tank 107.	CM
253.	7/27/1978	101, 102, 103, 104, 105, 106, 107	American Bridge continued fit-up and weld of dome plates and round seam welding for the tank 101 secondary course two. Erected tank 102 primary course three. Erected tank 103 primary course three and removed first primary access plate. American Bridge continued to place penetrations on dome and weld verticals on the secondary course three for thank 104. Prepared for round seam welding for tank 105. Round seam welding for the primary course two is complete for tank 106. Fit-up and welding bottom plates on both the secondary and primary.	CM
254.	7/28/1978	101, 102, 103, 104, 105, 106, 107	American Bridge continued welding dome plates and repair to secondary shell for tank 101. Vertical welding primary course three for tank 102. Erected secondary course one and begin to cut the access hole for tank 103. Continued to work on penetrations and also round seam welding secondary course three for tank 104. Preparation for round seam welding on primary course two for tank 105. Working on preparation for primary course three for tank 106. Welding bottom on secondary bottom for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
255.	7/31/1978	101, 102, 103, 104, 105, 106, 107	American Bridge continued to fit up and weld round seam between plates and repair weld of round seam on secondary course two for tank 101. American Bridge began vertical welding and fit-up of primary course three for tank 102. Vertical welding primary shell course three for tank 103. Continued to weld in penetrations and repair to secondary course there and prep for secondary course four for tank 104. Round seam welding and repair on primary course two for tank 105. Set secondary course one for tank 106. Continued to weld bottom plates on secondary and primary bottom is idle.	CM
256.	8/1/1978	101, 102, 103, 104, 105, 106, 107	American Bridge continued to weld and fit up dome plates and prepare for the secondary course three for tank 101. Vertical welding primary course three and preparing to begin round seam welding on secondary course two. Vertical welding primary course three for tank 103. Continued to weld in penetrations and also repair work to secondary course three for tank 104. Round seam welding primary course two and repair welding for tank 105. Set primary shell course three for tank 106. Continued to fit-up and weld secondary bottom plates for tank 107.	CM
257.	8/2/1978	101, 102, 103, 104, 105, 107	American Bridge continued to fit up and weld some and set secondary shell course three for tank 101. Repairing verticals on primary shell and began fit-up and weld of course three for tank 102. American Bridge vertical welded primary course three and prepared for round seam weld on secondary shell course one for tank 103. Continued to place penetrations in dome and repair to round seam on secondary shell course three for tank 104. Round seam welding and repair to primary course two for tank 105. Received tank 107 secondary knuckle by truck and also continued to weld and fit up bottom plates.	CM

Number	Date	Tank	Comments	Event Type[7]
258.	8/3/1978	101, 102, 103, 104, 106, 107	Welding intermediate round seam in the dome assembly was completed and erected the dollar plate in the dome assembly for tank 101. Weld vertical joints in the primary shell course three and secondary shell course one for tank 102. Repair welding on primary shell for tank 102. Weld vertical joints in the course three of the primary shell for tank 103. Raise course four of the secondary shell and weld pipe risers in the dome assembly for tank 104. Weld vertical joints and fit horizontal joint for primary shell course three for tank 106. Erect knuckle on secondary bottom and weld longitudinal joints in secondary bottom flat plate for tank 107.	CM
259.	8/4/1978	101, 102, 103, 104, 106, 107	Weld dollar plate in the dome assembly, weld vertical joints for secondary course three, and repair welding on primary shell for tank 101. Erect outer ring of dome assembly and weld vertical joints in the primary shell course one for tank 102. Weld vertical joints in primary shell course three for tank 103. Weld pipe risers in the dome assembly and fit secondary shell course four for tank 104. Weld horizontal joint in the primary shell course three and repair welding on the primary shell for tank 106. Weld longitudinal seams and fit knuckle sections on the secondary bottom for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
260.	8/7/1978	101, 102, 103, 104, 105, 107	American Bridge continued to weld in dollar plate to the dome for tank 101. American Bridge is round seam welding primary course three and repair welding secondary course one. Vertical welding on primary course three for tank 103. American Bridge continued to place penetrations and weld in place for tank 104. Vertical welding on secondary course four for tank 104. Repair work to the primary course one and course two and preparation for primary course three for tank 105. American Bridge continued to weld up bottom plate and begin fit-up of knuckle on secondary bottom for tank 107.	CM
261.	8/8/1978	101, 102, 103, 104, 105, 107	American Bridge continued to weld in dollar plate on the dome and is vertical welding secondary shell course three for tank 101. Finish round seam welding on primary course three and continued round seam repair on primary course three and secondary course one for tank 102. Welding outside plates of dome for tank 102. Vertical welding primary course three and began preparation for round seam welding for tank 103. American Bridge continued work on penetrations on dome and verticals repair welding for tank 104. Tack welding round seam and preparing round seam for secondary course four of tank 104. Set primary course three and began fit-up for tank 105. American Bridge continued weld-up of plates and knuckle.	CM

Number	Date	Tank	Comments	Event Type[7]
262.	8/9/1978	101, 102, 103, 104, 107	American Bridge began to lay out penetrations and studs on dome, finished welding dollar plate, continued to weld verticals for secondary course three, and did some repair to the secondary shell for tank 101. Continued to weld outer plates, prepared for setting inside plates for dome, and repaired welds on the secondary shell for tank 102. Repair weld to the verticals and began round seam weld of primary course three for tank 103. American Bridge continued to weld in penetrations, vertical weld secondary course four, and round seam weld secondary course four for tank 104. American Bridge continued to weld and fit-up knuckle and weld-up of plate for tank 107 secondary.	CM
263.	8/10/1978	101, 102, 103, 104, 107	American Bridge has begun layout of studs, grinding off fit-up gear, and began round seam welding of secondary course three for tank 101. Set the remaining inside plates and continued to fit up and weld dome for tank 102. Prepared for round seam weld of primary course three and vertical welding on primary course three and secondary course one. American Bridge continued to place penetrations in the dome and make repairs to welds in the secondary shell for tank 104. American Bridge continued to fit-up and weld knuckle and is completing plate welding for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
264.	8/11/1978	101, 102, 103, 104, 105, 107	American Bridge continued to lay out penetrations and studs and round seam weld secondary course three for tank 101. Continued to fit up and weld dome plates for tank 102. Vertical welding secondary course one and repair to verticals on primary course three for tank 103. Prepared for round seam weld on course three of tank 103. Beginning falsework layout. Continued to weld in penetrations on dome, made repairs to the shell, and began scaffolding for the top knuckle for tank 104. Began vertical welding on primary course three for tank 105. Boilermakers walked off the job after their lunch at approximately 11:00 a.m.	CM
265.	8/14/1978	101, 102, 103, 104, 105, 107	American Bridge finished welding and grinding on dome and was making repairs to the secondary course three for tank 101. Erected primary course four and continued welding inside plates of dome and round seam welding on dome for tank 102. Round seam welding primary course three with some repair to secondary course one for tank 103. Laying out and preparing falsework for tank 103 dome. Working on penetrations with some repair welds for tank 104. Vertical welding tank 105 primary course three. Cut round seam knuckle to bottom and continued to weld-up knuckles for tank 107. Received knuckles for primary bottom for tank 107.	CM
266.	8/15/1978		Boilermakers began work until it began raining at approximately 7:00 a.m. Only some clean-up and rigging was done.	CI

Number	Date	Tank	Comments	Event Type[7]
267.	8/16/1978	101, 102, 103, 104, 105, 107	American Bridge began layout of studs and penetrations and completed repairs to most of the primary and secondary shells for tank 101. Continued to fit-up and weld dome plates and set secondary course two for tank 102. Round seam welding tank 103 primary course three and preparing for round seam weld on secondary course one. Finishing riser placement and capping the risers for tank 104. Vertical welding on tank 105 primary course three and secondary course one. Dye-penetrant testing and some welding on knuckle for tank 107 secondary bottom and began fit-up and welding of tank 107 primary plate.	CM
268.	8/17/1978	101, 102, 103, 104, 105, 106, 107	American Bridge performing some repair work to shells and began to cut penetrations for tank 101. Continued to weld dome plates and vertical welding on secondary course two for tank 102. Round seam welding primary shell course three complete for tank 103 and began round seam welding secondary course one. Continued to erect dome falsework for tank 103. Erected top knuckle and set in place for tank 104. Capped some of the risers for tank 104. Vertical welding tank 105 secondary course one. Vertical welding tank 106 primary course three. Continued to weld-up knuckle on secondary bottom and fit-up and weld bottom plates on primary for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
269.	8/18/1978	101, 102, 103, 104, 105, 106, 107	American Bridge installed penetrations on dome and is erecting secondary course four for tank 101. Continued to weld second plates round seam to outer plates on dome and vertical welding secondary course two for tank 102. American Bridge continued to set up falsework for the dome and completing round seam welding on secondary course one for tank 103. Began fit-up and welding of verticals on tank 104 top knuckle. Vertical welding and repair to primary course three and round seam preparation and fit-up for secondary course one for tank 105. Vertical welding tank 106 primary course three. Continued to dye penetrant test primary plate welds and weld and fit up secondary plate.	CM
270.	8/21/1978	101, 102, 103, 104, 105, 106, 107	American Bridge continued to place penetrations in the dome with some vertical welding to secondary shell course four for tank 101. Continued to weld up dome with placement of dollar plate for tank 102. Vertical welding of secondary shell course two for tank 102. Finishing falsework assembly and some repair to secondary shell course one. Fit-up and weld of top knuckle for tank 104. Round seam welding primary course three and preparing for round seam weld on secondary course one for tank 105. Vertical welding primary course three for tank 106. Continued dye penetrant testing, some weld repair on secondary bottom, and fit round seam in secondary bottom for tank 107.	CM
271.	8/22/1978		Work suspended due to rain.	CI

Number	Date	Tank	Comments	Event Type[7]
272.	8/23/1978	101, 102, 103, 104, 105, 107	Continued to weld in penetrations on dome and vertical weld secondary shell course four for tank 101. Vertical welding primary course four and secondary course two for tank 102. Continued to weld in dollar plate for tank 102. American Bridge welding outer plates to the dome for tank 103. Placed studs on dome and continued to fit-up and weld the top knuckle for tank 104. Round seam welding primary course three and repair for tank 105. Preparing to round seam weld secondary shell course one for tank 105. Continued to weld flat plate on primary bottom and welding of knuckle for tank 107. Repair welding for tank 107 bottoms.	CM
273.	8/24/1978	101, 102, 103, 104, 105, 107	Continued to weld in penetrations on dome and placing lifting plates and vertical welding tank 101 secondary course four. Welding dome plates and vertical welding on primary course four and secondary course two for tank 102. Erected primary course four and secondary course two for tank 103 and welded dome plates. Continued welding dome top knuckle in place for tank 104. Began round seam weld on secondary course one and repair to primary course three round seam. Welding knuckle to bottom and tacking round seam for tank 107 with some dye penetrant testing on the secondary.	CM

Number	Date	Tank	Comments	Event Type[7]
274.	8/25/1978	101, 102, 103, 104, 105, 106, 107	American Bridge prepared secondary course four for round seam welding and shot studs on dome for tank 101. Continued to assemble dome and began to remove hardware for tank 102. Some vertical welding tank 102 primary course four. Continued to assemble dome and began vertical welding on primary course four for tank 103. American Bridge welding in round seam of the top knuckle to dome round seam for tank 104. Repair welding to round seam of secondary course one and primary course three of tank 105 and started to set scaffolding for the primary course four. Vertical welding on primary course three of tank 106. Continued to round seam weld knuckle to bottom on secondary and weld plate and layout primary for tank 107.	CM
275.	8/28/1978	101, 102, 103, 104, 105, 106, 107	Welded studs to dome and repair welding on tank penetrations for tank 101. Weld dollar plate in dome assembly is complete for tank 102. Welding horizontal joint in the second course of the secondary shell for tank 102. Welding radial joints in outer ring of the dome assembly, welding vertical joints in the fourth course of the primary shell, and repair welding the secondary shell for tank 103. Welding primary top knuckle to shell for tank 104. Repair welding on primary shell for tank 105. Welding vertical joints in primary course three and secondary course one for tank 106. Weld overhead on secondary bottom round seam for tank 107.	CM
276.	8/29/1978	101, 102, 103, 104, 106, 107	Weld 42 inch risers in dome and weld studs on pipe risers for tank 101. Weld horizontal joint in secondary course two and repair welding on secondary shell for tank 102. Erect inner ring of dome assembly and weld outer ring radial joints in dome for tank 103. Weld repair on top knuckle for tank 104. Weld vertical joints in primary and secondary shell for tank 106. Manual weld on round seam in secondary bottom of tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
277.	8/30/1978	101, 102, 103, 104, 106, 107	Weld 42 inch risers in the dome for tank 101. Completed horizontal weld joint in secondary course two and repair welding on secondary shell for tank 102. Weld radial joints in the outer ring of the dome assembly and fit the plates of the inner ring of the dome for tank 103. Fit and welded back-up strap to the top knuckle for the knuckle to dome joint and prepared the dome for raising for tank 104. Welded vertical joints in primary and secondary shells for tank 106. Welded round seam in the secondary bottom and dye penetrant tested welding on the primary bottom for tank 107.	CM
278.	8/31/1978	101, 102, 103, 104, 105, 106, 107	Weld repair on secondary shell for tank 101. Layout pipe penetrations and studs on dome and repair welding primary shell for tank 102. Weld vertical joints in primary course four and secondary course two for tank 103. Raise the tank dome into position for tank 104. Raise scaffold for next courses of shell plate for tank 105. Weld horizontal joint in primary shell course three for tank 106. Manual weld overhead on round seam in secondary bottom and fit primary knuckle sections together for tank 107. One truckload of castable refractory arrived at the jobsite.	CM
279.	9/1/1978	101, 102, 103, 104, 105, 106, 107	Repair welding on secondary shell for tank 101. Begin cutting penetrations and repair welding on primary and secondary shells for tank 102. Weld vertical joints on primary course four and secondary course two of tank 103. Fit dome to primary knuckle joint for tank 104. Raise scaffold inside the primary and secondary shells for tank 105. Complete welding on the horizontal joint of primary shell course three. Fit primary knuckle sections together and dye penetrant tested welding on the primary knuckle for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
280.	9/5/1978	101, 102, 103, 104, 105, 106, 107	Repair to penetrations in dome for tank 101. Layout of studs on dome and repair to secondary course two for tank 102. Prepared for round seam weld of primary course four and continued work on dome assembly for tank 103. Continued to weld round seam between dome and top knuckle and placed primary access plate for tank 104. Set in falsework for dome for tank 105. Repair to primary course three shell and preparing secondary course one for round seam welding on tank 106. Grinding off hardware from secondary bottom and dye penetrant testing for tank 107. Primary bottom welding and fit-up of knuckle for tank 107.	CM
281.	9/6/1978	101, 102, 103, 104, 105, 106, 107	Erected scaffolding for top knuckle work on tank 101. Cutting penetrations in dome for tank 102. Assembling dome plates and preparing primary course four for round seam welding for tank 103. Welding primary door sheet in place, and shooting studs, with layout, on secondary shell for tank 104. Erected primary course four and secondary course two for tank 105. Round seam welding secondary course one and preparing for primary course three round seam welding for tank 106. Welding knuckle to bottom on secondary bottom and continued to weld and fit-up knuckle on primary bottom for tank 107.	CM
282.	9/7/1978	101, 102, 103, 104, 105, 106, 107	Set-up of top knuckle scaffolding for tank 101. Erected secondary course three and continued cutting penetrations for tank 102. Assembling dome and prepared for primary course four round seam welding for tank 103. Weld top knuckle to dome and continued to weld door sheet and shoot studs for tank 104. Begin fit-up of primary course four for tank 105. Repair weld and prepare to round seam weld primary course three for tank 106. Repair weld on round seam knuckle to bottom and continued weld of primary knuckle for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
283.	9/8/1978	101, 102, 103, 104, 105, 107	Erection of top knuckle for tank 101. Cutting and setting penetrations in dome and welding verticals for secondary course two for tank 102. Round seam welding primary course four and welding dome assembly for tank 103. Welding round seam top knuckle to dome, welding door sheet in the primary, and shot studs on the secondary for tank 104. Began vertical welding on primary course four of tank 105. Repair welding secondary bottom and welding knuckle with fit for bottom to knuckle of tank 107.	CM
284.	9/11/1978	101, 102, 103, 104, 105, 106, 107	Finish erecting top knuckle and begin fit-up and welding for tank 101. Vertical welding secondary course three and continued to cut penetrations for tank 102. Finished round seam welding or primary course four and ready to round seam weld secondary course two for tank 103. Finished off round seam knuckle to dome on Saturday and finished door sheet for tank 104. Welding on thermocouples for tank 104. Begin vertical welding primary course four and secondary course two for tank 105. Repair to round seam of primary course three and began to raise scaffold on tank 106. Repair weld to primary bottom, prepared for welding plate on secondary, and weld-up of the knuckle for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
285.	9/12/1978	101, 102, 103, 104, 105, 106, 107	Working on fit-up and weld of knuckle for tank 101. Fit-up of secondary course three, continued to weld dome penetrations, and began round seam preparation for secondary course three for tank 102. Weld-up of dome, setting the dollar plate, and some primary round seams for tank 103. Finishing welding studs to secondary shell and began moving insulation into hole for installation for tank 104. Vertical welding secondary course two and primary course four for tank 105. Some repair and finished setting scaffolding for the primary course four for tank 106. Dye penetrant testing round seam knuckle to plate on secondary bottom and continued to weld up plate on the primary for tank 107.	CM
286.	9/13/1978	101, 102, 103, 104, 105, 106, 107	Weld up knuckle and began round seam weld top knuckle to dome for tank 101. Penetrations and round seam weld secondary course three for tank 102. Fit dollar plate and weld to dome for tank 103. Stud weld for haunch and place insulation for stress relief for tank 104. Began to set falsework for dome and vertical welding secondary course two and primary course four for tank 105. Began to set primary course four for tank 106. Finishing dye penetrant testing and repair welding on secondary and welding primary with some knuckle fit-up for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
287.	9/14/1978	101, 102, 103, 104, 105, 106, 107	Weld-up round seam top knuckle to dome and removed scaffolding from inside of the tank for tank 101. Installing penetrations on dome, began shooting studs on dome, and finished round seam weld of secondary course three for tank 102. Welding dome plates for tank 103. Installing insulation to primary shell for tank 104 and Vitro is surveying the tank 104 dome and bottom. Erected falsework for the dome and vertical welding secondary course two for tank 105. Finished erection of primary course four and erected secondary course two for tank 106. Repair welds to the primary bottom and knuckle and repair welds to the round seam secondary knuckle to bottom for tank 107.	CM
288.	9/15/1978	101, 102, 103, 104, 105, 106, 107	Erected dome and rigged for welding for tank 101. Continued to weld studs on dome and place penetrations for tank 102. Assembling dome for tank 103. Placing insulation on primary tank for stress relief of tank 104. Setting falsework for dome assembly for tank 105. Vertical welding secondary course two for tank 106. Began rigging for setting the secondary bottom with some repair and weld repair to the primary knuckles for tank 107.	CM
289.	9/18/1978	101, 102, 103, 104, 105, 106, 107	Welding dome in place and removing falsework for tank 101. Cut penetrations in the dome for tank 102. Final welding to the dollar plate and began grinding fit-up hardware off for tank 103. Installing insulation on primary shell for stress relief for tank 104. Round seam welding secondary course two and finished placing falsework for the dome for tank 105. Vertical welding primary course four and secondary course two for tank 106. Set the secondary bottom and removed falsework setup for tank 107. Dye penetrant testing joints and primary plate welding for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
290.	9/19/1978	101, 102, 103, 104, 105, 106, 107	Welding dome to top knuckle and laying out studs on secondary shell for tank 101. Final welding done on dome with removal of all hardware for tank 103 and some repair to the secondary course two. Placing insulation on the primary shell and dome, burners are in place, and blower tower has been fabricated for the stress relieving process for tank 104. Finished round seam welding secondary course two and set dome plate on falsework for tank 105. Continued vertical welding on secondary course two and primary course four for tank 106. Removed hardware and began grinding and magnetic particle testing for the secondary and continued weld repair and weld-up of the knuckle and bottom for tank 107.	CM
291.	9/20/1978	101, 102, 103, 104, 105, 106, 107	Welding on dome to top knuckle, removing falsework from tank, and finishing layout of studs on the shell for tank 101. Welding penetrations	
292.	9/21/1978	101, 102, 103, 104, 105, 106, 107	Continued to weld dome to haunch and removed all falsework from tank 101. Continued welding penetrations to dome and erected secondary shell course four for tank 102. Start layout of penetrations and begin fit-up of secondary course three for tank 103. Final prep of burners, thermocouples, etc. for stress relieving start up for tank 104. Finish off repair welding to primary course four and secondary course two and continued weld-up of dome plates for tank 105. Finished round seam welding of secondary course two and prepared primary course four for round seam welding for tank 106. Placing air distribution piping on the bottom of the secondary and cut round seam in the primary bottom and dye penetrant tested for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
293.	9/22/1978	104, 107	Boilermakers walked off the job at 8:30 a.m. and left the jobsite around 9:15 a.m. due to a labor dispute. Tank 104 is being stress relieved and reached soak period at 8:15 a.m. Expect to be back down around 600 degrees F at 5:00 p.m. on Friday. Fit conduit for the secondary bottom of tank 107.	CM
294.	9/25/1978	104	The Boilermakers left the jobsite shortly after 8:00 a.m. Barlells began removing insulation bats from tank 104.	CM
295.	9/26/1978	101, 102, 103, 104, 105, 106, 107	Continued to weld out the dome/knuckle RS, installed the door sheet in the primary shell, and began stud welding on the secondary shell for tank 101. Dome penetrations welding for tank 102. Penetrations layout and vertical welding secondary course three for tank 103. Removing insulation for tank 104. Dome assembly and erected secondary course three for tank 105. Round seam weld primary course four and repair primary course four and secondary course two for tank 106. Layout refractory, dye penetrant test primary bottom, and fit up knuckle to plate for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
296.	9/27/1978	101, 102, 103, 104, 105, 106, 107	Finishing repair and weld to dome/knuckle RS, welding in primary door sheet on primary shell, and continued to weld studs in secondary shell for tank 101. Final repair weld to penetrations on dome and vertical welding secondary course four for tank 102. Layout dome studs, place penetrations, and prepare secondary course three for round seam welding on tank 103. Finished removing insulation from tank 104 and transfer it to tank 101. Installed inside plates of dome and began fit-up for tank 105. Repair welding to secondary course three round seam and verticals for tank 106. Vertecs laid out and installed forms to secondary bottom for tank 107 and continued dye-penetrant testing of knuckles and fit-up of round seam plate to the knuckle.	CM
297.	9/28/1978	101, 102, 103, 104, 105, 106, 107	Completed all welding on dome to knuckle round seam and removed scaffolding to weld in primary door sheet for tank 101. Finished off penetrations and vertical welding to secondary course four for tank 102. Placement of penetrations on dome and round seam welding on secondary course three of tank 103. Some repair welding to secondary shell of tank 104. Continued to assemble dome and vertical welding on secondary course three of tank 105. Erected secondary course three and begin layout of falsework for the dome on tank 106. Final preparation of forms and mixes for pouring refractory in secondary of tank 107. Welding round seam bottom side of plate to knuckle for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
298.	9/29/1978	101, 102, 103, 105, 106, 107	Continued to weld out primary door sheet. Prepared to place insulation on primary tank. Continued to place final welds to penetrations on dome and vertical weld secondary course four of tank 102. Placing penetrations and finishing round seam secondary course three for tank 103. Continued to weld-up dome plates and begin vertical welding to secondary course three for tank 105. Erecting falsework for dome assembly for tank 106. Began placement of refractory for tank 107. An equipment breakdown halted the pour with plans to continue on Monday. Continued to weld round seam plate/knuckle for the primary of tank 107.	CM
299.	10/2/1978	101, 102, 103, 105, 106, 107	Made final repairs to tank 101 and prepared for stress relief. Finished with all work on penetrations on dome and round seam welded secondary course four of tank 102. Continued to place penetrations and repair welds for tank 103. Continued welding inside to outside places on dome and vertical welding secondary course three for tank 105. Erecting falsework for the tank 106 dome. Vertecs poured 3 sections of refractory on secondary bottom and did some weld repair to the plates and knuckles for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
300.	10/3/1978	101, 102, 103, 105, 106, 107	Installing insulation to primary tank and preparing for stress relieving with removal of equipment from the inside of the tank for tank 101. Finished round seam welding secondary course four and completed all penetration work on the dome for tank 102. Placing penetrations and studs on the dome for tank 103. Continued to assemble dome - vertical welding secondary course three and preparing round seam welding for secondary course three for tank 105. Vertical welding secondary course three and continued to assemble falsework for the dome for tank 106. Vertecs placed the last of the refractory on secondary bottom and American Bridge did dye penetrant testing and welding of round seam bottom plate to knuckle on primary bottom.	CM
301.	10/4/1978	101, 102, 103, 104, 105, 106 107	Installing insulation on primary tank and placing thermocouples for tank 101. Repair welding to secondary course four and preparing dome for lift for tank 102. Continued to shoot studs on dome and place penetrations for tank 103. Began erecting secondary course four for tank 103. Finished magnetic particle testing bottom for tank 104. Continued to assemble the dome, place the dollar plate, and began to fit it up for tank 105. Round seam welding secondary course three for tank 105. Continued to assemble dome falsework and vertical weld secondary course three for tank 106. Vertecs is laying out grooves in refractory and grinding bottom for flatness for tank 107. Finished round seam welding plate to knuckle and dye penetrant testing for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
302.	10/5/1978	101, 102, 103, 105, 106 107	Placing insulation on primary tank, placing thermocouples on the tank, and preparing for stress relieving for tank 101. Raising scaffolding for placement of top knuckle for tank 102. Continued shooting studs and placing penetrations on dome vertical welding secondary course four for tank 103. Continued to assemble dome and round seam weld secondary course three for tank 105. Vertical welding secondary course three for tank 106. Vertecs is cutting grooves in refractory for tank 107, repair welding and dye penetrant testing of the primary, and removing all fit-up equipment.	CM
303.	10/6/1978	101, 102, 103, 104 105, 106 107	Finished placing insulation on the tank, placed the burners, and set some thermocouples preparing for tank 101 stress relief. Set top knuckle and began fit-up for tank 102. Continued to shoot studs on risers on the dome and vertical weld secondary course four for tank 103. Setting scaffolding for secondary knuckle erection for tank 104. Weld-up dome and weld repair to secondary course three for tank 105. Round seam welding secondary course three for tank 106. Vertecs continued to cut slots in the refractory for tank 107. Removing fit-ups and grinding flush for tank 107 primary.	CM
304.	10/9/1978	101, 102, 103, 104 105, 106 107	Testing burners and making final preparations for stress relieving for tank 101. Welding knuckle to shell for tank 102. Vertical welding secondary course four and placing penetrations for tank 103. Welding clips to secondary for secondary top knuckle for tank 104. Continued to assemble dome and began secondary course four erection for tank 105. Finished round seam welding secondary course three and began placement of roof plate for tank 106. Vertecs continued to cut slots in refractory for tank 107. Final weld repair and dye penetrant testing for tank 107 and began preparation for setting the bottom.	CM

Number	Date	Tank	Comments	Event Type[7]
305.	10/10/1978	101, 102, 103, 104 105, 106 107	Started stress relieving process in the morning for tank 101. Welding top knuckle to shell for tank 102. Some vertical welding to secondary course four and began round seam welding secondary course four for tank 103. Continued to weld clips and prepare for secondary top knuckle for tank 104. Finished erecting secondary course four and began fit-up and welding for tank 105. Also continued to weld dome for tank 105. Continued to place roof plate for the dome and repair weld to the shell for tank 106. Rigged the primary bottom and set in place on the refractory for tank 107.	CM
306.	10/11/1978	101, 102, 103, 104, 105, 106, 107	Completed stress relieving process in the morning and began tear-down of gas line in the afternoon at 6 p.m. Welding primary top knuckle to shell for tank 102. Continued round seam welding and repair to secondary course four for tank 103. Began to fill tank 104 with water for hydrostatic test and also chalked the primary shell. Vertical welding secondary course four and continued to assemble the dome for tank 105. Working on dome assembly and began erection of secondary course four for tank 106. Removing lifting hardware from primary bottom and magnetic particle testing for tank 107.	CM
307.	10/12/1978	101, 102, 103, 104, 105, 106, 107	Removing insulation from primary shell for tank 101. Continued to weld round seam of primary top knuckle to shell for tank 102. Repair welding round seam of secondary course four of tank 103. Began to set secondary top knuckle for tank 104. Finishing welding dome, removing all fit-up hardware, and starting layout of penetrations for tank 105. Weld-up outside plates of dome and finished erecting secondary course four in the morning and start fit-up for tank 106. Continued to remove hardware and finished the majority of magnetic particle testing for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
308.	10/13/1978	101, 102, 103, 104, 105, 106, 107	Continued to remove insulation from tank 101. Continued to weld the secondary top knuckle to shell and began removing all inside scaffolding for tank 102. Repair welding secondary shell for tank 103. Finished erecting secondary knuckle for tank 104. Prepared and round seam welding secondary course four and began laying out penetrations for tank 105. Continued to weld outside plate of dome and vertical welding secondary course four of tank 106. Removing rigging hardware and magnetic particle testing areas and trimming round seam on knuckle of primary for tank 107.	CM
309.	10/16/1978	101, 102, 103, 104, 105, 106, 107	Finished removing insulation from tank 101 and began magnetic particle testing the bottom. Welding dome to knuckle and set in the primary door sheet for tank 102. Some repair to secondary shell and raising scaffolding for top knuckle erection for tank 103. Welding secondary top knuckle in place for tank 104. Round seam welding secondary course four and layout of penetrations and studs on the dome for tank 105. Vertical welding secondary course four and placed inside plates of dome for tank 106. Finished magnetic particle examination of the tank 107 primary bottom.	CM
310.	10/17/1978	101, 102, 103, 104, 105, 106	Cleanup work and set up for magnetic particle testing inside the tank for tank 101. Welding dome in place and primary door sheet is in place for tank 102. Began to set primary top knuckle for tank 103. Welding secondary top knuckle in place for tank 104. Continued to layout penetrations and studs on the dome and repair secondary shell for tank 105. Round seam welding secondary course four and welding dome plates.	CM

Number	Date	Tank	Comments	Event Type[7]
311.	10/18/1978	101, 102, 103, 104, 105, 106, 107	Setting scaffolding for secondary top knuckle erection and welding for tank 101. Continued to weld dome in place and weld primary door sheet for tank 102. Begin welding primary top knuckle in place for tank 103. Welding secondary top knuckle in place for tank 104. Repair welding to courses and layout of penetrations on tank dome for tank 105. Round seam welding secondary course four and continued to weld-up dome for tank 106. Squared off round seam edge on secondary knuckle and placed clips for shell course for tank 107.	CM
312.	10/19/1978	101, 102, 103, 104, 105, 106, 107	Magnetic particle testing primary bottom and repair to the bottom for tank 101. Welding dome in place, welding door sheet in place, and laying out wall studs for tank 102. Welding primary top knuckle for tank 103. Welding secondary top knuckle and have completed hydrostatic testing of tank 104. Some repairs to the secondary shell and layout of penetrations for tank 105. Finished round seam welding secondary course four and also welding dome plates for tank 106. Erected primary course one and began fit-up for tank 107.	CM/CI
313.	10/20/1978	101, 102, 103, 104, 105, 106, 107	Finished magnetic particle testing primary bottom and began preparing secondary top knuckle for tank 101. Completed welding dome to knuckle and began preparation for insulating for tank 102. Welding primary top knuckle to shell for tank 103. Welding secondary knuckle in place for tank 104. Layout and start cutting penetrations for tank 105. Some repair work to shell and continued to weld up the dome for tank 106. Start vertical welding on primary course one for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
314.	10/23/1978	101, 102, 103, 104, 105, 106, 107	Prepared to raise the secondary top knuckle for tank 101. Prepared to stress relieve the primary tank and repair welding on secondary tank for tank 102. Welding primary top knuckle for tank 103. Layout studs on secondary top knuckle for tank 104. Raise scaffold in preparation for primary top knuckle erection for tank 105. Weld inner ring of dome assembly for tank 106. Weld vertical joints and fit horizontal joint on first course of the primary shell for tank 107.	CM
315.	10/24/1978	101, 102, 103, 104, 105, 106, 107	Erected and fit upper secondary knuckle for tank 101. Hanging insulation bats and mounting burners in preparation for stress relieving, repairing welding on secondary shell, and welding form tie studs for tank 102. Welding tank 103 primary top knuckle. Welding secondary knuckle, surveying contour of the top, and layout of studs on secondary top knuckle for tank 104. Fit penetrations in the dome assembly for tank 105. Weld inner ring of dome assembly for tank 106. Cut and fit vertical closure joint in first course of the tank 107 primary shell and fit and grind horizontal joint between the primary shell and the bottom knuckle.	CM
316.	10/25/1978	101, 102, 103, 104, 105, 106, 107	Fit and weld secondary top knuckle for tank 101. Insulate and connect burners and fans in preparation to stress relieve the primary tank for tank 102. Welding of primary top knuckle complete for tank 103. Weld secondary top knuckle and layout form tie studs on the secondary knuckle for tank 104. Install dome pipe penetrations for tank 105. Trim and fit the round seam in the dome assembly for tank 106. Weld horizontal joint between the bottom knuckle and first course of the primary shell for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
317.	10/26/1978	101, 102, 103, 104, 105, 106, 107	Fit and welded the secondary top knuckle for tank 101. Hung insulation and connected fans and burners in preparation for stress relieving tank 102. Tacked fitting tabs to the top primary top knuckle and welded lift lugs to the dome in preparation to raise it for tank 103. Repair welding on the primary top knuckle for tank 103. Layout and weld studs on the secondary top knuckle for tank 104. Fit dome penetrations for tank 105. Fit intermediate round seam in the dome assembly for tank 106. Weld horizontal joint in the primary shell and began dismantling the falsework which was used for building the primary bottom for tank 107. A work stoppage by the boilermakers occurred on both projects at 9 a.m. when they objected to an alleged health hazard resulting from the handling of insulation bats for tank 102. They returned to work after lunch when the asbestos workers had completed their work.	CM
318.	10/27/1978	101, 102, 103, 104, 105, 106, 107	Fit and weld secondary top knuckle for tank 101. Stress relief of tank 102 - the burners were lit at 9:00 a.m. Temperature was reached at 7:00 p.m. Primary dome was raised to position and secured for tank 103. Layout and cut annulus penetrations in the secondary knuckle for tank 104. Fit and welded dome penetrations for tank 105. Fit intermediate round seam in the dome assembly. Repair welding on the primary shell for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
319.	10/30/1978	101, 102, 103, 104, 105, 106, 107	Welding secondary top knuckle in place for tank 101. Stud welding on secondary shell for tank 102. Welding dome in place for tank 103. Installing penetrations on secondary knuckle and welding some studs to the knuckle for tank 105. Continued placement of penetrations on dome and prepared for erecting the primary knuckle for tank 105. Welding the dome assembly for tank 106. Repair welding to the primary course one and teardown of primary bottom falsework for tank 107.	CM
320.	10/31/1978	101, 102, 103, 104, 105, 106, 107	Continued to weld secondary top knuckle in place for tank 101. Continued to weld studs to shell and began insulation removal for tank 102. Welding dome in place, removing falsework material out of the tank and set primary door sheet for tank 103. Continued placing penetrations on haunch for tank 104. Setting penetrations in dome for tank 105. Continued work on dome assembly for tank 106. Repair welding to primary course one for tank 107.	CM
321.	11/2/1978	101, 102, 103, 105, 106, 107	Continued to weld haunch to secondary shell and dome for tank 101. Welding studs to shell and some repair to the secondary shell for tank 102. Welding dome in place for tank 103. Continued to place and weld penetrations in the dome and also erected primary top knuckle and began fit-up for tank 105. Welding dome assembly for tank 106. Repair to primary shell for tank 107. Boilermakers started work at approximately 10:30 a.m. and only 32 were present. Others quit.	CM
322.	11/3/1978	103	Due to rain in the early morning, the boilermakers did not work. Some fit-up and welding to the primary door sheet for tank 103 primary.	CM/CI
323.	11/4/1978	102	Removing insulation from the primary walls and continued to remove it from the roof.	CM

