Appendices

Appendix 9 – Red Tank - Recycling Containment Weekly Inspection Report

Weekly Inspection Report

Water Treatment Facility and Containment

Work Order No:				
Inspected by (name and signature):				**Date/Time:**
Review of Prior Corrections	**Yes**	**No**	**N/A**	**Comments**
Have all identified issues from the previous facility inspection report been corrected and noted?				

Equipment Description	**Leak or spill? (Y/N)**	**Working condition? (Good / Needs Repairs)**	**Comments**
Water Treatment Facility			
Upstream Pump (20 HP)			
Flow Line to Reaction Tanks			
Reaction Tanks			
Treatment pump (50 HP)			
Weir Tanks			
Manifold at Weir Tank			
Recycle & Flowback Lines			
Downstream Pump (20 HP)			
Flow Line to Treated Water Pond			
Treated Water Containment(s) / Pond(s)			
Manifold			
Leak Detection System*			
Are exposed liners intact?*			
Does surface show visible oil?			
Fluid Height of Staff Gauge(s):			

** If a liner's integrity is compromised, or if any penetration of the liner occurs above the water surface, then the operator will notify the District office within 48 hours (phone or email).*

Additional Comments (including any equipment not checked off):	

Appendices

Appendix 10 – Red Tank - Recycling Containment Monthly Inspection Report

OXY Permian	**Monthly Inspection Report** **Treated Water Containment / Pond**

Work Order No:				
Inspected by (name and signature):				**Date/Time:**
Review of Prior Corrections	**Yes**	**No**	**N/A**	**Comments**
Have all identified issues from the previous facility inspection report been corrected and noted?				

Equipment Description	**Yes or No**	**Working condition? (Good / Needs Repairs)**	**Comments**
Are diversion ditches and berms around the containment secure? (check for erosion and collection of surface water run-on)			
Is the leak detection system intact? (check for evidence of damage or malfunction and monitor for leakage).			
Are there any dead migratory birds and other wildlife inside pond/treated water?*			
Are the sources and disposition of all recycled water recorded?**			

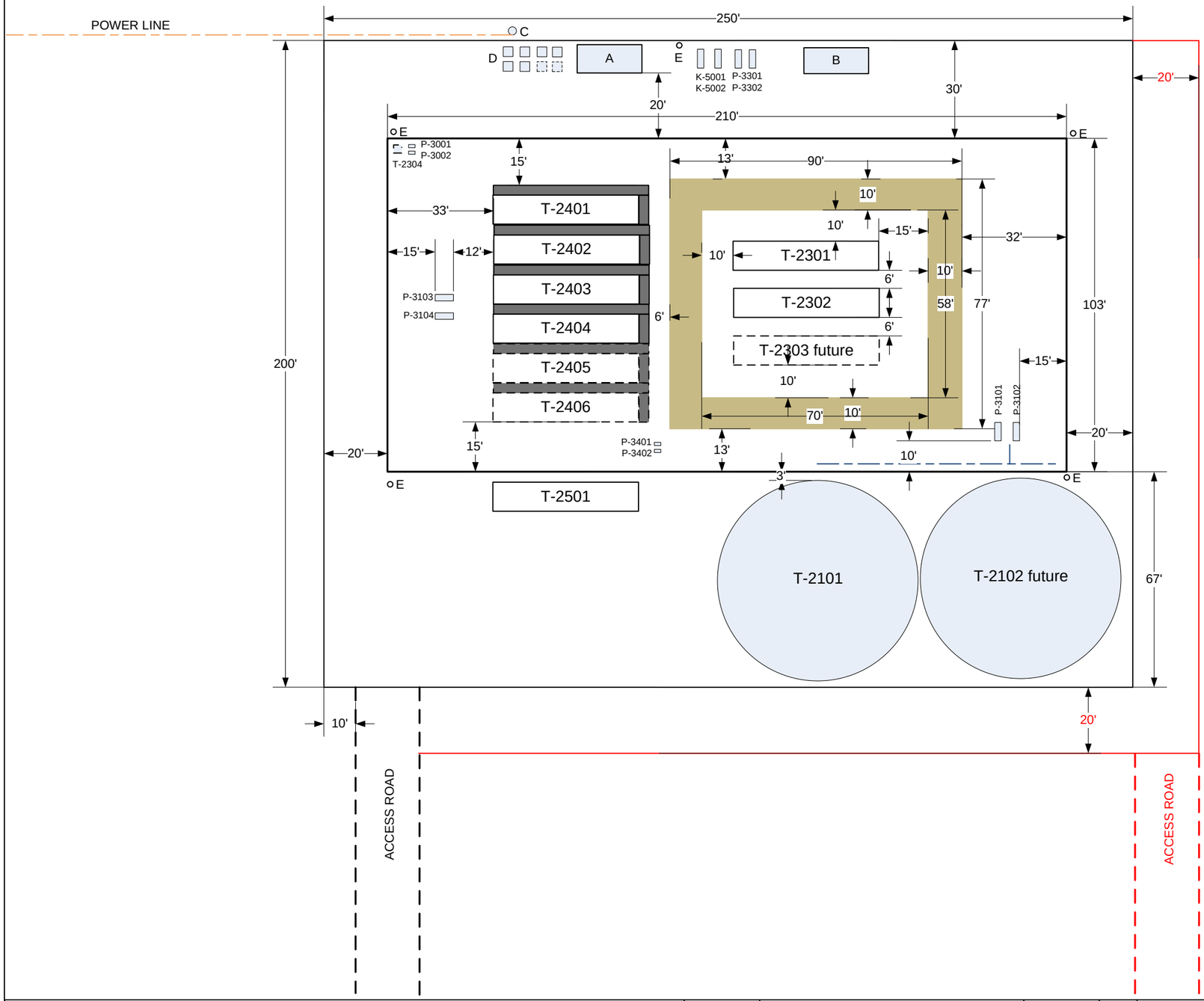
** Within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring*

*** Report to the division the total volume of water received for recycling, with the amount of fresh water received listed separately, and the total volume of water leaving the facility for disposition by use of the form C-148*

Additional Comments (including any equipment not checked off):	

Appendices

Appendix 11 – Red Tank – Recycling Facility Layout and ASTs Information



EQUIPMENT LIST

A	CONTROL RACK
B	CHEMICAL TREATING TRAILER
C	TRANSFORMER BANK
D	VFD/FILTERS
E	LIGHT POLE
T-2101	6000 BBL AST
T-2102	6000 BBL AST
T-2301	500 BBL REACTION TANK
T-2302	500 BBL REACTION TANK
T-2303	500 BBL REACTION TANK (FUTURE)
T-2401	WEIR TANK
T-2402	WEIR TANK
T-2403	WEIR TANK
T-2404	WEIR TANK
T-2405	WEIR TANK (FUTURE)
T-2406	WEIR TANK (FUTURE)
T-2501	SKIM TANK (FRAC RENTAL)
P-3101	50 HP PW INLET PUMP #1
P-3102	50 HP PW INLET PUMP #2
P-3103	50 HP TW OUTLET PUMP #1
P-3103	50 HP TW OUTLET PUMP #2
P-3301	60 HP CHEMICAL PUMP #1
P-3302	60 HP CHEMICAL PUMP #2
P-3401	## HP SKIM PUMP #1
P-3402	## HP SKIM PUMP #2
P-3001	3 HP SUMP PUMP #1
P-3002	3 HP SUMP PUMP #2
K-5001	2 HP INSTRUMENT AIR COMPRESSOR #1
K-5002	2 HP INSTRUMENT AIR COMPRESSOR #2

NOTES:

REV.	DESCRIPTION	DATE	BY
D		03/09/18	cr
C		03/09/18	cr
B		03/09/18	cr
A	FIRST DRAFT	03/08/18	cr

FACILITY: Red Tank | TYPE: WTF | ONEOXY: -

DWG TYPE: PLOT PLAN | SCALE: 1" = 35'-0"

DESCRIPTION: Red Tank Water Treatment Facility

OXY USA INC.- Permian Resources

ASSET	FACILITY	ENG DISC	NUMBER	SHEET
PER	TBD	CVL	00001	001

Recycling Facility ASTs (Lined)

The recycling facility will include two synthetically lined ASTs. The ASTs have a total capacity of 60,000 bbl. each and are lined with two 30 mil (minimum) LLDPE or two 40 mil (minimum) HDPE liners. An additional 30 mil (minimum) LLDPE or 40 mil (minimum) HDPE shall be placed on the base of the tank and shall act as an additional protective layer and the foundation for the visual leak detection system should a breach occur through the upper primary and secondary liner. The AST subgrade shall be covered with a geocomposite or geotextile to protect the liner system. The ASTs shall be netted and maintain at least 2 ft. of freeboard capacity. The facility layout and design/construction specifications for the ASTs are attached. The ASTs may be constructed with an under mount manifold as opposed to over the top discharge/suction line. The ASTs will serve as pre-treatment tanks and act as a buffer system before the input to the recycling facility – preventing system upsets by providing steady flow.

A copy of the C-147 will be submitted to the land owner (State of New Mexico).

Engineering and Standard Operating Procedures (QA/QC) for the Above Ground Storage Tanks (AST) Also known as Modular Large Volume Tanks (MLVT)

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Table Of Contents

Confidential Proprietary Information is included in this report. Only original signed copies are to be distributed and used. If copies are made and or distributed without the consent approval of the president of WWS legal action may be taken.

1.1

EMERGENCY ACTION PLAN

EMERGENCY PERSONNEL NAMES AND PHONE NUMBERS

DESIGNATED RESPONSIBLE PERSONNEL (Highest ranking manager at the site, such as, crew supervisor or crew lead.)

Name: _____ Phone: _____

EMERGENCY COORDINATOR:
Name: Brian Bullock Phone: 307-267-3964

AREA MONITORS:

Controller: Mike Karaouni Phone: 307-247-0791
US Sales Manager: Chad Campbell Phone: 307-259-1987

TANKS
North Dakota: Jake Travers Phone: 208-610-6692
Wyoming: JW Morris Phone: 307-267-8075

WATER TRANSFER
Wyoming: Ben Ledford Phone: 307-277-4681

WELL WATER SOLUTIONS AND RENTALS OWNERSHIP

CEO Chris Songe Phone: 307-247-1143
PRESIDENT Sean Lovelace Phone: 307-267-1878

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EVACUATION ROUTES

- Evacuation routes have been posted in each work area. The following information is marked on evacuation maps.

    1. Emergency exits
    2. Primary and secondary evacuation routes
    3. Locations of fire extinguishers
    4. Fire alarm pull station locations
    5. Assembly points

- Site personnel should know at least two evacuation routes.
- All emergency numbers listed in this manual are for the Casper WY area. All field employees shall list in the space provided all emergency numbers needed for the regions that they are working in on the following form and in the JSA (Pre Job Safety Analysis).

EMERGENCY PHONE NUMBERS

FIRE DEPARTMENT: Emergency 911
Non-emergency 307-237-7260 (Bar Nunn volunteer FD)

AMBULANCE: Emergency 911
Non-emergency 307-237-7260 (Bar Nunn volunteer FD)

POLICE: Emergency 911
Non-emergency 307-235-9282 (Sheriff's office dispatch)

POWER COMPANY: 1-888-221-7070 (Rocky Mountain Power)

WATER COMPANY: 307-265-7034 (Wardwell Water and Sewer district)

GAS COMPANY: 1-800-563-0012 (Source Gas)
Local Number 307-234-6216

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EMERGENCY REPORTING AND EVACUATION PROCEDURES

Types of emergencies to be reported by site personnel are:

- MEDICAL
- FIRE
- SEVERE WEATHER
- BOMB THREAT
- CHEMICAL SPILL
- EXTENDED POWER LOSS
- OTHER (specify)_____

  (e.g., active shooter, terrorist attack/hostage)

MEDICAL EMERGENCY

- Call medical emergency phone numbers
  - Ambulance
  - Fire Department
  - Police

Provide the following information:

a. Nature of medical emergency
b. Location of the emergency (address, building number, room number)
c. Your name and phone number you are calling from

- Do not move victim unless absolutely necessary
- Call the following personnel trained in CPR and First Aid to provide the required assistance prior to the arrival of professional medical help:

Brian Bullock 307-267-3964
Mike Karaouni 307-247-0791
Marc Collier 307-277-6043

- If trained personnel are not available, as a minimum, attempt to provide the following assistance:
  1. Stop the bleeding with firm pressure on the wounds (note: avoid contact with blood and other body fluids.)
  2. Clear the air passage using the Heimlich maneuver in case of choking.
- In case of rendering assistance to personnel exposed to hazardous materials, consult the SDS (Safety Date Sheet) and wear the appropriate PPE (personal protective equipment) attempt First Aid ONLY if trained and qualified.

