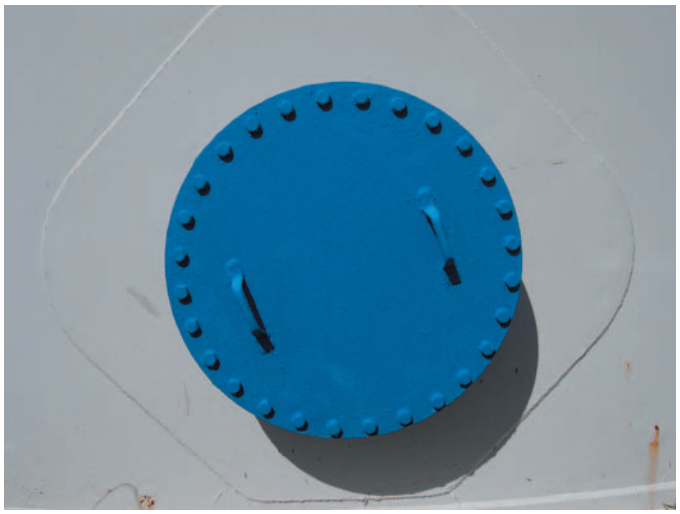
7 ***Exterior Wall Surfaces Found With Coating Chips, Exposed Steel And Mild Surface Corrosion***

8 ***Exterior Wall Surfaces Found With Coating Chips, Exposed Steel And Mild Surface Corrosion***

9 ***Exterior Wall Surfaces Found With Coating Chips, Exposed Steel And Mild Surface Corrosion***

10 ***Exterior Wall Surfaces Found With Coating Chips, Exposed Steel And Mild Surface Corrosion***



11 ***Manway***

12 ***Ladder***

13 ***Overflow***

14 ***Roof Surfaces Found With Coating Failure, Blotch Rusting And Exposed Steel***

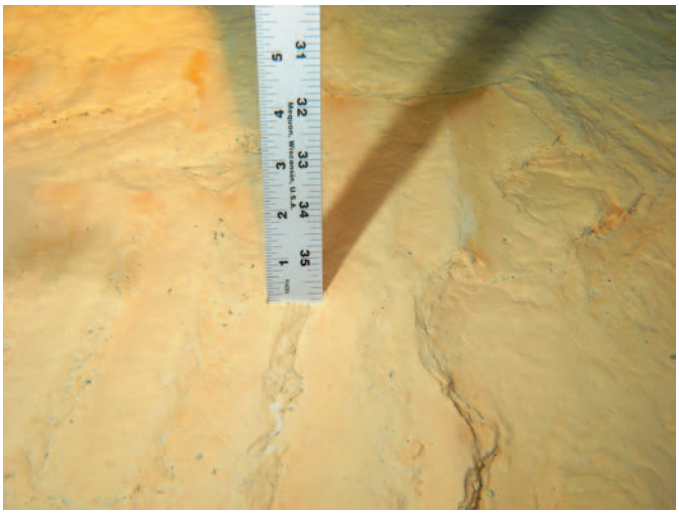
15 ***Roof Surfaces Found With Coating Failure, Blotch Rusting And Exposed Steel***

16 ***Roof Surfaces Found With Coating Failure, Blotch Rusting And Exposed Steel eel***

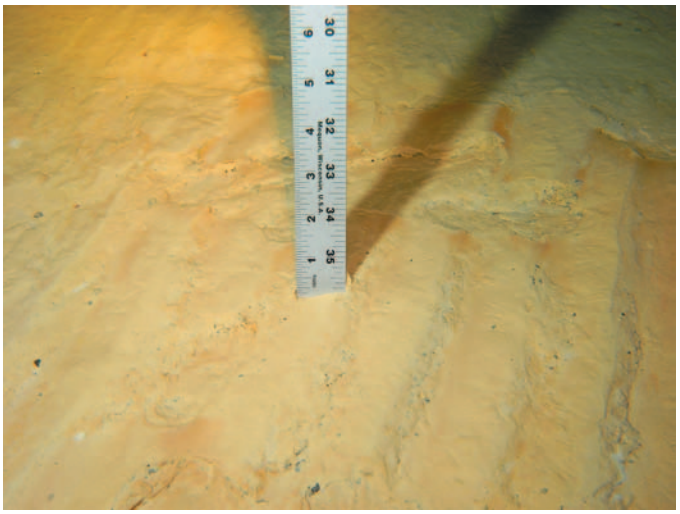
17 ***Roof Surfaces Found With Coating Failure, Blotch Rusting And Exposed Steel***

18 ***Vent***

19 ***Hatch Found With Metal Fatigue Of The Trunk***



20 ***Layer Of Precipitate***



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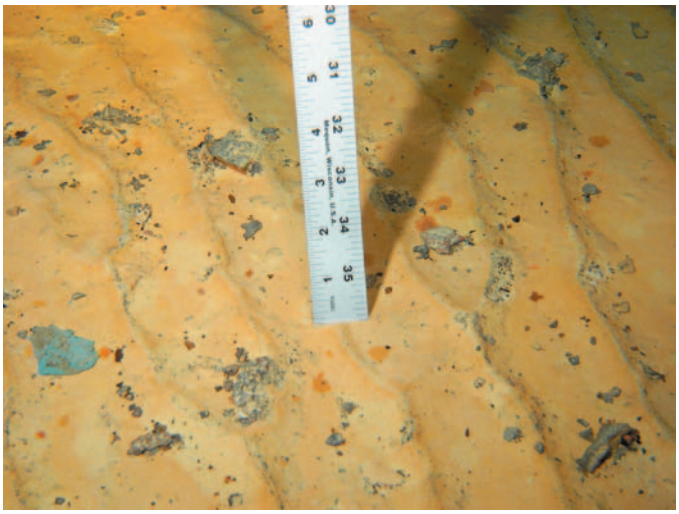

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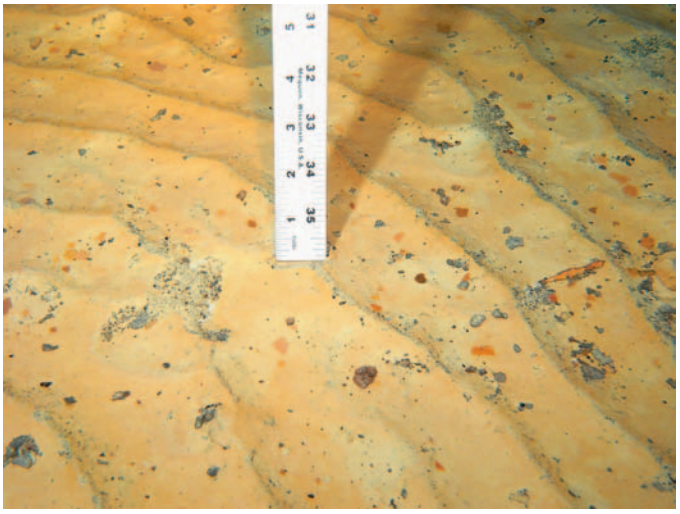

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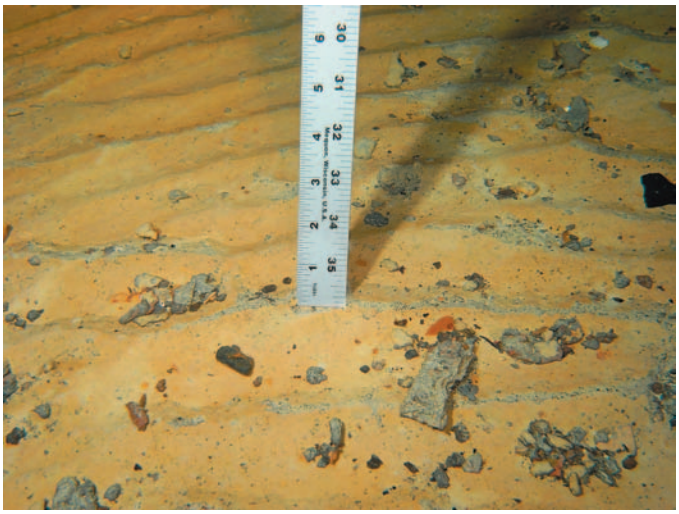

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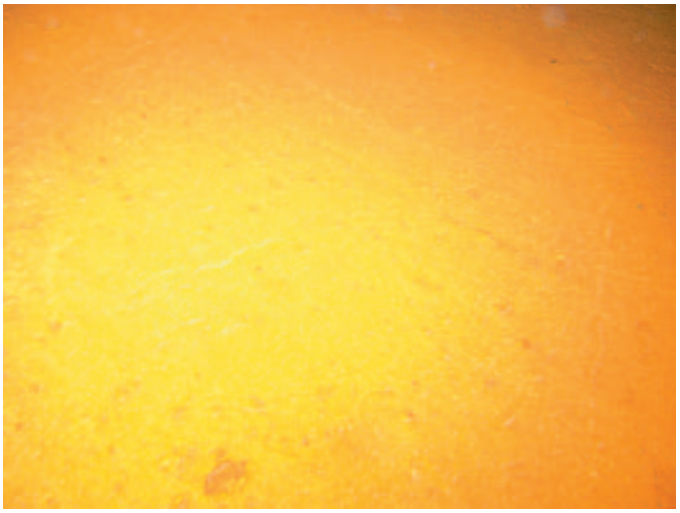
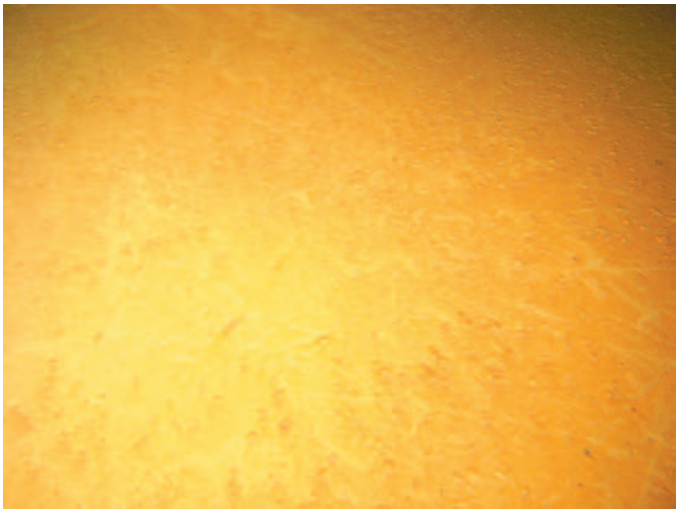


25 ***Sound Floor Surfaces With Staining After Cleaning***



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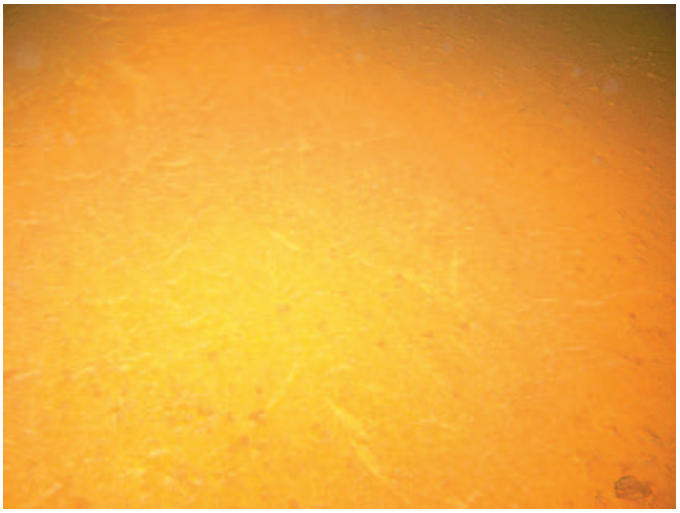
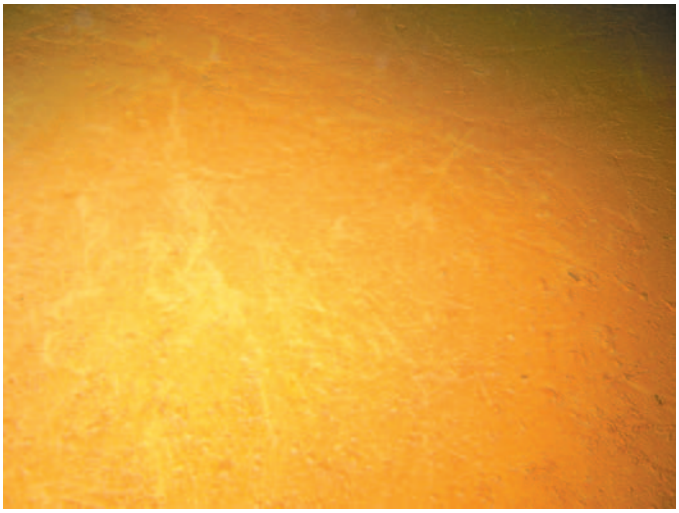
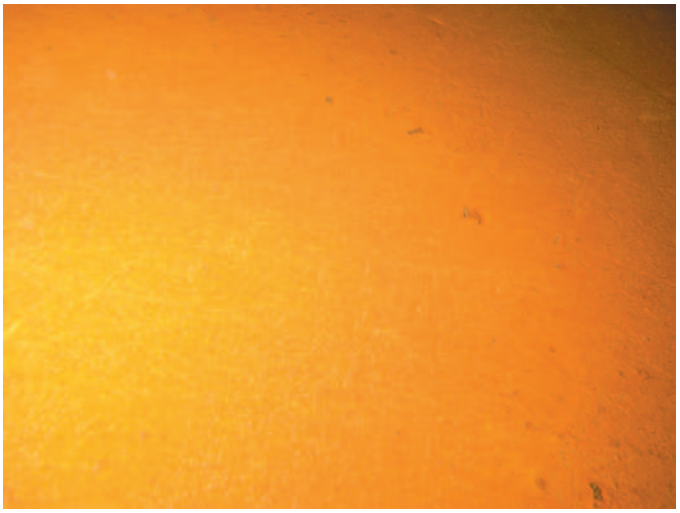


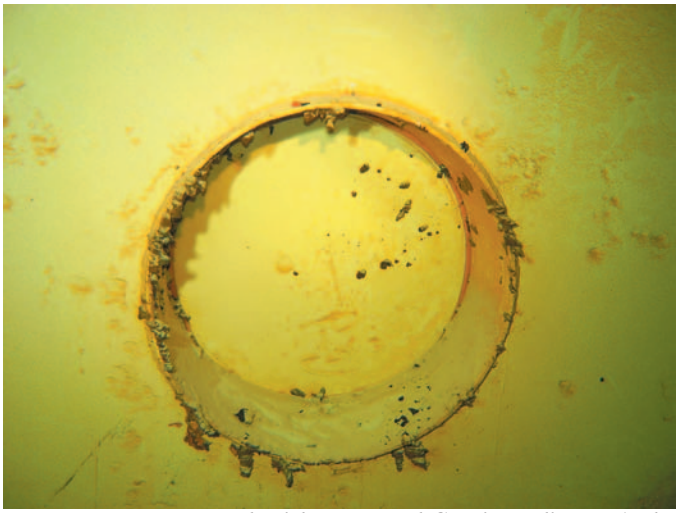
27 ***Sound Floor Surfaces With Staining After Cleaning***



