Exhibit No.:	
Issues:	Water Storage Tank Rehabilitation, Risks of Providing Water & Sewer Service
Witness:	Matthew A. Lueders
Exhibit Type:	Direct
Sponsoring Party:	Missouri-American Water Company
Case No.:	WR-2024-0320 SR-2024-0321
Date:	July 1, 2024

MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. WR-2024-0320
CASE NO. SR-2024-0321

DIRECT TESTIMONY

OF

MATTHEW A. LUEDERS

ON BEHALF OF

MISSOURI-AMERICAN WATER COMPANY

AFFIDAVIT

I, Matthew Lueders, under penalty of perjury, and pursuant to Section 509.030, RSMo, state that I am Deputy Director of Engineering for Missouri-American Water Company, that the accompanying testimony has been prepared by me or under my direction and supervision; that if inquiries were made as to the facts in said testimony, I would respond as therein set forth; and that the aforesaid testimony is true and correct to the best of my knowledge and belief.

Matthew Lueders

July 1, 2024
Dated

DIRECT TESTIMONY
MATTHEW A. LUEDERS
MISSOURI AMERICAN WATER COMPANY
CASE NO.: WR-2024-0320
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DIRECT TESTIMONY

MATTHEW A. LUEDERS

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Matthew A. Lueders. My business address is 727 Craig Road, Creve Coeur, MO 63141.

Q. By whom are you employed and in what capacity?

A. I am employed by Missouri-American Water Company (MAWC or the Company) as Deputy Director of Engineering.

Q. Please summarize your educational background and business experience.

A. I received a Master of Science Degree in Environmental Engineering in 2008, and a Bachelor of Science in Engineering Management in 2004, from the Missouri University of Science and Technology. I am registered as a professional engineer in Missouri and Indiana. I have more than 15 years of experience in water and wastewater system engineering.

From 2008 to 2011, I worked as an engineer for Indiana-American Water Company, and from 2011 to 2019, I worked as an engineer for MAWC. In these two roles I authored or co-authored more than 10 comprehensive planning studies, which guided the capital program for more than 60 water and wastewater systems and developed numerous targeted studies supporting engineering design and operations. In 2019, I was promoted to Engineering Manager for Capital Asset Planning at MAWC, where I was responsible for all water and wastewater capital planning. In 2022, I was promoted to Deputy Director of Engineering for MAWC.

Q. What are your current employment responsibilities?

A. As Deputy Director of Engineering, I oversee and manage the activities and groups supporting comprehensive water and wastewater planning, lead service line replacement, developer related services, and new system acquisitions. My responsibilities include maintaining compliance with state and federal requirements related to the planning of the capital investment program; providing comprehensive system planning for use in developing system needs and projecting capital spending; supporting the development of lead service line inventories and management of replacement activities; and supporting MAWC operations staff in performing plant/system troubleshooting. I am also responsible for the acquisition and integration process for new water and wastewater systems. As a Deputy Director of Engineering, I am familiar with the facilities and operations of the Company in each of its operating areas.

Q. Have you previously testified before the Missouri Public Service Commission (Commission)?

A. Yes, I adopted Direct Testimony and submitted Rebuttal Testimony for WR-2002-0303.

Q. What is the purpose of your direct testimony in this proceeding?

A. The purpose of my Direct Testimony is to sponsor and testify on the treatment of water storage tank rehabilitation and specifically the capitalization of tank coating systems and risks related to providing public water and wastewater services. MAWC witness Derek Linam's direct testimony will generally discuss MAWC's capital planning process and support the water and sewer utility plant and equipment that the Company has placed in service or will place in service from January 1, 2023 through May 2026.

Q. Are you sponsoring any Schedules with your Direct Testimony?

A. Yes, I am sponsoring the following Schedules:

Schedule MAL-1 – Water storage tank inventory

Schedule MAL-2 – Sample water storage tank inspection reports

II. WATER STORAGE TANK REHABILITATION

Q. What are water storage tanks?

A. In terms of a potable water system, water storage tanks are reservoirs typically located at a water treatment facility or within the distribution system. These tanks hold potable water so that it is available to meet short-term demands for filter wash water at the treatment facility or customer demands that may exceed the instantaneous capacity of the water treatment facility or the distribution system. These tanks are constructed of steel or concrete and are generally classified as ground storage tanks, standpipes, or elevated storage tanks. Each type interacts with the water systems through its unique hydraulic properties but serve the same general purpose of holding water for our customers.

Q. Why are water storage tanks critical to the operation of water systems?

A. Water storage tanks are a key piece of infrastructure allowing water systems to meet peak demands at significant cost savings compared to the design and construction of water treatment facilities to meet peak demands alone. Unlike electric power generation, water treatment plants are not constructed to meet instantaneous peak demands of the customers. Use of storage tanks in a water system is analogous to the use of a battery in an electrical system; storing treated water during non-peak usage periods and then returning it to the system for use during peak usage periods. Peak system demands result from multiple factors, including typical customer usage patterns which may include periods where demands may exceed twice the average and emergencies such as firefighting which are often many times greater than typical demands.

MAWC also utilizes storage tanks to improve operational flexibility and reliability. Energy costs are lower by treating and storing finished water when electricity costs are lower and delivering the stored water at reduced energy consumption when electricity costs are higher. Service reliability is increased by using tanks as a backup supply of water in the event of a main break or other disruption in the production or distribution of potable water, helping to maintain service until the problem can be resolved. Without adequate storage, periods of low pressure and the occurrence of boil orders would be common, disruptions of service would be much more frequent, and treatment plants and network transmission would necessarily be constructed much larger to meet peak demands.

Q. Please describe the Company's steel water storage tank rehabilitation program.

A. MAWC currently owns and operates 130 steel water storage tanks across the Company's service areas, ranging in size from 8,000 gallons to 11,000,000 gallons. The integrity of these structures is crucial to helping protect public health and providing safe, clean, and reliable water service to customers. To maintain that integrity, the Company maintains an asset management program to prioritize necessary investment which currently totals approximately $2 million to $3 million each year for water storage tank rehabilitation. This tank rehabilitation significantly extends the service life of these critical system assets. The rehabilitation program entails periodic detailed inspections of the interior and exterior structures of the tanks and a statewide prioritization to determine the current and upcoming investment needs. The specific investments may include the replacement of corroded steel components such as walls and roofs, addition of safety and security upgrades such as access ladders and manways, replacement of appurtenances such as vents and overflows, and renewal or replacement of protective coating systems. The work is bid to qualified licensed contractors. To verify that the coatings were properly applied and are performing as specified, the work is inspected during performance, directly after completion, and again following a one-year warranty period. Depending on service conditions and other variables, the entire rehabilitation process is repeated for each tank on a cycle of approximately 15 to 20-years, aligning with the expected lifespan of the coating systems utilized.

Q. Please describe the service life considerations for steel water storage tanks.

A. More than one-third of the Company's active steel water storage tanks have been in service for more than 50 years, with the three oldest being in service for more than 85 years. A complete listing of the Company's steel water storage tanks is included in Schedule MAL-1. If properly designed, constructed, and rehabilitated on a regular basis, these tanks can be expected to have service lives of well over 50 years and approaching 100 years. If not properly rehabilitated, the service life of a steel tank may be no more than 30 years. Rehabilitation, through the regular addition or reapplication of coating systems, is required to protect the interior and exterior steel surfaces from corrosion resulting from long-term exposure to harsh environmental conditions. Most of these tanks are exposed to a wide range of air temperature, water temperature, humidity, wind loading, and both seasonal and severe weather conditions. Tank interiors must also withstand ice formation resulting from extreme winter temperatures which can damage the steel and coating systems, and a persistent environment of chlorinated water vapor, which readily corrodes exposed steel. Corrosion, if left unattended, can lead to structural damage and leaks as well as poor aesthetic conditions. Areas damaged by corrosion can potentially result in a breach of the tank which can lead to contamination from intrusion or infiltration. Under severe circumstances, tank structural failure can occur. Proper periodic inspection, ongoing care to address spot corrosion, and regular rehabilitation projects are necessary for these assets to fully serve their expected useful life.

Q. Please describe the importance of structural steel coating systems.

A. As discussed, steel tanks require occasional but significant investment in the protective coating system. The Company utilizes a high-performance engineered coating system on both interior and exterior surfaces of tanks. The service life of the interior and exterior coatings varies depending upon several conditions, but typical high-performance coatings can last from 15 years to about 20 years. Installation of new coating systems on existing tanks typically requires removal of existing coatings to bare metal through abrasive blasting and then installation of a new, three-coat engineered coating system that will protect the structural metal and extend its useful life significantly. Work site containment systems are often constructed around the tank to control dust and overspray during abrasive blasting and the application of coatings. Some existing steel structures may have previously been coated with lead-based paint systems. For those facilities, the project activities are supplemented with lead abatement efforts to contain, collect, and properly dispose of possible lead-based residuals to protect workers, neighboring properties, the general public, and the environment.

Q. Have Engineered Coating Systems proven their value in protecting the Company's investment in tanks?

A. Yes. As discussed above, more than one-third of the Company's storage tanks were built prior to 1970 and have been in service for more than 50 years. Our oldest tanks have been in service for more than 85 years. These tanks would have failed or required extensive structural repairs without the installation, maintenance, and regular rehabilitation of effective coating systems.

Q. Please discuss any new innovations in tank coating systems.

A. Over time, the industry has provided significant innovation. From the introduction of polyurethane coatings to organic zinc-rich primers, to the development of fluoropolymer coatings and Volatile Organic Carbon (VOC) free coatings, these innovations extend the lives of the tank coating systems, meet current environmental and safety regulations, and help with aesthetic properties such as reducing color fading and retaining a high gloss durable finish for an extended period of time. The latest innovations allow for coating of tanks during periods of cold weather. While tanks can be more easily removed from service during cold periods due to lower water demands, the coating technology did not allow for application during colder temperatures. This latest innovation will allow more tanks to be coated during the off-peak demand season. The current window available for performing this work falls during higher demand periods (summer) and, in many instances, does not allow for tanks to be removed from service.

Q. How are the tank rehabilitation projects prioritized?

A. Capital improvements and maintenance activities for tanks (e.g., engineered coating replacements, structural repairs, surface cleaning, etc.) are prioritized based on inspection results and projected service lives. Notwithstanding this prioritization of the tanks in most urgent need of rehabilitation, MAWC estimates that it will need to rehabilitate the entire inventory steel water storage tanks, as well as any tanks added through acquisitions, over the next 20 years, or an average of about five to six tanks per year.

Q. Please discuss the cost to rehabilitate these tanks over the next five years.

A. Over the next five years, the estimated total cost to rehabilitate 25-30 steel water storage tanks is between $10 million and $15 million.

Q. What factors are taken into consideration when determining this cost?

A. The cost to rehabilitate a tank can vary greatly based on size, type of construction, physical condition and damage, site constraints and working room, environmental considerations, and other factors. The detailed tank inspections and subsequent reports and recommendations will weigh heavily in determining the actual tank rehabilitation needs and priorities. Further, any operational considerations may drive up costs. For instance, small systems that may have only one storage tank may require the use of portable hydropneumatic tanks to maintain pressure and safe operation of the system while the storage tank is out of service. These tanks are typically rented and temporarily piped to the distribution system to help address instantaneous changes in demand that cannot typically be addressed through pumping alone.

Q. Does the Company have detailed inspection reports or other materials to support the cost of tank rehabilitation?

A. Yes. The Company is required by the Missouri Department of Natural Resources (MDNR) to inspect each water storage tank on a three-to-five-year cycle. The Company has numerous detailed inspection reports that include cost estimates for necessary rehabilitation. Copies of the recently completed reports for Crestview and Sappington #2 tanks have been included in Schedule MAL-2 and are representative of typical reports.

Q. How does the Company currently record costs incurred for engineered coating systems associated with the rehabilitation program?

A. The Company currently treats these costs as maintenance supplies and services expenses, as described by Company witness Jennifer Grisham and presented in Schedule CAS-9.

Q. Is the Company requesting the Commission authorize a different treatment for engineered coatings in this case?

A. Yes. The Company is proposing to capitalize investments in Engineered Coatings in NARUC account 342, and to depreciate those assets over 20 years. This proposed treatment is on a prospective basis, beginning with the effective date of rates in this case.

