Gray & Osborne, Inc.
CONSULTING ENGINEERS

TECHNICAL MEMORANDUM 20434-2

TO:	BILL HUNTER, P.E., ASSISTANT GENERAL MANAGER/DISTRICT ENGINEER
FROM:	KEITH STEWART, P.E. RUSSELL PORTER, P.E.
DATE:	SEPTEMBER 10, 2021
SUBJECT:	SUDDEN VALLEY WTP CHLORINE CONTACT BASIN COATING ASSESSMENT LAKE WHATCOM WATER & SEWER DISTRICT, WHATCOM COUNTY, WASHINGTON G&O #20434.00

INTRODUCTION

In 2019, the Lake Whatcom Water & Sewer District (District) contracted with Gray & Osborne to perform a condition assessment for their existing Sudden Valley Water Treatment Plant (WTP) as part of a larger effort to analyze the District's water treatment facilities in order to prioritize funds for rehabilitation, modification, and/or replacement projects. The goal of the assessment and subsequent analysis is to identify potential improvements for the existing structures and treatment processes in an attempt to maximize treatment efficiency and extend the operational life of these facilities. The reports and technical memoranda generated as part of this assessment project will be used to develop a strategy for prioritizing modifications to the WTP to ensure it can efficiently and cost effectively provide clean, potable water for the existing and projected service areas.

This report summarizes the assessment of the interior and exterior coating systems on the existing chlorine contact basin.

BACKGROUND AND EXISTING FACILITIES

The District operates three Group A water systems – South Shore (DOH 95910), Eagleridge (DOH 08118), and Agate Heights (DOH 52957) – all of which are in and around the shores of Lake Whatcom, which lies southeast of Bellingham in Whatcom County, Washington. The District serves approximately 3,900 residential and commercial water system connections with a residential population of approximately 10,000 people.

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The South Shore system is the largest of the three systems and is supplied wholly by water treated at its Sudden Valley Water Treatment Plant. In addition to the WTP, the District also owns and maintains surface water source, storage, and distribution system facilities. The distribution system includes multiple pressure zones, four booster stations, and approximately 2.8 million gallons (MG) of storage in five reservoirs. The District also maintains a secondary intertie with the City of Bellingham Water System (DOH 50600) that is used only during emergency situations.

The existing WTP is a rapid-rate, direct filtration plant with a rated capacity of 2.0 million gallons per day (MGD) but currently operates at approximately 1.0 MGD (700 gallons per minute (gpm)). The WTP is housed in a partially below-grade concrete building located on Morning Beach Drive approximately 1 mile northeast of the intersection of Lake Whatcom Boulevard and Marigold Drive. The facility was constructed in 1972 and has undergone several minor improvements since that time, but was most recently upgraded in 1992. The WTP provides coagulation, flocculation, filtration, disinfection, and chlorine contact time before treated water is pumped to the distribution system and storage reservoirs.

The WTP utilizes a chlorine contact basin (CCB) to provide chlorine contact time for filtered water prior to introduction to the distribution system. Technical information for the CCB is provided in Table 1. Figure 1 shows a plan view of the CCB while Figure 2 shows a section view of the CCB.

TABLE 1

WTP CCB Summary

Parameter	Value
Year Constructed	1994
Type	Circular, Welded Steel
Diameter (ft)	40
Base Elevation (ft)	336.0
Overflow Elevation (ft)	360.0
Volume (gal)	225,000
Gallons per Foot	9,400
Inlet	10-inch Perforated Riser
Outlet	10-inch Perforated Riser
Instrumentation	Pressure Switch (High Alarm)

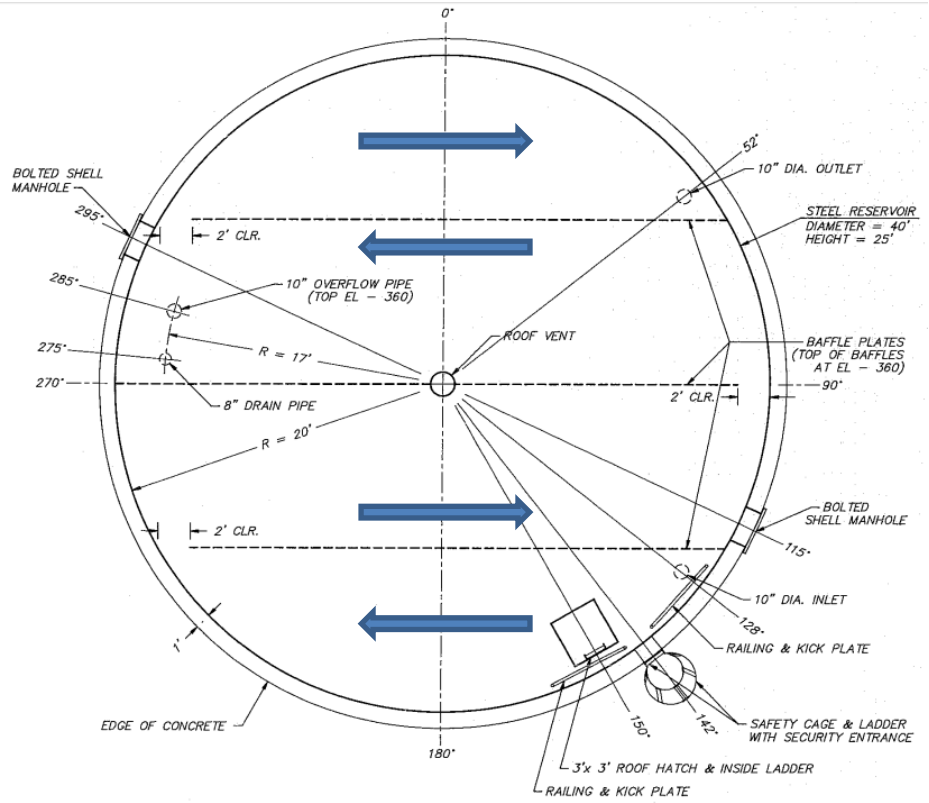


FIGURE 1

WTP CCB Plan View

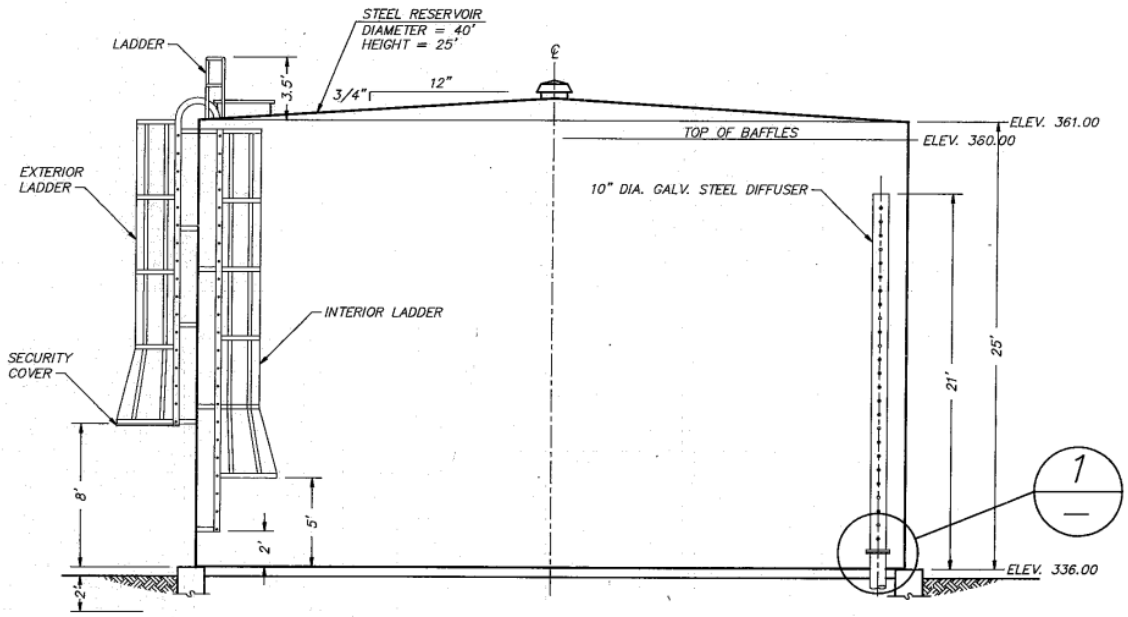


FIGURE 2

WTP CCB Section View

Water enters the CCB via a diffuser riser at one end and flows in a serpentine fashion between three steel baffles to the outlet diffuser. The inlet diffuser consists of a 10-inch diameter PVC pipe with 25 2-inch diameter holes drilled at approximately 9.25 inches on center. The outlet diffuser riser consists of a 10-inch diameter PVC pipe with 50 2-inch diameter holes drilled at approximately 9.25 inches on center. These risers act to promote consistent flow throughout the full depth of the water column from the inlet to the outlet.

The CCB provides chlorine contact time (CT) for filtered water, which is a function of the chlorine concentration of water entering the tank, the hydraulic residence time within the tank, and the baffling efficiency of the tank. As directed by DOH, the District must maintain a minimum of 16.5 feet of water within the tank in order to meet their minimum CT requirement. As such, the CCB represents a critical component of the overall treatment system and must remain functional anytime the WTP is in operation.

CCB INVESTIGATION

Gray & Osborne utilized a subcontractor, Evergreen Coating Engineers, LLC (ECE), to perform the formal investigation. The investigation was conducted by

Lance Stevens P.E., NACE CIP Level 3 on August 19, 2020, and included the following components:

- Visual inspection of the interior and exterior coatings.
- Measurement of coating thickness.
- Measurement of coating adhesion from six testing dollies.
- Collection of coating samples for RCRA 8 metal analysis.
- General assessment of safety equipment, site/tank access, and available appurtenances.

On August 18, representatives from Gray & Osborne traveled to the WTP and affixed six coating adhesion test dollies to the tank surface. Two dollies were placed on the roof of the tank, and four dollies were affixed to the sidewall. Figure 3 shows some of the testing dollies in place.

FIGURE 3

Coating Adhesion Testing Dollies

On August 19, ECE travelled to the WTP to complete the investigation. ECE provided a complete assessment report for their investigation and this report is provided in Exhibit A. A summary of the report's findings and recommendations is provided in the section below.

SUMMARY OF RECOMMENDATIONS AND COST ESTIMATES

The report provided by ECE had the following observations:

- Interior Coating System:
    - Likely consists of two or three coats of epoxy and is in moderate condition above the waterline and in good condition below the waterline.
    - Interior exhibits staining and rust corrosion, most likely from not having seal welds and not having been stripe-coated.
    - There is likely a section of peeling paint near the center of the tank. This section was difficult to see due to the location of the hatch.
    - Coating samples collected from the tank showed no significant concentrations of lead or other RCRA 8 metals (Exhibit B).
    - The interior of the tank has not been seal welded.
    - Previous corrosion/coating investigations completed by H_2O Solutions, LLC (2018) noted local areas of coating failure and light to moderate corrosion both on the interior and exterior of the tank. This report is provided in Exhibit D.
- Exterior Coating System:
    - Overall, the coating system on the sidewalls is in good condition, while the coating system on the roof is in moderate condition.
    - The roof exhibits algae and lichen growth, which will accelerate the deterioration of the coating system.
    - Existing coating patches have helped extend the service life, but show evidence of failure below the patch.
- Adhesion testing was performed and the results were favorable with a minimum pull strength of 1,089 pounds per square inch (psi) for the six samples tested.
- The tank is equipped with safety features; however, the tank could easily be accessed and/or vandalized in its current condition.
- The roof vent is in poor condition.
- Access to all portions of the tank for inspection is not provided via the single entry hatch.

To address the observations listed above, the report provided by ECE listed the following recommendations, which assume that the District will maintain use of the existing tank:

- Remove the existing interior coating system and replace it with new fluoropolymer coating within 5 years. The new interior coating system should include zinc primer and plural component epoxy topcoat. Sharp edges within the tank interior surface should be stripe coated as part of this coating process. The CCB will be unavailable for use during this process, which is anticipated to require 4 to 6 weeks to fully complete.

- Remove the existing exterior coating system and replace it with a new coating system within 5 years. The new coating system should include zinc primer, polyurethane intermediate coat, and fluoropolymer topcoat after surface preparation. The tank can be coated while in use, but it is desirable to prepare and coat the tank when not in use if feasible. Preparation and coating of the exterior is anticipated to take 2 to 4 weeks if completed with the interior coating work, and 4 to 6 weeks if completed separate from the interior coating work. Containment of the blast material and removed coating is recommended.

- The interior of the tank should receive seal welding to reduce potential for additional corrosion. Seal welding should extend the lifespan of the existing tank structure as well as any coating systems that are applied.

- Replace the existing roof vent, which shows signs of corrosion and damage.

- Install one additional access hatch that will allow for easier and more thorough tank inspection and maintenance.

- Remove both the interior and exterior ladder cages. The exterior ladder should be equipped with a ladder guard set at least 4 feet above grade to provide a protected height of at least 12 feet.

- Provide a cover for the existing access hatch padlock and replace the existing handhole screws with tamperproof devices.

The recommendations listed in the report are estimated to cost $680,000 which includes materials, labor, contingency (20 percent), Washington State sales tax (9.0 percent), and design and project administration (25 percent). If the optional items including the seal

welding, additional roof hatch, and new roof vent/tie-offs are removed from the project, the estimated project cost decreases to $500,000. It should be noted that these cost estimates do not include the costs for temporary CT tankage during rehabilitation. The WTP cannot operate in compliance with DOH requirements without providing CT and as such, additional CT facilities are required if the existing tank is removed from service for cleaning, preparation, and coating. A permanent CT tank, a temporary CT tank, or temporary CT piping are all feasible solutions to provide CT during tank rehabilitation.

For comparison, a new 250,000-gallon, 40-foot diameter, 25-foot high welded steel tank with interior baffles and safety appurtenances is estimated to cost between $1.0 million and $1.25 million. This would include new piping and fittings to connect the new tank to the existing finished water pump building but does not include costs such as land acquisition or permitting.

Cost estimates for all three of these alternatives are included in Exhibit C.

EXHIBIT A

EVERGREEN COATING ENGINEERS COATING ASSESSMENT REPORT

LAKE WHATCOM WATER & SEWER DISTRICT

Sudden Valley Water Treatment Plant

Chlorine Contact Basin Tank Evaluation

September 2021 - Draft Report – Rev 2

EVERGREEN
COATING ENGINEERS

Seattle, WA

EXECUTIVE SUMMARY

Gray & Osborne (G&O) contacted Evergreen Coating Engineers (ECE) to complete an evaluation of the Sudden Valley Chlorine Contact Basin Tank (CCB Tank or Tank) for Lake Whatcom Water & Sewer District (District) and provide recommendations for recoating and improvements. The evaluation consisted of the interior and exterior coating systems as well as the tank access features and site. The evaluation was performed by Lance Stevens, P.E., NACE CIP Level 3 of Evergreen Coating Engineers, LLC. The results of that evaluation are contained in this report.

The evaluation found that the coating system on the exterior of the tank is in relatively good condition. The coatings are still protecting the tank except in a few areas on the roof where corrosion has begun. Patches in the coating system on the side shell of the tank are beginning to fail as well. The interior coating system is of more significant concern as it is failing around the edges of the roof plates and structural steel members. The cathodic protection system appears to be working well beneath the water line where it is designed to work. It should be noted that due to the baffles within the tank and only having one access hatch, we could not inspect approximately 2/3 of the interior coating system. It is our opinion that the coatings will protect the tank for another five years but the tank could start to have more problematic metal loss after that.

In addition to the coating system replacement, there are several improvements which could be made to the tank to facilitate access and use. Seal welding, as described within the report, could help to extend the life of the tank as well as extend the length of each coating life cycle. The tank roof vent should be replaced and another access hatch added to the opposite side of the roof to allow for better inspection of the tank.

The improvements should be performed within the next 3 to 5 years and the estimated total project cost of the recommended project in 2020 is $519,000 including a 20 percent contingency and 8.5% sales tax.

INTRODUCTION

BACKGROUND

Lake Whatcom Water & Sewer District (District) contracted with Gray & Osborne (G&O) who teamed with Evergreen Coating Engineers (ECE) to evaluate the interior and exterior coating systems as well as the tank access and site features on the District's CCB Tank (Tank). The District's goal was to determine the condition of the tank and the options that are available to maintain the tank in the future. The Tank did not have a nameplate on the exterior so the actual dimensions and size are unknown from the field, however, the District provided data that the Tank is 24 feet in height to the overflow (25 feet overall) and 40 feet in diameter with a usable volume of 225,000 gallons. The Tank was constructed in 1994.

The field data collection was performed by Lance Stevens, P.E. of Evergreen Coating Engineers, LLC (ECE) on August 19, 2020 while the dollies for the adhesion testing were set by Keith Stewart, P.E. of Gray & Osborne, Inc. (G&O) on August 18, 2020. The scope of work was developed to provide the District with an evaluation of the existing coating systems on the interior and exterior of the tank along with a general evaluation of the tank access features and site. The interior was inspected by leaning into the roof hatch. Although it aids in chlorine contact time within the tank, the interior baffle prevented access or the ability to view approximately 2/3 of the tank that is opposite of the existing roof hatch. The exterior was

inspected by climbing the tank and by walking around the exterior. No lifts were provided for detailed inspection of the upper shell wall.

It is unknown if the tank has been recoated at some point since construction. Staff that was onsite at the time had not recalled the tank being taken out of service for recoating. Given the appearance of the coating system and that the tank serves as the chlorine contact basin for system CT requirements, it is likely that this is the original coating system.

The safety features of the tank were not evaluated as the District believes that all of the features are in compliance with current codes. A general evaluation of the site and access features is included within this report. Recommendations regarding railings and the ladders on the tank do not imply that an analysis was performed for their compliance with safety codes. The recommendations are based only upon ease of use and access of the facility by District personnel. If any of the recommended improvements are included in future design work, the improvements should be evaluated at that time for compliance with current safety codes.

The coating systems were graded utilizing The Society for Protective Coatings (SSPC)-VIS 2 Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces. In general, the values range from 1-10 with 10 being practically no corrosion evident and 1 being greater than 50 percent corroded. The areas are also categorized by the type of corrosion observed with an S = Spot Rusting, G = General Rusting, P = Pinpoint Rusting, O = Other Rusting which is a combination of types of rusting. As an example, a rust grade of 5-S would represent approximately 1-3 percent spot rusting on a surface.

INTERIOR COATING SYSTEM

The interior coating system likely consists of two or three coats of epoxy, a common coating system in 1994. The coatings were assessed by taking photos and visually observing what could be seen through the roof hatch. Since the tank is utilized for chlorine contact time and has interior baffles, the ability to assess the coatings within all of the tank was hindered and therefore issues could exist which are not included within this report. (See Figure 1).