28 ***Sound Floor Surfaces With Staining After Cleaning***

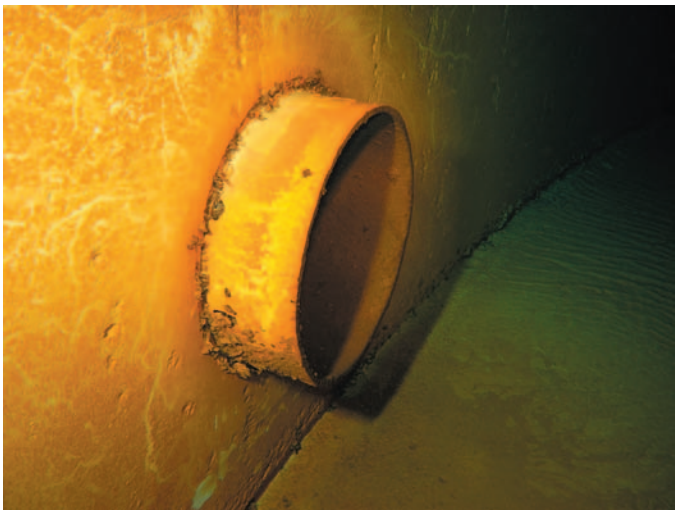


29 ***Sound Floor Surfaces With Staining After Cleaning***

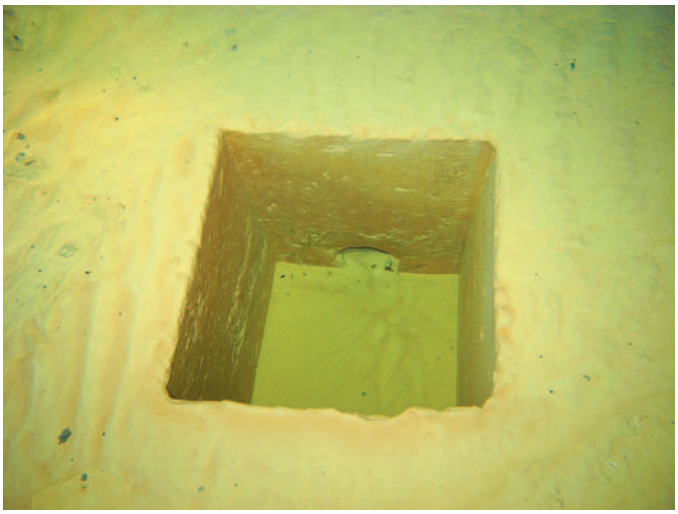


30 ***Manway Found With Ruptured Coating Blisters And Moderate Corrosion***

31 ***Piping***



32 ***Piping***



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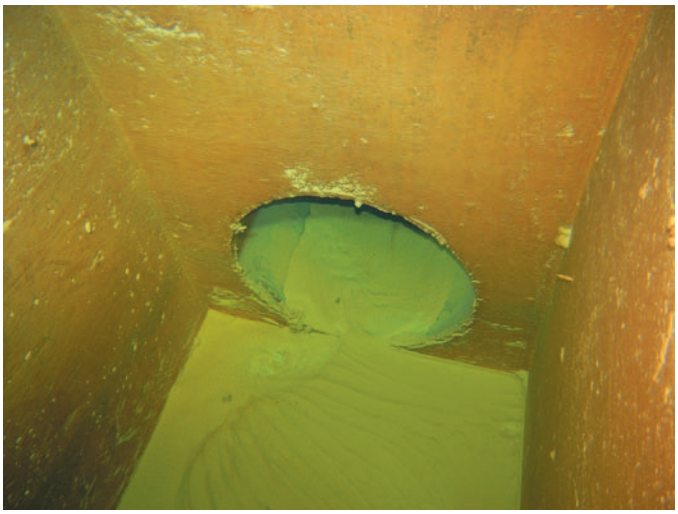
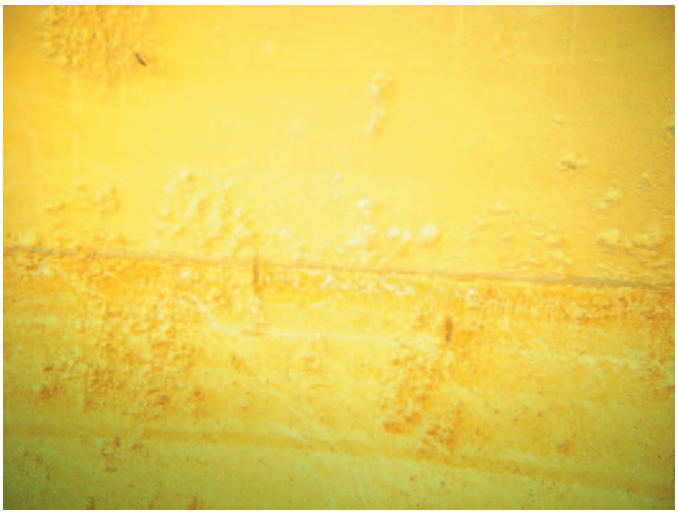
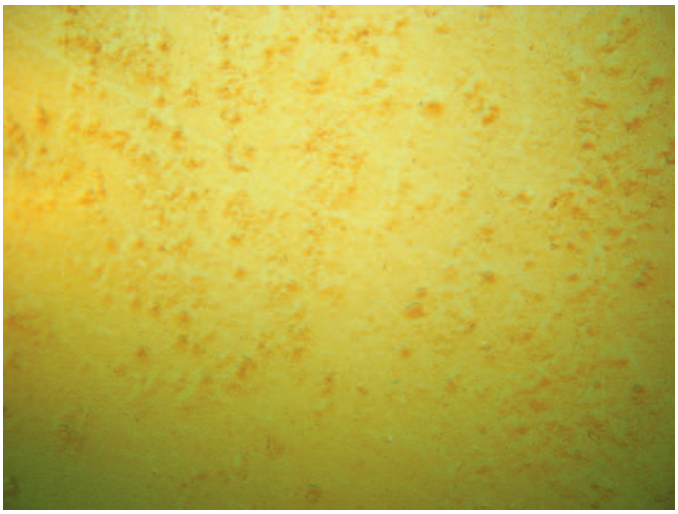


34 ***Piping***

35 ***Piping***



36 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***



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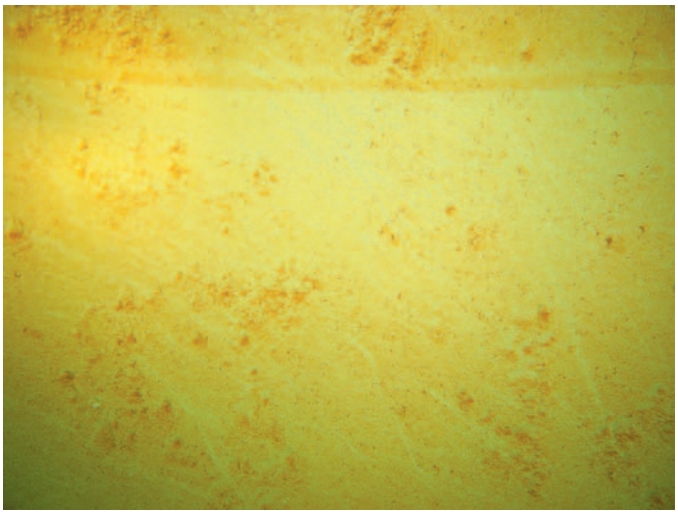

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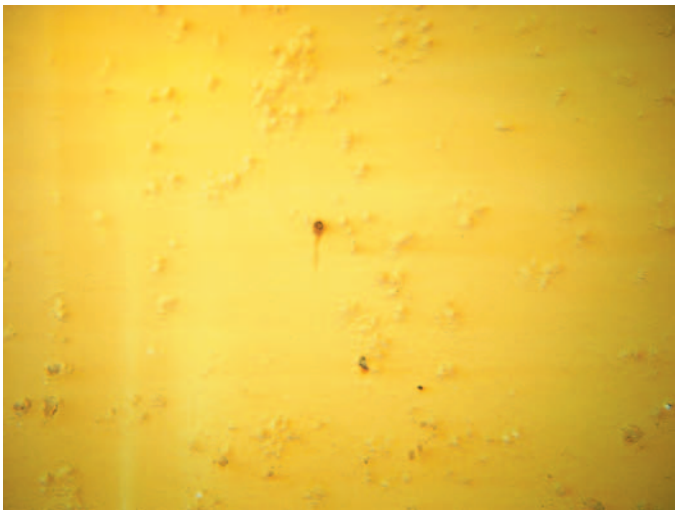
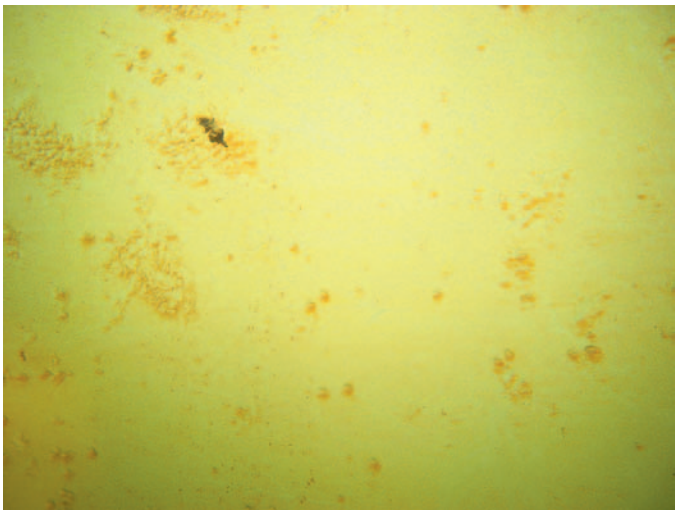


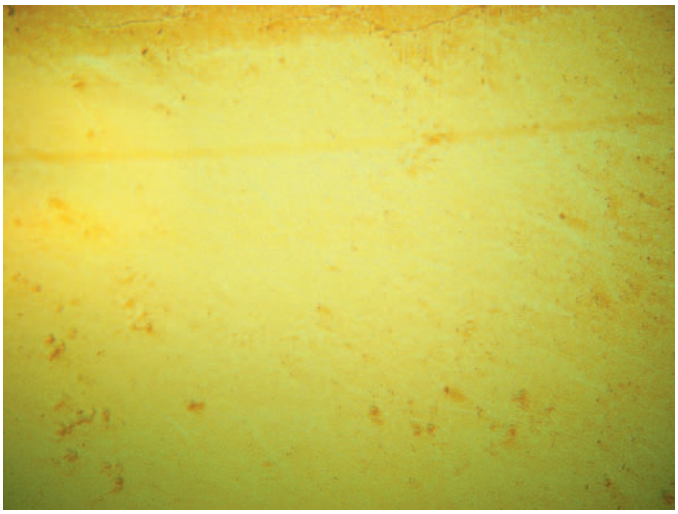
39 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***



40 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***

41 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***

42 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***



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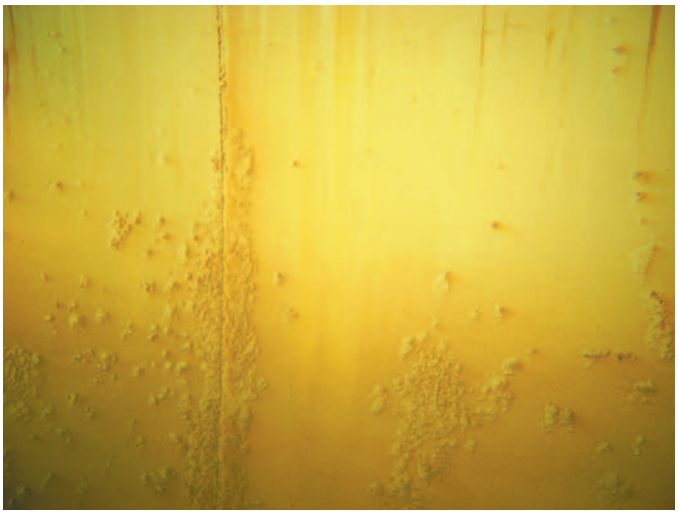

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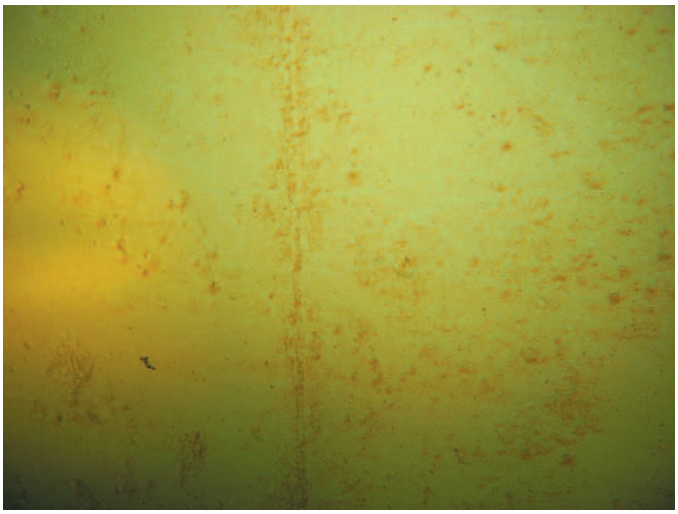
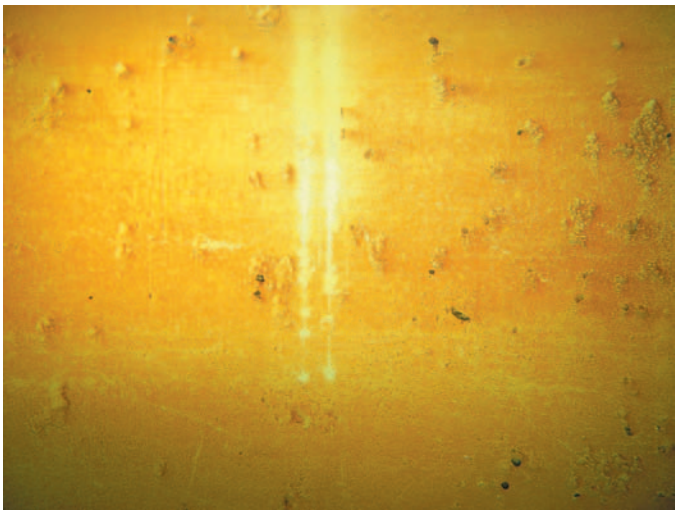


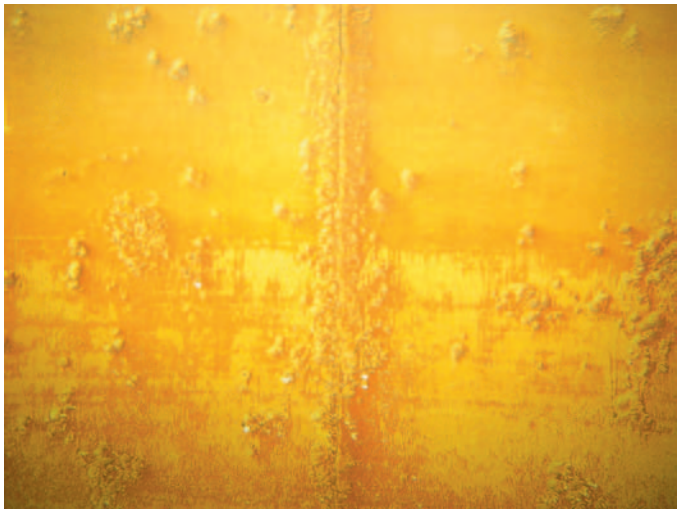
45 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***

46 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***

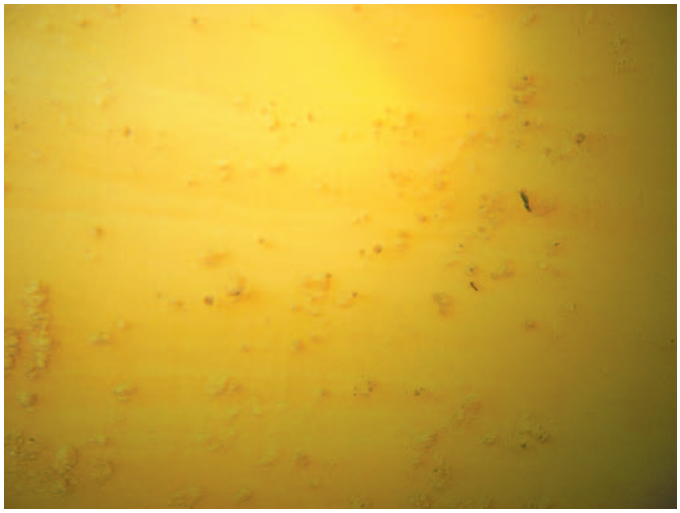
47 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***



48 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***

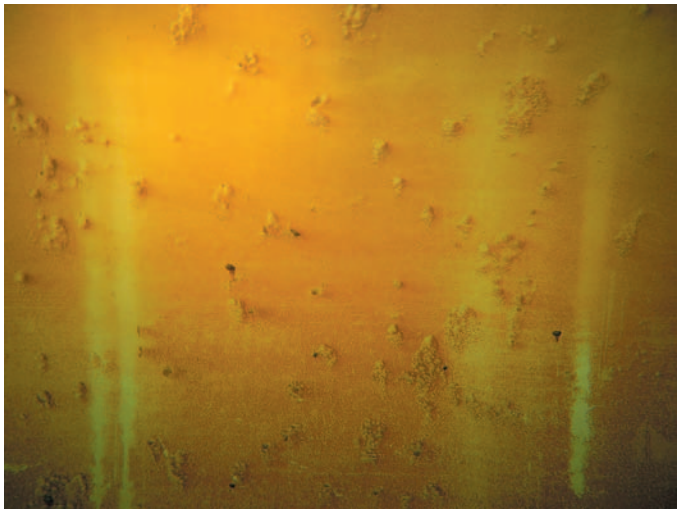


49 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***

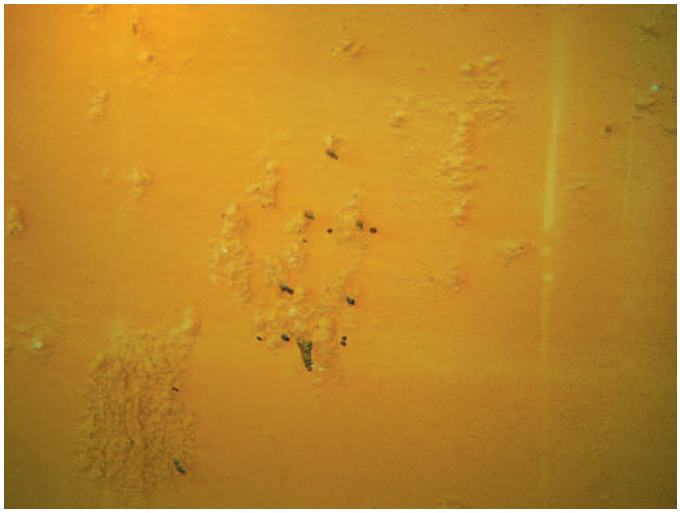


50 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***

51 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***



52 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***



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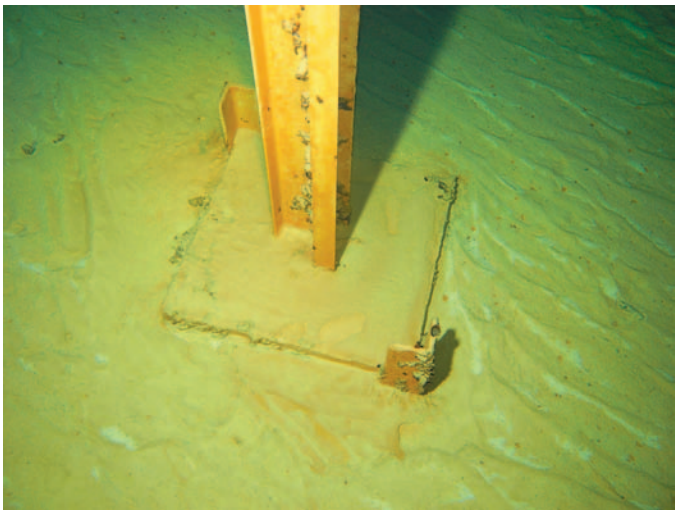
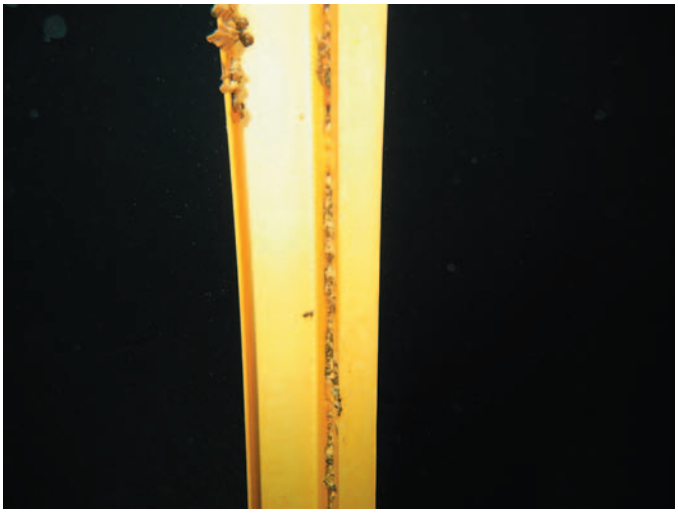
55 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***

56 ***Interior Wall Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***

57 ***Interior Ladder***



58 ***One Of Seven Support Columns Found With Coating Failure, Exposed Steel And Surface Corrosion***



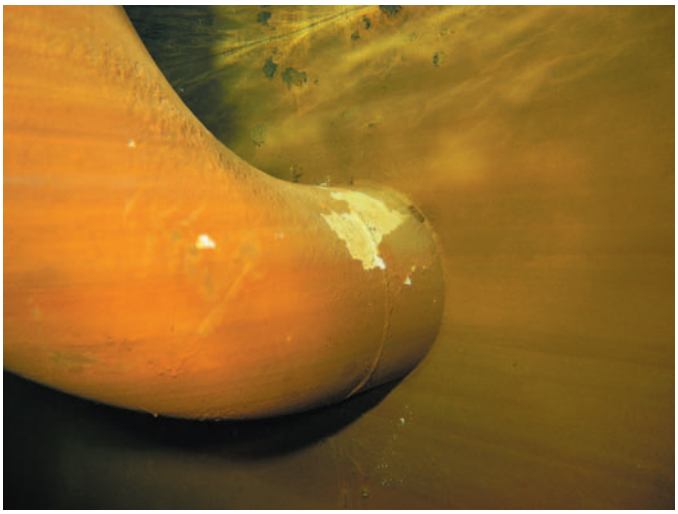
59 ***One Of Seven Support Columns Found With Coating Failure, Exposed Steel And Surface Corrosion***

60 ***One Of Seven Support Columns Found With Coating Failure, Exposed Steel And Surface Corrosion***

61 ***Overhead Surfaces Found With Coating Failure And Surface Corrosion***

62 ***Overhead Surfaces Found With Coating Failure And Surface Corrosion***

63 ***Overhead Surfaces Found With Coating Failure And Surface Corrosion***



64 ***Overflow Found Unobstructed***

65 ***Overflow Found Unobstructed***

66 ***Discharge During Cleaning***

Exhibit 5

Inspection Report for 1.5 Million Gallon Tank

The attached report is provided for informational purposes. The Owner and the Engineer make no guarantee, either expressed or implied, as to its accuracy or completeness.