Q. Has the Company capitalized these costs as part of this rate case?

A. No. The Company has included $3,403,123 in maintenance expense.

Q. If the Commission approves capitalization of Engineered Coating investments, would the Company adjust any components of this filing?

A. Yes. If the Engineered Coatings are capitalized, then the Company would reduce maintenance expense by $3,403,123.

Q. Why should this rehabilitation work be considered capital expenditure?

A. Consistent rehabilitation of protective coatings is essential to extending the life of a critical water system asset. Without rehabilitation of this component, the structural and environmental integrity of tanks would degrade quickly after the initial coating systems begin to fail and the service life of the tanks would be unnecessarily short. Significant risk to the service level and safety of our customers would be introduced as these assets deteriorate. Comparable to other capital work on long-lived assets such as the rehabilitation of a high-service pump, the tank coating has a significant service life of 15 to 20 years of its own and it maintains the continued viability of the original asset. Lastly, the rehabilitation is a significant expenditure and can be individually accounted for, tracked, and depreciated at a specific location in the Company's property records.

Q. Do customers benefit from capitalizing water tank rehabilitation work?

A. Yes. Allowing capitalization of tank reinvestment projects over time is more equitable to the customer base since the rehabilitation projects can extend tank expected lifespans for decades. As noted above, capitalization of these costs will properly apportion the costs over the life of the asset. Customers who benefit from the application of the coating will appropriately bear the cost spread over many years.

III. RISKS OF PROVIDING PUBLIC WATER & WASTEWATER SERVICES

Q. Please provide an overview of the risks associated with furnishing safe and adequate water quantity and water quality and complying with drinking water and environmental regulations that apply to MAWC's water supply facilities and operations.

A. Water supply utilities are subject to a complex array of regulations at the federal, state, and local levels with respect to water quantity, water quality, and other environmental aspects of their facilities and operations.

With respect to water sources and the quantity of water that can be withdrawn, Missouri in general does not currently suffer serious constraints on its supply of usable water. However, that assessment does not apply uniformly to all parts of the state. Limited surface water supplies, the legacy of mining and other industrial activities, run-off from agricultural land use, depleting ground water sources, brackish (saline) groundwater, and contamination of groundwater with various compounds such as hydrocarbons from fuel supplies, and perchloroethylene (PCE) or trichloroethylene (TCE) used in dry cleaning and metal degreasing, create challenges to obtaining adequate supplies of water in various areas of Missouri.

These factors add to the costs of treating existing water sources as well as the costs and uncertainty of obtaining new or increasing existing water resources to meet new demand. These are additional risk factors that directly affect MAWC's ability to furnish safe, clean, and reliable service, and can potentially increase the costs MAWC incurs to provide that service.

Drinking water quality is controlled by a combination of federal regulation established under the Safe Drinking Water Act of 1973 and state regulation under the Missouri Safe Drinking Water Act. The federal act established the US EPA as the federal regulatory authority on drinking water. Under that authority, US EPA has created standards for contaminant levels in drinking water[1] and a series of mandatory treatment method standards, coupled with monitoring and reporting requirements, and public notification mandates, in the event of contaminant level or treatment method non-compliance.[2] In turn, Missouri has adopted the federal regulatory standards, plus certain other rules, which are administered by the MDNR.

Q. Please describe the US EPA's efforts to make disinfectant byproduct regulations more stringent.

A. The EPA has continued to make its regulations concerning disinfection byproducts more stringent. Disinfection byproducts are produced by the interaction of disinfection agents (such as chlorine) with constituents (such as organic compounds) that naturally occur in source water. The Stage 2 Disinfectants and Disinfection Byproducts Rule (DBPR)

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[1] See: https://www.epa.gov/sdwa/drinking-water-regulations-and-contaminants#List
[2] See: 40 C.F.R. Parts 141-143.

adopted in 2006, coupled with increasingly stringent disinfection regulations, requires a very careful balancing of treatment processes and source water monitoring to meet the twin goals of inactivating microbes (such as giardia and e-coli) while avoiding unacceptable concentrations of disinfection byproducts such as chlorite, bromate, trihalomethanes, and halogenic acetic acids.

In addition to the Stage 2 DBPR, the US EPA was required by the 1996 Amendments to the Safe Drinking Water Act to develop rules to balance the risks between microbial pathogens and disinfection byproducts (DBPs). The Long Term 2 Enhanced Surface Water Treatment Rule (LT2), adopted in 2006, is the second phase of rules required by Congress to address microbial pathogens. The purpose of the LT2 is to reduce illness linked to the contaminant cryptosporidium and other pathogenic microorganisms in drinking water. The rule supplements existing regulations by targeting additional cryptosporidium treatment requirements in facilities that take steps to decrease formation of disinfection byproducts that result from chemical water treatment. Cryptosporidium is a significant concern in drinking water because it contaminates most surface water used as drinking water sources, it is resistant to chlorine and other disinfectants, and it has caused waterborne disease outbreaks.

Q. Is MAWC's water supply at risk from emerging contaminants?

A. Yes. The community of water purveyors along with scientists and regulators work to understand the prevalence and health-effects of constituents in our water supplies, and then decide whether to regulate appropriately or not to regulate them. With advances in testing and health research, constituents that were previously undetectable are now being discovered in the water supply and at concentrations far lower than previously possible.

Additionally, health science continues to develop the body of research around acute and chronic human exposure to constituents now the environment. These chemicals are known as emerging contaminants and include substances such as pharmaceuticals, personal care products, nanomaterials, microplastics and algal toxins.

The EPA is required by the Safe Drinking Water Act (SDWA) to develop and publish a Contaminant Candidate List (CCL) every five years and then make a formal determination on whether or not to regulate at least five constituents on that list. This process has been completed five times with potential contaminants for the sixth CCL being under review at this time. The most recent Regulatory Determination based on CCL4, which was published on February 22, 2021, identified perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) for regulation. These two chemicals are part of a group of chemicals commonly referred to as Per- and polyfluoroalkyl substances (PFAS).

Q. Has the EPA proposed any recent National Primary Drinking Water Regulations?

A. Yes. On April 10, 2024, the EPA announced the most recent addition to the National Primary Drinking Water Regulations by finalizing regulations for six PFAS compounds, including PFOS and PFOA. Concern over PFAS compounds is a current example of how evolving research and regulatory responses can drive the need for higher levels of treatment and impose demands for increased investment in new and more intensive forms of treatment.

In addition to the promulgation of the PFAS primary drinking water regulation, on April 19, 2024, the EPA also designated PFOA and PFOS as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This designation puts the Company, and many other water utilities, at risk of being held responsible for the presence of these compounds in treatment residual waste. Disposal of these wastes may become more costly, regulatory tracking more onerous, and risk of involvement in clean-up lawsuits higher as the presence of these compounds in source waters makes interaction with them unavoidable.

Q. What steps are being taken by MAWC in regard to PFAS?

A. The Company has completed testing and the results, to date, have not indicated a need for the high levels of investment anticipated in many water systems throughout the country.

Q. Is lead a risk the Company faces in providing water and wastewater service to its customers?

A. Yes. On December 6, 2023, the US EPA published proposed revisions to the National Primary Drinking Water Regulations for lead and copper under the Safe Drinking Water Act.[3] The new proposed rules will strengthen and build on the 2021 Lead and Copper Rule Revisions and the original 1991 Lead and Cooper Rule. Although the Company continues to evaluate the proposed changes, those changes strengthen key elements of the rule in three main focus areas of the US EPA: replacing all lead service lines, reducing complexity for public health protection, and increasing transparency and informing the public. The most significant change is that the US EPA "is proposing the elimination of all [Lead Service Lines (LSLs)] and certain galvanized service lines from water systems in 10 years or less... EPA proposes that water systems must replace LSLs and certain galvanized service lines regardless of the lead levels occurring in tap or other drinking water samples. This proposal would significantly reduce the potential for lead releases into drinking water.

[3] See: https://www.federalregister.gov/documents/2023/12/06/2023-26148/national-primary-drinking-water-regulations-for-lead-and-copper-improvements-lcri

In addition, while corrosion control is generally effective at reducing lead to low levels, elimination of LSLs can result in even greater public health protection by eliminating a lead exposure source and minimizes the opportunities for error that have often occurred over the years." Id.

In addition, the EPA "is proposing to lower the lead action level to 0.010 mg/L and eliminate the lead trigger level to simplify the rule and require water systems to act earlier" and is proposing to update the tap sampling practice. The EPA is also proposing significant changes in the frequency of communications and enhanced outreach activities to improve transparency and information that provides more proactive messaging about lead in drinking water, along with the introduction of new public education requirements for lead and copper.

Q. Please provide an overview of MAWC's efforts to address removal of lead service lines?

A. The Company, with support provided by Commission decisions, has initiated a program that addresses the concerns addressed by the EPA about the presence of lead service lines. In addition to the replacement of the typically utility-owned portion of the lead service line; under its program, the Company also replaces the customer-owned portion lead service lines across its service territory at no direct cost to the customer. This program is underway and has an established internal Company target to replace all lead service lines and galvanized service lines requiring replacement for its systems ahead of the proposed LCRI deadline of ten years.

The Company has initiatives to educate its customers about the risks of lead in drinking water and provides them the information they need to participate in the Company's customer-owned lead service line replacement program. Generally, the Company schedules and replaces lead and galvanized services lines as they are identified through the development of the lead service line inventory which is an intensive effort prioritized based on estimated age of structures, community equity, and other factors. Additionally, the Company is working to significantly reduce the risk of lead exposure to children by implementing a targeted inspection and verification of service line materials at schools and childcare facilities within its service areas, ahead of other targets, followed by replacement of any lead or galvanized service lines found.

The Company is at the forefront of the water industry in proactively eliminating the risks that might accompany the presence of lead service lines. However, these efforts also require the dedication of management time and resources and the commitment of significant investment of capital to achieve the intended results. These factors, in addition to the demands the Company already faces to rehabilitate, replace, and enhance aging infrastructure and meet evolving regulatory demands, add to risk factors that MAWC faces as it works to provide safe, adequate and reliable water service.

Q. Provide an overview of the risks that environmental regulation poses for MAWC as the owner and operator of public wastewater systems.

A. As with the provision of public water supply service, the operation of wastewater collection and treatment systems are also regulated at both the federal and state levels pursuant to several statutes and voluminous regulations, and are subject to a range of environmental regulatory risks. At the federal level, wastewater systems are regulated pursuant to the Clean Water Act and numerous regulations adopted by the EPA under that law. At the state level, the MDNR has adopted and enforces those standards under the Missouri Code of State Regulations Title 10, Division 20. These regulations set standards and requirements for virtually every aspect of wastewater system operation.

One risk associated with operating wastewater systems is that effluent limitations imposed on WWTP discharges are stringent and can become more stringent over time. The Clean Water Act requires wastewater systems to obtain and comply with National Pollutant Discharge Elimination System (NPDES) permits which, in Missouri, are issued by MDNR. NPDES permits establish stringent effluent limits based upon the stricter of: (1) technology-based effluent limits; and (2) water quality-based effluent limits.

Technology-based limits are set by EPA (or, in the absence of EPA guidelines for effluent limits, by the permit writer's best professional judgment) at levels that reflect (depending on the parameter) best conventional control technology (BCT), best practicable control technology currently available (BPT), or best available technology economically achievable (BAT). Determinations of BCT, BPT and BAT can change over time, becoming more stringent as technology evolves.

Water quality-based effluent limits (WQBEL) are established to avoid discharges to water bodies that exceed instream water quality criteria, which are set to protect existing and designated uses, such as recreation and various categories of fisheries. WQBEL limits are usually based on the assimilative capacity of a stream to receive and dilute the discharge during extremely low flow – that is, when stream flow is at the 7-day, 10-year low flow (Q7-10). By definition, WQBELs may require treatment beyond technology-based values, even beyond what is considered best available technology. Moreover, as streams become cleaner, there exists a possibility that their classifications may be upgraded such that their protected uses are deemed to be more sensitive, which, in turn, leads to even more stringent

WQBEL calculations.

As just one example, many of the Company's small wastewater treatment systems are now required to meet ammonia discharge limits. A notable risk in wastewater operations is that limits for some parameters may have conflicting impacts on treatment efforts or may not be attainable with existing treatment systems. Such is the case with respect to fecal coliform standards on the one hand and limits on treatment residuals (residual chlorine and dichlorobromomethane) on the other – where a delicate balancing is required to concurrently meet all applicable standards.