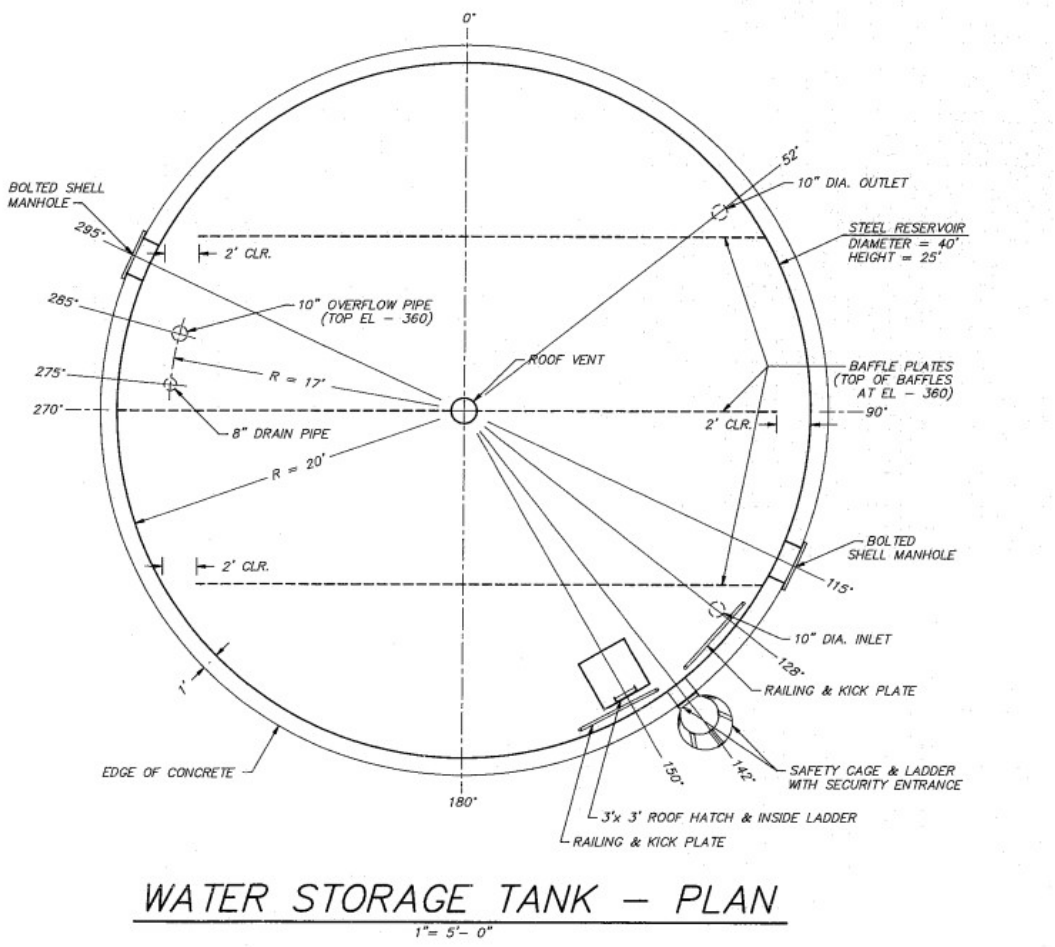


FIGURE 1: CCB Tank Plan

Overall, the interior coating system appeared to be in moderate condition. Beneath the waterline, the coatings appeared to be in good condition. Given the age of the tank, this is most likely due to the cathodic protection system that was observed on the roof of the tank. There was significant rust staining within the interior of the tank mostly from within the lap joints of the roof plates or on edges of angle supports, rafters, and plates (Photos 29-35). The lap joints are where the roof plates overlap each other and the painters can no longer prepare or paint the area within the lap so the area within corrodes and streaks out onto the coated steel. Corrosion within the lap joints can only be prevented by seal welding which is discussed later in this report. Corrosion on the edges of plates and angles can be significantly reduced during recoating by stripe coating these areas. Stripe coating is the application of an additional coat of paint in these areas to build thickness and to prevent the coatings from pulling away from the sharp edges. The corrosion in the overhead area is not designed to be protected by the cathodic protection system.

It was very difficult to see but something which most likely was paint, was peeling from the roof about 10 feet west of the hatch (Photo 35). The observable walls and center portions of the roof plates of the tank typically corresponded to an SSPC-VIS 2 Rust Grade 9- or 10-G representing less than 0.03 percent of the

surface rusted. However, the edges of the roof plates, angle supports, and rafters typically corresponded to an SSPC-VIS 2 Rust Grade 4- to 5-G representing approximately 3 to 5 percent rusting.

A coating sample was taken of the interior coating system for Total Metals testing. The results of that test are included at the end of this report. The test results that there is a small amount of lead present in the interior coatings as well as other metals. It is not anticipated that the amount of metals present will require handling measures that will impact project costs. However, the contractors should be made aware of the test results so that they can handle the removal and disposal of the waste materials appropriately.

EXTERIOR COATING SYSTEM

The exterior coating system is likely the original coating system and may consist of a variety of different styles of coatings as that era was a transition period in coating systems. Overall, the coating system has protected the tank well for 26 years in a very damp environment. There are multiple places around the exterior of the tank where coatings have been patched however these are failing underneath the patch as evidenced by the rust staining coming from them (Photo 9). There was a patch of mildew remaining on the side shell on the west side of the tank that hadn't been cleaned the last time that the tank was cleaned (Photo 3). The side shell appears to be in moderate condition with chalking and loss of gloss evident in the coating system. Overall, the exterior side shell appears to be an SSPC-VIS 2 Rust Grade 7-S.

The coatings on the roof of the tank appear to be in moderate condition. The roof had a layer of algae on it which made it very slippery (Photos 21 and 25). While most of the coatings are intact, the top coat could be seen delaminating from the intermediate coat in some areas (Photos 27 and 28). The roof is also suffering from corrosion in areas around the roof hatch and vent. Overall, the roof area around the ladder appears to be an SSPC-VIS 2 Rust Grade 3-S while the rest of the roof is a 10-S.

A coating sample was taken of the exterior coating system for Total Metals testing. The results of that test are included at the end of this report. The test results indicate that there is a negligible amount of barium present in the exterior coating system but no other metal of concern was detected.

COATING ADHESION TESTING

There are two options for recoating a tank. Either all of the coatings can be removed to bare steel and a new coating system applied or the existing coatings can be top coated where they are cleaned and a new system applied over the old system. Not removing the existing system lowers project cost by eliminating the containment that must be constructed if the existing coatings are blasted off. From experience, the cost to blast clean a structure versus pressure wash and hand clean every rusted spot are about equal. It must be understood that applying a new system over an existing system, or top coating, does carry risk to the owner. Any issue that occurs with the existing coating system after top coating will not be warranted by the Contractor as that is an existing condition outside of his control. The issues can be delamination from stresses that are imparted to the existing system by the new system or sometimes from the solvents used in the new system which can attack the old coating system causing failures. There are two ways to help lessen these risks, but some risk does remain. The first way is adhesion testing and the second is to paint a 10 foot by 10 foot patch of the new coating system on the existing system and give it approximately six months to field test the effects.

Adhesion testing is utilized to determine how tight the existing coating system is held to itself and to the structure. The purpose of the testing is to determine whether the existing coating system can withstand the weight of the new coatings as well as the stresses that will be imparted as the new coatings dry. The test is conducted by utilizing an epoxy adhesive to glue an aluminum dolly to the coating. Once the epoxy is cured, either a manual or automatic adhesion tester is attached to the dolly and pressure is applied until the dolly is pulled from the surface or 3,500 psi is reached. If the coatings fail, they will fail in some combination of cohesive failure which is within the same layer of paint, or adhesive failure which is failure between layers of paint or between the paint and the substrate. The glue can also fail adhesively or cohesively but in either event it is noted as a percentage of glue failure. For this test, a Defelsko PosiTest AT-A Automatic S/N 17275 was utilized which has a hydraulic pump that automatically applies a smooth and continuous pull-off pressure which will provide the best result.

Six dollies were set on the tank and their location is shown in Figure 1 above and the pdf results are attached at the end of this report. The results are provided in Table 1: Adhesion Test Results below. The test layers are:

TABLE 1: Adhesion Test Results

A = Substrate; B= Primer coat; C= Intermediate coat; D= Top Coat; Y= Adhesive; Z= Dolly

Dolly	Max: 3,500	Failure %			Location
No.	PSI	Adhesion %	Cohesive %	Glue %	Of Failure
1	1,215		20		D
				80	Y
2	1,089		15		D
				85	Y
3	1,496			100	Y
4	1,622		5		D
				95	Y
5 (Roof)	2,298		50		D
				50	Y
6 (Roof)	1,273		95		C
			5		D

Overall the results were very good. Typically, results over 1,000 psi are acceptable and over 1,400 psi are preferred. It should be noted that these are values that Evergreen Coating Engineers recommends and industry values, depending upon the source, can be as low as 600-700 psi. We believe that the risk that the Owner carries in opting to top coat versus the savings involved should meet a higher standard than the industry minimums.

While the adhesion results are good, one concerning issue is the delamination of the top coat from the intermediate coat on the roof (Photos 27 and 28). From the dolly pull, it may be delaminating cohesively from within itself. It could also be due standing water or to biological attack from what appear to be lichens (Photo 26) that are growing on the roof. Mildew, lichens, and moss grow roots into the coatings which can physically break the coatings apart.

SITE AND ACCESS

The tank site is adjacent to a heavily used parking space that provides resident access to recreation areas and is open to access by the public The site is heavily treed and is very damp but is on a hillside and appears to be well drained. The height of the ring wall of the tank varies in relation to the ground elevation. In some places it is at or below grade and others it sits above grade. On the northeast side of the tank at the sample lines, the ringwall appears to be above the ground (Photo 8). The sill grout is in good condition. The tank is anchored to the ringwall by 13 anchor chairs. Two 36-inch manways are located on the north and south sides of the tank. A fence has been built very close to the tank in order to fence off what is assumed to be a fuel tank for the plant generator.

The roof of the tank is accessed via a ladder system that starts 8 feet from the ground and has a ladder cage and Saf-T-Climb for fall protection. The Saf-T-Climb rail has been painted which may interfere with operation of the device (Photo 22). The ladder cage has a cage guard that swings down vertically. These can be problematic as they can swing down quickly when a lock is removed and hit a worker utilizing a ladder to access the guard. These can be replaced with a horizontal swinging guard. A run of three 1-inch conduit run up the right side of the ladder cage.

Once on the roof, the immediate area is protected by railings. Within this area is the rooftop access hatch. A cable is attached to an anchor point near the roof vent that a worker can attach to a D Ring on his climbing harness. It should also be noted that the #24 mesh screen that protects the vent from insects appears to have a significant amount of corrosion on it from the interior and should be cleaned. While this wouldn't harm the tank in a vacuum situation, in a pressure situation where the pumps fail to shut off, the vent could be significantly blocked. A cathodic protection junction box is also on the roof of the tank.

ANALYSIS

Interior

The interior and exterior coating systems need to be addressed within the next five years depending upon the District's tolerance for steel loss to corrosion on the interior of the tank. One issue is that the majority of coatings in the interior of the tank could not be observed during this assessment so the condition of those areas at this time is unknown. In 2017, the District contracted with H2O Solutions to provide an in-situ inspection of the tank and the degree of corrosion. Additional information on the conditions of the interior components is available in that report.

It is highly recommended that the tank be seal welded as this will prevent a lot of corrosion in the future. If the corrosion damage goes too far, edges of plates and rafters which are typically welded in the seal welding process could get too thin to weld and require additional work or materials to weld. Seal welding is discussed later in this report. The full interior coating system should be removed and replaced. One issue that will likely increase costs on the interior of the tank are the baffles. While these are extra steel to coat, they will likely hinder the work being performed. The two foot gaps between the baffles and the shell wall should be enough room to move most workers and materials around but they will slow the work. A door sheet could be cut into the side of the tank to help improve the ability to complete the recoating or other work inside of the tank. A door sheet is an opening that the contractor cuts into the side of the tank and then welds it back into place once the job is complete. Often the option to cut a door sheet is left up to the contractor to determine which they believe is more cost efficient versus working

through the manways. The baffles are also at the same height as the overflow pipe which could allow water to short circuit the baffles once it gets high enough to enter the overflow.

Although the interior ladder that was present during this assessment was found to be in good condition above the water surface, the District removed the ladder and associated safety cage on August 31, 2020. The ladder showed significant signs of corrosion below the water surface and was thought to be taxing the existing passive cathodic anodes that serve to inhibit/slow the rate of corrosion of the tank. The ladder and safety cage was removed by H2O Solutions and additional information on this work is provided in their report. It should be noted that while this action helps improve protection from corrosion, it does leave the District without stable and convenient access to the tank interior.

The interior can only be observed from the one access hatch and as noted above, provides only a limited view of the interior of the tank. The addition of another access hatch on the opposite side of the tank would make inspecting the interior much easier. This could be added for minimal cost as a ladder would not be necessary to include with the hatch.

Exterior

The exterior of the tank is largely protected by the existing coating system but it is beginning to fail. The coating repair patches on the side of the tank are corroding underneath the patches as evidenced by the rust staining leaking from them. The coatings showed strong adhesion as demonstrated in the adhesion tests, however there are some issues with the coatings as they are delaminating in places on the roof. The rooftop areas could likely be pressure washed and prepared via hand tools to remove the loose coatings but some risk could remain that there is a problem that will continue to spread after topcoating if that option was selected. One other problem that was noted while onsite is the moisture in that area. The inspection was conducted in late August which is typically the driest time of the year and the tank was still very wet at noon. This type of moisture would require the use of containment and dehumidification equipment in order to paint the tank and cure the coatings properly. If containment is used, there is no point in top coating the existing system as the costs at that point to remove and replace the coating system would be approximately the same as top coating. The heavy algal growth on the roof and on the sides of the tank show that this moisture is an ongoing issue.

The roof also has some significantly corroded areas in and around the access hatch area and roof vent. The vent is an older styled vent and is showing significant corrosion on the exterior. The interior of the vent is likely much more corroded than the exterior due to the steam that will leave the vent during the summertime. At a minimum the vent should be removed so that the riser can be inspected but should probably be replaced with a vent utilizing pressure and vacuum relief pallets.

Fall Protection

Although an evaluation of fall protection on this reservoir was not part of the scope of work, there is one option that the District may want to consider. Fall protection from the tank roof appears to be provided via an existing structural tie-off anchor. Another option would be for the District to add a circumferential guard rail around the perimeter of the tank and enclose the entire top of the tank for approximately $11,000. This eliminates the need for the static and safety lines and allow multiple personnel on the rooftop at any given time.

Although the District does have a structural tie-off point attached to the tank roof (Photo 18), utilization

of this anchor will result in workers' safety cables dragging across the roof surface which will damage the coating system over time. Another option is to install an elevated anchor point approximately 12-inches above the surface of the roof. This style of anchor minimizes contact between the roof surface and the safety lines, thus reducing dragging, scratching, and damage to the coating system.

Security

No evidence of vandalism or security issues were noted onsite. If security is a concern, the interior of this tank could be accessed very easily. Although the ladder is approximately eight feet off of the ground, the ladder guard would likely be ineffective in deterring an intruder. The outside of the cage could be ascended to the roof of the tank (Photo 7). Once on the rooftop, the camera is in an obvious and easily accessible area and could be bagged or dismantled (Photo 16), the padlock on the access hatch is easily accessible to be cut and removed (Photo 23), and the handhole covers could be removed to insert a contaminant into the tank (Photo 17).

While a determined intruder is very difficult to stop, there are multiple ways to improve the security of the tank. A ladder cage is not required since the tank has a Saf-T-Climb fall protection device so that could be eliminated and replaced with an eight foot high full ladder guard set four feet off of the ground to give a protected height of twelve feet. Intrusion switches could be added to the access hatch and included in the SCADA system which likely exists at the treatment plant. This way even if the camera is disabled, District personnel would know if the tank had been breached. The handholes should have the phillips head screws removed and should utilize a security bolt. The padlock could be protected by the addition of a small piece of plate steel over the top of the padlock to prevent accessing it with bolt cutters or a reciprocating saw. Finally, the District could consider the installation of a seismic valve. While these valves are typically used to protect the contents of the tank from being lost after a seismic event, they can also be utilized to isolate the tank until District personnel can verify what has occurred in the event that an intruder sets off an alarm.

Rehabilitation Schedule

In discussions with staff while onsite, it was confirmed that this tank is critical to the operation of the treatment plant and for providing chlorine CT for the system. This tank will be out of service for a minimum of 4-6 weeks in order to recoat the interior and place back into service if the contractor used plural component coatings with a 48 hour cure time. The exterior of the tank will need to be contained in order to paint it. Although precautions would need to be taken, the exterior could be painted with the tank full of water and in operation.

There are two ways to proceed with taking the tank out of service. First, a temporary water tank could be purchased and utilized while the tank is down. Given that this tank provides CT storage, the temporary tank would likely need to include baffles. The chlorine dose could be increased but that could result in complaints and not likely reduce the size of the tank considerably. The second option is to build a new tank. The new tank could range significantly in cost from a Mt. Baker Silo style tank to another welded steel tank. The addition of a second tank would allow for more operational flexibility in the future.

One final issue that was noted is that the bottom of ring wall foundation is exposed next to the sample lines. The District should continue to monitor this area and take action if additional exposure, erosion, or undercutting is observed.

Seal Welding

If the tank is not seal welded, much of the staining that is visible within the roof of the tank will reappear within a couple of years of the interior recoating. This staining is due to ongoing corrosion occurring between the overlaps of the roof plates and the space between the roof plates and rafters. These areas are usually very tight and cannot be cleaned and painted. Eventually the roof plates and rafters will suffer significant corrosion, although the amount of time this takes varies greatly from tank to tank. The only way to prevent this ongoing corrosion is by seal welding the interior of the tank to eliminate these gaps.

As can be seen in Photo 36 from another reservoir, the flange on a rafter can be severely corroded. Photo 38 shows the seal welded tank that the rafter in Photo 37 was taken from. You can see that the corrosion in the ¼-inch thick roof plate above that rafter was significant with degradation of up to a third of the thickness of that plate having occurred. With the seal welding complete, you can see the rafter to roof plate gap has been welded shut. Photo 38 shows the roof plate lap welded shut. The coatings can now be applied as a complete film across those areas and the amount of corrosion that the tank will undergo from this point forward has been significantly reduced, thereby extending the lifespan of the tank. Seal welding the tank during the next recoating project will extend the service life of the structure and will also extend the maximum life that can be obtained from a coating system. The corrosion seen on the edges of the roof plates and the vast majority of the staining seen in the roof of the tank are all issues that are eliminated by seal welding and stripe coating and all things being equal, will typically extend the life of a recoating project by five or more years. The cost to seal weld the interior of Tank 1 is approximately $75,000.

RECOMMENDATIONS

Both the interior and exterior coatings should be removed and replaced. If the work is done after January of 2023, the interior coating system will most likely be a plural component epoxy coating as NSF 61/600 regulations are changing and eliminating most of the coatings that are NSF 61 compliant today. We still recommend the application of a zinc primer to hold the blast before application of a plural component epoxy. This will allow the tank to be fully blasted and cleaned prior to the application of the epoxy and result in a much cleaner and better end product.

On the exterior, we recommend removing and replacing the existing coating system with a zinc primer, polyurethane intermediate coat, and a fluoropolymer top coat. The fluoropolymers are a newer type of coating but have been in widespread use for the last 15 years nationwide. This tank is readily visible by the public and the fluoropolymer coatings will look better at 15 years than a traditional polyurethane coating will look in 4-5 years. The fluoropolymers are also proving that they will last 20+ years and they may last up to 30 years. The fluoropolymer system on this tank would be about $8,500 more than the typical polyurethane system. We also recommend including the containment system so that the environmental conditions can be controlled.

We highly recommend seal welding as it will extend the lifespan of the tank as well as each coating system applied to the tank for the rest of its service life.

We recommend replacing the roof vent, adding an additional access hatch, and installing a padlock guard on the existing hatch. The remaining items mentioned throughout the report would provide additional benefit and could be installed if desired by the District.

COSTS

The Estimated Total Construction Cost for this project is $519,000. This value includes the cost to:

- Remove the existing interior and exterior coatings and recoat the interior and exterior;
- Seal weld the interior:
- Replace the roof vent;
- Add the access hatch and security plate over the existing padlock;

The following are options that should be considered but are not specifically included:

- Circumferential railing could be added for approximately $11,000.
- The exterior ladder guard could be added for approximately $7,500.