UNDERWATER SOLUTIONS INC.

INSPECTION AND CLEANING OF THE 1.5-MILLION GALLON WELDED STEEL WATER STORAGE TANK

CITY OF NORTH MIAMI WATER TREATMENT PLANT
NORTH MIAMI, FLORIDA

FEBRUARY 10, 2009

INSPECTION AND CLEANING OF THE 1.5-MILLION GALLON WELDED STEEL WATER STORAGE TANK

CITY OF NORTH MIAMI WATER TREATMENT PLANT NORTH MIAMI, FLORIDA

FEBRUARY 10, 2009

SCOPE:

On February 10, 2009, Underwater Solutions Inc. conducted an inspection of the 1.5-million gallon welded steel water storage tank to provide information regarding the overall condition and integrity of this structure and removed the sediment accumulation found on the floor of the structure.

EXTERIOR INSPECTION:

The entire exterior of this water storage tank (and components) was inspected to include walls and coating, manway, ladder, overflow, roof, vent and hatch.

Walls and Coating

The exterior wall surfaces were inspected and found to appear sound while several coating chips, ranging from 1/8" to 3/4" in diameter, were found on approximately 5% of the walls throughout all elevations of the tank.

These coating chips appear to be the result of objects striking these surfaces and cause mild surface corrosion of the exposed steel.

No obvious steel fatigue (pitting) was witnessed at the time of this inspection.

The remainder of these wall surfaces were found with reduced film thickness of the protective coating. This condition is due to weathering, which has caused the coating to become chalky.

Manway

One 24" inside diameter manway was inspected penetrating the lowest wall panel located approximately 14" above the ground.

This manway was found securely bolted in place and with no obvious leakage at the time of this inspection.

Ladder

A ladder extends from 8' above the ground up to the roof supported to the tank wall with two sets of welded standoffs.

This entire structure was found in good condition and provides good safe access to the roof at this time.

Overflow

A 12" inside diameter overflow pipe exits the top wall panel of the tank, located approximately 21" below the roof and wall junction, and extends away from the tank approximately 14".

This overflow pipe was found with a secure screen properly installed, yet several 2" diameter holes were seen within this screen.

This overflow was found unobstructed at the time of this inspection.

Roof

The roof of this water storage tank was found with mostly sound conditions.

The protective coating applied to these roof surfaces has become weathered, reducing the film thickness. This condition causes poor adhesion value, resulting in cracking of the coating and blotch rusting on approximately 10% of these surfaces.

Within all areas where the protective coating has cracked, exposure of the underlying steel was found, yet no obvious steel fatigue (pitting) was witnessed at the time of this inspection.

Vent

The vent is located within the center of the roof having a 12" inside diameter and stands 12" tall.

A 14" outside diameter cap was found securely installed over this vent while the perimeter screening is loose, causing gaps between the cap and vent. This condition allows access to the interior of the tank.

Hatch

One 24" inside diameter hatch provides access to the interior of the tank through the roof.

The hatch lid was found in working condition, yet extensive fatigue of the steel has caused gaps and holes throughout the circumference of the hatch trunk, allowing access to the interior of the tank.

INTERIOR INSPECTION:

The entire interior of this water storage tank (and components) was inspected to include sediment accumulations, floor, manway, piping, walls and coating, ladder, support columns, overhead, overflow and aesthetic water quality.

Sediment Accumulations

A non-uniform layer of accumulated precipitate was found on all floor surfaces averaging 2" in depth.

Upon completing this inspection, all floor surfaces were vacuumed.

Floor

After removing all accumulated precipitate, these steel floor panel surfaces, to include the welds between each panel, were inspected and found with mostly sound conditions while coating failure exposes the primary coating system and the underlying steel in several areas.

The protective coating applied to these surfaces was found with adhesion loss causing blistering throughout approximately 5% of the floor surfaces.

Approximately 15% of these coating blisters have ruptured, causing exposure of the primary coating system and underlying steel, resulting in moderate surface corrosion.

No obvious steel fatigue (pitting) was witnessed at the time of this inspection.

Moderate staining exists throughout all floor surfaces due to the accumulation of precipitate.

Manway

One 24" inside diameter manway was inspected from the interior of the tank penetrating the lowest wall panel located approximately 18" above the floor.

This manway was found securely in place and free of obvious leakage at the time of this inspection.

Piping

Six pipes were inspected within this water storage tank.

The first and second pipe inspected, penetrate the tank wall located approximately 20" above the floor. Each pipe has an 8" inside diameter and extends into the tank approximately 5" through 90º elbows directing each pipe down. These pipes then terminate approximately 7" above the floor.

No flow was detected within either of these pipes at the time of this inspection.

The third pipe inspected, penetrates the tank wall located approximately 12" above the floor. This pipe has a 24" inside diameter and is flush within the wall.

Flow was leaving the tank through this pipe at the time of this inspection.

The fourth pipe inspected, penetrates the tank wall located approximately 14" above the floor. This pipe has a 15" inside diameter and extends into the tank approximately 10".

No flow was detected within this pipe at the time of this inspection.

The fifth pipe inspected, penetrates the tank wall located approximately 13" above the floor. This pipe has a 15" inside diameter and extends into the tank 4".

Flow was entering the tank through this pipe at the time of this inspection.

The sixth and final pipe inspected, penetrates the tank wall located approximately 10" above the floor.

This pipe has a 6" inside diameter and extends into the tank approximately 5" through a 90º elbow directing the pipe down. This pipe then terminates approximately 7" above the floor of a 24" inside diameter by 10" deep sump within the floor of the tank.

No flow was detected within this pipe at the time of this inspection.

All piping was found without obstructions at the time of this inspection.

Walls and Coating

All interior wall surfaces were inspected beginning at the floor and spiraling the circumference up to the water surface.

The protective coating applied to these surfaces shows signs of expiration.

Coating blisters were found throughout approximately 5% of all wall panel surfaces, to include all welds between each panel, due to adhesion loss.

At the time of this inspection, none of the blisters had ruptured, as no exposure of the underlying steel was witnessed.

Heavy staining exists on all wall surfaces beginning approximately 10" below the overflow and extending down to the floor.

Ladder

A ladder extends from the floor up to the entry hatch supported to the wall with three sets of bolted standoffs.

Although this ladder was found securely attached to the wall, the top three rungs have extensive fatigue of the steel resulting in failure and instability.

Support Columns

Six 3" by 8" "I" beam support columns extend from 5' by 5' by 8" tall "H" beam footers up to the "I" beam supports in the overhead.

Each column appears sound while the protective coating has failed throughout all elevations of these columns resulting in exposure of the steel causing moderate surface corrosion.

Overhead

The entire overhead was inspected from the water surface.

These overhead panels, to include all supports, were found sound and without obvious fatigue or failures at the time of this inspection.

The protective coating applied to these overhead surfaces, to include all supports, appears to have poor adhesion value due to reduced film thickness and expiration. This condition causes blotch rusting to show through the coating throughout approximately 50% of these surfaces at this time.

Overflow

The overflow consists of a 36" by 18" by 18" deep welded box in the top wall panel of the tank located approximately 2" below the roof and wall junction.

This overflow was found without obstructions at the time of this inspection.

Aesthetic Water Quality

The aesthetic water quality within this tank was found to be good.

This condition allowed our visibility during this inspection to be unlimited.

CONCLUSION:

It is the opinion of Underwater Solutions Inc. that this water storage tank appears mostly sound and without leakage at this time, yet requires rehabilitation within the near future.

The exterior walls appear sound and without obvious fatigue (pitting) of the steel at this time.

The protective coating applied to these wall surfaces was found weathered, causing reduced film thickness and chalky coating.

Several coating chips, appearing to be caused by objects striking these surfaces, have exposed the underlying steel resulting in mild surface corrosion.

All roof surfaces were found without obvious fatigue or failure (pitting) of the steel.

The protective coating applied to these roof surfaces was found having poor adhesion value and reduced film thickness caused from weathering, resulting in cracking of the coating and blotch rusting.

All components affixed to this structure were found properly installed while the screen on the vent is loose allowing gaps and the screen on the overflow has several large holes allowing access to the interior of the tank.

We recommend immediately replacing the screens on both the vent and overflow in an effort to prevent access.

The trunk for the hatch was found with extensive fatigue of the steel, resulting in gaps and holes, allowing access to the tank interior when the lid is closed.

We recommend immediately repairing the trunk for the hatch in an effort to allow the lid to close properly and prevent unwanted access to the interior of the tank.

The protective coating applied to the interior walls, floor, support columns and overhead surfaces was found with poor adhesion value causing blistering of the coating. Numerous coating blisters have ruptured throughout the floor and support columns resulting in exposure of the underlying steel and causes surface corrosion.

We recommend recoating all interior surfaces of the tank using an A.N.S.I. / N.S.F.61 approved coating for use in structures containing potable water and should be done within the near future, as continued exposure of the steel will result in metal fatigue (pitting) and eventually result in failure.

The interior ladder was found securely supported to the wall, yet the top three rungs have extensive fatigue of the steel (pitting) resulting in failure and instability of this section.

We recommend immediately replacing or repairing the interior ladder in an effort to provide good safe access to the interior of the tank.

We recommend all repairs be completed under the guidance, supervision and plans produced by a professional engineer licensed in the state of Florida with specific professional expertise with such work.

All piping within this structure remains securely in place and free of obstructions at this time.

Upon completing this inspection, all floor surfaces were vacuumed.

As always, we recommend re-inspection and cleaning of all water storage facilities in accordance with A.W.W.A. Standards and local guidelines.

_____
UNDERWATER SOLUTIONS INC.
Christopher A. Cole, Project Manager

This report, the conclusions, recommendations and comments prepared by Underwater Solutions Inc. are based upon spot examination from readily accessible parts of the tank. Should latent defects or conditions which vary significantly from those described in the report be discovered at a later date, these should be brought to the attention of a qualified individual at that time. These comments and recommendations should be viewed as information to be used by the Owner in determining the proper course of action and not to replace a complete set of specifications. All repairs should be done in accordance with A.W.W.A. and/or other applicable standards.

CAC/jld

1 ***Exterior Wall Surfaces Found With Coating Chips, Exposed Steel And Mild Corrosion***

2 ***Exterior Wall Surfaces Found With Coating Chips, Exposed Steel And Mild Corrosion***

3 ***Exterior Wall Surfaces Found With Coating Chips, Exposed Steel And Mild Corrosion***

4 ***Exterior Wall Surfaces Found With Coating Chips, Exposed Steel And Mild Corrosion***

5 ***Exterior Wall Surfaces Found With Coating Chips, Exposed Steel And Mild Corrosion***

6 ***Exterior Wall Surfaces Found With Coating Chips, Exposed Steel And Mild Corrosion***

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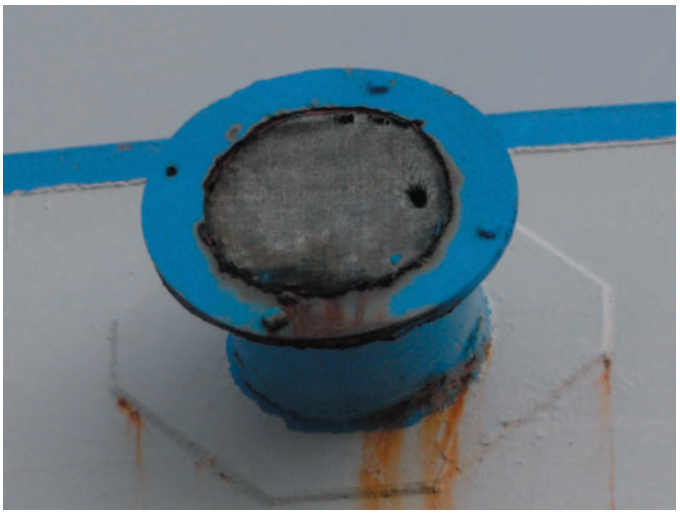
11 ***Manway***

12 ***Ladder***

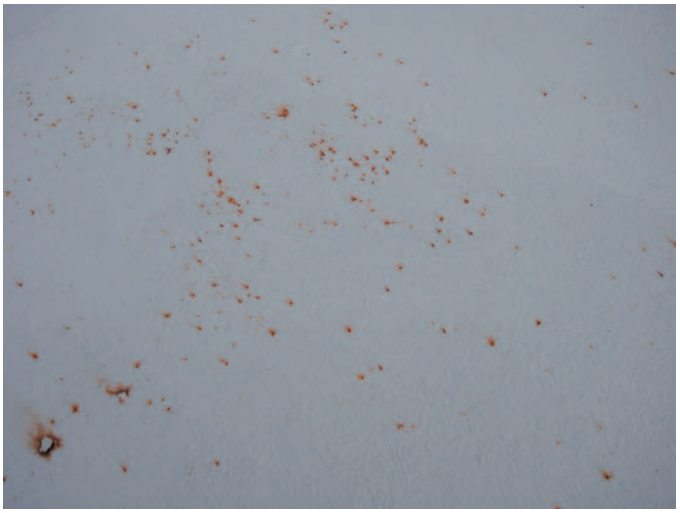


13 ***Overflow Found With Failure Of The Screen***

14 ***Roof Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***

15 ***Roof Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***

16 ***Roof Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***



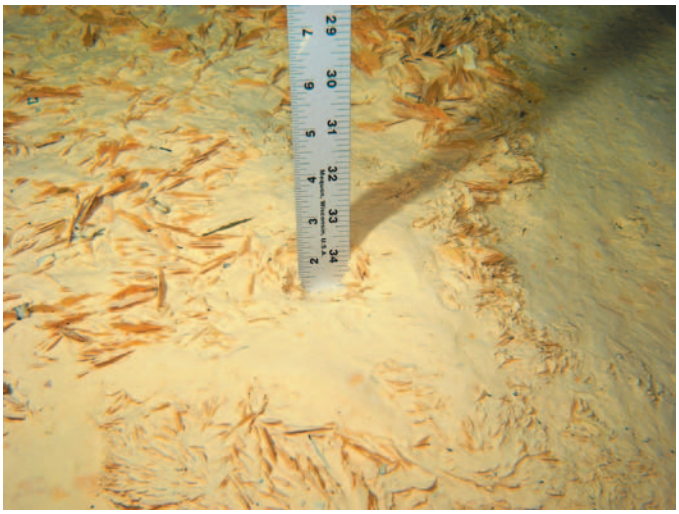
17 ***Roof Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***

18 ***Roof Surfaces Found With Coating Failure, Exposed Steel And Surface Corrosion***