Number	Date	Tank	Comments	Event Type[7]
324.	11/6/1978	101, 102, 103, 104, 105, 106, 107	Continued to weld top knuckle in place for tank 101. All insulation is off tank 102, inside scaffolding is being removed, and welding studs to the shell is complete. Continued to weld dome in place and weld up door sheet. Continued welding in penetrations on the haunch for tank 104. Fit-up and welding top primary knuckle and placing penetrations on the dome for tank 105. Placed clips for knuckle and continued to weld-up dome assembly for tank 106. Erected primary course two for tank 107.	CM
325.	11/7/1978	101, 103, 104, 105, 106, 107	Weld-up the secondary top knuckle and begin layout of penetrations for tank 101. Completed welding on dome to knuckle and removed scaffolding for tank 103. Continued to place the remaining studs on the haunch and weld penetrations in place for tank 104. Fit-up and weld of primary top knuckle and working on penetrations on the dome for tank 105. Continued dome assembly for tank 106. Fit-up and vertical welding primary course one for tank 107.	CM
326.	11/8/1978	101, 103, 104, 105, 106, 107	Welding secondary top knuckle in place for tank 101. Continued to weld door sheet in place and remove erection hardware for tank 103. Continued to weld in penetrations on haunch for tank 104. Layout and beginning stud placement and continued to weld penetrations in place for tank 105. Placed and began welding fit-up for center places for tank 106. Fit-up and vertical welding primary course two in place for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
327.	11/9/1978	101, 103, 104, 105, 107	Finished round seam knuckle to shell, placed scaffolding for penetration placement, and removing clips for tank 101. Installing thermocouples on dome and shell and preparing for insulating and erecting internal scaffolding for tank 103. Welding penetrations on haunch for tank 104. Shooting studs on dome and fit-up and weld of primary top knuckle for tank 105. Continued to fit-up and weld verticals on primary course two for tank 107.	CM
328.	11/13/1978	101, 102, 103, 104, 105, 106, 107	Removing hardware from top secondary knuckle and laid out penetrations for tank 101. Final work done on inside of tank for tank 102. Worked on Saturday and Sunday to insulate the tank and Lord Electric connected thermocouples for tank 103. Placing skirt plates and continued weld up of penetrations for tank 104. Fit-up and welding knuckle in place and placed studs on the dome and penetrations for tank 105. Continued to assemble the dome and weld round seam for tank 106. Round seam welding primary course two and erected secondary course one for tank 107.	CM
329.	11/14/1978	101, 102, 103, 104, 105, 106, 107	Laid out penetrations on haunch for tank 101. Prepared for secondary top knuckle, raising scaffolding clips for tank 102. Testing of burners and final hook up of thermocouples for tank 103. Continued to make final welds on penetrations on the haunch for tank 104. Finished welding top knuckle and removing inside scaffolding - preparing for dome lift for tank 105. Continued to assemble the dome for tank 106. Finished round seam welding primary course two and repair welding course two.	CM

Number	Date	Tank	Comments	Event Type[7]
330.	11/15/1978	101, 102, 103, 104, 105, 106, 107	Cutting penetrations in secondary top knuckle for tank 101. Made repairs to shells and prepared for secondary top knuckle for tank 102. Began stress relieving in the morning and came out of soak at approximately 2:00 a.m. on the 16th for tank 103. Placed skirt plate over the haunch to dome joint and continued to finish welding penetrations for tank 104. Prepared to lift the dome and did some repairs to the top knuckle for tank 105. Continued to assemble the dome for tank 106. Repair weld to primary course two and began vertical welding secondary course one.	CM
331.	11/16/1978	101, 103, 104, 105, 106, 107	Continued to cut penetrations in haunch and began to weld 90 degree angle studs on haunch for tank 101. Tank 103 is cooling, as noted previously, the soak completed at 2:00 a.m. Continued to weld out penetrations and placement of skirt on the bottom of tank 104. Erected dome for tank 105. Welded dome assembly for tank 106. Vertical welding secondary course one for tank 107.	CM
332.	11/17/1978	101, 104, 105, 106, 107	Placement of appurtenances over penetrations for tank 101. Final welding of appurtenances, skirt plate placement, and weld-up of secondary door sheet for tank 104. Removing falsework out of the tank and fit-up and weld of dome to primary top knuckle for tank 105. Continued to weld dome and removing fit-up hardware for tank 106. Repair welds to verticals and continued to vertical weld secondary course one for tank 107.	CM
333.	11/18/1978	103	Began insulation removal on tank 103. With increasing poor conditions (wind and low temperatures), removal slowed down.	CM

Number	Date	Tank	Comments	Event Type[7]
334.	11/20/1978		Due to weather conditions, only some cleanup and preparation work was done. Clearing snow and ice. No productive work accomplished. Boilermakers worked half a day.	CI
335.	11/21/1978	101, 104, 105, 106, 107	Welding penetrations in place for tank 101. Still removing some scaffolding, water pipe, and misc. items from tank 104. Round seam welding dome to knuckle and welding the door sheet for tank 105. Welding dome plates for tank 106. Repair welding to verticals on secondary course one and round seam and verticals of primary course two.	CM
336.	11/22/1978	101, 102, 103, 104, 105, 106, 107	Continued to place penetrations on secondary knuckle and placing studs on knuckle for tank 101. Erecting scaffolding for secondary knuckle for tank 102. Prepared to fill tank 104 to the top with water. Continued to weld dome in place for tank 105. Continued to weld dome assembly for tank 105. Begin round seam welding secondary course one.	CM
337.	11/24/1978	103	Worked to remove the remainder of the insulation from tank 103.	CM
338.	11/27/1978	101, 102, 103, 104, 105, 106, 107	Continued to weld penetrations in place and place studs on the secondary knuckle for tank 101. Prepared for erecting the secondary top knuckle for tank 102. Magnetic particle testing the primary bottom for tank 103. Finished removing the last of the hardware off the shell for tank 104. Welding the door sheet in place and dome to the primary top knuckle for tank 105. Began layout of penetrations on the dome and erected the top primary knuckle for tank 106. Finished round seam welding secondary course one and began repairs for tank 107. Also raised the scaffolding for primary course three for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
339.	11/28/1978	101, 103, 104, 105, 106, 107	Continued to weld penetrations in place for tank 101. Magnetic particle testing the bottom and layout of studs on shell for tank 103. Started to rebar on Wednesday for tank 104. Finishing welding dome in place for tank 105. Fit-up and welding of primary top knuckle and some repair work to the dome assembly for tank 106. Erected primary course three and repair work to secondary course one for tank 107.	CM
340.	11/29/1978	101, 102, 103, 104, 105, 106, 107	Placing final penetrations on haunch and welding in place. Begin erecting secondary knuckle for haunch for tank 102. Continued layout of studs on secondary shell for tank 103. Welded cover on the 42 inch riser and conducted some skirt work for tank 104. Tank 104 was deemed complete. Pre-fabricated rebar curtains being hauled into the excavation. Finished welding dome in place and some repairs to the door sheet for tank 105. Continued welding top knuckle to the shell and began layout of studs and penetrations on the dome for tank 106. Fit-up and vertical welding of primary course three and repair to secondary course one for tank 107.	CM
341.	11/30/1978	101, 102, 103, 104, 105, 106, 107	Continued to weld penetrations on haunch and welding airline for tank 101. Continued to erect secondary top knuckle for tank 102. Some repair to shell and layout of studs for tank 103. Set first curtain of rebar in place for first and second lifts for tank 104. Removing all scaffolding and preparing for insulation for tank 105. Layout, cut, and placing penetrations on dome and also continuing to weld the top knuckle into place for tank 106. Welding verticals on primary course three for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
342.	12/1/1978	101, 102, 103, 104, 105, 106, 107	Continued to finish welding out penetrations on the haunch and place flashing between the haunch and dome for tank 101. Completed erecting the haunch sections and began fit-up and weld of verticals on the top knuckle for tank 102. Shooting studs on the secondary shell for tank 103. Placing second mat of rebar curtains for tank 104. Finished removing all scaffolding and prepared for insulating tank 105 over the weekend. Continued to weld the primary top knuckle in place and placing penetrations on the dome for tank 106. Prepared round seam of primary course three for round seam welding and continued to weld verticals for tank 107. Also erected secondary course two for tank 107.	CM
343.	12/2/1978	105	Worked on the weekend insulating tank 105 in preparation for stress relieving it.	CM
344.	12/3/1978	105	Insulating of tank 105 completed.	CM
345.	12/4/1978	104, 105	Boilermakers showed up for work, however no work was started. They left at approximately 9:30 a.m. - would not even stay to move equipment or material. H. Halvorson and West Valley/Rebar West are setting bottom form brace and tying rebar for tank 104. Lord Electric installing thermocouples.	CM

Number	Date	Tank	Comments	Event Type[7]
346.	12/5/1978	101, 102, 103, 104, 105, 106, 107	Finishing weld penetrations on haunch, placing caps on risers, finished flashing, and began filling the tank with water for hydrostatic testing for tank 101. Welding secondary top knuckle in place for tank 102. Shooting studs to secondary shell for tank 103. Prepared forms for installation and tying rebar for tank 104. Some placement of thermocouples, monitor hookup, insulation, and prep work for stress relief of tank 105. Continued to weld and make repairs to the primary knuckle and finish placement of penetrations on the dome of tank 106. Began layout of falsework for the dome, prepared round seam of primary course three, and began vertical welding secondary course two for tank 107.	CM
347.	12/6/1978	101, 102, 103, 104, 105, 106, 107	Trying to complete penetrations on the haunch and began skirt work for tank 101. Welding top knuckle in place for tank 102. Completed shooting studs on secondary shell for tank 103. Prepared for first lift for installing forms for tank 104. Prepared for stress relieving for tank 105. Making penetration repairs on the dome and repairs to the primary top knuckle for tank 106. Round seam welding primary course three and began vertical welding on secondary course two for tank 107.	CM
348.	12/7/1978	101, 102, 103, 105	Install skirt plate on tank 101. Welding top section knuckle in place on tank 102. Prepping tank 103 for top knuckle. Stress relieving tank 105. At approximately 2:30 p.m. the temperature was about 450° F.	CM
349.	12/8/1978	101, 104, 105, 107	Began placing rebar on shell of tank 101 for concrete. Installing forms on tank 104 for first lift. Continued stress relieving tank 105, finished soak this morning. Began to set dome plate in tank 107.	CM
350.	12/11/1978	101, 107	Placing rebar for tank 101. Finished placing dome plate on tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
351.	12/12/1978	101, 102, 106	Continued setting rebar curtains for tank 101. Laying out and cutting penetrations in haunch of tank 102. Erected tank dome 106 and began fit-up.	CM
352.	12/13/1978	101, 106	Laid out forms for first lift on tank 101. Welding dome to primary top knuckle in tank 106.	CM
353.	12/14/1978	104, 107	Pouring first lift of concrete on tank 104. Erecting fourth course primary shell on tank 107.	CM
354.	12/15/1978	101, 102, 106	Installing concrete forms for tank 101 first lift. Installing air distribution piping in tank 102 annulus. Finished welding tank dome 106 in place and welding door sheet in place.	CM
355.	12/16/1978	102, 103, 106	Tank 102 - Weld annulus penetrations, install air distribution pipe; Tank 103 - Erect secondary top knuckle; Tank 106 - Weld door sheet in primary shell.	CM
356.	12/18/1978	103, 104	Weather protection on first lift of concrete on tank 104. Erected tank 103 knuckles.	CM
357.	12/19/1978	102, 103, 107	Began tank 102 skirt work. Welding tank 103 secondary knuckle in place. Setting inside material for tank dome 107.	CM
358.	12/20/1978	102, 104, 106	Filling tank 102 with water for hydro test. Finish weather protection on first lift of tank 104 today. Finishing repair to door sheet on tank 106 primary.	CM
359.	12/21/1978	101, 102, 104, 107	Poured first lift of wall concrete for tank 101. Continued cold weather protection on first lift on tank 104. Tacking skirt plate on tank 102 lower knuckle; Completed fourth course of tank 107 primary shell and fit and welded tank 107 dome assembly.	CI/CM

Number	Date	Tank	Comments	Event Type[7]
360.	12/22/1978	101, 102, 104, 106	Tank 101 cold weather protection on first lift. Tank 102 fabrication complete except for non-destructive examination on secondary shell manhole. Prepared tank 106 for stress relieving. Tank 104 forms stripped from first lift concrete pour.	CI/CM
361.	12/26/1978	101, 103, 104	Removed cold weather protection materials from tank 101 first lift. Began tank 103 penetrations layout. Began placing second lift forms for tank 104.	CI/CM
362.	12/27/1978	101, 102, 104, 106, 107	Began removing forms from tank 101 first lift. Began installing first and second lift rebar on tank 102. Finished installing forms for tank 104 second lift. Placing burners on dome of tank 106. Continued dome assembly on tank 107.	CM
363.	12/28/1978	101, 102, 103, 104	Began prep for second concrete lift on tank 101. Installing outside mat of rebar on tank 102. Installing risers on tank 103 haunch. Held off tank 104 concrete pour due to weather.	CM
364.	12/29/1978	106, 107	Tank 106 will be insulated over the weekend. Continued to weld up tank 107 dome assembly.	CM
365.	12/30/1978	106	Worked on tank 106 insulation.	CM
366.	12/31/1978	106	Worked on tank 106 insulation.	CM
367.	1/1/1979	106	Completed insulation of tank 106.	CM
368.	1/2/1979	105	Prepare to erect tank 105 secondary top knuckles.	CM
369.	1/3/1979	101, 107	Installing second lift forms on tank 101. Continued to weld tank 107 dome assembly.	CM

Number	Date	Tank	Comments	Event Type[7]
370.	1/4/1979	103, 105, 106, 107	Tank 103 filled with water to hydro test at 2:00 a.m. Began erection of tank 105 secondary top knuckles. Tank 106 stress relief burners were lit off at 11:00 a.m., but subcontractor was interrupted for two hours when he ran out of fuel. Tank temperature had not yet reached 600° F. Erected and fit tank 107 dollar plate in dome assembly.	CI/CM
371.	1/5/1979	103, 105, 106, 107	Tank 103 hydro test was accepted by Vitro. Completed erection of tank 105 secondary top knuckle; begin fitting and welding. Tank 106 stress relief temperature was reached at 5:00 p.m. Erected tank 107 fourth course secondary.	CM
372.	1/6/1979	106	Remove tank 106 insulation and thermocouples.	CM
373.	1/8/1979	102, 103, 104	Tank 102 hydrotest was inspected in the p.m. no leaks were found. Installed flashing on tank 103 dome; begin placing slide plate in the wall slot. Tank 104 second lift was called off due to cold weather.	CI/CM
374.	1/9/1979	103	Began installation of tank 103 skirt plate and tacked manhole plate in the secondary shell.	CM
375.	1/10/1979	N/A	Five inches of snow fell overnight, and intermittent light snow fell during the day.	CI
376.	1/11/1979	104	No work due to snow. Four heaters were set up in tank 104 in preparation for concrete pour.	CI
377.	1/12/1979	103, 105	Install skirt plate on bottom of tank 103 secondary vessel. Weld tank 105 secondary top knuckle.	CM
378.	1/15/1979	103, 105	Installation of tank 103 skirt plate complete. Layout and cut penetration in tank 105.	CM
379.	1/16/1979	103, 105	Completed filling tank 103 dome with water for encasement support. Layout and cut holes for tank 105 annulus penetrations.	CM

Number	Date	Tank	Comments	Event Type[7]
380.	1/17/1979	103	Tank 103 dome filled with water for support.	CM
381.	1/18/1979	106, 107	Prepare to erect tank 106 secondary knuckle. Cut holes and fit dome penetration in tank 107.	CM
382.	1/19/1979	106, 107	Erect tank 106 secondary top knuckle. Erect tank 107 primary top knuckle.	CM
383.	1/22/1979	105, 107	Fit up and weld annulus risers on tank 105. Weld tank 107 primary knuckle.	CM
384.	1/23/1979	105, 106	Installed air distribution piping in annulus of tank 105. Vitro survey crew checked primary tank bottom 106 for flatness.	CI/CM
385.	1/24/1979	106	Erection of tank 106 secondary top knuckle completed.	CM
386.	1/25/1979	105, 106, 107	Installation of wall slide plate and weld annulus risers for tank 105. Fit secondary top knuckle for tank 106. Complete welding dome penetrations, weld lift lugs on dome, and prepare to raise tank 107.	CM
387.	1/26/1979	105, 106, 107	Complete welding annulus penetrations and weld studs in wall slot for tank 105. Fit and weld secondary top knuckle for tank 106. Raise dome assembly for tank 107.	CM
388.	1/29/1979	105, 106, 107	Welding studs in wall slot, install skirt plate, and repair welding on annulus penetrations for tank 105. Weld secondary knuckle for tank 106. Fit and weld dome to primary top knuckle and remove scaffolding and plywood from the interior of tank 107.	CM
389.	1/30/1979	104, 105, 106, 107	Cleaning snow out of forms and covering formwork with tarps for cold weather treatment and protection for tank 104. Finished repair and placement of skirt and studs. Weld vertical seams on secondary top knuckle for tank 106. Welding dome in place to knuckle and removing ice and equipment from the inside of the tank for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
390.	1/31/1979	102, 103, 104, 105, 106, 107	Tying some rebar for tank 102. Placing rebar curtains for first and second concrete wall lift for tank 103. Preparing for putting heat to the forms and secondary shell and draping forms for weather protection for tank 104. Finish applying studs to the skirt and began to fill the tank with water for hydrostatic testing for tank 105. Layout of penetrations on secondary top knuckle and continued to weld the knuckle in place for tank 106. Welding the dome in place and cleaning out the inside of the tank for tank 107.	CM
391.	2/1/1979	103, 104, 105, 106, 107	Erected wall curtains for tank 103. Covered the second wall lift form and prepared to introduce additional form heating for tank 104. Filled tank 105 with water for hydrostatic testing and cleaned up the annulus space. Welded the secondary top knuckle and laid out annulus penetrations for tank 106. Welded the dome to primary knuckle, removed scaffolding, and removed the jig from the interior of tank 107.	CM
392.	2/2/1979	103, 104, 105, 106, 107	Tying rebar in place for tank 103. Preparing equipment and forms for heating for tank 104. Continued to fill tank 105 with water and removed scaffolding from the outside of the shell. Continued to weld the secondary top knuckle in place and lay out penetrations on the knuckle for tank 106. Finished welding the dome in place and are placing circulator restraints on the bottom of the tank as well as laying out studs on the secondary shell for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
393.	2/5/1979	103, 104, 105, 106, 107	Tying rebar in place for tank 103. Supplying heat to forms and melting ice within forms for tank 104. Finished filling with water and preparing for hydrostatic testing for tank 105. Cutting penetrations in secondary knuckle and finishing welding knuckle in place for tank 106. Finishing magnetic particle testing on circulator restraints, installed the door sheet, and finished layout of the studs for tank 107.	CM
394.	2/6/1979	101, 103, 104, 105, 106, 107	Placing tarps to enclose forms for heating for tank 101. Tying some rebar on curtains for tank 103. Finished removing all ice within forms and prepared to pour concrete for tank 104. Chalking for hydrostatic test and removing outside scaffolding for tank 105. Continued to cut penetrations out of the knuckle for tank 106. Welding access plate in place, shooting studs on the secondary shell and began placing the skirt for tank 107.	CM
395.	2/7/1979	101, 103, 104, 105, 106, 107	Adding heat to forms to melt the ice and snow for tank 101. Tied some rebar in place for tank 103. Poured second lift of concrete and prepared weather protection for tank 104. Re-chalked shell for hydrostatic test for tank 105. Continued to cut penetrations and began to place risers on the knuckle for tank 106. Welding door sheet in place and continued stud welding on the secondary shell and placing the skirt for tank 107.	CM
396.	2/8/1979	101, 102, 103, 104, 105, 106, 107	Installed chutes and prepared for pouring second lift of concrete for tank 101. Placed bottom form retainer for tank 102. Providing cold weather protection for tank 104. Began setting rebar curtains and concluded hydrostatic testing for tank 105. Installing risers on the secondary top knuckle for tank 106. Welding the door sheet in place, placing studs on the skirt assembly, and installing scaffolding for weekend insulation for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
397.	2/9/1979	101, 103, 104, 105, 106, 107	Poured second lift of concrete for tank 101. Placed some J-Bolts on the dome for tank 103. Weather protection for tank 104. Finished removing all scaffolding from inside tank 105. Welding risers in place and installing skirt assembly for tank 106. Completing all repairs, preparing burners for stress relieving, and moved insulation into the area for tank 107.	CM
398.	2/12/1979	101, 102, 104, 105, 106, 107	Cold weather protection for second lift pour for tank 101. Installing forms for first lift pour for tank 102. Removing second lift forms from tank 104, cleaning, and preparing for placement on tank 102. Welding secondary access hole and installed the second mat of rebar curtains for tank 105. Welding studs to secondary knuckle, welding penetrations, and working on the skirt for tank 106. Preparing for stress relieving and installing thermocouples for tank 107.	CM
399.	2/13/1979	101, 102, 104, 105, 106, 107	Removed second lift forms and laid out haunch rebar for tank 101. Finished setting first lift forms and began preparation for tank 102. Laid out and began setting haunch steel for tank 104. Finished welding access hole for tank 105. Continued to weld risers in place and install studs on the haunch knuckle. Prepared for stress relieving for tank 107.	CM
400.	2/14/1979	101, 102, 104, 105, 106, 107	Set scaffolding and installing rebar for first mat of the haunch for tank 101. Placing first mat vertical bars for tank 104. Access hole welding is complete for tank 105. Placing rebar curtains in access hole area and setting first lift concrete forms for tank 105. Repairing round seam secondary top knuckle, finished stud welding on knuckle and continued to weld in place the risers for tank 106. Stress relieving began in the afternoon for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
401.	2/15/1979	101, 102, 104, 105, 106, 107	Installing haunch vertical rebar for tank 101. Preparing for pour and hung tarps for weather protection for tank 102. Installed haunch circumferential rebar and began cadwelding for tank 104. Preparing forms for first lift pour for tank 105. Continued to weld penetration risers in place and repair the round seam of the secondary top knuckle for tank 106. Completed stress relieving for tank 107.	CM
402.	2/16/1979	101, 102, 104, 105, 106, 107	Installing haunch radial bars for tank 101. Pouring first lift of concrete for tank 102. Began cadwelding and welding reinforcing rebar to reinforcing plates for tank 104. Preparing forms for first lift pour for tank 105. Continued penetration work and completing the tank for tank 106. Began removal of stress relieving equipment, torn down tower, and began scaffolding erection for the secondary top knuckle for tank 107.	CM
403.	2/19/1979	101, 102, 104, 105	Installing circumferential rebar of the first mat for tank 101. Removing tarps and weather protection from tank 102. Cadwelding verticals and circumferential bars for tank 104. Prepared and tarped first forms for pour for tank 105.	CM
404.	2/20/1979	101, 102, 104, 105, 106, 107	Placed haunch reinforcing steel for tank 101. Erected forms for second wall lift for tank 102. Placed haunch reinforcing steel for tank 104. Poured first wall lift for tank 105. Welded annulus penetrations, installed wall slide plate, and repair welding for tank 106. Raise scaffolding preparatory to erecting secondary top knuckle for tank 107.	CM
405.	2/21/1979	101, 102, 105, 106, 106	Place haunch reinforcing steel for tank 101. Form second wall lift for tank 102. Cure first wall pour with supplementary heat for tank 105. Weld annulus penetrations, install wall slide plate, and repair welding for tank 106. Erect secondary top knuckle for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
406.	2/22/1979	101, 102, 104, 106, 107	Placed haunch reinforcing steel for tank 101. Formed second wall lift for tank 102. Placed haunch steel for tank 104. Hydrostatic test accepted, weld repair on knuckle and studs, removal of scaffolding, installing angle at the bottom of the wall, and welding secondary closed for tank 106. Fit and weld secondary top knuckle for tank 107.	CM
407.	2/23/1979	101, 102, 104, 106, 107	Place haunch rebar for tank 101. Form and hang cold weather protection tarps for tank 102. Place haunch rebar for tank 104. Tank closure x-rays approved, studs welded to angle and plate in the encasement wall slot, and removed scaffolding from the exterior vessel for tank 106. Magnetic particle on the primary bottom completed and welding the secondary top knuckle for tank 107.	CM
408.	2/26/1979	101, 102, 104, 105, 106, 106	Place upper mat of haunch rebar for tank 101. Pour second wall lift concrete for tank 102. Place upper mat of haunch rebar for tank 104. Strip forms from the first wall pour and sandblast the construction joint for tank 105. Erection complete for tank 106. Weld secondary top knuckle, raise upper ring of scaffolding, lay out penetrations, and fill with water on day shift only for tank 107.	CM
409.	2/27/1979	101, 105, 107	Place and weld top mat haunch rebar for tank 101. Raise scaffolding and form for second lift wall pour for tank 105. Weld secondary top knuckle and layout annulus penetrations for tank 107.	CM
410.	2/28/1979	101, 104, 105, 107	Place and weld haunch steel for tank 101. Place and weld haunch steel for tank 104. Form for second wall lift pour for tank 105. Fit and weld annulus risers, weld horizontal joint in secondary top knuckle, and fill with water for hydrostatic test of tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
411.	3/1/1979	101, 102, 104, 105, 107	Place and weld haunch steel for tank 101. Strip forms from second lift wall pour for tank 102. Place and weld haunch steel for tank 104. Close and secure forms for second lift wall pour for tank 105. Fit and weld annulus risers, weld horizontal joint in secondary knuckle, weld studs on knuckle, and fill with water for hydrostatic testing for tank 107.	CM
412.	3/2/1979	101, 102, 104, 105, 107	Weld haunch rebar for tank 101. Complete stripping of forms from wall pour and began placing haunch steel for tank 102. Weld haunch rebar for tank 104. Pour second wall lift concrete - completed by 2 p.m. for tank 105. Fit and welded annulus risers, welded horizontal joint in secondary top knuckle, welded brackets and studs on the knuckle, welded closures on the primary tank risers, tank is filled with water to hydrostatic test level and the weld joints are chalked for hydrostatic testing for tank 107. Air distribution pipe installed for tank 107.	CM
413.	3/5/1979	101, 102, 103, 104, 107	Welded haunch rebar and placed outside vertical bars in the haunch for tank 101. Placed inner mat of haunch steel for tank 102. Form for first lift wall pour for tank 103. Weld haunch rebar for tank 104. Weld annulus risers, install flashing, install air piping and conduit, and the tank hydrostatic test was inspected and accepted for tank 107.	CM
414.	3/6/1979	101, 102, 103, 104, 105, 106, 107	Welded haunch rebar, place haunch outside vertical bars for tank 101. Place haunch steel inner mat for tank 102. Form for first lift of wall pour for tank 103. Weld haunch steel for tank 104. Begin stripping form from second lift wall pour for tank 105. Set wall rebar curtains for tank 106. Weld annulus risers, remove scaffolding from annulus, and repair welding on secondary top knuckle for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
415.	3/7/1979	101, 102, 103, 104, 105, 106, 107	Place haunch rebar top mat for tank 101. Place haunch rebar bottom mat for tank 102. Form for first lift wall pour completed for tank 103. Weld haunch rebar for tank 104. Strip forms from second lift wall pour completed and raising scaffolding brackets to haunch level for tank 105. Set wall reinforcing steel curtains for tank 106. Weld annulus risers, weld closure plate in secondary shell access opening, repair welding on knuckle for tank 107.	CM
416.	3/8/1979	101, 102, 103, 104, 105, 106, 107	Place horizontal rebar and manual weld outer mat of haunch reinforcing steel for tank 101. Place and cadweld vertical bars in bottom mat of haunch for tank 102. Poured concrete in first lift of wall encasement for tank 103. Place outer mat rebar for tank 104. Raised scaffolding to haunch elevation for tank 105. Wall rebar curtain erection complete and installed thermocouples for tank 106. Welding on annulus risers and secondary knuckle completed for tank 107. X-rays of welding on secondary shell closure accepted for tank 107.	CM
417.	3/9/1979	101, 102, 104, 106, 107	Manual weld haunch rebar for tank 101. Place and weld haunch rebar for tank 102. Place haunch horizontal bars in outer mat for tank 104. Form first lift of wall pour for tank 106. Scaffold brackets and ladders removed from tank.	CM
418.	3/12/1979	101, 102, 103, 104, 105, 106	Weld haunch rebar for tank 101. Place haunch inner mat for tank 102. Strip forms from first lift wall pour for tank 103. Cut and fit outside vertical bars in haunch for cadwelding for tank 104. Clean construction joint and rebar for tank 105. Form for first wall pour for tank 106.	CM

Number	Date	Tank	Comments	Event Type[7]
419.	3/13/1979	101, 102, 103, 104, 106	Weld haunch rebar for tank 101. Place haunch inner mat for tank 102. Form second lift wall pour for tank 103. Place haunch verticals and prepare for cadwelding for tank 104. Form for first lift wall pour for tank 106.	CM
420.	3/14/1979	102, 103, 104, 105, 106	Place inner mat of haunch reinforcement for tank 102. Form for second lift wall pour for tank 103. Cadweld vertical bars in haunch for tank 104. Begin placing haunch rebar for tank 105. Forming and preparation completed for first lift wall pour for tank 106.	CM
421.	3/15/1979	101, 102, 103, 104, 105, 106, 107	Placing third mat haunch vertical bars for tank 101. Installing first mat circumferential haunch for tank 102. Preparation for second lift pour for tank 103. Installing bulkhead and welding to rebar for tank 104. Poured first lift concrete pour for tank 106. Continued to install first and second lift curtains for tank 107.	CM
422.	3/16/1979	101, 102, 103, 104, 105, 106	Placed verticals on haunch third mat for tank 101. Placed first mat horizontal on haunch for tank 102. Hung chutes and prepared for second lift for tank 103. Installed bulkhead and set steel on dome for placement for tank 104. Installed first mat of rebar for tank 105. First lift of concrete curing and tied some rebar for the second lift for tank 106.	CM
423.	3/19/1979	101, 102, 103, 105, 106	Cadwelding vertical bars in the haunch for tank 101. Set reinforcement plates for tank 102. Poured concrete for second wall lift for tank 103. Set riser reinforcement plates in haunch for tank 105. Begin stripping forms from first wall pour for tank 106.	CM

Number	Date	Tank	Comments	Event Type[7]
424.	3/20/1979	101, 102, 103, 105, 106, 107	Weld horizontal rebar for tank 101. Weld riser reinforcement plates for tank 102. Install bulkhead between haunch and dome for tank 104. Weld riser reinforcement plates for tank 105. Form for second wall pour for tank 106. Make up wall reinforcing arrived and was tied into the wall curtains for tank 107.	CM
425.	3/21/1979	102, 103, 105, 106, 107	Placed haunch mid curtain rebar for tank 102. Stripped forms from second wall lift for tank 103. Weld riser reinforcement plates for inner curtain of tank 105. Form second wall lift pour for tank 106. Place wall reinforcing steel curtains for tank 106.	CM
426.	3/22/1979	102, 103, 105, 106	Weld horizontal rebar in haunch inner mat for tank 102. Lift haunch steel to top of tank for tank 103. Place template bars for outer mat for tank 105. Form for second wall lift concrete pour and extend conduit for tank 106.	CM
427.	3/23/1979	102, 103, 104, 106, 107	Weld haunch reinforcing steel and place for tank 102. Place haunch reinforcing steel for tank 103. Begin hanging haunch form panels for tank 104. Complete forming for second lift of wall concrete for tank 106. Set and anchor bottom plate for wall forms for tank 107.	CM
428.	3/26/1979	102, 103, 104, 105, 106	Place and weld horizontal steel in haunch for tank 102. Fit weld joints in haunch vertical steel for tank 103. Place dome steel for tank 104. Place and weld horizontal steel in outer mat for tank 105. Pour concrete for second lift of wall encasement for tank 106.	CM
429.	3/27/1979	102, 104, 105	Place and weld haunch horizontal steel for tank 102. Form for haunch concrete pour for tank 104. Place haunch horizontal steel for tank 105.	CM

Number	Date	Tank	Comments	Event Type[7]
430.	3/28/1979	101, 102, 104, 105	Cadwelding vertical bars in haunch outside mat for tank 101. Place horizontal bars in outer mat of haunch and welding horizontal bars for tank 102. Form for haunch concrete pour and install thermocouples on the dome for tank 104. Place horizontal bars in the haunch outside mat for tank 105.	CM
431.	3/29/1979	101, 102, 103, 104, 105, 106	Cadwelding vertical bars in outer mat of haunch for tank 101. Weld horizontal bars in outer mat of haunch for tank 102. Cadwelding vertical bars in inner mat of haunch for tank 103. Form for haunch concrete pour for tank 104. Place horizontal bars in outer mat of haunch for tank 105. Strip forms from second wall pour.	CM
432.	3/31/1979	101, 104, 106	Began placement of dome rebar and finished bulkhead on tank 101. Near completion of dome rebar and securing forms in preparation of pour on tank 104. Begin layout of haunch rebar on tank 106.	CM
433.	4/2/1979	101, 102, 104, 107	Placing dome steel on tank 101. Began installing bulkhead on tank 102. Prepping for haunch concrete pour for tank 104. Installing forms for first wall lift on tank 107.	CM
434.	4/3/1979	101, 104, 107	Place dome reinforcing steel for tank 101. Complete forming for haunch concrete pour for tank 104. Form for first lift of wall encasement.	CM
435.	4/4/1979	101, 104, 107	Install bulkhead form at top of haunch concrete pour for tank 101. Pour of haunch concrete for tank 104 completed at 6:00 p.m. and finishing at 6:30 p.m. Form first wall pour for tank 107.	CM
436.	4/5/1979	107	Form first wall pour for tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
437.	4/6/1979	102, 104, 107	Place dome reinforcing steel in tank 102. Strip forms from haunch concrete for tank 104. Complete forming for first wall lift pour for tank 107. One of Halvorson's rented cranes is broken down.	CM
438.	4/9/1979	101, 102	Form for haunch concrete pour for tank 101. Place dome reinforcing steel for tank 102.	CM
439.	4/10/1979	101, 102,104, 105, 107	Form for haunch concrete pour in tank 101. Place dome reinforcing steel in tank 102. Seal encasement wall-foundation joint with polysulfide sealant for tank 104. Place dome reinforcing steel for tank 105. Pour concrete for first lift of the wall encasement for tank 107.	CM
440.	4/11/1979	101	Form haunch concrete pour.	CM
441.	4/12/1979	101, 105, 107	Install haunch for bulkhead. Clean wall to foundation joint in preparation for caulking on tank 105. Strip forms from first wall pour on tank 107.	CM
442.	4/13/1979	101, 107	Form for haunch concrete pour in tank 101. Form for second lift wall concrete pour.	CM
443.	4/16/1979	102, 104, 107	Place bulkhead form for top of haunch pour for tank 102. Chipped out water collecting basins at the top of the haunch concrete on tank 104. Form for second wall pour for tank 107.	CM/CI
444.	4/17/1979		No activity - All craftsmen were sent home because of rain.	CM
445.	4/18/1979	101, 107	Forms for haunch concrete pour for tank 101. Poured concrete for second wall lift for tank 107 which was completed by 2 p.m.	CM
446.	4/19/1979	101	Complete forming and preparation for haunch concrete pour for tank 101.	CM
447.	4/20/1979	101	Poured haunch concrete for tank 101 and completed at 6 p.m.	CM

Number	Date	Tank	Comments	Event Type[7]
448.	4/23/1979	101, 105	Strip haunch concrete form from tank 101. Place dome reinforcing steel for tank 105.	CM
449.	4/24/1979	101, 104, 105	Begin excavating for the leak detection sump and drain line for tank 101. Begin installation of leak detection sump and drain line from tank for tank 104. Place dome reinforcing steel for tank 105.	CM
450.	4/25/1979	101, 102, 104	Installed polysulfide sealant and stripped the haunch to dome construction joint on tank 101. Continued forming tank 102 haunch. Excavated for the tank 104 leak detection sump.	CM
451.	4/26/1979	101, 102, 103, 104	Cleaned construction joint at upper edge of haunch pour for tank 101. Closed up haunch form and ready to pour for tank 102. Install bulkhead form for haunch concrete pour for tank 103. J.A. Jones patched damaged protective coating on leak detection sump and risers for tank 104.	CM/CI
452.	4/27/1979	103, 104, 105	Install bulkhead form for haunch pour for tank 103. J.A. Jones installed leak detection pit sump and risers for tank 104. Install form ties for haunch pour for tank 105. An ABC News camera crew was onsite shooting film of the construction activity.	CM
453.	4/30/1979	102	Poured tank haunch encasement for tank 102. 305 cubic yards and completed at 6:30 p.m.	CM
454.	5/1/1979	101, 104	Excavated to the existing leak detection foundation for tank 101. Cleaned construction joint at the top of haunch pour for tank 104.	CM
455.	5/2/1979	101, 102, 104, 105	Clean construction joint at top of haunch pour for tank 101. Strip haunch concrete forms from tank 102. Clean construction joint at top of haunch pour and begin backfilling leak detection pit for tank 104. Weld haunch steel for tank 105.	CM