Photo 1: East side of tank.

Photo 2: North side of tank with Dolly #4 in the photo.

Photo 3: North side of the tank.

Photo 4: South side of tank with vertical swinging ladder guard.

Photo 5: Overflow with air gap.

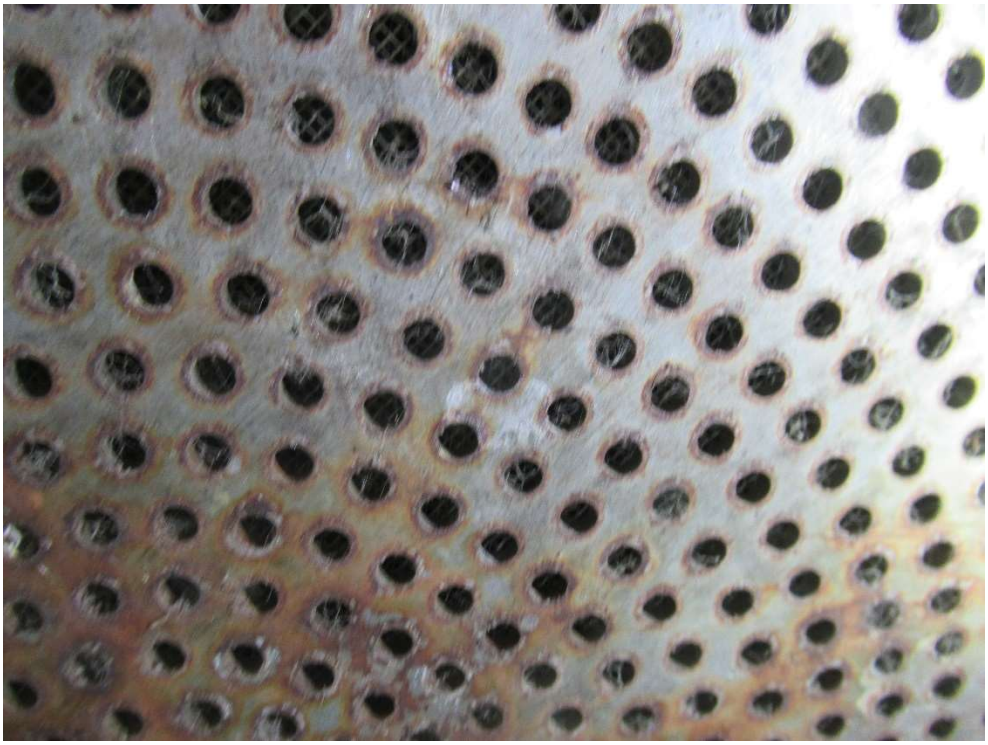


Photo 6: #24 mesh screen protecting the overflow pipe.

Photo 7: Southeast side of the tank with level gauge.

Photo 8: Exposed ring wall on east side by sample lines.

Photo 9: Rust stains from underneath coating patches.

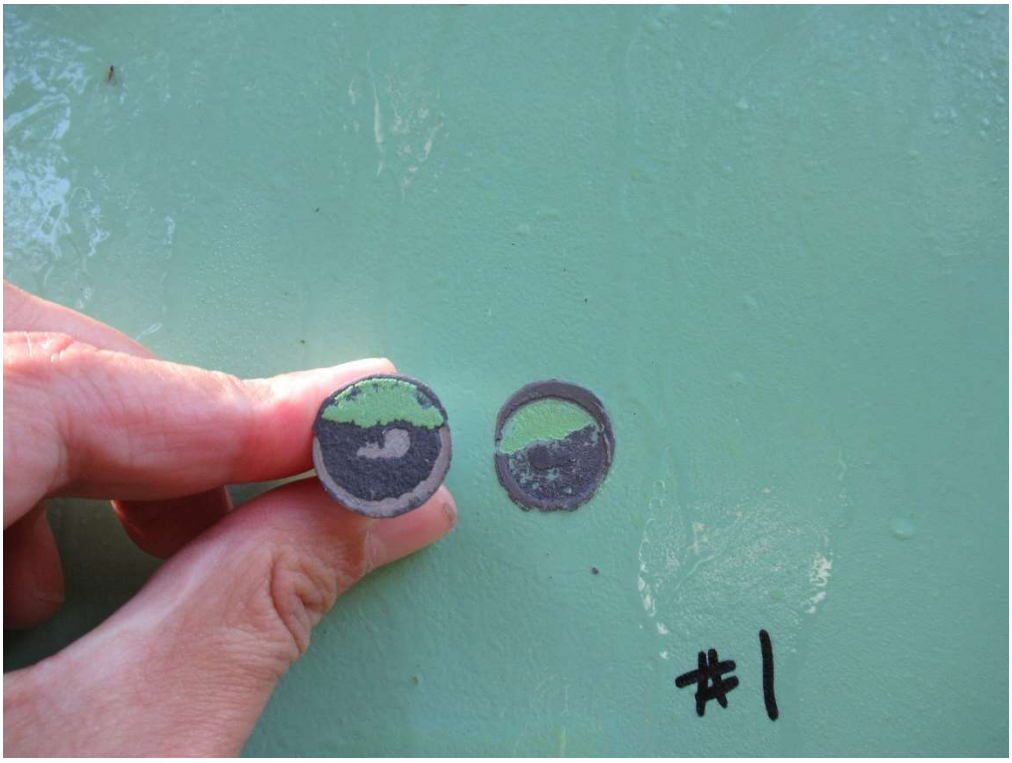


Photo 10: Dolly #1 on the side shell.

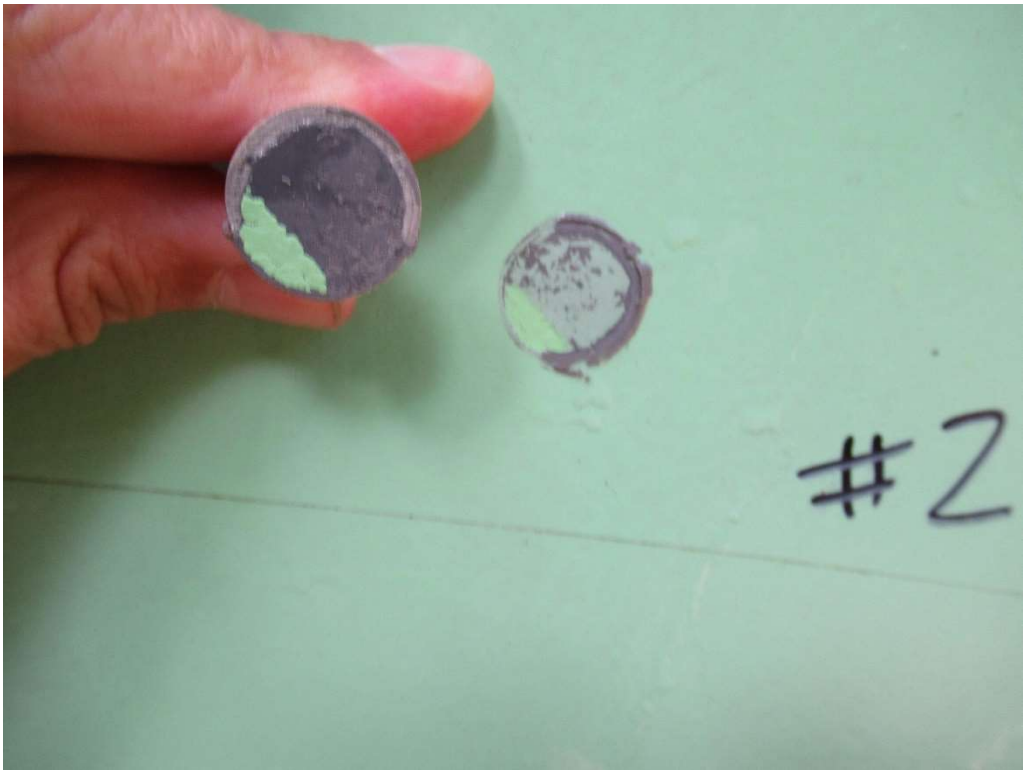


Photo 11: Dolly #2 on the side shell.

Photo 12: Dolly #3 on the side shell.

Photo 13: Dolly #4 on the side shell.

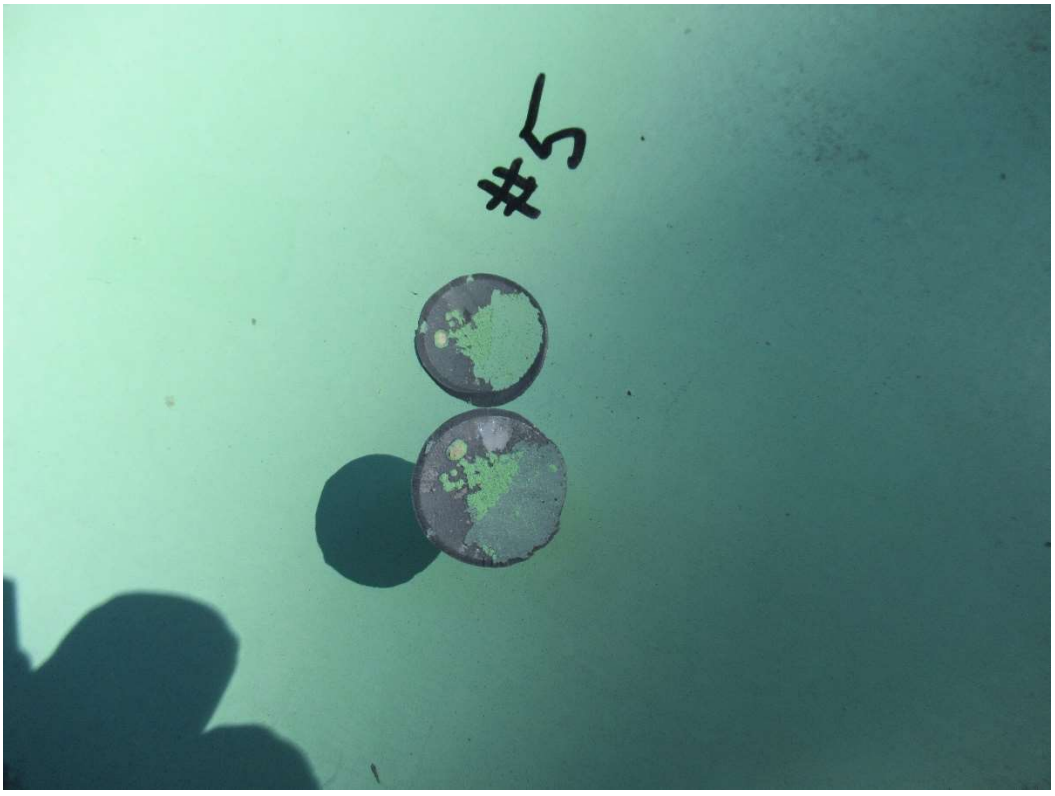


Photo 14: Dolly #5 on the roof.

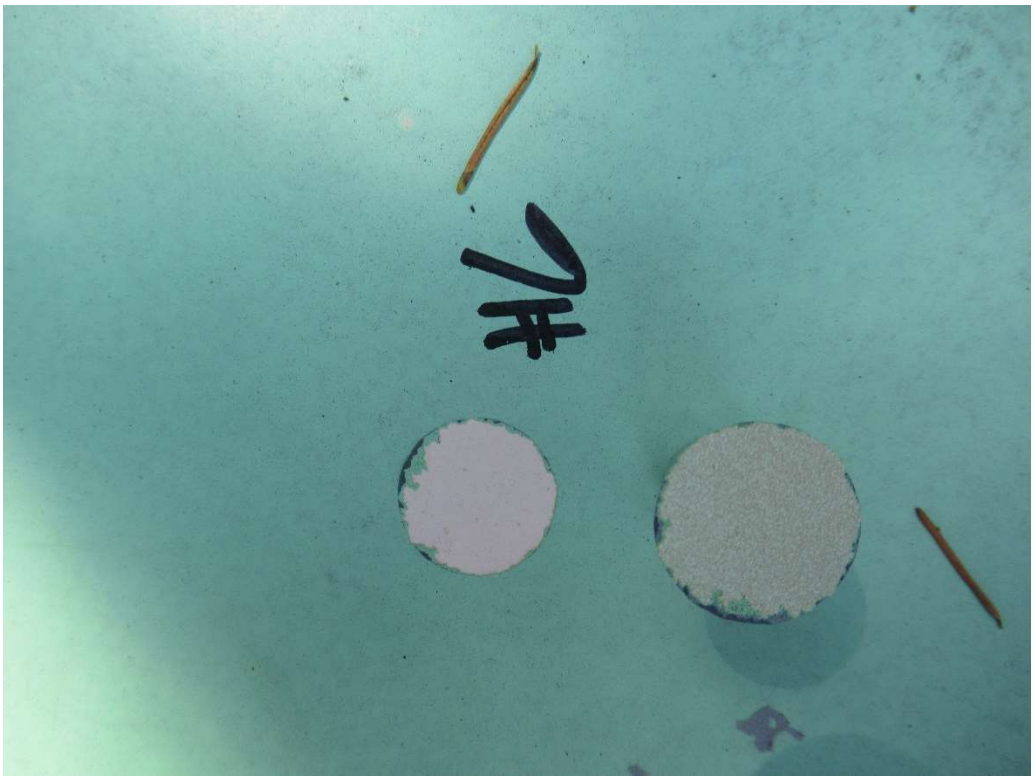


Photo 15: Dolly #6 on the roof.

Photo 16: Ladder, railings, camera, and access hatch.

Photo 17: Level gauge.

Photo 18: Anchorage, roof vent, and cathodic protection box.

Photo 19: Roof vent with rust on the interior of screen.

Photo 20: Cathodic protection box.

Photo 21: Looking north. Note the algae in the right side of the photo.

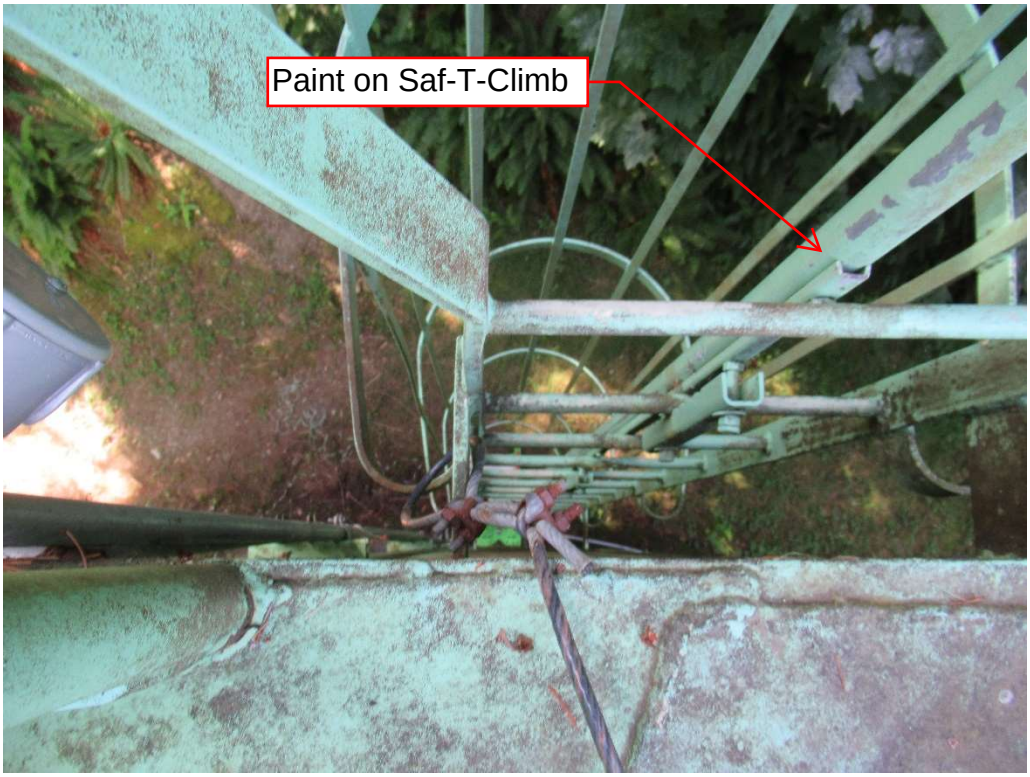


Photo 22: Safety line tied to ladder standoff. Note the Saf-T-Climb is painted.

Photo 23: Access hatch lock.

Photo 24: Corrosion adjacent to the access hatch.

Photo 25: Closeup of the algae on the roof.

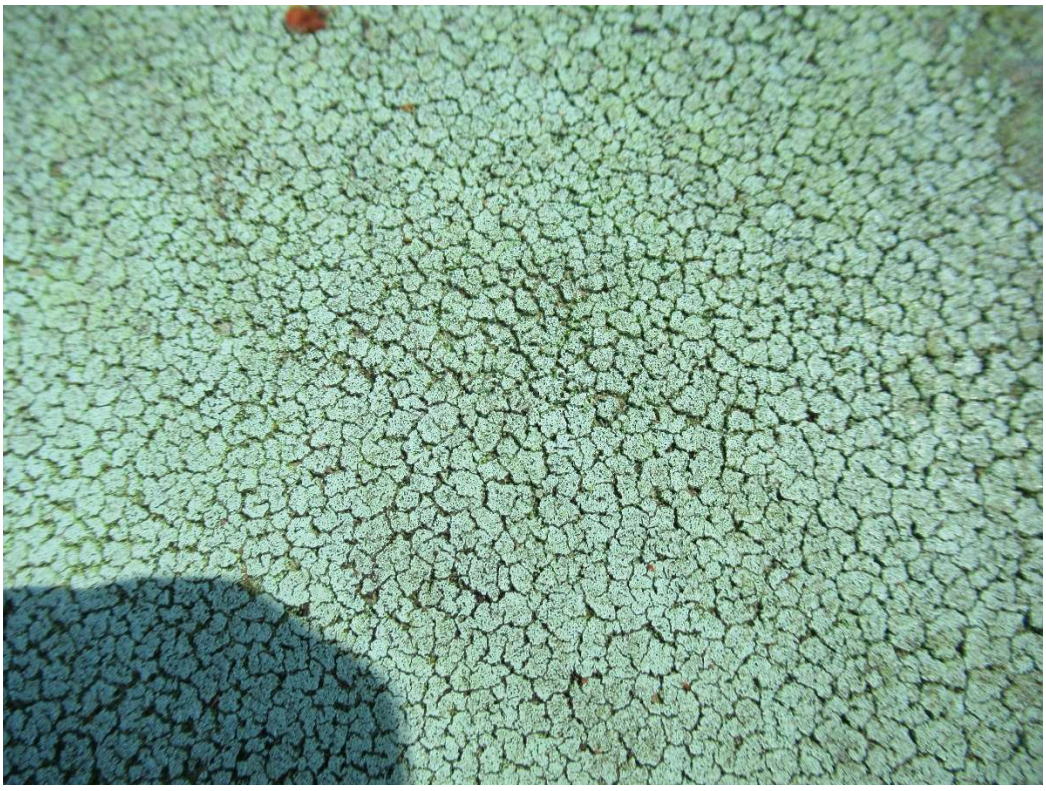


Photo 26: Most likely lichens growing on the roof.

Photo 27: Coating delamination on the roof.

Photo 28: Coating delamination on the roof.

Photo 29: Inside of the access hatch.

Photo 30: Inlet pipe diffuser.