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FIRE EMERGENCY

When fire is discovered:

- Activate the nearest fire alarm (if installed)
- Notify the local fire department by calling 911.

Be prepared to give location, (address, building number, room number) your name and number you are calling from.

- If alarm is not available, notify site personnel about the fire emergency by the following means.
    - Voice communication
    - Phone paging
    - Radio
    - Other (specify)_____

Fight fire ONLY if:

- The Fire Department has been notified.
- The fire is small and is not spreading to other areas.
- Escaping the area is possible by backing up to the nearest exit.
- The fire extinguisher is in working condition and personnel are trained to use it.

Upon being notified about the fire emergency, occupants must:

- Leave the building using the designated escape routes.
- Assemble in the designated area (specify location)
- Remain outside until the component authority (Designated official or designee) announces that it is safe to reenter.

Designated official, Emergency Coordinator, or supervisors must,

- Disconnect utilities and equipment unless doing so jeopardizes his/her safety.
- Coordinate an orderly evacuation of personnel.
- Perform an accurate head count of personnel reported to the designated area.
- Determine a rescue method to locate missing personnel.
- Provide the Fire Department personnel with the necessary information about the facility.
- Perform assessment and coordinate with ownership for office closing procedures.

Area monitors must:

- Ensure that all employees have evacuated the area.
- Report any problems to the Emergency Coordinator at the assembly area.
-

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EXTENDED POWER LOSS

In the event of extended power loss to the facility, certain precautionary measures be taken depending on the geographical location and environment of the facility:

- Unnecessary electrical equipment and appliances should be turned off in the event that power restoration would surge causing damage to electronics and effecting equipment.
- Facilities with freezing temperatures should turn off and drain the following lines in the event of a long term power loss.
    - Fire sprinkler system
    - Standpipes
    - Portable water lines
    - Toilets
- Add propylene-glycol (anti-freeze) to drains to prevent traps from freezing.
- Equipment that contains fluids that may freeze due to long term exposure to freezing temperatures should be moved to heated areas, drained of liquids, or provided auxiliary heat sources.

Upon restoration of heat and power:

- Electronics should be brought up to ambient temperatures before energizing to prevent condensate from forming on circuitry.
- Fire and portable water piping should be checked for leaks from freeze damage after the heat has been restored to the facility and water turned back on.

CHEMICAL SPILL

In the event of a spill, always consult the SDS and check safe distances and appropriate PPE (Personal Protective Equipment).

When a large spill has occurred:

- Immediately notify the designated official and Emergency Coordinator.
- Contain the spill with available equipment (e.g. pads, brooms, absorbent powder, etc.)
- Secure the area and alert other on site personnel.
- DO NOT attempt to clean the spill unless trained to do so.
- Attend to any injured personnel and call the medical emergency number, if required.
- Call a local spill clean-up company or the fire department (if arrangements have been made) to perform a large chemical spill clean-up.

Fire department Non-emergency 307-237-7260 (Bar Nunn volunteer FD)

- Evacuate building as necessary.

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When a small spill has occurred:

- Notify Supervisor
- If toxic fumes are present, secure the area (with caution tape or cones) to prevent other personnel from entering.
- Deal with the spill in accordance with the instructions described in the SDS.
- Small spills must be handled in a safe manner, while wearing the proper PPE.

TELEPHONE BOMB THREAT CHECKLIST

INSTRUCTIONS: BE CALM, BE COURTEOUS. LISTEN. DO NOT INTERUPT THE CALLER.
YOUR NAME:_____TIME:_____DATE:_____
CALLER'S IDENTITY: SEX: MALE___FEMALE___ADULT____JUVENILE___APROX AGE____
ORIGIN OF CALL: LOCAL_____LON DISTANCE_____

Voice Characteristics	Speech	Language
___Loud ___Soft ___High pitch ___Deep ___Raspy ___Pleasant ___Intoxicated ___Other ACCENT ___Local ___Not local ___Foreign ___Region ___Race	___Fast ___Slow ___Distinct ___Distorted ___Stutter ___Nasal ___Slurred ___Other MANNER ___Calm ___Angry ___Rational ___Irrational ___Coherent ___Incoherent ___Deliberate ___Emotional ___Righteous ___Laughing	___Excellent ___Good ___Fair ___Poor ___Foul ___Other BACKGROUND NOISES ___Factory ___Trains ___Machines ___Animals ___Music ___Quiet ___Office ___Voices ___Machines ___Airplanes ___Street ___Party ___Traffic ___Atmosphere

BOMB FACTS

PRETEND DIFFICULTY HEARIN-KEEP CALLER TALKING-IF CALLER SEEMS AGREEABLE TO FURTHER CONVERSATION, ASK QUESTIONS LIKE:
When will it go off? Certain Hour_____Time Remaining_____
Where is it located? Building_____Area_____
What kind of bomb?_____
What kind of package?_____
How do you know so much about the bomb?_____
What is your name and address?_____
If building is occupied, inform caller that detonation could cause injury or death.
Call the Sheriff at 307-235-9282 and relay information about the call.
Did the caller appear familiar with the shop or location (by his/her description of the bomb location)?
Write out the message in its entirety and any other comments on a separate sheet of paper and attach it to this checklist.

Notify your supervisor immediately.

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SEVERE WEATHER AND NATURAL DISASTERS

Tornado:

- When a warning is issued by sirens or other means, seek inside shelter. Consider the following:
    1. Small interior rooms on the lowest floor and without windows.
    2. Hallways on the lowest floor away from doors and windows.
    3. Rooms constructed with reinforced concrete, brick, or block with no windows.
- Stay away from outside walls and windows.
- Use arms to protect head and neck.
- Remain sheltered until the tornado threat is announced to be over.

Earthquake:

- Stay calm and await instructions from the Emergency Coordinator and/or the designated official.
- Keep away from overhead fixtures, windows, filing cabinets, and electrical power.
- Assist people with injuries in finding a safe place.
- Evacuate as instructed by the Emergency Coordinator and/or the designated official.

Flood:

If indoors:

- Be ready evacuate as directed by the Emergency Coordinator and/or the designated official.
- Follow the designated primary and secondary routes.

If outdoors:

- Climb to high ground and stay there.
- Avoid driving or walking through flood water.
- If car stalls, abandon it immediately and climb to higher ground.

Blizzard:

If indoors:

- Stay calm and await instructions from the Emergency Coordinator or the designated official.
- Stay indoors.
- If there is no heat:
    1. Close off unneeded rooms and areas.
    2. Stuff towels or rags in cracks under doors.
    3. Cover windows at night.
- Eat and drink. Food provides the body energy and heat. Fluids prevent dehydration.

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- Wear layers of loose-fitting, lightweight, warm clothing if available.

If outdoors:

- Find a dry shelter. Cover all exposed parts of the body.
- If shelter is not available:
    1. Prepare a lean-to, windbreak, or snow cave for protection from the wind.
    2. Build a fire for heat and to attract attention. Place rocks around the fire to absorb and reflect heat.
    3. DO NOT eat snow. It will lower your core body temperature. Melt it first.

If stranded in a car or truck:

- Stay in the vehicle!
- Run the motor for about ten minutes every hour. Open the window a little for fresh air to avoid carbon monoxide poisoning. Make sure the exhaust pipe is not blocked.
- Make yourself visible to rescuers.
    1. Turn on the dome light at night when running the engine.
    2. Tie a colored cloth to the antenna or door.
    3. Raise the hood after the snow stops falling.
- Exercise to keep blood circulating and to keep warm.

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1.2

Company Information	Victim Information
Company Name_____	Name_____
Location_____	Category: Injury Illness (circle one)
Company Man_____	Location_____
Phone_____	Job Title_____
	Department_____
	Date_____

Incident Information

What was the injury or illness?_____

Time work began?_____

What happened? (short explanation of how the incident occurred)_____

_____

_____

What object or substance directly harmed the employee?_____

_____

Unsafe acts by people: (circle all that apply)

Operating without permission	Unsafe lifting
Operating at unsafe speeds	Taking an unsafe position or posture
Servicing Equipment with power	Distraction, teasing, or horseplay
Making a safety device inoperative	Failure to wear PPE
Using defective equipment	Failure to use available equipment
Using equipment incorrectly	Other_____

Did you see the potential incident while preforming the job? YES or NO

Explain_____

_____

Did you notify the supervisor of the unsafe acts or conditions prior to the incident? YES or NO

Explain_____

_____

_____

Where was the supervisor prior to and during the incident?_____

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_____

How could this incident have been avoided? (circle all that apply)

Stop the activity Train supervisor Routinely inspect for the hazard
Guard the hazard Redesign task steps PPE
Train employee Write a new policy or procedure
Other_____

Was there corrective action taken? YES or NO
What correction action was taken?_____
_____
_____
_____
List all unsafe conditions leading to injury._____
_____
_____
What happened? (short explanation of how injury occurred)_____
_____
_____
_____
Was the supervisor notified of unsafe acts or conditions prior to injury? YES or NO
Explain_____
_____
Where was the supervisor prior to/during to the injury?_____
_____
How could this injury have been avoided?_____
_____
Was corrective action taken? YES or NO
What corrective action was taken?_____
_____
_____

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NEAR MISS REPORT

A near miss is a potential hazard or incident that has not resulted in any personal injury. Unsafe working conditions, unsafe employee work habits, improper use of equipment or use of malfunctioning equipment have the potential to cause work related injuries. It is everyone's responsibility to report and /or correct these potential accidents/incidents immediately. Please complete this form as a means to report these near-miss situations.

Department/Location_____ Date: _____

Time _____ O am O pm

Please check all appropriate conditions:

O Unsafe Act
O Unsafe Condition
O Unsafe equipment
O Unsafe use of equipment

Description of incident or potential hazard :_____

_____

_____

Employee Signature_____ Date_____

(optwnaf)

NEAR MISS INVESTIGATION

Description of the near-miss condition:_____

_____

Causes (primary and contributing)_____

_____

Corrective action taken (Remove the hazard, replace, repair, or retrain in the proper procedures for the task)

_____

_____

_____

Signed: _____ Date Completed _____

Not completed for the following reason: _____

Management _____ Date _____

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1.3

JSA will be filled out prior to the start of the day or different new task.