Number	Date	Tank	Comments	Event Type[7]
456.	5/3/1979	101, 103, 104, 105	Clean construction joint at top of haunch pour for tank 101. Install form ties for tank 103. Installed leak detection pit drain line for tank 104. Form for haunch concrete pour for tank 105.	CM
457.	5/4/1979	101, 102, 103, 105	Clean construction joint above haunch pour for tank 101 and 102. Install haunch form ties and bulkhead for tank 103. Complete haunch form ready for concrete pour for tank 105.	CM
458.	5/7/1979	102, 103	Place dome reinforcing steel in tank 102 and 103.	CM
459.	5/8/1979	101, 102, 103	Clean construction joint at top of haunch pour and set leak detection sump and risers for tank 101. Clean construction joint at the top of the haunch pour for tank 102. Install form ties for haunch concrete pour for tank 103.	CM
460.	5/9/1979	101, 102, 103, 105	Clean construction joint at the top of the haunch pour on tank 101 and 102. Excavate for leak detection pit for tank 102. Begin placing dome panels for haunch pour for tank 103. Strip haunch form panels from tank 105.	CM
461.	5/10/1979	101, 102, 103, 105, 107	Clean upper construction joint for tank 101. Clean upper construction joint and set leak detection sump on tank 102. Form for haunch concrete pour for tank 103. Clean upper construction joint for tank 105. Hook and tie reinforcing steel in tank 107.	CM
462.	5/11/1979	102, 103, 105	Clean construction joint above haunch pour for tank 102. Complete forming for haunch pour for tank 103. Place dome reinforcing steel and set leak detection pit and risers for tank 105.	CM

Number	Date	Tank	Comments	Event Type[7]
463.	5/14/1979	101, 102, 103, 106, 107	Backfill and compact leak detection sump for tank 101. Fit drain line attachment place to the foundation for tank 102. Pour haunch concrete for tank 103. Place dome reinforcing steel for tank 106. Place hooks and tie steel in haunch of tank 107.	CM
464.	5/15/1979	101, 102, 103, 105, 106, 107	Backfill leak detection sump for tank 101. Clean construction joint above haunch for tank 102. Break form ties loose from haunch concrete for tank 103. Clean construction joint for tank 105. Place dome reinforcing steel for tank 106. Install haunch concrete form bulkhead for tank 107.	CM
465.	5/16/1979	101, 102, 103, 105, 106, 107	Backfill leak detection sump for tank 101. Clean construction joint for tank 102. Strip haunch concrete forms for tank 103. Clean construction joint for tank 105. Form for haunch concrete pour for tank 106. Place dome reinforcing steel for tank 107.	CM
466.	5/17/1979	102, 103, 105, 106, 107	Backfill leak detection sump for tank 102. Clean construction joint for tank 103. Hook and tie dome reinforcing steel for tank 105. Form for haunch concrete pour on tank 106. Place dome reinforcing steel on tank 107.	CM
467.	5/18/1979	102, 103, 105, 106, 107	Backfill leak detection pit sump for tank 102. Clean construction joint above haunch pour for tank 103. Place hooks and tie dome steel for tank 105. Form for haunch concrete pour for tank 106. Place dome reinforcing steel for tank 107.	CM
468.	5/21/1979	102, 103, 106,	Backfill leak detection pit sump on tank 102. Clean construction joint on tank 103. Pour haunch concrete - complete at 4:30 p.m.	CM
469.	5/22/1979	102, 103, 105	Backfill leak detection pit sump on tank 102. Clean construction joint on tank 103. Clean construction joint and backfill leak detection sump on tank 105.	CM

Number	Date	Tank	Comments	Event Type[7]
470.	5/23/1979	101, 102, 103, 105, 106, 107	J.A. Jones tied in leak detection pit on tank 101. Fit drain pipe on tank 102. Cleaned construction joint on tank 103. Hook and tie dome steel for tank 105. Strip forms from the haunch concrete pour for tank 106. Hang form panels and place reinforcing steel hooks for the haunch pour for tank 107.	CM
471.	5/24/1979	102, 103, 105, 106, 107	Welded drain pipe to foundation plate and leak detection pit in tank 102. Cleaned construction joint and excavated hole for leak detection sump in tank 103. Fit and welded leak detection drain pipe for tank 105. Cleaned construction joint on tank 106. Formed for the haunch concrete pour on tank 107.	CM
472.	5/25/1979	103, 105, 106, 107	Clean construction joint on tank 103. Weld leak detection pit drain pipe on tank 105. Clean construction joint on tank 106. Form for haunch concrete pour on tank 107.	CM
473.	5/29/1979	102, 105, 106	Halvorson stripped the bulkhead on tank 106 and performed general clean-up of the tank farm. J.A. Jones welded the drain line on tank 102; completed tarring and wrapping of the drain line on tank 105.	CM
474.	5/31/1979	101, 102, 103, 106, 107	Halvorson continued stripping and cleaning the bulkhead on tank 106; removed hardware from forms on tank 107 haunch in preparation for stripping forms; performed general clean-up. J.A. Jones backfilled the tanks 101 and 105 drain lines, applied protective coating to the weld areas and damaged areas on the tank 102 drain line, installed and welded the tank 103 drain line, excavated for the tank 106 leak detection sump.	CM

Number	Date	Tank	Comments	Event Type[7]
475.	6/1/1979	101, 102, 103, 106, 107	Halvorson continued stripping the bulkhead on tank 106 haunch, stripped formed and started stripping the bulkhead on the tank 107 haunch; continued general clean-up of the tank farm. J.A. Jones completed backfilling the tank 101 drain line; started backfill of the tank 102 drain line; completed welding the tank 103 drain line and performed MT of the welds; set and grouted the tank 106 sump.	CM
476.	6/2/1979	102, 103, 107	J.A. Jones completed backfilling the tank 102 drain; backfilled the tank 103 drain; made repairs to, set, and grouted the tank 107 sump.	CM/CI
477.	6/3/1979	103, 106	J.A. Jones completed backfilling the tank 103 drain; backfilled the tank 106 sump; installed the tank 106 drain.	CM
478.	6/4/1979	106, 107	Halvorson continued stripping the bulkheads on the tank 106 and 107 haunches; performed general clean-up of the site. J.A. Jones backfilled the tank 106 drain line; installed tank 107 drain line.	CM
479.	6/5/1979	107	J.J. Welcome started mass backfill of the AN tank farm. J.A. Jones performed MT of the welds on the tank 107 drain line; applied protective coating to the sump and drain; backfilled the drain line.	CM
480.	6/6/1979		J.J. Welcome continued the around the clock backfill of the AN tank farm.	CM
481.	6/7/1979		J.J. Welcome continued the around the clock backfill of the AN tank farm.	CM
482.	6/8/1979		Backfilling tanks 2 shifts - 12 hours each.	CM
483.	6/9/1979		Welcome continued around the clock backfilling of the tanks.	CM
484.	6/10/1979		Welcome continued around the clock backfilling of the tanks.	CM

Number	Date	Tank	Comments	Event Type[7]
485.	6/11/1979		Due to contaminated backfill in the tank farm, the suspension of work continued.	CI
486.	6/11/1979		Welcome continued around the clock backfilling of the tanks.	CM
487.	6/13/1979		Welcome continued mass backfill of the tank farm until contaminated soil was encountered. Work was suspended. Halvorson stripped the bulkhead on the tank 107 haunch. Rockwell started decontamination of Welcome's equipment.	CI
488.	6/15/1979		Due to contaminated backfill in the tank farm, the suspension of work continued. J.A. Jones started removal of contaminated backfill from the tank farm; started decontamination of Welcome's equipment.	CI
489.	6/16/1979		J.A. Jones completed decontamination of Welcome's equipment. Welcome removed equipment from the site as soon as it was released.	CI
490.	6/18/1979	104	J.A. Jones CPAF excavated contaminated dirt east of tank 104.	CM/CI
491.	6/19/1979	101, 104	J.A. Jones CPAF continued hauling contaminated backfill out of the tank farm back to the borrow pit outside the fence. Dirt was removed from the surface of the backfill east of tank 104 and from between tanks 101 and 104.	CM/CI
492.	6/20/1979	102, 103, 105, 106	J.A. Jones CPAF continued hauling contaminated backfill out of the tank farm. Dirt was removed from between tanks 102 and 105 and 103 and 106 to a depth of about 6 inches.	CM/CI

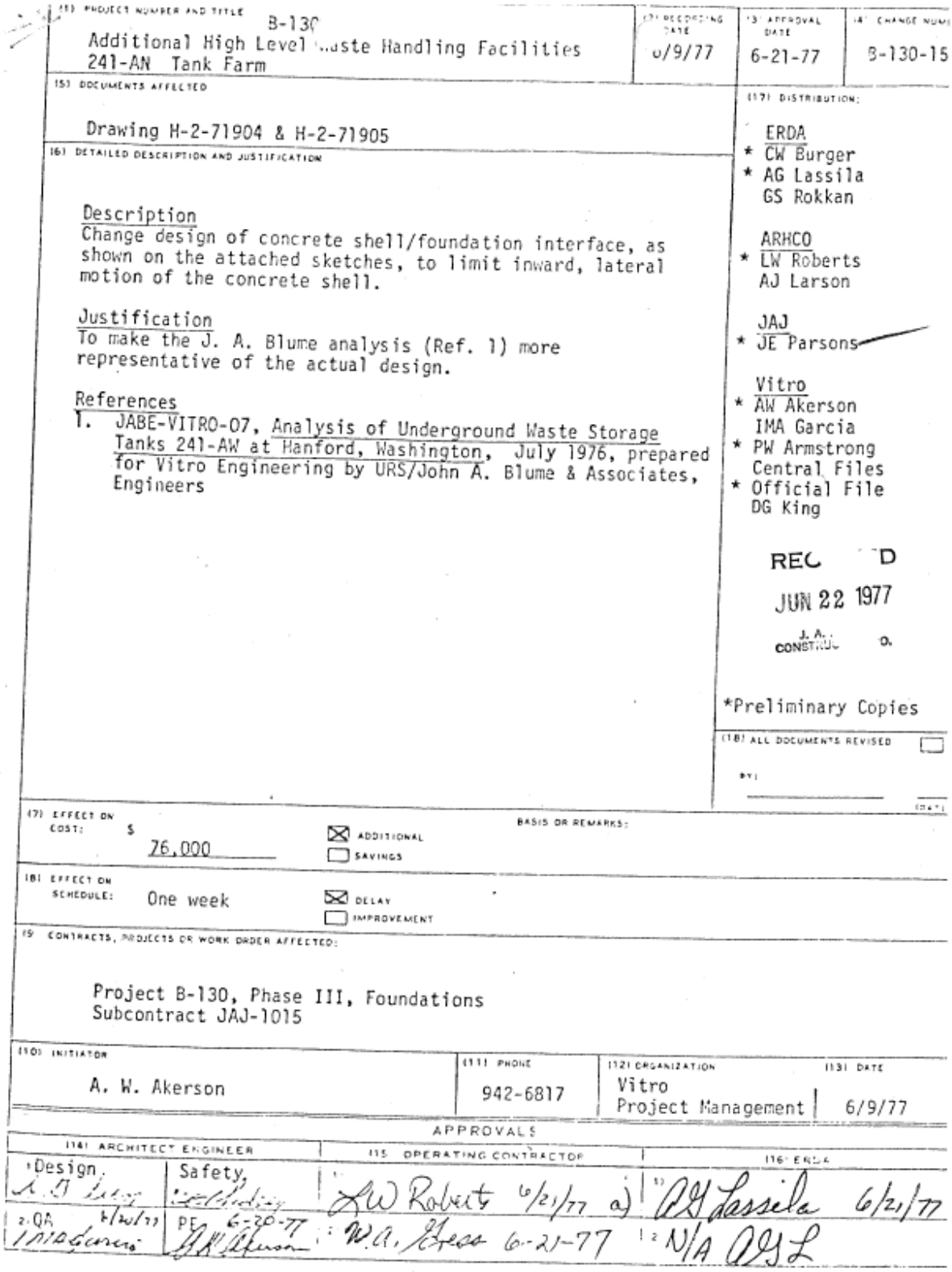
Number	Date	Tank	Comments	Event Type[7]
493.	6/22/1979		No work by Halvorson due to contaminated soil in the tank farm. J.A. Jones completed removal of the surface contamination in the tank farm and haul road. Rockwell provided Excavation Permit 79-113 for clean backfill to bring the tank farm back to its original grade.	CM/CI
494.	6/25/1979		No work by Halvorson due to contamination in the tank farm. J.A. Jones started placement of clean backfill material over the contaminated soil on the north side of the tank farm. Tank farm should be released to Halvorson Thursday morning for concrete placement on the domes.	CM/CI
495.	6/26/1979		No work by Halvorson due to radiological conditions in the tank farm. J.A. Jones continued covering contaminated soil on the north side of the tank farm; started placement of clean material in the tank farm proper.	CM/CI
496.	6/27/1979		No work by Halvorson due to radiological conditions in the tank farm. J.A. Jones continued backfill of the tank farm.	CM/CI
497.	6/28/1979	106, 107	Halvorson sandblasted the construction joint on tank 106 and stripped the bulkhead on tank 107.	CM
498.	6/29/1979	102, 103, 106	Halvorson worked on setting screeds for the domes of tanks 102, 103, and 106. Installing rebar on the domes of tanks 103 and 106.	CM
499.	7/2/1979	103, 106, 107	Halvorson worked on cleanup of the domes and setting screeds for the concrete pours for tanks 103 and 106.	CM
500.	7/3/1979	106, 107	Placing screeds for dome concrete pour for tank 106. Cleanup for dome pour, JAJ backfilling north of tank 107.	CM

Number	Date	Tank	Comments	Event Type[7]
501.	7/5/1979	101, 102, 103, 104, 105, 106 107	Dan Doyle, American Bridge, was on the jobsite pressurizing tanks for the dome encasement support. Set screeds for dome concrete pour on tank 107. Checkout domes for concrete pour on tanks 103 and 106. Cleaned dome on tank 102.	CM
502.	7/6/1979	101, 102, 105	Set screeds for dome pour on tanks 102 and 105. Cleaned up tank top on tank 101. J.A. Jones continued backfilling an additional 8 feet north of existing.	CM
503.	7/9/1979	103	Poured dome encasement on tank 103. J.A Jones continued extending backfill north of tanks 105 and 107.	CM
504.	7/10/1979	106	Poured dome encasement on tank 106. J.A. Jones continued extending backfill north of the tanks.	CM
505.	7/11/1979	107	Poured dome encasement on tank 107. J.A. Jones completed the backfill extension of tank farm to elevation 651'.	CM
506.	7/12/1979	102	Halvorson placed concrete on the dome of tank 102; prepped for the following day's pour.	CM
507.	7/13/1979	105	Halvorson placed concrete on the dome of tank 105; prepped for Monday's concrete pour.	CM
508.	7/16/1979	104	Halvorson placed concrete on the dome of tank 104; prepped for tomorrow's placement.	CM
509.	7/17/1979	101	Tank 101 dome concrete poured completing all tank encasements.	CM
510.	7/19/1979	103	J.A. CPAF is making preparations to pump water out of tank 103.	CM
511.	7/20/1979		J.A. Jones CPAF worked on installation of tank water removal equipment.	CM

Number	Date	Tank	Comments	Event Type[7]
512.	7/23/1979	103	McMillin Brothers drained tank 103 dome and cut holes for the water discharge pumps in the 42" riser caps. J.A. Jones installed pumps in tank 103.	CM
513.	7/24/1979	103, 106	McMillin Brothers opened a riser on tank 106 to drain the dome. J.A. Jones began pumping water from tank 103 at 10:45 a.m.	CM
514.	7/25/1979	103	J.A. Jones CPAF completed pumping water out of tank 103.	CM
515.	7/26/1979	103, 106	J.A. Jones CPAF began setting pumps in tank 106.	CM
516.	7/27/1979	102, 107	Tank 102 dome as drained. J.A. Jones pumped water from tank 107.	CM
517.	7/30/1979	105, 107	J.A. Jones pumped out tank 107 and moved pumps and pipe on to tank 105.	CM
518.	7/31/1979	105	J.A. Jones is pumping water from tank 105.	CM
519.	8/1/1979	105	J.A. Jones pumped water from tank 105.	CM
520.	8/2/1979	104	McMillin Brothers backfilled the tank farm between tanks. J.A. Jones began pumping water from tank 104.	CM
521.	8/3/1979	104	J.A. Jones pumped water from tank 104.	CM
522.	8/6/1979	101, 104	J.A. Jones completed pumping water out of tank 104 and moved to tank 101.	CM
523.	8/7/1979	101	J.A. Jones pumped water from tank 101.	CM

APPENDIX B SUPPORTING DOCUMENTATION

App. Figure B-1. Design Change B-130-15



(5) PROJECT NUMBER AND TITLE
B-130
Additional High Level Waste Handling Facilities
241-AN Tank Farm

(2) RECEIVING DATE: 6/9/77

(3) APPROVAL DATE: 6-21-77

(4) CHANGE NUMBER: B-130-15

(15) DOCUMENTS AFFECTED

Drawing H-2-71904 & H-2-71905

(16) DETAILED DESCRIPTION AND JUSTIFICATION

Description
Change design of concrete shell/foundation interface, as shown on the attached sketches, to limit inward, lateral motion of the concrete shell.

Justification
To make the J. A. Blume analysis (Ref. 1) more representative of the actual design.

References
1. JABE-VITRO-07, Analysis of Underground Waste Storage Tanks 241-AW at Hanford, Washington, July 1976, prepared for Vitro Engineering by URS/John A. Blume & Associates, Engineers

(17) DISTRIBUTION:

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JUN 22 1977
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CONSULTING ENGINEERS

*Preliminary Copies

(18) ALL DOCUMENTS REVISED ☐
BY:
(DATE)

(7) EFFECT ON COST: $ 76,000 ☒ ADDITIONAL ☐ SAVINGS
BASIS OR REMARKS:

(8) EFFECT ON SCHEDULE: One week ☒ DELAY ☐ IMPROVEMENT

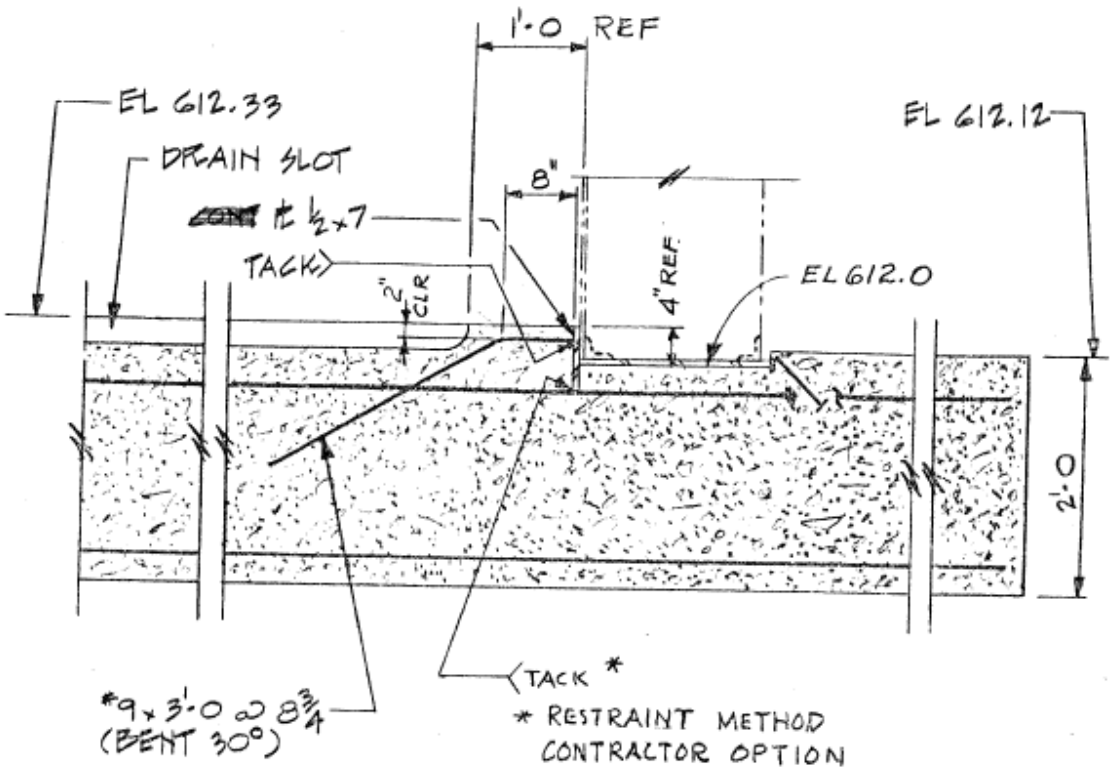
(9) CONTRACTS, PROJECTS OR WORK ORDER AFFECTED:

Project B-130, Phase III, Foundations
Subcontract JAJ-1015

(10) INITIATOR	(11) PHONE	(12) ORGANIZATION	(13) DATE
A. W. Akerson	942-6817	Vitro Project Management	6/9/77

APPROVALS

(14) ARCHITECT ENGINEER		(15) OPERATING CONTRACTOR	(16) ERDA
1. Design [signature]	Safety [signature]	[signature] LW Roberts 6/21/77	[signature] AG Lassila 6/21/77
2. QA [signature] 6/20/77	PE [signature] 6-20-77	[signature] W. A. Hess 6-21-77	2. N/A [signature]



NOTE: DETAIL MODIFIED ONLY AS SHOWN.

MODIFIES DETAIL 7 H-2-71904

0 2FT 3/4"=1'-0

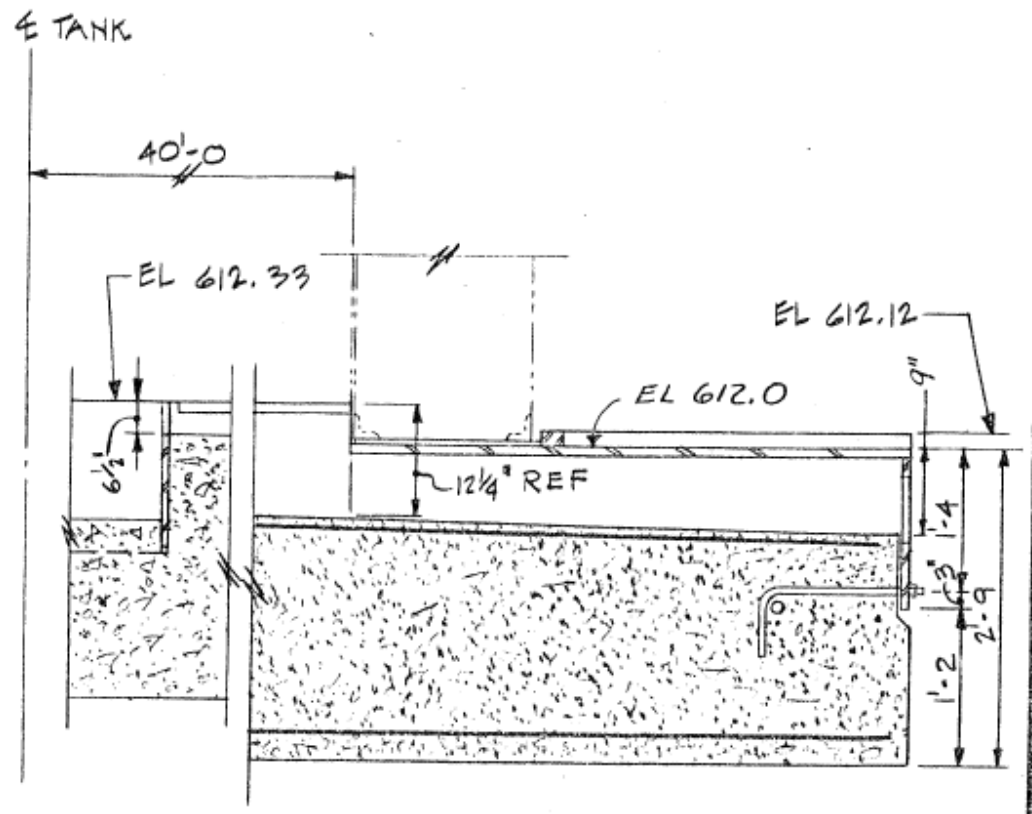
NO.	DATE	DESCRIPTION	BY	CH	AP
REVISIONS					

U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
RICHLAND OPERATIONS OFFICE
ATRO ENGINEERING CORPORATION

SCALE	SHOWN	APPD.	
DRAWN	PMB 6-16-77	CLASSIFICATION	
CHKD.	DL 6-17-77	CLASS. BY	

MODIFICATION TO SLAB OF TANK PROJECT B-130

SAF RE Chidsey 6-20-77
QA J MAGarcia 6/20/77
SKETCH NO. ES-130-H1



NOTE: DETAIL MODIFIED ONLY AS SHOWN.

MODIFIES DETAIL 5 H-2-71904

0 2 PT 3/4"=1'-0

NO.	DATE	DESCRIPTION	BY	CH	AP
REVISIONS					

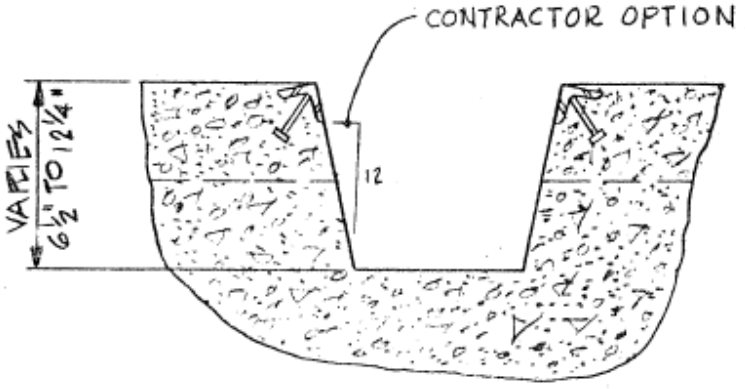
U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
RICHLAND OPERATIONS OFFICE
VITRO ENGINEERING CORPORATION

SCALE	SHOWN	APPD.	
DRAWN	PMB 6-16-77	CLASSIFICATION	
CHKD.	DL 6-17-77	CLASS. BY	

MODIFICATION TO SLAB OF TANK PROJECT B-130

SAF RC Chidsey 6-20-77
QA IMA Gasiu 6/20/77
SKETCH NO. ES-130-H2

VE-147 (1-76)



NOTE: DETAIL MODIFIED ONLY AS SHOWN.

MODIFIES DETAIL 4 H-2-71904

0 6 IN 3"=1'-0

NO.	DATE	DESCRIPTION	BY	CH	AP
REVISIONS					

U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
RICHLAND OPERATIONS OFFICE
VITRO ENGINEERING CORPORATION

SCALE	SHOWN	APPD.	
DRAWN	PME 6-17-77	CLASSIFICATION	
CHKD.	DL 6-17-77	CLASS. BY	

MODIFICATION TO SLAB OF TANK PROJECT B-130

SAF RECheney 6-20-77
QA [illegible] 6/20/77
SKETCH NO. ES-130-H3

VE-147 (1-76)

App. Figure B-2. March 28, 1978, Memorandum Regarding Change in Stress Relieving Procedure

BOX
83195

VITRO ENGINEERING CORPORATION

INTER – OFFICE MEMORANDUM

DATE March 28, 1978

TO Distribution

FROM A. W. Akerson — Project Management (LOCATION OR DEPARTMENT)

SUBJECT Project B-120, 241-AW Tank Farm — Title III, W. O. C12003

References: 1. Subcontract JAJ-932, with American Bridge Division of United States Steel Corporation, for design and construction of steel tanks.
2. Procurement Data Transmittal #932-34 (Stress Relieving Procedure)

Attached is a modification to American Bridge's reference 2 stress-relieving procedure for Tank 241-AW-102. This modification is intended to prevent a reoccurance of the dome distortion that occured during stress-relieving of Tank 241-AW-101. American Bridge feels that reducing the temperature to which the dome penetrations are exposed will provide a satisfactory solution to the problem. This management team action was taken after discussion was held and agreement was reached among the participants at a meeting held 3/21/78 at the JAJ, 241-AW Trailer, 200 East Area, from 10:30-12:00AM--The following participants were in attendance:

DOE	RHO	Vitro	JAJ	American Bridge
RD Freeberg	JD Galbraith	AW Akerson	JJ Flannery	CJ Madewell
AG Lassila	HA Reading	P. Felise	DR Olney	JS Renner (Cooperheat)

Please add this to your files as authority for proceeding with the stress-relieving of Tank 241-AW-102 prior to disposition of the NCR covering the dome distortion of Tank 241-AW-101 and to account for this deviation in the approved stress-relieving procedure.

Distribution
JM Johnston, 2101M
JV Lawler

cc: RD Freeberg, DoE-RL
AG Lassila, DoE-RL
(2) JD Galbraith, RHO, 2704W
(2) JJ Flannery, JAJ, 241-AW Trlr. 200E
P. Felise
IMA Garcia/WH Brayman
CW Kelley
EV Norris
Central Files/B-120
AWA Files/B-120, 0.0d
LB:B-120-61

VE-60 (9-77)

Per verbal notification of American Bridge on March 21, 1978, the following modifications to the stress relieving procedure for Tank 102 are acceptable:

1. Insulate air tubes to one foot below dome.
2. Install thermocouple @ each penetration where burner and/or damper is located.
3. Stress relieve 3 hours @ 1000°F.

This action is taken with the understanding that should distortion occur in the Tank 102 dome because of the stress relieving operation, further resolution will be required from American Bridge before any further tanks are stress relieved.

DoE R. E. Isenberg

RHO H. A. Reading 3/21/78

Vitro A. W. Aderson 3-21-78

JAJ J. J. Jamison 3-21-78

App. Figure B-3. April 21, 1978 Memorandum S. Bucksbaum to C. J. Madewell Regarding Stress Relief Procedure

American Bridge
Division of United States Steel Corporation

RECEIVED
APR 24 1978
AB CONST. DEPT.
HANFORD-RICHLAND, WASH.

DD WAI WMB VF — CJM SFH PNB

Interorganization Correspondence

Date: April 21, 1978

To: C. J. MADEWELL
Project Manager
ABD - Richland

From: S. BUCKSBAUM
Assistant District Engineer
ABD - Los Angeles

Subject: ABD Job No. K-9224
Stress Relief

During my visit to the site on 4/10/78 we were asked to present the results of any additional analysis done with respect to stress relief of the tanks. One area of particular interest was the matter of internal pressure in Tank 101 during stress relief.

First, it should be noted that the calculations for conditions during stress relief presented in the Design Report are based on zero internal pressure. Inspection of Tables 5.4(a) and 5.4(b) shows low general stresses which are to be compared to the allowable stresses developed in Appendix A-2. The conclusion of the Design Report is that the tank is safe to stress relieve without internal pressurization.

Second, in our letter of September 8, 1977 we discussed the matter of bumps and ridges in the bottoms of previously constructed tanks - particularly with reference to the contribution that the stress relief operation had in their formation. Based on Computer Analysis AW1XDFA, the conclusion reached in this letter was that if pressurized to 3-1/2" of H_2O during stress relief, the load to the lower tangent point of the bottom knuckle would be lower than when dead load only is applied and that the stresses throughout the tank were quite low.

The lowest internal pressure reported while Tank 101 was over 1000F was 1.6" H_2O. We attach computer output AW1XD62 which still shows low stresses throughout the tank.

We conclude that the reduced internal pressure was not harmful to the tank. We do, however, continue to believe that the optimum internal pressure in the tank is 3-1/2" of water and have taken steps to assure its maintenance during future operations. Before attempting stress relief of Tank 102, we directed our subcontractor to close up the gaps in the gimbal plate burner mountings with sheet asbestos. This was done and a pressure of over 3" of water was maintained.

Another matter of interest was the distortions observable in the dome of Tank 101 (and Tank 102) which has been considered as follows. On Tank 101 the dome was at or above 1000F from 0200 3/5/78 to 1100 3/5/78, that is, about 9 hours. The maximum temperature was about 1170F. If the distortions were caused by creep, there were two obvious measures which could be taken to reduce those distortions. The temperature, and the time at temperature

could be substantially reduced. On Tank 102, the dome was at or above 1000F from 1530 3/23/78 to 2230 3/23/78, that is, about 7 hours. The maximum temperature was about 1090F. There was a very substantial reduction in distortion. Efforts will continue to reduce the time at temperature which will further reduce the distortions.

The remaining component of creep is stress. We adapted the computer model used in Appendix C-4 of the Design Report to include the effect of a 42" nozzle at the center of the dome using 3/8" plate. We did several static, small deflection analyses based on a burner weight of 800 lbs. as follows:

AW1XDPI	Simulate Tank 101	Burner on nozzle, Int Pressure 2"
AW1XDPL	Simulate Tank 102	Burner on nozzle, Int Pressure 3-1/2"
AW1XDPY	Alternate	Burner on nozzle, Int Pressure 4-1/2"
AW1XDPX	Simulate Tank 103	No load to nozzle, Int Pressure 3-1/2"

The models used are shown on sheets SK1 and SK2, dated 4/5/78, enclosed.

Study of the results of these analyses shows that removing the burner weight from the nozzle reduces the stress by about one-half, and, increasing the internal pressure has practically no effect on the local stresses caused by the weight of the nozzle and burner. We do not propose to use the 42" nozzles to heat the remaining tanks.

Results of the stress relief of Tank 103 indicate that the distortions have been reduced to acceptable levels. Those that remain are consistent with the strains to be expected at weld seams after stress relief and with the effect of self-weight of the various nozzles.

The effect of the distortions in the dome of Tanks 101 and 102 on concrete placement has been reviewed. The dome was never capable of resisting the concrete placement loads without support. The scheme presented in the Design Report (Section 5.6.2 and Appendices C-9, C-10 and C-11) for support of the roof utilizes water pressure for support of the dome during concrete placement. The use of this method generates only tensile stresses in the dome before, during, and after placement at the concrete. With the concrete in place, the tensile stresses approach zero.

There was a question regarding the stresses currently existing in the domes. Forming, fitting and welding introduce a very complex system of stresses. When a plate is bent to a shape, it is obvious that the surfaces at least, are at the yield point. Similarly, welding introduces yield level stresses. Upon heating to 1170F (Tank 101) or 1070F (Tank 102) the yield point is very substantially reduced. The material after cooling has stresses in it at about that level. Design Report Appendix A2, page 9,

provides test results for Medium Carbon Steel. We enclose a similar page of test results for USS Cor-Ten which gives an idea of the effect on yield strength of a steel with room temperature yield strength above 50,000 psi.

Based on the analysis described above, and the refinement of the stress relief procedure to minimize distortions we should proceed with the stress relief of the remaining tanks and release them for concrete placement upon completion of the hydrotest.