Photo 31: Interior baffle walls.

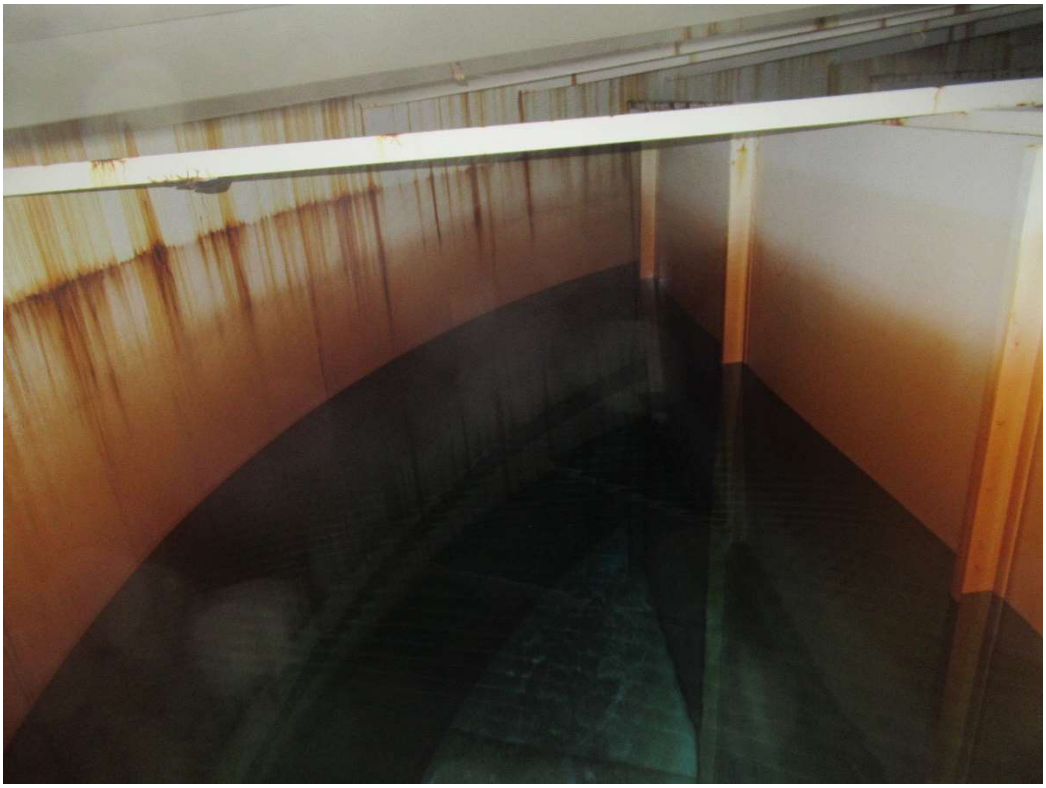


Photo 32: Interior condition.

Photo 33: Interior condition.

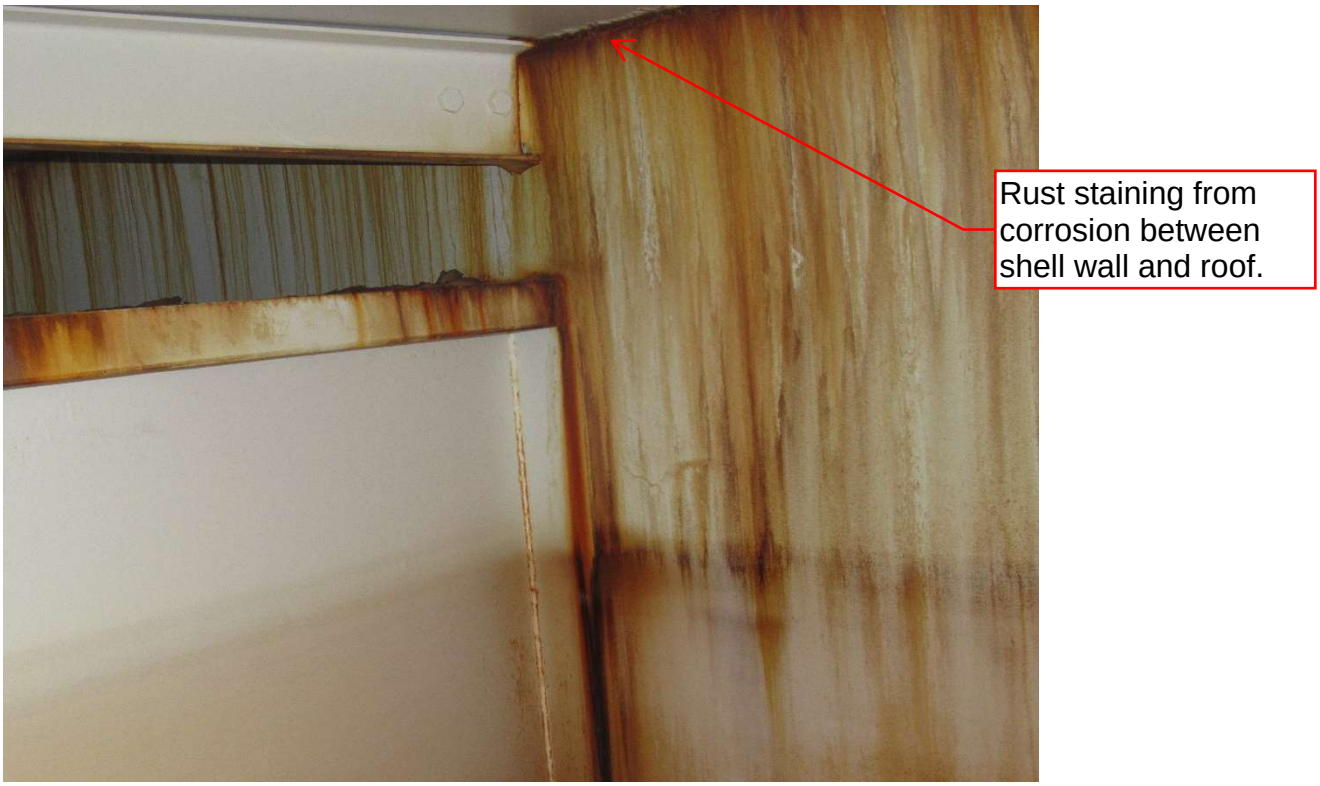


Photo 34: Interior condition.

Photo 35: Interior condition. Note delamination in roof.

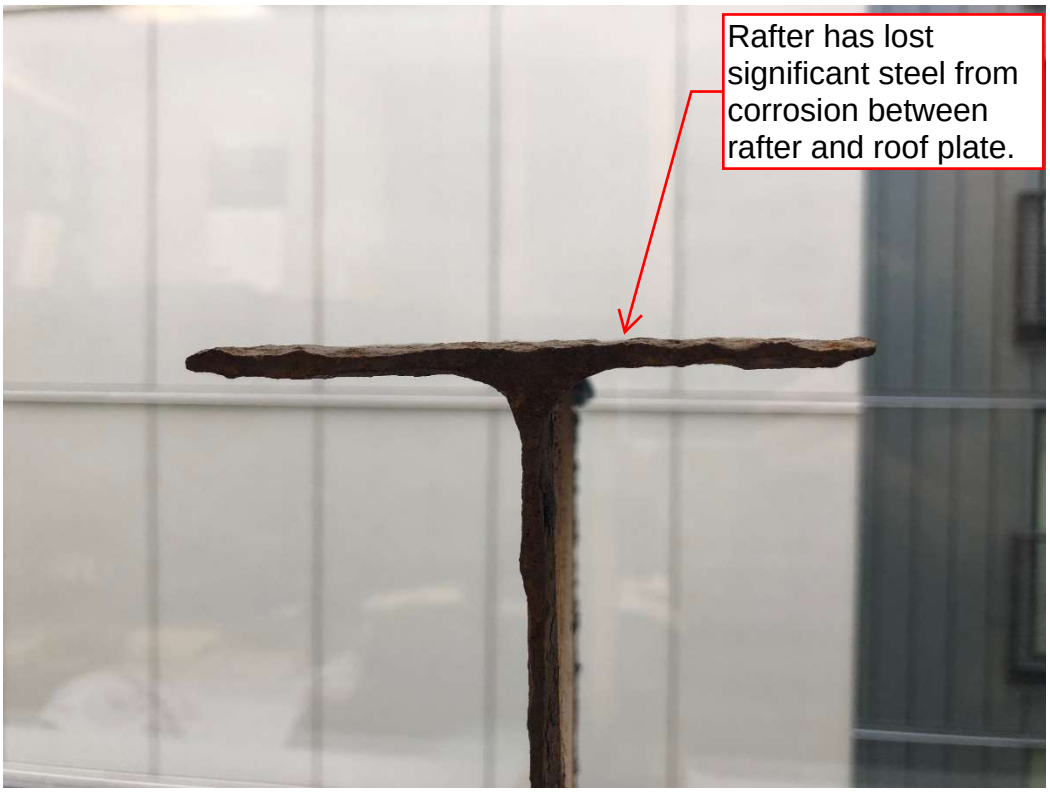


Photo 36: Corroded Rafter

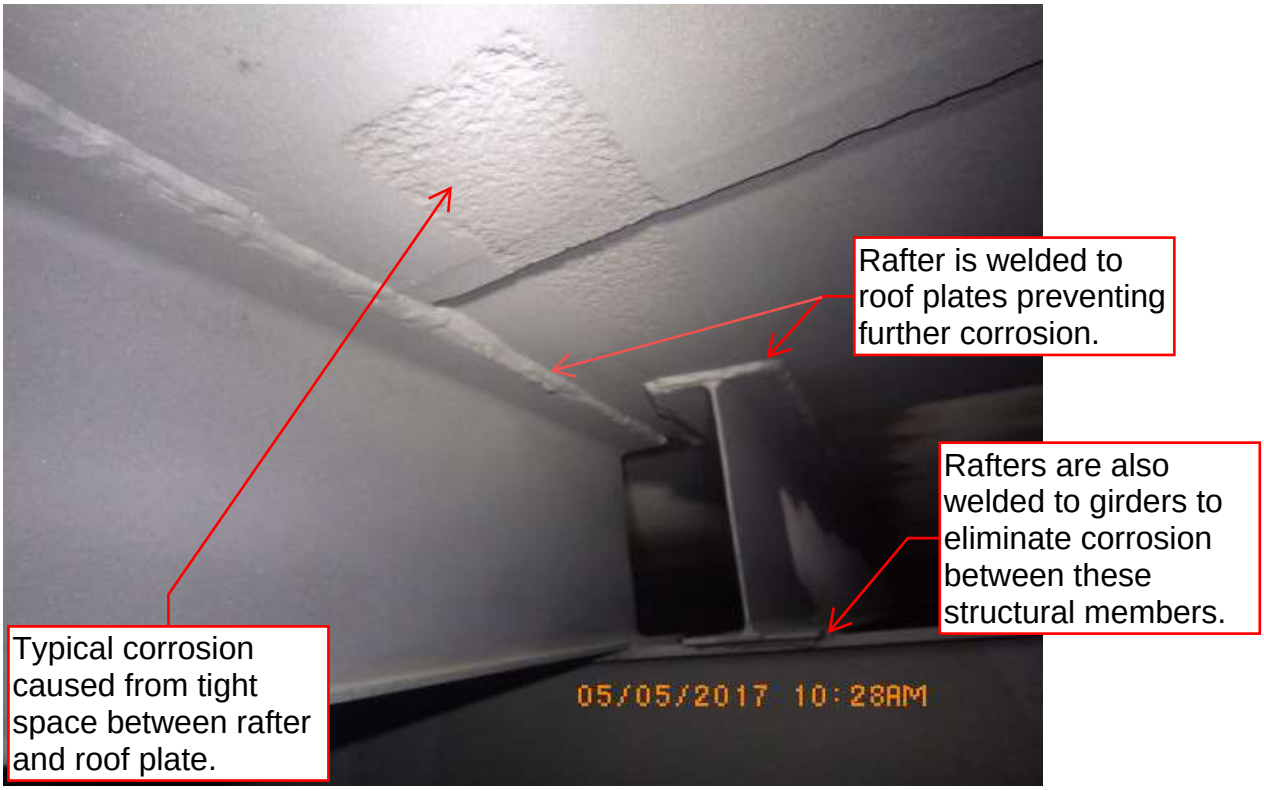


Photo 37: Seal welded rafter cut back from original location.

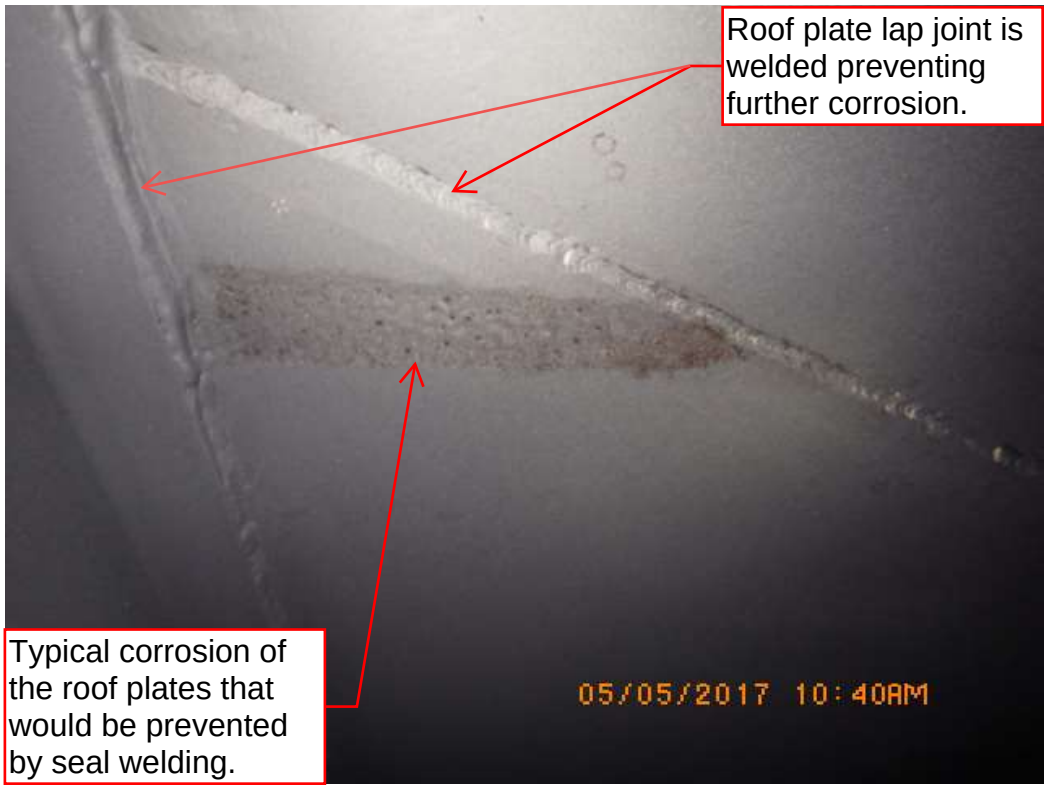


Photo 38: Seal welded roof lap joints. Note the corrosion from the previous rafter location.

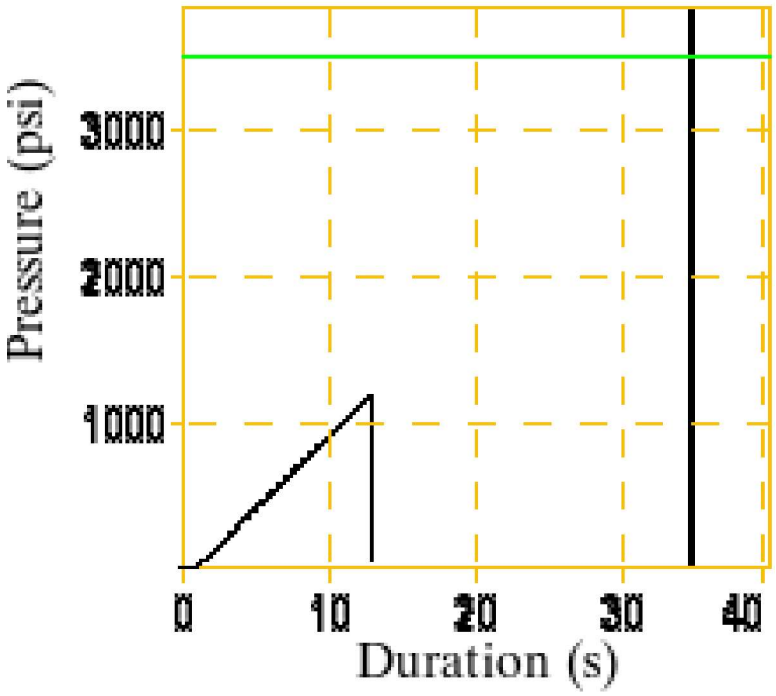
B7

Created: 2020-08-19 12:56:36
PosiTest AT-A S/N: 17275

Readings

#	Pressure Limit (psi)	Duration Hold Time (s)	Dolly Size (mm)	Rate (psi/s)	Result	Pass/Fail Time
1	1214 3500	12.9 0.0/0.0	20	100	Pulled 2020-08-19 12:57:28	X

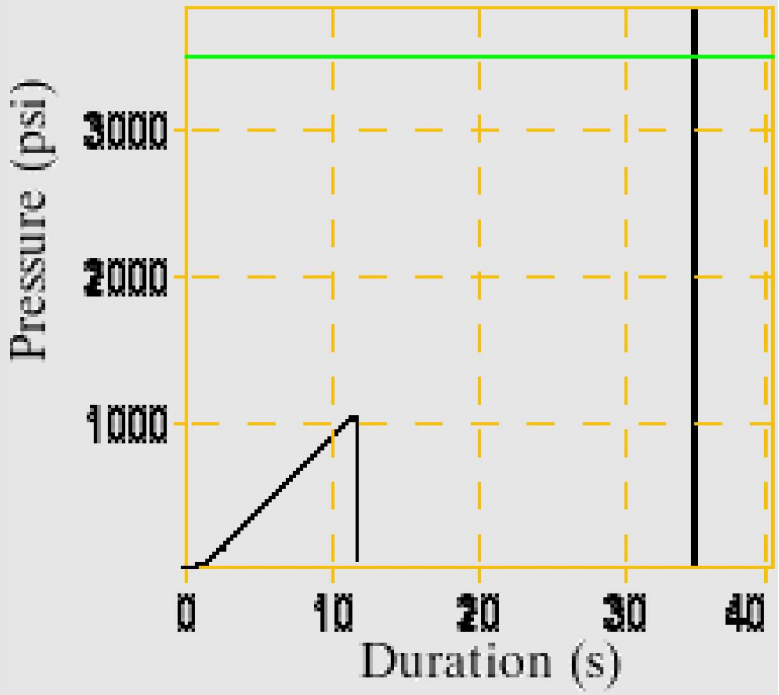
Glue Y:	0	Y/Z Interface:	0
Layer 1: B	0	B/Y Interface:	0
Substrate: A	0	A/B Interface:	0



B7 Readings

#	Pressure Limit (psi)	Duration Hold Time (s)	Dolly Size (mm)	Rate (psi/s)	Result	Pass/Fail Time
2	1089 3500	11.8 0.0/0.0	20	100	Pulled	X 12:59:25