Thus, more stringent effluent limits may be imposed when technology evolves or stream conditions change, engendering requirements for significant capital improvements and/or increased operating costs for enhanced treatment performance. Every five years, NPDES permits are up for renewal, and in any such renewal more stringent limits may be triggered.

Another risk for the Company is that a number of Missouri streams, including those where the Company is operating wastewater systems, are parts of watersheds that are classified as "impaired" (meaning their instream quality does not meet state standards). Such impaired waters are subject to the development and imposition of Total Maximum Daily Loads (TMDLs) for parameters that contribute to the instream conditions. Where TMDLs are established by EPA or MDNR, stringent waste load allocations are made to point-source discharges (such as WWTPs), and allocations are also made to non-point sources such as agriculture and urban runoff. Where any cap loading exceedance irrespective of the cause (such as increased flows and loadings from system customers or high stormwater flows entering the system) – can potentially lead to penalties and other enforcement actions.

Wastewater systems also face significant regulatory and environmental liability risks. Non-compliance with wastewater system effluent limits and other permit conditions can result in severe penalties. Regulatory violations expose the operator to the risk not only of governmental agency enforcement actions, but also of citizen suits in which both injunctive relief and civil penalties can be imposed.

Other potential liability risks from wastewater system operations arise from backups, overflows or releases that may occur from the collection system onto private property or into the environment. As an example, some wastewater system operators have been confronted with claims under the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) for cleanup of contamination that occurred when wastewater containing “hazardous substances” leaked from sewer lines into soils or groundwater. While not as extreme, liabilities resulting from wastewater backups into buildings or other unplanned discharges are an inherent part of wastewater system risks. This may become more of a concern in the future given the recent designated of PFOA and PFOS as hazardous substances by the EPA under CERCLA. Wastewater collection systems and treatment processes will inherently collect and concentrate these constituents in effluent discharges and waste residuals which will need to be released or disposed of, potentially opening wastewater purveyors to increased costs and legal risks.

Q. What effects did these rules have on MAWC’s infrastructure investment?

A. To comply with these rules, which evolve along with the science, the Company is required to evaluate and modify its treatment processes, which, in turn, requires the Company to invest in new plant and equipment to enable revised treatment methods. This is another example of the need for the Company to study, monitor, and comply with new and evolving standards that are accompanied by higher costs and increased demands for new investment. The projects implemented depend on the regulation being met, with examples being: completion of demonstration of performance studies to assert compliance with the LT2 Rule, replacement of treatment components to maintain compliance with the Safe Drinking Water Act, replacement of lead and galvanized service lines to comply with the Lead and Copper Rule Revisions, and wastewater treatment plant upgrades to comply with discharge limits issued through the Clean Water Act. The continued development of the science around health-effects, advancement of testing methods enabling increasingly low detection limits, and escalation of public concern over particular contaminants, and the subsequent regulatory determinations from the EPA and state drinking water regulators have resulted in increasingly stringent regulatory standards. This process, along with the specific regulatory examples noted earlier, characterizes the regulatory landscape where demands are, in effect, a "moving target" for water suppliers, making them another significant risk factor for MAWC.

Q. Does climate variability pose additional risks for water supply and wastewater system utilities such as MAWC?

A. Yes. Whatever the causes of climate variability may be, water supply and wastewater utilities face the reality of changing climatic conditions and attendant stresses on water resources. Although climate models for the midwestern U.S. generally predict overall annual precipitation amounts to remain similar to average historic experience, the EPA has indicated a likelihood for increasingly intense storms and repeated, extended dry periods are anticipated.[4,5] That means we can expect more droughts of varying degrees of severity

[4] See: https://www.epa.gov/system/files/documents/2023-11/lcri-fact-sheet-for-the-public_final.pdf
[5] See: https://nca2023.globalchange.gov/chapter/24/

and more frequent and intense high-flow events and floods – all of which impact water and wastewater utilities.

Water supply systems are fundamentally resource-dependent and, therefore, the effects of climate variability pose a significant on-going risk and create challenges with regard to maintaining a reliable water supply during the full range of potential future conditions, including even what might be assumed to be "normal" periods. The safe yields of water supply sources have historically been evaluated based on historical climatic patterns, data from so called "droughts of record" or dry period frequency analysis. However, changing climatic conditions suggest that historical hydrologic data (which in many cases only reflect 50-100 years of rainfall and stream flow measurement data collection – a quite short period in geologic or climatic time) may not accurately predict future conditions. Thus, the calculated safe yield of streams, reservoirs and groundwater wells are put in question as the effects of climate variability are experienced across the midwestern United States. Thus, in response to climate variability, water supply systems must address the risks posed to the reliability and resilience of their sources.

While droughts are the major challenge for water supply systems, heavy precipitation and high-flow events are the concern of wastewater systems. As mentioned previously, wastewater systems of all types are impacted by storm water – directly in the case of combined sewer systems and indirectly (but nevertheless significantly) by I&I in "sanitary only" systems. The prediction of increased intensity of strong storms and high rainfall events in the midwestern United States portends challenges to wastewater systems which must, in turn, cope with and treat higher peak flows while avoiding exceedance of effluent limitations and reducing the potential for untreated overflows. An additional challenge related to high intensity rain events is higher levels and frequency of flooding. Flooding has the potential to impact both water and wastewater treatment facilities which are often located in proximity to water ways. For example, the Company is investing nearly $20 million to enhance the reliability and resiliency of the South Plant (I170200167) in St. Louis in part due to increased flooding in the area. This project is further described in MAWC witness Linam's direct testimony.

Q. Does this conclude your direct testimony?

A. Yes.

Water storage tank inventory

System	Title	Capacity (MG)	Tank Style	Use	Material	Diameter	Height	Recent Exterior Coating	Recent Interior Coating	Year Erected
Joplin	32nd St	2	Ground Storage	Finished Water Distribution	Steel	102	33	2011	2011	1997
Joplin	4th St (elevated)	1	Elevated	Finished Water Distribution	Steel	67	108	2010	2010	1962
St. Louis County	Affton 2 (dome)	1.52	Ground Storage	Finished Water Distribution	Steel	72	50	2013	2016	1953
St. Louis County	Affton 3	4	Ground Storage	Finished Water Distribution	Steel	177	50	2020	2021	1967
St. Joseph	Agency	0.07	Standpipe	Finished Water Distribution	Steel	10	120.5	2018	2018	1976
St. Charles	Anna Meadows	0.15	Standpipe	Finished Water Distribution	Steel	15	114	2018	2018	2018
Eureka	Arbors	0.5	Floating Ground Storage	Finished Water Distribution	Steel	69	20	2017	2024	2017
St. Louis County	Baxter	8	Ground Storage	Finished Water Distribution	Steel	175	45	2015	2015	1968
Eureka	Brock/Palisades	0.5	Floating Ground Storage	Finished Water Distribution	Steel	46	40			2003
Brunswick	Brunswick Hill (elevated)	0.1	Elevated	Finished Water Distribution	Steel	25	67	2006	2006	1963
St. Louis County	Carman	4	Ground Storage	Finished Water Distribution	Steel	117	50	2008	2008	1975
St. Louis County	Cherry Hills	4	Ground Storage	Finished Water Distribution	Steel	117	50	2014	2014	1987
Lawson	City Park Tank	0.05	Elevated	Finished Water Distribution	Steel	20	117.167			1955
St. Louis County	Clayton	2.54	Ground Storage	Finished Water Distribution	Steel	116	32	2020	2012	1962
Jefferson City	Clearwell 2	1	Ground Storage	Finished Water Clearwell	Steel	102	18	2006	2006	1959
St. Louis County	Crestview	0.5	Elevated	Finished Water Distribution	Steel	55.5	146	2016	2024	1998
Parkville	Crooked Rd	0.5	Floating Ground Storage	Finished Water Distribution	Steel	52	32	2012	2012	1969
Joplin	Crossroads	1	Hydropillar	Finished Water Distribution	Steel/Concrete Composite	74	140	2003	2003	2003
St. Charles	Ehlmann Rd	0.5	Ground Storage	Finished Water Distribution	Steel	35	41	2006	2006	1964
Joplin	Eland	0.4	Single Ped	Finished Water Distribution	Steel	51.5	136	2006	2006	2005
Jefferson City	Ellis	1.5	Ground Storage	Finished Water Distribution	Steel	105	25	2004	2004	2004
Emerald Point	Emerald Point	0.175	Standpipe	Finished Water Distribution	Steel	15.83	110	2015		1994
St. Louis County	Fee Fee	8	Ground Storage	Finished Water Distribution	Steel	172	46	2023	2023	1966
St. Louis County	Ferguson	0.25	Elevated	Finished Water Distribution	Steel	38	143	2016	2016	1939
St. Louis County	Florissant	2.5	Ground Storage	Finished Water Distribution	Steel	110	35	2023	2023	1961
St. Louis County	Foerster (dry tank DO NOT INSPECT)	4	Ground Storage	Finished Water Distribution	Steel	117	50	2013	2013	1968
Eureka	Forby Road	0.5	Floating Ground Storage	Finished Water Distribution	Steel	46	40			2005
St. Charles	Harvester Rd West (1.5MG)	1.465	Ground Storage	Finished Water Distribution	Steel	50	100	2009	2009	1977
St. Charles	Harvester Rd East (3.5MG)	3.5	Ground Storage	Finished Water Distribution	Steel	78	99	2009	2009	1990
St. Louis County	Hawkins	2.46	Ground Storage	Finished Water Distribution	Steel	92	50	2019	2019	1968
St. Louis County	Hazelwood 1 (dome)	4	Ground Storage	Finished Water Distribution	Steel	120	47	2019	2019	1960
St. Louis County	Hazelwood 2	4	Ground Storage	Finished Water Distribution	Steel	118	49	2022	2022	1965
Joplin	Hill St	1	Ground Storage	Finished Water Distribution	Steel	66	40	2006	2006	1980
St. Joseph	Huntoon Rd 1	3.3	Floating Ground Storage	Finished Water Distribution	Steel	110	40	2018	2008	1954
St. Joseph	Huntoon Rd 2	4	Floating Ground Storage	Finished Water Distribution	Steel	117	50	2022	2014	1957
Lawson	Hwy 69 Tank	0.3	Elevated	Finished Water Distribution	Steel	45	93.583			1984
Incline Village	Incline Village	0.2	Elevated	Finished Water Distribution	Steel	30	91	2021	2022	2005
St. Joseph	Industrial Park	1	Elevated	Finished Water Distribution	Steel	76	137	2011	2011	1973
St. Charles	Jaxson Estates	0.585	Standpipe	Finished Water Distribution	Steel/Bolted	29	12			2007
St. Joseph	Karnes Rd	0.75	Elevated	Finished Water Distribution	Steel	64.5	115	2010	2010	1970
St. Louis County	Kehrs Mill 1 (elevated)	0.25	Elevated	Finished Water Distribution	Steel	40	102	2017	2017	1955
St. Louis County	Kehrs Mill 2 (dome)	2.46	Ground Storage	Finished Water Distribution	Steel	92	50	2012	2012	1960
Woodland Manor	Kimberling City Cardinal Ln	0.018	Ground Storage	Finished Water Distribution	Steel	10	18.33	2016	2016	2016
St. Joseph	King Hill 1	2	Ground Storage	Finished Water Distribution	Steel	100	35	2019	2006	1954
St. Joseph	King Hill 2	2	Ground Storage	Finished Water Distribution	Steel	100	35	2018	2006	1954
Lake Carmel	Lake Carmel	0.226	Standpipe	Finished Water Distribution	Steel	8	100			2003
Lake Taneycomo Acres	Lake Taneycomo Acres	0.034	Standpipe	Finished Water Distribution	Steel	12	36	2022	2022	1973
Lakewood Manor	Lakewood Manor	0.012	Ground Storage	Finished Water Distribution	Steel	12	30			2003
St. Joseph	Landis Rd	0.06	Standpipe	Finished Water Distribution	Steel	10	110.6	2012	2012	1987
Eureka	Large/New/West Viola	0.5	Floating Ground Storage	Finished Water Distribution	Steel	52	32			1977
Eureka	Legends	0.5	Floating Ground Storage	Finished Water Distribution	Steel	47	40	2023	2023	1996
Maplewood	Maplewood	0.0865	Standpipe	Finished Water Distribution	Steel	11	120			1971
St. Louis County	Mehlville 2 (dome)	2	Ground Storage	Finished Water Distribution	Steel	75	60	2016	2016	1956
St. Louis County	Mehlville 3	2	Ground Storage	Finished Water Distribution	Steel	75	60	2023	2023	1970