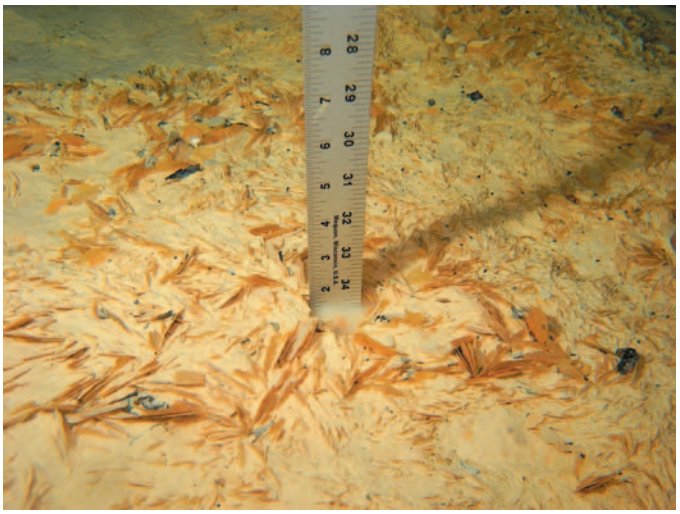
19 ***Vent***

20 ***Vent Found With Loose Perimeter Screening***

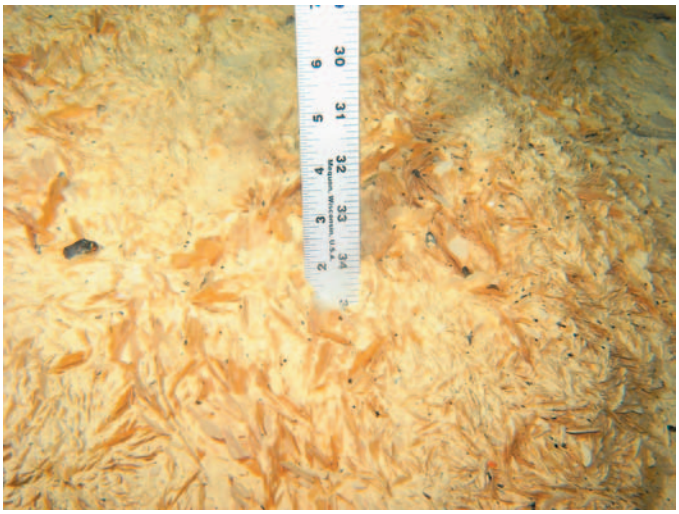
21 ***Hatch Having Failure Of Steel Trunk***



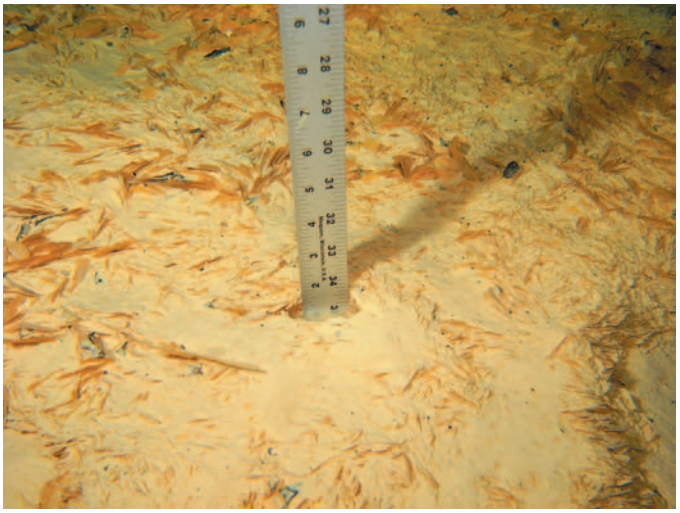
22 ***Layer Of Precipitate***



23 ***Layer Of Precipitate***



24 ***Layer Of Precipitate***



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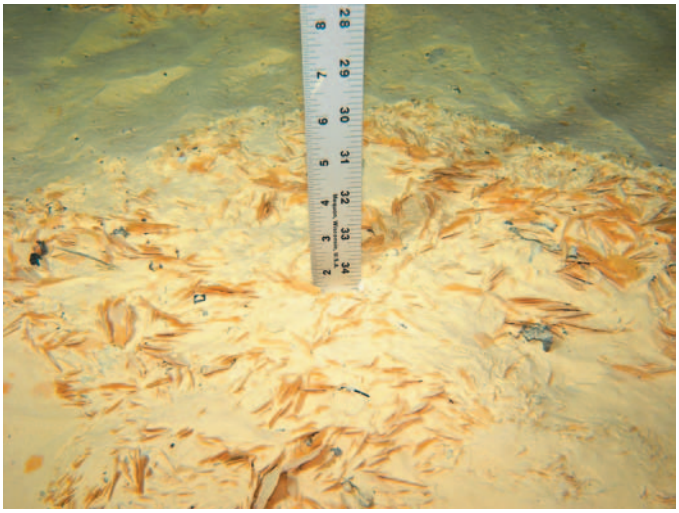
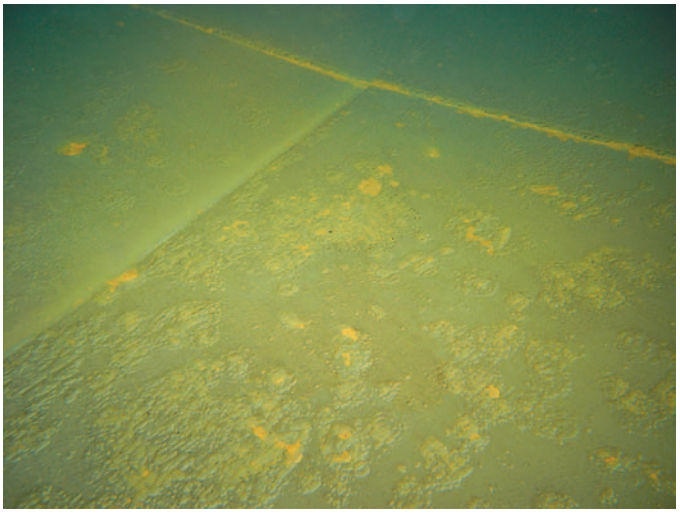
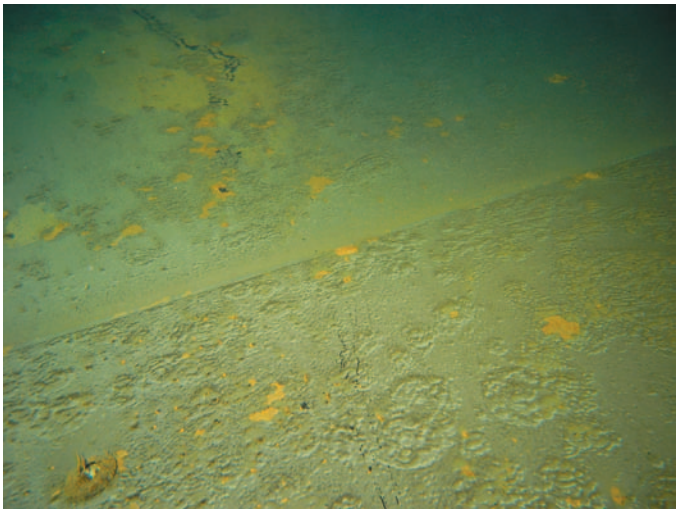


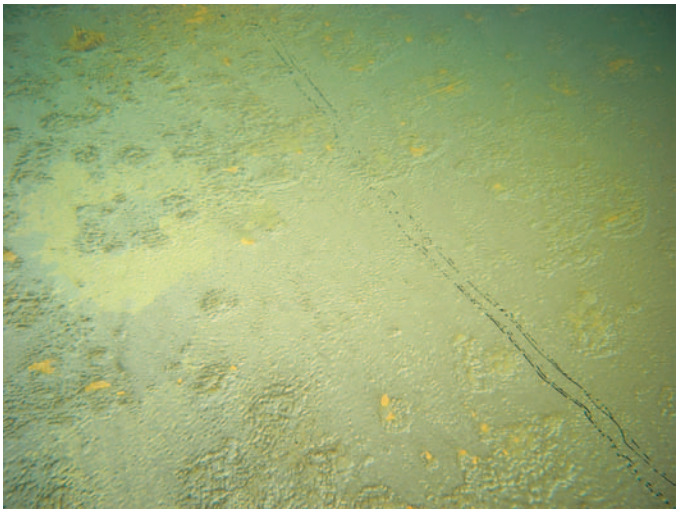
26 ***Layer Of Precipitate***



27 ***Floor Surfaces Found With Coating Failure And Surface Corrosion After Cleaning***

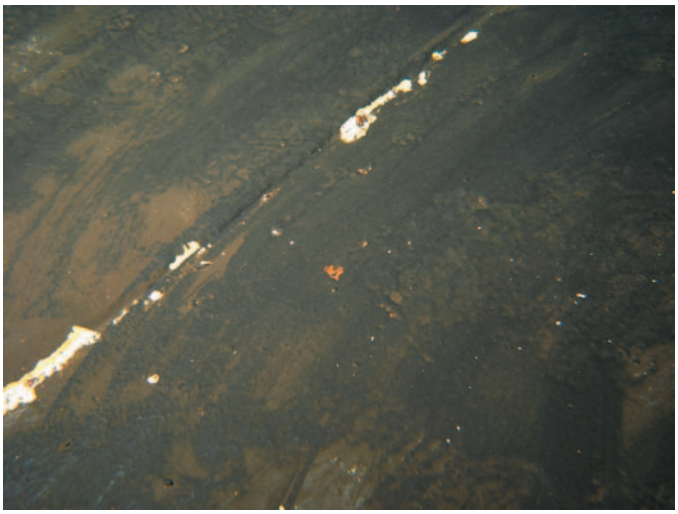


28 ***Floor Surfaces Found With Coating Failure And Surface Corrosion After Cleaning***

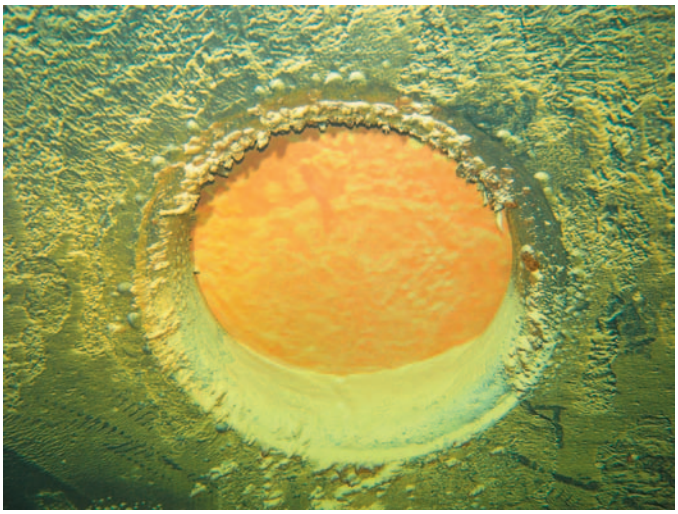


29 ***Floor Surfaces Found With Coating Failure And Surface Corrosion After Cleaning***

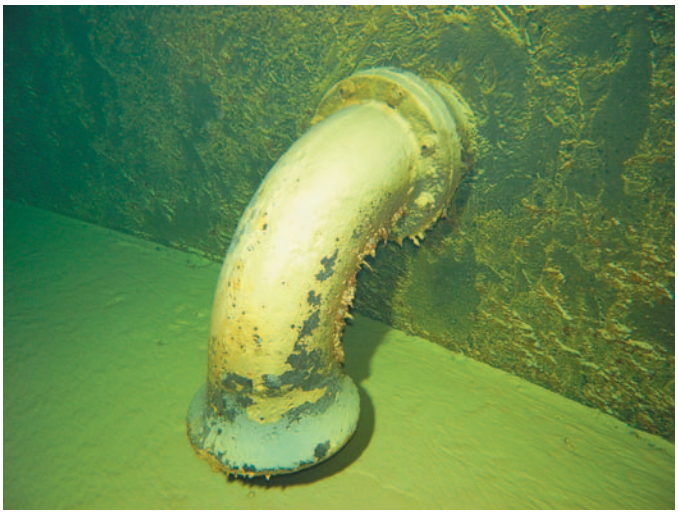
30 ***Floor Surfaces Found With Coating Failure And Surface Corrosion After Cleaning***



31 ***Floor Surfaces Found With Coating Failure And Surface Corrosion After Cleaning***

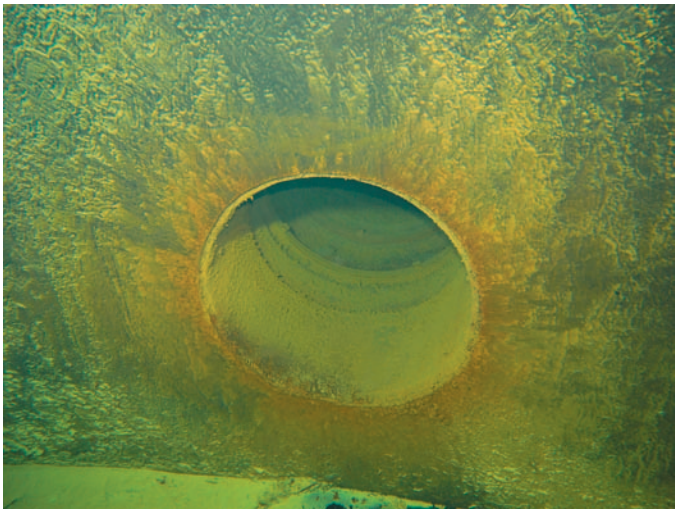


32 ***Manway***

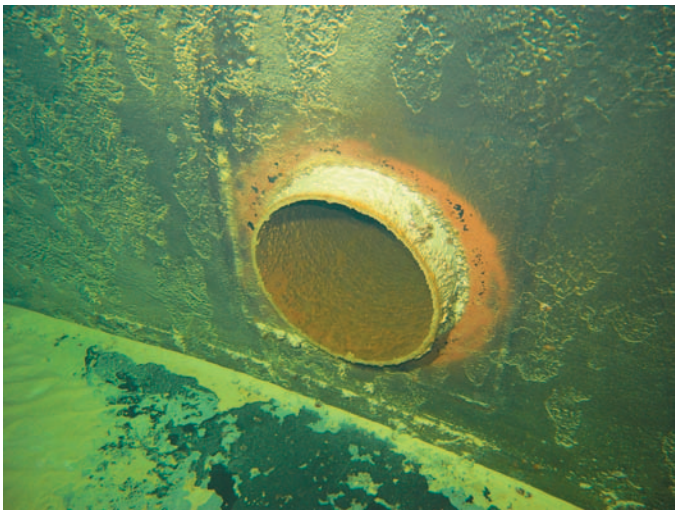


33 ***Piping***

34 ***Piping***

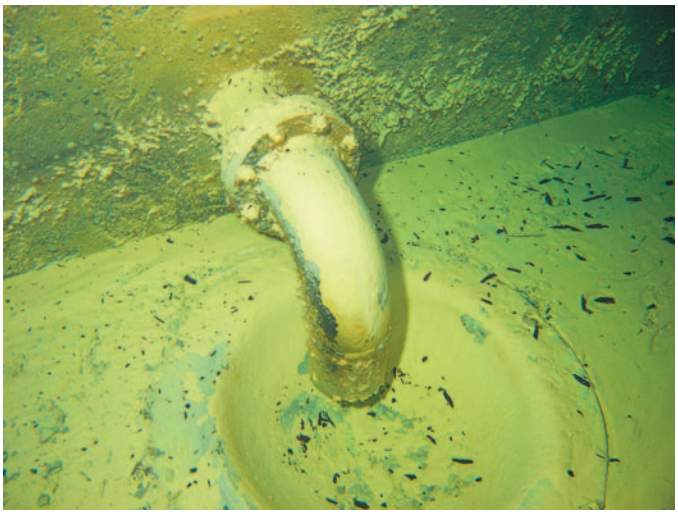


35 ***Piping***

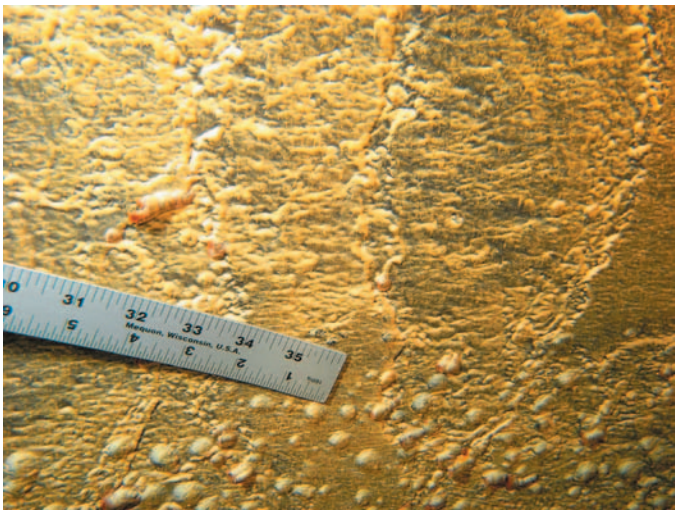


36 ***Piping***

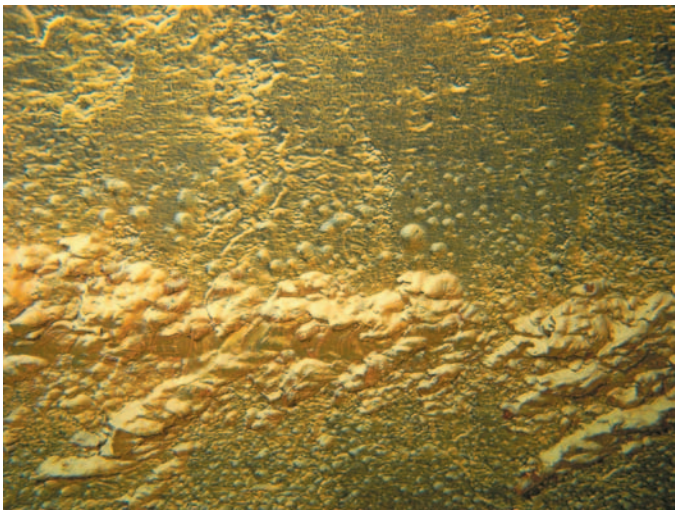
37 ***Piping***



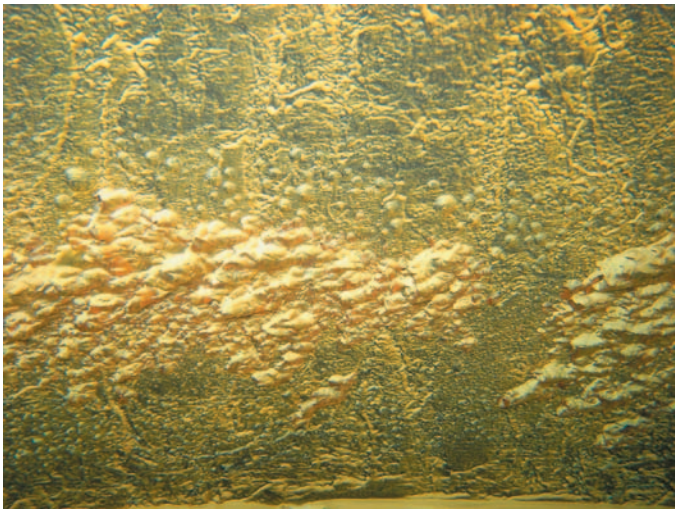
38 ***Piping***



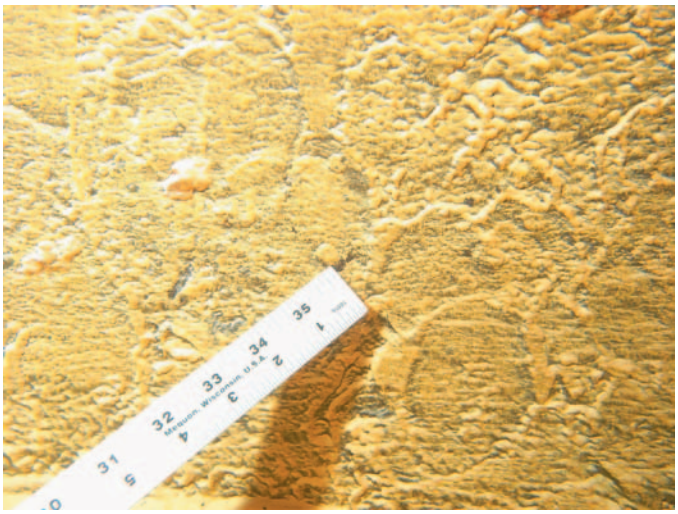
39 ***Interior Wall Surfaces Found With Coating Failure And Staining***