By G. S. Preston

GSP:rs
Enclosures:
SK1 4/5/78
SK2 4/5/78
AW1XD62
AW1XDPI
AW1XDPL
AW1XDPY
AWSXDPX
p. 30, Steels at Elevated Temperatures

cc: J. W. Fecko (w/o enclosures)
W. D. McGregor - ABD-SSF (w/o enclosures)

App. Figure B-4. Inspection Report, December 13, 1978

VITRO ENGINEERING CORPORATION

INSPECTION REPORT

Project or Work Order Number: B-130. TANK FARM

Date: 12-13-78

1. Discipline(s) involved in my activity today:

☐ Survey ☐ C/S ☐ Mech (HVAC) ☒ Mech (Pipe/Vessels) ☐ Electrical

☐ Instr. ☐ Other

2. Was job site visited? ☒ YES ☐ NO

If yes, were contractor personnel working? (personal observation) ☒ YES ☐ NO

3. Did weather conditions hinder construction activity? ☐ YES ☒ NO

If yes, explain

Was any work rejected due to weather elements? ☐ YES ☒ NO

If yes, explain

4. Were inspection functions performed today? ☒ YES ☐ NO

If yes, what items were inspected?	ACC	REJ	DOCUMENT NO.
TANK No 102. HAUNCH RISER. IN FITUP & FABRICATION STAGE. — WATER HYDRO IN PROGRESS.			
TANK No 106. DOME TOP WELD'S SEAM IN HEAVY FABRICATION			

5. Ware activities other than inspection performed? ☐ YES ☐ NO

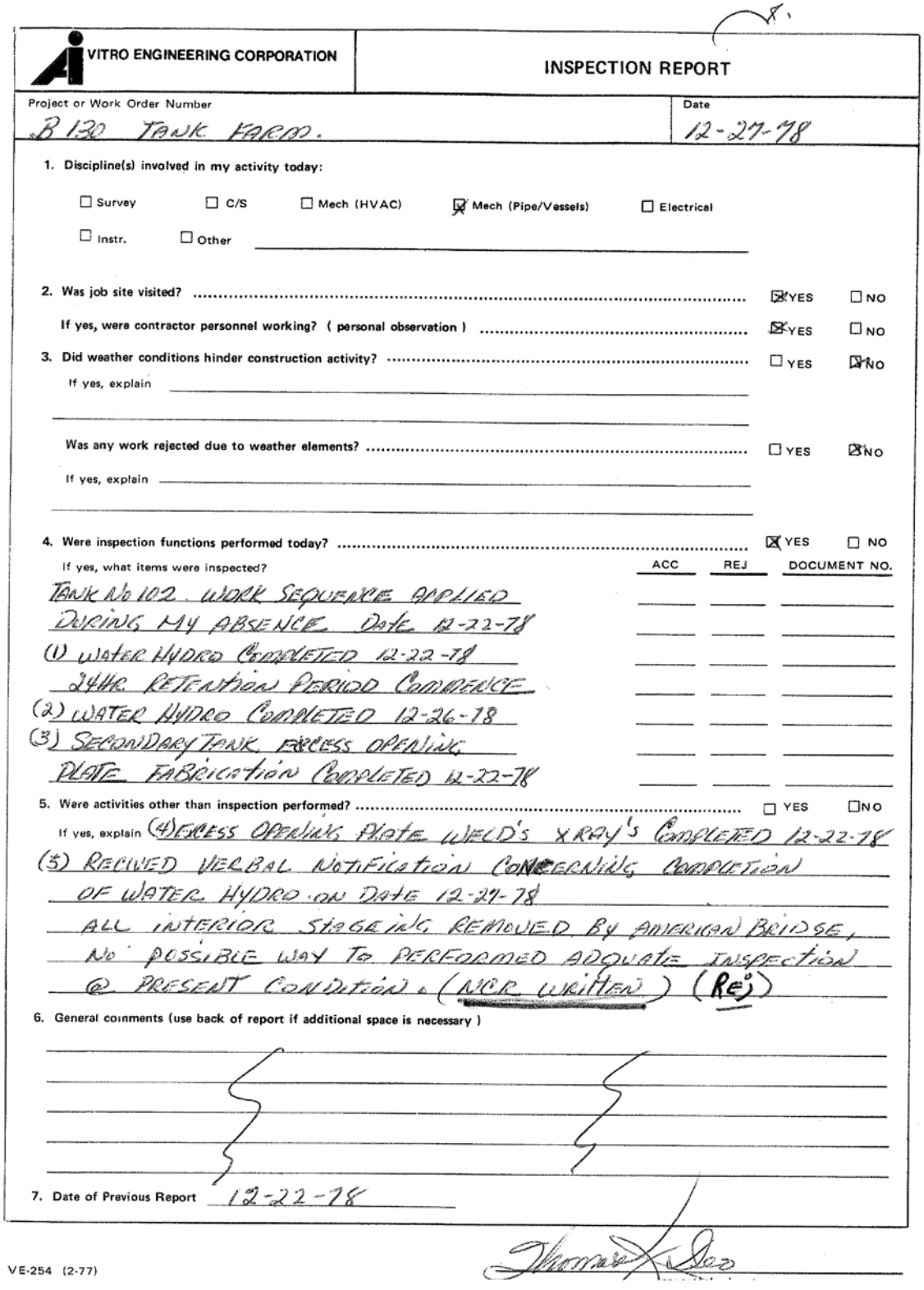
If yes, explain TANK No. 104. REBAR CURTAINS (2) IN PLACE. PRESENTLY IN PREPARATION FOR CONCRETE POUR.
TANK No. 101 REBAR CURTAINS ARE BEING INSTALLED.
Note: TK 104 REBAR WORK WERE FOUND SATISFACTORY
TK 101 REBAR CURTAIN APPLICATION WORK WERE SATISFACTORY.

6. General comments (use back of report if additional space is necessary)

7. Date of Previous Report 12-11-78

VE-254 (2-77)

App. Figure B-5. Inspection Report, December 27, 1978



VITRO ENGINEERING CORPORATION

INSPECTION REPORT

Project or Work Order Number: B 130 TANK FARM.

Date: 12-27-78

1. Discipline(s) involved in my activity today:

☐ Survey ☐ C/S ☐ Mech (HVAC) ☒ Mech (Pipe/Vessels) ☐ Electrical

☐ Instr. ☐ Other

2. Was job site visited? ☒ YES ☐ NO

If yes, were contractor personnel working? (personal observation) ☒ YES ☐ NO

3. Did weather conditions hinder construction activity? ☐ YES ☒ NO

If yes, explain

Was any work rejected due to weather elements? ☐ YES ☒ NO

If yes, explain

4. Were inspection functions performed today? ☒ YES ☐ NO

If yes, what items were inspected?	ACC	REJ	DOCUMENT NO.
TANK No 102 WORK SEQUENCE APPLIED			
DURING MY ABSENCE. Date 12-22-78			
(1) WATER HYDRO COMPLETED 12-22-78			
24HR. RETENTION PERIOD COMMENCE			
(2) WATER HYDRO COMPLETED 12-26-78			
(3) SECONDARY TANK ACCESS OPENING			
PLATE FABRICATION COMPLETED 12-22-78			

5. Were activities other than inspection performed? ☐ YES ☐ NO

If yes, explain (4) ACCESS OPENING PLATE WELD'S X RAY'S COMPLETED 12-22-78
(5) RECIVED VERBAL NOTIFICATION CONCERNING COMPLETION OF WATER HYDRO ON DATE 12-27-78
ALL INTERIOR STAGEING REMOVED BY AMERICAN BRIDGE, NO POSSIBLE WAY TO PERFORMED ADQUATE INSPECTION @ PRESENT CONDITION. (NCR WRITTEN) (Rej)

6. General comments (use back of report if additional space is necessary)

7. Date of Previous Report 12-22-78

Thomas L. Dee

VE-254 (2-77)

App. Figure B-6. Inspection Report, January 8, 1979

VITRO ENGINEERING CORPORATION

INSPECTION REPORT

Project or Work Order Number: B-130

Date: 1-8-79

1. Discipline(s) involved in my activity today:

☐ Survey ☐ C/S ☐ Mech (HVAC) ☒ Mech (~~Pipe~~/Vessels) ☐ Electrical

☐ Instr. ☐ Other _____

2. Was job site visited? ..... ☒ YES ☐ NO

If yes, were contractor personnel working? (personal observation) ..... ☒ YES ☐ NO

3. Did weather conditions hinder construction activity? Extreme cold weather ..... ☒ YES ☐ NO

If yes, explain _____

Was any work rejected due to weather elements? ..... ☐ YES ☒ NO

If yes, explain _____

4. Were inspection functions performed today? ..... ☒ YES ☐ NO

If yes, what items were inspected?	ACC	REJ	DOCUMENT NO.
I witnessed the hydrostatic test performed on primary Tank #102. It should be noted that witnessing this test was performed at ground elevation since no staging or platforms were made available for title III	X		

5. Were activities other than inspection performed? ..... ☐ YES ☐ NO

If yes, explain to perform the out inspection of weldments. The weld seams had previously been coated with a blue chalk mixture but this coating had been flaked off or worn off by weather conditions since its application. There was also no lighting made available except for the 5 cell flash light I carried. The

6. General comments (use back of report if additional space is necessary)

above conditions I feel are not adequate ~~is~~ for the performance of these hydrostatic testing and should most certainly be improved on the following tank hydrotests. THERE HAS ALSO BEEN 0° WEATHER FOR the past two week period & any small leak would freeze & not show up (possibly).

7. Date of Previous Report 1-5-79

VE-254 (2-77)

James H Parrish
Inspector's signature

App. Figure B-7. NCR B-130-56

NONCONFORMANCE REPORT

(1A) PROJECT, LOCATION OR W.O.	(1B) TITLE	(1C) NCR NO.
B-130	Additional High Level Waste Schedule Facilities, 241-AN Tank Farm	B-130-56 (1000-26)

(1D) REQUIREMENTS AND NONCONFORMANCE DESCRIPTION

This NCR supersedes NCR#B-130-52 & NCR B-130-53 Requirements.

1. Construction Specification B-130-C4, Paragraph 3.03.A.3, Page 15176-16, requires administration notification of the schedule of all Non Destructive Testing.

2. Vitro B-130 - Phase IV Inspection Plan, Appendix D, Inspection Hold Points.

NONCONFORMANCE DESCRIPTION

1. Adequate access and lighting was not provided for Vitro Title III inspection personnel to perform 100% visual weld examination.

2. The chalk was not adequate to provide 100% visual inspection for Vitro Title III personnel.

(1G) DISTRIBUTION

ACTION:
DOE
*RD Freeberg
*AG Lassila

RHO
*JT Belcher
*MA Cahill

INFORMATION
JAJ
LJ Maenpaa
*DR Olney

VITRO
IMA Garcia
WH Hays
*NR Kerr
*JH Parrish
*EM Zdravkovich

Central File
*Official File/2101M
*Preliminary Copies

(1E) HOLD TAG NO.

(1F) ORIGINATOR, TITLE AND DATE

NR Kerr Project Engineer for GS Rokkan DOE 1/29/79

(2A) RECOMMENDED DISPOSITION:

- [X] ACCEPT AS IS
- [ ] CONDITIONAL ACCEPT
- [ ] REWORK
- [ ] REPAIR
- [ ] REJECT
- [ ] OTHER (SPECIFY):

(2B) DISPOSITION JUSTIFICATION

1. Coordination by JA Jones shall be implemented with Vitro Title III inspection personnel to insure adequate inspection conditions exist prior to inspection; access, lighting & chalking.

2. Hydrostatic test was inspected and certified by sub-contract "American Bridge" and was found to meet the specification requirements. This will release Vitro Title III inspection personnel to comply to the hold point of the inspection plan for Tank 102.

Inspection Report of American Bridge K9263 Tank 103 and K9263 Tank 102 attached.

FEB 27 1979

J. A. JONES CONSTRUCTION CO.

(2C) DESIGN CHANGE REQUIRED?

- [ ] YES
  NO. _____
- [X] NO

(2D) APPROVALS (SIGNATURE AND DATE) Vitro Engr.

Design Safety R.H. Dennis 1/30/79

QA Mgr 1/31/79

Proj Engr

(2E) CONCURRENCE - (SIGNATURE AND DATE)

2/5/79

2-5-79

2/14/79

2/14/79

(3A)

- [X] DISPOSITION EFFECTED AS DIRECTED. NCR CLOSED.
- [ ] OTHER (SPECIFY)

ORIGINATOR OR REPRESENTATIVE

2/21/79
DATE

App. Figure B-8. Inspection Report, January 5, 1979

VITRO ENGINEERING CORPORATION

INSPECTION REPORT

Project or Work Order Number: B-130

Date: 1-5-79

1. Discipline(s) involved in my activity today:

☐ Survey ☐ C/S ☐ Mech (HVAC) ☒ Mech (Pipe/Vessels) ☐ Electrical

☐ Instr. ☐ Other

2. Was job site visited? ☒ YES ☐ NO

If yes, were contractor personnel working? (personal observation) ☒ YES ☐ NO

3. Did weather conditions hinder construction activity? ☐ YES ☒ NO

If yes, explain

Was any work rejected due to weather elements? ☐ YES ☒ NO

If yes, explain

4. Were inspection functions performed today? ☒ YES ☐ NO

If yes, what items were inspected?

	ACC	REJ	DOCUMENT NO.
(1) TANK No. 106. STRESS RELIEF OPERATION COMPLETED. - Results of THIS OPERATION WERE SATISFACTORY.	✓		
(2) TANK No. 103. HAUNCH RISER (INTERIOR) & GIRT WELDS WERE VISUALLY INSPECTED. NOTE: THIS WORK WERE FOUND ACCEPTABLE. - WATER HYDRO ACCEPTED	✓		

5. Were activities other than inspection performed? ☐ YES ☐ NO

If yes, explain (3) TANK No 105. MT. PERFORMANCE COMPLETED SATISFACTORY. HAUNCH PLATE FITUP IN PROGRESS. - INSPECTOR NOTED CHALKING HAVE BEEN APPLIED. No WATER HYDRO ~~APPLIED~~ WITNESSED JHP at PRESENT. - REQUESTED RECHALKING OF ALL WELD'S AS REQUIRED PER SPEC.

6. General comments (use back of report if additional space is necessary)

7. Date of Previous Report 1-4-79

VE-254 (2-77)

Inspector's signature

App. Figure B-9. Inspection Report, January 15, 1979

VITRO ENGINEERING CORPORATION

INSPECTION REPORT

Project or Work Order Number: B130. TANK FARM.

Date: 1-15-79

1. Discipline(s) involved in my activity today:

☐ Survey ☐ C/S ☐ Mech (HVAC) ☒ Mech (Pipe/Vessels) ☐ Electrical

☐ Instr. ☐ Other

2. Was job site visited? ☒ YES ☐ NO

If yes, were contractor personnel working? (personal observation) ☒ YES ☐ NO

3. Did weather conditions hinder construction activity? ☐ YES ☒ NO

If yes, explain

Was any work rejected due to weather elements? ☐ YES ☒ NO

If yes, explain

4. Were inspection functions performed today? ☒ YES ☐ NO

If yes, what items were inspected?

	ACC	REJ	DOCUMENT NO.
(1) TANK No. 106. M.T. REQUIREMENTS IN THIS STAGE. ALL RESIDUE AND OTHER DETRIMENTAL'S ARE BEING REMOVE & CLEANING OF WELD SEAMS IN PROGRESS. INSPECTION WILL CONTINUE AS WORK PROGRESSES.			
Notes: Inspection Incomplete			

5. Were activities other than inspection performed? ☐ YES ☐ NO

If yes, explain (2) TANK No. 105 - NELSON SHELL & MANWAY RISER IN FABRICATION (SHELL) RESULTS, WORK APPLICATION WERE FOUND SATISFACTORY - INSPECTION WILL CONTINUE AS WORK PROGRESSES.

(3) TK No. 105 - NOTE: THERE IS NO WATER HYDRO. REQUIREMENTS APPLIED @ PRESENT. — CHALKING IS COMPLETED @ PRESENT.

6. General comments (use back of report if additional space is necessary)

7. Date of Previous Report 1-12-79

VE-254 (2-77)

Inspector's signature

App. Figure B-10. Inspection Report, February 2, 1979

VITRO ENGINEERING CORPORATION

INSPECTION REPORT

Project or Work Order Number: TANK FARM - B-130.

Date: 2-2-79

1. Discipline(s) involved in my activity today:

☐ Survey ☐ C/S ☐ Mech (HVAC) ☒ Mech (Pipe/Vessels) ☐ Electrical

☐ Instr. ☐ Other _____

2. Was job site visited? ..... ☒ YES ☐ NO

If yes, were contractor personnel working? (personal observation) ..... ☒ YES ☐ NO

3. Did weather conditions hinder construction activity? ..... ☐ YES ☒ NO

If yes, explain _____

Was any work rejected due to weather elements? ..... ☐ YES ☒ NO

If yes, explain _____

4. Were inspection functions performed today? ..... ☒ YES ☐ NO

If yes, what items were inspected?

	ACC	REJ	DOCUMENT NO.
TANK FARM - TK No. 105. HAUNCH			
GIRT WELDING & FINAL CLEAN-			
UP COMPLETED. VISUAL			
INSPECTION RESULTS WERE			
SATISFACTORY - WATER HYDRO	✓		
PERFORMANCE IN PROGRESS.			
RECHALKING ON ALL WELD SEAMS Required. (PRIMARY TANK)			

5. Were activities other than inspection performed? ..... ☐ YES ☐ NO

If yes, explain _____

6. General comments (use back of report if additional space is necessary)

7. Date of Previous Report 2-1-79

VE-254 (2-77)

Inspector's signature

App. Figure B-11. Inspection Report, February 6, 1979

VITRO ENGINEERING CORPORATION

INSPECTION REPORT

Project or Work Order Number: B-130 TANK FARM

Date: 2-6-79

1. Discipline(s) involved in my activity today:

☐ Survey ☐ C/S ☐ Mech (HVAC) ☒ Mech (Pipe/Vessels) ☐ Electrical

☐ Instr. ☐ Other

2. Was job site visited? ☒ YES ☐ NO

If yes, were contractor personnel working? (personal observation) ☒ YES ☐ NO

3. Did weather conditions hinder construction activity? ☐ YES ☒ NO

If yes, explain

Was any work rejected due to weather elements? ☐ YES ☒ NO

If yes, explain

4. Were inspection functions performed today? ☒ YES ☐ NO

If yes, what items were inspected?	ACC	REJ	DOCUMENT NO.
TANK No. 106 HAUNCH PLATE GIRT WELDING TO SECONDARY IN PROGRESS, INCLUDING HAUNCH RISER LAYOUT & FITUP. WORK APPLICATION RESULTS WERE FOUND SATISFACTORY.	✓		

5. ~~Were activities other than inspection performed~~? ☐ YES ☐ NO

If yes, explain TANK No. 105. WATER HYDRO REJECTED DUE MOISTURE AND INADQUATE CHALKING - REQUEST RECHALKING AFTER MOISTURE IS DRIED FROM EXTERIOR OF PRIMARY TANK. INSPECTION WILL CONTINUE

6. General comments (use back of report if additional space is necessary)

7. Date of Previous Report 2-5-79

VE-254 (2-77)

Inspector's signature

App. Figure B-12. Inspection Report, February 14, 1979

VITRO ENGINEERING CORPORATION

INSPECTION REPORT

Project or Work Order Number: B-130

Date: 2-14-79

1. Discipline(s) involved in my activity today:

☐ Survey ☐ C/S ☐ Mech (HVAC) ☑ Mech ~~(Pipe/A~~ essels) ☐ Electrical

☐ Instr. ☐ Other _____

2. Was job site visited? ..... ☒ YES ☐ NO

If yes, were contractor personnel working? (personal observation) ..... ☒ YES ☐ NO

3. Did weather conditions hinder construction activity? ..... ☐ YES ☒ NO

If yes, explain _____

Was any work rejected due to weather elements? ..... ☐ YES ☒ NO

If yes, explain _____

4. Were inspection functions performed today? ..... ☒ YES ☐ NO

If yes, what items were inspected?	ACC	REJ	DOCUMENT NO.
1) I witnessed the hydro testing of tank 106 primary. (NOTE there are two small wet areas on weld seams that will require looking at tomorrow to make sure it is not a leak in the joint).	X		

5. Were activities other than inspection performed? ..... ☐ YES ☐ NO

If yes, explain 2) Visually inspected areas of weld on the Access opening seal Secondary tk 105 AND ACCEPTED this. there WAS SOME Distortion on this opening WHICH WAS Shown to A. Bridge AND Repaired to AN ACCEPTable Condition.

6. General comments (use back of report if additional space is necessary)

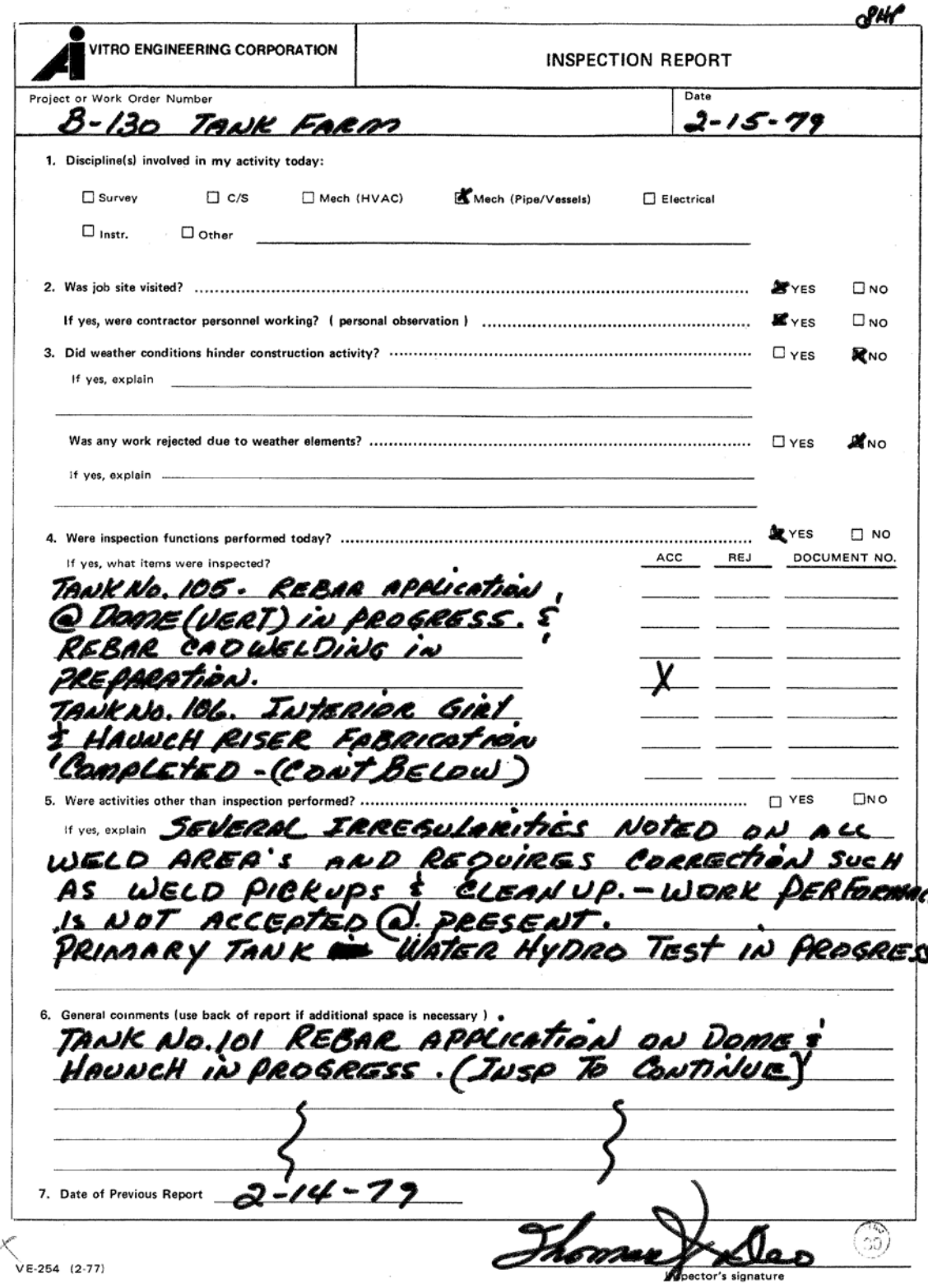
7. Date of Previous Report 1-12-79

VE-254 (2-77)

James H Rinck

Inspector's signature

App. Figure B-13. Inspection Report, February 15, 1979



VITRO ENGINEERING CORPORATION

INSPECTION REPORT

Project or Work Order Number: B-130 TANK FARM

Date: 2-15-79

1. Discipline(s) involved in my activity today:

☐ Survey ☐ C/S ☐ Mech (HVAC) ☒ Mech (Pipe/Vessels) ☐ Electrical

☐ Instr. ☐ Other

2. Was job site visited? ☒ YES ☐ NO

If yes, were contractor personnel working? (personal observation) ☒ YES ☐ NO

3. Did weather conditions hinder construction activity? ☐ YES ☒ NO

If yes, explain

Was any work rejected due to weather elements? ☐ YES ☒ NO

If yes, explain

4. Were inspection functions performed today? ☒ YES ☐ NO

If yes, what items were inspected?

	ACC	REJ	DOCUMENT NO.
TANK No. 105 - REBAR APPLICATION @ DOME (VERT) IN PROGRESS. & REBAR CADWELDING IN PREPARATION.	X		
TANK No. 106. INTERIOR GIRT & HAUNCH RISER FABRICATION COMPLETED - (CONT BELOW)			

5. Were activities other than inspection performed? ☐ YES ☐ NO

If yes, explain SEVERAL IRREGULARITIES NOTED ON ALL WELD AREA'S AND REQUIRES CORRECTION SUCH AS WELD PICKUPS & CLEAN UP. - WORK PERFORMANCE IS NOT ACCEPTED @ PRESENT. PRIMARY TANK WATER HYDRO TEST IN PROGRESS.

6. General comments (use back of report if additional space is necessary).

TANK No. 101 REBAR APPLICATION ON DOME & HAUNCH IN PROGRESS. (INSP TO CONTINUE)

7. Date of Previous Report 2-14-79

Thomas J. Dao

Inspector's signature

VE-254 (2-77)

APPENDIX C TANK DEFICIENCY DOCUMENTATION

App. Figure C-1. Inspection Report, May 16, 1978

VITRO ENGINEERING CORPORATION
Architects • Engineers

INSPECTION REPORT

Project or Work Order Number: B-130

Date: 5-16-78

1. Discipline(s) involved in my activity today:

☐ Survey ☐ C/S ☐ Mech (HVAC) ☑ Mech (Pipe/Vessels) ☐ Electrical

☐ Instr. ☐ Other _____

2. Was job site visited? ☑ YES ☐ NO

If yes, were contractor personnel working? (personal observation) ☑ YES ☐ NO

3. Did weather conditions hinder construction activity? ☐ YES ☑ NO

If yes, explain _____

Was any work rejected due to weather elements? ☐ YES ☑ NO

If yes, explain _____

4. Were inspection functions performed today? ☑ YES ☐ NO

If yes, what items were inspected?

	ACC	REJ	DOCUMENT NO.
TK 102 primary bottom, post move			
MT BEW's 1 thru 8, BNS 6 1 thru 8	✓		
TK 103 primary bottom PT exam			
BNS 4 (0-8), BEW 5, BNS 6, BEW 6, BNS 7 (0-8)	✓		(note)
TK 106 primary bottom, visual BNS 1 & 2	✓		
TK 105 primary bottom, visual BNS 2	✓		
TK 104 primary, shell, visual RS 1 (V5 to V8)	✓		

5. Were activities other than inspection performed? ☑ YES ☐ NO

If yes, explain I found one area exceeding the 3/8" per foot on TK 102 primary bottom near Knuckle 7 and wrote N.C.R. One area near BNS 3 (2m. 26) TK 102 had a lamination in the plate and was been ground out. I talked with Paul Felise, Vitro design concerning the lamination

6. General comments (use back of report if additional space is necessary)

(Sctd) and he advised me that a grind, weld, grind and MT would be an acceptable Fix. (note) BNS 6 (32-33) & (39-40) was welded and re PT'd.

7. Date of Previous Report 5-15-78

VE-254 (2-77)

M. C. [illegible]
Inspector's signature

App. Figure C-2. NCR B-130-32

RL-604 (3-76)

NONCONFORMANCE REPORT

(1A) PROJECT, LOCATION OR W.O.	(1B) TITLE	(1C) NCR NO.
B-130	ADDITIONAL HIGH LEVEL WASTE STORAGE FACILITIES, 241-AN TANK FARM	B-130-32 (1000-9)

(1D) REQUIREMENTS AND NONCONFORMANCE DESCRIPTION

REQUIREMENT

B-130-C4, Section 15176, Part 3.02, B,2, page 15

DESCRIPTION

Initial survey of primary tank bottom 102 indicates that one area at knuckle joint #7 does not meet the required tolerance of 3/8" per foot.

NOTE: The above area exceeds the specified tolerance by approximately 1/16".

RECEIVED
JUN 5 1978
J. A. JONES CONSTRUCTION CO.

(1G) DISTRIBUTION

DOE
*RD Freeberg
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QA

Rockwell
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JAJ
*JJ Flannery
LJ Maenpaa

Vitro
*AW Akerson
*MC Arntzen, Jr.
IMA Garcia
*KA Lucas
*JH Parrish
LH Smith
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*Official File/2101M

*Preliminary Copies

(1E) HOLD TAG NO.	(1F) ORIGINATOR, TITLE AND DATE
N/A	M. C. Arntzen, Jr., Senior Field Inspector 5-15-78

(2A) RECOMMENDED DISPOSITION:

- ☐ ACCEPT AS IS
- ☐ CONDITIONAL ACCEPT
- ☐ REWORK
- ☐ REPAIR
- ☐ REJECT
- ☐ OTHER (SPECIFY):

(2B) DISPOSITION JUSTIFICATION

THIS N.C.R. VOIDED BECAUSE RE-SURVEY PERFORMED ON 5-17-78 REVEALED THIS CONDITION TO BE ACCEPTABLE. JHP 5/25/78

VOID

Per AW Akerson 5-18-78

Results of survey of tank bottom conducted at a later date revealed that deformations were within tolerance.

J. M. Johnston 6-2-78
Redistributed 6-2-78

(2C) DESIGN CHANGE REQUIRED?

- ☐ YES
  NO. _____
- ☐ NO

(2D) APPROVALS (SIGNATURE AND DATE)	(2E) CONCURRENCE - (SIGNATURE AND DATE)
Design	
Safety	
QA PE	

(3A)

- ☐ DISPOSITION EFFECTED AS DIRECTED. NCR CLOSED.
- ☐ OTHER (SPECIFY)

ORIGINATOR OR REPRESENTATIVE _____ DATE _____

App. Figure C-3. American Bridge Notes on Tank AN-104 Refractory Void

ABD Claim for Holdup to Grout Under Tank #104 Insulating Concrete

1. 3-21-78 - Reported by Vitro that there is probably a void between the insulating concrete and the steel secondary bottom for tank #104. The void was reported as being near the center of the bottom. It was agreed by the Project Team that JAJ would be directed to drill test holes in the refractory to verify the fact that a void exists.
2. 3-23-78 - A gap appeared also between the center section of the refractory pour and the steel plate for tank #102 bottom. It closed up, however, with a decrease in the temperature of the secondary bottom steel and refractory and before subsequent formed sections of the bottom were poured.
3. 4-7-78 - JAJ forces drilled 4-1" ϕ holes through the refractory in tank #104 bottom and cleaned them out. The holes were located near the center, about 8' in one direction and 5'-6" in the opposite direction in the center sectionalized pour of the bottom.

2

The maximum depth of the void discovered between the refractory and steel was 5/8" as measured by using an L-shaped rod inserted through the drilled holes.

4. 4-13-78 - JAJ forces drilled 4 additional exploratory holes in the refractory in Tank #104 bottom per Vitro direction.

5. 4-20-78 - A meeting was held to discuss the grouting of the void beneath the insulating concrete in #104 bottom. In attendance were representatives from ABD, Vertecs, Pryor-Giggey and J A Jones. The decision was made to use LW-70 refractory screened through No. 8 mesh to remove the largest aggregate in the material. It was also agreed to drill holes at intervals that would allow following of the grout outward in the void as it was poured into the void using a minimum gravity head on grout column. JAJ also agreed to compensate ABD (Vertecs) for making the actual grout pour because the existence of the void was beyond the control of the subcontractor. American Bridge was directed to proceed with the grouting.

3

5. 4-21-78 - JAJ forces began drilling the refractory on 2'-0" centers each way in an area approximately 16'x16' in the "C" section of the refractory pour at the center of the tank. The drilling pattern was as directed by Vitro who also stated their approval of the proposed material and manner of mixing and pouring the grout.
6. 4-24-78 - D. Doyle stated that he would have set #104 primary bottom on Friday april 21st if the secondary bottom had been available. JAJ completed drilling and cleaning the holes in the refractory shortly after noon, and Vertecs poured the grout shortly thereafter completing it about 3:30 PM. American Bridge set the primary bottom after grouting was completed finishing about 5 P.M.

App. Figure C-4. NCR B-130-29

RL-604 (3-76) NONCONFORMANCE REPORT 70102

(1A) PROJECT, LOCATION OR W.O.	(1B) TITLE	(1C) NCR NO.
B-130	ADDITIONAL HIGH LEVEL WASTE STORAGE FACILITIES, 241-AN TANK FARM	B-130-29 (1000-6)

(1D) REQUIREMENTS AND NONCONFORMANCE DESCRIPTION

REQUIREMENT

The bottom surface of the cured castable refractory is required to have a 100% bearing surface on the top of the secondary bottom.

Specification B-130-C4
Drawing H-2-71906, Rev. 0

DESCRIPTION

On Tank 104, Sections C, B and D, 8 one-inch holes were core drilled for inspection.

Inspection revealed that there was a void between the bottom of the castable Refractory and the top surface of the steel secondary tank bottom. The void area was measured and found to be as per attached sketch.

(1G) DISTRIBUTION

DOE
*RD Freeberg
*AG Lassila

Rockwell
*PB Fisk
*HA Reading

JAJ
LJ Maenpaa
*JJ Flannery

Vitro
*AW Akerson
*PW Armstrong
IMA Garcia
*KA Lucas
*JH Parrish
LH Smith
Central File
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*Preliminary Copies

(1E) HOLD TAG NO.	(1F) ORIGINATOR, TITLE AND DATE
N/A	P. W. Armstrong, Field Inspector, 4-14-78

(2A) RECOMMENDED DISPOSITION:

- ☐ ACCEPT AS IS
- ☐ CONDITIONAL ACCEPT
- ☐ REWORK
- ☒ REPAIR
- ☐ REJECT
- ☐ OTHER (SPECIFY):

(2B) DISPOSITION JUSTIFICATION

TANK 104, SECTION 'C'

1. IN THE CENTER 16'-0 (8'-0 EACH SIDE OF THE E/W CENTERLINE) DRILL 2" HOLES @ 2'-0 ON CENTER EACH WAY.
2. FILL VOIDS BELOW THE CASTABLE REFRACTORY WITH A POURABLE GROUT MIX
3. REPLACE THE REMOVED PORTIONS OF THE REFRACTORY WITH NEW REFRACTORY.

SEE ATTACHED SKETCH - COPY 2

(2C) DESIGN CHANGE REQUIRED?