JOB SAFETY ANALYSIS REPORT

COMPANY

LOCATION

SUPERVISOR

DATE :

Task Description:

Task	Hazard Description:

Safety Solutions and Suggestions:

Personnel Names	Personnel Signatures	TIME IN

Sign out: I here by certify that I was not injured on the job and there was not work stoppage

Printed Name	Signature	TIME OUT

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1.4

TRUCK PRETRIP CHECKLIST

Operator	**Date**
Truck #	**Gas/Diesel**

OPERATOR MUST COMPLETE CHECKLIST AT THE START OF THE DAY
Mileage Beginning_____Mileage Ending_____

Visual checks	**OK**	**Service**	**N/A**	**Notes**
Tire Condition				
Head/Tail lights				
Warning lights				
Fluid Levels				
Battery conn.				
Seatbelts				
Mirrors				
Gauges				
Fluid leaks				
Oil change				
Horn				
Steering				
Ops check				
Check oil				
Check coolant				
Diesel additive				
Battery levels				
Tire pressure				
Brakes				
Brake fluid				
Power steering				
Belts/hoses				
In service?	**Yes**	**No**		

TRAILER PRETRIP CHECKLIST

Operator	**Date**
Trailer #	**Dual Tandem/Single**

Pre-trip	**Ok**	**Service**	**Notes**
Check gooseneck, connection, safety latch, & emergency Brake away			
All lights and connection			
Tires, pressure, hub, and lugs			
Deck boards, condition, clean, broken			
Min 12 straps and 4 chains and ratchet boomers			
Date of last DOT inspection with proof and registration			
In service?	**Yes**	**No**	

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FORKLIFT PRE USE CHECKLIST

FORKLIFT #_____ LOCATION_____

DAY_____SHIFT_____TIME_____

ITEM INSPECTED	OK	HIGH	LOW	AMOUNT ADDED
Fuel level				
Oil level				
Leaks under lift				
Forks, backrest, and Carriage				
Mast, Chain, Hydraulic lines				
Check Frame for cracks				
Tires, tire pressure, Axles				
Overhead Guard				
Fuel tank and connections				
Hydraulic cylinders and levels				
Battery and Cables				
Seat and Seatbelt				
Horn and backup alarm				
Lights and ops manual				
Gauges and instruments				
Brakes and Emergency brake				
Hydraulic controls and lift				
Steering				
Check boom for leaks and cracks				
All glass and wipers				
All Mirrors				

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BACKHOE PRE USE CHECKLIST

BACKHOE #_____ LOCATION_____

DAY_____SHIFT_____TIME_____

ITEM INSPECTED	OK	HIGH	LOW	AMOUNT ADDED
Fuel level				
Oil level				
Leaks oil, hydraulic, fuel				
Check belts and hoses for cracks				
Battery and cables				
Inspect frame for cracks				
Check Hydraulic lines and fittings				
Check steps and handles				
Check bucket and teeth				
Inspect stabilizers and pads				
Lights and signals				
Horn and backup alarm				
All glass and wipers				
Instruments and gauges				
Steering				
Check tires and pressure				
Check all brakes				
Grease all points daily				

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Aerial lift pre-use inspection checklist

Operator _____ Date _____ Aerial or scissor lift ID _____

Unit type: Location

1. Safety Precautions	OK, NO, NA	2. Check Operations	OK, NO, NA
Windy		Horn	
Less than 20-25 MPH		Guage	
PPE		Brakes	
Wheel chock or Brake		Lights	
Working surface -Level		Steering	
Power Lines or Electrical Source		Attatchments or Accessories	
Load Limits		Back up Alarm	
Outriggers		Warning lights	
Other		Other	
3. Vehicle Inspection	OK, NO, NA	**4. Platform Lift Inspection**	OK, NO, NA
Oil Level		Lift and travel controls and switches	
Hydraulic Oil level		Placards, Decals, and Control ID labels	
Fuel Level		Handrails, Guardrails, and Safety Chains	
Check lift and area for leaks		Platform deck and toeboards	
Coolant level		Other	
Tire pressure and condition of tires			
Battery and charger			
Ground control switches			
Other			
Comments			

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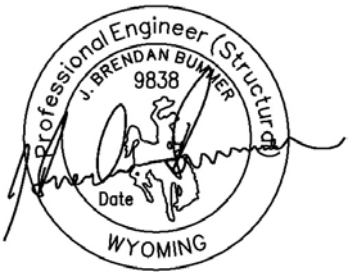
2.1

Modular Large Volume Tank

STRUCTURAL DESIGN SPECIFICATIONS

Prepared for:
WELL WATER SOLUTIONS
Casper, Wyoming

July 1, 2014



Prepared by:
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www.pillarse.com

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Structural Design Specifications

Project:	Modular Large Volume MLVT
Project No.:	14-06087
Date:	July 1, 2014
Pages 1-8:	General References Project Summary Structural Design Certification MLVT Erection Operations Manual MLVT Inspection and Testing Specifications
Attachments:	Design Drawings

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GENERAL REFERENCES

Manual of Steel Construction – Load and Resistance Factor Design, Third Edition, American Institute of Steel Construction.

Welded Steel Tanks for Oil Storage – API Standard 650, Eleventh Edition, June 2007, American Petroleum Institute.

Tank Inspection, Repair, Alteration, and Reconstruction – API Standard 653, Fourth Edition, April 2009, Addendum 1, August 2010, American Petroleum Institute.

PROJECT SUMMARY

These specifications have been prepared for Well Water Solutions, a supplier of MLVT's located in Casper, WY.

The specifications herein include the structural design certification, MLVT erection operations manual, and MLVT inspection and testing specifications. All other components of the policy requirements including site preparation and liner certification and installation are provided and certified by others. These specifications have been prepared as general guidelines specific to the MLVT's provided only by Well Water Solutions.

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2.2

PILLAR STRUCTURAL ENGINEERING

June 30, 2015

Well Water Solutions and Rental, Inc.
2130 W. 40th
Casper, WY 82604
Attn: Sean Lovelace

Re: Portable Frac Tank Certification – Pinned Seams

Dear Mr. Lovelace:

Per your request our office has performed a structural analysis of the portable frac tanks as well as the associated accessories. This analysis was performed to determine that the tanks meet the required strength criteria under operating conditions according to the AISC Manual of Steel Construction.

The tanks range in diameter from approximately 81 to 190 feet and are 11 feet, 8 inches in height and are designed to store water. They are constructed of individual steel reinforced panels that are connected together with a patent pending steel pin system.

The following tanks sizes were included in the analysis:

- 10,000 BBL – Approximately 81'Ø
- 20,000 BBL – Approximately 108'Ø
- 30,000 BBL – Approximately 135'Ø
- 40,000 BBL – Approximately 156'Ø
- 50,000 BBL – Approximately 176'Ø
- 55,000 BBL – Approximately 183'Ø
- 60,000 BBL – Approximately 190'Ø

The tanks are constructed of the following materials:

- Tank Panels – ASTM A36, 36 ksi Steel Plate
- Horizontal & Vertical Framing – ASTM A500, Grade B, 46 ksi Structural Steel Tubing
- Connecting Pins - ASTM A36, 36 ksi Steel Round Bar

PILLAR STRUCTURAL ENGINEERING

1964 East 1st Street
Casper, WY 82601

PHONE (307) 265-3900
FAX (307) 265-3559
WEB SITE http://www.pillarse.com

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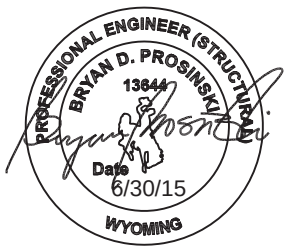
Our office has determined that the portable frac tanks, as described herein, are capable of supporting the operating load conditions in conformance with the AISC Manual of Steel Construction.

Calculations of this analysis can be provided upon request.

If you have any questions or require additional information please contact our office.

Sincerely,



Bryan Prosinski, P.E., S.E.
Pillar Structural Engineering

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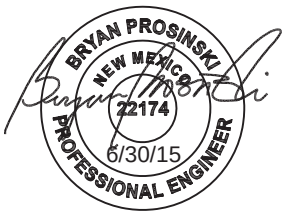

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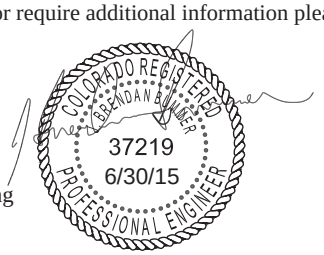

J. Brendan Bummer, P.E.
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Sincerely,

REGISTERED PROFESSIONAL ENGINEER
BRYAN D. PROSINSKI
PE-8605
DATE
6/30/15
NORTH DAKOTA

Bryan Prosinski, P.E., S.E.
Pillar Structural Engineering

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KEYSTONE
FIELD ENGINEERING INC.
"Practical Engineering Solutions"
Box 7866 5014 Industrial Road, Drayton Valley, Ab. T7A 1L5 Ph: (780) 542-3096 Fax: (780) 542-6405

Engineering Compliance

July 6, 2015 **KFE Project #151055**

Water Well Solutions and Rentals, Inc.
Attn: Scott Sandler
2130 W. 40th
Casper, Wyoming (USA) 82604

Attention: Mr. Scott Sandler

Re: Portable Frac Tank Engineering Review and Compliance – Pinned Seams
Sizes: 10K, 20K, 30K, 40K, 50K, 55K and 60K Tanks

A structural engineering review was conducted by Peter Vann (P. Eng) of Keystone Field Engineering Inc. for the above noted tank sizes. It was determined that the 'pinned' tank panel connections are capable of supporting the operating load conditions; and the panel lift points are of suitable construction according to the Canadian Handbook of Steel Construction (latest addition). The certified liner for the tanks shall have a minimum bonded seam strength of 40 ppi.

If you have any questions, please contact the office at 780-542-3096.

PERMIT TO PRACTICE
KEYSTONE FIELD ENGINEERING INC
Signature
Date July 6, 2015
PERMIT NUMBER: P 10239
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER ALBERTA
PETER J. VAN NIEUWENHUYZEN
2015-07-06

Peter Vann, P. Eng
Structural Engineer

KEYSTONE FIELD ENGINEERING INC.
PV/ kj
Reference:
Drawings completed by Nalco FabTech

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2.3

I. MLVT ERECTION OPERATIONS MANUAL

A. PRE CHECKS
1. Complete JSA prior to any work commencing
2. Confirm MLVT location and inspect for proper compliance with *WYOGC* requirements and site preparation recommendations.
3. Inspect trenches for proper construction according to site preparation recommendations.
4. Check weather conditions for the entire day to assure there will be proper weather conditions. If wind exceeds 15-20 MPH consider stopping work or consider deploying liner once all but one MLVT panels have been erected to provide a satisfactory wind block.
5. Review compaction tests for conformance with site preparation recommendations.
6. Comply with MLVT Inspection and Testing Specifications.

B. TOOLS, MATERIALS, and EQUIPMENT
1. Hard Hat
2. FRC Clothing
3. Gloves and Safety Glasses
4. Fall Arrest Gear
5. Box Knife
6. Drills with Deep Well Sockets
7. Telehandler Attachment
8. Telehandler (9,000 lb. or larger)
9. Optional Telehandler Man Basket with OSHA Certified Load Rating
10. Man Lift

C. MLVT ERECTION PROCEDURE
1. Inspect ditches, find center of MLVT and paint the ring for the MLVT. 40K=156'Ø, 30K=135' Ø, 20K=108' Ø, 10K=82' Ø.
2. Once the ring is painted make a mark 15' out from the ring around the outside. This mark is used as a reference point to assure there is enough liner to go over the MLVT walls once they are erected.
3. Unroll and position the 10 ounce geotextile fabric to all sides of the ring. Ensure the center mark labeled on the geotextile fabric is in the center of the MLVT. Adjust the geotextile if necessary.
4. Once the geotextile fabric is laid out and free of large wrinkles unroll and pull the liner out past the edges of the geotextile fabric. All layers should overlap each other and the liner should extend past the 15' mark. Once you have ensured the geotextile fabric and liner are square and centered it is ok to then begin to fill the trenches with water. Take care not to walk on liner that has no geotextile fabric underneath it. Make sure boots are clean and free of rocks before walking on any liner.
5. Once the geotextile fabric and liner are pulled out, begin to set the ring by first folding the geotextile fabric and the liner back onto itself to expose the MLVT diameter line for the MLVT panel ring.