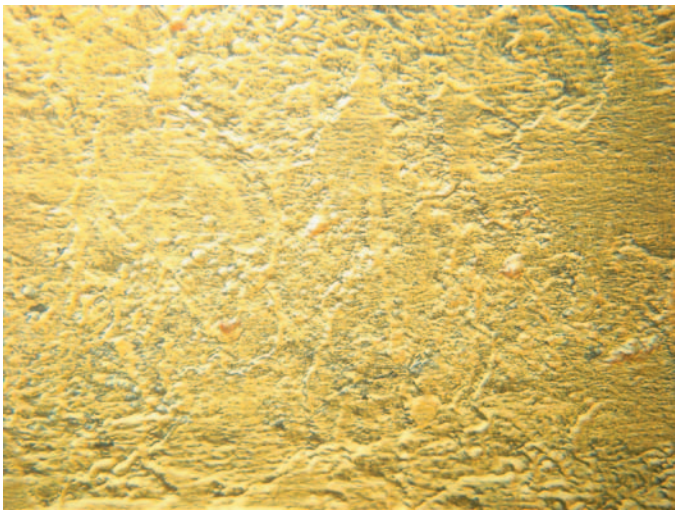
40 ***Interior Wall Surfaces Found With Coating Failure And Staining***



41 ***Interior Wall Surfaces Found With Coating Failure And Staining***



42 ***Interior Wall Surfaces Found With Coating Failure And Stainings***



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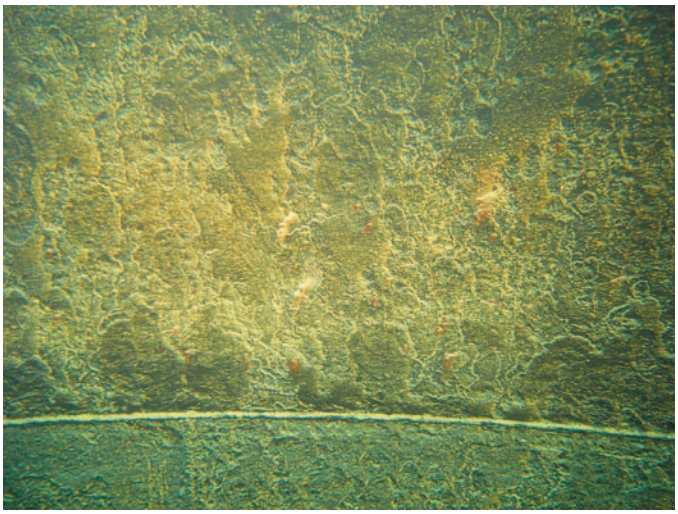

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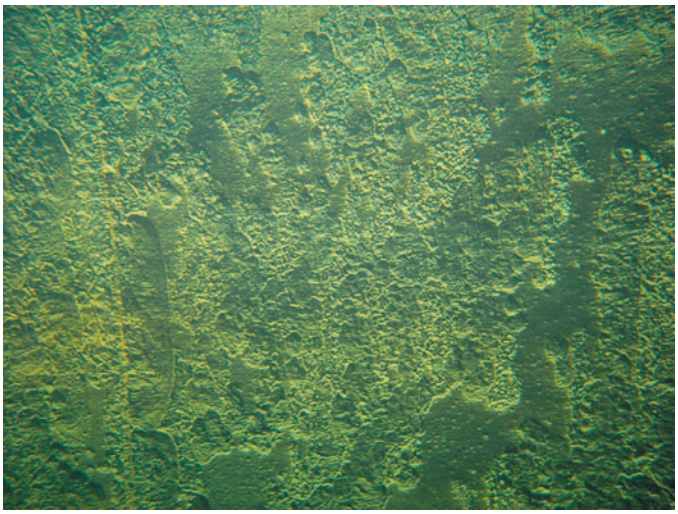
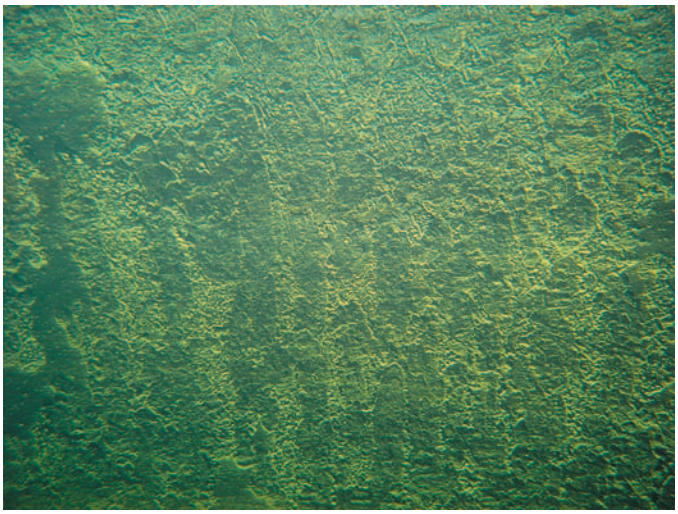
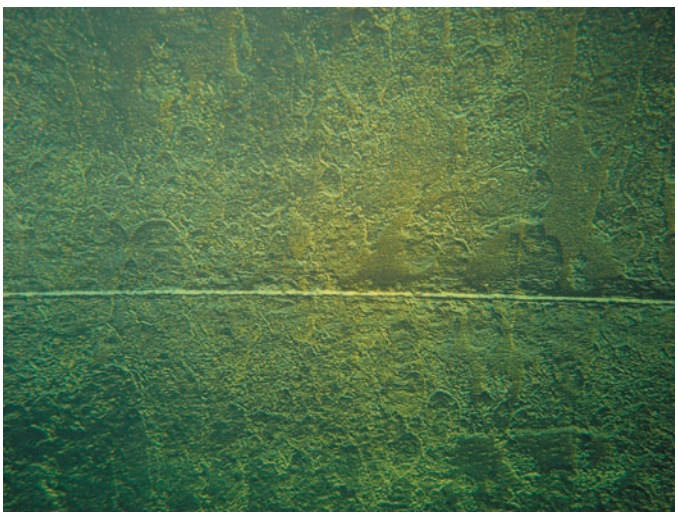


45 ***Interior Wall Surfaces Found With Coating Failure And Staining***



46 ***Interior Wall Surfaces Found With Coating Failure And Staining***

47 ***Interior Wall Surfaces Found With Coating Failure And Staining***



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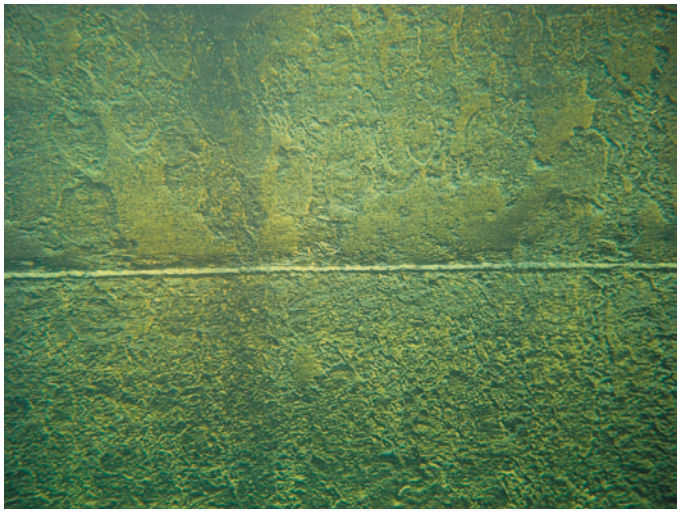
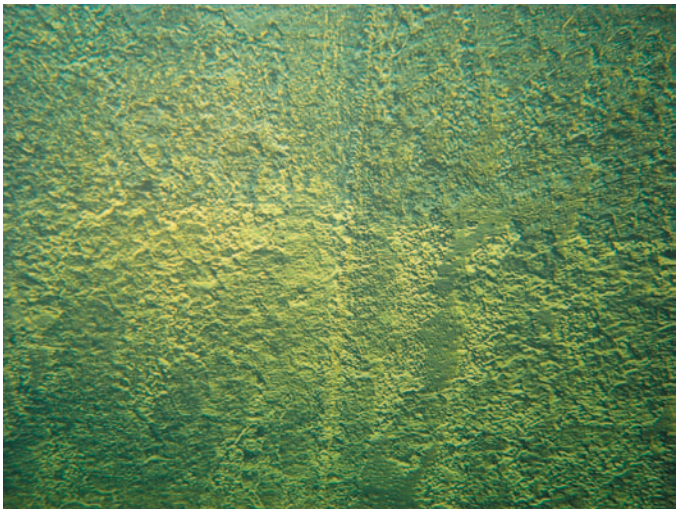
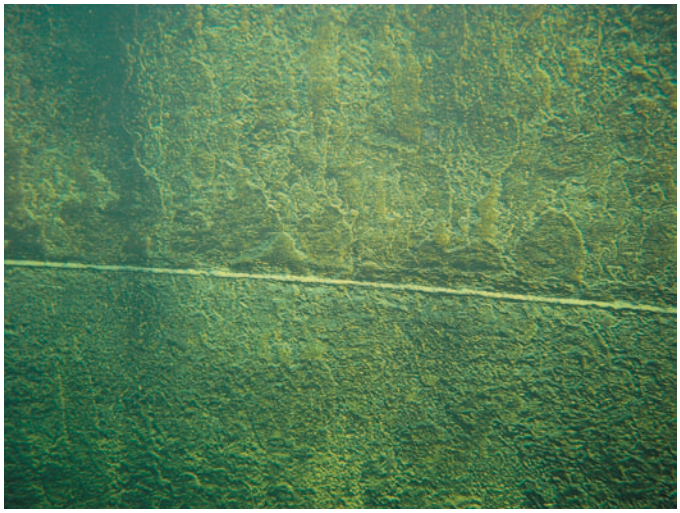


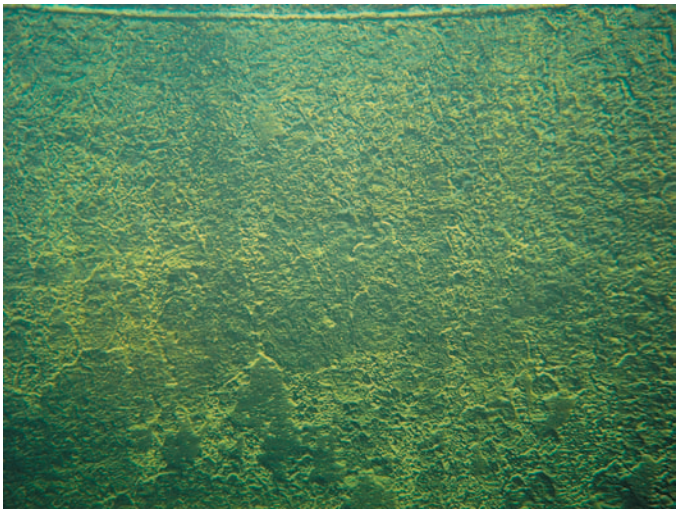
49 ***Interior Wall Surfaces Found With Coating Failure And Staining***



50 ***Interior Wall Surfaces Found With Coating Failure And Staining***



51 ***Interior Wall Surfaces Found With Coating Failure And Staining***



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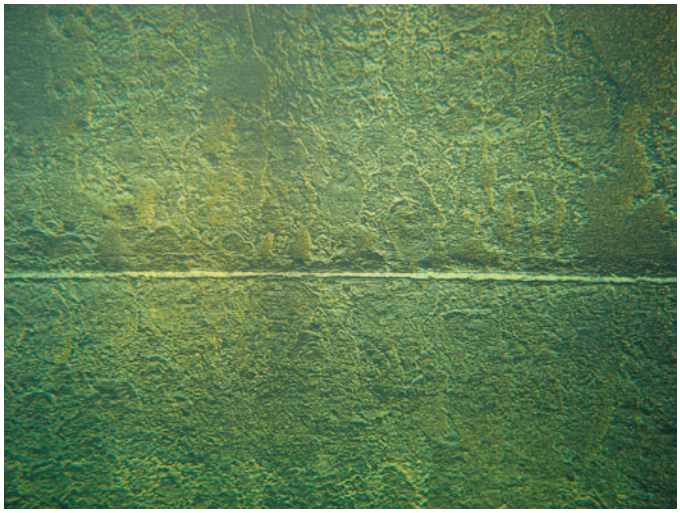
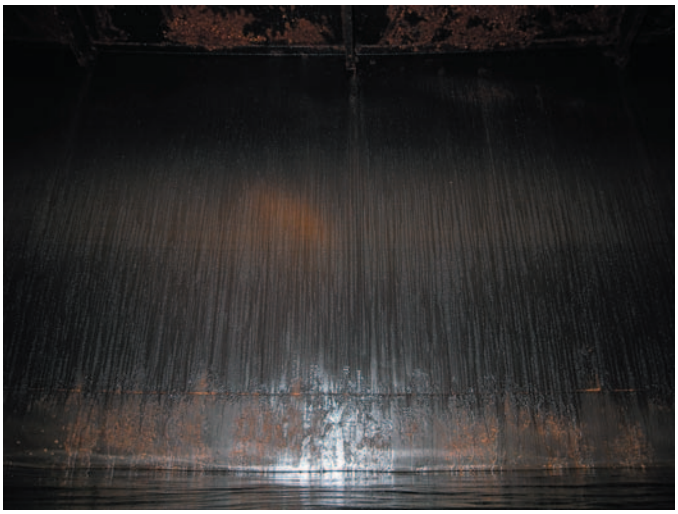


53 ***Interior Wall Surfaces Found With Coating Failure And Staining***

54 ***Interior Wall Surfaces Found With Coating Failure And Staining***

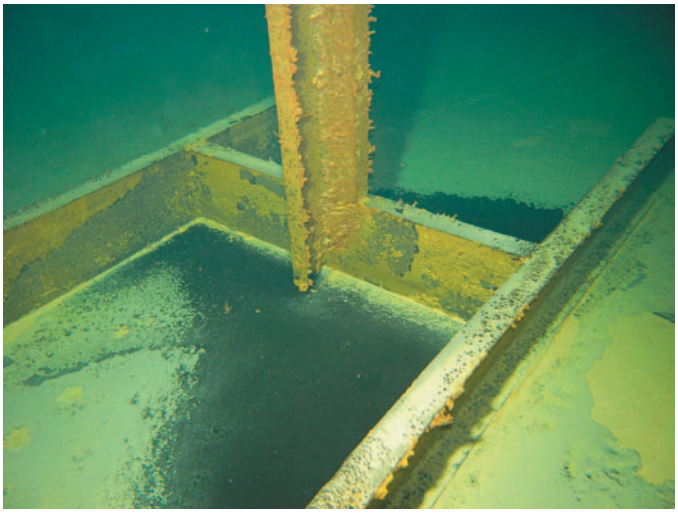
55 *Interior Wall Surfaces Found With Coating Failure And Staining*



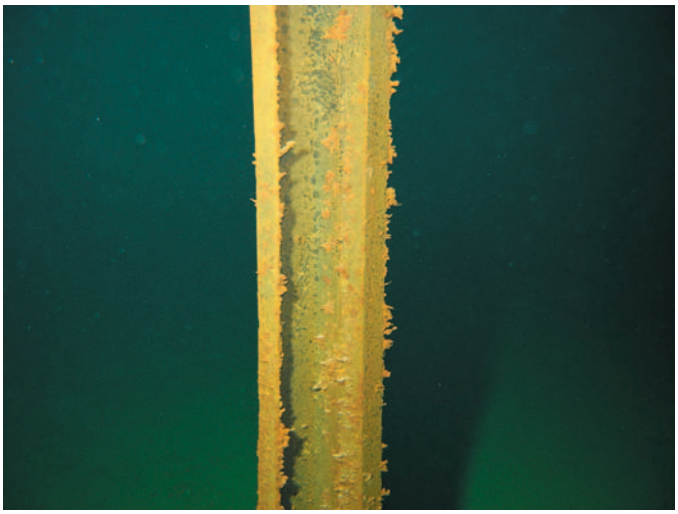
56 *Interior Wall Surfaces Found With Coating Failure And Staining*

57 *Interior Ladder*

58 *Top Three Rungs Of Ladder Having Extensive Fatigue Of The Steel*



59 *One Of Three Support Column Found With Coating Failure, Exposed Steel And Corrosion*

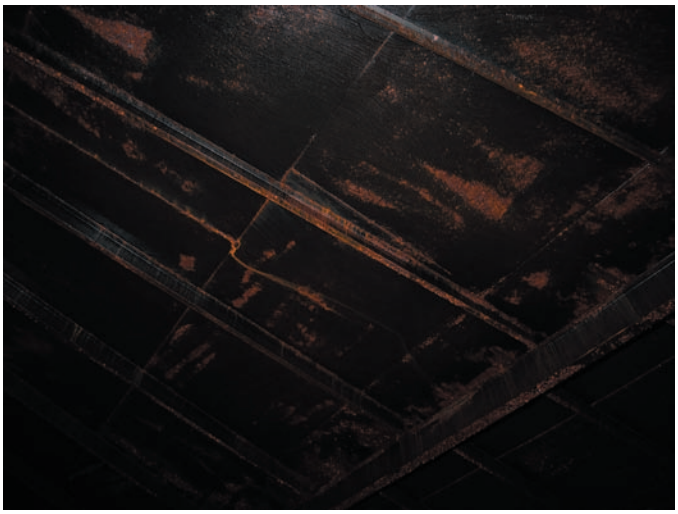


60 *One Of Three Support Column Found With Coating Failure, Exposed Steel And Corrosion*

61 ***One Of Three Support Column Found With Coating Failure, Exposed Steel And Corrosion***

62 ***Overhead Surfaces Found With Poor Coating Adhesion And Blotch Rusting***

63 ***Overhead Surfaces Found With Poor Coating Adhesion And Blotch Rusting***



64 ***Overhead Surfaces Found With Poor Coating Adhesion And Blotch Rusting***

65 ***Overflow Found Unobstructed***

66 ***Discharge During Cleaning***

Exhibit 6

Inspection Report for Clearwell

The attached report is provided for informational purposes. The Owner and the Engineer make no guarantee, either expressed or implied, as to its accuracy or completeness.