- ☐ YES
- NO. _____
- ☒ NO

(2D) APPROVALS (SIGNATURE AND DATE)		(2E) CONCURRENCE (SIGNATURE AND DATE)
Design G Kocei 4/18/78		J D Galbraith 4/19/78
Safety R. H. Dennis 4/18/78		QA 4/19/78
QA IMA Garcia 4/18/78	PE A.W. Akerson 4-19-78	A D Lassila 4/20/78

(3A)

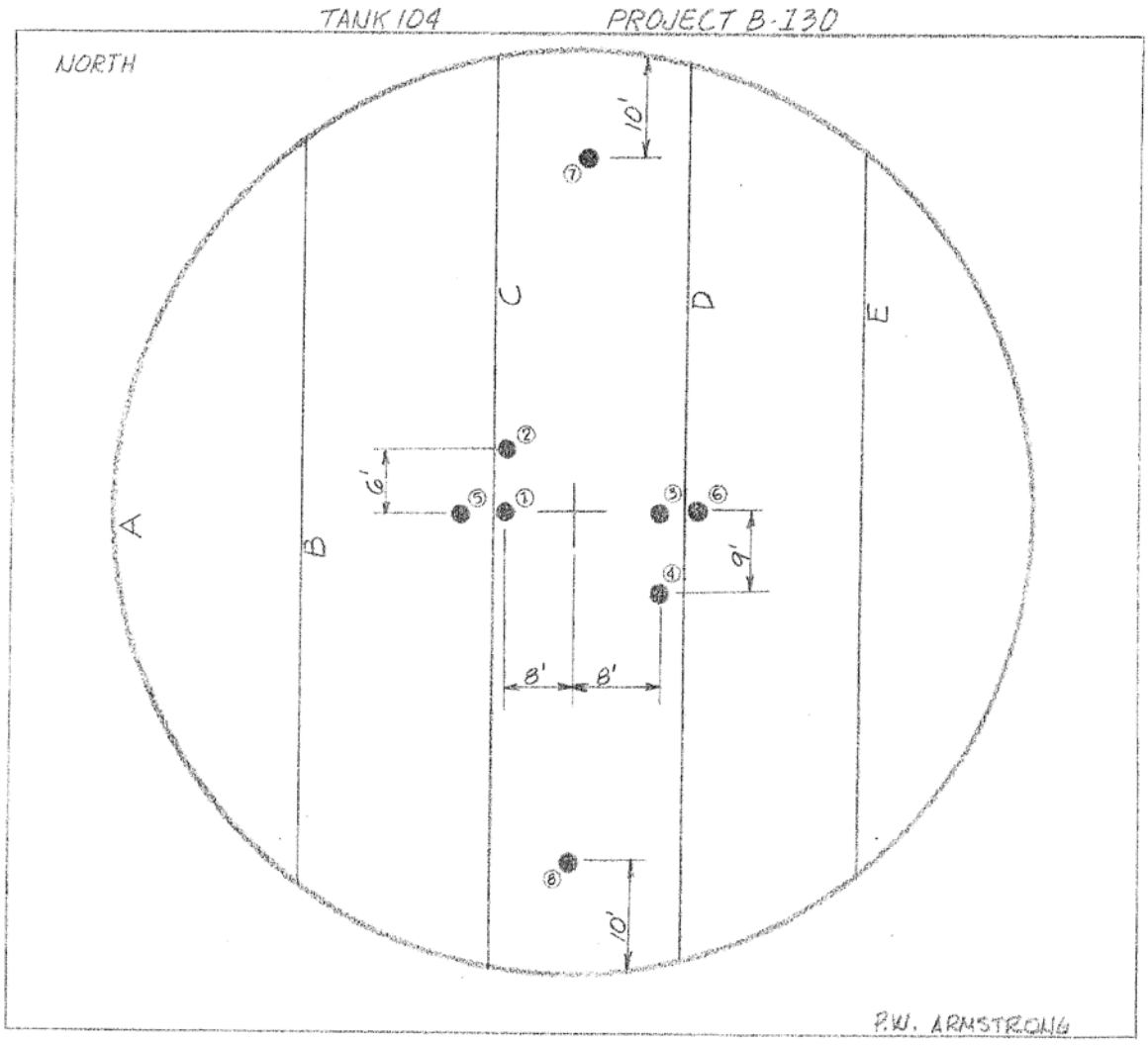
- ☒ DISPOSITION EFFECTED AS DIRECTED. NCR CLOSED.
- ☐ OTHER (SPECIFY)

P. W. Armstrong — ORIGINATOR OR REPRESENTATIVE — 5-10-78 — DATE

NCR B-130-29, Att. 1

CORE DRILLED (8) ONE INCH HOLES FOR INSPECTION. THE VOID BETWEEN THE BOTTOM OF THE INSULATING CONCRETE AND TOP OF SECONDARY, STEEL TANK BOTTOM IS AS FOLLOWS:

HOLE #1 ~ VOID 5/8"
HOLE #2 ~ VOID 1/2"
HOLE #3 ~ VOID 1/4"
HOLE #4 ~ VOID 0"
HOLE #5 ~ VOID 0"
HOLE #6 ~ VOID 0"
HOLE #7 ~ VOID 0"
HOLE #8 ~ VOID 0"



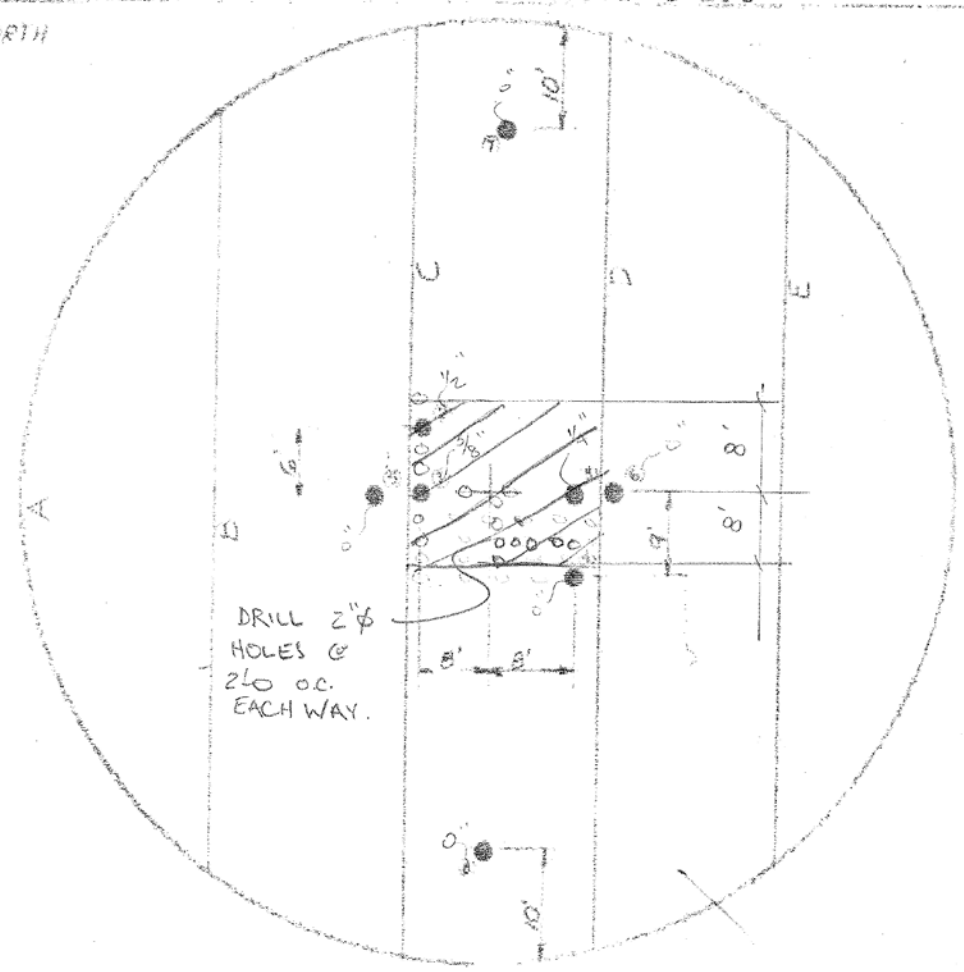
CR B-130-29, Att. 2

CORE DRILLED (8) ONE INCH HOLES FOR INSPECTION. THE VOID BETWEEN THE BOTTOM OF THE INSULATING CONCRETE AND TOP OF SECONDARY, STEEL TANK BOTTOM IS AS FOLLOWS:

HOLE #1 ~ VOID 5/8"
HOLE #2 ~ VOID 1/2"
HOLE #3 ~ VOID 1/4"
HOLE #4 ~ VOID 0"
HOLE #5 ~ VOID 0"
HOLE #6 ~ VOID 0"
HOLE #7 ~ VOID 0"
HOLE #8 ~ VOID 0"

TANK 104 PROJECT B-130

NORTH



R.W. ARMSTRONG

App. Figure C-5. Statement of Fact Regarding Tank AN-104 Refractory Void

B-130 241-AN TANK FARM
JAJ-1000 FABRICATE & ERECT STEEL TANKS
GROUT VOID IN TANK 104 SECONDARY BOTTOM

Statement of Fact

A void was discovered between the insulating cancrete and the steel of the secondary tank bottom for Tank 104. Insulating concrete, Lite-Wate 70, is poured in the secondary bottom to a depth of 8" on which the primary tank bottom rests. By design, the steel of the secondary bottom is to rest on the concrete foundation, the insulating concrete on the secondary bottom and the primary tank, which contains the plant product, rests on the insulating concrete. The great amount of weight that will be bearing on the LW-70 would no doubt cause it to crack and the primary tank to settle. An NCR, No. B-130-29, was written for disposition.

Exploratory holes were drilled in the insulating concrete to determine the depth and extent of the void. It was found that the void extended a distance of 8' each of 4 directions from the center of the bottom and the maximum depth encountered was 5/8". The top surface was level and smooth and within elevation and flatness tolerance.

Two methods of repairing the deficiency were discussed: (1) Entailing the removal of all of the poured refractory over the void and replacing it, or (2) drilling holes through the refractory, then grouting the void and holes using the same material that was poured in the secondary bottom. The grouting method was selected on the basis of less cost and time to perform the work. With the concurrence of the Project Team, the Subcontractor and the insulating concrete manufacturer's representative, the procedure for drilling, mixing and pouring the LW-70 grout was discussed and unanimously approved.

R. W. Harrison
Project Engineer

4-21-78
Date

App. Figure C-6. Procedure for Grouting Tank AN-104 Refractory Void

A 70102

J. A. JONES CONSTRUCTION COMPANY

801 FIRST STREET • RICHLAND, WASHINGTON • 99352 • (509) 942-6707

Redistribution by AWA
P. Felise
JM Johnston, 2101M
CW Kelley
NR Kerr
EE Smith
Central Files/B-130
DG Lien/EA Goakey/GL Koci
AWA Files/B-130, 4.1b

APR 2 1978
WITRC Engineering

JAJ-1000-185

April 21, 1978

American Bridge
Division of United States
Steel Corporation
P.O. Box 1099
Richland, Washington 99352

Attention: Mr. C. J. Madewell
Project Manager

Gentlemen:

SUBCONTRACT NO. JAJ-1000 (B-130) K-9263
Reference: NCR B-130-29 - Void Between Tank 104
Secondary Bottom and Refractory

The subject NCR has been dispositioned to repair as follows:

"Tank 104, Section 'C'

1. In the center 16'-0" (8'-0" each side of the E-W center line) drill 2" holes at 2'0" on center each way.

2. Fill voids below the castable refractory with a pourable grout mix.

3. Replace the removed portions of the refractory with new refractory. See attached sketch - Copy 2."

J. A. Jones forces will perform the drilling of holes in the refractory as shown on the NCR, but they will be approximately 1"Ø instead of 2"Ø as stated.

To verify verbal directives given to you on Wednesday, April 19, you are to perform the repair work described herein and if there is to be any change in the contract price indicated for this work, in your opinion, please so notify us immediately.

Very truly yours,

J. A. JONES CONSTRUCTION

J. J. Flannery
Project Manager

JJF:kw

cc: B-130 Team Members

B-130

App. Figure C-7. NCR B-130-41

NONCONFORMANCE REPORT

(1A) PROJECT, LOCATION OR W.O.	(1B) TITLE	(1C) NCR NO.
B-130	ADDITIONAL HIGH LEVEL WASTE STORAGE FACILITIES, 241-AN TANK FARM	B-130-41 (1000-16)

(1D) REQUIREMENTS AND NONCONFORMANCE DESCRIPTION

REQUIREMENT

Construction Specification B-130-C4, Section 15176-23, Paragraphs 3.04, E. 2 and 4

DESCRIPTION

The above specification paragraphs require that nine thermocouples be installed in the foundation concrete and connected to a recorder during stress relief.

This was not accomplished on Tank 101 stress relief.

(1G) DISTRIBUTION

DOE
*RD Freeberg
*AG Lassila

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*MA Cahill
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*RA Nederhood
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(1E) HOLD TAG NO.	(1F) ORIGINATOR, TITLE AND DATE
N/A	R. A. Nederhood, Field Engrg. Specialist 10-12-78

(2A) RECOMMENDED DISPOSITION:

- [X] ACCEPT AS IS
- [ ] CONDITIONAL ACCEPT
- [ ] REWORK
- [ ] REPAIR
- [ ] REJECT
- [ ] OTHER (SPECIFY):

(2B) DISPOSITION JUSTIFICATION

Accept as is, due to the past history of heat transfer from the primary vessel to the base concrete for the tanks constructed at AY, AZ, SY and AW tank farms.

NOV 2 8 1978
J. A. JONES CONSTRUCTION CO.

(2C) DESIGN CHANGE REQUIRED?

- [ ] YES
  NO. _____
- [X] NO

(2D) APPROVALS (SIGNATURE AND DATE)	(2E) CONCURRENCE - (SIGNATURE AND DATE)
G. Kocis 10/20/78	11/3/78
10/23/78	11-9-78
10/23/78	11/14/78

(3A)

- [X] DISPOSITION EFFECTED AS DIRECTED. NCR CLOSED.
- [ ] OTHER (SPECIFY)

ORIGINATOR OR REPRESENTATIVE — DATE 11-14-78

App. Figure C-8. NCR B-130-43

RL-604 (3-78)

NONCONFORMANCE REPORT

RW1

(1A) PROJECT, LOCATION OR W.O.	(1B) TITLE	(1C) NCR NO.
B-130	ADDITIONAL HIGH LEVEL WASTE STORAGE FACILITIES, 241-AN TANK FARM	B-130-43 (1000-18)

(1D) REQUIREMENTS AND NONCONFORMANCE DESCRIPTION

REQUIREMENTS

1. The maximum temperature differential at any time above 600° shall not exceed 200° (B-130-C4, paragraph 3.04, B.4, page 15176-22).
2. Hold the steel tanks during stress relieving at a temperature of 1100° per inch of material per hour or as modified by ASME Section VIII, Division 2 (B-130-C4, paragraph 3.04, D, page 15176-22).

DESCRIPTION

1. Trace #15 on recorder #3 of Tank 104 exceeded the 200° maximum temperature differential.
2. Trace #15 on recorder #3 of Tank 104 did not maintain the required temperature for the required amount of time during the soak period.

NOTE: Trace #15 gave erratic readings during the soak period and eventually open circuited prior to completion of the soak period.

(1G) DISTRIBUTION

DOE
*RD Freeberg
*AG Lassila

RHO
*JT Belcher
*MA Cahill

JAJ
LJ Maenpaa
*DR Olney

Vitro
IMA Garcia
*NR Kerr
*JH Parrish
LH Smith
*EM Zdravkovich
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*Preliminary Copies

(1E) HOLD TAG NO.	(1F) ORIGINATOR, TITLE AND DATE
N/A	JHP J. H. Parrish, Project Field Coordinator, 10-27-78

(2A) RECOMMENDED DISPOSITION:

- [X] ACCEPT AS IS
- [ ] CONDITIONAL ACCEPT
- [ ] REWORK
- [ ] REPAIR
- [ ] REJECT
- [ ] OTHER (SPECIFY):

(2B) DISPOSITION JUSTIFICATION

Only one thermocouple did not meet the requirements of the specification. This thermocouple gave erratic readings and eventually open circuited. It is reasonable to disregard all readings of this thermocouple. Readings from all other thermocouples were within spec and the same stress relief techniques used on B-120 are being employed. The facts indicate that a satisfactory stress relief was performed.

NOV 28 1978

J. A. JONES CONSTRUCTION CO.

(2C) DESIGN CHANGE REQUIRED?

- [ ] YES
  NO. _____
- [ ] NO

(2D) APPROVALS (SIGNATURE AND DATE)	(2E) CONCURRENCE (SIGNATURE AND DATE)
Design [illegible] 11/7/78	[illegible] 11-9-78
Safety [illegible] 11/7/78	[illegible] 11-9-78
QA PE	

(3A)

- [X] DISPOSITION EFFECTED AS DIRECTED, NCR CLOSED.
- [ ] OTHER (SPECIFY)

James H Parrish 11-14-78

ORIGINATOR OR REPRESENTATIVE — DATE

App. Figure C-9. NCR B-130-45

NONCONFORMANCE REPORT

(1A) PROJECT, LOCATION OR W.O.	(1B) TITLE	(1C) NCR NO.
B-130	ADDITIONAL HIGH LEVEL WASTE STORAGE FACILITIES, 241-AN TANK FARM	B-130-45 (1000-19)

(1D) REQUIREMENTS AND NONCONFORMANCE DESCRIPTION

REQUIREMENTS

1. Hold the steel tanks during stress relieving operation at a temperature of 1100° F per inch of material thickness per hour or as modified by ASME Section VIII, Division 2 (Construction Specification B-130-C4, Paragraph 3.04, D, Page 15176-22).
2. During stress relieving the rate of temperature rise and reduction between the 600° and 1100° temperature is not to exceed 100° per hour.

(See attachment for continuation)

JAN 15 1979

J. A. JONES CONSTRUCTION CO.

(1G) DISTRIBUTION

DOE
*RD Freeberg
~~*AG Lassila~~ GS Rokka

RHO
*JT Belcher
*MA Cahill

JAJ
LJ Maenpaa
*DR Olney

Vitro
IMA Garcia
WH Hays
*NR Kerr
*JH Parrish
*EM Zdravkovich
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*Preliminary Copies

(1E) HOLD TAG NO.	(1F) ORIGINATOR, TITLE AND DATE
N/A	J. H. Parrish, Project Field Coordinator, 11-20-78

(2A) RECOMMENDED DISPOSITION:

- [X] ACCEPT AS IS
- [ ] CONDITIONAL ACCEPT
- [ ] REWORK
- [ ] REPAIR
- [ ] REJECT
- [ ] OTHER (SPECIFY):

(2B) DISPOSITION JUSTIFICATION

Item 2:
Specification was not met. Standard vessel construction practice calls for stress relief to be repeated to specification. However, if American Bridge, in their capacity of having design responsibility for the steel tank, can justify that the post-stress relief integrity of the tank has not been compromised by exceeding the 100°F per hour reduction rate, and that no residual stresses have been generated, especially in high stress areas, disposition of this NCR will be changed to accept as is.

Item 1:
Review of all the thermocouple data indicates that the thermocouple was probably malfunctioning. Therefore, this item can be dispositioned accept as is.

Redisposition: American Bridge Justification has been provided. Change disposition to ACCEPT AS IS. (Per A.W. Bjorkedal 1-8-79)

(2C) DESIGN CHANGE REQUIRED?

- [ ] YES
  NO. _____
- [X] NO

(2D) APPROVALS (SIGNATURE AND DATE)	(2E) CONCURRENCE (SIGNATURE AND DATE)
Design 12/14/78 AWB 12/19/78	DM Galbraith 12-15-78
Safety 12/15 12-14-78	D.W. Krupp 12-15-78
QA 12/11/78 PE 12-4-78	L.S. Seeley 12/22/78

(3A)

- [X] DISPOSITION EFFECTED AS DIRECTED. NCR CLOSED.
- [ ] OTHER (SPECIFY)

James Hansel 1-8-79
ORIGINATOR OR REPRESENTATIVE — DATE

DESCRIPTION

1. Trace #1 on recorder #2 of Tank 102 did not maintain the required temperature during the soak period.

   NOTE: The lowest temperature it achieved during soak period was 950°. (Construction Specification B-130-C4, Paragraph 3.04, B.2., Page 15176-C21)

2. The rate of temperature reduction after the soak period was completed on Tank 102 exceeded the 100° per hour as specified.

   NOTE: The fastest temperature drop per hour was 145° and an approximate average of all thermocouples was 115° per hour. This quicker drop in temperature occurred for two hours.

App. Figure C-10. NCR B-130-46

RUN 96

NONCONFORMANCE REPORT

(1A) PROJECT, LOCATION OR W.O.	(1B) TITLE	(1C) NCR NO.
B-130	ADDITIONAL HIGH LEVEL WASTE STORAGE FACILITIES, 241-AN TANK FARM	B-130-46 (1000-20)

(1D) REQUIREMENTS AND NONCONFORMANCE DESCRIPTION

REFERENCE

Construction Specification B-130-C4, Paragraph 3.04 B.2., Page 15176-21, requires the rate of temperature rise or reduction to be limited to 100° per hour (between the 600° and 1100° period). The temperature rate on Tank 103 was exceeded by the following:

Rate of Rise per hour		Rate of Reduction per hour	
Recorder #1	140°	Recorder #1	140°
Recorder #2	110°	Recorder #2	115°
Recorder #3	110°	Recorder #3	160°
Recorder #4	105°	Recorder #4	115°

NOTE: The rate of temperature rise per hour exceeded the limit for one hour at approximately 700°, and the rate of temperature drop per hour exceeded the limit for two hours at approximately 800° to 600°. NCR B-130-45 (1000-19) describes this same condition existing on Tank 102.

(1G) DISTRIBUTION

DOE
*RD Freeberg
~~*AG Lassila~~ G.S. Rokka

RHO
*JT Belcher
*MA Cahill

JAJ
LJ Maenpaa
*DR Olney

Vitro
IMA Garcia
WH Hays
*NR Kerr
*JH Parrish
*EM Zdravkovich
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(1E) HOLD TAG NO.: N/A

(1F) ORIGINATOR, TITLE AND DATE: J. H. Parrish, Field Project Coordinator, 11-27-78

(2A) RECOMMENDED DISPOSITION:

- [X] ACCEPT AS IS
- [ ] CONDITIONAL ACCEPT
- [ ] REWORK
- [ ] REPAIR
- [ ] REJECT
- [ ] OTHER (SPECIFY):

(2B) DISPOSITION JUSTIFICATION

Specification was not met. Standard vessel construction practice calls for stress relief to be repeated to specification. However, if American Bridge, in their capacity of having design responsibility for the steel tank, can justify that the post-stress relief integrity of the tank has not been compromised by exceeding the 100°F per hour reduction rate, and that no residual stresses have been generated, especially in high stress areas, disposition of this NCR will be changed to accept as is.

Redisposition: American Bridge has provided justification. Change disposition to ACCEPT AS IS. (Per A.W. Bjorkedal 1-8-79)

(2C) DESIGN CHANGE REQUIRED?

- [ ] YES
  NO. _____
- [X] NO

JAN 15 1979

J. A. JONES CONSTRUCTION CO.

(2D) APPROVALS (SIGNATURE AND DATE)	(2E) CONCURRENCE (SIGNATURE AND DATE)
Design 12/1/78	J.A. Galbraith 12-15-78
Safety [illegible] 12/1/78	[illegible] 12-15-78
QA IMAGarcia 12/1/78 PE MKerr 12-1-78	[illegible] 12/22/78

(3A)

- [X] DISPOSITION EFFECTED AS DIRECTED. NCR CLOSED.
- [ ] OTHER (SPECIFY)

James Harrist 1-9-79
ORIGINATOR OR REPRESENTATIVE — DATE

App. Figure C-11. NCR B-130-47

NONCONFORMANCE REPORT

(1A) PROJECT, LOCATION OR W.O.	(1B) TITLE	(1C) NCR NO.
B-130	ADDITIONAL HIGH LEVEL WASTE STORAGE FACILITIES, 241-AN TANK FARM	B-130-47 (1000-21)

(1D) REQUIREMENTS AND NONCONFORMANCE DESCRIPTION

REQUIREMENT

Construction Specification B-130-C4, Paragraph 3.04 B.2., Page 15176-21, requires the rate of temperature rise or drop to be limited to 100° per hour (between the 600° and 1100° period).

DESCRIPTION

On Tank 104 during stress relieving operation, the rate of temperature reduction exceeded that required by above specification.

NOTE: See Attachments for thermocouple identification and locations.

JAN 30 1979

J. A. JONES CONSTRUCTION CO.

(1G) DISTRIBUTION

DOE
*RD Freeberg
*AG Lassila

RHO
*JT Belcher
*MA Cahill

JAJ
LJ Maenpaa
*DR Olney

Vitro
IMA Garcia
WH Hays
*NR Kerr
*JH Parrish
*EM Zdravkovich
Central File
*Official File/2101M
A.W. BJORKDAL
*Preliminary Copies

(1E) HOLD TAG NO.	(1F) ORIGINATOR, TITLE AND DATE
N/A	J. H. Parrish, Field Project Coordinator, 12-6-78

(2A) RECOMMENDED DISPOSITION:

- [X] ACCEPT AS IS
- [X] CONDITIONAL ACCEPT
- [ ] REWORK
- [ ] REPAIR
- [ ] REJECT
- [ ] OTHER (SPECIFY):

(2B) DISPOSITION JUSTIFICATION

Standard vessel manufacturing practice calls for stress relief to be repeated when the stress relief is not conducted within specification. However, if American Bridge, in their capacity of having design responsibility for the steel tanks, can provide adequate justification that the post-stress relief integrity of the tank has not been compromised by exceeding the 100°F per hour temperature reduction rate, the stress relief shall be considered adequate. Justification must be provided showing that no residual stresses have been generated by the temperature reduction rate, especially in high stress areas.

1/22/79 - CHANGE DISPOSITION TO ACCEPT AS IS. AMERICAN BRIDGE IN ATTACHMENT NCR B-130-47 ATT. 4 HAS PROVIDED SUFFICIENT JUSTIFICATION THAT THE TEMPERATURE REDUCTION RATE HAS NOT COMPROMISED THE INTEGRITY OF THE TANK. Non-conformance

(2C) DESIGN CHANGE REQUIRED?

- [ ] YES
  NO. _____
- [X] NO

(2D) APPROVALS (SIGNATURE AND DATE)	(2E) CONCURRENCE - (SIGNATURE AND DATE)
Design, 12/14/78	12-28-78
Safety, R.H. Dennis 12/15/78	12-26-78
QA, 12/19/78 PE TRK 12-21-78	1/3/79

(3A)

- [X] DISPOSITION EFFECTED AS DIRECTED. NCR CLOSED.
- [ ] OTHER (SPECIFY)

James H. Parrish — ORIGINATOR OR REPRESENTATIVE — 1/29/79 — DATE

COOPERHEAT

FURNACE & GAS DIVISION

Telephone: 713–462-5007 4804 BLALOCK RD., HOUSTON, TEXAS 77041, U.S.A. Telex: 76–2035

TEMPERATURE LOG SHEET Sheet No. 5

SITE 241 AR Tank Farm CONTRACT Tank 104

CUSTOMER American Bridge

RECORDER NO. #2 DATE 9-23-98

Trace No.	Couple No.	Time 13:00 Temp° F	Rate	Time 14:00 Temp° F	Rate	Time 15:00 Temp° F	Rate	Time 16:00 Temp° F	Rate	Time 17:00 Temp° F	Rate	Time Temp° F	Rate
1	22	935	55	850	85	765	85	680	85	610	-70		
2	23	950	40	870	80	780	90	690	90	620	-70		
3	24	940	60	865	75	775	90	695	80	615	-80		
4	25	975	60	880	65	780	100	700	80	620	-80		
5	26	970	55	860	85	775	75	700	75	620	-80		
6	27	965	70	875	90	725	150	700	25	500	-200		
7	28	920	70	890	80	770	120	655	115	540	-115		
8	29	950	70	845	105	745	100	620	75	580	-40		
9	30	940	65	885	75	790	95	710	80	620	-90		
10	31	975	55	900	75	790	110	710	80	620	-90		
11	32	975	70	900	75	790	110	710	80	620	-90		
12	33	965	65	890	65	785	105	710	75	620	-90		
13	34	965	70	890	65	785	105	705	80	620	-85		
14	35	975	60	905	70	800	65	715	95	640	-25		
15	36	970	70	900	70	795	115	710	85	625	-85		
16	37	965	65	890	25	795	95	710	85	625	-85		
17	38	975	75	905	70	805	100	720	85	635	-85		
18	39	955	70	880	65	780	100	695	95	615	-80		
19	40	965	70	890	75	795	95	710	85	625	-85		
20	41	960	65	895	65	785	90	700	85	620	-80		
21	42	960	70	890	70	795	95	710	85	630	-80		
22	212	650	60	580	70	1500	—	1490		—	—		
23	—					50				—	—		
24	CUC	1205		1205	0	1205		1205		1205			
MAX.		975		905		805		710		640			
MIN.		935		845		725		655		540			
SPREAD		40		60		80		55		100			

COOPERHEAT
FURNACE & GAS DIVISION
Telephone: 713–462-5007 4804 BLALOCK RD., HOUSTON, TEXAS 77041, U.S.A. Telex: 76–2035

TEMPERATURE LOG SHEET Sheet No. 5 of

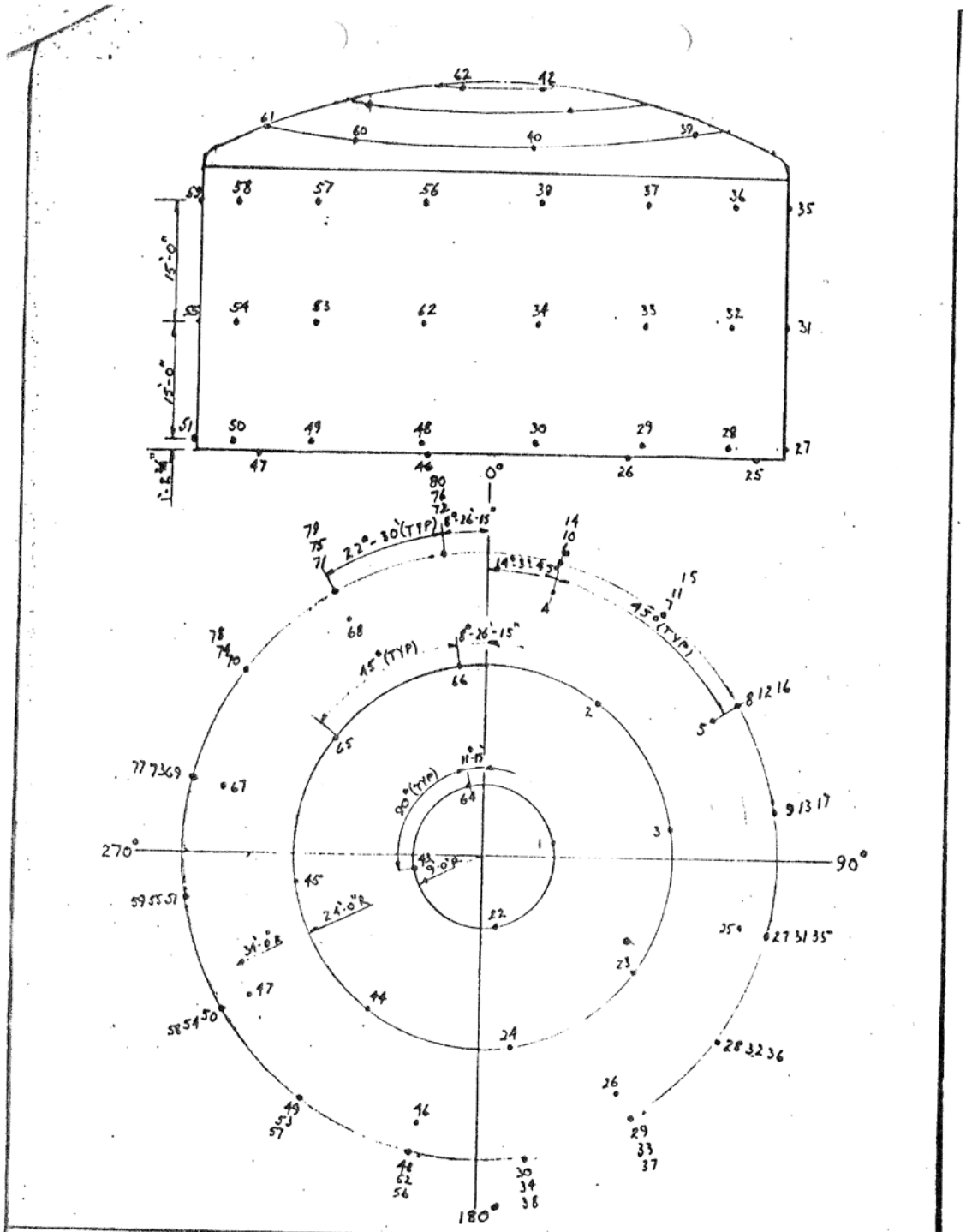
SITE 241 A.N. Tank Farm CONTRACT Tank # 104

CUSTOMER American Bridge

RECORDER NO. #1 DATE 9-22-78

Trace No.	Couple No.	Time 13:00 Temp° F	Rate	Time 14:00 Temp° F	Rate	Time 15:00 Temp° F	Rate	Time 16:00 Temp° F	Rate	Time 17:00 Temp° F	Rate	Time 18:00 Temp° F	Rate
1	1	960	-40	870	-90	775	-95	695	-80	625	-70		
2	2	930	-30	870	-60	775	-95	695	-80	620	-75		
3	3	945	-55	865	-90	760	-105	680	-80	605	-75		
4	4	935	-65	870	-65	755	-115	700	-55	625	-75		
5	5	950	-55	890	-60	790	-100	706	-90	635	-65		
6	6	950	-75	885	-65	775	-115	650	-135	550	-100		
7	7	935	-70	865	-80	760	-105	670	-70	585	-85		
8	8	955	-60	885	-70	770	-115	655	-115	550	-95		
9	9	965	-80	895	-70	780	-115	680	-100	590	-90		
10	10	965	-80	890	-75	785	-105	705	-80	620	-85		
11	11	965	-80	890	-75	785	-105	705	-80	620	-85		
12	12	970	-70	895	-75	790	-105	705	-85	620	-85		
13	13	970	-70	900	-70	790	-110	705	-85	625	-80		
14	14	970	-75	900	-70	795	-105	715	-80	640	-75		
15	15	980	-70	905	-75	795	-110	715	-80	635	-80		
16	16	980	-70	905	-75	795	-110	715	-80	635	-80		
17	17	970	-75	895	-75	795	-100	715	-80	635	-80		
18	18	975	-65	895	-80	790	-105	705	-85	625	-80		
19	19	970	-70	895	-75	790	-105	710	-80	630	-80		
20	20	985	-95	890	-65	790	-100	700	-90	620	-80		
21	21	955	-70	890	-65	790	-100	705	-85	630	-75		
22	DTI	955	-25	650	-22	1490	-84	1440	—	—			
23	—	—		—		—		—					
24	CVU	1200		1900		1200		1500		1200			

MAX.	980	905	795	715	640	
MIN.	930	865	755	620	550	
SPREAD	50	50	40	65	90	


0°
90°
180°
270°
22°-30'(TYP)
45°(TYP)
90°(TYP)
DRAWN BY DU
DATE 6·23·77
SCALE ~
PROPOSED THERMOCOUPLE LOCATION
PRIMARY BOTTOM & SIDE - PLAN.
PRIMARY SIDE & ROOF - ELEV.
AMERICAN BRIDGE
COOPERHEAT
SK NO 2

#227

American Bridge
DIVISION
UNITED STATES STEEL CORPORATION
P. O. BOX 1099
RICHLAND, WASHINGTON 99352

cc SMITH
AWBROWNELL
STRESS RELIEF
NCR's

December 22, 1978

J. A. Jones Construction Company
P. O. Box 560
Richland, Washington 99352

Attention: Mr. D. R. Olney
Project Manager

Subject: K-9263 - Subcontract No. JAJ-1000 (B-130)
241-AN Tank Farm

Gentlemen:

We reference your letter JAJ-1000-262 dated December 14, 1978 and enclosed Nonconformance Reports B-130-45 and B-130-46, pertaining to the stress relief of Tank 102 and Tank 103.

Our Engineering Department has reviewed the stress relief charts and records from the stress relief of the above mentioned tanks. Although they agree with the findings described by the NCR's, they are of the opinion that the integrity of the tank design has not been compromised in any way. A letter dated December 20, 1978, from our Engineering Department with their response to the NCRs is enclosed. Also enclosed are comments from Mr. Dan Urquhart of Cooperheat which are supportive of the Engineering Department's position.

Based upon our Engineering Department's comments, I therefore request that the disposition of NCR B-130-45 and NCR B-130-46 be changed to 'accept as is' as the tank's design and integrity have not been compromised.

Very truly yours,

S. F. Hanau

S. F. Hanau
Project Manager

SFH/cf
cc: D. W. Crapnell
S. E. Ault
W. D. McGregor

A-2205.22

Steve J

S. HANAU
Project Manager
ABD - Richland

Total 2 Pages

December 20, 1978

S. BUCKBAUM
Assistant District Engineer
ABD - Los Angeles

K-9263 Six Waste Tanks for J. A. Jones
241-AN Tank Farm

We are responding to NCR's B-130-45 (1000-19) and B-130-46 (1000-20).

Our review of the charts and records of the stress relief operations essentially confirms the findings described by the NCR's. The question remaining is, to what extent if any, has the design of these tanks been compromised by heating and cooling the tanks at rates in excess of the 100F maximum as specified in Specification B-130-04, Paragraph 3.04B.2.

In our opinion, the design has not been compromised at all by the reported violation. Some facts that contributes to the formation of this opinion are:

1. Spec B-130-04 was obviously prepared before the Winter 1975 Addenda to the ASME Code were issued. Before that time, the ASME Code required that the heating and cooling rates be controlled above 600F.

2. Since the Winter 1975 Addenda, the ASME Code has required that the heating and cooling rates be controlled above 800F.

3. The ASME Code limited heating and cooling rates in order to limit the temperature differential thru the thickness of a weldment. For many years, ASME has limited the heating rate to 400F/hr/inch of thickness and has limited the cooling rate to 500F/hr/inch of thickness. Regardless of the thickness of material, in no case was a rate of less than 100F per hour required.

4. It should be noted that the ASME Codes apply to all types of pressure vessels including critical high pressure - high temperature components containing lethal substances.

5. Please refer to ASME Section III, Division 1, Subsection NB for Class 1 Components, Paragraph NB-4623, 1977 Edition. You will note that heating and cooling rates are controlled above 800F, that the maximum rate is 400F/hr/inch with an absolute maximum of 400F/hr and that the rate need not be less than 100F/hr.

6. The thickest (and most highly stressed) material in these tanks is 15/16". The maximum heating and cooling rate for this plate by the most restrictive Code in use today (Section III) is 400F/hr.

7. The Specification was undoubtedly intended to be conservative with respect to the 1974 ASME Section VIII, Division 2, but it is obvious that, upon review, ASME decided (as shown in later editions of Section VIII, Division 1, Division 2 and Section III) that the 600F control point was too low and that the 100F/hr minimum heating/cooling rate was still appropriate for all thicknesses over 4".