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6. Put telehandler attachment on telehandler (Remove round bar holding forks onto telehandler and reinsert through custom attachment and re-secure bar to carriage.) and use attachment to place the first panel on the line. Secure the panel in place to secondary equipment with a certified chain. Secondary equipment may be a backhoe or other large machinery.
7. Continue to set panels in a counter clockwise fashion by placing the female holes of the new panel onto the male pins of the previous panel. Set the rest of the ring in this same manner. (At each panel joint secure a 16 ounce geotextile strip to top pin of the panel and drape to the inside of the MLVT. Spray glue or tape in place on the interior joint to provide added liner protection at these points.)
8. Hang one to two fill lines and secure them with ratchet straps to give the water trucks a place to continue filling the MLVT as the remainder of the panels are erected.
9. Once there are enough panels (about half) in place for the MLVT to hold itself erect, begin pulling liner up the wall and placing temporary clips to hold in place. Take care to leave sufficient slack in the liner. Ensure that the person in the man basket has on the appropriate fall arrest gear.
10. Before setting the last panel hang the manifold and connect the suction line and strainer box. (Make sure suction hose is connected in a straight alignment to assure good suction.)
11. Set the last panel of the MLVT.
12. Begin setting the permanent clips by adjusting liner in a straight and loose manner to allow for tightening as water is added to the MLVT. Ensure that personnel setting the clips are wearing the proper fall arrest gear.
13. When the liner is adjusted correctly, place 2 clips per panel and tighten the bolts with impact drills.
14. Continue setting clips in this manner until all clips are placed. It is very critical to have around 12-16 inches of water in the MLVT before all clips are installed. Monitor the MLVT closely until the minimum required amount of water is in the MLVT. If there is not at least 12 inches of water in the MLVT, install the clips only on every other panel. This will break any vacuum created from wind and will prevent the liner from shifting. Once the required amount of water is in the MLVT it must be fully clipped.
15. Once all clips are set, trim back the excess liner and discard.
16. Hang all remaining plumbing and secure with ratchet straps.
17. Walk location and pick up ALL trash.
18. Secure all materials and trash to be removed from location and leave location.

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II. MLVT INSPECTION AND TESTING SPECIFICATIONS

A. VISUAL INSPECTION FREQUENCY
1. MLVT owner to visually inspect each panel as they are offloaded.
2. MLVT owner to visually inspect each panel and panel connection once the MLVT is erected.
3. Operator, contractor, or MLVT owner to conduct routine visual inspections of the exterior panels and panel connections of the MLVT as required by the WYOGC.
4. MLVT owner to visually inspect each panel and panel connection as they are disassembled.
5. MLVT owner to verify thickness of every panel a minimum of every 50 set-ups.
6. Design Engineer of Record to perform annual visual observation of each MLVT in production.

B. VISUAL INSPECTION GUIDELINE
1. Inspect for deficiencies in the MLVT panels, panel connections, and connection components. Deficiencies include but are not limited to; damaged panels or panel connection components, excessive corrosion of steel, cracked welds, paint coatings, etc.
2. Inspect for any indication of tank settlement.
3. Inspect for any indication of leaks.
4. Inspect for any indication of tank panel and/or panel connection fatigue.

C. MAGNETIC PARTICLE EXAMINATION
1. Magnetic Particle Examination must be performed by a certified inspector a minimum of every 50 MLVT set-ups.
2. The examination must include ALL welded joints.
3. Any deficiencies found must be repaired by a certified welder. If deficiencies cannot be adequately repaired, consult design engineer for appropriate recommendations.

D. RECORDS
1. Records of all inspections must be kept.
2. A log of each MLVT must be kept by MLVT owner indicating dates and duration of each service, inspections and examinations performed, and repairs or alteration performed.

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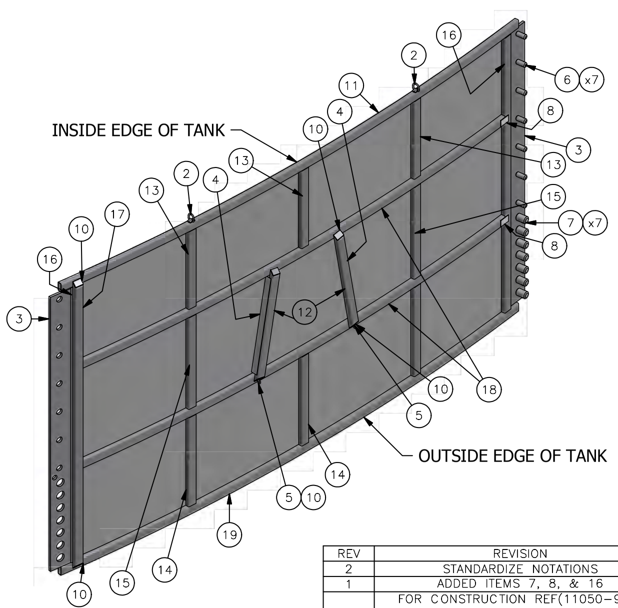
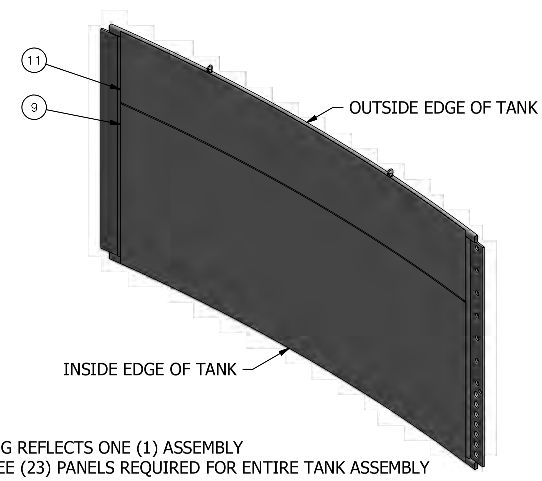
2.5

Parts List								
CK	ITEM	QTY	DESCRIPTION	WIDTH	LENGTH	MATERIAL	CLENGTH (in)	WEIGHT
	1	14	BAR, ROUND, 5/8" (LOCK PIN)		6 1/2 in	A36	6.50	
	2	2	D-RING, 1/2" B38, WORKING LOAD 4080 lbs			A29/A29M -91 1045(C-1045), MODIFIED TO WELD DOWN		2
	3	2	FBAR, 1"	10 in	131 1/2 in	A36	131.50	373
	4	2	FBAR, 10GA	3 in	43 1/8 in	A36	86.25	99
	5	2	PAD EYE, #2			CROSBY GROUP, S-264		0
	6	7	PIN, 2" DIA		4 1/2 in	KUSTOM KONCEPTS, A1018	31.50	3
	7	7	PIN, 3 " DIA		4 1/2 in	KUSTOM KONCEPTS, A1018	31.50	8
	8	2	PLATE, 3/16"	3 in	5 in	A36	10.00	2
	9	1	PLATE, 3/16"	96 in	240 in	A36	240.00	156
	10	6	SHEET, 10GA	2 1/2 in	3 3/4 in	A36	22.50	3
	11	1	SHEET, 10GA	42 1/2 in	240 in	A36	240.00	50
	12	2	TUBE, 4" x 2" x 1/4" (MITER BOTH ENDS)		52 in	A500B CLEAN COAT	104.00	55
	13	3	TUBE, 4" x 2" x 3/16"		37 1/4 in	A500B CLEAN COAT	74.50	43
	14	3	TUBE, 4" x 2" x 3/16"		42 3/4 in	A500B CLEAN COAT	128.25	74
	15	2	TUBE, 4" x 2" x 3/16"		44 in	A500B CLEAN COAT	88.00	50
	16	2	TUBE, 4" x 2" x 3/16"		132 in	A500B CLEAN COAT	264.00	151
	17	1	TUBE, 4" x 2" x 3/16" (MITER BOTH ENDS)		137 1/2 in	A500B CLEAN COAT	137.50	78
	18	2	TUBE, 4" x 2" x 3/16", (ROLL TO 155'-6 7/8" I.D.)		236 3/8 in	A500B CLEAN COAT	472.75	271
	19	2	TUBE, 4" x 2" x 3/16", (ROLL TO 155'-6 7/8" I.D.)		253 7/8 in	A500B CLEAN COAT	507.75	291





NOTES:
-THIS DRAWING REFLECTS ONE (1) ASSEMBLY
-TWENTY THREE (23) PANELS REQUIRED FOR ENTIRE TANK ASSEMBLY

REV	REVISION	DATE	BY
2	STANDARDIZE NOTATIONS	1/17/2012	JDV
1	ADDED ITEMS 7, 8, & 16	12/09/11	DSG
0	FOR CONSTRUCTION REF(11050-901) CHANGED HEIGHT AND LOCATION OF PINS REF(11078-40-901)	9/1/2011	CJD

FabTech A NALCO COMPANY
4500 33 Mile Road
Casper, WY 82601 (307) 472-9740

Unless otherwise stated SHARP EDGES BROKEN Tolerance for non-toleranced dimensions:
Approval
Drafter/Designer JDV
Originated From
Date 5/31/2011
Total Mass N/A
Job Group T - TANKS
Customer #/Location WELL WATER SOLUTIONS
Project/Job # STANDARDS

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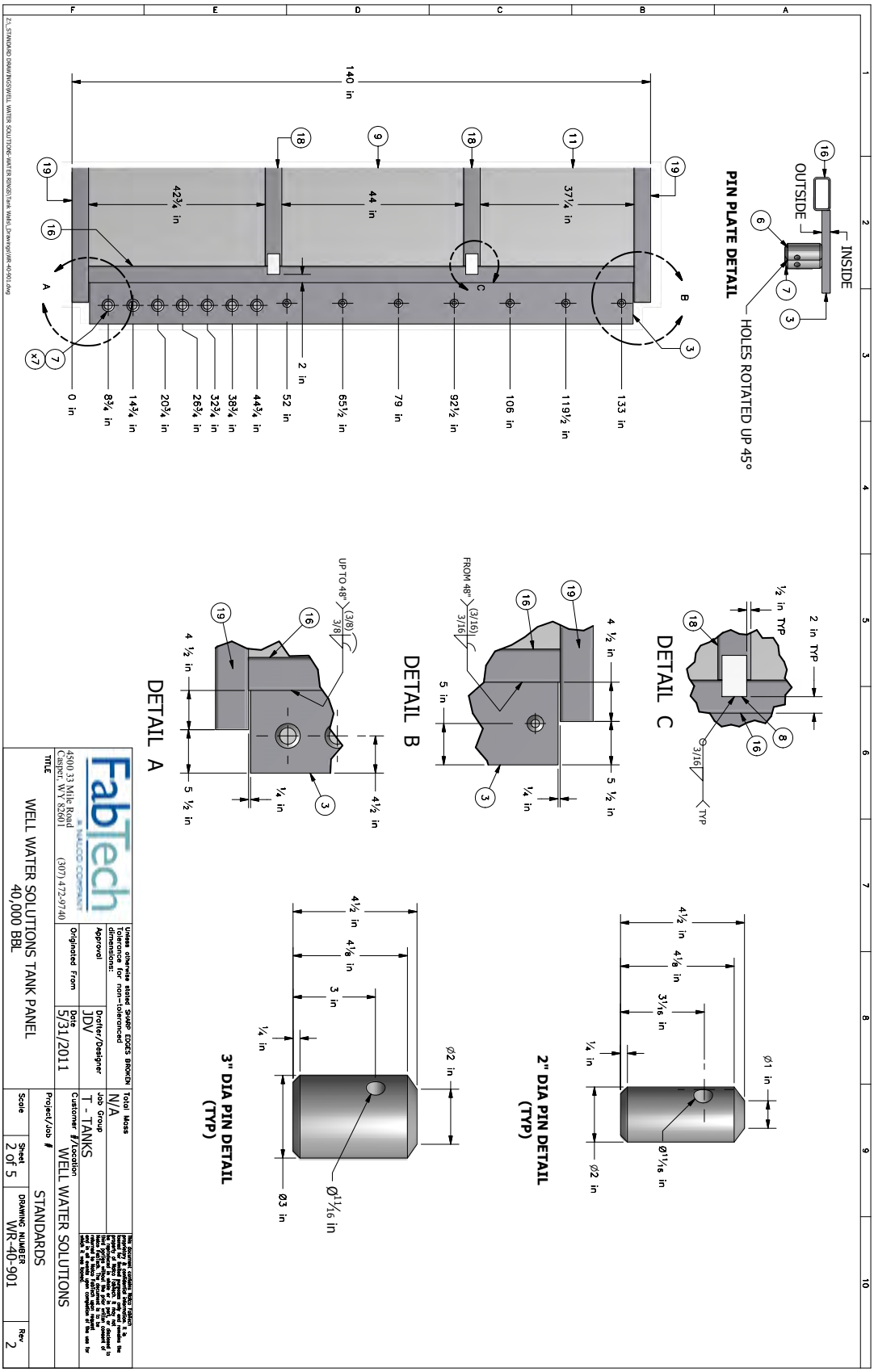
TITLE WELL WATER SOLUTIONS TANK PANEL 40,000 BBL
Scale | Sheet 1 of 5 | DRAWING NUMBER WR-40-901 | Rev 2