Water storage tank inventory

System	Title	Capacity (MG)	Tank Style	Use	Material	Diameter	Height	Recent Exterior Coating	Recent Interior Coating	Year Erected
Mexico	Mexico West Tank (elevated)	0.25	Elevated	Finished Water Distribution	Steel	40	110	2006	2006	1988
Eureka	Niehoff/Augustine	0.5	Floating Ground Storage	Finished Water Distribution	Steel	40	56			2007
St. Louis County	Norwood	2.46	Ground Storage	Finished Water Distribution	Steel	92	49	2020	2020	1963
St. Louis County	Oakville 1 (elevated)	0.15	Elevated	Finished Water Distribution	Steel	32	29	2013	2013	1951
St. Louis County	Oakville 2	1.5	Ground Storage	Finished Water Distribution	Steel	72	50	2018	2018	1967
St. Louis County	Old Halls Ferry	8	Ground Storage	Finished Water Distribution	Steel	175	44	2012	2012	1971
Ozark Mountain %231	Ozark Mountain 1	0.03	Standpipe	Finished Water Distribution	Steel	12	36			1971
Ozark Mountain %232	Ozark Mountain 2	0.058	Standpipe	Finished Water Distribution	Steel	10	100			2003
Ozark Mountain %233	Ozark Mountain 3	0.038	Standpipe	Finished Water Distribution	Steel	8	101			2003
St. Louis County	Paradise Valley	0.152	Standpipe	Finished Water Distribution	Steel	20	65	2016	2016	1979
Parkville	Park College	1	Floating Ground Storage	Finished Water Distribution	Steel	68	37.6	2000	2000	1999
Pevely Farms	Pevely Farms Clearwell East	0.033	Above-ground Clearwell	Finished Water Clearwell	Steel	15.33	24	2020	2020	2020
Pevely Farms	Pevely Farms Clearwell West	0.033	Above-ground Clearwell	Finished Water Clearwell	Steel	15.33	24	2020	2020	2020
Joplin	Plant Washwater	0.36	Standpipe	Wash Water	Steel	26	80	2008	1983	1959
Jefferson City	Plant Washwater Standpipe	0.3	Standpipe	Wash Water	Steel	20	125	2006	2006	1888
Parkville	Platte Woods	0.31	Elevated	Finished Water Distribution	Steel	44	100	2010	2010	1957
Rogue Creek	Pressure Tank	0.008	Hydropneumatic	Finished Water Distribution	Steel		8	2019	2019	2019
Rankin Acres	Rankin Acres	0.018	Hydropneumatic	Finished Water Distribution	Steel	8	48	2020	2020	2020
Redfield	Redfield	0.044	Standpipe	Finished Water Distribution	Steel	8	110	2016	2016	2000
Joplin	Rex	0.5	Elevated	Finished Water Distribution	Steel	50	125	2011	2000	1955
Parkville	Riverside	0.5	Single Ped	Finished Water Distribution	Steel	50	82.5	2018	2018	1987
Riverside Estates	Riverside Estates	0.01	Ground Storage	Finished Water Distribution	Steel	24	27			2004
Jefferson City	Rockhill Tank	1.5	Hydropillar	Finished Water Distribution	Steel/Concrete Composite	86	159	2014	2014	2014
St. Louis County	Rockwood	0.05	Elevated	Finished Water Distribution	Steel	20	120	2018	2018	1967
St. Joseph	S. 22nd St	0.5	Elevated	Finished Water Distribution	Steel	56	103	2023	2023	1965
Saddlebrook	Saddlebrooke	0.25	Single Ped	Finished Water Distribution	Steel	45	80			2003
St. Louis County	Sappington 1	2.46	Ground Storage	Finished Water Distribution	Steel	92	49	2014	1998	1954
St. Louis County	Sappington 2	2.46	Ground Storage	Finished Water Distribution	Steel	92	49	2015	1992	1968
Tri-State	Skyline (Well 4 Standpipe)	0.3	Standpipe	Finished Water Distribution	Steel	30	88	2015	2015	1987
Eureka	Small/Old/East Viola	0.25	Floating Ground Storage	Finished Water Distribution	Steel	33	32			1966
Spokane	Spokane Well Tank	0.01	Ground Storage	Finished Water Distribution	Steel	12	18	2019	2019	1992
Stonebridge	Stonebridge (elevated)	0.4	Single Ped	Finished Water Distribution	Steel	40	69	2012		1994
Stonebridge	Stonebridge (Ground)	0.25	Ground Storage	Finished Water Distribution	Steel	22	44	2018		2003
Pevely Farms	Stonewall Tank 1	0.11	Floating Ground Storage	Finished Water Distribution	Steel	20	40		2001	2001
Pevely Farms	Stonewall Tank 2	0.2	Floating Ground Storage	Finished Water Distribution	Steel	30		2021	2021	2021
Rogue Creek	Storage Tank	0.008	Ground Storage	Finished Water Distribution	Steel	21.33	8	2019	2019	2019
St. Louis County	Stratmann 1	11	Ground Storage	Finished Water Distribution	Steel	240	33	2009	2009	1960
St. Louis County	Stratmann 2	11.26	Ground Storage	Finished Water Distribution	Steel	264	27	1996	1998	1965
St. Louis County	Sunset	0.25	Elevated	Finished Water Distribution	Steel	40	122		2020	1936
St. Louis County	Tesson Ferry 1	3	Ground Storage	Finished Water Distribution	Steel	125	33	2017	2017	1967
St. Louis County	Tesson Ferry 2 (dome)	3	Ground Storage	Finished Water Distribution	Steel	125	33	2019	2019	1996
St. Charles	Towers Rd	2	Ground Storage	Finished Water Distribution	Steel	62	90	2008	2008	1981
Tri-State	Well 6 Standpipe	0.5	Standpipe	Finished Water Distribution	Steel	27	118	2020	2020	2019
St. Joseph	Union Rd	0.04	Standpipe	Finished Water Distribution	Steel	8	110	2012	2012	1973
St. Louis County	Valley Park	0.75	Ground Storage	Finished Water Distribution	Steel	52	50	2006	2006	1981
Tri-State	Vineyard (Well 5 Standpipe)	0.3	Standpipe	Finished Water Distribution	steel	29	93	2014		1994
St. Louis County	Walton	4	Ground Storage	Finished Water Distribution	Steel	117	50	2011	2011	1979
Wardsville	Wardsville Elevated	0.15	Elevated	Finished Water Distribution	Steel	25	128	2021	2021	1998
Warrensburg	Warrensburg North (elevated)	0.3	Elevated	Finished Water Distribution	Steel	35	123	2010	2010	1949
Warrensburg	Warrensburg South (elevated)	0.5	Elevated	Finished Water Distribution	Steel	50	125	2008	2008	1989

System	Title	Capacity (MG)	Tank Style	Use	Material	Diameter	Height	Recent Exterior Coating	Recent Interior Coating	Year Erected
White Branch	White Branch (Benton County)	0.0865	Standpipe	Finished Water Distribution	Steel	11	119			1971
St. Louis County	Wild Horse Creek	0.5	Ground Storage	Finished Water Distribution	Steel/Bolted	48	41	1998	2017	1967
Woodland Manor	Woodland Manor Bayfront Middle	0.02	Ground Storage	Finished Water Distribution	Steel	10	18.33	2017		1986
Woodland Manor	Woodland Manor Bayfront North	0.02	Ground Storage	Finished Water Distribution	Steel	10	18.33	2017		1986
Woodland Manor	Woodland Manor Bayfront South	0.02	Ground Storage	Finished Water Distribution	Steel	10	18.33	2017		1986
St. Louis County	CP1 Backwash (elevated)	0.25	Elevated	Wash Water	Steel	35	58.5	2019	2019	1969
St. Louis County	CP2 Backwash (dome)	1.29	Standpipe	Wash Water	Steel	61.5	60	2023	2023	1999
St. Louis County	CP3 Backwash	1.33	Ground Storage	Wash Water	Steel	90	28	2010	2010	1967
St. Louis County	MP Backwash	1	Ground Storage	Wash Water	Steel	65	40	2012	1999	1971
St. Louis County	NP-E Backwash (dome)	0.5	Ground Storage	Wash Water	Steel	57	35	1995	2000	1963
St. Louis County	NP-W Backwash (dome)	0.5	Ground Storage	Wash Water	Steel	52	35	2023	2023	1996
St. Louis County	SP Backwash	1	Ground Storage	Wash Water	Steel	59	51	1998	1998	1986
Mexico	Mexico Plant (elevated)	0.5	Elevated	Finished Water Distribution	Steel	56	210	1998	1998	1962
Mexico	Mexico East Tank	0.25	Elevated	Finished Water Distribution	Steel	40	138	2006	2006	1987
Orrick	Orrick Elevated	0.15	Elevated	Finished Water Distribution	Steel	30	138			2000
Garden City	Stand Pipe	0.305	Standpipe	Finished Water Distribution	Steel	31	56			2000
Garden City	Elevated	0.055	Elevated	Finished Water Distribution	Steel	20				1955
Garden City	Clearwell	0.125	Above-ground Clearwell	Finished Water Clearwell	Steel/Bolted	25	35			1989
Ironton	Dent St.	0.2	Floating Ground Storage	Finished Water Distribution	Steel	34	32			1965
Ironton	Ironton North	0.11	Floating Ground Storage	Finished Water Distribution	Steel/Bolted	25.1	29.1			2007
Ironton	Westwood St	0.11	Floating Ground Storage	Finished Water Distribution	Steel/Bolted	25.1	29.1			2007
Stewartsville	Stewartsville	0.2	Single Ped	Finished Water Distribution	Steel	30				1994
Purcell	Purcell	0.05	Elevated	Finished Water Distribution	Steel	20	85			1911
Wood Heights	Wood Heights	0.1	Elevated	Finished Water Distribution	Steel	30	135			1995
St. Charles	Knaust	2	Hydropillar	Finished Water Distribution	Steel/Concrete Composite	98	133	2022	2022	2022
Smithton	Smithton	0.05	Elevated	Finished Water Distribution	Steel	25	84	2012	2012	1956

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Visual Sanitary Inspection Report

Project Information

Crestview

Prepared For

Mattie Zautner

Prepared On

2/23/2024

Prepared By

Brad Huebner

Phone: 314-369-3087

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General Information

Tank Details

Capacity:	500,000 Gallon.
Construction Style:	Single Pedestal.
Builder:	Caldwell.
Construction Date:	1998.
Exterior Coating:	Urethane.
Interior Coating:	Epoxy.
Inspector:	Brad Huebner.
Inspection Date:	2/14/2024.
Height:	140' HWL.

General Information

Exterior Coatings Condition

Exterior coating condition: Coatings are in good condition with an average of 14.0-17.0 mils DFT. Spot failures with light rust on roof and roof vent. Light mold and mildew growth on lower pedestal. Two pipe chases next to roof hatch for cellular and coax cables to access roof should be sealed to prevent birds and insects from entering dry tube.

Foundation :	Concrete, good condition. Lower grade on S. side of foundation.
Overflow Pipe:	Concrete vault.
Overflow Screen:	Not accessible.
Flap Gate:	Yes, not accessible.
Splash Pad:	Concrete pad to Rip-Rap.
Exterior ladder:	None.
Safety Climb:	Safety cable.
Ladder Gate:	None.
Vent:	Steel, insect screen intact.
Manway:	(Wet) 30" round with 6" curb / 24" port side / 18"x24" bowl access.
Catwalk:	N/A.
Cables:	Multiple cellular and coax cables.
Roof Hatch:	(Dry) 30" round with 4" curb.
Aviation Light:	None.
Roof Ladder:	None, antenna corral.
Cellular Carriers	Yes.

Interior Coating Condition

Interior Coating Condition: Coatings are in poor condition with spot failures on roof where antenna mounts have been welded and burned coatings. Rusting along roof plate overlapping seams. Multiple spot failures visible on sidewalls. Minimal sediment visible on bowl floor.

Interior Wet Ladder: Yes, top rung has heavy delaminating rust ladder needs replaced.

Safety Climb: Safety cable.

Interior Riser Ladder: Good condition.

Cathodic Protection: None.