In our opinion, the design and the tank integrity would not have been compromised if the heating/cooling rates had approached 400F/hr.

We have asked Cooperheat to comment on the effect of heating/cooling rates above 100F/hr. We expect that their comments will be supportive of the above.

We suggest that you request that these NCR's be disposed to accept "as is."

By
O. S. Preston

OSP:rs

cc: W. D. McGregor - ARD-SRF
D. W. Crapnell

WESTERN DIVISION

worldwide product and postweld heat treatment specialists - multiple operator welding system

815 E. MIDDLEFIELD ROAD, MOUNTAIN VIEW, CALIFORNIA 94043 USA (415) 961-2720 TELEX 34831

December 22, 1978

American Bridge
Division of United States Steel Corporation
P.O. Box 1099
Richland, WA 99352

Attention: Mr. S. F. Hareu
Project Manager

Subject: K-9263 - 241 - AN Tank Farm
Richland, Washington
Purchase Order No. 76-Y-0966-80

Gentlemen:

We acknowledge and thank you for your letter of December 14, 1978 together with attached J.A. Jones Construction Company letter reference JAJ-1000-262 and Non- Conformance Reports relating to the Post Weld Heat Treatment of Tank Nos. 102 & 103.

In accordance with standard Cooperheat Quality Assurance Requirements the original temperature chart records of each treatment operation are retained in the possession of our Customer and we therefore, at this time, are only able to remark and opinion by consideration of the copy Temperature Log Sheet Records forwarded by our Washington Division.

Although the Construction Specification for Post Weld Heat Treatment of the Tank relates to A.S.M.E. Section VIII, Division 2, Article F-4, the ascent and descent rates as stated per Construction Specification B-130-C4, Paragraph 3.04.,B.2., considerably departs from the stipulated code permitted rates.

It is not the purpose here to question the revision parameters or to suggest any departure from these revisions but to affirm our confidence in the integrity of the structured vessel following the subject heat treatment and it's acceptability in the 'as-is' state.

We consider no adverse residual stress conditions due to thermal cycles exist at the vessel. Contrary to there being any cause for concern on a metallurgical basis by the marginal acceleration indicated, may we propose confidence and satisfaction in a proven system which achieves such controlled overall temperature uniformity and rates of applied heat at these particular structures so closely within the terms of what we feel you will agree can be considered a safely tolerenced heat treatment specification.

Please be assured at this time that action has been taken to ensure strict conformance within the specified heating and cooling rates of similar vessels remaining at this contract.

We trust the foregoing meets with your own and concerned authorities complete satisfaction in this matter.

Very truly yours,

Dan Urquhart

Dan Urquhart
Chief Engineer

DU/rs

App. Figure C-12. NCR B-130-48

RL-604 (3-76)

NONCONFORMANCE REPORT

(1A) PROJECT, LOCATION OR W.O.	(1B) TITLE	(1C) NCR NO.
B-130	ADDITIONAL HIGH LEVEL WASTE STORAGE FACILITIES, 241-AN TANK FARM	B-130-48 (1000-22)

(1D) REQUIREMENTS AND NONCONFORMANCE DESCRIPTION

REQUIREMENTS

1&2. Construction Specification B-130-C4, Paragraph 3.04, B requires the tanks to be stress relieved at a temperature of 1000° for a 3 hour soak period.

3. Construction Specification B-130-C4, Paragraph 3.04, B.4 requires no more than a 200° temperature differential (MAX.) above 600°.

NONCONFORMANCE DESCRIPTION

1. Traces #3 and 4 on recorder #2 did not achieve the required 1000° temperature during the soak period.
2. Traces #1,2, and 4 on recorders #3 and 4 did not achieve the required 1000° temperature during the soak period.
3. Traces #3 on recorders #1 and 2, and trace #2 on recorder #4 did not maintain the 200° temperature differential as specified.

NOTE: The temperatures achieved by the above thermocouples were erratic because of steam and moisture. Temperatures ranged from 925° to 985°.
Above discrepancy occurred during stress relief of Tank 105-AN.

(1G) DISTRIBUTION

DOE
*RD Freeberg
*AG Lassila

RHO
*JT Belcher
*MA Cahill

JAJ
LJ Maenpaa
*DR Olney

Vitro
IMA Garcia
WH Hays
*NR Kerr
*JH Parrish
*EM Zdravkovich
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*Official File/2101M

*Preliminary Copies

(1E) HOLD TAG NO.	(1F) ORIGINATOR, TITLE AND DATE
N/A	J. H. Parrish, Field Coordinator, 12-14-78

(2A) RECOMMENDED DISPOSITION:

- [x] ACCEPT AS IS
- [ ] CONDITIONAL ACCEPT
- [ ] REWORK
- [ ] REPAIR
- [ ] REJECT
- [ ] OTHER (SPECIFY):

(2B) DISPOSITION JUSTIFICATION

The erratic thermocouple readings are probably a result of thermocouple malfunction due to excessive moisture. This has been encountered during stress relief of previous tanks. Review all temperature data indicates an acceptable stress relief was performed.

JAN 30 1979

J. A. JONES CONSTRUCTION CO.

(2C) DESIGN CHANGE REQUIRED?

- [ ] YES
  NO. _____
- [x] NO

(2D) APPROVALS (SIGNATURE AND DATE)	(2E) CONCURRENCE - (SIGNATURE AND DATE)
Design 1/23/79	1-17-79
Safety 1/24/79	1-17-79
QA 1/24/79 PE 1-3-79	1/23/79

(3A)

- [x] DISPOSITION EFFECTED AS DIRECTED. NCR CLOSED.
- [ ] OTHER (SPECIFY)

ORIGINATOR OR REPRESENTATIVE — DATE 1/24/79

App. Figure C-13. NCR B-130-57

RL-604 (3-76)

NONCONFORMANCE REPORT

(1A) PROJECT, LOCATION OR W.O.	(1B) TITLE	(1C) NCR NO.
B-130	ADDITIONAL HIGH LEVEL WASTE STORAGE FACILITIES, 241-AN TANK FARM	B-130-57 (1000-27)

(1D) REQUIREMENTS AND NONCONFORMANCE DESCRIPTION

REQUIREMENT

Construction Specification B-130-C4, Section 15176, Paragraph 3.04, B.4 requires the temperature of the steel tank to be uniform within 200° after any recorded temperature reaches 600°.

NONCONFORMANCE DESCRIPTION

On Tank 106 trace #2 on recorder #3 did not maintain the 200° temperature differential. The actual temperature differential was 275° and lasted for a period of 45 minutes.

(See Attachment for continuation)

(1G) DISTRIBUTION

DOE
*RD Freeberg
*GS Rokkan

RHO
*JT Belcher
*MA Cahill

JAJ
LJ Maenpaa
*DR Olney

Vitro
IMA Garcia
WH Hays
*NR Kerr
*JH Parrish
*EM Zdravkovich
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*Official File/2101M

*Preliminary Copies

(1E) HOLD TAG NO.	(1F) ORIGINATOR, TITLE AND DATE
N/A	J. H. Parrish, Field Project Coordinator, 2-1-79

(2A) RECOMMENDED DISPOSITION:

- [X] ACCEPT AS IS
- [ ] CONDITIONAL ACCEPT
- [ ] REWORK
- [ ] REPAIR
- [ ] REJECT
- [ ] OTHER (SPECIFY):

(2B) DISPOSITION JUSTIFICATION

This condition has existed on other tanks. Review of all Thermocouple data indicates an adequate stress relief was performed.

FEB 2 7 1979

J. A. JONES CONSTRUCTION CO.

(2C) DESIGN CHANGE REQUIRED?

- [ ] YES
  NO. _____
- [X] NO

(2D) APPROVALS (SIGNATURE AND DATE)	(2E) CONCURRENCE - (SIGNATURE AND DATE)
Design 2/5/79	2/13/79
Safety 2/5/79	2-14-79
QA 2/6/79 PE 2-8-79	2/15/79 2/19/79

(3A)

- [X] DISPOSITION EFFECTED AS DIRECTED. NCR CLOSED.
- [ ] OTHER (SPECIFY)

James H Parrish — ORIGINATOR OR REPRESENTATIVE — 2/21/79 DATE

REQUIREMENT

Construction Specification B-130-C4, Section 15176, Paragraph 3.04, D. requires the temperature of the steel tank during stress relieving to be 1100° per inch of material for one hour. ASME code allows this to be modified so that the holding temperature of the steel tank may be 1000° for a period of three hours.

NONCONFORMANCE DESCRIPTION

On Tank 106 trace #4 on recorder #3 and trace #'s 1 and 2 on recorder #4 did not maintain the 1000° temperature for the three hour holding period. (975° was the low temperature.)

NOTE: Both of the above discrepancies were probably a result of excessive moisture and steam as encountered during previous stress relieving operations.

App. Figure C-14. NCR B-170-3

NONCONFORMANCE REPORT

(1A) PROJECT, LOCATION OR W.O.	(1B) TITLE	(1C) NCR NO.
B-170	ADDITIONAL HIGH LEVEL WASTE STORAGE FACILITIES, TANK 241-AN-107	B-170-3 (1000-1)

(1D) REQUIREMENTS AND NONCONFORMANCE DESCRIPTION

REQUIREMENT

ASME Section VIII, Division 2, Article F-4, requires a minimum holding temperature of 1000° for a period of three hours per inch of steel being stress relieved.

NONCONFORMANCE DESCRIPTION

1. On Recorder 1, thermocouple 1, 4 and 5 did not achieve the required 1000° temperature during the soak period.
2. On Recorder 2, thermocouples 2 and 4 did not achieve the required 1000° temperature during the soak period.
3. On Recorder 3, thermocouple 1 did not achieve the required 1000° temperature during the soak period.
4. On Recorder 4, thermocouples 1, 2 and 3 did not achieve the 1000° temperature during the soak period.

NOTE: All of the above thermocouples were giving erratic readings attributable to the moisture contained in the insulating concrete.

(1G) DISTRIBUTION

DOE
*RD Freeberg
*GS Rokkan

RHO
*JT Belcher
*MA Cahill

JAJ
LJ Maenpaa
*DR Olney

Vitro
IMA Garcia
WH Hays
*NR Kerr
*JH Parrish
*EM Zdravkovich
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(1E) HOLD TAG NO.	(1F) ORIGINATOR, TITLE AND DATE
N/A	J. H. Parrish, Field Project Coordinator, 2-27-79

(2A) RECOMMENDED DISPOSITION:

- [x] ACCEPT AS IS
- [ ] CONDITIONAL ACCEPT
- [ ] REWORK
- [ ] REPAIR
- [ ] REJECT
- [ ] OTHER (SPECIFY):

(2B) DISPOSITION JUSTIFICATION

Review of all the thermocouple data indicates the tank had an acceptable stress relief. The erratic readings have also been encountered on the tanks of the B-120 and B-130 Projects.

MAR 28 1979

J. A. JONES CONSTRUCTION CO.

(2C) DESIGN CHANGE REQUIRED?

- [ ] YES
  NO. _____
- [ ] NO

(2D) APPROVALS (SIGNATURE AND DATE)	(2E) CONCURRENCE - (SIGNATURE AND DATE)
Design 3/2/79	3/13/79
Safety 3/5/79	3-13-79
QA 3/6/79 PE	3/21/79 3/21/79

(3A)

- [x] DISPOSITION EFFECTED AS DIRECTED. NCR CLOSED.
- [ ] OTHER (SPECIFY)

James H Parrish — ORIGINATOR OR REPRESENTATIVE — 3/22/79 (DATE)

App. Figure C-15. Inspection Report, March 15, 1978

SHP

VITRO ENGINEERING CORPORATION
Architects • Engineers

INSPECTION REPORT

Project or Work Order Number: B-130

Date: 3/15/78

1. Discipline(s) involved in my activity today:

☐ Survey ☐ C/S ☐ Mech (HVAC) ☑ Mech (~~Pipe~~/Vessels) ☐ Electrical

☐ Instr. ☐ Other _____

2. Was job site visited? ..... ☑ YES ☐ NO

If yes, were contractor personnel working? (personal observation) ..... ☑ YES ☐ NO

3. Did weather conditions hinder construction activity? ..... ☐ YES ☑ NO

If yes, explain _____

Was any work rejected due to weather elements? ..... ☐ YES ☑ NO

If yes, explain _____

4. Were inspection functions performed today? ..... ☑ YES ☐ NO

If yes, what items were inspected?	ACC	REJ	DOCUMENT NO.
Liquid Penetrant - 1035 - BRS-1,2,3,4	✓		
" " " KJ-1,2,3,6,7,8,9	✓		

5. Were activities other than inspection performed? ..... ☐ YES ☑ NO

If yes, explain _____

6. General comments (use back of report if additional space is necessary)

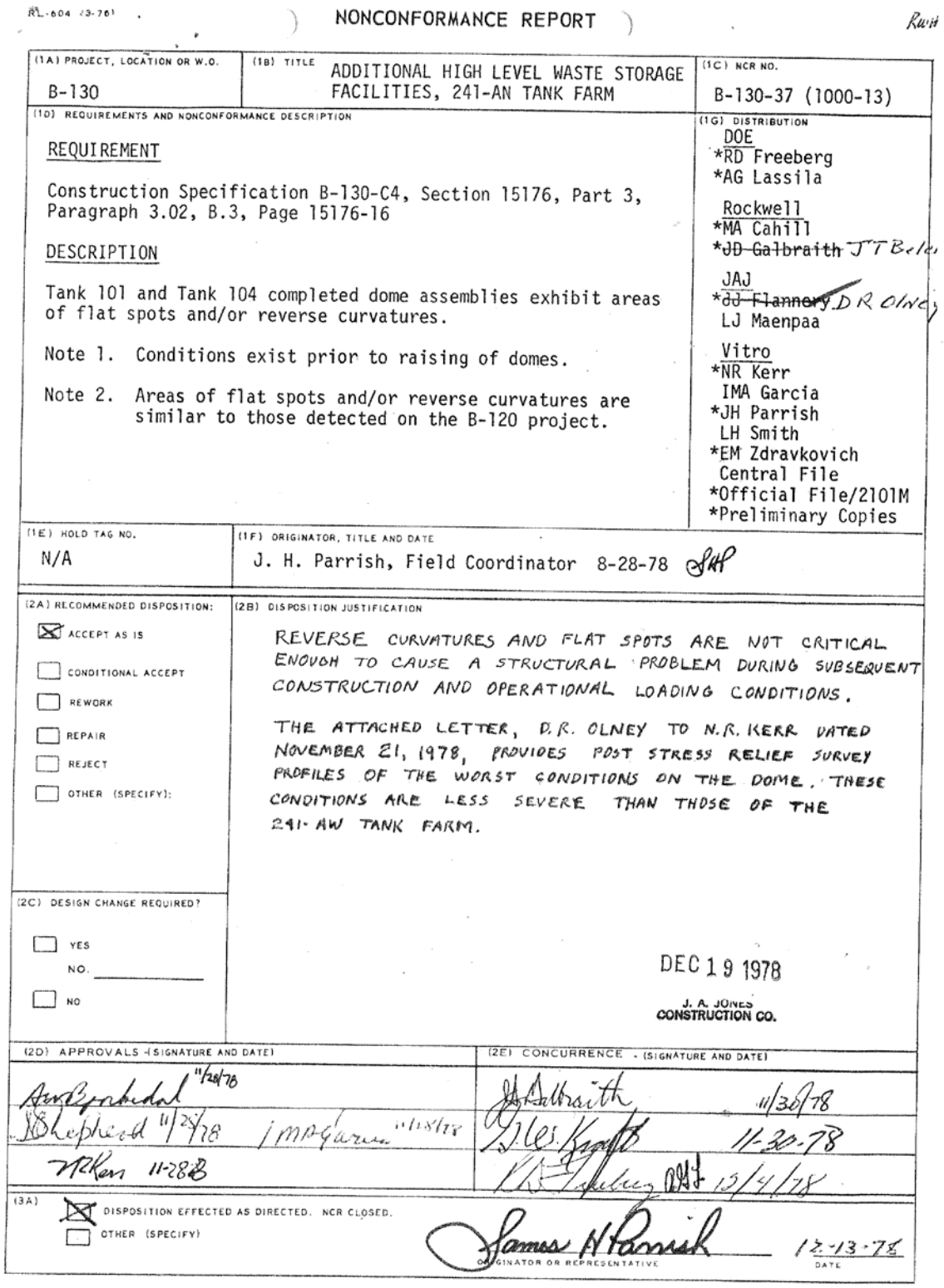
Penetrant testing on 1035 round seam revealed 9 indications of cracks in the 3/8" bottom plate. The cracks were ~½" long, adjacent to and perpendicular to the weld. Each was ground out until no further indication, welded + rechecked. This condition was not found on 1045, 1015 or 1035.

7. Date of Previous Report 3/14/8

VE-254 (2-77)

J D Waggoner
Inspector's signature

App. Figure C-16. NCR B-130-37



RL-604 (3-76)

NONCONFORMANCE REPORT

Rwh

(1A) PROJECT, LOCATION OR W.O.	(1B) TITLE	(1C) NCR NO.
B-130	ADDITIONAL HIGH LEVEL WASTE STORAGE FACILITIES, 241-AN TANK FARM	B-130-37 (1000-13)

(1D) REQUIREMENTS AND NONCONFORMANCE DESCRIPTION

REQUIREMENT

Construction Specification B-130-C4, Section 15176, Part 3, Paragraph 3.02, B.3, Page 15176-16

DESCRIPTION

Tank 101 and Tank 104 completed dome assemblies exhibit areas of flat spots and/or reverse curvatures.

Note 1. Conditions exist prior to raising of domes.

Note 2. Areas of flat spots and/or reverse curvatures are similar to those detected on the B-120 project.

(1G) DISTRIBUTION

DOE
*RD Freeberg
*AG Lassila

Rockwell
*MA Cahill
*~~JD Galbraith~~ JT Beles
JAJ
*~~JJ Flannery~~ DR Olney
LJ Maenpaa

Vitro
*NR Kerr
IMA Garcia
*JH Parrish
LH Smith
*EM Zdravkovich
Central File
*Official File/2101M
*Preliminary Copies

(1E) HOLD TAG NO.	(1F) ORIGINATOR, TITLE AND DATE
N/A	J. H. Parrish, Field Coordinator 8-28-78 JHP

(2A) RECOMMENDED DISPOSITION:

- [X] ACCEPT AS IS
- [ ] CONDITIONAL ACCEPT
- [ ] REWORK
- [ ] REPAIR
- [ ] REJECT
- [ ] OTHER (SPECIFY):

(2B) DISPOSITION JUSTIFICATION

REVERSE CURVATURES AND FLAT SPOTS ARE NOT CRITICAL ENOUGH TO CAUSE A STRUCTURAL PROBLEM DURING SUBSEQUENT CONSTRUCTION AND OPERATIONAL LOADING CONDITIONS.

THE ATTACHED LETTER, D.R. OLNEY TO N.R. KERR DATED NOVEMBER 21, 1978, PROVIDES POST STRESS RELIEF SURVEY PROFILES OF THE WORST CONDITIONS ON THE DOME. THESE CONDITIONS ARE LESS SEVERE THAN THOSE OF THE 241-AW TANK FARM.

(2C) DESIGN CHANGE REQUIRED?

- [ ] YES
  NO. _____
- [ ] NO

DEC 19 1978

J. A. JONES CONSTRUCTION CO.

(2D) APPROVALS - (SIGNATURE AND DATE)	(2E) CONCURRENCE - (SIGNATURE AND DATE)
11/24/78	11/30/78
11/25/78 11/15/78	11-30-78
11-28-78	12/4/78

(3A)

- [X] DISPOSITION EFFECTED AS DIRECTED. NCR CLOSED.
- [ ] OTHER (SPECIFY)

James H Parrish 12-13-78

ORIGINATOR OR REPRESENTATIVE — DATE

J. A. JONES CONSTRUCTION COMPANY
801 FIRST STREET • RICHLAND, WASHINGTON • 99352 • (509) 942-6707

DRO:0206

November 21, 1978

Vitro Engineering Corporation
Automation Industries, Inc.
P. O. Box 296
Richland, Washington 99352

Attention: Mr. N. R. Kerr

Gentlemen:

FLAT SPOTS ON THE TANK DOMES

Per my conversation with Mr. Al Bjorkedal on October 20, 1978, transmitted herewith are survey profiles along three lines on the Tank 104 dome which have been determined by American Bridge as being representative of the "worst" conditions on the dome. It is our understanding that this information will provide the basis for dispositioning Nonconformance Reports B-130-37 (1000-13) and B-130-42 (1000-17) to "accept as is". It is also our understanding that these profiles will satisfy any future Nonconformance Report which is generated for flat spots and/or areas of reverse curvature of similar magnitude on the domes

Very truly yours,

J. A. JONES CONSTRUCTION

D. R. Olney
Project Manager

DRO:kw

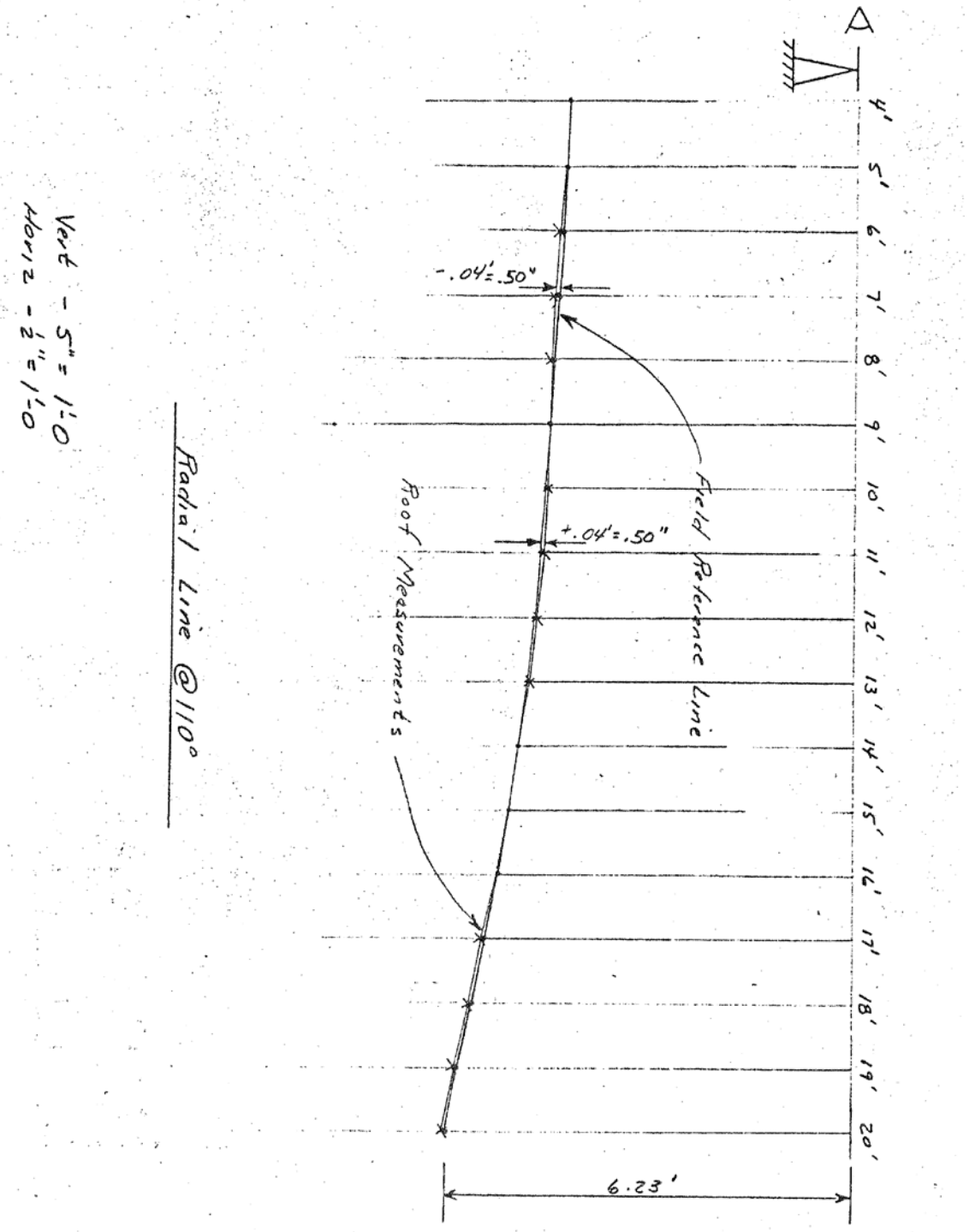
cc: JH Parrish w/attach.