Z:_STANDARD DRAWINGS\WELL WATER SOLUTIONS-WATER RINGS\Tank Walls_Drawings\WR-40-901.dwg



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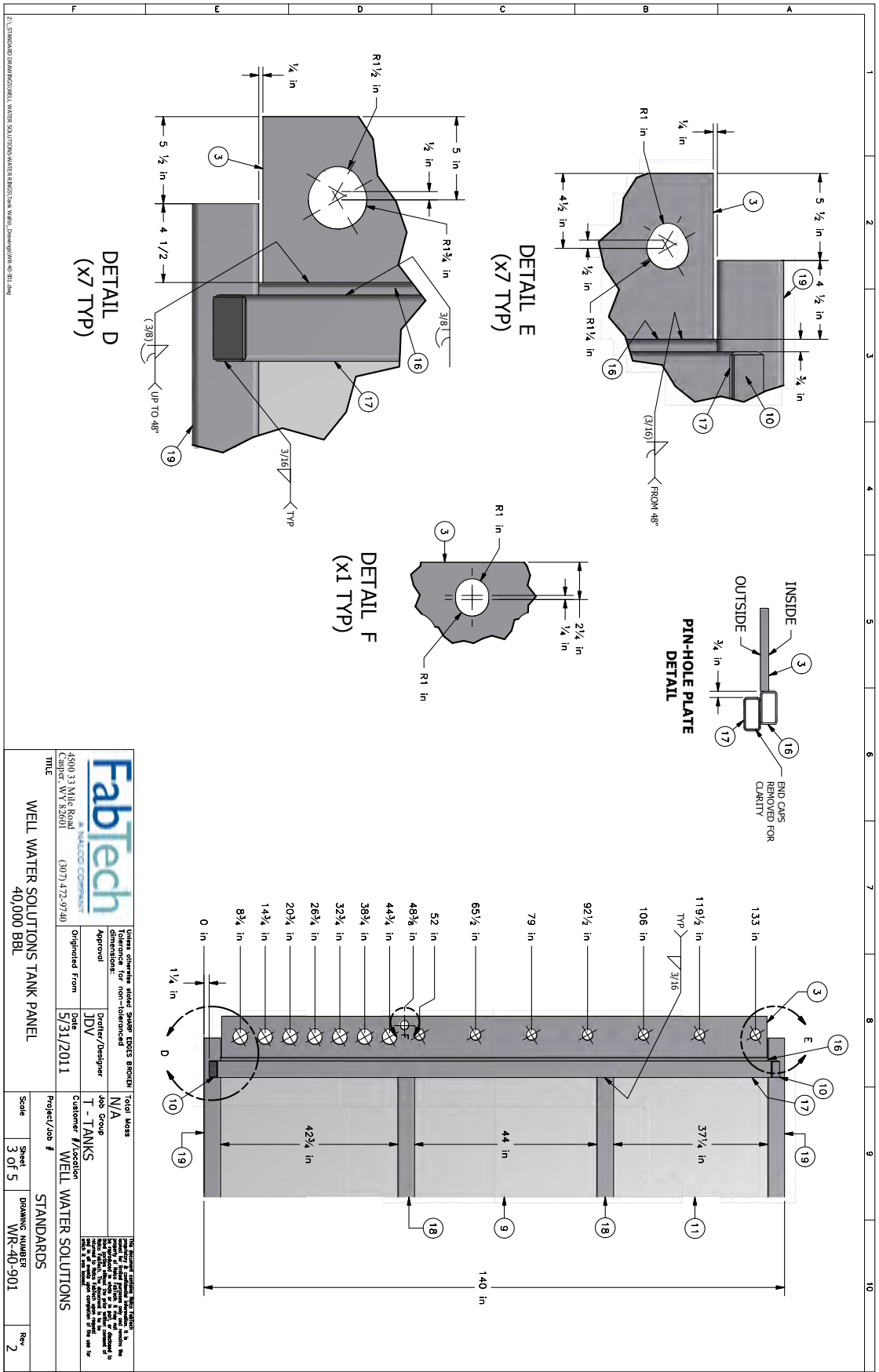
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38¾ in
32¾ in
26¾ in
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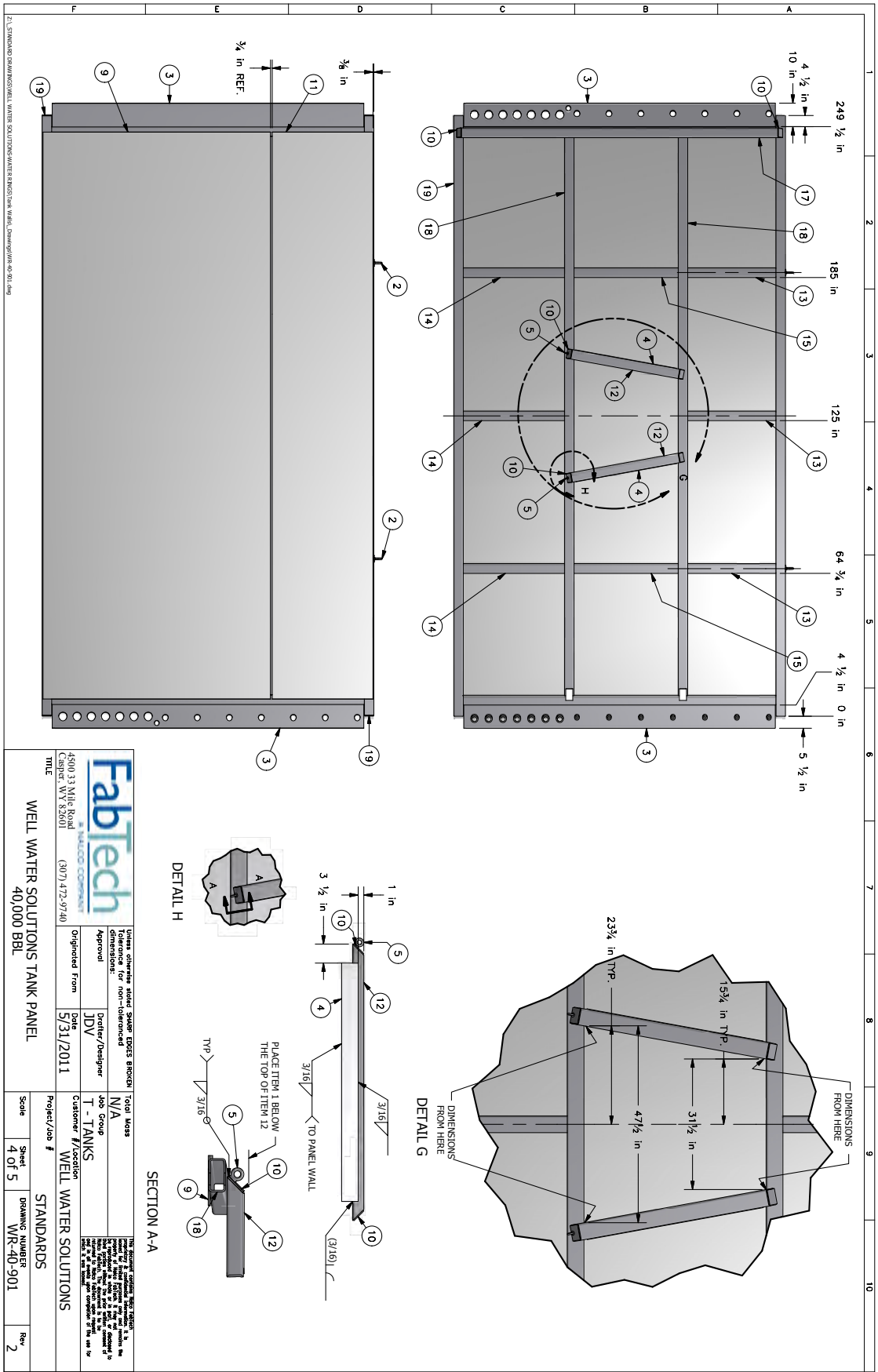
14¾ in
8¾ in
0 in
37¼ in
44 in
42¾ in
140 in
FabTech
4500 33 Mile Road
Casper WY 82601
(307) 472-9740
Drafter/Designer
JDV
Date
5/31/2011
Job Group
T - TANKS
Customer #/Location
WELL WATER SOLUTIONS
Project/Job #
STANDARDS
WELL WATER SOLUTIONS TANK PANEL
40,000 BBL
Scale
Sheet
3 of 5
DRAWING NUMBER
WR-40-901
Rev
2



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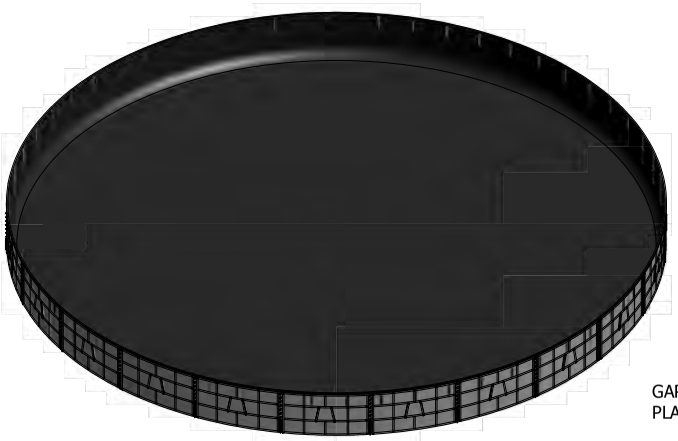

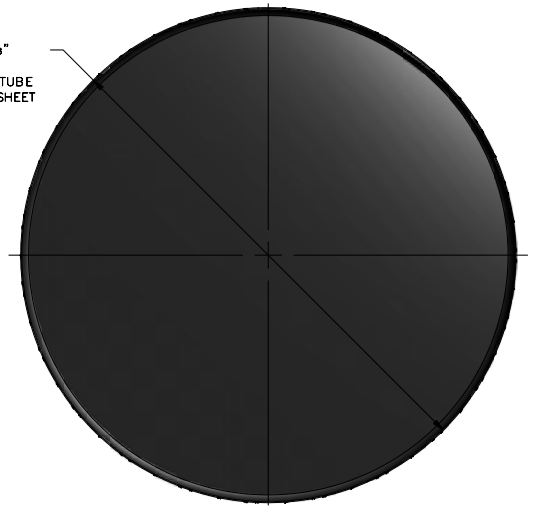

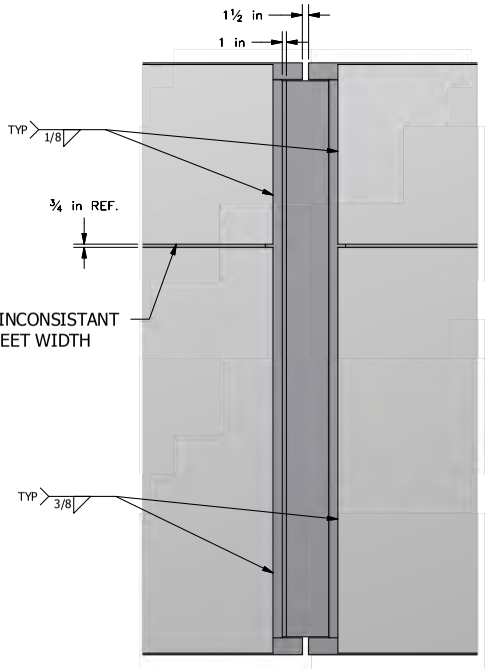

SEAM DETAIL
(INSIDE-OUT)