Dry Riser: Multiple spot failures with moderate rusting on condensation plates and inside dry riser tube.

Security

Gates and Fences: Chain link fence with locked gate

Ladder Gate: Man door to lower pedestal access locked.

Roof Hatch: Locked.

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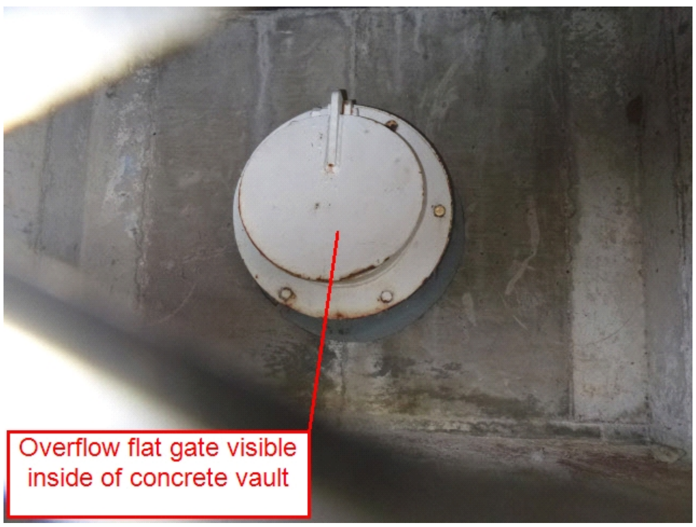
Exterior Coating Photos


Overflow flat gate visible inside of concrete vault


Lower grade on south side of foundation



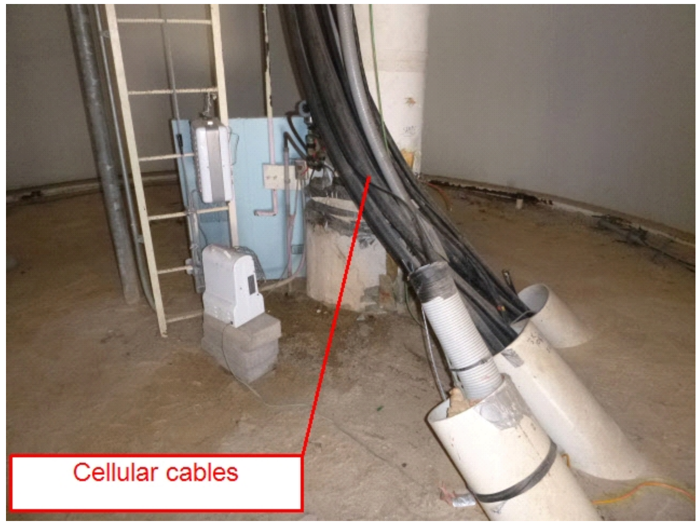


PosiTector
14.1
thou
6000


13.6


17.1
PosiTector


PosiTector
16.0


Cellular cables


NOTICE


NOTICE
Beyond This Point you are entering an area where RF Emissions may exceed the FCC General Population Exposure Limits
Follow all posted signs and site guidelines for working in a RF environment


Peeling paint with rust on
interior lower flange


Spot failures with rust
on condensation plate

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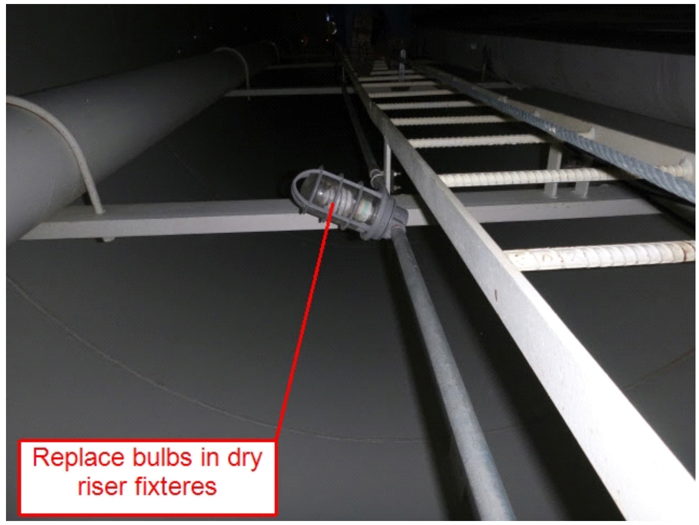

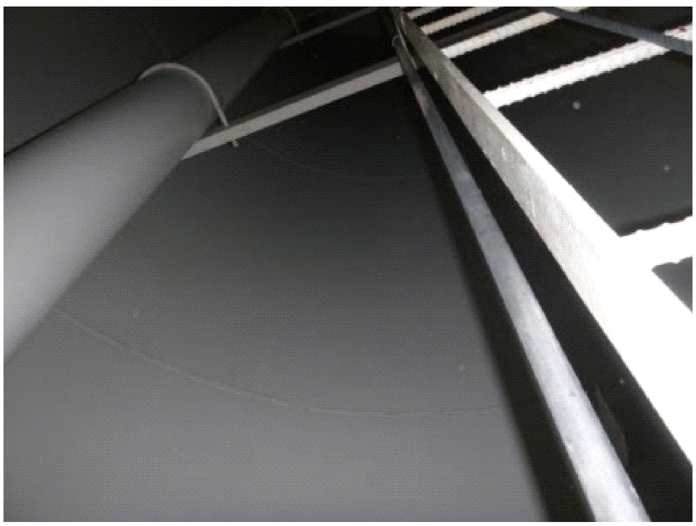

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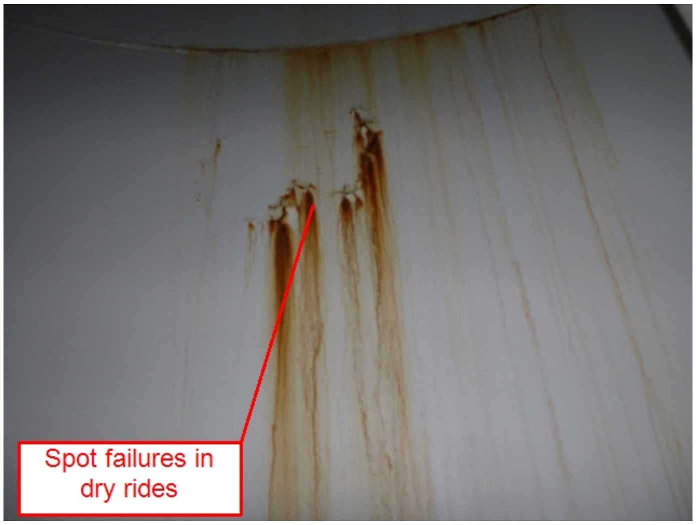
Spot failures in dry rides

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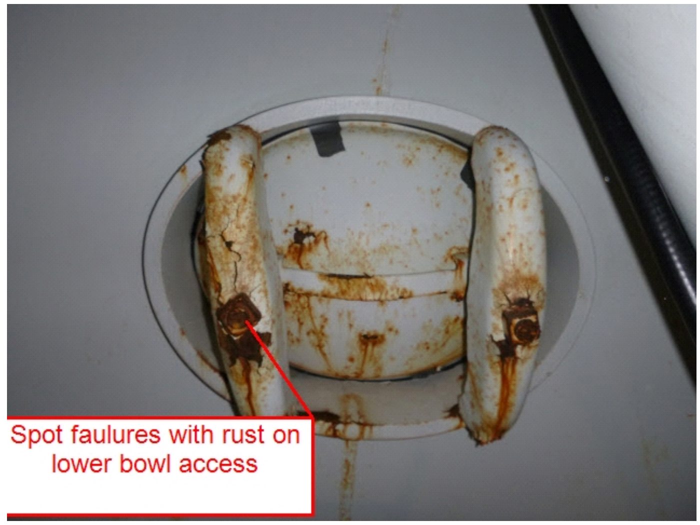

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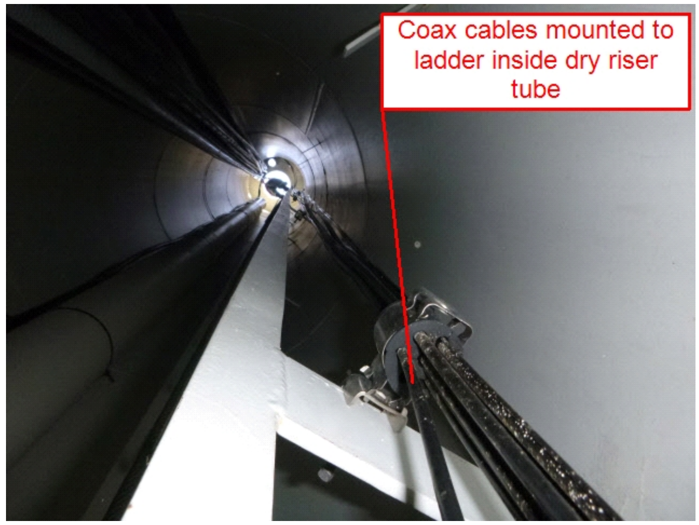
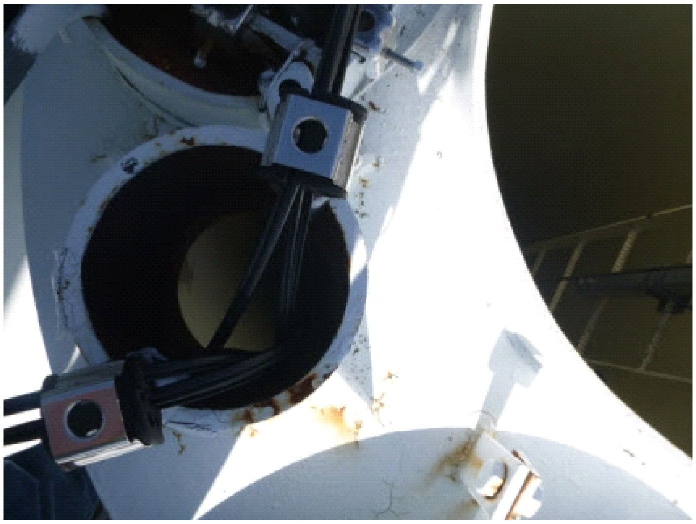
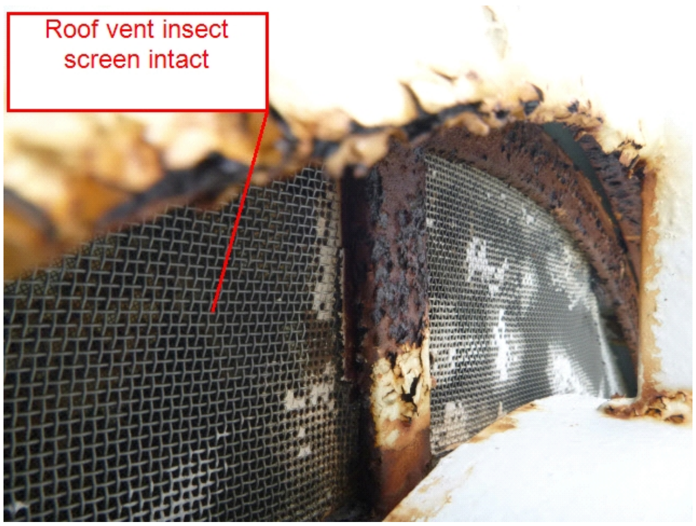
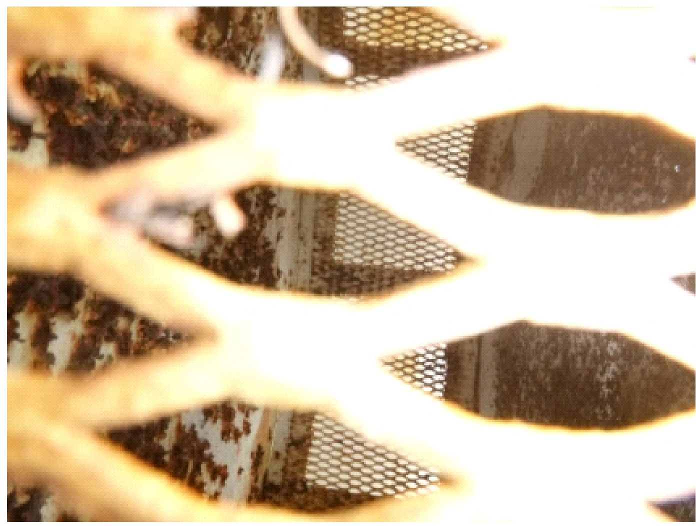