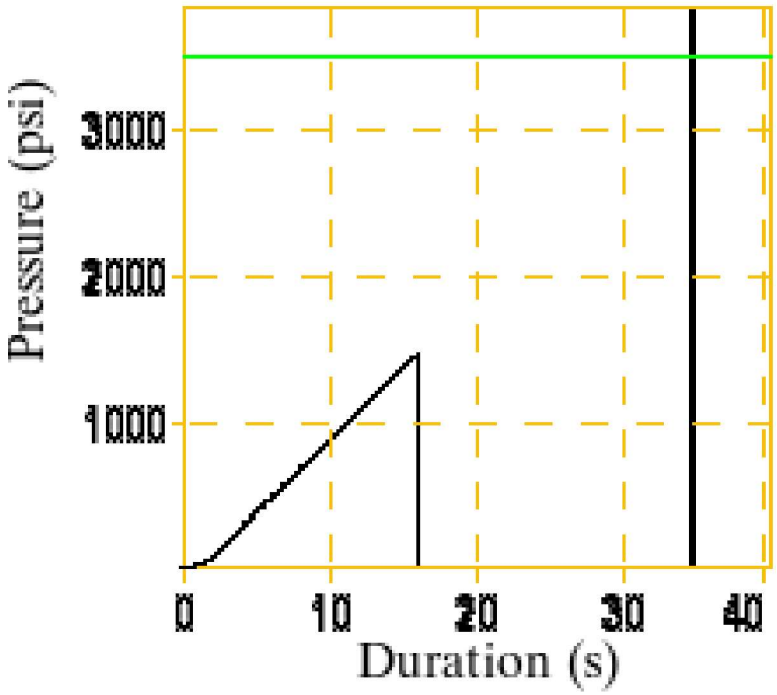
Glue Y:	0	Y/Z Interface:	0
Layer 1: B	0	B/Y Interface:	0
Substrate: A	0	A/B Interface:	0



B7 Readings

#	Pressure Limit (psi)	Duration Hold Time (s)	Dolly Size (mm)	Rate (psi/s)	Result	Pass/Fail Time
3	1496 3500	16.1 0.0/0.0	20	100	Pulled	X 13:01:21

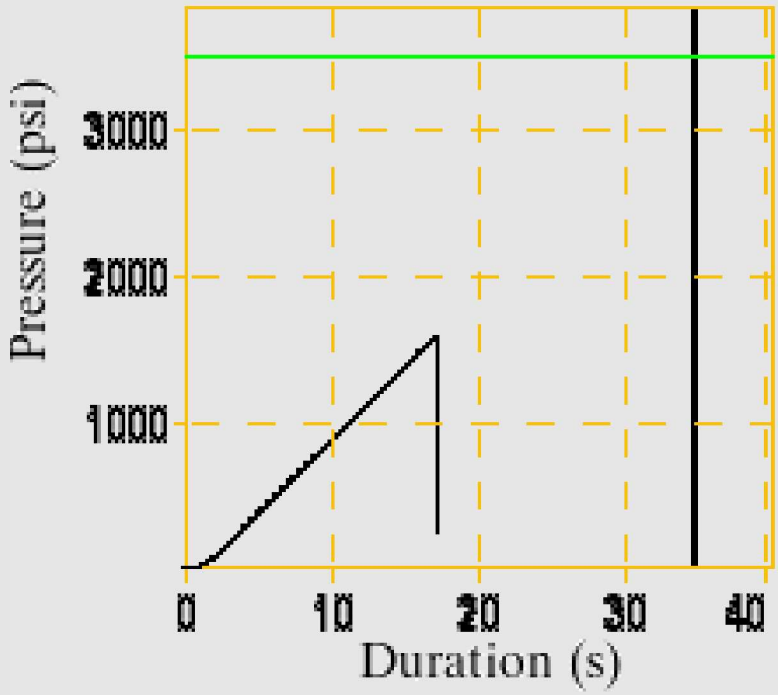
Glue Y:	0	Y/Z Interface:	0
Layer 1: B	0	B/Y Interface:	0
Substrate: A	0	A/B Interface:	0



B7 Readings

#	Pressure Limit (psi)	Duration Hold Time (s)	Dolly Size (mm)	Rate (psi/s)	Result	Pass/Fail Time
4	1622 3500	17.2 0.0/0.0	20	100	Pulled	X 13:04:38

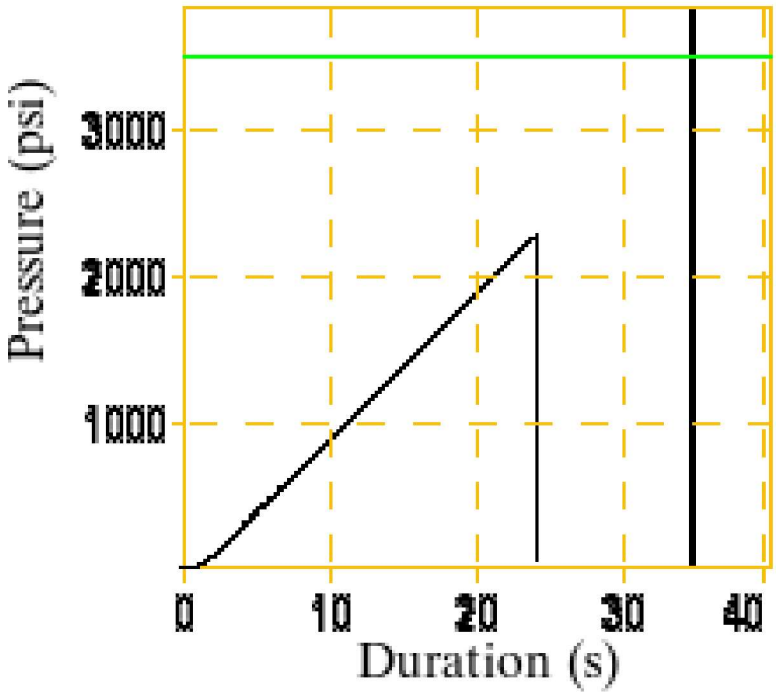
Glue Y:	0	Y/Z Interface:	0
Layer 1: B	0	B/Y Interface:	0
Substrate: A	0	A/B Interface:	0



B7 Readings

#	Pressure Limit (psi)	Duration Hold Time (s)	Dolly Size (mm)	Rate (psi/s)	Result	Pass/Fail Time
5	2298 3500	24.0 0.0/0.0	20	100	Pulled	X 13:29:03

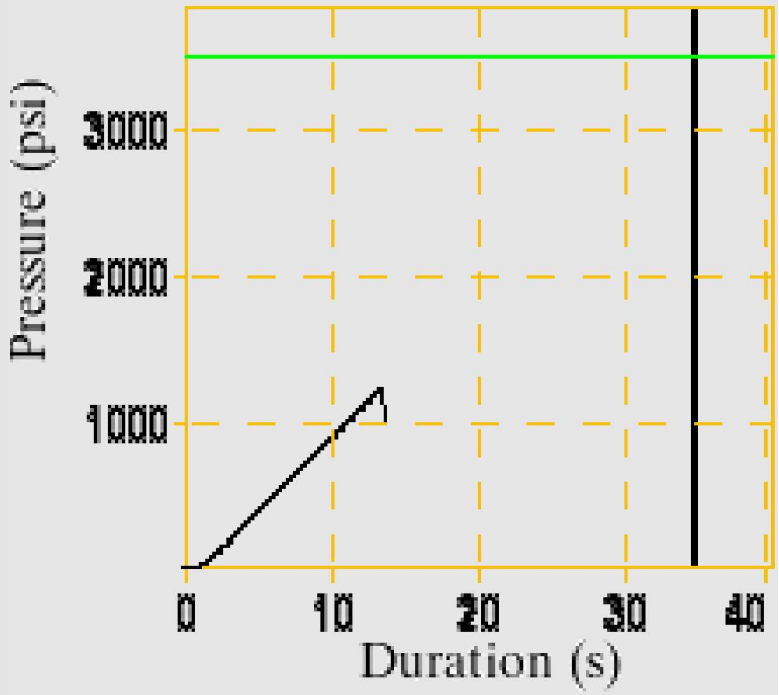
Glue Y:	0	Y/Z Interface:	0
Layer 1: B	0	B/Y Interface:	0
Substrate: A	0	A/B Interface:	0

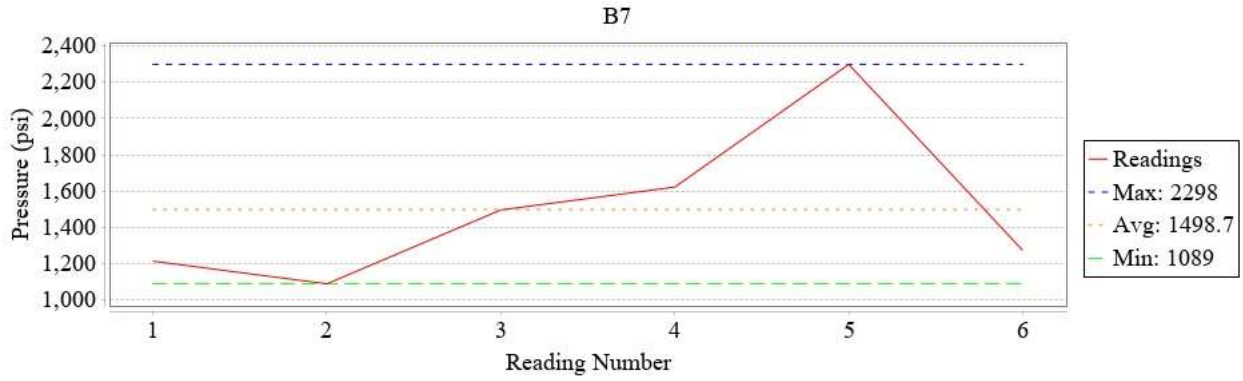


B7 Readings

#	Pressure Limit (psi)	Duration Hold Time (s)	Dolly Size (mm)	Rate (psi/s)	Result	Pass/Fail Time
6	1273 3500	13.6 0.0/0.0	20	100	Pulled	X 13:36:11

Glue Y:	0	Y/Z Interface:	0
Layer 1: B	0	B/Y Interface:	0
Substrate: A	0	A/B Interface:	0





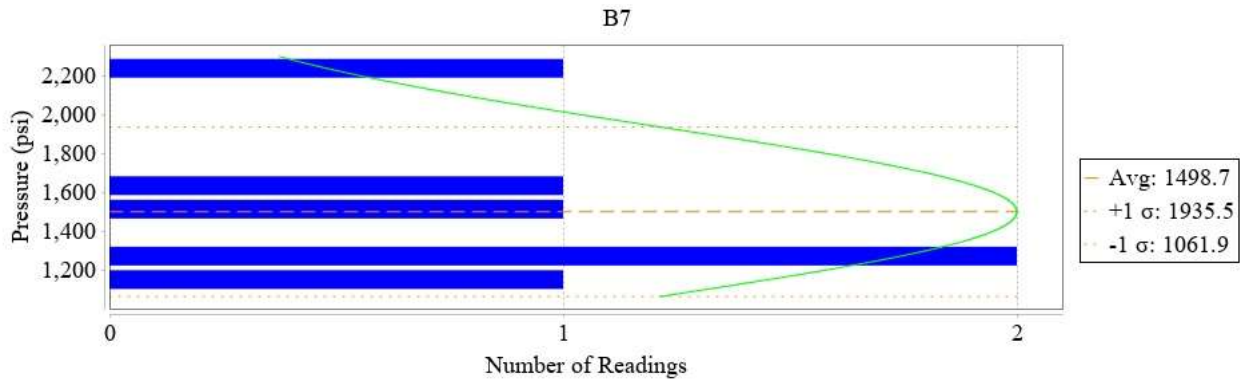

B7
Pressure (psi)
2,200
2,000
1,800
1,600
1,400
1,200
0
1
2
Number of Readings
Avg: 1498.7
+1 σ: 1935.5
-1 σ: 1061.9

EXHIBIT B

COATING SYSTEM SAMPLE ANALYSIS

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

Laboratory Job ID: 580-98505-1
Client Project/Site: Sudden Valley CCB Tank

For:
Evergreen Coating Engineers
6925 37th Ave SW
Seattle, Washington 98126

Attn: Lance Stevens

Authorized for release by:
11/5/2020 1:19:43 PM

Ashley Worthy, Project Manager I
(253)248-4965
Ashley.Worthy@Eurofinset.com

Table of Contents

Job ID: 580-98505-1

Laboratory: Eurofins TestAmerica, Seattle

Narrative

Job Narrative
580-98505-1

Comments
No additional comments.

Receipt
The samples were received on 10/26/2020 12:45 PM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 17.8º C.

Receipt Exceptions

The Field Sampler was not listed on the Chain of Custody.

The Chain-of-Custody (COC) was incomplete as received and/or improperly completed. The COC was not relinquished by the client. The requested analyses are not in the customary place(so the box is not checked) but rather in the lower left of the COC in the 'special instructions' field.

The client did not submit enough sample volume to perform the tests (metals & mercury) requested. The manager of the metals department was consulted regarding the sample volumes. The project manager will need to inform the client that lab can only perform one of those analyses.

Metals
Method 3050B: The following sample did not contain sufficient amount for 3050B method analysis. Amount sample use is recorded in worksheet method and proceeded usual otherwise. CCB INT (580-98505-1) and CCB EXT (580-98505-2)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: Evergreen Coating Engineers
Project/Site: Sudden Valley CCB Tank

Job ID: 580-98505-1

Qualifiers

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Client Sample Results

Client: Evergreen Coating Engineers
Project/Site: Sudden Valley CCB Tank

Job ID: 580-98505-1

Client Sample ID: CCB INT

Date Collected: 10/14/20 11:30
Date Received: 10/26/20 12:45

Lab Sample ID: 580-98505-1

Matrix: Solid

Method: 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	79		28	2.3	mg/Kg		10/31/20 09:10	11/03/20 20:49	1
Barium	14000		4.6	0.73	mg/Kg		10/31/20 09:10	11/03/20 20:49	1
Cadmium	640		9.2	0.45	mg/Kg		10/31/20 09:10	11/03/20 20:49	1
Chromium	39	B	12	2.0	mg/Kg		10/31/20 09:10	11/04/20 19:53	1
Lead	270		14	2.0	mg/Kg		10/31/20 09:10	11/03/20 20:49	1
Selenium	9.5	J B	46	3.6	mg/Kg		10/31/20 09:10	11/03/20 20:49	1
Silver	62		23	5.1	mg/Kg		10/31/20 09:10	11/03/20 20:49	1

Client Sample Results

Client: Evergreen Coating Engineers
Project/Site: Sudden Valley CCB Tank

Job ID: 580-98505-1

Client Sample ID: CCB EXT

Date Collected: 10/14/20 11:30
Date Received: 10/26/20 12:45

Lab Sample ID: 580-98505-2

Matrix: Solid

Method: 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		38	3.1	mg/Kg		10/31/20 09:10	11/03/20 20:54	1
Barium	**16**		6.3	0.99	mg/Kg		10/31/20 09:10	11/03/20 20:54	1
Cadmium	ND		13	0.62	mg/Kg		10/31/20 09:10	11/03/20 20:54	1
Chromium	ND		16	2.7	mg/Kg		10/31/20 09:10	11/03/20 20:54	1
Lead	ND		19	2.8	mg/Kg		10/31/20 09:10	11/03/20 20:54	1
Selenium	ND		63	5.0	mg/Kg		10/31/20 09:10	11/03/20 20:54	1
Silver	ND		31	7.0	mg/Kg		10/31/20 09:10	11/03/20 20:54	1

Method: 6010D - Metals (ICP)

Lab Sample ID: MB 580-342143/23-A
Matrix: Solid
Analysis Batch: 342376

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 342143

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		3.0	0.25	mg/Kg		10/31/20 09:10	11/03/20 18:39	1
Barium	ND		0.50	0.079	mg/Kg		10/31/20 09:10	11/03/20 18:39	1
Cadmium	ND		1.0	0.049	mg/Kg		10/31/20 09:10	11/03/20 18:39	1
Chromium	ND		1.3	0.22	mg/Kg		10/31/20 09:10	11/03/20 18:39	1
Lead	ND		1.5	0.22	mg/Kg		10/31/20 09:10	11/03/20 18:39	1
Selenium	0.460	J	5.0	0.40	mg/Kg		10/31/20 09:10	11/03/20 18:39	1
Silver	ND		2.5	0.56	mg/Kg		10/31/20 09:10	11/03/20 18:39	1

Lab Sample ID: MB 580-342143/23-A
Matrix: Solid
Analysis Batch: 342506

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 342143

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		3.0	0.25	mg/Kg		10/31/20 09:10	11/04/20 18:17	1
Barium	0.130	J	0.50	0.079	mg/Kg		10/31/20 09:10	11/04/20 18:17	1
Cadmium	ND		1.0	0.049	mg/Kg		10/31/20 09:10	11/04/20 18:17	1
Chromium	0.645	J	1.3	0.22	mg/Kg		10/31/20 09:10	11/04/20 18:17	1
Lead	ND		1.5	0.22	mg/Kg		10/31/20 09:10	11/04/20 18:17	1
Selenium	ND		5.0	0.40	mg/Kg		10/31/20 09:10	11/04/20 18:17	1
Silver	ND		2.5	0.56	mg/Kg		10/31/20 09:10	11/04/20 18:17	1

Lab Sample ID: LCS 580-342143/24-A
Matrix: Solid
Analysis Batch: 342376

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 342143

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	50.0	49.4		mg/Kg		99	80 - 120
Barium	50.0	53.5		mg/Kg		107	80 - 120
Cadmium	50.0	52.8		mg/Kg		106	80 - 120
Chromium	50.0	51.0		mg/Kg		102	80 - 120
Lead	50.0	53.9		mg/Kg		108	80 - 120
Selenium	50.0	49.1		mg/Kg		98	80 - 120
Silver	50.0	52.4		mg/Kg		105	80 - 120

Lab Sample ID: LCS 580-342143/24-A
Matrix: Solid
Analysis Batch: 342506

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 342143

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	50.0	50.6		mg/Kg		101	80 - 120
Barium	50.0	55.1		mg/Kg		110	80 - 120
Cadmium	50.0	51.9		mg/Kg		104	80 - 120
Chromium	50.0	49.0		mg/Kg		98	80 - 120
Lead	50.0	51.7		mg/Kg		103	80 - 120
Selenium	50.0	49.8		mg/Kg		100	80 - 120
Silver	50.0	52.0		mg/Kg		104	80 - 120

Method: 6010D - Metals (ICP) (Continued)

Lab Sample ID: LCSD 580-342143/25-A
Matrix: Solid
Analysis Batch: 342376

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 342143

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic			50.0	49.4		mg/Kg		99	80 - 120	0	20
Barium			50.0	50.6		mg/Kg		101	80 - 120	6	20
Cadmium			50.0	53.3		mg/Kg		107	80 - 120	1	20
Chromium			50.0	49.3		mg/Kg		99	80 - 120	3	20
Lead			50.0	53.4		mg/Kg		107	80 - 120	1	20
Selenium			50.0	49.0		mg/Kg		98	80 - 120	0	20
Silver			50.0	52.6		mg/Kg		105	80 - 120	0	20

Lab Sample ID: LCSD 580-342143/25-A
Matrix: Solid
Analysis Batch: 342506

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 342143

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic			50.0	52.5		mg/Kg		105	80 - 120	4	20
Barium			50.0	56.2		mg/Kg		112	80 - 120	2	20
Cadmium			50.0	54.9		mg/Kg		110	80 - 120	6	20
Chromium			50.0	54.8		mg/Kg		110	80 - 120	11	20
Lead			50.0	54.0		mg/Kg		108	80 - 120	4	20
Selenium			50.0	52.2		mg/Kg		104	80 - 120	5	20
Silver			50.0	52.5		mg/Kg		105	80 - 120	1	20