SEAM DETAIL
(OUTSIDE-IN)

FabTech
A NALCO COMPANY
4500 33 Mile Road
Casper, WY 82601 (307) 472-9740

Unless otherwise stated SHARP EDGES BROKEN
Tolerance for non-toleranced dimensions:

Approval	Drafter/Designer
	JDV
Originated From	Date
	5/31/2011

Total Mass: N/A

Job Group: T - TANKS

Customer #/Location: WELL WATER SOLUTIONS

Project/Job #: STANDARDS

TITLE: WELL WATER SOLUTIONS TANK PANEL
40,000 BBL

Scale	Sheet	DRAWING NUMBER	Rev
	5 of 5	WR-40-901	2

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Z:_STANDARD DRAWINGS\WELL WATER SOLUTIONS-WATER RINGS\Tank Walls_Drawings\WR-40-901.dwg

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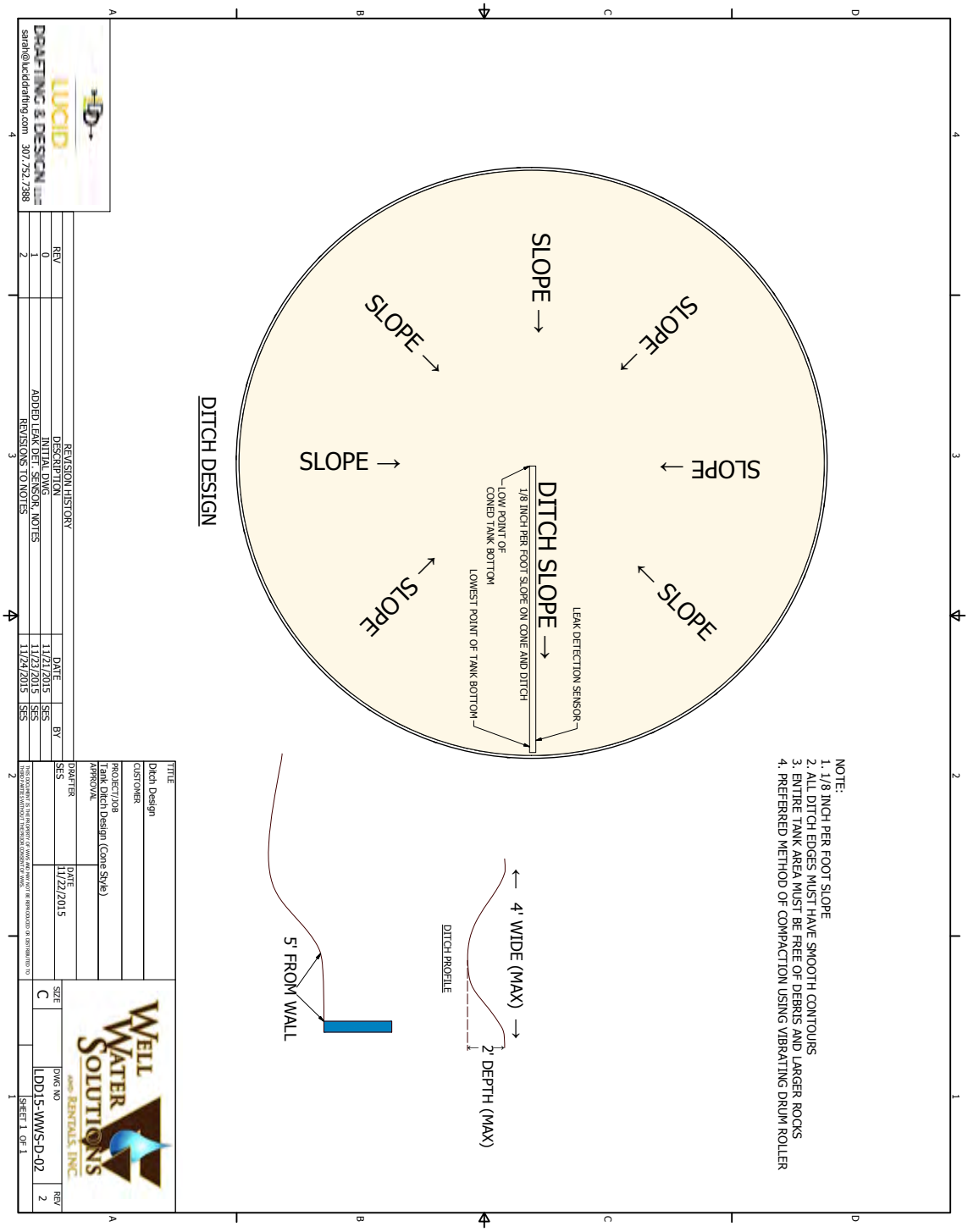
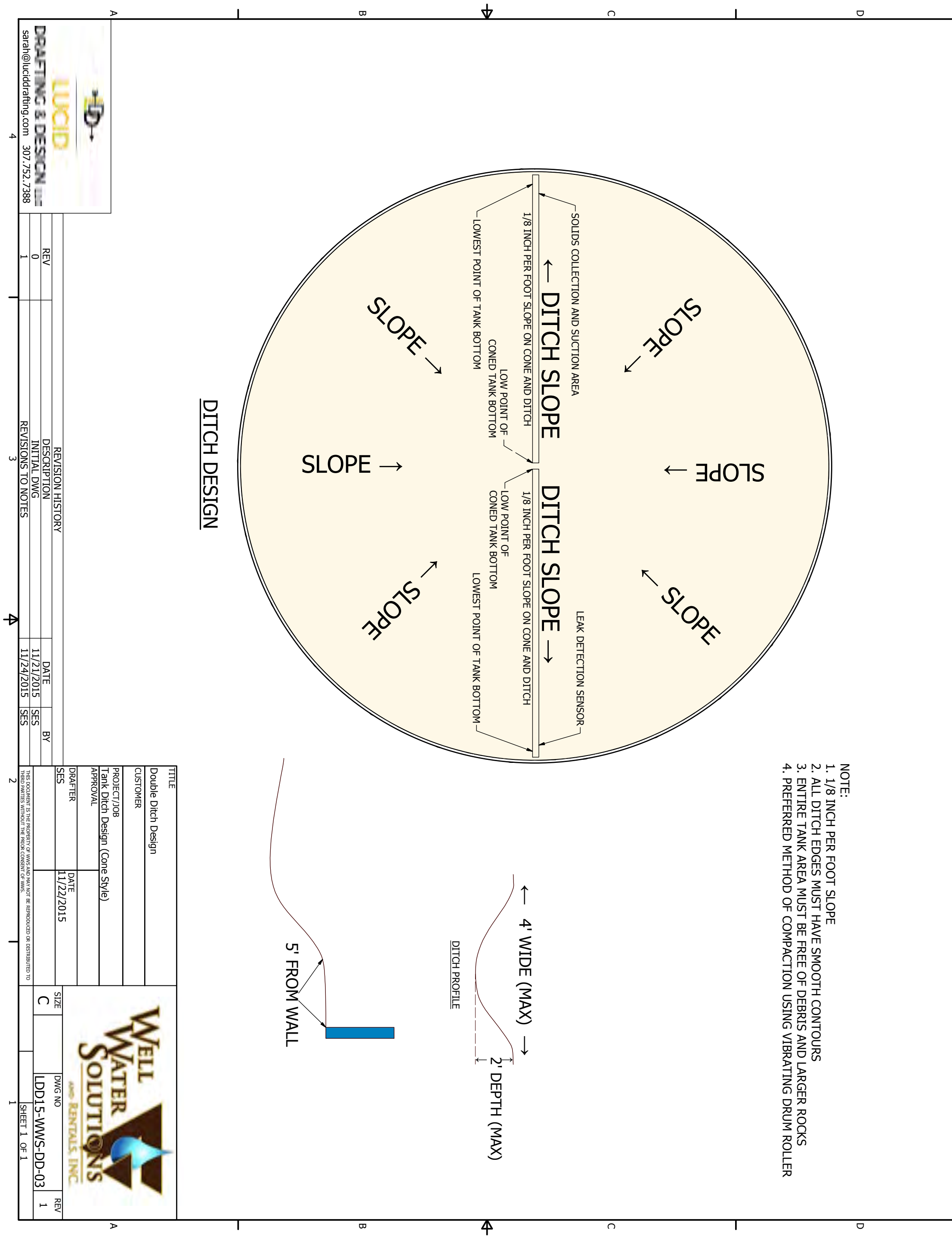
3.1


NOTE:
1. 1/8 INCH PER FOOT SLOPE
2. ALL DITCH EDGES MUST HAVE SMOOTH CONTOURS
3. ENTIRE TANK AREA MUST BE FREE OF DEBRIS AND LARGER ROCKS
4. PREFERRED METHOD OF COMPACTION USING VIBRATING DRUM ROLLER
DITCH DESIGN
SLOPE →
SLOPE ↙
SLOPE ↘
SLOPE →
SLOPE ←
SLOPE ↖
SLOPE ←
DITCH SLOPE →
1/8 INCH PER FOOT SLOPE ON CONE AND DITCH
LOW POINT OF CONED TANK BOTTOM
LOWEST POINT OF TANK BOTTOM
LEAK DETECTION SENSOR
← 4' WIDE (MAX) →
2' DEPTH (MAX)
DITCH PROFILE
5' FROM WALL
REVISION HISTORY
REV DESCRIPTION DATE BY
0 INITIAL DWG 11/21/2015 SES
1 ADDED LEAK DET. SENSOR, NOTES 11/23/2015 SES
2 REVISIONS TO NOTES 11/24/2015 SES
LUCID DRAFTING & DESIGN LLC
sarah@luciddrafting.com 307.752.7388
TITLE
Ditch Design
CUSTOMER
PROJECT/JOB
Tank Ditch Design (Cone Style)
APPROVAL
DRAFTER
SES
DATE
11/22/2015
WELL WATER SOLUTIONS AND RENTALS INC
SIZE
C
DWG NO
LD015-WWS-D-02
REV
2
SHEET 1 OF 1


NOTE:
1. 1/8 INCH PER FOOT SLOPE
2. ALL DITCH EDGES MUST HAVE SMOOTH CONTOURS
3. ENTIRE TANK AREA MUST BE FREE OF DEBRIS AND LARGER ROCKS
4. PREFERRED METHOD OF COMPACTION USING VIBRATING DRUM ROLLER
SLOPE
SLOPE
SLOPE
SLOPE
SLOPE
SLOPE
SOLIDS COLLECTION AND SUCTION AREA
← DITCH SLOPE
1/8 INCH PER FOOT SLOPE ON CONE AND DITCH
LOW POINT OF CONED TANK BOTTOM
LOWEST POINT OF TANK BOTTOM
LEAK DETECTION SENSOR
DITCH SLOPE →
1/8 INCH PER FOOT SLOPE ON CONE AND DITCH
LOW POINT OF CONED TANK BOTTOM
LOWEST POINT OF TANK BOTTOM
DITCH DESIGN
← 4' WIDE (MAX) →
2' DEPTH (MAX)
DITCH PROFILE
5' FROM WALL
LUCID DRAFTING & DESIGN LLC
sarah@luciddrafting.com 307.752.7388
REVISION HISTORY
REV DESCRIPTION DATE BY
0 INITIAL DWG 11/21/2015 SES
1 REVISIONS TO NOTES 11/24/2015 SES
TITLE
Double Ditch Design
CUSTOMER
PROJECT/JOB
Tank Ditch Design (Cone Style)
APPROVAL
DRAFTER
SES
DATE
11/22/2015
WELL WATER SOLUTIONS AND RENTALS, INC.
SIZE
C
DWG NO
LDD15-WWS-DD-03
REV
1
SHEET 1 OF 1

4.1

November 20, 2015

To whom it may concern:

Referenced Project: Unknown

Referenced Material: SuperGeo L40B
Material Description: 40 mil Nominal Linear Low Density Polyethylene Black/Black Smooth provided in fabricated panels approximately 200' X 200'.