UNDERWATER SOLUTIONS INC.

INSPECTION AND CLEANING OF THE 250,000-GALLON CONCRETE CLEARWELL

CITY OF NORTH MIAMI WATER TREATMENT PLANT
NORTH MIAMI, FLORIDA

FEBRUARY 11, 2009

INSPECTION AND CLEANING OF THE 250,000-GALLON CONCRETE CLEARWELL

CITY OF NORTH MIAMI WATER TREATMENT PLANT NORTH MIAMI, FLORIDA

FEBRUARY 11, 2009

SCOPE:

On February 11, 2009, Underwater Solutions Inc. conducted an inspection of the 250,000-gallon concrete clearwell to provide information regarding the overall condition and integrity of this structure and removed the sediment accumulation found on the floor of the structure.

EXTERIOR INSPECTION:

This clearwell is located underground and beneath the water treatment plant.

Hatch

One 24" by 24" inside diameter hatch within the floor of the building provides access to the interior of the clearwell.

A metal grate was found securely in place over the hatch preventing unwanted access.

INTERIOR INSPECTION:

The entire interior of this clearwell (and components) was inspected to include sediment accumulations, floor, piping, pump columns, walls, support columns, overhead and aesthetic water quality.

Sediment Accumulations

A uniform layer of accumulated precipitate was found on all floor surfaces averaging 6" in depth.

Upon completing this inspection, all floor surfaces were vacuumed.

Floor

After removing all accumulated precipitate, these floor surfaces were inspected and found sound.

All floor surfaces are uniform as no cracks, spall or settlement were seen at the time of this inspection.

Heavy staining exists throughout all floor surfaces due to the accumulation of precipitate.

Piping

Five pipes were inspected within this clearwell.

The first pipe inspected, penetrates the overhead having a 6" inside diameter and extends down, and terminates 6" above the floor.

No flow was detected within this pipe at the time of this inspection.

The remaining four pipes inspected, penetrate the overhead, each having 10" inside diameters and terminate approximately 24" above the floor.

Flow was entering the clearwell through each of these four pipes at the time of this inspection.

All piping was found without obstructions at the time of this inspection.

Pump Columns

Two vertical turbine pump columns were inspected within this clearwell.

Two, 15" outside diameter pump columns penetrate the overhead and extend down, terminating approximately 20" above the floor of a 15' by 15" by 6" deep sump located in the northwest corner within the floor of the clearwell.

These pump columns were found with mild surface corrosion throughout their lengths, yet in good sound condition and appeared to be unobstructed at the time of this inspection.

Walls

All interior wall surfaces were inspected beginning at the floor and moving up and down the walls throughout the clearwell.

These interior walls appear very sound at this time, as no obvious cracks, spalls or other obvious fatigue of the concrete was seen at the time of this inspection.

Heavy staining exists on all wall surfaces beginning approximately 24" below the roof and wall junction, extending down to the floor.

Support Columns

Seven, 24" by 24" concrete support columns extend from the floor up to a 24" by 30" beam in the overhead.

All seven concrete support columns were found appearing sound and without obvious fatigue or failure of the concrete at the time of this inspection while the horizontal support in the overhead also appears very sound a this time.

Overhead

The entire overhead of this clearwell was inspected from the water surface.

This formed in place, concrete overhead appears sound while no obvious fatigue was seen. Rust staining, appearing to be from construction hardware, was seen throughout the overhead.

Efflorescence and stalactites were seen throughout approximately 10% of the concrete overhead while no obvious failures of the concrete were found.

Aesthetic Water Quality

The aesthetic water quality within this clearwell was found to be only fair, as suspended particulate and color caused poor visibility.

This condition limited our visibility during this inspection to approximately 48" throughout the clearwell.

CONCLUSION:

It is the opinion of Underwater Solutions Inc. that this clearwell appears mostly sound while no obvious leakage was occurring at the time of this inspection.

The interior floor, wall, support columns and overhead concrete surfaces appear very sound while no obvious fatigue (cracks, spalls) were seen at the time of this inspection.

All piping and pump columns within this clearwell were securely and properly in place and had no obstructions at the time of this inspection.

The rust staining witnessed throughout the overhead appears to be the result of construction hardware left within the concrete.

Upon completing this inspection, all floor surfaces were vacuumed.

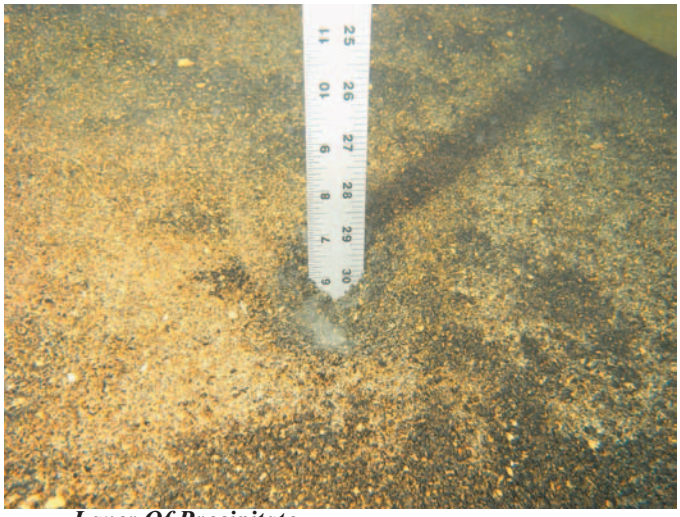
As always, we recommend re-inspection and cleaning of all water storage facilities in accordance with A.W.W.A. Standards and local guidelines.

_____
UNDERWATER SOLUTIONS INC.
Christopher A. Cole, Project Manager

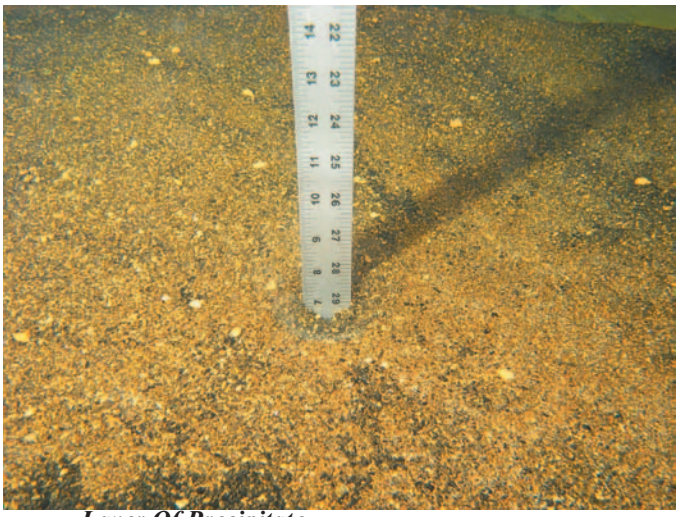
This report, the conclusions, recommendations and comments prepared by Underwater Solutions Inc. are based upon spot examination from readily accessible parts of the tank. Should latent defects or conditions which vary significantly from those described in the report be discovered at a later date, these should be brought to the attention of a qualified individual at that time. These comments and recommendations should be viewed as information to be used by the Owner in determining the proper course of action and not to replace a complete set of specifications. All repairs should be done in accordance with A.W.W.A. and/or other applicable standards.

CAC/jld

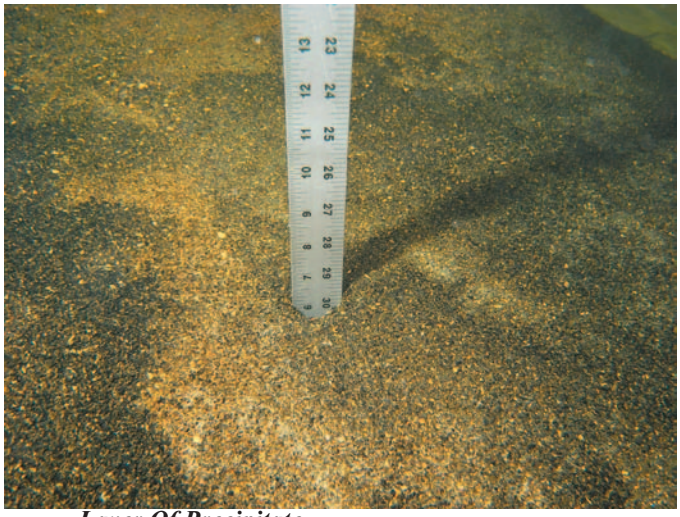
1 ***Hatch***



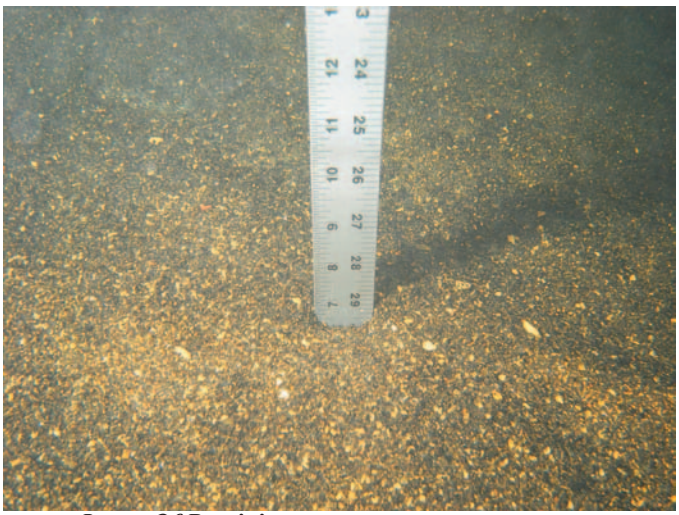
2 ***Layer Of Precipitate***



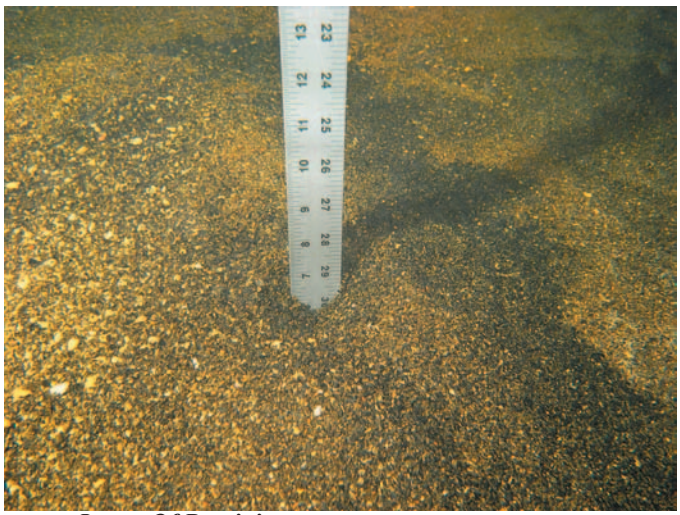
3 ***Layer Of Precipitate***



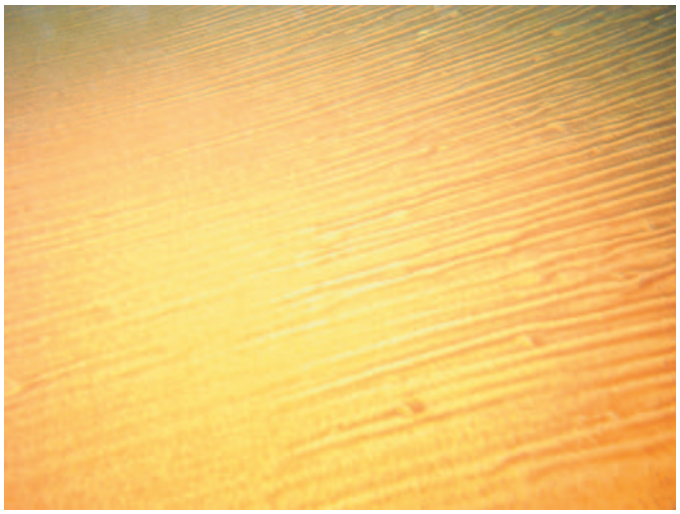
4 ***Layer Of Precipitate***



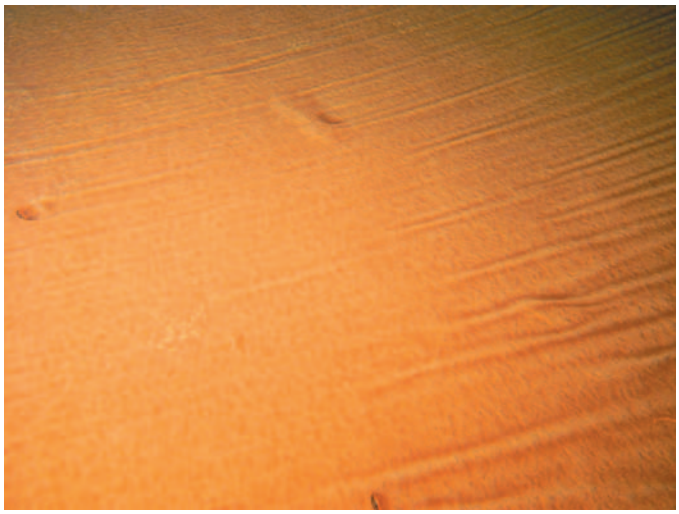
5 ***Layer Of Precipitate***



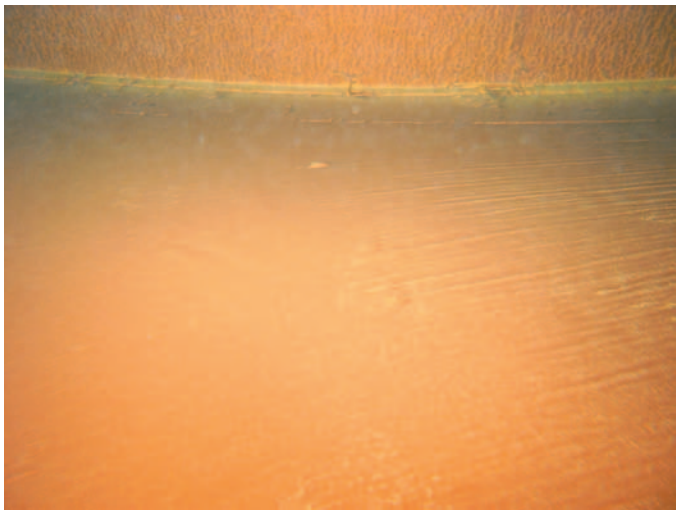
6 ***Layer Of Precipitate***



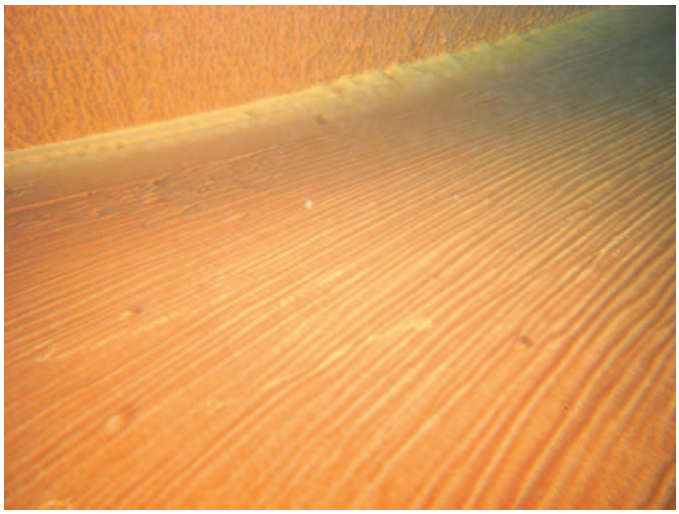
7 ***Sound Floor Surfaces Found Stained After Cleaning***