Coax cables mounted to ladder inside dry riser tube


Spot failures inside dry tube



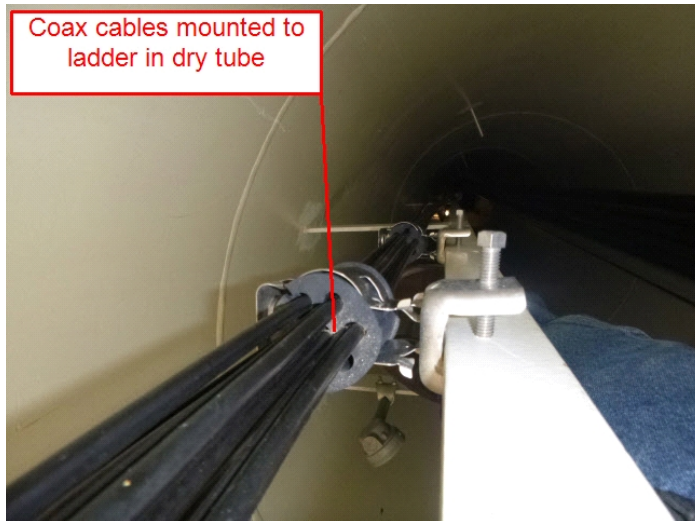

Roof vent insect
screen intact



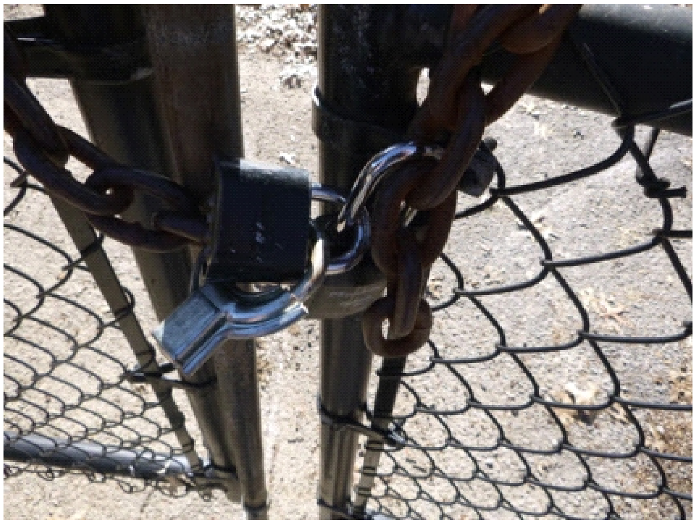

Spot failures on roof vent


Pipe chase access for cables should be foam sealed closed


Pipe chase access for cellular cables needs foam sealant


Coax cables mounted to ladder in dry tube


CREV



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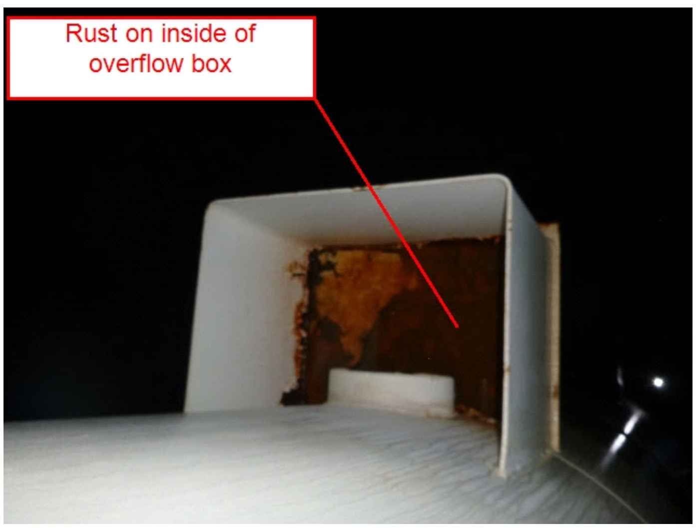
Interior Coating Photos



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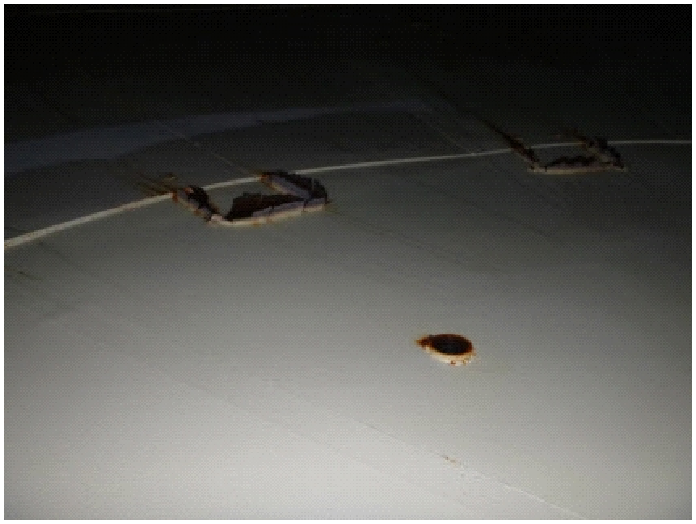

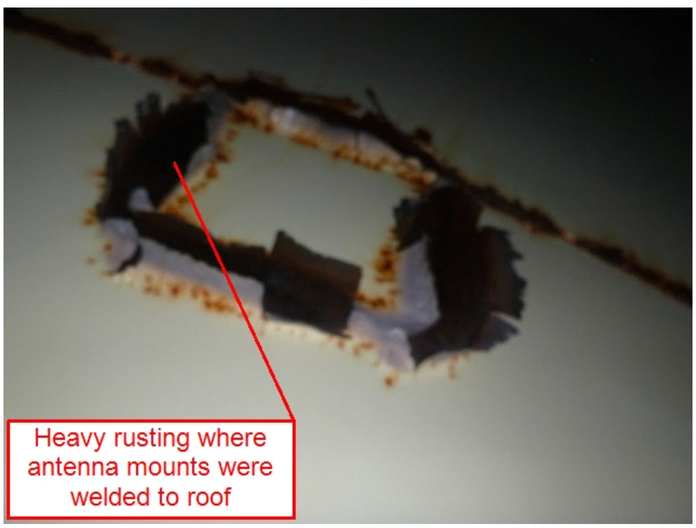

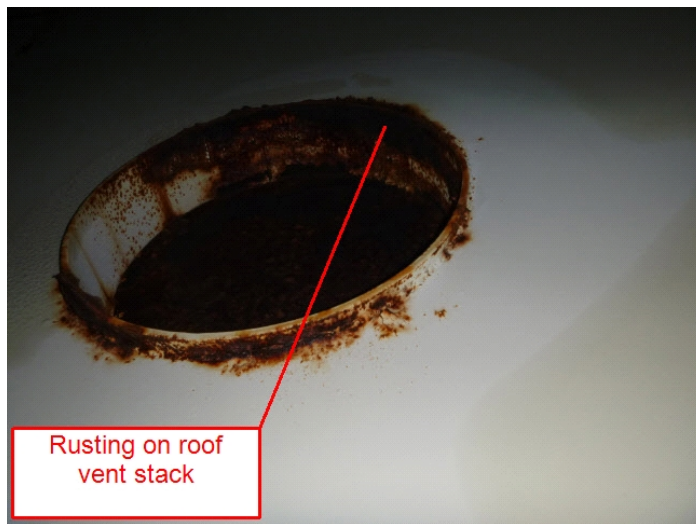

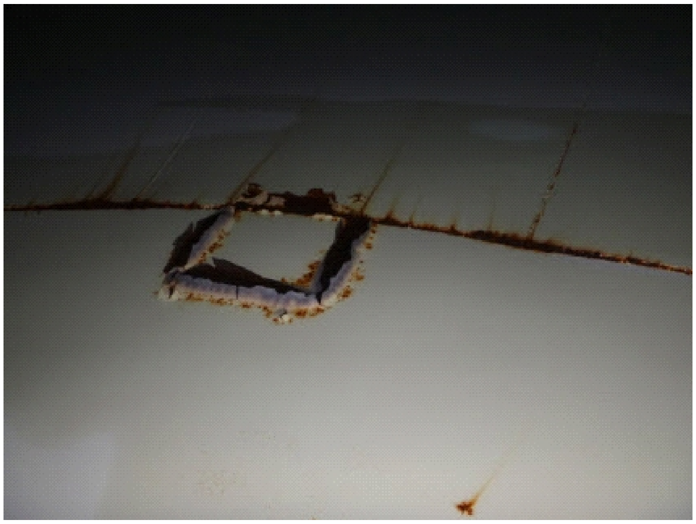

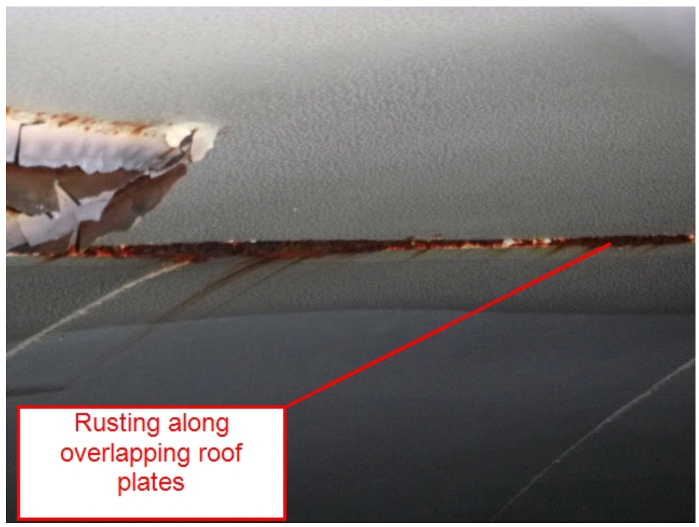
Rusting along
overlapping roof
plates

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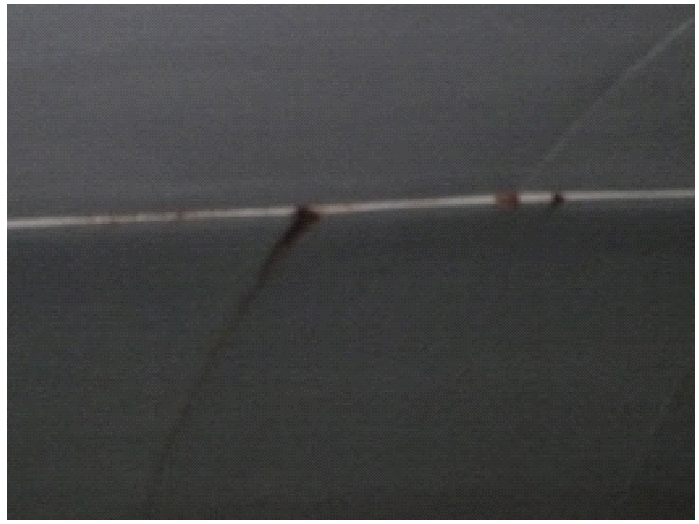

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Recommendations

- Replace bowl ladder at next renovation.
- Lower grade on south side of foundation.
- Seal pipe chases in dry tube for cellular and coax cables closed.
- Relocate cables mounted to ladder in dry tube.
- Consider interior wet and dry riser complete renovation in the next year.