Brawler Industries' SuperGeo L40B is compatible and approved for use with processed water containing 1000 ppm oil and bleach. Brawler Industries estimates the exposed life of SuperGeo L40B to be a minimum of 15 years and would issue a warranty for 10 years against UV degradation.

Please see below for additional information required.

Tensile strength at break – 200 lb/in per ASTM D6693 (On data sheet)
Elongation at break – 800 % per ASTM D6693(On data sheet)
Puncture resistance – 90 lbs per ASTM D1004 (On data sheet)
Hydrostatic burst strength – N/A
Axi-symmetric strain – 60 % per ASTM D5617 (On data sheet)
Flexibility cycles without cracking – N/A
Uv resistance % at 30000 hrs – N/A
Coff of thermal expansion - <2 %
Chem resistanc3 to oil, bleach – See above – No issues with given concentration level
Complete material description – See above
Seaming method, results – Wedge welding, Hot Air, or Extrusion Welding approved

Marlyn Waltner
Director of Market Development
Brawler Industries, LLC

28

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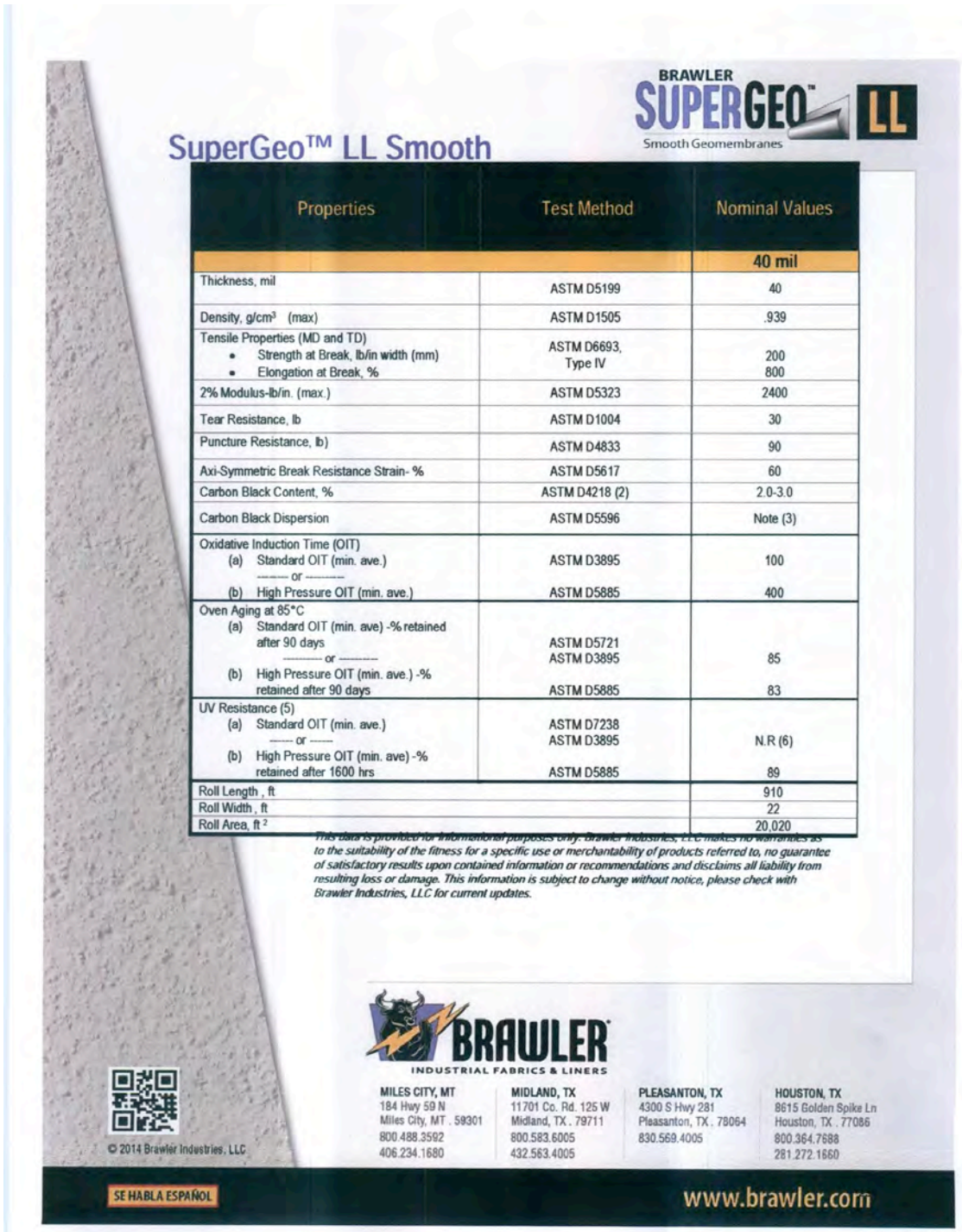

BRAWLER SUPERGEO™ LL
Smooth Geomembranes

SuperGeo™ LL Smooth

Properties	Test Method	Nominal Values
		40 mil
Thickness, mil	ASTM D5199	40
Density, g/cm³ (max)	ASTM D1505	.939
Tensile Properties (MD and TD) • Strength at Break, lb/in width (mm) • Elongation at Break, %	ASTM D6693, Type IV	 200 800
2% Modulus-lb/in. (max.)	ASTM D5323	2400
Tear Resistance, lb	ASTM D1004	30
Puncture Resistance, lb)	ASTM D4833	90
Axi-Symmetric Break Resistance Strain- %	ASTM D5617	60
Carbon Black Content, %	ASTM D4218 (2)	2.0-3.0
Carbon Black Dispersion	ASTM D5596	Note (3)
Oxidative Induction Time (OIT) (a) Standard OIT (min. ave.) ---- or ---- (b) High Pressure OIT (min. ave.)	ASTM D3895 ASTM D5885	100 400
Oven Aging at 85°C (a) Standard OIT (min. ave) -% retained after 90 days ---- or ---- (b) High Pressure OIT (min. ave.) -% retained after 90 days	ASTM D5721 ASTM D3895 ASTM D5885	 85 83
UV Resistance (5) (a) Standard OIT (min. ave.) ---- or ---- (b) High Pressure OIT (min. ave) -% retained after 1600 hrs	ASTM D7238 ASTM D3895 ASTM D5885	 N.R (6) 89
Roll Length , ft		910
Roll Width , ft		22
Roll Area, ft²		20,020

This data is provided for informational purposes only. Brawler Industries, LLC makes no warranties as to the suitability of the fitness for a specific use or merchantability of products referred to, no guarantee of satisfactory results upon contained information or recommendations and disclaims all liability from resulting loss or damage. This information is subject to change without notice, please check with Brawler Industries, LLC for current updates.

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HOUSTON, TX
8615 Golden Spike Ln
Houston, TX . 77086
800.364.7688
281.272.1660

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SE HABLA ESPAÑOL

www.brawler.com

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5.0
PATENTS AND PATENT PROTECTION

Well Water Solutions & Rentals Inc. has the first two patents in this field that protects two separate hinge connection designs. Also included in the patents are the quick connecting attachment and the industries safest and strongest liner clamp design to date.


US008376167B2

(12) **United States Patent**
Lovelace et al.

(10) **Patent No.: US 8,376,167 B2**
(45) **Date of Patent: Feb. 19, 2013**

(54) **PORTABLE RESERVOIR FRAME**

(75) Inventors: **Sean Michael Lovelace**, Casper, WY (US); **Christopher Jason Songe**, Casper, WY (US)

(73) Assignee: **Energy Innovations, LLC**, Casper, WY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/469,883**

(22) Filed: **May 11, 2012**

(65) **Prior Publication Data**

US 2012/0223073 A1 Sep. 6, 2012

Related U.S. Application Data

(63) Continuation of application No. 13/245,492, filed on Oct. 21, 2011.

(51) **Int. Cl.**
B65D 6/00 (2006.01)

(52) **U.S. Cl.** **220/4.17**; 220/4.16; 220/693; 220/567; 220/4.12

(58) **Field of Classification Search** 220/1.6, 220/4.12, 4.16, 4.17, 9.4, 23.9, 495.06, 495.08, 220/567, 681, 693
See application file for complete search history.

(56) **References Cited**

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1,875,666	A *	9/1932	Schwemlein	220/693
3,233,251	A *	2/1966	Barrera	52/245
3,648,303	A *	3/1972	Stewart et al.	52/5
4,124,907	A *	11/1978	Laven	52/169.7

FOREIGN PATENT DOCUMENTS

CA	2692016	7/2010

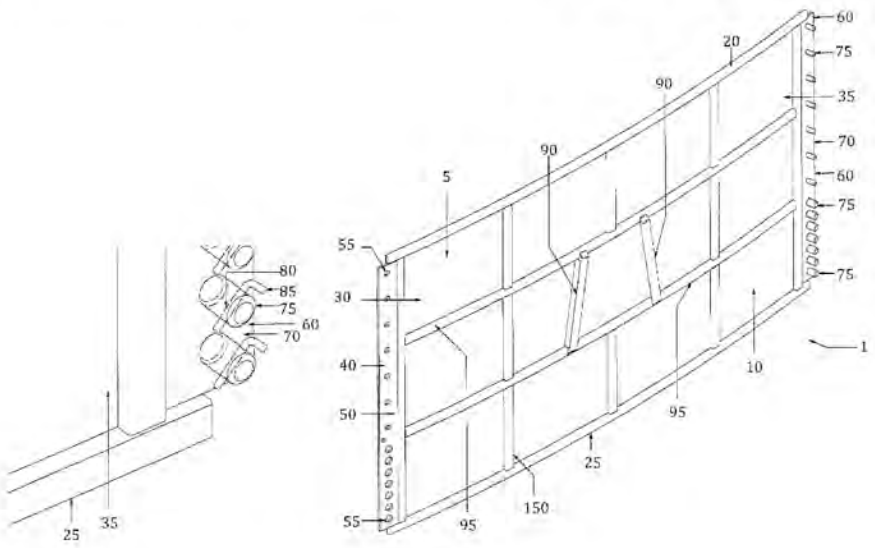
* cited by examiner

Primary Examiner — Anthony Stashick
Assistant Examiner — Christopher McKinley
(74) *Attorney, Agent, or Firm* — Gordon Silver, Ltd.; Ronald C. Gorsche

(57) **ABSTRACT**

A portable reservoir frame composed of interlocking panels secured by a series of flanges having holes and pegs. An inner liner to hold liquid inside the reservoir frame is presented.

16 Claims, 11 Drawing Sheets



US008365937B2

(12) **United States Patent**
Lovelace et al.

(10) **Patent No.: US 8,365,937 B2**
(45) **Date of Patent: Feb. 5, 2013**

(54) **PORTABLE RESERVOIR FRAME**

(75) Inventors: **Sean Michael Lovelace**, Casper, WY (US); **Christopher Jason Songe**, Casper, WY (US)

(73) Assignee: **Energy Innovations, LLC**, Casper, WY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/469,845**

(22) Filed: **May 11, 2012**

(65) **Prior Publication Data**

US 2012/0234829 A1 Sep. 20, 2012

Related U.S. Application Data

(63) Continuation of application No. 13/426,286, filed on Mar. 21, 2012, which is a continuation-in-part of application No. 13/245,492, filed on Oct. 21, 2011.