DIVISION
UNITED STATES STEEL CORPORATION

FOR Tank 104- Measurements Along Roof

SHEET NO. 1 OF 6

ORDER NO.& ING. NO. K9263

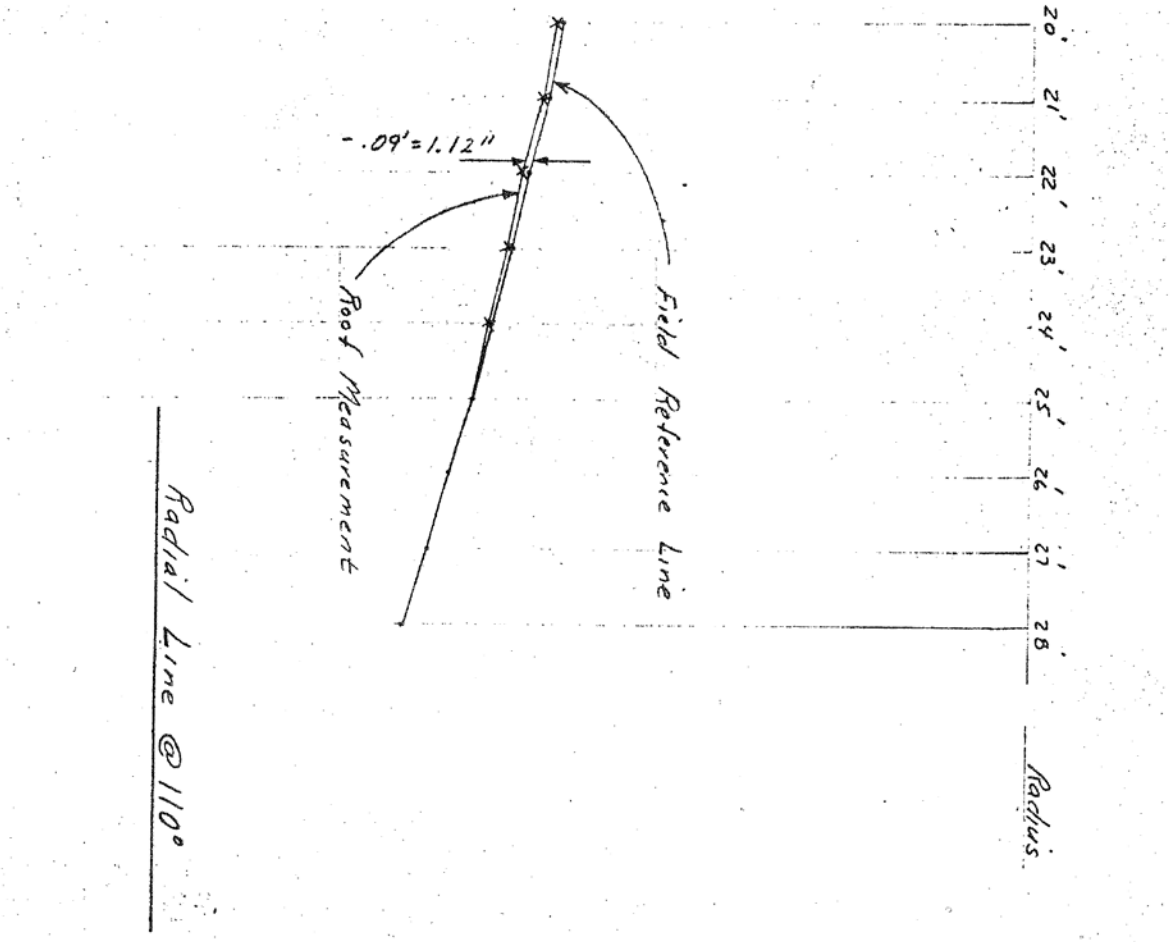


D-103 REV. 4-78

AMERICAN BRIDGE
DIVISION
UNITED STATES STEEL CORPORATION

DATE 11/17/78 BY SFH
SHEET NO 2 OF 6
ORDER NO. & ING. NO. K9263

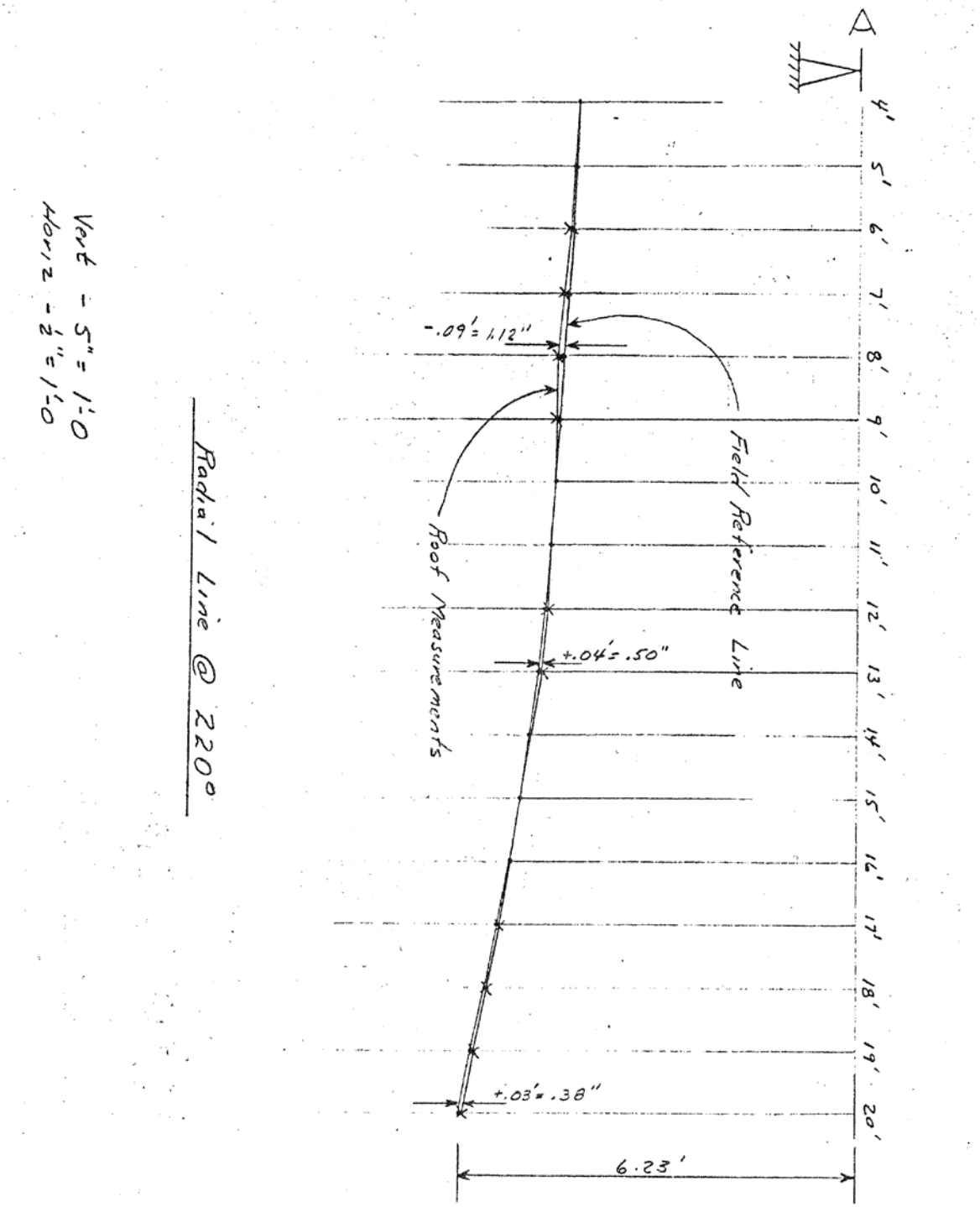
FOR Tank 104 - Measurements Along Roof



AMERICAN BRIDGE
DIVISION
UNITED STATES STEEL CORPORATION

DATE 11/17/28 BY: SFH
SHEET NO. 3 OF 6
ORDER NO.& ING. NO. K9263

FOR Tank 104- Measurements Along Roof

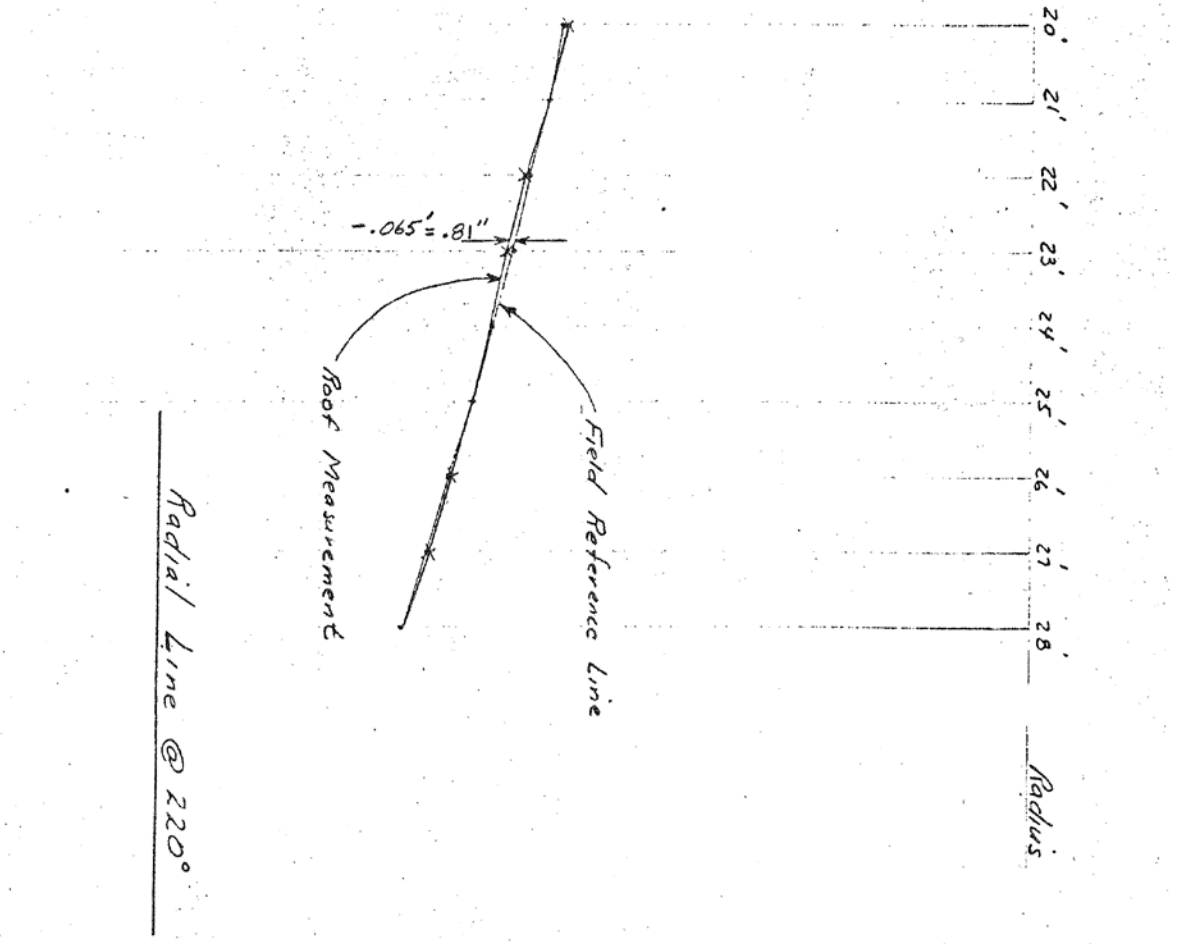


D-103 REV. 4-75

AMERICAN BRIDGE
DIVISION
UNITED STATES (USS) STEEL CORPORATION

DATE 11/17/78 BY: SFH
SHEET NO. 4 OF 6
ORDER NO.& ING. NO. K9263

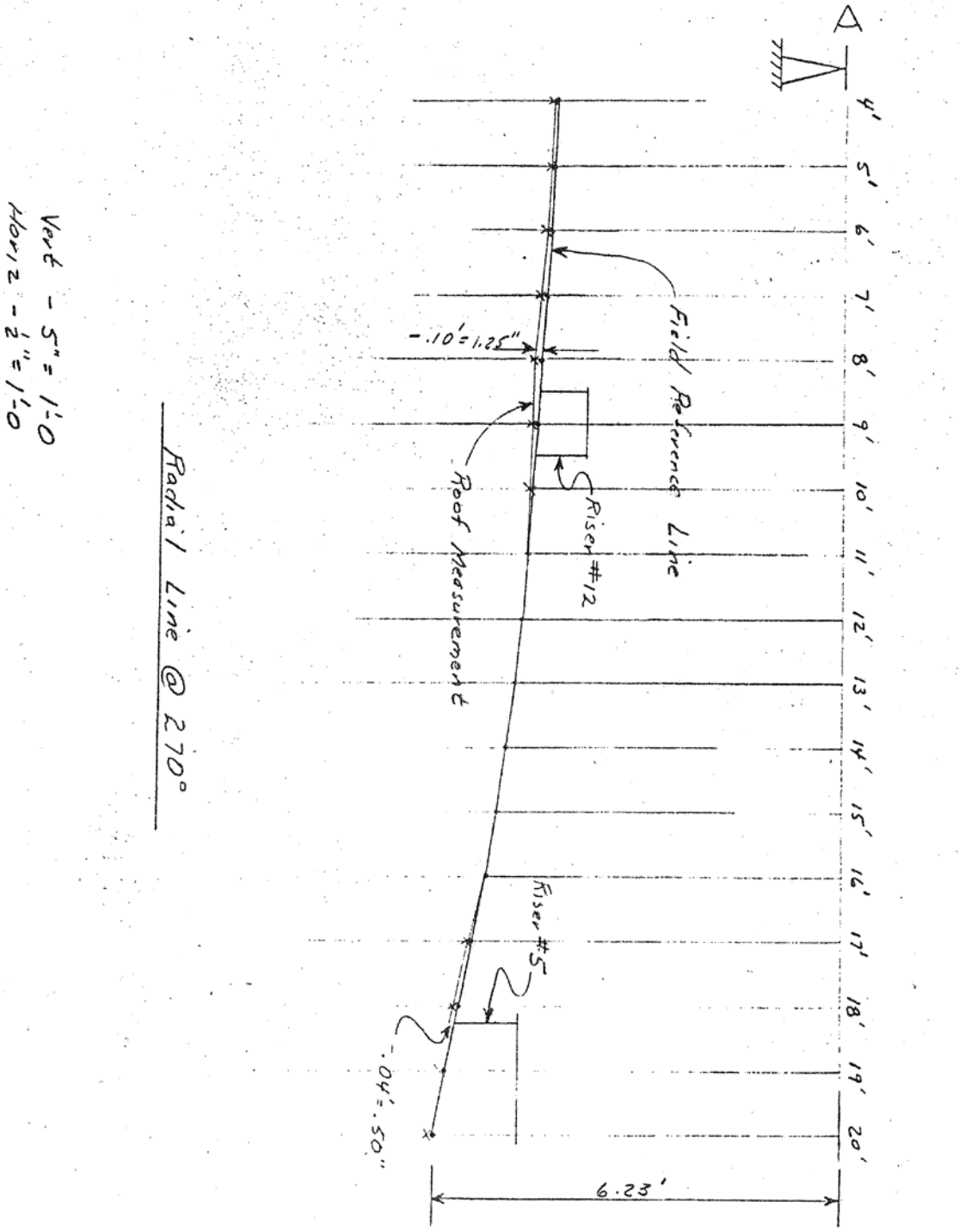
FOR Tank 104 - Measurements Along Roof

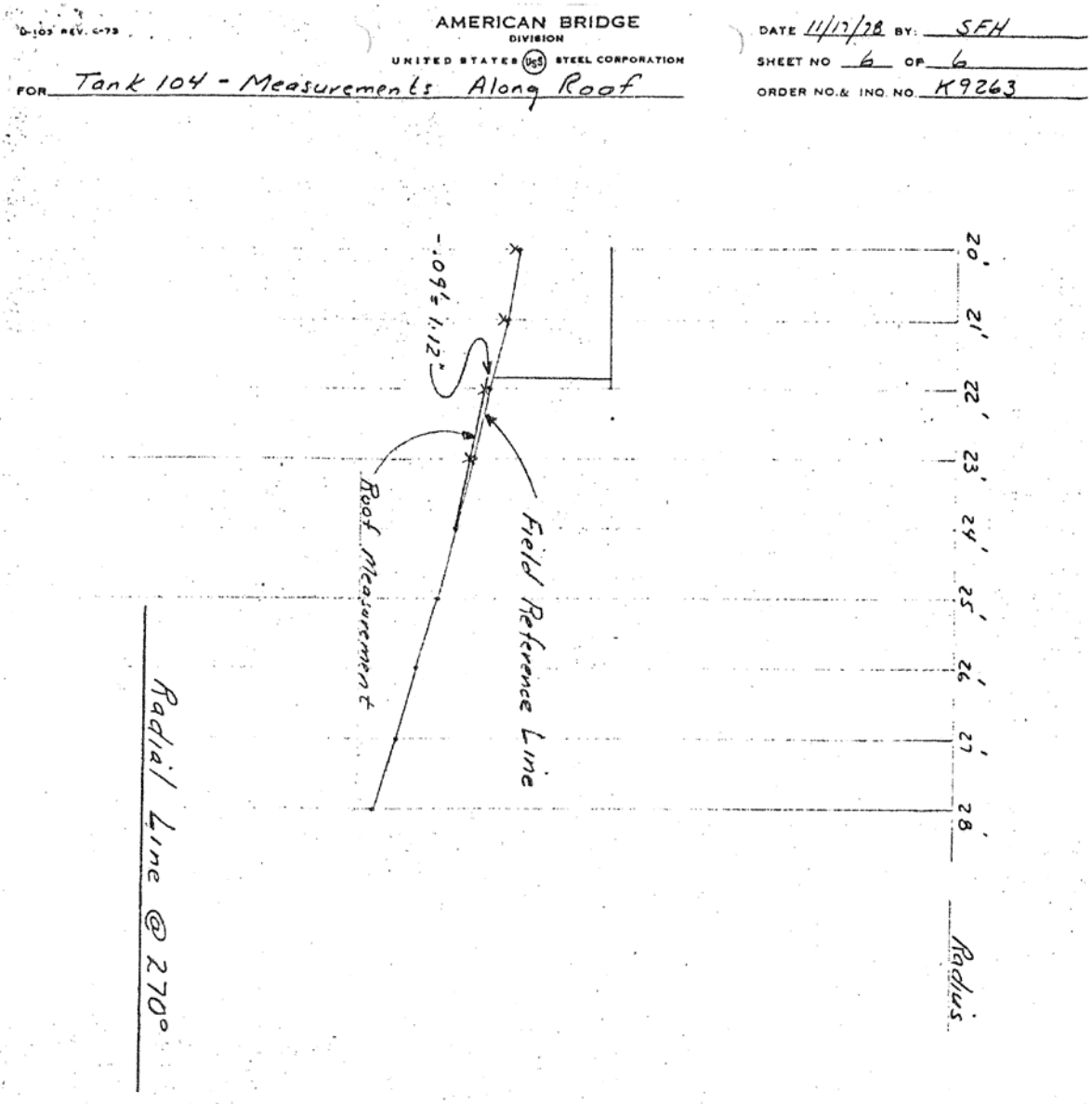


AMERICAN BRIDGE
DIVISION
UNITED STATES STEEL CORPORATION

DATE 11/17/78 BY: SFH
SHEET NO. 5 OF 6
ORDER NO.& ING. NO. K9263

FOR Tank 104- Measurements Along Roof




AMERICAN BRIDGE
DIVISION
UNITED STATES STEEL CORPORATION
FOR Tank 104 - Measurements Along Roof
DATE 11/17/78 BY: SFH
SHEET NO 6 OF 6
ORDER NO.& ING. NO. K9263
-.095 1.12"
Roof Measurement
Field Reference Line
Radial Line @ 270°
20'
21'
22'
23'
24'
25'
26'
27'
28'
Radius

App. Figure C-17. NCR B-130-42

NONCONFORMANCE REPORT

(1A) PROJECT, LOCATION OR W.O.	(1B) TITLE	(1C) NCR NO.
B-130	ADDITIONAL HIGH LEVEL WASTE STORAGE FACILITIES, 241-AN TANK FARM	B-130-42 (1000-17)

(1D) REQUIREMENTS AND NONCONFORMANCE DESCRIPTION

REQUIREMENT

Construction Specification B-130-C4, Section 15176, Part 3, Paragraph 3.02, B.3, Page 15176-16.

DESCRIPTION

Tank 102 and Tank 103 completed dome assemblies exhibit areas of flat spots and/or reverse curvatures.

Note 1. Conditions exist prior to raising of domes.

Note 2. Areas of flat spots and/or reverse curvatures are similar to those detected on Tank 101 and 104. (See NCR #B-130-37)

(1G) DISTRIBUTION

DOE
*RD Freeberg
*AG Lassila

RHO
*MA Cahill
*JT Belcher

JAJ
*~~JJ Flannery~~ DC Cincy
LJ Maenpaa

Vitro
IMA Garcia
*NR Kerr
*JH Parrish
LH Smith
*EM Zdravkovich
Central File
*Official File
*Preliminary Copies

(1E) HOLD TAG NO.	(1F) ORIGINATOR, TITLE AND DATE
N/A	J. H. Parrish, Field Coordinator, 10-20-78

(2A) RECOMMENDED DISPOSITION:

- [X] ACCEPT AS IS
- [ ] CONDITIONAL ACCEPT
- [ ] REWORK
- [ ] REPAIR
- [ ] REJECT
- [ ] OTHER (SPECIFY):

(2B) DISPOSITION JUSTIFICATION

REVERSE CURVATURES AND FLAT SPOTS ARE NOT CRITICAL ENOUGH TO CAUSE A STRUCTURAL PROBLEM DURING SUBSEQUENT CONSTRUCTION AND OPERATIONAL LOADING CONDITIONS

DEC 19 1978

J. A. JONES CONSTRUCTION CO.

(2C) DESIGN CHANGE REQUIRED?

- [ ] YES
  NO. _____
- [ ] NO

(2D) APPROVALS (SIGNATURE AND DATE)	(2E) CONCURRENCE - (SIGNATURE AND DATE)
Design 11/29/78	11/30/78
Safety 11/30/78	11-30-78
QA PE 11-28-78	12/5/78

(3A)

- [X] DISPOSITION EFFECTED AS DIRECTED. NCR CLOSED.
- [ ] OTHER (SPECIFY)

James H. Parrish — 12-13-78

ORIGINATOR OR REPRESENTATIVE — DATE

App. Figure C-18. October 27, 1980, Letter from Battelle to Rockwell Hanford Operations Regarding Tank AN-107 Pitting

Corrosion

Copies
DCB
RCR
RJF
GTD

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington U.S.A. 99352
Telephone (509) 376-0989
Telex 15-2874

October 27, 1980

Mr. J. Albaugh
2750 E/A137
200 Area
Rockwell Hanford Operations
POB 800
Richland, WA 99352

Dear Sir:

Subject: Examination of Tank 107AN

On Monday, 20 October, 1980, C. H. Kindle and I, together with several Rockwell personnel, examined the interior of TANK 107AN. Water left in the tank after hydrotesting had caused some corrosion and the question was raised as to whether or not this had caused any serious structural damage.

There were a number of sites with localized corrosion, some marked by a previous group of examiners as well as a few selected by ourselves. None of the sites observed had penetrated more than about 0.02 to 0.03 inch, and they had diameters of about 1/4 inch. Part of the depth is probably artificial in that it represents the thickness of mill scale which had to be penetrated.

The corrosion observations are:

1. The majority of the tank is corroded to some extent and is covered with loose red/orange/brown oxide which is expected to be Fe_2O_3 or one of its hydrated forerunners,

2. In many locations the corrosion products have formed tubercules or "puff ball" structures (particularly true of the lower three feet on the wall),

3. The scale over and to each side of the welds, particularly the vertical welds, is loose, and

4. The surface surrounding the localized corrosion on the tank bottom still appears to be a well-adherent layer of mill scale.

RECEIVED
OCT 29 1980
J. H. BOECKER

R04890

We interpret these observations thusly:

1. No significant impact.

2,3. Possible corrosion impact--the structures produce crevices which might isolate the contents sufficiently from the bulk tank contents to allow the OH^- and NO_2^- (corrosion inhibiting ions) in the crevices to be depleted. Should this happen, rapid penetration of the tank walls would likely result.

4. Possible corrosion impact--A classic corrosion example of a large cathode (the mill scale) and small anode (the corroded areas) is possible. The large cathode/anode ratio leads to high corrosion rates at the anode with, consequently, rapid penetration of the tank. The presence of the anodic corrosion inhibitor NO_2^- will slow the corrosion reaction, but if any barrier (precipitate, corrosion product or ?) should isolate the small anode, then rapid corrosion would occur even though NO_2^- was present in the tank.

We recommend the following action to correct these corrosion concerns:

1. Remove (wire brush ?) the tubercules from the lower tank walls.
2. Clean (wire brush ?) the area around the welds to remove the loose mill scale.
3. Enlarge the anode (base metal) relative to the cathode (mill scale) by grinding away the mill scale to expose the underlying base. The anode should be at least 25 percent of the total area; grinding of the entire tank bottom is more certain protection. (An alternative, which we do not recommend because of uncertainties in effectiveness, is to reoxidize the anodic areas.

We suggest the following preventive measures to minimize the recurrence of these problems in other tanks:

- All solutions in the tanks should contain OH^- and NO_2^- (E.L. Moore can supply concentration limits),
- More generally, one of the engineers who has daily input into the waste processing storage activities should become familiar with corrosion phenomenon. NACE short courses are one starting point.

Sincerely,

J. R. Divine, PE
Senior Research Engineer
Corrosion Research & Engineering

JRD:pl

cc: EL Moore
J Scofield

App. Figure C-19. November 3, 1980, Letter from E.L. Moore to J.F. Albaugh Regarding Tank AN-107 Pitting

GTD → DRG (FILE)

Internal Letter

Rockwell International

Date: November 3, 1980

No: 10130-80-130

TO: (Name, Organization, Internal Address)
J. F. Albaugh
Program Manager
Waste Storage and Disposal
2750-E/200 East

FROM: (Name, Organization, Internal Address, Phone)
E. L. Moore, Staff Metallurgist
Office of Waste Package Studies
Peoples Bank Building - 3rd Floor
6-8988

Subject: Inspection of Tank 107-AN

A review has been made of the results of the inspection of the 107-AN waste tank primary liner. During this inspection, several shallow pits were found in areas of the floor previously statistically selected for examination. These appeared to have been caused by preferential corrosive attack as the result of galvanic action between the adherent mill scale and base metal. Absence of significant pitting in the areas examined, however, provides a measure of confidence that the condition of the tank has not been compromised by the prescence of the hydro-test water.

Further examination of the inside surface of the primary tank wall revealed the presence of agglomerations of corrosion product (rust) scattered over the surface in the form of knoblike mounds. Many of those probed had formed over small fractured "blisters" developed by loosening of the mill scale during stress relief. (Existence of the "blisters" was verified by inspection of the outside surface of the primary liner from the annulus). Although no significant attack of the metal was evident beneath the agglomerates probed, these are suspect areas for the occurrence of pitting as the "blisters" or voids fill with waste solution.

Normally, the presence of both nitrite and hydroxyl ions in the neutralized waste solution filling the void will tend to surpress the corrosive attack. The nitrite ion, as an anodic inhibiter, maintains metal surface passivity and the hydroxyl ion neutralized the acidic conditions promoted by chloride ions present. Since nitrite is classified as a "dangerous" inhibiter, however, its depletion can promote an even greater rate of attack. The key question to be addressed, then, is whether or not a continuous supply of nitrite ion can be provided in the void by the diffusion of nitrate and formation of nitrite by radiolysis. I have addressed this question in the past and have concluded that the answer is "yes". However, loose mill scale was envisioned as forming the crevice and not the agglomerates or rust which have now been observed.

An obvious means of confidently eliminating the potential pitting problem would be to remove the loose rust agglomerates and adherent mill scale. Both would be a significant undertaking. Before making the recommendation to proceed with either, I want to discuss it further with corrosion specialists at SRP while I'm there next week.

E L Moore

E. L. Moore, Staff Metallurgist
Office of Waste Package Studies

ELM/ccb

R01894

cc: F. E. Boyd, G. M. Christensen, J. L. Deichman, R. D. Hammond, D. G. Harlow, L. P. Hoebel, G. A. Huff, L. A. Jensen, G. L. Jordan, J. D. Keck, A. R. Light, M. J. Oss, R. D. Prosser, R. C. Roal, J. H. Roecker, W. D. Schildknecht, J. S. Schofield, T. B. Veneziano, D. J. Washenfelder, D. G. Wilkins, H. A. Zweifel

App. Figure C-20. November 13, 1980, Letter from E.L. Moore to J.F. Albaugh Regarding Tank AN-107 Pitting

GTD

Corrosion

Internal Letter

Rockwell International

Date: November 13, 1980

No: 10130-80-135

TO: (Name, Organization, Internal Address)
J. F. Albaugh
Program Manager
Waste Storage and Disposal
2750-E/A-137

FROM: (Name, Organization, Internal Address, Phone)
E. L. Moore, Staff Metallurgist
Office of Waste Package Studies
Peoples Bank Building - 3rd Floor
6-8988

Subject: Recommendation for the Prevention of Pitting Attack During Double-Shell Waste Tank Operation

Ref: Letter, November 3, 1980, E. L. Moore to J. F. Albaugh, "Inspection of Tank 107-AN"

In the referenced letter, the potential for pitting corrosion of the double-shell waste tanks after they are put into service is discussed. It was hypothesized that areas under rust agglomerates and loose mill scale on the tank wall might be subject to future attack. The key question posed was whether or not a continued supply of nitrite ion could be maintained to inhibit the anodic reaction on the base metal surface. The concern was that the nitrite supply would be interrupted by the loose deposits. After discussions with metallurgists at Savannah River Plant (SRP), it was agreed that cleaning the tank wall would not be economically justifiable since it was felt that despite the loose deposits, diffusion and radiolysis of nitrate would continue to provide sufficient nitrite. The presence of nitrite and the alkalinity (pH>12) of the proposed waste solution should give reasonable assurance that pitting attack on the tank wall will be prevented.

As described in inspection reports, slight localized attack has occurred on the tank floor. This is caused by a galvanic cell between the areas (cathodic) of adherent mill scale and areas (anodic) of base metal. Since the anodic areas are accessible to nitrite, once the tanks are put into service any further attack will be prevented due to the presence of nitrite and the alkalinity of the waste solution. Therefore, removal of the adherent mill scale on the tank bottom is not warranted.

In order to bet protect tanks from pitting attack prior to putting them into active liquid service, they should be kept dry. If this is not possible, the pH of the water heel should be at least 12 and the concentration of sodium nitrite should be at least 500 ppm.

On future tanks to be constructed at Hanford, I would recommend that the mill scale be removed from tank plates prior to fabrication. This descaling will minimize the difficulty in visually inspecting the tank for anomalies prior to putting the tank into service. In addition, descaling will prevent any localized attack to the base metal in the event that untreated water is left in the tank for any lengthy duration.

John Schofield for
E. L. Moore, Staff Metallurgist
Office of Waste Package Studies

ELM:peb

cc: F. E. Boyd, G. M. Christensen, J. L. Deichman, R. D. Hammond, D. G. Harlow, L. P. Hoebel, G. A. Huff, L. A. Jensen, G. L. Jordan, J. D. Keck, A. R. Light, M. J. Oss, R. D. Prosser, R. C. Roal, J. H. Roecker, W. D. Schildknecht, J. S. Schofield, T. B. Veneziano, D. J. Washenfelder, D. G. Wilkins, H. A. Zweifel

R01895

App. Figure C-21. June 15, 1979, Letter from D.M. McCorkle and K.L. Jones to L.J. Maenpaa Regarding 241-AN Tank Farm Contaminated Backfill

INTER-OFFICE CORRESPONDENCE

J.A. JONES CONSTRUCTION SERVICES COMPANY

To: L. J. Maenpaa

From: D. M. McCorkle/K. L. Jones

Date: June 15, 1979

Re: CONTAMINATED BACKFILL MATERIALS
PROJECT B-130

1. On June 8th, the area designated for additional fill materials was surveyed and released by RHO/RM and the subcontractor was authorized to proceed with excavation. J. J. Welcome Construction Company at this time began to clear the area of vegetation and proceed with backfill operations. The rate of backfill is being computed at this time by H. Halvorson/J. J. Welcome to determine how much fill material was placed. But based upon conversations with uninvolved parties the approximate rate of backfill was 1 load every 8 minutes or 105 loads per hour from the old north stock pile. Therefore, based upon the distance from the subject area to the tank farm backfill area which is approximately twice as far as the north stock pile you would have to decrease the backfill rate to approximately 1 load every 8 minutes or 48 loads per hour using 5 scrapers with a load capacity of 25 to 30 cu. yds. for 4 days, 2 days for 24 hours and 2 12 hour days or 72 hours = approximately 86,400 cu. yds. of fill was placed. These are not accurate figures just approximations. The final tally should come from the subcontractor. Part of this material was mixed with some of the clean or old stock piled material.

2. Per D. Olney, he instructed this subcontractor to excavate in an area south of the designated area. Being there were no radiation boundary markers posted, the area was surveyed by the RHO/RM's and the excavation permit and drawings were not as well defined as they could have been. Mr. Olney made a decision and it just happened to be a bad one. Had the area been properly posted this might not have happened.

3. It seems that the most important concern on the projects is to maintain schedule and save money. Which I agree with entirely, but you can't compromise safety and quality while doing it. The materials being stored out there will be here when we are long gone. With the attitude toward Nuclear Power and Waste as it is today it seems more due care should be exercised by all concerned parties to preclude anything like this from happening, and not so much emphasis placed on saving money and time. RHO and JAJ have adequate Radiation Protection Safety Procedures. It's just a matter of proper implementation of those procedures.

This does not conclude our investigation. We will be continuing to discuss this matter with concerned parties during the week of June 18, 1979.

DMM/KLJ:pr

App. Figure C-22. June 18, 1979, Letter from D.R. Olney to R.B. Gates Regarding 241-AN Tank Farm Contaminated Backfill

6319 8

JAJ-1083
B-130

INTER-OFFICE CORRESPONDENCE

J.A. JONES CONSTRUCTION SERVICES COMPANY

To: R. B. Gates

From: D. R. Olney

Date: June 18, 1979

Re: Contamination of the 241-AN Tank Farm

Backfill of the 241-AN Tank Farm started on the morning of June 5, 1979 and was being performed by J. J. Welcome Construction Company, a lower-tier contractor to H. Halvorson, Inc. under subcontract JAJ-1083. This backfill was being performed on an around-the-clock basis which was part of an acceleration of the work that had been previously negotiated. By the afternoon of June 6, 1979, it was becoming fairly obvious that there was not enough material stockpiled at the tank farm (excavated material) to complete the backfill operation. Review of the Special Conditions showed that an alternate borrow area had not been designated. That afternoon, I discussed the situation with Mr. Alex Buchanan, Superintendent for J. J. Welcome, and he concurred that there was not enough material stockpiled to complete the job. He estimated that the stockpiled material would be expended sometime during the weekend.

On June 7, 1979, at the Monthly Cost & Schedule Review, I advised Mr. John Belcher of Rockwell that a borrow area needed to be designated as soon as possible so that the backfill operation would not be delayed. He started work on the problem that afternoon. On the morning of June 8, 1979, Mr. Buchanan advised that the stockpiled material would be expended sometime late that night or early the next morning. I contacted Mr. Belcher and requested him to expedite designation of a borrow area. Late that morning, Mr. Belcher provided me with an excavation permit and a drawing showing a map of the area with a borrow area designated on the outside of the 200-East perimeter fence. Mr. Belcher advised that Mr. Ward Givan, RHO RM, had attempted to survey the area for radiation/contamination but had been hampered by the dense growth of sage brush and other desert shrubs. Mr. Belcher requested that J. A. Jones' CPAF be directed to strip a couple of pathways out through the area so that the survey could be completed. As J. A. Jones would also need to remove the perimeter fence, I issued a cross order to CPAF to perform the work. Mr. Louie Wishert of J. A. Jones advised that he would have the front end loader outside the fence right after lunch and that Mr. Givan should have his RM out there at that time also. I had also contacted Mr. Maurice Thornton of RHO Patrol and advised him that an opening was to be made in the perimeter fence that afternoon, and that Patrol coverage would be required for approximately one week. A work order was issued to Rockwell for this coverage.

On the afternoon of June 8, 1979, J. A. Jones' CPAF removed the perimeter fence and ran a couple of strips out through the area. Near the fence, some contamination was found and removed by J. A. Jones. Meanwhile, I had written a letter to H. Halvorson designating the new borrow area, and imposed on Halvorson the same requirements that had been imposed on me by Mr. Belcher, i.e. berm over an existing pipe line and the paved perimeter road and excavate east of the existing pipe line, north of an existing crib (identified by ventilators above the surface of the ground), and south of an existing 6-foot wide ditch. No offset from any of these features

was indicated on the permit or drawing. Another group of drawings showing an enlarged map of the area had been provided with the permit, but at the time, I did not notice any offset dimensions shown on it either. (Review of this drawing on June 13, 1979 showed an offset of 360' ± from the crib hand-written on the drawing.) After, a walk-through survey by RM was completed at approximately 5:45 p.m., I was advised that the area was acceptable and that the subcontractor (Welcome) could proceed with stripping the area and excavation for additional backfill material. Mr. Buchanan was so advised, and he stated the area would be stripped that evening.

I did not visit the site on either Saturday, Sunday or Monday (June 9, 10, 11) and do not know at what point Welcome started using the designated area for borrow. My staff advised that Welcome was hauling out of the designated borrow area when they arrived at work on Monday morning (June 11). When I returned to the site on Tuesday morning (June 12), there was no activity in that Welcome had completed Monday night. My review of the limits of the backfilling and the drawing requirements showed that the backfill had not been extended far enough to the north and west. After discussions with Welcome and Halvorson, the work was resumed Tuesday (June 12) morning to extend the limits of the backfill to their required locations. Borrowing for this work continued out of the designated area. Early in the afternoon of June 12, I was contacted by Mr. Jerry Rodgers of Rockwell and advised that the borrowing activity should be moved to the north to keep away from the crib. I went out to investigate the situation and could see that Welcome was cutting the borrow area at a 2 to 1 slope away from the crib and that it appeared they were at least 100 feet away from the ventilators marking the centerline of the crib. The borrow area was long and narrow and appeared to be 6 to 8 feet deep. I requested Welcome's foreman (Mr. John Bennett) to move the borrow activity to the north. The borrow trench was wide enough to accommodate this request and the dozers and scrapers were moved to the north side of the trench. Mr. Belcher was notified that this move had been done but that the operation could not be moved any further to the north without cutting a new trench.

Late that afternoon (June 12), I was advised by Welcome's foreman that some moisture in the borrow area had been encountered but that they felt it was residual water from the sprinklers. (A large irrigation sprinkler (nozzle 5/8" to 3/4") had been set in the area immediately after stripping Friday night in order to get some moisture into the soil as soon as possible.) I told him that I would contact RM immediately to have it checked out. Mr. Bennett advised that the moisture had been removed and that there was nothing left to survey. I told Mr. Bennett that if he encountered moisture in the soil again, he was to get his men and equipment away from it and notify me immediately in order to arrange a survey. No further action was taken on my part that afternoon, and Welcome continued backfilling until about eight or nine o'clock that evening.

On the morning of June 13, 1979, the backfill operation continued until approximately 9:15 a.m. when Mr. Elmer Dahl of H. Halvorson, Inc. advised that moisture had again been encountered in the borrow area. I told Mr. Dahl to have Welcome get his men and equipment out of there until it could be surveyed by RM. I then contacted Mr. Givans and apprised him of the situation and requested a survey. He stated it would be performed within thirty minutes. At approximately 9:45 a.m., Mr. Dahl advised that he had talked with the RM and that contamination had been detected. He further stated the area was being roped off and that the RM's would be checking

the Tank Farm. Mr. Belcher was at my office for the weekly construction meeting and I apprised him of the situation. I then contacted Mr. Givans to ascertain the details of the survey. He stated that very low level (1500 counts/minute) contamination had been found in the borrow area and on the subcontractor's equipment, and that Mr. Bill Hodges had been requested to survey the tank farm to see if any contaminated dirt had been brought into the tank farm. This survey showed that contaminated dirt was in the tank farm and J. A. Jones' CPAF was requested to assist in roping off the tank farm.

At approximately 11:15 a.m., I was approached by Mr. Bill Heine, Mr. Larry Ogletree and Mr. George Owens of Rockwell who explained the situation and stated that a clean area was being prepared for the equipment to be taken to for decontamination and that they would probably recommend lung counts and urinalysis tests for the people involved. I advised him that the subcontractor and I would cooperate in any manner that we could. Mr. Heine requested a list of subcontractor personnel involved with the backfill operation. Mr. Ogletree requested a BNW photographer be dispatched to the site at once. (He worked through his own people on this request.) It was at this point that I contacted Mr. Roy Purkey and apprised him of the situation.

I located Mr. Dahl and Mr. Buchanan and explained to them the facts relative to the situation as they had been presented to me. I stressed that the contamination was extremely low level but that the equipment was contaminated and would have to be cleaned. Mr. Buchanan stated that his men were somewhat concerned but that he did not anticipate any problems. He further stated that under no conditions did he want J. A. Jones or RHO personnel operating his equipment and that his operators would enter the zone to move the equipment if so requested. I requested Mr. Dahl and Mr. Buchanan to furnish me with a list of their personnel which they did a short time later.

Shortly after 12:00 p.m., I contacted Mr. Heine who was still at the site and provided him with the list of subcontractor personnel involved with the work. I also relayed to him the fact that Welcome's operators would suit-up and move the equipment if requested to do so (6 scrapers, a D-9 dozer and a D-8 dozer were at the borrow area, while the water wagon and one scraper were at the tank farm and the blade was in-between the areas). Mr. Heine advised that it was Rockwell's recommendation to have lung counts and urinalysis performed on all the subcontractor's involved personnel. He came to my office to notify Mr. Red Crass of this recommendation but Mr. Crass was not at his office, so he talked to Mr. Purkey instead. Mr. Purkey stated that he would have Mr. Crass contact him when he returned to the office at approximately 1:00 p.m. Mr. Crass called back and talked to me at about 1:10 p.m. He felt that based on the fact that no contamination had been found on the personnel and that the cabs of the equipment showed no contamination, the tests were not justified at this point, in that without a prior history on these people, if contamination was found, there was no way it could be positively tied back to this work. I told Mr. Crass that Mr. Heine seemed to be adamant about it and that I would locate him and have him return the call to him. I located Mr. Heine and he telephoned Mr. Crass and explained Rockwell's recommendation and the basis for it to him. Mr. Crass advised that he would be coming to the site that afternoon.

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At some point during the afternoon, Mr. L. B. Leonard was made aware of the situation and he requested that he be kept briefed periodically of the situation. He stated that I was to cooperate fully with Rockwell, and that any recommendations by Rockwell should not be taken lightly. I told him I would do anything Rockwell requested.

Late that afternoon, I was advised by Rockwell (I don't recall whom) that a clean area for decontamination of the equipment was ready and that the scrapers with dirt in them were to be emptied in the borrow trench and then driven to the decontamination area. Rockwell's water truck would wet down the bottom of the trench and wash some of the loose dirt off the scrapers as they passed through the trench. Welcome's operators suited-up and got the equipment running at the borrow area and proceeded to empty the 3 or 4 scrapers that had dirt in them. The six scrapers and the D-9 dozer were then driven to the decontamination area. Earlier in the day, the D-8 dozer had been found to have very little contamination on it and had assisted in clearing and preparing the decontamination area. The blade had also assisted in preparing the decontamination area. The scraper and water wagon at the tank farm were also driven to the decontamination area. Rockwell's scrapers then covered the borrow area with a few loads of clean dirt. Shortly thereafter, the blade and the D-8 were released by RM with the blade removed from the radiation zone and the D-8 parked just inside the zone. The subcontractor's personnel were then released for the day but were requested to report to the worksite the following morning to pick up their equipment and move off-site. (It was assumed that the equipment would be decontaminated that night and released Thursday morning.) I informed Mr. Dahl and Mr. Buchanan that no further backfill work would be performed by Welcome due to the unknown extent of the contamination and the uncertainties as to when work would be allowed to resume. (Mr. Leonard was apprised of this determination.)

Welcome's people were to arrive at the jobsite at approximately 9:00 a.m. in order to give RM enough time to check out the equipment first thing in the morning.

During the afternoon, I discussed the situation with Mr. Joe Vacca, the Vitro Title III inspector assigned to the backfill work. He advised that the material was yellowish in color and had a distinct odor to it. He figured that contaminated dirt had been placed starting late on Tuesday (June 12) afternoon when the moisture had first been encountered in the borrow area. He based his opinion on the fact that readings on his CPN gauge for determining density of the in-place material had been running low starting at about 5:00 p.m. (This would be testing through one or two lifts to a previous lift probably deposited around 3:00 to 4:00.) He stated that if the device was picking up background radiation, a low reading would result. The same phenomenon had been encountered Wednesday morning prior to the shut-down. He further stated that a strata containing yellowish material

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had been encountered Sunday afternoon and was located six to eight feet below finish grade in the entire tank farm. (Mr. Bennett of J. J. Welcome confirmed this fact and Mr. Belcher of RHO was apprised.) Mr. Vacca explained that Mr. Gerald Rippey of Vitro Title III had been assigned the inspection work Sunday afternoon and had reported to the whole-body counter Wednesday afternoon. (According to the Vitro Title III Inspection Reports, the borrow area outside the fence was used for backfill from Elevation 641' to 644' and then from El 646 and up, and that material was hauled from the pit starting Saturday afternoon.)

Late in the afternoon, I was contacted by Mr. Leonard and informed that Rockwell had told him that the operation was outside the limits of the area designated by Rockwell. He informed me that the designated area had been established by spray painting the sage brush at the limits of the area. I told him I had overheard Rockwell personnel discussing this but had not been informed of this restriction until he had told me about it. Mr. Leonard advised that Mr. Jake Heberlein's people were aware of it and had done their stripping within that area. He suggested I check it out with Mr. Heberlein. I contacted Mr. Heberlein and he informed me that Mr. Les Reynolds, the JAJ operator foreman, confirmed the existence of the painted sagebrush which was apparently to define the limits of the borrow area. I told Mr. Heberlein that nothing had been said to me about the painted sagebrush on Friday afternoon, and that I had waited until 6:00 p.m. for the RHO RM to release the area. The RM had informed me that the area was clean but had said nothing about painted sagebrush defining the limits of the borrow area.

It should be noted that prior to leaving the work area, Welcome's equipment operators were requested to blow their nose and spit up on a napkin in order to see if any contamination had been inhaled or swallowed. Mr. Hodges surveyed these samples at the site and stated there were no counts. Mr. Hodges also stated that the samples would be submitted to further analysis at the RM office.

That evening, I was contacted at home by Mr. Crass who stated he had met with Mr. Leonard late that afternoon and that Mr. Leonard requested that Mr. Crass and I be present for a meeting with him at 7:30 a.m. Thursday morning. He also stated that, based on Rockwell's recommendations, the subcontractor's personnel would be transported to HEHF for a lung count. Transportation would be provided by J. A. Jones.

On the morning of June 14, 1979, Mr. Crass, Mr. Rusty Gates and I met with Mr. Leonard to review the situation and determine a plan of action. It was decided that all the subcontractor personnel would be transported by J. A. Jones to HEHF for lung counts. Mr. Crass was to accompany me to the jobsite to brief the subcontractor personnel. Mr. Leonard suggested that I arrange a meeting with Rockwell and Mr. Heberlein and Mr. Crass in order to arrive at a decision as to what to do with the contaminated soil in the tank farm, i.e. remove it

or cover it. I also briefed Mr. Leonard regarding the facts as I knew them. At the conclusion of the meeting, Mr. Crass and I departed for 200 East.

Upon arrival at the jobsite, I contacted Mr. Belcher of Rockwell regarding the meeting and I was advised that Rockwell's and DoE's upper management were discussing the situation at that moment and that they would provide direction as to the removal or covering-up of the contaminated soil. I met with Mr. Buchanan outside my office and notified him that no additional equipment had been released by RM that morning because they were having a hard time washing off the caked on dirt. He advised that should it be necessary to remove any backfill, he would be willing to use some of his old scrapers to do it. I questioned him as to how much dirt had been taken out of the borrow area to which he responded that he would estimate at least 50,000 yards. He stated a fairly accurate quantity could be determined from the load counts, but that these were at his Prosser office. Standing on Canton Avenue, we looked out toward the east at the portion of the borrow area we could see from that vantage point. The line of risers from the crib and the fence around the crib were clearly visible as was a mound of strippings that had been spoiled next to the fence by Welcome. It was also obvious that the borrow area ran parallel to the crib. The top of the cut for the borrow area could also be seen from our location. We estimated that the bottom of the borrow area where material was being excavated from was approximately 150 to 200 feet from the centerline of the crib.