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MAWC TANK ACTION SUMMARY

Crestview/500,000 Gallon/Single Pedestal

Category	Exterior Roof	Exterior Sidewall	Interior Roof	Interior Sidewall	Base/Floor
1	No rust; No steel delamination	Minimal blistering or spot failures	No rust; No steel delamination	Minimal blistering or spot failures	Minimal blistering or spot failures
2	Light rust; Light steel delamination	1-5% of spot failures as a percent of surface area	Light rust; Light steel delamination	1-5% of blisters or spot failures as a percent of surface area	1-5% of blisters or spot failures as a percent of surface area
3	Moderate rust; Moderate steel delamination	5-10% of spot failures as a percent of surface area	Moderate rust; Moderate steel delamination	5-10% of blisters or spot failures as a percent of surface area	5-10% of blisters or spot failures as a percent of surface area
4	Heavy rust; Heavy steel delamination	10-15% of spot failures as a percent of surface area	Heavy rust; Heavy steel delamination	10-15% of blisters or spot failures as a percent of surface area	10-15% of blisters or spot failures as a percent of surface area
5	Pinholes in the steel beams; Rusted through; Heavy steel delamination	Metal Loss; Existing failure	Pinholes in the steel beams; Rusted through; Heavy steel delamination	Metal Loss; Existing failure	Metal Loss; Existing failure

Component	Score	Comments
Exterior Roof	2	Spot failures, light rust
Exterior Sidewall	1	Good condition
Interior Roof	4	Heavy rusting on roof seams and spot failures from welding antenna mounts
Interior Sidewall	3	Spot failures with rust visible through water
Base/Floor	1	Minimal sediment visible

Maximum Score	4
Average Score	2.2

RECOMMENDED TANK ACTION

	ITEM	ESTIMATED COST
1	Replace bowl ladder at next renovation.	$ 8,000.00
2	Lower grade on south side of foundation.	Estimate
3	Seal pipe chases in dry tube for cellular and coax cables closed.	$ 1,500.00
4	Relocate cables mounted to ladder in dry tube.	$ 2,500.00
5	Consider interior wet and dry riser complete renovation in the next year.	
6		
7		
8		
9		
10		

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Visual Sanitary Inspection Report

Project Information

Sappington #2

Prepared For

Mattie Zautner

Prepared On

2/23/2024

Prepared By

Brad Huebner

Coating Inspection Services
PO Box 133 Eureka, MO 63025
coatinginspectionservices.net

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Report produced using www.FastPhotoReports.com

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- Recommendations 24

Phone: 314-369-3087

Tank Details

Capacity:	2,460,000 Gallon.
Construction Style:	Ground Storage.
Builder:	Nooter Corp.
Construction Date:	1967.
Exterior Coating:	Urethane .
Interior Coating:	Epoxy.
Inspector:	Brad Huebner.
Inspection Date:	2/14/2024.
Height:	49' H / 92' Dia.

Exterior Coatings Condition

Exterior coating condition: Coatings are in fair condition with an average of 15.0-17.0 mils DFT. Isolated spots of top coat delamination where sidewalls meet lower flange. Spot failures with rust on top of wind girder.

Foundation :	Concrete, good condition.
Overflow Pipe:	Concrete vault.
Overflow Screen:	Not accessible.
Flap Gate:	Yes, not accessible.
Splash Pad:	Rip-Rap.
Exterior ladder:	Good condition, smooth rungs not OSHA compliant.
Safety Climb:	None.
Ladder Gate:	Aluminum, good condition.
Vent:	Aluminum, insect screen intact.
Manway:	(1) 24" round.
Catwalk:	N/A.
Cables:	One coax cable attached to wind girder handrail.
Roof Hatch:	36"x36" with 4" curb.
Aviation Light:	None.
Roof Ladder:	Handrail up to roof vent.
Cellular Carriers	None.

Phone: 314-369-3087

Interior Coating Condition

Interior Coating Condition: Coatings are in fair condition with heavy rusting on overflow box and around dome mounts. Rusting on top edge of sidewall. Surface rusting visible on overflow pipe. Isolated spot failures on sidewalls. Minimal sediment visible on tank floor.

Interior Wet Ladder: None.

Safety Climb: None.

Interior Riser Ladder: N/A.

Cathodic Protection: None.

Dry Riser: N/A.

Phone: 314-369-3087

Security

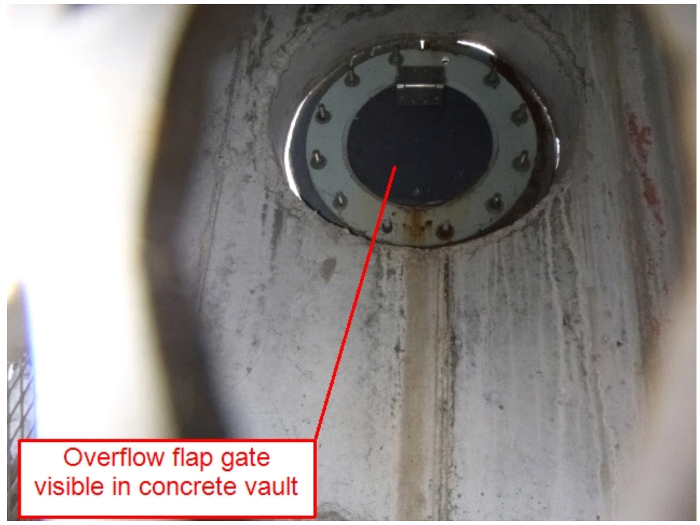
Gates and Fences: Chain link fence with locked gate.

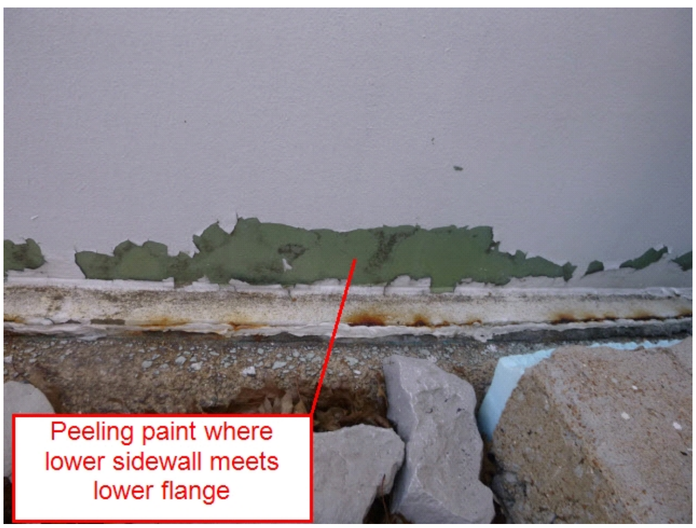
Ladder Gate: Locked.

Roof Hatch: Locked.

Exterior Coating Photos

Phone: 314-369-3087





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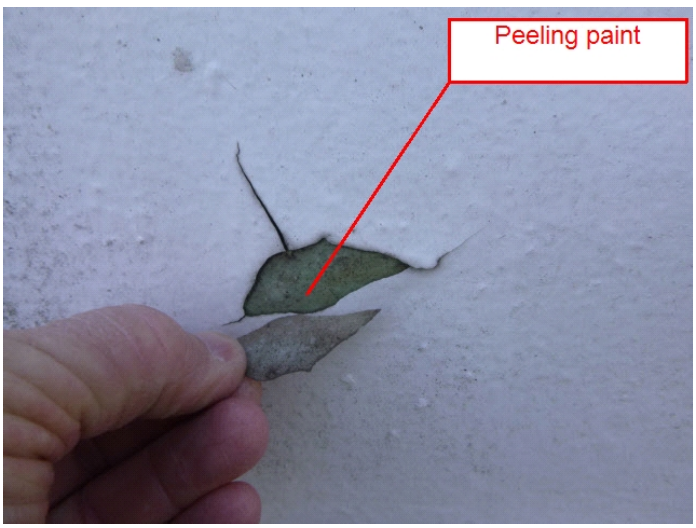
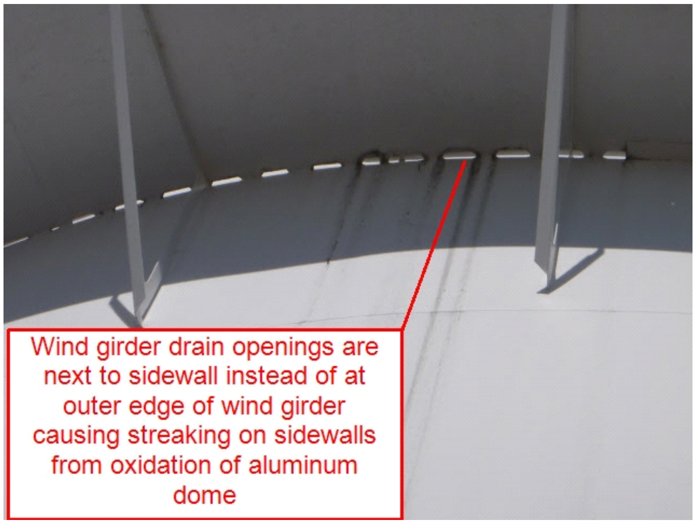
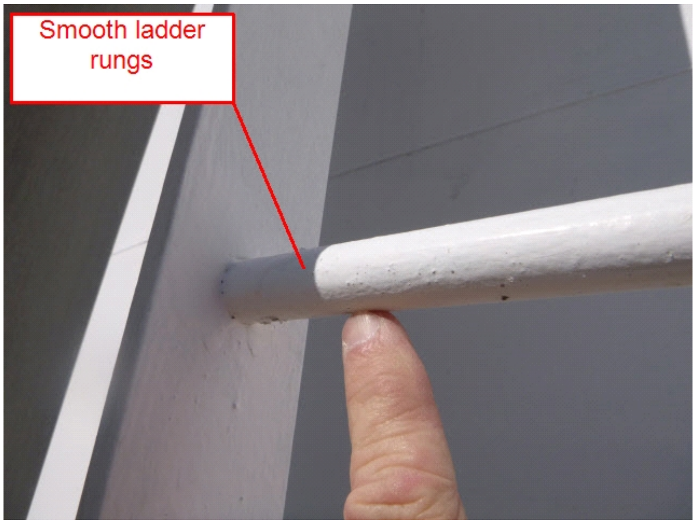

Peeling paint


16.6
PosiTector


17.8
PosiTector


17.7
PosiTector


Wind girder drain openings are next to sidewall instead of at outer edge of wind girder causing streaking on sidewalls from oxidation of aluminum dome