(51) **Int. Cl.**
B65D 6/00 (2006.01)

(52) **U.S. Cl.** **220/4.17**; 220/4.16; 220/693; 220/567; 220/4.12

(58) **Field of Classification Search** 220/565, 220/567, 1.6, 4.16, 4.12, 9.4, 495.06, 495.08, 220/23.9, 4.17, 693, 681

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

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7,766,184	B2 *	8/2010	Avery et al.	220/573.1
7,918,764	B2 *	4/2011	VanElverdinghe	482/27
2009/0127255	A1 *	5/2009	Rood, Jr.	220/1.5

FOREIGN PATENT DOCUMENTS

CA	2692016	7/2010

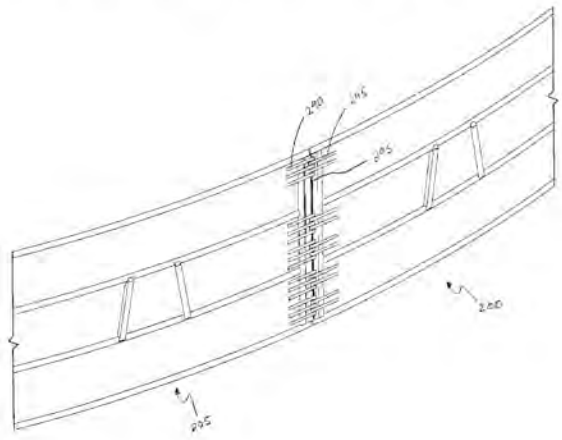
* cited by examiner

Primary Examiner — Anthony Stashick
Assistant Examiner — Christopher McKinley
(74) *Attorney, Agent, or Firm* — Gordon Silver Ltd.; Ronald C. Gorsché

(57) **ABSTRACT**

A portable reservoir frame having a number of interlocking panels secured by a plurality of interleaved knuckle members is provided.

20 Claims, 20 Drawing Sheets



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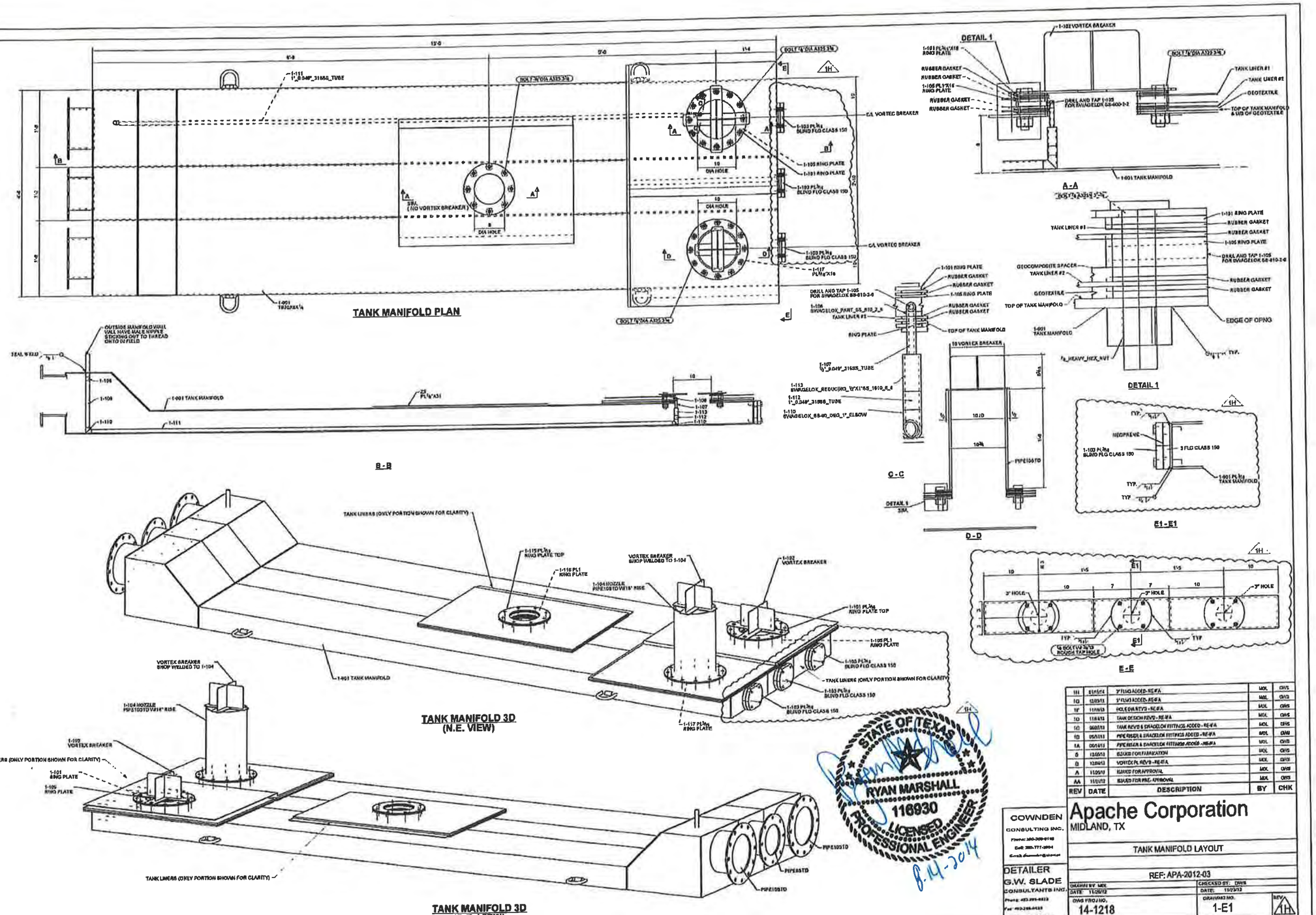
Reference Photos

Under-Mount Manifold Option



REV	DATE	DESCRIPTION	BY	CHK
1H	8/15/14	3" FLG ADDED - RE #A	MDL	DWS
1G	12/05/13	3" FLG ADDED - RE #A	MDL	DWS
1F	11/19/13	HOLE QUANTITY - RE #A	MDL	DWS
1E	11/14/13	TANK DESIGN REVD - RE #A	MDL	DWS
1C	06/07/13	TANK REVD & SWAGELOK FITTINGS ADDED - RE #A	MDL	DWS
1B	05/16/13	PIPE REVD & SWAGELOK FITTINGS ADDED - RE #A	MDL	DWS
1A	05/14/13	PIPE REVD & SWAGELOK FITTINGS ADDED - RE #A	MDL	DWS
0	12/05/12	ISSUED FOR FABRICATION	MDL	DWS
B	12/04/12	VORTEX PL REVD - RE #A	MDL	DWS
A	11/29/12	ISSUED FOR APPROVAL	MDL	DWS
AA	11/01/12	ISSUED FOR PRE-APPROVAL	MDL	DWS

COWNDEN CONSULTING INC.

DETAILER
G.W. SLADE
CONSULTANTS INC.

Apache Corporation
MIDLAND, TX

TANK MANIFOLD LAYOUT

REF: APA-2012-03

DRAWN BY: MDL	CHECKED BY: DWS
DATE: 11/29/12	DATE: 11/29/12
CWS PROJ NO. 14-1218	DRAWING NO. 1-E1

TOTAL QTY	SET QTY	SITE BOLTS	LENGTH
4	4	5/8DIA A325N	3 1/4"
8	4	5/8DIA A325N	3 1/4"
8	4	5/8DIA A325N	3 1/4"

* 1 8" FLNG W/
8" 150 ANSI BOLT PATERN
DBC=11"-3/4 (298mm)
HOLE DIA=7/8
OF BOLTS=8
PLATE ID = 8
PLATE OD = 13"-1/2 (343mm)

8" 150 ANSI SCH STD RFWN FLANGE BUYOUT

* 2 10" FLNG W/
10" 150 ANSI BOLT PATERN
DBC=14"-1/4 (362mm)
HOLE DIA=1
OF BOLTS=12
PLATE ID = 10
PLATE OD = 15 15/16 (405mm)

10" 150 ANSI SCH STD RFWN FLANGE BUYOUT

BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
1-901					
1-901	1	TANK MANIFOLD			
1-901	1	TS20X20X1/4	17'-1 13/16"	710	A36
1w2	1	PIPE10STD	0'-8 1/2"	30	A106-GRAD
1w9	1	PIPE_NIPPLE_1"_3000#	0'-6"	0	Misc_Units
1m17	1	TS20X10X1/4	1'-8 13/16"	150	A36
1p1	1	PL1/4"X10"	1'-8"	14	A36
1p7	1	PL1/4"X8"	1'-8"	8	A36
1p13	1	PL1/4"X8" 3" FLG CLASS 150	0'-7 1/2"	8	A105N
1p14	1	PL1/4"X8"	0'-7 1/2"	0	Neoprene
1p17	1	PL1/4"X14 1/4"	1'-8"	20	A36
1p18	1	PL3/4"X10"	1'-8"	6	A36
1p19	2	PIPE3/4STD	0'-2"	0	A53
1p20	2	C6X8	1'-1 1/8"	7	A36
1p22	1	[redacted] *2 BUYOUT	1'-3 15/16"	41	A105N
	1	1_HEAVY_HEX_NUT		0	
	11	7/8_HEAVY_HEX_NUT		4	
1-902	1	TANK MANIFOLD			
1-902	1	TS20X20X1/4	17'-1 13/16"	705	A36
1w3	1	PIPE10STD	0'-8 1/2"	30	A106-GRAD
1m17	1	TS20X10X1/4	1'-8 13/16"	170	A36
1p1	1	PL1/4"X10"	1'-4"	11	A36
1p2	1	PL1/4"X8"	1'-8"	8	A36
1p7	1	PL3/4"X10" 3" FLG CLASS 150	1'-4"	8	A36
1p10	1	PL1/2"X8"	0'-7 1/2"	8	A105N
1p14	1	PL1/8"X8"	0'-7 1/2"	0	Neoprene
1p17	1	PL1/4"X14 1/4"	1'-4"	20	A36
1p19	2	PIPE3/4STD	0'-2"	0	A53
1p20	2	C6X8	1'-1 1/8"	3	A36
1p23	1	[redacted] *2 BUYOUT	1'-3 15/16"	13	A105N
	12	7/8_HEAVY_HEX_NUT		4	
1-903	1	TANK MANIFOLD			
1-903	1	TS10X10X1/4	17'-1 13/16"	401	A36
1w18	1	PIPE8STD	0'-8 1/2"	16	A106-GRAD
1m19	1	TS10X14X1/4	1'-8 11/16"	115	A36
1p4	1	PL1/4"X8"	1'-2"	9	A36
1p8	1	PL1/4"X14" 3" FLG CLASS 150	1'-4"	11	A36
1p9	1	PL1/4"X14"	1'-2 1/4"	16	A36
1p10	1	PL7/8"X8"	0'-7 1/2"	8	A105N
1p13	1	PL3/8"X13 1/2"	1'-1 1/2"	6	A36
1p14	1	PL1/8"X8"	0'-7 1/2"	0	Neoprene
1p23	1	[redacted] *1 BUYOUT	1'-1 1/2"	13	A105N
	8	1_HEAVY_HEX_NUT		0	
		TOTAL WEIGHT THIS DRAWING		2495	

ONE - TANK MANIFOLD - 1-901

RYAN MARSHALL
116930
Ryan Marshall
8-14-2014

REV	DATE	DESCRIPTION	BY	CHK
1D	01/15/14	3" FLNG ADDED-RE#FA	MDL	GWS
1C	11/14/13	TANK DESIGN REVD - RE#FA	MDL	GWS
1B	06/27/13	TANK SUPPORT REVD - RE#FA	MDL	GWS
1A	08/17/13	RIGHT END OF TANK REVD - RE#FA	MDL	GWS
0	12/05/12	ISSUED FOR FABRICATION	MDL	GWS
A	11/26/12	ISSUED FOR APPROVAL	MDL	GWS
AA	11/15/12	ISSUED FOR PRE-APPROVAL	MDL	GWS

COWNDEN
CONSULTING INC.

DETAILER
G.W. SLADE
CONSULTANTS INC.

Apache Corporation
TANK MANIFOLD
REF: APA-2012-03, 1-E1
DRAWN BY MDL DATE 11/20/12
CHK'D BY GWS DATE 11/23/12
JOB No. 14-1218
DWG No 1-901
1D