Lab Chronicle

Client: Evergreen Coating Engineers
Project/Site: Sudden Valley CCB Tank

Job ID: 580-98505-1

Client Sample ID: CCB INT

Lab Sample ID: 580-98505-1
Matrix: Solid
Date Collected: 10/14/20 11:30
Date Received: 10/26/20 12:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			342143	10/31/20 09:10	JCP	TAL SEA
Total/NA	Analysis	6010D		1	342376	11/03/20 20:49	TMH	TAL SEA
Total/NA	Prep	3050B			342143	10/31/20 09:10	JCP	TAL SEA
Total/NA	Analysis	6010D		1	342506	11/04/20 19:53	TMH	TAL SEA

Client Sample ID: CCB EXT

Lab Sample ID: 580-98505-2
Matrix: Solid
Date Collected: 10/14/20 11:30
Date Received: 10/26/20 12:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			342143	10/31/20 09:10	JCP	TAL SEA
Total/NA	Analysis	6010D		1	342376	11/03/20 20:54	TMH	TAL SEA

Laboratory References:

TAL SEA = Eurofins TestAmerica, Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: Evergreen Coating Engineers
Job ID: 580-98505-1
Project/Site: Sudden Valley CCB Tank

Laboratory: Eurofins TestAmerica, Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-024	02-19-22
ANAB	Dept. of Defense ELAP	L2236	01-19-22
ANAB	ISO/IEC 17025	L2236	01-19-22
California	State	2901	11-05-20
Montana (UST)	State	NA	04-13-21
Oregon	NELAP	WA100007	11-06-20
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	US Federal Programs	P330-20-00031	02-10-23
Washington	State	C553	02-18-21

Sample Summary

Client: Evergreen Coating Engineers
Project/Site: Sudden Valley CCB Tank

Job ID: 580-98505-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
580-98505-1	CCB INT	Solid	10/14/20 11:30	10/26/20 12:45	
580-98505-2	CCB EXT	Solid	10/14/20 11:30	10/26/20 12:45	

Eurofins TestAmerica, Seattle
5755 8th Street East
Tacoma, WA 98424

Chain of Custody Record

98505 eurofins Environment Testing TestAmerica

Regulatory Program: ☐ DW ☐ NPDES ☑ RCRA ☐ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact	**Project Manager: Lance Stevens**	**Site Contact:**	**Date:**
Evergreen Coating Engineers	Email: lance@coating-engineers.com	**Lab Contact:**	**Carrier:**
6925 37th Ave SW	**Tel/Fax: 206.450.6243**		
Seattle, WA 98126	**Analysis Turnaround Time**		
(206) 450-6243 Phone	☐ CALENDAR DAYS ☐ WORKING DAYS		
N/A FAX	TAT if different from Below _____		
Project Name: Sudden Valley CCB Tank	☐ 2 weeks		
Site:	☐ 1 week		
P O #	☐ 2 days		
	☐ 1 day		

COC No:
_____ of _____ COCs
TALS Project #:
Sampler:
For Lab Use Only:
Walk-in Client:
Lab Sampling:
Job / SDG No.:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	Sample Specific Notes:
CCB INT	14-Oct	11:30			1			
CCB-EXT	10/14/20	11:30			1			

580-98505 Chain of Custody

Therm. ID: R6 Cor: 17.5° Unc: 18.5°
Cooler Dsc: Envelope
Packing: _____
Cust. Seal: Yes ___ No ~~X~~
Blue Ice, Wet, Dry, ~~X~~one
FedEx: _____
UPS: _____
Lab Cour: _____
Other: USMail

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☐ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments: Please test for RCRA 8 metals

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:_____ Corr'd:_____ Therm ID No.:_____

Relinquished by:	Company:	Date/Time:	Received by: Tom Blunt	Company: TA-Sea	Date/Time: 10/20/20 1245
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.33, dated 5/4/2020

Login Sample Receipt Checklist

Client: Evergreen Coating Engineers

Job Number: 580-98505-1

Login Number: 98505
List Number: 1
Creator: Blankinship, Tom X

List Source: Eurofins TestAmerica, Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	Thermal preservation not required.
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	False	COC not relinquished.
Is the Field Sampler's name present on COC?	False	Refer to Job Narrative for details.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	False	Refer to Job Narrative for details.
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

EXHIBIT C

COATING ALTERNATIVE COST ESTIMATES

LAKE WHATCOM WATER AND SEWER DISTRICT

SUDDEN VALLEY WTP ASSESSMENT AND ALTERNATIVES ANALYSIS PROJECT
PRELIMINARY COST ESTIMATE

Technical Memorandum 20434-2 - Recommended Modifications to CCB
September 11, 2020
G&O# 20434.00

NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Mobilization and Demobilization	1	LS	$ 30,000	$ 30,000
2	Removal of Mill Scale	4000	SF	$ 4	$ 16,000
3	Tank Exterior - Preparation & Recoating	1	LS	$ 105,000	$ 105,000
4	Tank Interior - Preparation & Recoating	1	LS	$ 115,000	$ 115,000
5	Tank Containment	1	LS	$ 35,000	$ 35,000
6	Interior Seal Welding, Complete	1	LS	$ 75,000	$ 75,000
7	Access Hatch	1	LS	$ 10,000	$ 10,000
8	Roof Vent & Additional Tie-offs	1	LS	$ 25,000	$ 25,000
9	Surface Restoration	1	LS	$ 5,000	$ 5,000
				Subtotal*	**$ 416,000**
				Contingency (20%)	$ 83,200
				Subtotal	**$ 499,200**
				Washington State Sales Tax (9.0%)**	$ 44,900
				Subtotal	**$ 544,100**
				Design and Project Administration (25.0%)***	$ 136,000
				TOTAL CONSTRUCTION COST	**$ 680,000**

* Costs listed are in 2020 dollars

** Current sales tax rate is 8.7%.

*** Standard project design and administration fees are 25% of the subtotal including contingency and tax and is provided for planning purposes only.

LAKE WHATCOM WATER AND SEWER DISTRICT

SUDDEN VALLEY WTP ASSESSMENT AND ALTERNATIVES ANALYSIS PROJECT
PRELIMINARY COST ESTIMATE

Technical Memorandum 20434-2 - Reduced Modifications to CCB
September 11, 2020
G&O# 20434.00

NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Mobilization and Demobilization	1	LS	$ 30,000	$ 30,000
2	Removal of Mill Scale	4000	SF	$ 4	$ 16,000
3	Tank Exterior - Preparation & Recoating	1	LS	$ 105,000	$ 105,000
4	Tank Interior - Preparation & Recoating	1	LS	$ 115,000	$ 115,000
5	Tank Containment	1	LS	$ 35,000	$ 35,000
6	Interior Seal Welding, Complete	1	LS	$ -	$ -
7	Access Hatch	1	LS	$ -	$ -
8	Roof Vent & Additional Tie-offs	1	LS	$ -	$ -
9	Surface Restoration	1	LS	$ 5,000	$ 5,000
				Subtotal*	**$ 306,000**
				Contingency (20%)	$ 61,200
				Subtotal	**$ 367,200**
				Washington State Sales Tax (9.0%)**	$ 33,000
				Subtotal	**$ 400,200**
				Design and Project Administration (25.0%)***	$ 100,100
				TOTAL CONSTRUCTION COST	**$ 500,000**

* Costs listed are in 2020 dollars

** Current sales tax rate is 8.7%.

*** Standard project design and administration fees are 25% of the subtotal including contingency and tax and is provided for planning purposes only.

LAKE WHATCOM WATER AND SEWER DISTRICT

SUDDEN VALLEY WTP ASSESSMENT AND ALTERNATIVES ANALYSIS PROJECT
PRELIMINARY COST ESTIMATE

Technical Memorandum 20434-2 - New Welded Steel Tank
September 11, 2020
G&O# 20434.00

NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Mobilization and Demobilization	1	LS	$ 30,000	$ 30,000
2	Earthwork & TESC	1	LS	$ 20,000	$ 20,000
3	Excavation Safety Systems	1	LS	$ 5,000	$ 5,000
4	Unsuitable Excavation	25	CY	$ 250	$ 6,250
5	Welded Steel Tank	1	LS	$ 275,000	$ 275,000
6	Safety Appurtenances	1	LS	$ 50,000	$ 50,000
7	Piping, Fittings, and Appurtenances	1	LS	$ 100,000	$ 100,000
8	Connection to Existing System	1	LS	$ 20,000	$ 20,000
9	Interior and Exerior Coating	1	LS	$ 200,000	$ 200,000
				Subtotal*	**$ 706,250**
				Contingency (20%)	$ 141,300
				Subtotal	**$ 847,550**
				Washington State Sales Tax (9.0%)**	$ 76,300
				Subtotal	**$ 923,850**
				Design and Project Administration (25.0%)***	$ 231,000
				TOTAL CONSTRUCTION COST	**$ 1,155,000**

* Costs listed are in 2020 dollars

** Current sales tax rate is 8.7%.

*** Standard project design and administration fees are 25% of the subtotal including contingency and tax and is provided for planning purposes only.

EXHIBIT D

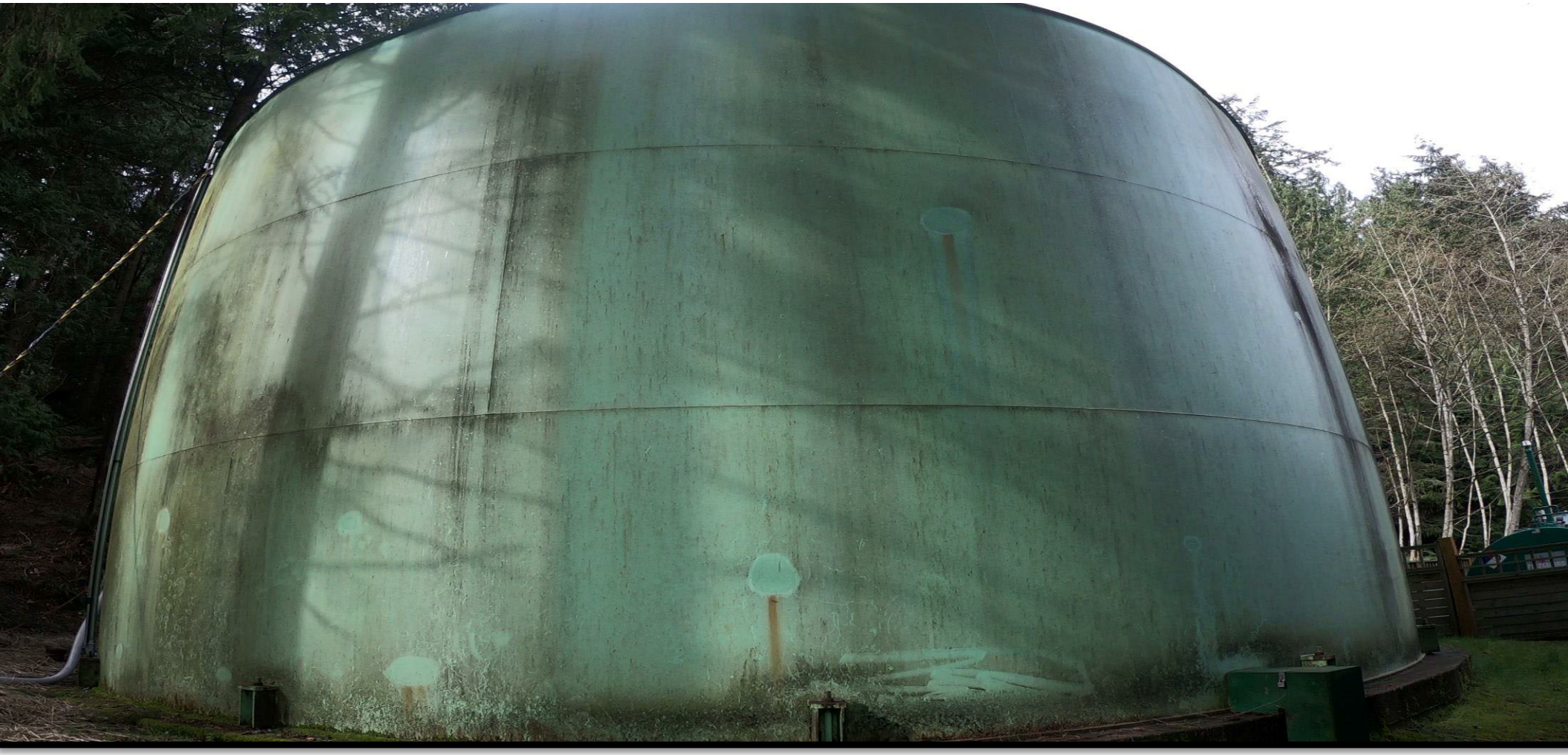
2018 COATINGS AND CORROSION INSPECTION BY H_2O SOLUTIONS

LAKE WHATCOM WATER & SEWER DISTRICT

Treatment Plant Reservoir

April 11, 2018

H2O SOLUTIONS, LLC

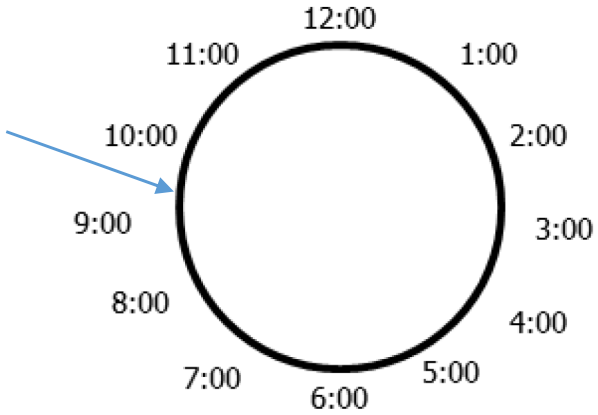


Date of Cleaning & Inspection :	April 11, 2018	Tank Name :	Treatment Plant
Water Loss from Cleaning:	12,000 Gallons	Height :	40′
Construction Type:	Steel	Diameter or L x W :	25′
Capacity(gal):	235,000	Year Built :	1992

Exterior Wall

Description

Appeared to be in good condition with areas of minor surface corrosion. Overall 5% corrosion present.



Rust Grade

4

Coating System

Appeared to be in good condition with chalking and delamination. Overall 10% coating failure.

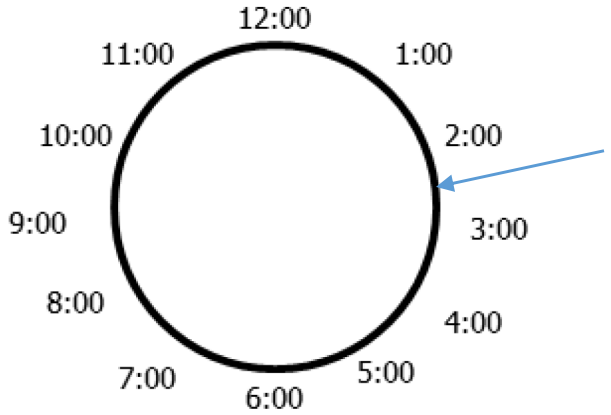
Recommendations

None at this time

Exterior Wall

Description

Appeared to be in good condition with areas of minor surface corrosion. Overall 5% corrosion present.



Rust Grade

4

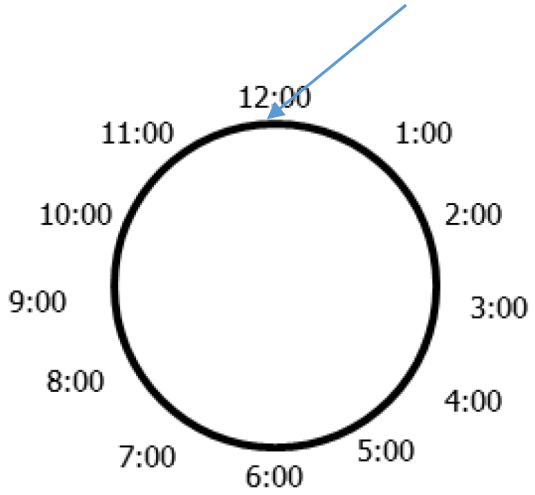
Coating System

Appeared to be in good condition with chalking and delamination. Overall 10% coating failure.

Recommendations

None at this time

Exterior Ladder



Description

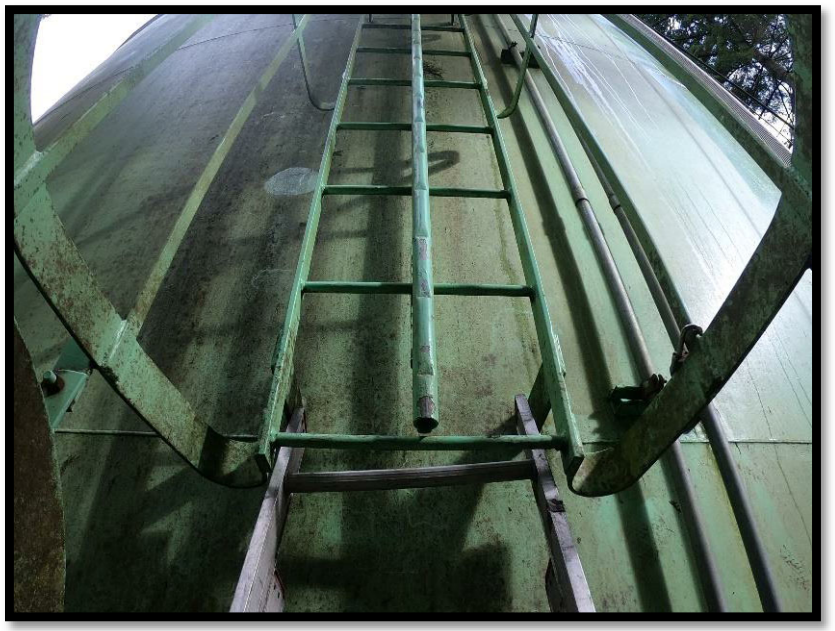
Structurally sound and in good condition. A few isolated spots of minor surface corrosion. Overall 5% corrosion present.

Rust Grade

4

Coating System

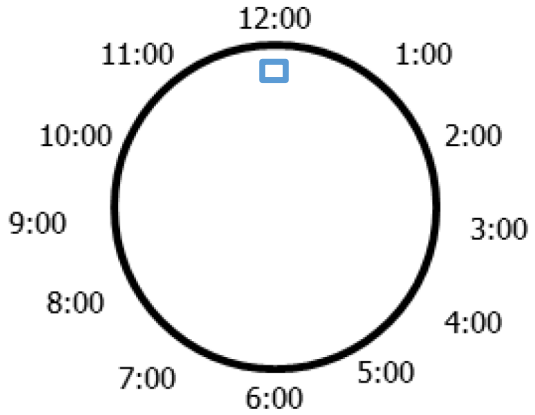
Appeared to be in good condition with minor chalking. Overall less than 5% coating failure.



Recommendations

None at this time.

Exterior Hatch Lid



Description

Appeared to be in good working condition with a few spots of minor surface corrosion. Overall less than 5% corrosion present.

Rust Grade

6

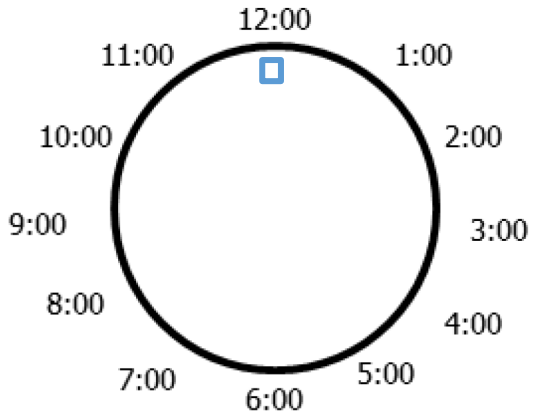
Coating System

Appeared to be in good condition with minor chalking. Overall less than 5% coating failure.