Smooth ladder rungs

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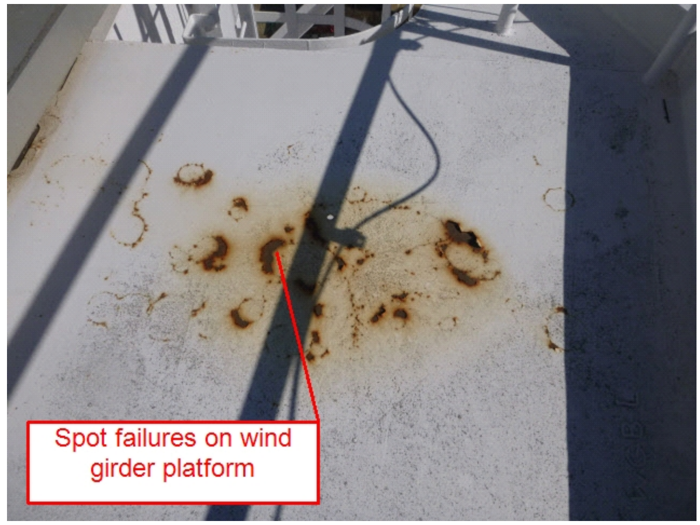
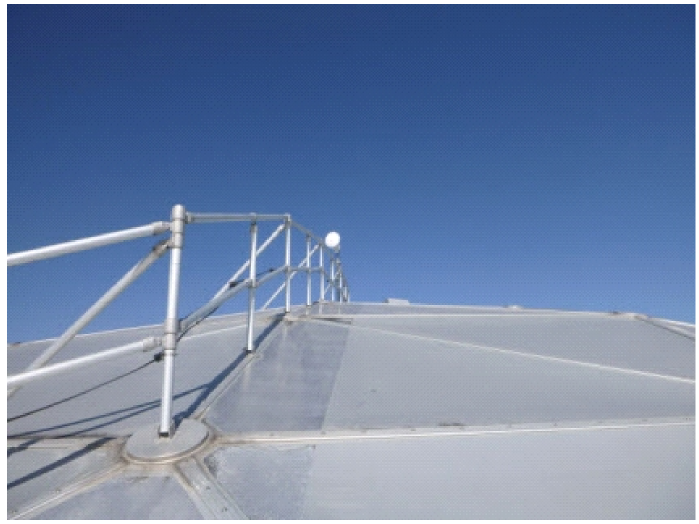
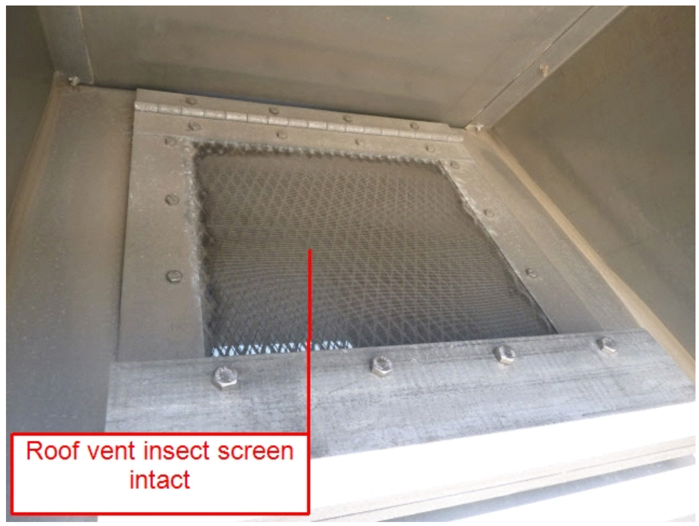
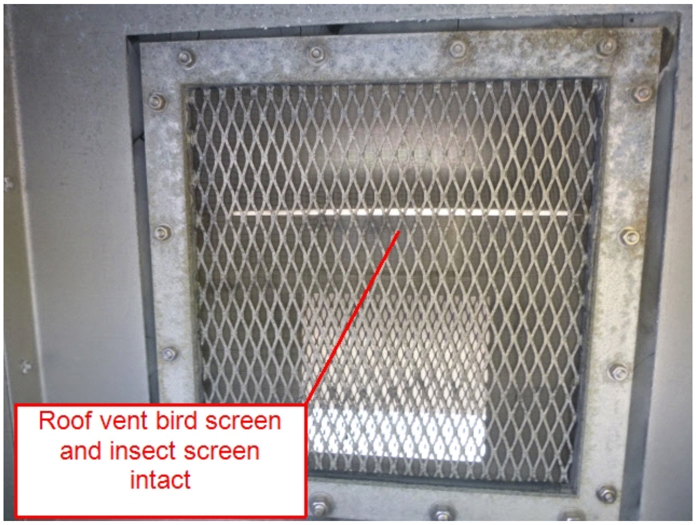
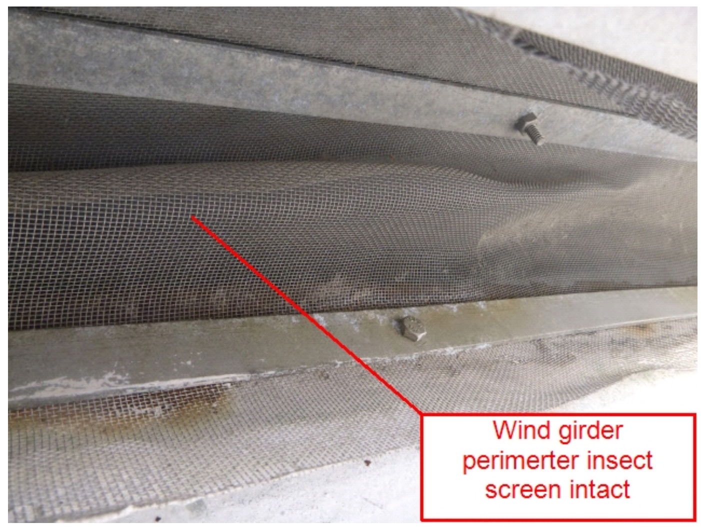


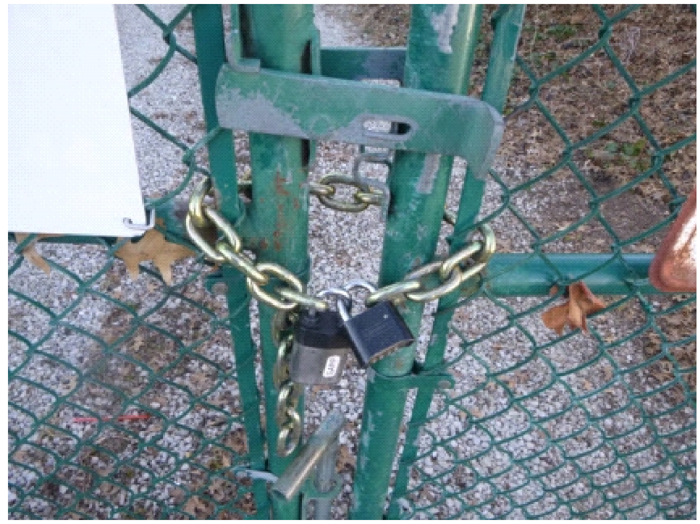



Roof vent insect screen
intact

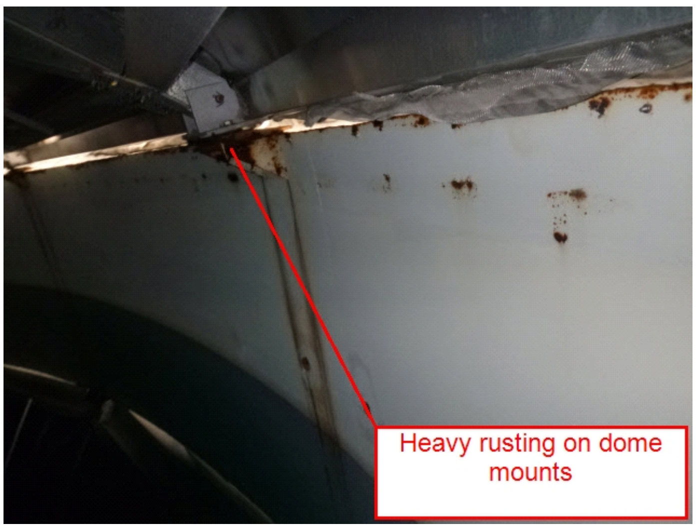

Roof vent bird screen
and insect screen
intact


Spot failures on wind girder platform

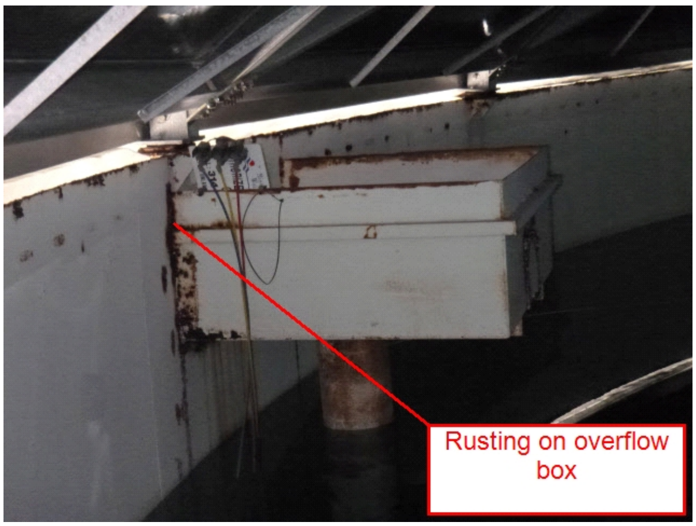

Wind girder perimerter insect screen intact



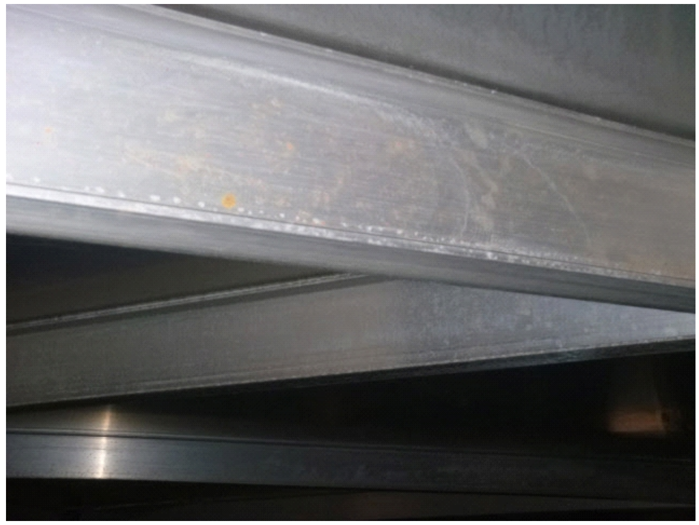
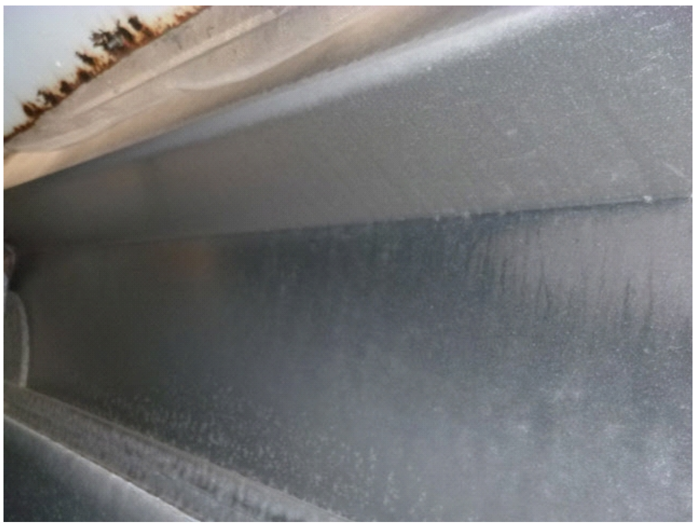
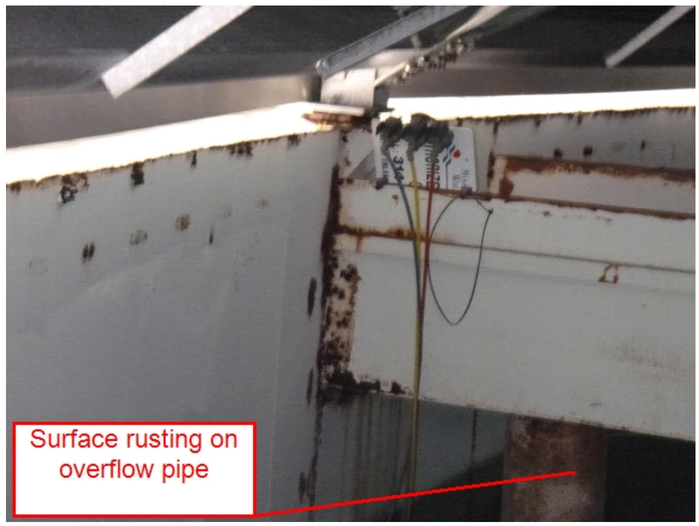
Interior Coating Photos




Heavy rusting on top edge of sidewalls


Rusting on overflow box


Rust streaking on sidewalls from dome mounts rusting





Surface rusting on overflow pipe


CONSERVATEK
MANUFACTURERS OF CLEAR-SPAN ALUMINUM COVERS
P.O. BOX 1678 CONROE, TEXAS 77305 409-539-1747

Tank Recommendations

Recommendations

- Install additional 30" manway during next tank renovation.
- Replace main ladder or install anti skid compound on ladder rungs.
- Install safety cable on main ladder.
- Pressure wash tank to remove mold and mildew.
- Consider complete interior and exterior renovation in the next two years, remove outer dome panels to access rusted dome mounts and top edge of sidewalls.

MAWC TANK ACTION SUMMARY

Sappington #2/2,460,000 Gallon/Ground Storage

Category	Exterior Roof	Exterior Sidewall	Interior Roof	Interior Sidewall	Base/Floor
1	No rust; No steel delamination	Minimal blistering or spot failures	No rust; No steel delamination	Minimal blistering or spot failures	Minimal blistering or spot failures
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5	Pinholes in the steel beams; Rusted through; Heavy steel delamination	Metal Loss; Existing failure	Pinholes in the steel beams; Rusted through; Heavy steel delamination	Metal Loss; Existing failure	Metal Loss; Existing failure

Component	Score	Comments
Exterior Roof	1	Aluminum Dome
Exterior Sidewall	2	Peeling paint
Interior Roof	1	Aluminum Dome
Interior Sidewall	4	Heavy rusting around dome mounts and along top edge of sidewall
Base/Floor	3	Spot failures on floor

Maximum Score	4
Average Score	2.2

RECOMMENDED TANK ACTION

	ITEM	ESTIMATED COST
1	Install additional 30" manway during next tank renovation.	$ 8,500.00
2	Replace main ladder or install anti skid compound on ladder rungs.	$ 8,000.00
3	Install safety cable on main ladder.	$ 4,500.00
4	Pressure wash tank to remove mold and mildew.	$ 18,000.00
5	Consider complete interior and exterior renovation in the next two years, remove outer dome panels to access rusted dome mounts and top edge of sidewalls.	