I returned a call to Mr. Leonard and advised him that a decision relative to the contaminated soil was being made by Rockwell and DoE upper management who were currently meeting at the Federal Building. I also advised him that the bottom of the excavation was estimated to be 150 to 200 feet from the centerline of the crib. I also notified him that Welcome was willing to assist with removal of any contaminated soil should we be required to do so. I further stated that none of Welcome's equipment had been released this morning. He requested that I keep him posted of any new developments.

At approximately 9:30 a.m., Mr. Crass and Mr. Hodges met with the subcontractor's personnel to brief them of the upcoming tests and answer questions relative to the test. The first van load of personnel departed for Richland shortly thereafter. After the meeting, I asked Mr. Hodges what the status of the equipment was. He advised that there was still readings of 800 counts/minute on the two scrapers that had been given a good washing. He also stated that the RM's were concerned about the inaccessible areas on the equipment where contaminated soil would escape detection. He explained that the contamination was Beta and that a release could not be signed until the level of contamination was less than 100 counts/minute which would be a background level.

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Mr. Leonard called back to advise me that DoE and Rockwell upper management had determined that all material excavated from the borrow area was to be returned to the borrow area. As this amounted to at least 50,000 yards, I suggested that we talk to Welcome to see what kind of money he would be talking about to perform the work. I explained that Mr. Buchanan was a principal with J. J. Welcome Construction Company and that he could speak for them. He suggested that I obtain a quote from them. He also asked if I had ascertained any further information regarding the Vitro Inspector who had reported to the body counter the previous day. I responded that I had not been able to reach him this morning.

I then requested Mr. Buchanan to contact his people relative to assisting with excavation of the contaminated material. He contacted them and they supported his decision to assist. Mr. Buchanan stated he would work up a price as soon as he knew the extent of the work to be performed.

I was then able to contact Mr. Rippey who stated that he had only had his badge read, not a whole-body count. He stated the technician told him the badge showed 430 gamma penetrating which was approximately double what he normally received in a quarter. Mr. Rippey also stated that the technician would not validate the reading for some unknown reason.

Late that morning, a meeting was held in my office with Rockwell to review the situation and determine how to remove the backfill material from the tank farm. In attendance were Ned Raile , John Belcher, Jerry Rodgers and Bill Hodges with Rockwell and Jake Heberlein and myself. Rockwell reported that all the backfill from the borrow area had to be removed and returned to the pit--approximately 50,000 yards. Rockwell advised that cores were to be taken near the borrow area in an attempt to determine the extent of the contamination outside the perimeter fence. They stated it would be at least next Friday before we would be able to start backfilling the borrow area. Mr. Hodges reported that all areas had been surveyed and provided copies of a sketch he had prepared showing contamination levels. He stated the highest readings were found approximately three feet up from the bottom of the borrow area. Two foot deep test holes were dug in the tank farm that confirmed our thinking that the bulk of the contaminated soil was on the north strip of the tank farm with only surface contamination in-between the tanks. I advised the group that there was a possibility that contaminated soil had been encountered as early as Sunday and that it would be located approximately eight foot down from the surface throughout the tank farm. It was decided that the rest of the tank farm would be roped off until the extent of the contamination could be determined. Mr. Heberlein stated he would have his people do just that right after lunch. Mr. Rodgers stated that the elevation of the contamination in the pit was pretty close to the bottom elevation of the crib, and that he suspected that the crib leaked. However, he had no explanation for any contamination that may have been found closer to the surface. (The RM's had not found any contamination except near the bottom of the trench.) I explained that Welcome was willing to assist with removal of the contaminated backfill and that we might as well take advantage of his expertise as long as his equipment was

contaminated anyway. Mr. Heberlein stated that Welcome's people would have to be put on Jones' payroll so that we could send them through HEHF for physicals. He suggested that if Welcome was to assist, we should have his people run through HEHF for physicals while they were down there for whole-body counts. Mr. Heberlein stated that the Government had five scrapers which could be used for the operation, but that it would go faster if Welcome's were also available. The meeting was adjourned at approximately 12:15 p.m. for lunch with the meeting to reconvene at 1:00 p.m. It was at about this time that the second van load of subcontractor personnel departed for Richland for their tests.

At about this time, Mr. Seth Bridges notified me that Mr. Leonard had requested Mr. L. J. Maenpaa to prepare an independent report of the incident and that he had been requested by Mr. Maenpaa to do it. He stated that he had walked through the area this morning and had located the painted sagebrush outlining the Rockwell designated area and had found the borrow pit to be well outside the limits of this designated area. Mr. Bridges also stated that he contacted Mr. Louie Wishert, Mr. Elmer Dahl and Mr. Buck Buchanan to obtain statements from them. He stated that Mr. Wishert said that he had not been aware of, nor had seen the painted sagebrush. (Mr. Wishert repeated this statement to me later in the day.) He further stated that Mr. Reynolds seemed to be the only one aware of the painted sagebrush and, in fact, directed his blade operator to strip along the boundaries of the painted sagebrush last Friday, at the request of the RM. Mr. Bridges also stated that Mr. Dahl and Mr. Buchanan informed him that the only restriction I had placed on them as to the location of the borrow area was what I had written in my letter to Halvorson dated June 8, 1979, plus my verbal restriction of maintaining a 40 foot distance from the fence around the crib. I informed Mr. Bridges that I did not recall making that restriction, but that I very well could have.

At shortly after 1:00 p.m., the meeting reconvened with the same people in attendance, plus Mr. Heine, Mr. Owens and Mr. Ed Dodd of Rockwell and Mr. Gene Frederickson of J. A. Jones. Rockwell stated that they were keeping the surface of the contaminated areas wet so as to preclude any contaminated material becoming airborne. They also stated they were considering the application of a fixative to the surface of the soil. Mr. Heine questioned as to whom was preparing the unusual occurrence report and stated that he did not believe it was Rockwell's responsibility to do it. I stated that J. A. Jones would prepare the report. At about this time, Mr. John Anttonen of DoE telephoned me to state that J. A. Jones was not authorized to remove any contaminated dirt until he granted approval to do so. I so advised the meeting attendees. Mr. Heberlein reported that the J. A. Jones scrapers were located at 100-D Area (2) and 3000 Area (1) and that the cats were at 100-F. He stated there was no way he could assemble the equipment and commence any work prior to Friday morning. Mr. Heine then stated that only the contaminated soil had to be removed and that if this involved more than about 5000 yards to get the tank farm in a clean condition (less than 250 counts/minute), Rockwell would re-evaluate this determination. The excavated backfill material was to be returned to the borrow area. Due to the fact that scrapers tend to dribble dirt out of their pans continuously, it was decided that the removal

should be accomplished with dump trucks, a front-end loader and a dozer. The plan of attack was to move in from a clean area towards the area between the tanks and attempt to keep the loader and dozer on clean dirt at all times. Mr. Heberlein stated that he could start this type of an operation that afternoon, but I cautioned that the only thing that could be accomplished today was to get the equipment over here. Mr. Dodd stated that his personnel were now in the tank farm with a hand augur and would attempt to drill as deep as they could with the augur to characterize the extent of the contamination. He stated that it would be Friday morning before he could get a core drill rig in the tank farm. At this point, the meeting was adjourned.

I then contacted Mr. Anttonen to apprise him of the decisions reached in the meeting and the course of action to be undertaken. Mr. Anttonen also wanted to discuss it with Mr. Raile who was still at my office working on the excavation permit and excavation procedure. After a lengthy conversation with Mr. Raile, Mr. Anttonen notified me that the remainder of the tank farm would have to be characterized prior to starting excavation. He also advised he would be at the site at 7:30 a.m. on Friday morning to review the situation and authorize J. A. Jones to proceed. Mr. Anttonen stated that he had no objection to J. A. Jones continuing to mobilize our equipment. I relayed this information to Mr. Heberlein.

Mr. Leonard was contacted and briefed regarding the latest developments. He also wanted to know if I had the drawings that had accompanied the excavation permit for the borrow area. I told him that I had given them back to Mr. Rodgers upon Mr. Rodgers' request. He stated that I should have kept them and suggested that I retrieve them. I told him I would attempt to retrieve them.

Mr. Gates arrived at my office at about 3:30 p.m. and I briefed him regarding the day's activities. I had also found out that due to the problems with decontaminating Welcome's equipment, consideration was being given to sending them to the steam cleaner at 200 West. The primary problem was the caked-on dirt in the pans and on the tires. Rockwell had informed us that the tires had to be clean to transport the scrapers to the steam cleaner. Mr. Leonard called Mr. Gates and requested that he attend a meeting at Mr. Dale Bartholomew's office that was to take place shortly. Mr. Gates and I departed for this meeting immediately. (In the meantime, the first van load of subcontractor personnel had returned from Richland.)

Mr. Gates and I arrived at the meeting shortly after 4:00 p.m. In attendance were Mr. Bartholomew and Mr. Rodgers and two other Rockwell personnel that I did not recognize. The drawings that had accompanied the excavation permit were laid out on the table. The large drawing did, in fact, show a penciled-in dimension of 360 feet from the fence around the crib to the edge of a square that had obviously been partially erased. (It was like that when I got it on Friday.) The dimensions of the square were 120' by 120'. Using the same centerline and enlarging the square to 500' by 500' reduced the 360' to 170'. However, the borrow area was inside even this 170' dimension. Mr. Bartholomew

tape-recorded statements by Mr. Rodgers and myself (in addition to those taped prior to our arrival) and indicated he would be meeting with Mr. Leonard that night and would play it back for him. At the conclusion of the meeting, the drawings were returned to me. The second van load of subcontract personnel had still not returned from Richland.

Mr. Gates and I left for Richland at approximately 4:45 p.m. and I delivered the drawings to Mr. Leonard at his home. I reviewed the permit and the drawings with Mr. Leonard and explained what I had told Mr. Bartholomew.

At approximately 6:45 p.m. on June 14, Mr. Crass called me from the whole-body counter to report that it had taken nearly two hours to complete the tests on the last two people due to the fact they were extremely drunk and had been making a nuisance of themselves. Mr. Crass stated that the subcontractor personnel and the J. A. Jones teamster were at the Labor Temple, and that he thought it would be best if he drove them back to 200 East which he did. He stated he would discuss the situation with Mr. Elmer Dahl the next morning.

On Friday, June 15, 1979, another meeting was held at my office at approximately 7:45 a.m. In attendance were John Anttonen and Ron Gerton of DoE, John Belcher, Bill Heine, George Owens, Larry Johnson, Rocky Ybarra, Ed Dodd, B. J. Saueressig and Mr. Deichman of Rockwell and Rusty Gates and myself of J. A. Jones. A re-cap of the two previous days' activities and events was provided by me. Rockwell advised that core drilling in the tank farm would be performed starting at 8:00 a.m. The Rockwell programmatic recommendation is to remove the contaminated soil only from the tank farm. They further stated that it would be acceptable to remove the contaminated backfill from the tank farm proper and leave the contaminated backfill on the north side. This would require extension of the tank farm to the north so that the contaminated soil could be covered with clean dirt. This would result in removal of only approximately 500 yards of contaminated soil which could be accomplished using dump trucks and a front-end loader as proposed on Thursday. Mr. Saueressig stated that first consideration must be given to the haul road to preclude any further contamination being spread by the trucks. He stated this could be accomplished by either blading off the surface of the haul road or keeping it wet. It was decided that J. A. Jones' CPAF would be requested to commence removal of the contaminated soil in the tank farm proper to a depth of approximately 12" where it appeared the contamination ended. The estimate for this work was approximately $5,500.00 ($4,000 to remove and $1,500 to replace). Mr. Saueressig stated that Mr. Heberlein and Mr. Hodges were currently planning their course of action to cover this removal operation. An excavation permit and RWP for this work had been prepared the previous day. A procedure for the excavation was attached to the excavation permit.

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Earlier in the meeting, Mr. Dodd had provided a map showing the results of Thursday's augering in the tank farm. Mr. Dodd explained that they had been able to auger to a depth of only about three feet because the hole collapsed at that depth. This map confirmed that the north side of the tank farm was where the bulk of the contaminated dirt had been placed and that the depth could be 6' to 8'. Mr. Dodd stated that a core drill would be moved into the Tank Farm that morning in order to determine the depth of the contaminated dirt on the north side and to confirm that the surface contamination was the extent of the problem in the tank farm proper. It was also decided that the north side was to be sprayed with a fixative pending a decision on whether that material had to be removed. Mr. Anttonen concurred with all actions decided at the meeting. The meeting was adjourned.

After the meeting, Mr. Anttonen requested that I provide him with the story behind this incident as I saw it. Both Mr. Gerton and Mr. Gates were present while I ran through the history of the incident. I told him how I had been pressuring Rockwell since June 7 to designate a new borrow area because it was evident we did not have enough material stockpiled to complete the work. I had suggested to Rockwell that a swale immediately north of the tank farm between a low area and the ash pit be considered but it turned out that material was unsuitable due to a fairly heavy concentration of cobbles in that area. Rockwell had wanted to use the borrow pit in the southeast corner of 200 East, but I had dismissed that due to the length of the haul (one mile each way) and the fact that the paving on Canton Avenue would be destroyed by the scrapers running up and down the road. (There wasn't enough room to run off the edge of the road due to radiation zones and existing facilities.) The remainder of the history of the incident was related as previously told in this report. Mr. Anttonen and Mr. Gerton then left my office and I started preparation of an occurrence report.

Meanwhile, both J. A. Jones' CPAF work and the Rockwell core drilling operation had commenced. Per the request of Mr. Leonard, Mr. Gates and I designated Mr. Seth Bridges as the J. A. Jones representative to follow through on getting Welcome's equipment decontaminated, and off-site. Later that morning, I was made aware that DoE had directed that the equipment be decontaminated and released no later than Monday morning. Rockwell, since early in the morning, had been making arrangements to transport the equipment to the steam cleaner in 200 West if it became necessary to use steam for decontamination. Mr. Bridges was requested to coordinate between J. A. Jones and Rockwell in meeting this Monday deadline.

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Mr. Joe Vacca and Ms. B. J. Ford of Vitro Title III stopped in to see me and told me that all Title III personnel who had been working the backfill operation were to report to the whole-body counter that afternoon for testing. This was to be a precautionary test only.

Mr. Mike McCorkle and Ken Jones of J. A. Jones' QA then came to my office and stated they had been appointed by Mr. Maenpaa to investigate the incident in that Mr. Maenpaa felt that Mr. Bridges was too close to the scene to provide a completely unbiased report. They asked several general questions to which I responded and then they left. They had already talked to Mr. Bridges and obtained a statement from him. (It was my understanding that Mr. Bridges had previously obtained statements from Mr. Dahl, Mr. Buchanan and Mr. Wishert.)

Later that morning, I was advised by JAJ Radiation Protection that the whole-body counts of the subcontractor personnel showed no internal contamination. They also advised that the incident from the previous night at the whole-body counter had been discussed with Mr. Dahl and Mr. Buchanan and that any reprimands were to be left with the subcontractors.

Shortly before noon, I completed the Occurrence Report and gave it to Mr. Al Purtill who was returning to 3000 Area and said he would deliver it to Mr. Gates. About this time, I was advised by Mr. Bridges that J. A. Jones' CPAF had been requested to assist Rockwell in decontamination of the subcontractor's equipment. The problem was that the dirt was caked on the equipment and Rockwell was unable to wash it off with their equipment. J. A. Jones was to go in with hand tools and attempt to chip off the caked-on dirt. After this operation, the equipment would be surveyed by RM and, if the counts were still not acceptable, the equipment would be washed again. After another check by RM, the equipment would then be re-surveyed and, if the counts were still not acceptable, the equipment would be transported to 200 West for steam cleaning. J. A. Jones' CPAF was to start this work immediately after lunch.

Right after lunch, I saw Mr. Dodd and asked him what the results of his core drills were. He had a graph showing the counts by depth on the two cores that had been drilled to a depth of six feet along the north side of the tank farm. This chart showed the readings to vary considerably up and down at any given depth with the highest readings about 1500 counts/minute. He stated that he did not know the results of the coring being done in the vicinity of the borrow area.

On Friday afternoon, I dressed in whites to personally inspect the equipment decontamination effort plus the location of the borrow area. The equipment decontamination was proceeding slowly. However, Mr. Al Gallegos of Rockwell had arranged for the Fire Department to send their tanker truck with pump to assist. The high pressure streams of water quickly cleaned the caked-on mud off the water wagon, the D-8 dozer and one scraper. A re-survey of the D-8 at noon time showed some contaminated dirt on the tracks. As soon as the equipment dried, an RM would be requested to survey these pieces. At approximately 5:00 p.m. I was notified that the survey of these pieces was complete and that they had been

released by the RM. The D-8 was immediately loaded on a low boy and removed from the area. The scraper and water wagon were moved to a clean area. J. A. Jones' CPAF was to resume decontamination efforts the following morning at 6:00 a.m. and work as late as necessary on Saturday and Sunday if required.

Welcome's people (2 or 3) would also be present over the weekend to move the equipment as may be required and to transport it off-site as it was released.

After reviewing the decontamination effort, I proceeded to the borrow area so as to get an idea of its extent. On the way, I walked through the area that Rockwell thought had been designated. A large part of this area had been stripped with the stripped material spoiled along the north side of the area. The painted sagebrush in the northwest corner was the only boundary I could still find. The borrow area that had been used was approximately 150 ft. by 500 ft. with the stripped area for haul roads extending another 100 ft. to 150 ft. to the north, east and west. The borrow area ran nearly parallel to the crib with the south edge of the top of the cut approximately 40 ft. north of the fence around the crib. Stripped material had been spoiled between the fence and top of the cut and was mounded up about two or three feet. The depth of the cut on the north side was approximately fifteen to twenty feet deep and on the south side was about ten feet deep. From the edge of the cut north of the fence, the ground had been cut away at an approximate two to one slope. The area at the bottom was approximately 100 feet wide, and the south bank was also cut at approximately two to one back to the existing grade. Haul roads from the east and west into the borrow area had been built. Approximately thirty loads of contaminated soil had already been deposited in the borrow area by J. A. Jones.

After returning to the office, I was advised by Rockwell that they had neglected to make arrangements for their water wagon to keep the tank farm and haul road wet during the weekend. It had been decided earlier in the day that J. A. Jones would not work over the weekend removing the contaminated soil and Rockwell, in accordance with the procedure attached to the excavation permit, was to keep the area wet down when J. A. Jones was not working. I contacted Mr. Gates to advise him. Mr. Gates called back a short time later and stated he had talked with Mr. Fritch of Rockwell and that Rockwell would take care of keeping the tank farm and haul road wet.

On Saturday afternoon, June 16, Mr. Wishert called me at home and advised that all of Welcome's equipment except for two pieces had been released, and that the RM's were checking out those two pieces. All released equipment had been removed from the work site.

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241-AN Tank Farm

In retrospect, it can be seen that the primary cause of this situation was the breakdown in communication between myself and Rockwell. When I was given the excavation permit for the borrow area, no particular emphasis was placed on the location of the 500 by 500 foot area sketched on the drawing. The blown-up drawings of the area were confusing in that some one had sketched an area on them and then tried to erase it. I attached no significance or importance to the blown-up drawings because of this; however, when I looked at it again on Wednesday, the dimension of 360 feet from the fence to the area was evident. There is no question that I should have sought to ascertain a definitive location for the borrow area rather than the general description of north of the crib, south of the ditch and east of the buried pipeline. Any significance of the location of the 500 by 500 foot area on the drawing was not relayed to me. There was also no restriction relayed to me relative to the depth Rockwell expected in the borrow area. There was no significance attached to or relayed to me relative to the 360 foot dimension. Again, I did not question it--we needed a borrow area and needed to get it stripped before dark Friday night.

It is now also apparent that Rockwell had meant to restrict the borrow area to a designated location, and, to this end, had the sagebrush painted to define the boundaries. However, this information was not relayed to me. The only J. A. Jones employee aware of the painted sagebrush outlining the designated area was Mr. Reynolds, the operator foreman and he did not tell me about it. I would suggest that in the future, any designated areas be staked and that restriction be attached to the excavation permit.

App. Figure C-23. Occurrence Report 79-19

OCCURRENCE REPORT

CONTRACTOR	FACILITY	WORK AREA
J. J. Welcome Const. Co. - a lower tier contractor to H. Halvorson, Inc. Subcontract JAJ-1083	241-AN Tank Farm	200-East

REPORT NO.		DATE AND TIME OF OCCURRENCE
79-19	[X] PRELIMINARY [ ] INTERIM [X] FINAL	June 13, 1979 9:15 a.m.

OCCURRENCE SUBJECT

Placement of contaminated backfill at Tank Farm 241-AN

APPARENT CAUSE

[ ] DESIGN [ ] MATERIAL [XX] PERSONNEL [ ] PROCEDURE [ ] OTHER

1. DESCRIPTION OF OCCURRENCE

Additional backfill material for the 241-AN Tank Farm was being obtained from a borrow area to the East of the 200-East perimeter fence, North of crib 216-A-24 and South of a ditch. At the time of the occurrence, the subcontractor was excavating approximately 100 ft. North of the fence surrounding the crib at a depth of approximately 15 feet. An area of moisture in the soil was encountered. Some of this material had already been transported and placed in the tank farm. The material was contaminated and had been placed along the North side of the Tank Farm between 33 and 66 feet North of Tank 107 and 104 with some spillage from the scrapers in between the Tanks and along the haul road. See the attached sketch showing the extent of the contamination.

2. CONSTRUCTION OR OPERATING CONDITIONS AT TIME OF OCCURRENCE

Backfill material was being excavated from a borrow area and was being placed in the 241-AN Tank Farm. Weather conditions were excellent with very light wind. Work was being performed during daylight hours. (No Radiation Monitors were present during the initial stages of excavation.)

BD-9913-355 (3-77)

IMMEDIATE EVALUATION, CORRECTION TAKEN AND RESULTS

Directed subcontractor to cease work and remove his equipment and personnel from the borrow area until the area could be surveyed by RM. This was done. Mr. Ward Give of Rockwell was notified that moisture had been encountered in the borrow area and tha an immediate survey by RM was needed. This survey was performed by 9:45 a.m.

4. RECOMMENDATIONS

A. TEMPORARY CORRECTIVE ACTION

Suspend work at the Tank Farm until contaminated dirt is either removed or covered and the subcontractor can resume work. Rockwell will core drill in the tank farm to characterize the extent of the contamination. The area outside the fence, East of Canton Road will also be core drilled by Rockwell.

B. Surface contamination between tanks to a depth of approximately 12" to 24" is to be removed by JAJ CPAF under SWP conditions. Material to be replaced with clean backfill from an area to be designated by RHO. Area along Northern edge of Tank Farm is to be covered by clean material in accordance with the attached Rockwell Plan of Action for Contaminated Soil Removal and/or Stabilization of 241-AN Tank Farm, Project B-130.

B. PERMANENT CORRECTIVE ACTION

In addition, the following actions will be taken by Rockwell & J. A. Jones to improve communication and minimize the possibility of a similar incident occurring in th future.

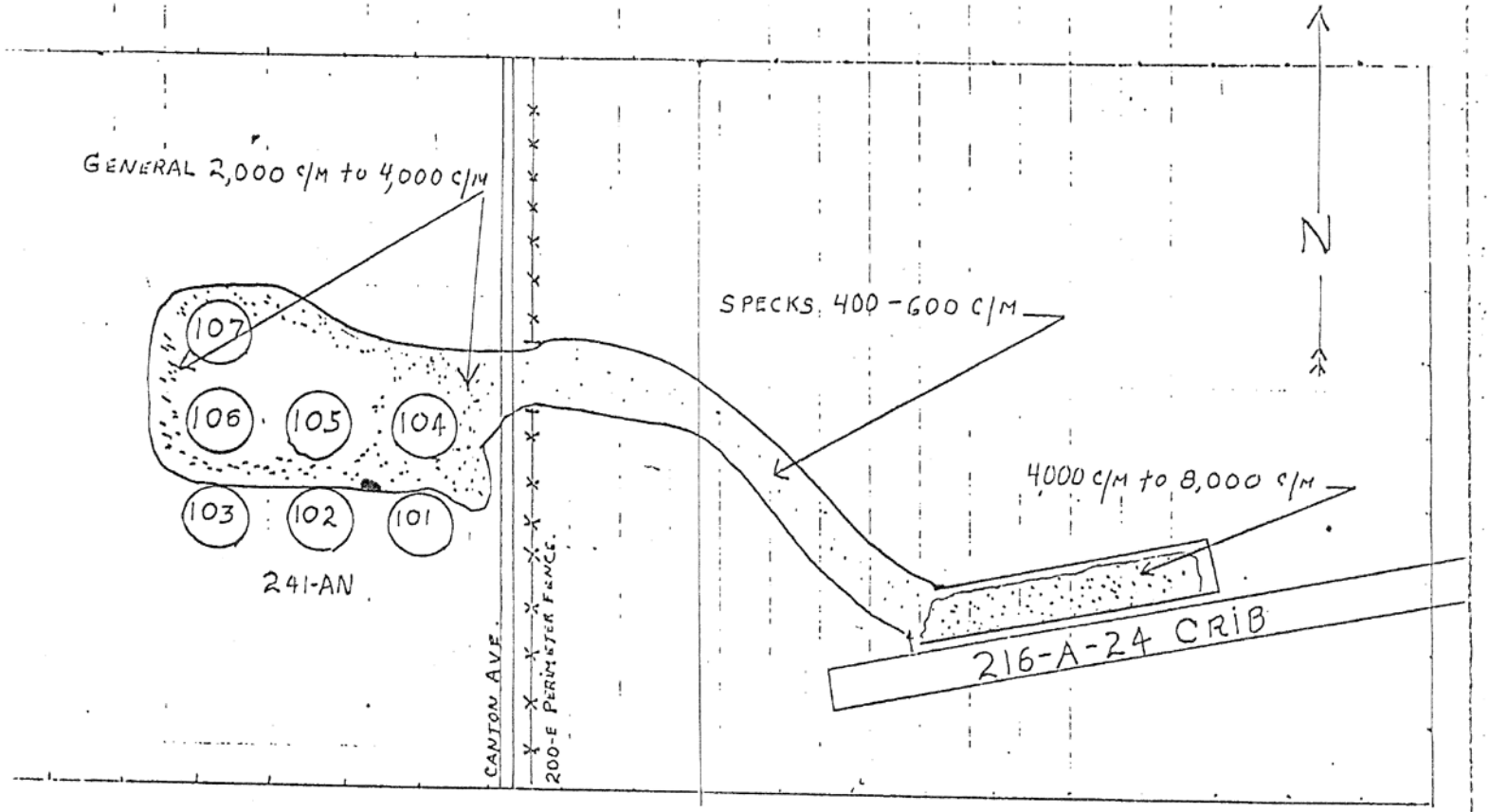
1. Rockwell - procedure for issuance of Excavation Permits will be revised to require physical participation by J. A. Jones (walk-through of area).
2. J. A. Jones - A. Perform audits on a quarterly basis (or as determinated by management) to assure continuity of contracts and modifications on a particular project. B. Conduct training sessions to familiarize J. A. Jones personnel with excavation permit requirements. C. Review this occurrence with JAJ CM staff personnel for educational purposes as an example of consequences of "hurry-up" actions.

IS DESIGN CHANGE NECESSARY? ☐ YES ☒ NO	IF YES, WHEN	
IS FURTHER EVALUATION NECESSARY? ☐ YES ☒ NO	IF YES, BY WHOM	
ERMANENT CORRECTIVE ACTION BY:	NAME (as described above)	WHEN

ATED BY R C [illegible] TITLE Proj. Mgr. DATE 7-2-79

D BY [illegible] TITLE QA Mgr DATE 7/2/79

BY [illegible] TITLE CM Construction Manager DATE 7/6/79



it holes dug around tank area revealed contamination to 1,000 c/m down to 24" depth.
ntaminated areas zoned off.
earth-movers and one Cat contaminated from 300 c/m to 3,000 c/m on tires and framework.
personnel contamination.
clothing contamination.

WRH
6-13-79

[illegible]	[illegible]	2-2911	D-100	6-8-79

START DATE	COMP. DATE	LOCATION
6-9-79	6-29-79	EAST of 200E PERIMETER FENCE - OPPOSITION 241-C TANK

PURPOSE OF EXCAVATION - TIE-IN - CORE DRILLING

ADDITIONAL BACKFILL MATERIAL (SOIL) IS REQUIRED FOR BACKFILLING of 241-AN TANK FARM CONSTRUCTION SITE. SELECTED SITE HAS BEEN DEEMED MOST DESIRABLE FROM ECONOMICAL AND CONSTRUCTABILITY CONSIDERATION. THIS SITE WILL SUPPLY SUFFICIENT MATERIAL for JOB COMPLETION.

DESCRIPTION OF WORK

APPROXIMATELY 100,000 cu yd of SOIL will be removed from BLCK A AN, APPROXIMATELY 500'x500'. MATERIAL will be TRANSPORTED DIRECTLY WEST, through PERIMETER FENCE, to 241-AN TANK FARM SITE by JAS CONTROLED CONTRACTOR ACCESS ROAD from SITE to TANK FARM to be SUPPLIED by JAS.

REFERENCE DRAWINGS

SITE LOCATED ON ATTACHED DRAWING. H-2-99500, H-2-44501, SH 90, 91

SPECIAL INSTRUCTIONS OR COMMENTS

PRIOR to START of WORK EXCAVATION SITE will be MONITORED TO INSURE UNCONTAMINATED STATE. SOIL/ICE CONTAMINATION BETWEEN EXCAVATION SITE AND CANTON ROAD will be SCRAPED to the SIDE AND ROADWAY COVERED WITH CLEAN DIRT. SECURITY PERSON will be REQUIRED DUE to OPEN FENCE

PROJECT ENGINEER: JOHN T. BELLINGER | PHONE: 942-2911

THE RIGHT TO RESCIND THIS PERMIT IS RESERVED, IN CASE OF UNFORESEEN INTERFERENCE.

6-8-79 DATE — J. Miller 27811 x652 AUTHORIZED AREA REPRESENTATIVE

APPROVALS FOR CONDUCT OF WORK

OPERATIONAL MANAGER: [illegible]	MAINTENANCE - MANAGER
OTHER: Jerry A. Rodgers 6-8-79	OTHER
	OTHER
IS SHP REQUIRED? ☒ YES ☐ NO	SPECIALIST - RADIATION MONITORING: [illegible] 6-8-79

WORK COMPLETED SATISFACTORILY

EA REPRESENTATIVE	DATE	ISSUER	DATE

3000-035 (3-69)

[X] EXCAVATION [ ] TIE-IN [ ] CORE DRILLING

REQUESTED BY (GROUP)	AUTHOR'S SIGNATURE	TELEPHONE EXT.	W.R. OR PROJECT NO.	DATE
Facilities Engr. & Const.	J. T. Belcher	2-2911	B-130	6/21/79

START DATE	COMP. DATE	LOCATION
6/21/79	6/29/79	East of 200 E Perimeter Fence & AN Tank Farm, 200 E

PURPOSE OF EXCAVATION - TIE-IN - CORE DRILLING

Soil material is required for backfilling the excavation performed during removal of contaminated soil in the tank farm and for stabilizing the area north of Tank 107 including the slope. (ref. excavation permit 79-107)

DESCRIPTION OF WORK

Excavate soil from a site located east of the 200 E perimeter fence and backfill the AN Tank Farm as described per paragraphs 1, 2, and 3 of the attached Rockwell Plan of Action dated 6/21/79 "Project B-130, 241-AN Tank Farm Contaminated Soil Removal and/or Stabilization". The maxium depth of excavation shall not exceed 10 feet. Approximate coordinates of northwest corner are N42905 and W47095.

REFERENCE DRAWINGS

H-2-44500 and H-2-71901 as marked and RHO Plan of Action attached, Figures 2 & 3 and attached sketch.

SPECIAL INSTRUCTIONS OR COMMENTS

Continuous Radiation Monitoring shall be provided during all operations. Continuous security shall be maintained at fence opening until conclusion of work and closure of fence. Prior to the start of excavation, a construction meeting will be held to review permit requirements, drawings, and inspect the site. Attendance will be mandatory for RHO Project Engineer & PM; D.Jones const. mgmt. and the const. supervisor.

All Permit instructions, including appendices, are acknowledged & concurred with:

PROJECT ENGINEER	PHONE
J. T. Belcher	2-2911

THE RIGHT TO RESCIND THIS PERMIT IS RESERVED, IN CASE OF UNFORESEEN INTERFERENCE.

6-22-79 (DATE) — 27911 x6512 (AUTHORIZED AREA REPRESENTATIVE)

APPROVALS FOR CONDUCT OF WORK

OPERATIONAL MANAGER: O. J. Washenfelder 6-22-79	MAINTENANCE - MANAGER
OTHER: T. M. Sutton 6-22-79	OTHER
OTHER: 600 AREA 6-22-79	OTHER
IS SAP REQUIRED? [X] YES [ ] NO	SPECIALIST - RADIATION MONITORING: G. K. Girau

WORK COMPLETED SATISFACTORILY

AREA REPRESENTATIVE	DATE	ISSUER	DATE

54-3000-C35 (3-69)

PLAN OF ACTION

PROJECT B-130, 241-AN TANK FARM
CONTAMINATED SOIL REMOVAL AND/OR STABILIZATION

The following Plan of Action outlines the method to be used for removal and/or stabilization of the contaminated soil within the 241-AN Tank Farm construction site.

1. Complete the removal effort of contaminated soil at the access to the east portion of the Tank Farm, areas between tanks, and a perimeter of 30 feet beyond tank walls as identified in excavation permit 79-107 (see attached sketch). Backfill shall be provided to the same level requirements identified prior to this excavation. Decontamination shall be performed to the satisfaction of Rockwell Radiation Monitoring to release the area for continuance of construction work designated as a Non-Radiation zone (no SWP required).

2. Locate and select an area for a suitable supply of soil (approximately 5000 to 7500 cubic yards) for the backfill operations. The soil selected should meet the characteristics required for project specified acceptable levels of compaction. After identification of a site for removal of backfill soil, the area shall be surveyed by core drilling and an evaluation performed for freedom from contamination. The area shall be plotted and staked for all boundaries, approved and released by Rockwell Facilities Engineering & Construction project engineer, Environmental and Occupational Safety engineer, Radiation Monitoring, and Tank Farm Operations and Surveillance. Continuous RM coverage shall be provided during all phases of excavation and backfilling. An excavation permit shall be prepared and approved in accordance with Engineering Procedures Manual RHO-MA-115 Section N-1 prior to the start of soil removal.

3. Stabilization of the north slope of the 107 tank extending east and west of:

   a) The top level of soil above the slope extending towards Tank 107 shall be backfilled a minimum of one foot and compacted to provide interim stabilization during completion of Projects B-130 and B-170 construction. The clean backfilled soil shall be allowed to spread over and down the slope to a depth of approximately one foot to establish a base for backfilling identified in step b).

   b) The slope shall be extended and backfilled to a minimum of 8 feet at an angle perpendicular to the slope surface.

c) The area shall be identified and isolated (roped off) as directed by Rockwell Environmental and Occupational Safety Department. Radiation monitoring shall provide continuous coverage during all of the above excavation and backfilling operations.

4. Obtain J. A. Jones Cost Estimates of the following:

   a) Current cost for top soil removal and backfill operations.

   b) Cost of subcontractors equipment clean-up effort.

   c) Cost of maintaining a security patrol at the perimeter fence opening.

   d) Costs for interim north bank backfill and stabilization. (The final backfill of entire area is included in the total project costs.)

5. Release of the 241-AN Tank Farm (Projects B-130/B-170) to the subcontractor for completion of vessel dome construction.

6. At the completion of project construction, the final backfill operations in the 241-AN Tank Farm shall provide a minimum of 10 feet of soil coverage over all presently exposed surfaces except for the slope identified in paragraph 3b of this plan. Soil for this backfill operation previously identified and approved for this project is the spoil pile located in the southeast corner of the 200 East area.

APPROVED:

R. M. Ware — Facilities Engineering & Construction — 6-21-79 Date

D J Washenfelder — Tank Farm Surveillance & Operations — 6-22-79 Date

J Vincent Parker — Environmental Protection — 6-22-79 Date

W R Hoston / for W. Givan — Radiation Monitoring — 6-22-79 Date

CONCURRENCE:

J. A. Jones Construction Management — Date