Recommendations

None at this time.

Exterior Hatch



Description

Appeared to be in good working condition with areas of surface corrosion. Overall 20% corrosion present.

Rust Grade

3

Coating System

Appeared to be in good condition with chalking, delamination and fading. Overall 25% coating failure.

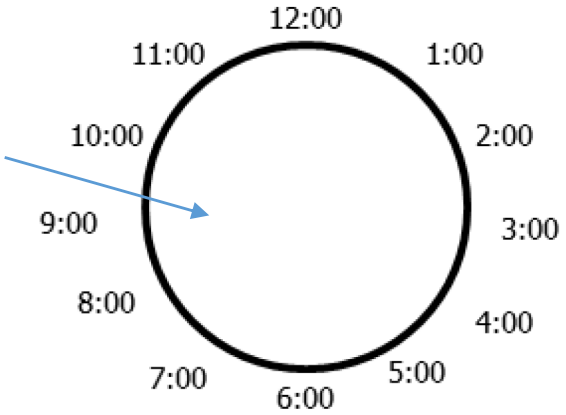
Recommendations

None at this time

Exterior Roof

Description

Appeared to be in good condition with a few isolated spots of minor surface corrosion. Overall 5% corrosion present.



Rust Grade

4

Coating System

Appeared to be in good condition with minor chalking and organic growth build up. Overall 5% coating failure.

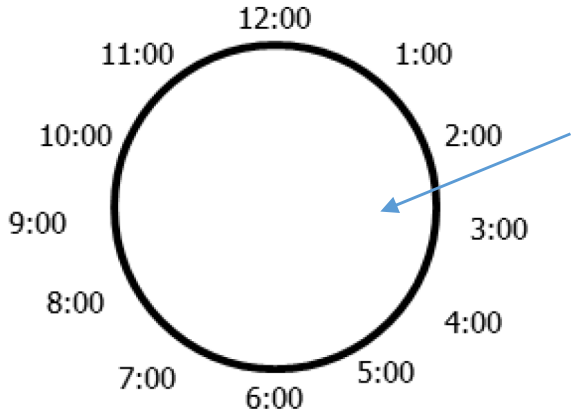
Recommendations

None at this time

Exterior Roof

Description

Appeared to be in good condition with a few isolated spots of minor surface corrosion. Overall 5% corrosion present.



Rust Grade

4

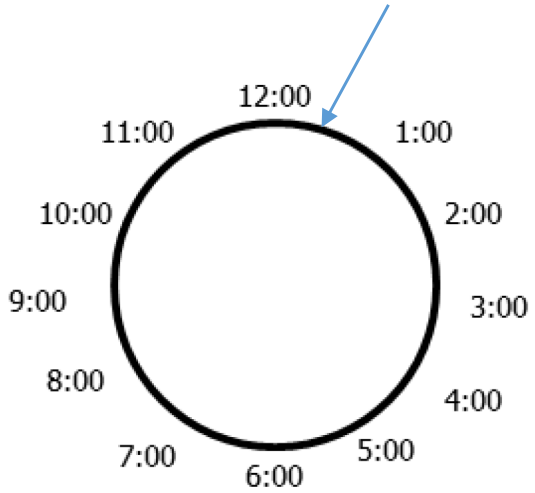
Coating System

Appeared to be in good condition with minor chalking and organic growth build up. Overall 5% coating failure.

Recommendations

None at this time

Exterior Railing



Description

Appeared to be in good condition with areas of minor surface corrosion. Overall less than 5% corrosion present.

Rust Grade

6

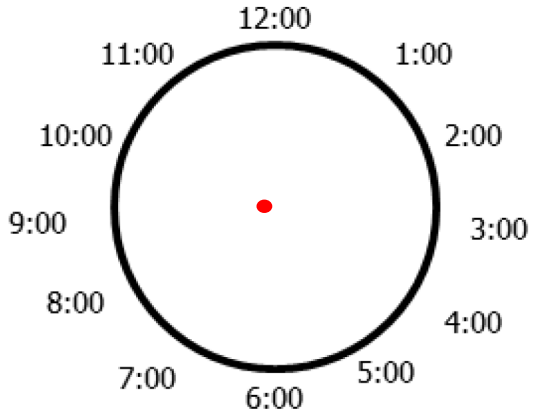
Coating System

Appeared to be in good condition with chalking and delamination. Overall 5% coating failure.

Recommendations

None at this time

Exterior Vent



Description

Appeared to be in good working condition with a few spots of minor surface corrosion. Overall less than 5% corrosion present. Fine mesh screen present and in good condition.

Rust Grade

5

Coating System

Appeared to be in good condition with chalking and delamination. Overall 5% coating failure.

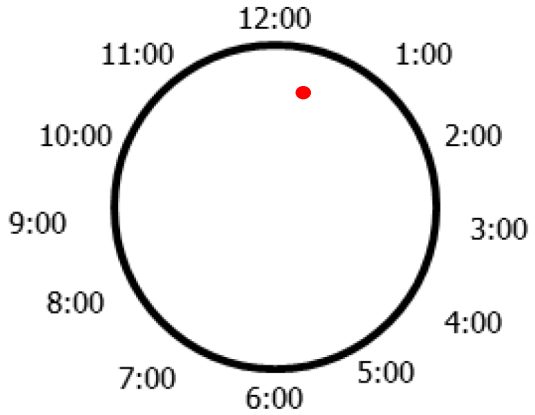
Recommendations

None at this time.

Exterior Telemetry

Description

Appeared to be in good working condition.



Rust Grade

N/A

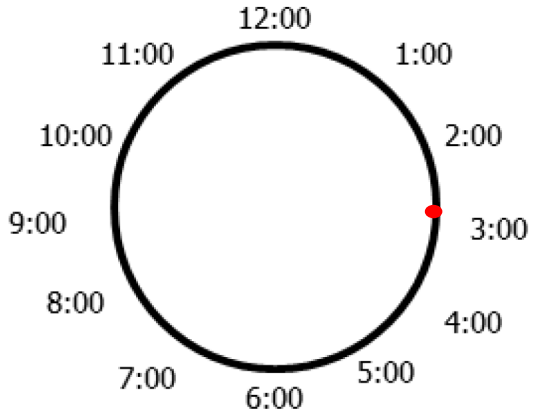
Coating System

N/A

Recommendations

None at this time

Exterior Manway



Description

Appeared to be in good condition with a few isolated spots of minor surface corrosion. Overall less than 5% corrosion present.

Rust Grade

6

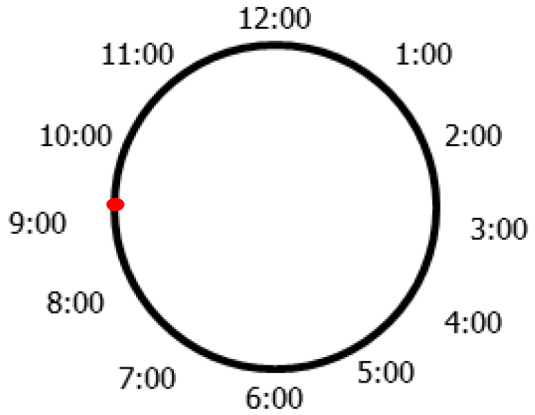
Coating System

Appeared to be in good condition with minor chalking and delamination. Overall 5% coating failure.

Recommendations

None at this time

Exterior Manway



Description

Appeared to be in good condition with a few isolated spots of minor surface corrosion. Overall less than 5% corrosion present.

Rust Grade

6

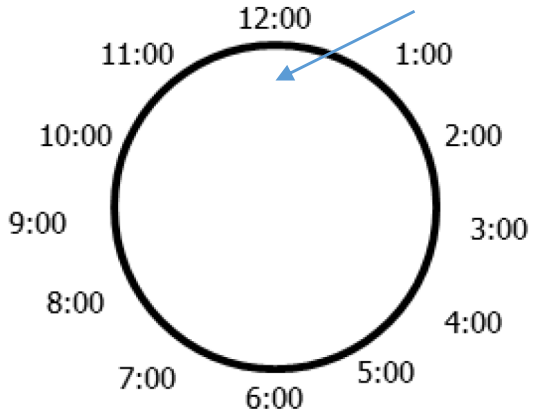
Coating System

Appeared to be in good condition with minor chalking and delamination. Overall 5% coating failure.

Recommendations

None at this time

Interior Ladder

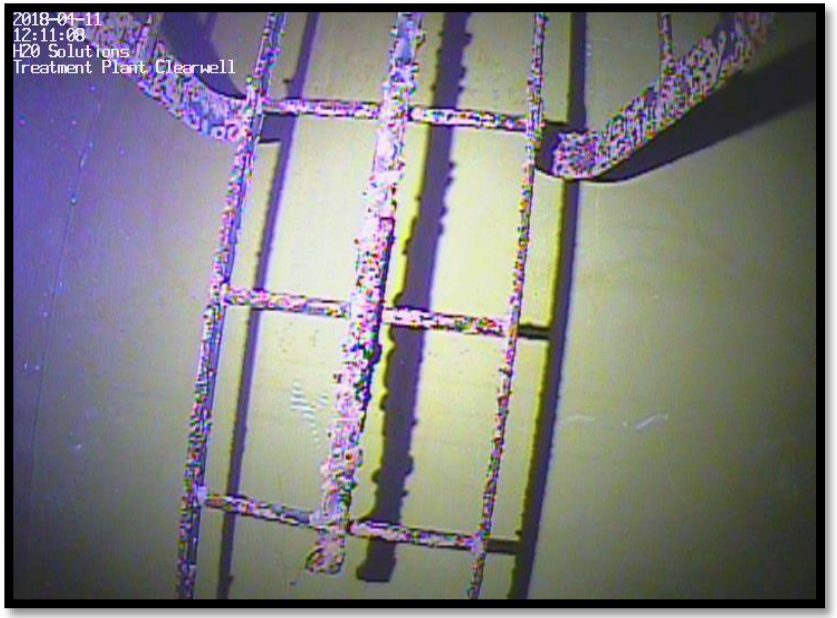


Description

Structurally sound and in fair condition. Areas of moderate to heavy surface corrosion on the rungs. Overall 50% corrosion present.

Rust Grade

1



Coating System

Appeared to be in poor condition with chalking and delamination. Overall 75% coating failure.

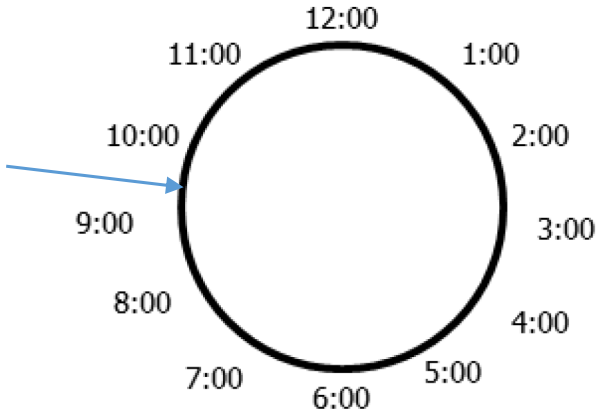
Recommendations

None at this time.

Interior Wall

Description

Appeared to be in good condition with a few isolated spots of minor surface corrosion. Overall less than 5% corrosion present.



Rust Grade

6

Coating System

Appeared to be in good condition with chalking, delamination, fading and blistering. Overall 5% coating failure.

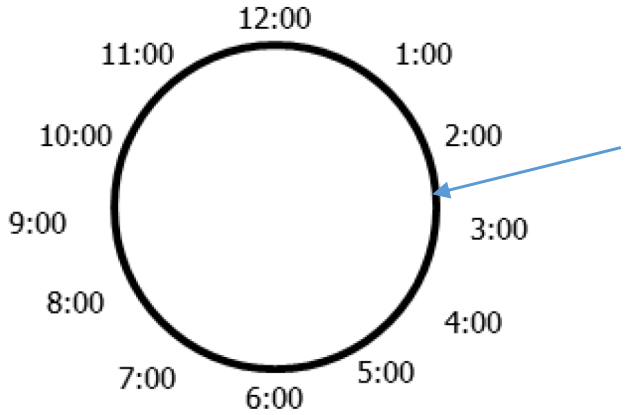
Recommendations

None at this time

Interior Wall

Description

Appeared to be in good condition with a few isolated spots of minor surface corrosion. Overall less than 5% corrosion present.



Rust Grade

6

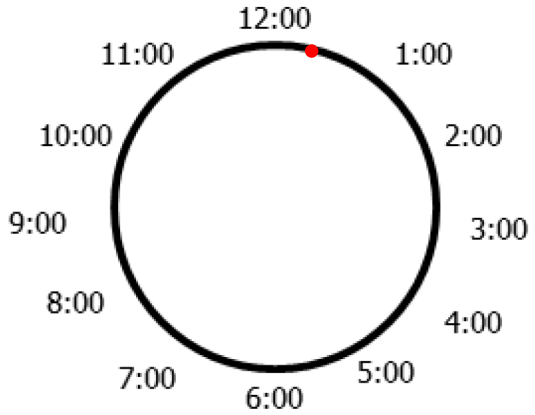
Coating System

Appeared to be in good condition with chalking, delamination, fading and blistering. Overall 5% coating failure.

Recommendations

None at this time

Interior Telemetry



Description

Appeared to be in good working condition.

Rust Grade

N/A

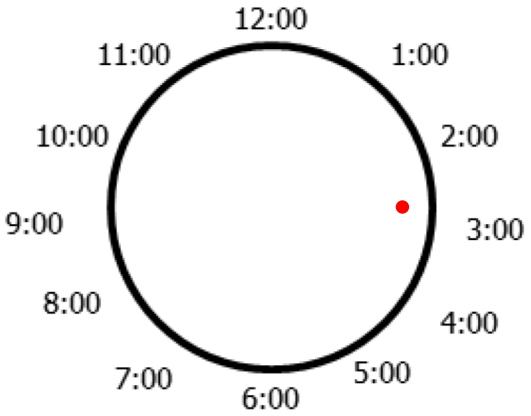
Coating System

N/A

Recommendations

None at this time

Interior Overflow



Description

Appeared to be in good working condition with a few isolated spots of minor surface corrosion. Overall 5% corrosion present.

Rust Grade

4

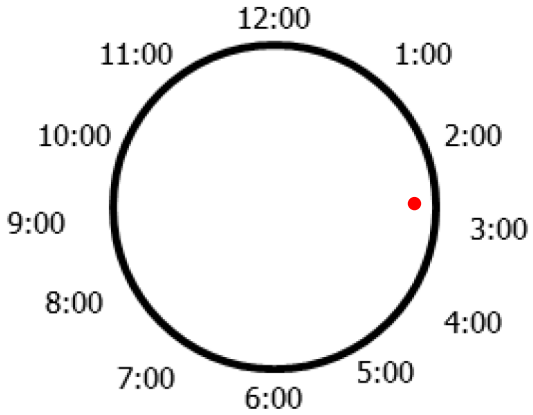
Coating System

Appeared to be in good condition with chalking and blistering. Overall 5% coating failure.

Recommendations

None at this time

Interior Overflow Base



Description

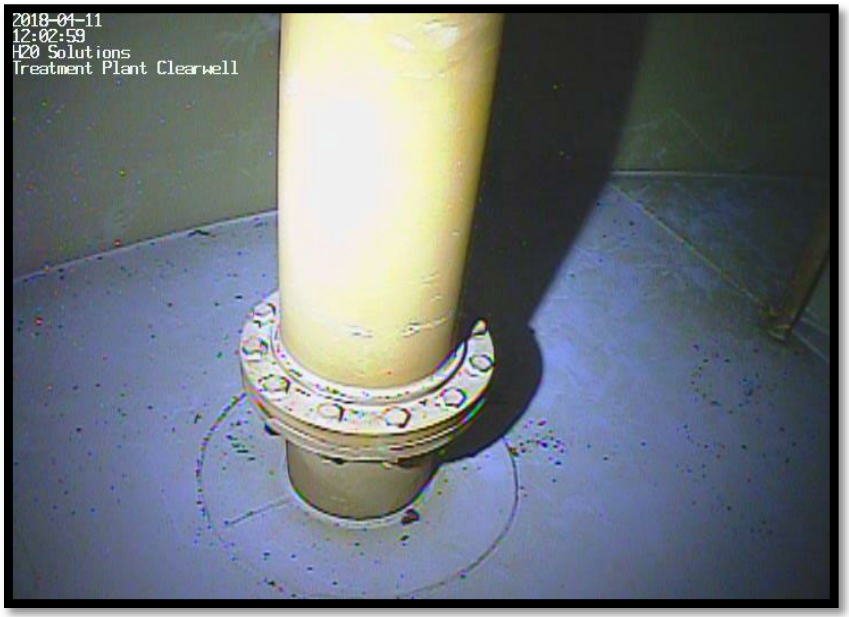
Appeared to be in good working condition with a few isolated spots of minor surface corrosion. Overall 5% corrosion present.

Rust Grade

4

Coating System

Appeared to be in good condition with chalking and blistering. Overall 5% coating failure.



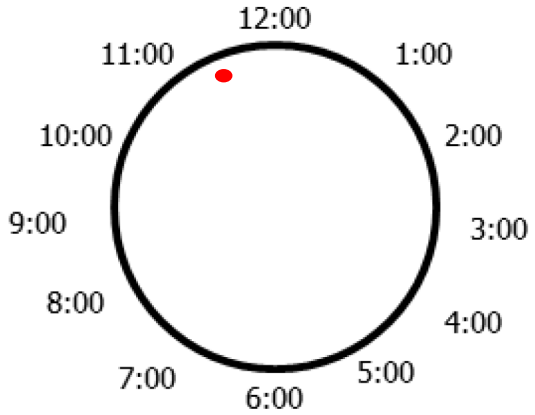
Recommendations

None at this time

Interior Inlet Base

Description

Appeared to be in good working condition with areas of moderate surface corrosion. Overall 25% corrosion present.



Rust Grade

2

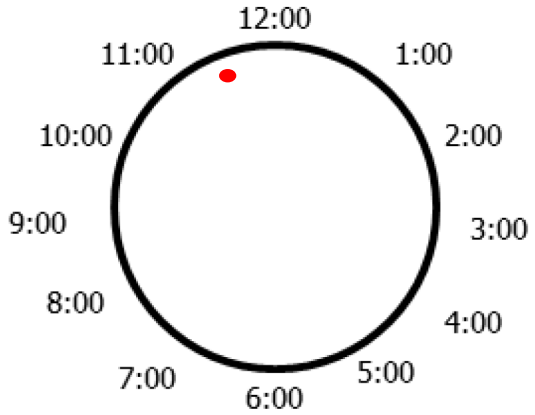
Coating System

Appeared to be in fair condition with delamination. Overall 50% coating failure.

Recommendations

None at this time

Interior Inlet



Description

Appeared to be in good working condition with areas of moderate surface corrosion. Overall 25% corrosion present.

Rust Grade

2

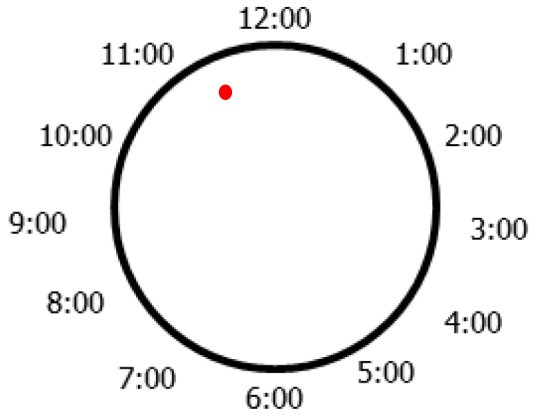
Coating System

Appeared to be in fair condition with delamination. Overall 50% coating failure.