8 ***Sound Floor Surfaces Found Stained After Cleaning***



9 ***Sound Floor Surfaces Found Stained After Cleaning***



10 ***Sound Floor Surfaces Found Stained After Cleaning***

11 ***Sound Floor Surfaces Found Stained After Cleaning***

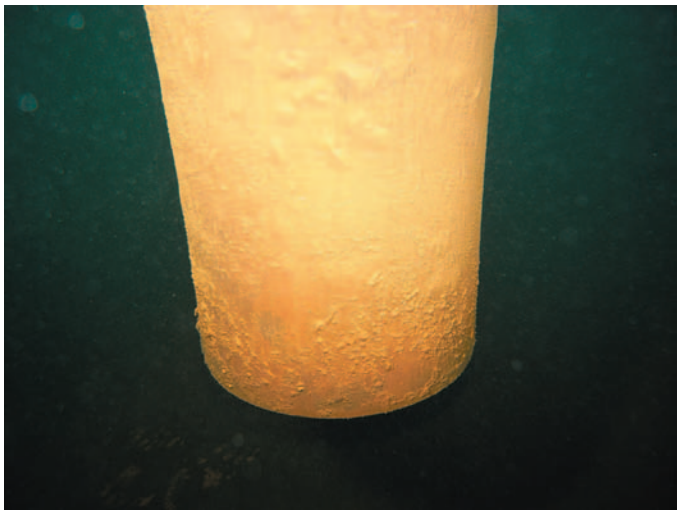
12 ***Piping***

13 ***Piping***

14 ***Piping***

15 ***Piping***

16 ***Piping***



17 ***Piping***

18 ***Piping***

19 ***Piping***

20 ***Piping***

21 ***Piping***

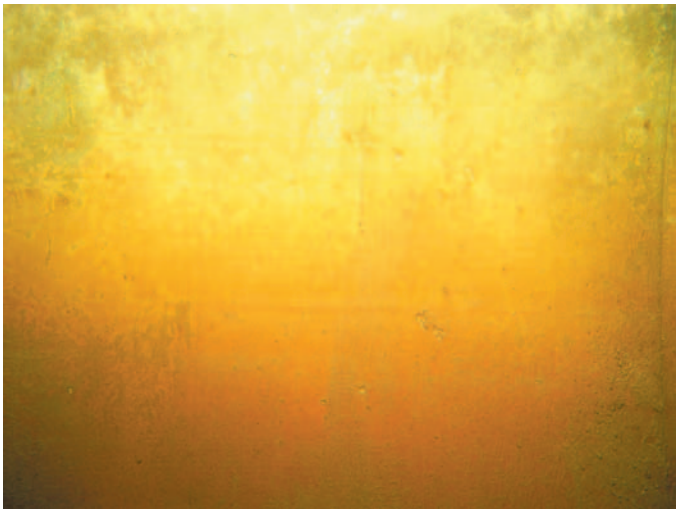
22 ***Pump Column Found Unobstructed***

23 ***Pump Column Found Unobstructed***

24 ***Pump Column Found Unobstructed***

25 ***Pump Column Found Unobstructed***

26 ***Sound Interior Walls Found With Heavy Staining***



27 ***Sound Interior Walls Found With Heavy Staining***

28 ***Sound Interior Walls Found With Heavy Staining***

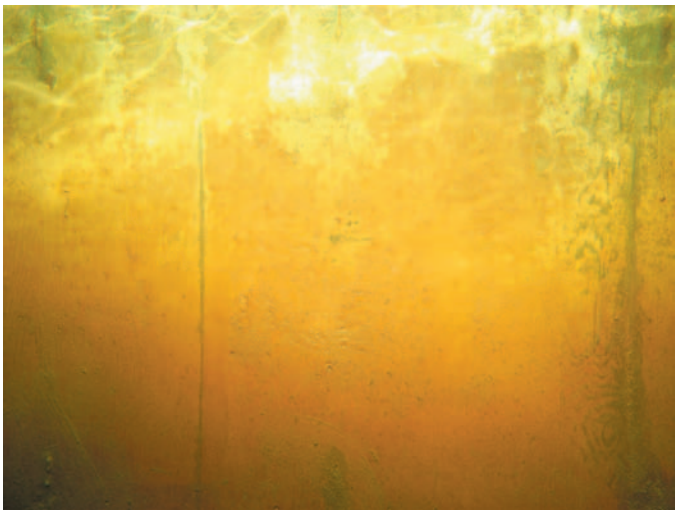
29 ***Sound Interior Walls Found With Heavy Staining***

30 ***Sound Interior Walls Found With Heavy Staining***

31 ***Sound Interior Walls Found With Heavy Staining***

32 ***Sound Interior Walls Found With Heavy Staining***

33 ***Sound Interior Walls Found With Heavy Staining***



34 ***Sound Interior Walls Found With Heavy Staining***

35 ***Sound Interior Walls Found With Heavy Staining***

36 ***Sound Interior Walls Found With Heavy Staining***

37 ***Sound Interior Walls Found With Heavy Staining***

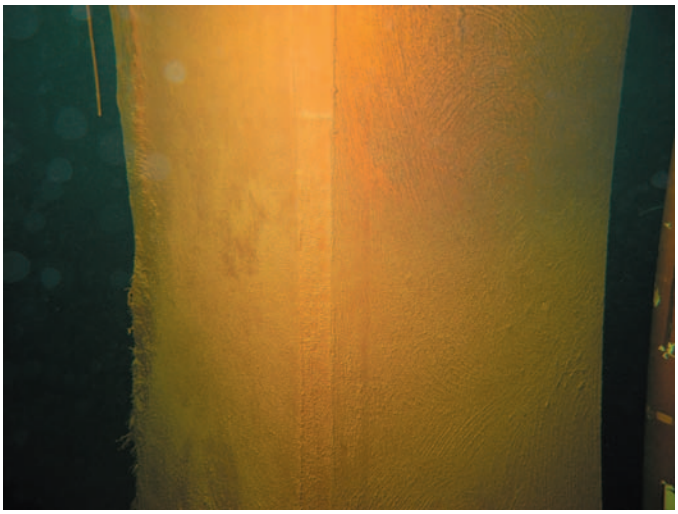
38 ***Sound Interior Walls Found With Heavy Staining***

39 ***Sound Interior Walls Found With Heavy Staining***

40 ***Sound Interior Walls Found With Heavy Staining***

41 ***Sound Interior Walls Found With Heavy Staining***

42 ***One Of Seven Support Columns***



43 *One Of Seven Support Columns*

44 *One Of Seven Support Columns*

45 *Overhead Surfaces Found With Efflorescence, Stalactites And Rust Staining*

46 *Overhead Surfaces Found With Efflorescence, Stalactites And Rust Staining*

47 *Overhead Surfaces Found With Efflorescence, Stalactites And Rust Staining*

48 *Discharge During Cleaning*

Exhibit 7

Basis of Design Report

NORTH MIAMI
FLORIDA

Basis of Design Report (BODR) – REVISED
BP3: Winson WTP Rehabilitation Project

April 2013

44238-004C001

HAZEN AND SAWYER
Environmental Engineers & Scientists

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CITY OF NORTH MIAMI WINSON WATER TREATMENT PLANT
BID PACKAGE 3: WTP REHABILITATION PROJECT
BASIS OF DESIGN REPORT – MAR 2013

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APPENDICIES

APPROVALS FROM CITY

- END OF TOC –

HAZEN AND SAWYER
Environmental Engineers & Scientists

Hazen and Sawyer, P.C.
4000 Hollywood Boulevard
Seventh Floor, North Tower
Hollywood, Florida 33021
(954) 997-0066
Fax: (954) 987-2949

Basis of Design Report - INTRODUCTION
City of North Miami
BP 3: Winson WTP Rehabilitation Project

To: Distribution

From: Hazen and Sawyer, P.C.

Date: April 2013 (REVISED) – Re-issued to replace TM 4 from Prior March 2013

The City of North Miami owns and operates the Winson Water Treatment Plant (WTP), a conventional lime softening facility with a permitted capacity of 9.3 mgd. The WTP treats raw water from the Biscayne Aquifer and serves areas within the City limits as well as the Village of Biscayne Park, portions of Golden Glades, Westview, Pinewood, and surrounding areas of unincorporated Miami-Dade County. Potable water is supplied from the WTP and interconnects with the Miami-Dade County Water and Sewer Department (MDWASD), providing approximately 8.5 mgd AADF and 4.5 mgd AADF to users respectively. The WTP was constructed in the early 1960s.

In 2007 the City prepared a report titled Winson Water Treatment Plant Expansion Feasibility Study indicating that the existing treatment systems and Biscayne Aquifer wellfield infrastructure were at or near the end of their useful life. Based upon subsequent on-site observations and discussions with City staff, H&S generally concurred with these recommendations. To this end, the City determined that WTP facilities should be rehabilitated via the Bid Package 3: WTP Rehabilitation Project proposes to ensure continued reliability through the year 2030. Due to budget constraints, the existing treatment capacity will remain fixed at 9.3 mgd.

A total of nine Technical Memoranda (TM) comprise the Basis of Design Report (BODR) for the Winson Water Treatment Plant BP 3 WTP Rehabilitation Project. Work on these TMs was initiated with a Kick-off Meeting on May 31, 2012. However, on October 24, 2012 the City authorized Hazen and Sawyer to proceed with revisions to Technical Memoranda to include newly acquired City property located adjacent to the northeast perimeter of the Winson WTP into the BODR. This direction necessitated the relocation of proposed Administration Building from the northwest to the southwest corner of the WTP site, and that the proposed 2.5 MG Water Storage Tank, in the southwest corner of the site was replaced with two 1.25 MG Storage Tanks to be located on the new City property. In addition, the City also requested that the Administration Building conceptual floor plan be revised to further increase the size of the Emergency Operations Center (EOC), as well as provide a dedicated EOC access to the planned Observation Deck. These requests impacted six of the eight TMs, which were either nearly complete or already accepted by the City, as well as required the development of a new Bid Package 4 to address the construction of the

The purpose of this document is to present the Basis of Design Report (BODR) for the BP 3 Project. Work on this BODR initiated with a Kick-off Meeting on May 31, 2012, and was comprised of the following nine Technical Memoranda (TM):

- TM 1: Existing Facility Overview. Accepted by City on Dec 3, 2012
- TM 2: On-Site Raw Water System Improvements. Accepted by City on Dec 3, 2012
- TM 3: Structural Evaluations and Improvements. Accepted by City on Oct 23, 2012
- TM 4: Proposed Process Improvements. Accepted by City on February 25. 2103
- TM 5: New Administration Building. Accepted by City on Sept 18, 2012
- TM 6: Plant Control and Information System. Accepted by City on Sept 24, 2012
- TM 7: Electrical System Improvements. Accepted by City on Oct 23, 2012
- TM 8: Site Development Requirements. Accepted by City on October 30, 2012
- TM 9: Construction Sequencing and Preliminary Cost. Accepted by City on February 25, 2013

On October 24, 2012 the City authorized Hazen and Sawyer to proceed with revisions to the Technical Memoranda to include newly acquired City property located adjacent to the north-east perimeter of the Winson WTP into the BODR. This direction necessitated the relocation of proposed Administration Building from the northwest to the southwest corner of the WTP site, and that the proposed 2.5 MG Water Storage Tank, in the southwest corner of the site was replaced with two 1.25 MG Storage Tanks to be located on the new City property. In addition, the City also requested that the Administration Building conceptual floor plan be revised to further increase the size of the Emergency Operations Center (EOC), as well as provide a dedicated EOC access to the planned Observation Deck. These requests impacted six of the eight TMs, which were either nearly complete or already accepted by the City, as well as required the development of a new Bid Package 4 Project to address the construction of the two 1.25 MG water storage tanks and appurtenant improvements on the City acquired land.

As a result, the following TMs were revised as noted below, with versions of the original documents included as Appendicies to this Basis of Design Report.

- TM 2 – On-Site Raw Water System Improvements: Revised to reflect the new Administration Building and Storage Tank location and their impacts on Well No. 2.
- TM 4 – Proposed Process Improvements – Revised to address changes to noted site layout as well as process impacts required for operation of the WTP with only the existing 0.75 MG Storage, Tank until the two new 1.25 MG Storage Tanks are constructed on the newly purchased land under the BP 4 Project.
- TM 5 – Proposed Administration Building – Revised to reflect City request for a larger EOC with dedicated access to the observation deck. Also reflects site layout and additional parking made necessary by these changes.
- TM 6 – Plant Control and Information System – Revised to address proposed PLC location changes as a result of new site layout.
- TM 7 – Electrical Improvements – Revised to address changes to site layout as well

as impacts due to new location of the Administration Building Electrical Room on generator and site feeder ductbanks.

- TM 8 – Site Development Requirements – Revised to address changes to site layout as well as impacts to previously approved stormwater management plan.

Contract documents for the BP 3: Winson WTP Rehabilitation Project will be developed based on design criteria summarized in this BODR. Please reference each TM accordingly for further details

Attachments

Distribution:
A. Ghany
W. Pierre-Louis
P. Vida
B. Vidal
T. Carney
JP Silva

c: *G. Brown*
File 44238-004 / 1.2

TECH MEMO 1 – EXISTING FACILITY OVERVIEW

HAZEN AND SAWYER
Environmental Engineers & Scientists

Hazen and Sawyer, P.C.
4000 Hollywood Boulevard
Seventh Floor, North Tower
Hollywood, Florida 33021
(954) 997-0066
Fax: (954) 987-2949

Technical Memorandum No. 1 – BODR
City of North Miami Winson WTP
Existing Facility Overview

To: Distribution

From: Hazen and Sawyer, P.C.

Date: November 2012

1.0 Background and Purpose

The City of North Miami owns and operates the Winson Water Treatment Plant (WTP), a conventional lime softening facility with a permitted capacity of 9.3 mgd. The WTP treats raw water from the Biscayne Aquifer and serves areas within the City limits as well as the Village of Biscayne Park, portions of Golden Glades, Westview, Pinewood, and surrounding areas of unincorporated Miami-Dade County. Potable water is supplied from the Winson Water Treatment Plant (WTP) and interconnects with the Miami-Dade County Water and Sewer Department (MDWASD), providing approximately 8.5 mgd AADF and 4.5 mgd AADF to users respectively. The WTP was constructed in the early 1960s.

In 2007 the City prepared a report titled Winson Water Treatment Plant Expansion Feasibility Study (Feasibility Study) indicating that the existing lime softening treatment system and Biscayne Aquifer wellfield infrastructure were at or near the end of their useful life. Based upon subsequent on-site observations and discussions with City staff, H&S generally concurred with the recommendations of the Feasibility Study. To this end, the City has determined that WTP facilities should be rehabilitated to ensure continued reliability through the year 2030. Due to budget constraints, expansion of the treatment capacity is currently on hold. Bid Package 3: WTP Rehabilitation Project (BP 3) proposes to rehabilitate existing WTP unit processes throughout the facility while maintaining the existing treatment capacity fixed at 9.3 mgd.

The purpose of this Technical Memorandum (TM) No. 1 is to provide a general overview of the existing facility process components, flow diagram, design criteria and reported process concerns. As no tabulation of existing WTP design criteria is available from record documents, this TM is intended to facilitate future design efforts by establishing a summary baseline document of existing conditions. For additional details regarding proposed upgrades to be implemented under BP 3, reference TM 3 – Structural Evaluations and Improvements and TM No. 4 – Proposed WTP Process Improvements.

2.0 Existing Conditions and Proposed Improvement Overview

General: The Winson Water Plant employs various unit processes to treat high quality raw water from the Biscayne Aquifer and deliver it to users. A plan view of the facility is presented as Exhibit 1-1. A corresponding schematic Process Diagram for the existing WTP is included as Exhibit 1-2.

Finished Water Quality: Discussions with City staff indicate the North Miami Winson WTP is in compliance with current drinking water regulations. Finished water quality parameters for the WTP from the October 2011 Routine Compliance Testing (RCT) Report are presented in Table 1.1.

Table 1.1
North Miami Winson WTP
Finished Water Quality – Oct 2011 RCT Report

Parameter	Unit	Value
Alkalinity	mg/L as $CaCO_3$	63
Calcium Hardness	mg/L as $CaCO_3$	78
Magnesium Hardness	mg/L as $CaCO_3$	10
Aluminum	mg/L	0.05
Chlorides	mg/L	29
Copper	mg/L	0.0009
Fluoride	mg/L	0.60
Iron	mg/L	0.02
Manganese	mg/L	0.0006
Silver	mg/L	0.002
Sulfate	mg/L	31
Zinc	mg/L	0.01
Color	CU	15
Odor	TON	1.0
pH	-	8.97
Total Dissolved Solids	mg/L	176
Nitrate	mg/L	0.10
Nitrite	mg/L	0.02
Arsenic	mg/L	0.0005
Barium	mg/L	0.003
Cadmium	mg/L	0.0005
Chromium	mg/L	0.002
Cyanide	mg/L	0.005
Lead	mg/L	0.01
Mercury	mg/L	0.00002
Nickel	mg/L	0.002
Selenium	mg/L	0.0005
Sodium	mg/L	23
Antimony	mg/L	0.0005
Beryllium	mg/L	0.00005
Thallium	mg/L	0.0005

A complete finished water quality summary, including primary and secondary drink water standard constituents, were provided by the City and included as Exhibit 1-3. In addition, the

City is currently compiling raw water quality data from testing conducted in October 2012. That data will be included in the Final Basis of Design Report (BODR) when received.

Existing Design Criteria: A summary of existing WTP design criteria, as developed from available record documents, field investigations, and discussions with WTP staff, are presented in Exhibit 1-4. Note that even though extensive efforts were expended to locate, identify and verify the information presented, aged record drawings, coupled with undocumented past improvements to existing facilities, resulted in information that could not be verified / identified, and as such is missing from this tabulation. However, planned improvements as discussed in TM 4 address all required design parameters for proposed unit processes, superseding any missing information in this tabulation.

Raw Water Supply Wells: The WTP is supplied raw water through six off-site and two on-site wells. The six off-site wells have a combined capacity of 7,400 gpm (10.66 mgd) with upgrades being addressed under a separate Project. The two on-site wells each have a capacity of 1,500 gpm (4.32 mgd) and are the subject of TM No. 2 entitled "On-Site Raw Water System Improvements".

Raw Water Aerator Unit: Aerators are used to pre-treat raw water prior to softening as a means of mitigating odor and/or taste in finished product water. Oxygen introduced by aeration facilitates conversion of dissolved iron and/or manganese in the raw water to insoluble precipitates that are removed via subsequent softening and filtration. The WTP currently has one aerator tower supplied with two "waterfall-type" fiberglass aerator units with a reported total capacity of 20 mgd. The existing aerator base pan / enclosure design allows splash-over. This has become both a nuisance and a source of wasted raw water. In addition, aerator maintenance is very time consuming as the units are located approximately 25-ft above grade and no ready means of access to the top of the support structure are available.