Recommendations

None at this time

Interior Outlet



Description

Appeared to be in good working condition with areas of moderate surface corrosion. Overall 25% corrosion present.

Rust Grade

2

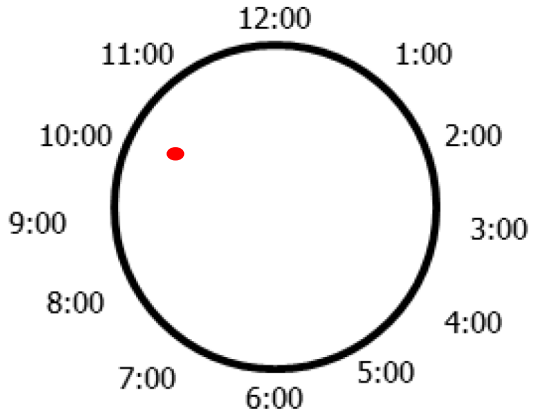
Coating System

Appeared to be in fair condition with delamination. Overall 50% coating failure.

Recommendations

None at this time

Interior Drain



Description

Appeared to be in good working condition with a few isolated spots of minor surface corrosion. Overall less than 5% corrosion present.

Rust Grade

6

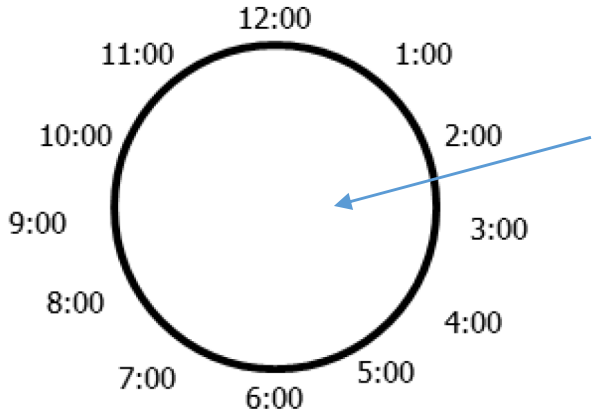
Coating System

Appeared to be in good condition with minor chalking. Overall less than 5% coating failure.

Recommendations

None at this time

Interior Ceiling



Description

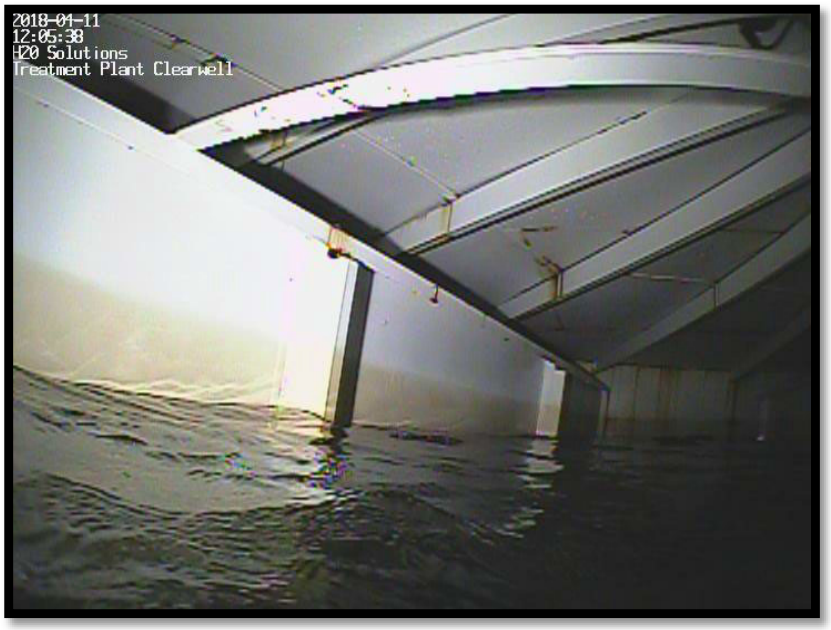
Appeared to be in good condition with a few isolated spots of minor surface corrosion. Overall less than 5% corrosion present.

Rust Grade

6

Coating System

Appeared to be in good condition with chalking. Overall 5% coating failure.



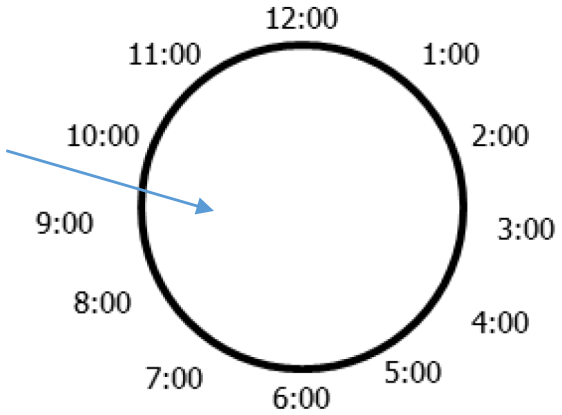
Recommendations

None at this time

Interior Ceiling

Description

Appeared to be in good condition with a few isolated spots of minor surface corrosion. Overall less than 5% corrosion present.



Rust Grade

6

Coating System

Appeared to be in good condition with chalking. Overall 5% coating failure.

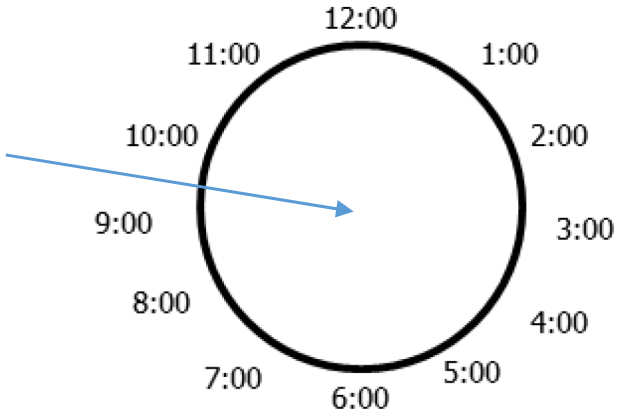
Recommendations

None at this time

Interior Ceiling

Description

Appeared to be in good condition with a few isolated spots of minor surface corrosion. Overall less than 5% corrosion present.



Rust Grade

6

Coating System

Appeared to be in good condition with chalking. Overall 5% coating failure.

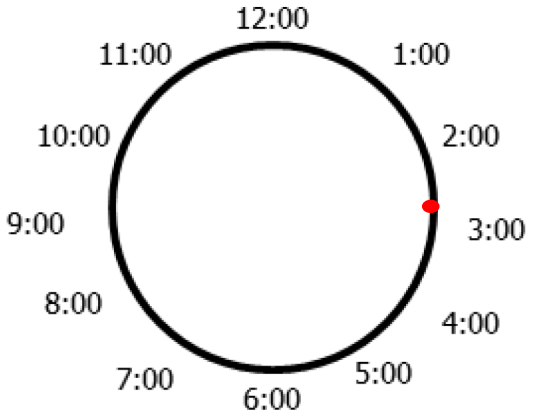
Recommendations

None at this time

Interior Manway

Description

Appeared to be in good condition with a few isolated spots of minor surface corrosion. Overall 10% corrosion present. Gasket is in good condition.



Rust Grade:

3

Coating System

Appeared to be in good condition with chalking and blistering. Overall 5% coating failure.

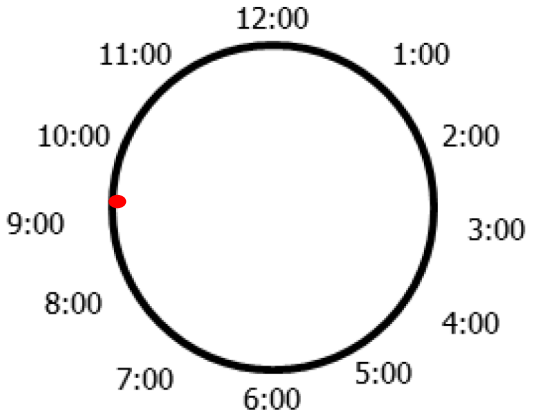
Recommendations

None at this time

Interior Manway

Description

Appeared to be in good condition with a few isolated spots of minor surface corrosion. Overall 10% corrosion present. Gasket is in good condition.



Rust Grade:

3

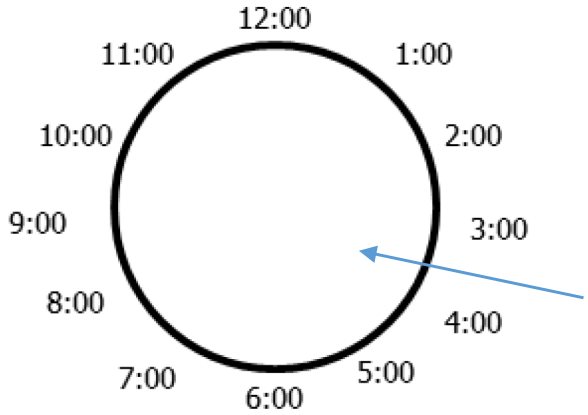
Coating System

Appeared to be in good condition with chalking and blistering. Overall 5% coating failure.

Recommendations

None at this time

Interior Floor



Description

Appeared to be in good working condition with a few isolated spots of minor surface corrosion. Overall less than 5% corrosion present.

Rust Grade

6

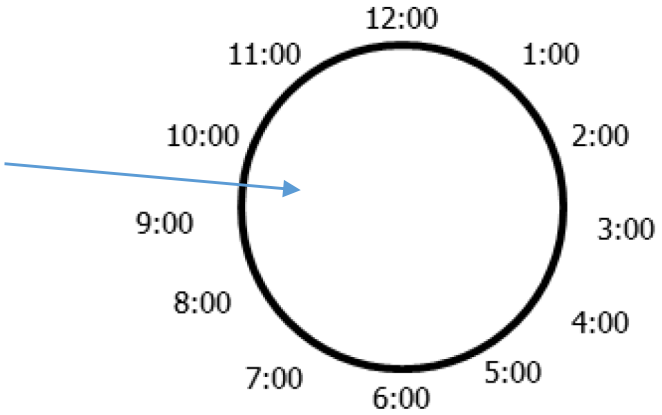
Coating System

Appeared to be in good condition with chalking, blistering and staining. Overall 10% coating failure.

Recommendations

None at this time

Interior Floor



Description

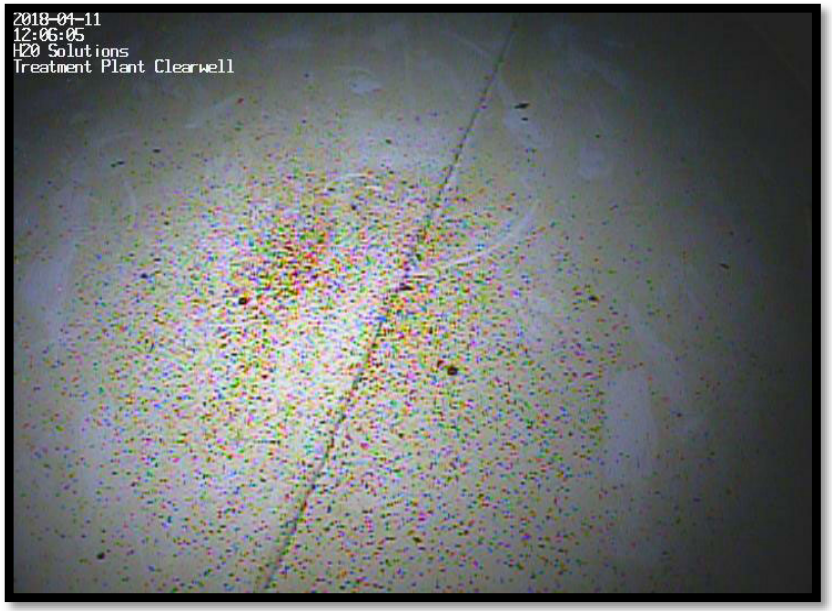
Appeared to be in good working condition with a few isolated spots of minor surface corrosion. Overall les than 5% corrosion present.

Rust Grade

6

Coating System

Appeared to be in good condition with chalking, blistering and staining. Overall 10% coating failure.



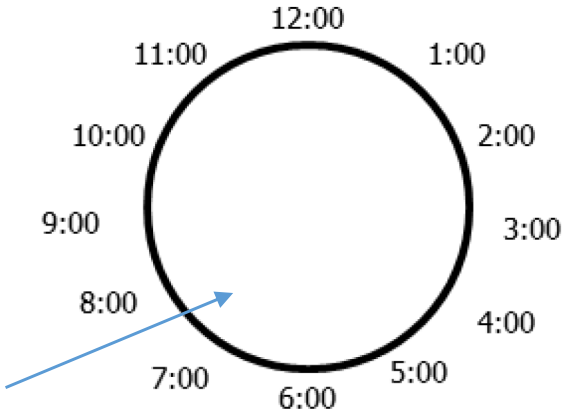
Recommendations

None at this time

Interior Floor

Description

Appeared to be in good working condition with a few isolated spots of minor surface corrosion. Overall less than 5% corrosion present.



Rust Grade

6

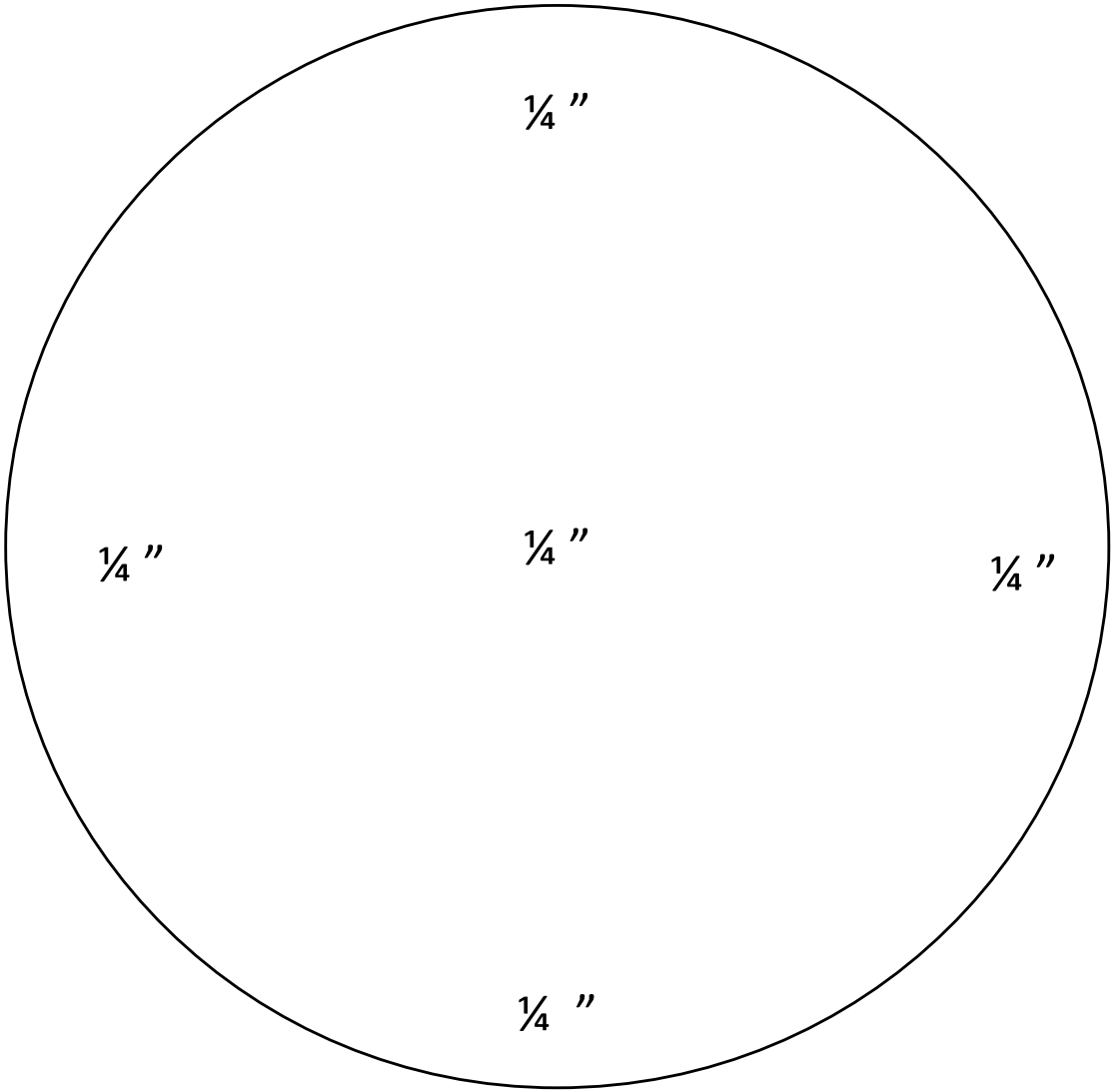
Coating System

Appeared to be in good condition with chalking, blistering and staining. Overall 10% coating failure.

Recommendations

None at this time

Sediment Depth



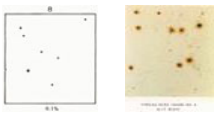
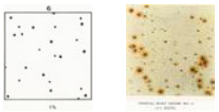
References

Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces – SSPC-Vis 2-82 & ASTM D 610-85 (1989)

The graphical representations show examples of area percentages, which may be helpful in rust grading. The use of photographical reference standards requires the following precautions:

- Some finishes are stained by rust. This staining must not be confused with the actual rusting involved.
- Accumulated dirt or other material may make accurate determination of the degree of rusting difficult.
- Certain types of deposited dirt that contain iron or iron compounds may cause surface discoloration that should not be mistaken for corrosion.
- It must be realized that failure may vary over a given area and discretion must therefore be used in applying these reference standards.
- In evaluating surfaces, consideration shall be given to the color of the finish coating, since failures will be more apparent on a finish that shows color contrast with rust, such as white, than on a similar color, such as iron oxide finish.
- The photographic reference standards are not required for use of the rust-grade scale since the scale is based upon the percent of the area rusted and any method of assessing area rusted may be used to determine the rust grade.

A	Similar to European Scale of Degree of rusting for Anti-Corrosive Paints (1961) (Black & White)
B	Corresponds to SSPC Initial Surface Conditions E (0 - 0.1%) and BISRA (British Iron and Steel Research Association) 0.1%
C	Corresponds to SSPC Initial Surface Conditions F (0.1%-1%) and BISRA 1%
D	Corresponds to SSPC Initial Surface Conditions G (1 - 10%)
E	Rust grades below 4 are of no practical importance in grading performance of paints
F	Corresponds to SSPC Initial Surface Condition H (50 - 100%)

Rust Grades [A]	Description	Graphical Representation
10	No rusting or less than 0.01% of surface rusted	Unnecessary
9	Minute rusting less than 0.03% of surface rusted	
8[B]	Few isolated rust spots less than 0.1% of surface rusted	
7	Less than 0.3% of surface rusted	
6[C]	Extensive rust spots but less than 1% of surface rusted	
5	Rusting to the extent of 3% of surface rusted	
4[D]	Rusting to the extent of 10% of surface rusted	
3[E]	Approximately on sixth of the surface rusted 16%	
2	Approximately one third of the surface rusted 33%	
1	Approximately one half of the surface rusted 50%