Lime Contactor Unit – The existing lime-softening unit is an "Accelator" Model as furnished by Infilco Degremont. The Accelator has a capacity of 9.0 mgd at a loading rate of 2.07 gpm/sqft. The WTP operates the Accelator over a typical range of 7.5 to 9.3 mgd, which is within normal operating range as reported by the Supplier. Based on prior studies conducted by the City, the internal mechanism of the Accelator unit, including walkways and drive mechanism, require routine maintenance by the City, have generally reached the end of their useful life, and require replacement. The existing welded steel tank that houses the lime contactor is in good condition but requires refurbishment to targeted areas at both interior and exterior locations.

Lime Slaker and Silo: The existing lime slaker produces a lime slurry that is pumped from the slaker to the Accelator via a lime slurry pump. The slaker has a capacity of 1,000 pounds per hour with a silo storage volume of 2,800 cuft. The lime-silo is functioning adequately and is in relatively good condition, but the slaker was mounted with very close tolerances to the silo feeder and maintenance requires that a portion of the feeder structure be disassembled. The City has requested that this orientation be revised, and that a fully redundant slaker unit be furnished and installed.

Filters: The WTP is furnished with four down-flow type filters each with an approximate surface area of 540 sq ft. The approximate dimensions of each filter are 30-ft 0-inches long by 18-ft 0-inches wide and a 3-ft 6-inch mixed media bed depth. The filters are designed to

produce 9 mgd of total capacity at an average loading rate of 3.0 gpm/sq ft. With one filter out of service, a 4.0 gpm/sqft loading rate can be applied and the 9.0 mgd rating is achieved in compliance with the 2012 Edition of the Recommended Standards for Water Works.

The filters, surface wash system and filter gallery piping are being refurbished under the Bid Package 1: Filter Rehabilitation Project. Due to limitations regarding the amount of work in BP 1 – made necessary due to a fast-track design schedule to meet State Revolving Fund (SRF) requirements, the rehabilitated filters will continue to use the existing single backwash pump that provides a backwash rate of 12 gpm/sq ft.

Filter Backwash System: The backwash process involves pumping product water from the clearwell to the filter bottom through an underdrain system designed to distribute the backwash water evenly across the bottom of the filter. Previously a manual operation, the BP 1 Filter Rehabilitation Improvements are automating the backwash process, with cycles monitored and executed based on high filter head or timed cycles, through as series of new electrically actuated valves and instruments.

As noted above, the filters are currently serviced by one single vertical turbine type constant speed pump drawing flow from the filter clearwell as the backwash water source. The capacity of this existing pump is 6,300 gpm (or 12 gpm/sqft), and is lower than recommended by filter suppliers, requiring a longer 47 minute backwash cycle duration. Depending on the number of backwash cycles executed per day, up to 3.4% (or 300,000 gallons) of water production may be used for backwash purposes. However, this water is recirculated back into the treatment process via the on-site Waste Backwash Holding Basins, resulting in minimal water loss. When not in backwash service, the backwash pump can also operate as a transfer pump to the on-site storage tanks.

Filter Clearwell and Transfer Pump: The filtered water clearwell is located below all four existing filters and the filter gallery. The original structural drawings illustrate an approximate depth of 8 feet yielding a storage volume of approximately 177,000 gallons. The clearwell also has a 15-ft long by 15-ft wide extension on the west end with an additional 7,200 gallon capacity. Therefore, the estimated total capacity of the existing clearwell and sump is approximately 184,000 gallons. Sodium hypochlorite is added upstream of the clearwell to provide free chlorine for disinfection.

The sump extension houses two vertical turbine pumps that act as transfer and backwash pumps. The operation of the backwash pump was discussed above. The transfer pump, with a capacity of 6,300 gpm, transfers filtered water to the 750,000 gallon storage tank via a 20 / 24-inch diameter main. This transfer main also manifolds with the high service pump suction lines to off-site finished water distribution but is not used as CxT disinfection criteria cannot be met without discharge of filtered water to the on-site storage tank system.

Exterior and interior inspection of the clearwell was performed by Underwater Solutions Inc. in March 2005. The resulting report concluded the following observations:

- The clearwell was in good structural condition and the aesthetic water quality within the tank was also found to be sufficient.
- There was only a uniform layer of precipitate averaging 6-inches in depth on all

the floor surfaces.

- No obstructions or failures in the pumps or any of the piping.

High Service Pumps: There are currently six high service, constant speed pumps at the Winson WTP that pump water from the finished storage tanks into the distribution system through a common discharge header. Based on discussion with plant staff, the installation is based on five duty pumps and one backup unit. All pumps are designed for a discharge pressure of 160 TDH (70 psi). Three of the pumps are rated at 2,000 gpm (2.88 mgd) and two pumps are rated at 1,000 gpm (1.44 mgd). The backup pump has a rating of 3,000 gpm (4.32 mgd) and is reported to operate 100% of the time by the City. The combined design capacity of all pumps is approximately 15 mgd. Due to the advanced age of all the pumps, replacement with newer, more efficient pumps is recommended. In addition, new high service pumps will be furnished with variable frequency drives to increase operability and reduce the number of required pumps from six units to four units.

It is important to note than the City routinely purchases up to 4 mgd of finished water from MDWASD to augment the current permitted 9.3 mgd production capacity of the Winson WTP. Thus, a current peak demand (capacity required) of 14.88 mgd can be met with the current 12.96 mgd (total installed high service pumping capacity) with 3+1 pumps, plus the additional purchased water.

Waste Backwash and Lime Sludge Holding Basin: The existing basins are approximately 62-ft x 31-ft, with an average depth estimated at 6.3-ft (sloped bottom), and a center divider wall separating the two chambers. The combined basin volume totals 181,000 gallons which is sufficient for backwash water and lime sludge capacity. Visual inspection indicates that wall surfaces show some signs of deterioration. In addition, the existing truck loading station platform has deteriorated beyond repair. The existing decant pumps that return settled backwash flow to the lime contactor unit need replacement. In addition, the City is currently pilot testing the discharge of settled lime sludge via pump into the MDWASD collection system.

Per discussions with City staff, the decant pumps are operated manually. Both basins are used concurrently for backwash water recovery. However, the basins are alternated for waste sludge holding prior to disposal.

On-Site 750,000 Gallon Ground Storage Tank: It is reported that the existing 750,000 gallon welded steel tank was built during the plant's 1964 expansion. An exterior and interior inspection was performed by Underwater Solutions Inc. in March 2005 regarding the overall condition and integrity of the structure. That report concluded the following observations:

- The water storage tank remains in good structural condition throughout.
- Coating adhesion on the exterior surfaces was in good conditions with the exception of an area of surface corrosion on the east side of the tank approximately 18-ft above the ground.
- A heavy scaly corrosion was observed in the inner hatch surfaces
- Due to the coating system expiring and losing its adhesion value with the steel, extensive coating failure was found in the interior wall panel and overhead surfaces. Surface corrosion was found in many areas where coating blisters have fractured.

On-Site 1.5 Million Gallon Ground Storage Tank: The 1.5 MG welded steel storage tank is reported to pre-date 1962. Exterior and interior inspection performed by Underwater Solutions Inc. in March 2005 reported the following observations:

- Good structural condition throughout the water storage tank.
- Steel fatigue was observed at the hatch trunk.
- Even though the vent is securely in place, the perimeter screening requires replacement.
- The overflow screen was found to be torn and requires replacement.
- All columns and walls still have sufficient coating adhesion offering protection of the steel.
- Blotch rust staining was observed on the overhead through the coating due to thin application.
- All floor surfaces remain coated but some coal tar coating adhesion has been lost. Within these few areas, the underlying coating is protruding the steel.

Main Filter / OPS Building: The existing building construction is a combination of cast-in-place concrete with masonry walls. The roof structure is finished with built-up roofing. The facility houses the process filters, operations offices, and laboratory and restroom facilities..

Chemical Processes and Disinfection: A summary of WTP chemical systems is presented below:

- Two hypochlorite solution metering pumps are located in the room to the west of the two 2000 gallon Hypochlorite Storage Tanks. The pumps take suction from self-contained storage tanks with visual level monitoring. The pumps can inject directly to the lime contactor clarifier for algal control and into the clearwell under the filters for disinfection purposes. Both pumps currently require manual operation as no flow pacing control exists.
- Lime is added to the lime contactor reaction zone for softening. Lime slurry is transported from the lime silo slaker to the contactor via an eductor system utilizing a water booster pump.
- Coagulant aid is added to the lime contactor to enhance flocculation and maximize turbidity and particle removal. The coagulant aid is a potato starch product delivered in 20 kg bags and stored in pallets. A batch solution of coagulant is prepared daily on a 350 gallon batch mixing/storage tank and is pumped with a single metering pump that requires manual operation, as no flow pacing control exists.
- Liquid ammonia is added for formation of chloramines and is stored at the plant in 55 gallon drums which are manually checked for levels. Ammonia is injected into the line between the two on-site storage tanks. The single metering pump requires manual operation as no flow pacing control exists.
- Fluoride is injected into the main transfer line from the clearwell to the storage tanks. Fluoride is stored in one 500 gallon tank and delivered via a 55 gallon drum serving as a day tank, which is manually checked for levels. The single metering pump re-

quires manual operation as no flow pacing control exists.

Yard Piping and Finished Water Distribution Mains: Reference TM 8 – General Site and Facility Improvements. Also includes discussion on perimeter gates, landscaping, stormwater management and roadway improvements.

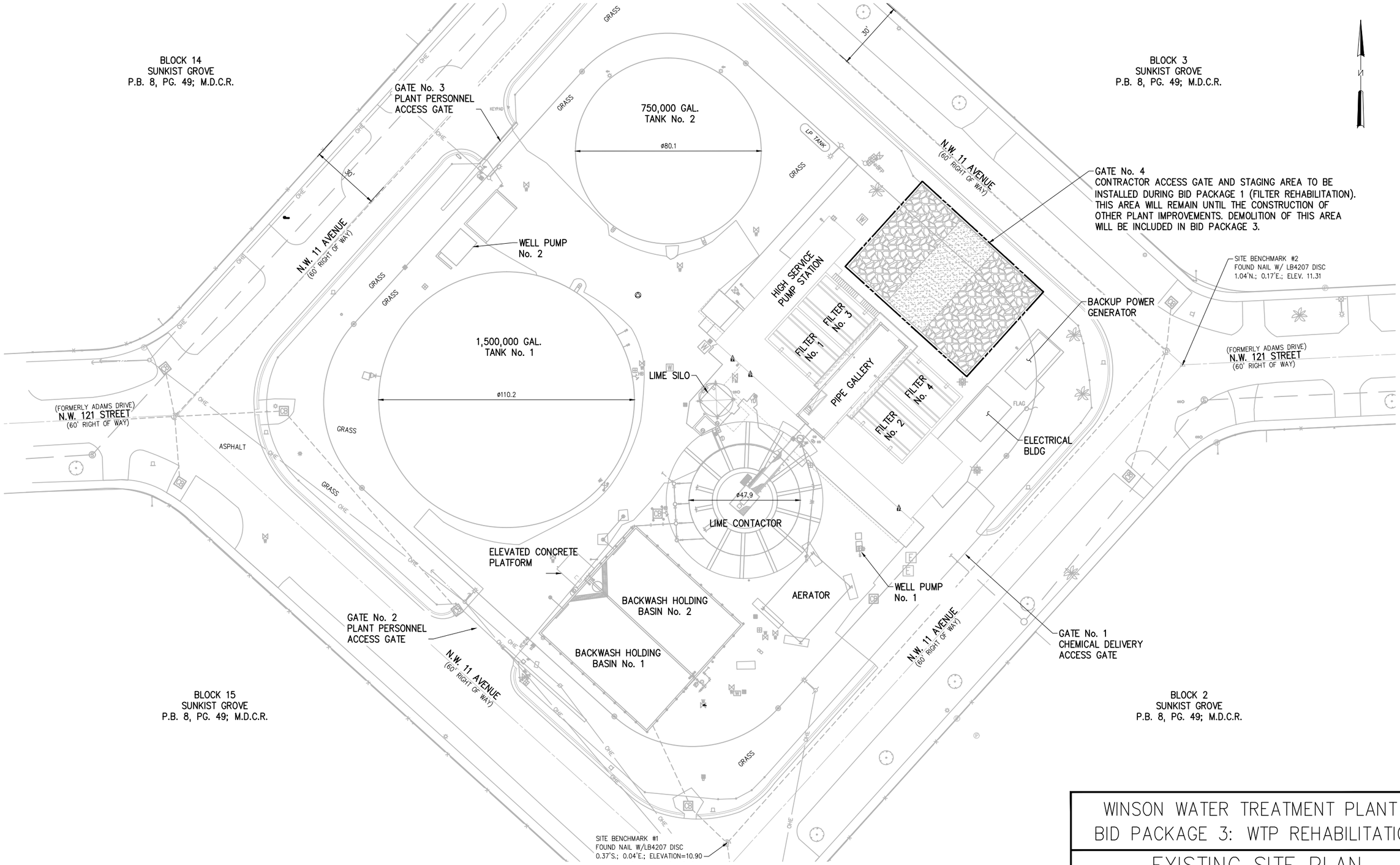
Electrical System: Reference TM 7 – Electrical System Improvements.

Instrumentation & Control: Reference TM 6 – Plant Control and Information System.

Attachments

Distribution:
A. Ghany
W. Pierre-Louis
P. Vida
B. Vidal
T. Carney
JP Silva

c: G. Brown
File 44238-004 / 1.2



WINSON WATER TREATMENT PLANT
BID PACKAGE 3: WTP REHABILITATION

EXISTING SITE PLAN

EXHIBIT 1–1

HAZEN AND SAWYER
Environmental Engineers & Scientists

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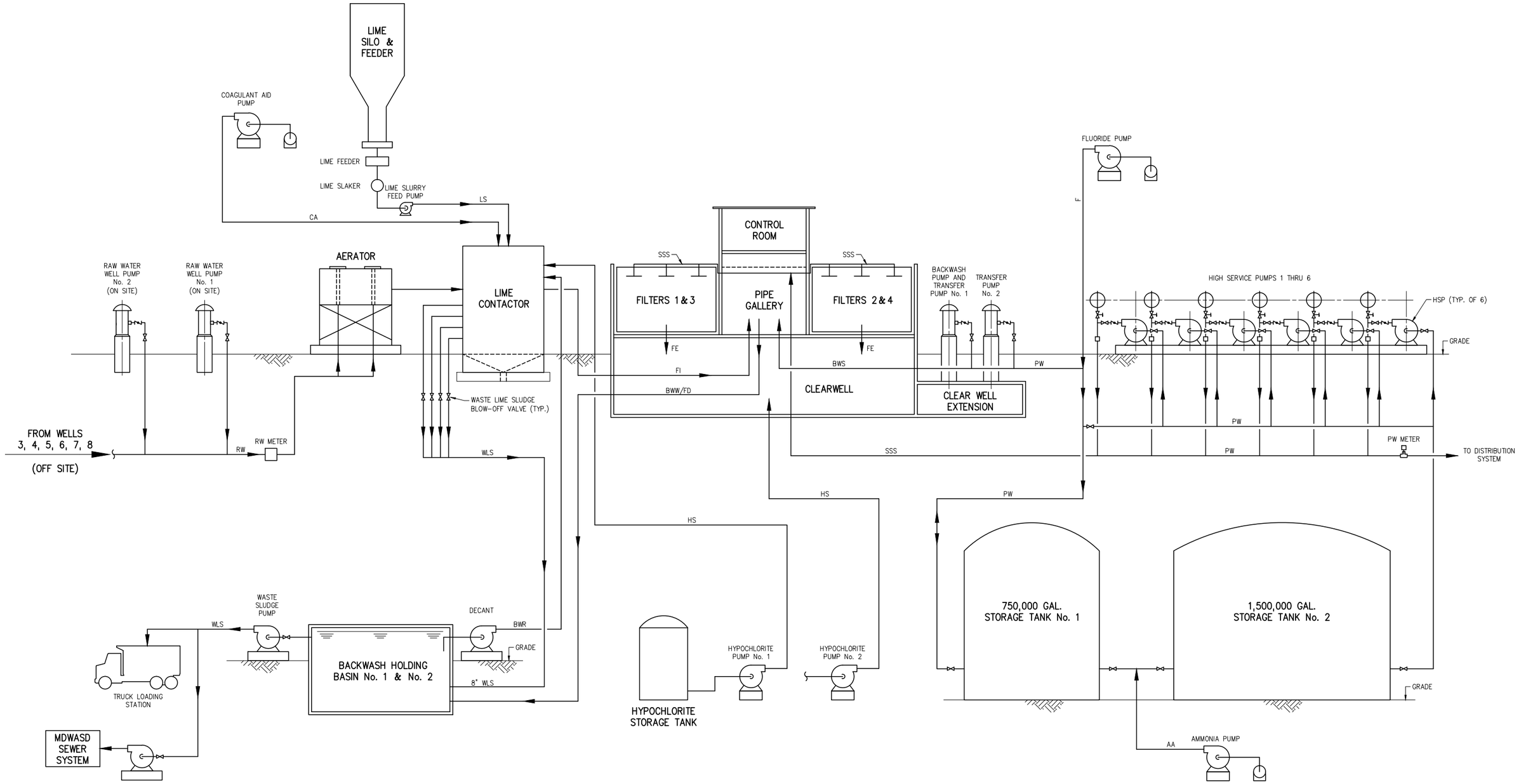

AA – AQUEOUS AMMONIA
BWR – BACKWASH RETURN
BWS – BACKWASH SUPPLY
BWW – BACKWASH WASTE
CA – COAGULANT AID
F – FLUORIDE SOLUTION
FD – FILTER DRAIN
FE – FILTER EFFLUENT
FI – FILTER INFLUENT
HS – HYPOCHLORITE SOLUTION
HSP – HIGH SERVICE PUMP
LS – LIME SLURRY
PW – POTABLE WATER
RW – RAW WATER
SSS – SURFACE SCOUR SUPPLY
WLS – WASTE LIME SLUDGE

HAZEN AND SAWYER
Environmental Engineers & Scientists

WINSON WATER TREATMENT PLANT
BID PACKAGE 3: WTP REHABILITATION

EXISTING PROCESS FLOW DIAGRAM

EXHIBIT 1–2

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