

APPENDIX A

PARTIAL INSPECTION REPORT

Part 1 – Project Information

Tank Location: _____ **Manufacturer:** PDM
Construction Date: 1966 **Serial No.:** 26662
Design Code: AWWA D-100-64 **Type of Construction:** Welded
Heights: Overall 177' Shell/Balcony 150' HWL 162' LWL 127'
Tank Diameter: 105-feet
Number and Size of Support Columns: 14
Type of Access to Tank Interior: Manway on roof
Tank Construction Drawings: Unknown
Purpose of Inspection: Tank assessment by R.O.V. and interior & exterior coating evaluation.
Date of Inspection: November 2, 2006
Inspected By: Rodney Ellis & Scott Kriese
Type of Inspection: R.O.V. Assessment
Previous Inspection Records: Yes; AEC Engineering Evaluation Report Dated 12/8/1987

Part 2 – Existing Coating Information

	<u>Interior Wet</u>	<u>Interior Dry</u>	<u>Exterior</u>
Date Last Coated	1989 to 1991	1989 to 1991	1989 to 1991
Full or Spot Repair	Full	Spot/overcoat	Full
Coating Contractor	Skrobis Painting	Skrobis Painting	Skrobis Painting
Surface Preparation	SSPC-SP6	SSPC- SP6	SSPC-SP6
Paint System	Epoxy	Epoxy ^{SP2}	Epoxy/Urethane
Paint Manufacturer	Ameron	Ameron/overcoat	Ameron
Lab Lead Test Paint Chips	Yes	Yes	Yes

Part 3 – Observations and Recommendations

Interior Wet Structural and Appurtenances:

- Based on the inspection data, it appears that extensive miscellaneous structural modifications and repairs are required. These modifications and repairs serve to bring the tank into compliance with OSHA regulations, AWWA standards, as well as allow for better coating bonding, allow for safer access in and on the tank and, in some cases, removing unnecessary items.
- KLM recommends removing or structurally repairing the tower crow's nest. Remove the interior electrical lights and electrical conduit as these items are heavily corroded and difficult to maintain. **See photo 2.**
- Seal welding of all interior seams on the roof appurtenances is recommended to prevent corrosion in areas inaccessible for coating. These include the roof access door, vent and drywell tube curb. **See photo 3 and 4.**
- In areas which were accessible, the roof structure appears to have seal welded connections; however some of the welds have defects in them consisting of undercutting, pinholes, and surface porosity. KLM Engineering recommends that the roof structure be evaluated at the time of reconditioning using the contractors rigging. Repairs may be needed to allow additional strength to the structure to withstand wind loads during containment of the tower, and to prevent corrosion in areas inaccessible for coating. **See photo 5 and Video Capture 6.**
- There appear to be numerous areas of erection bracket scab marks located on the tower shell and bowl plates and weld spatter located on the reservoir shell and bowl weld seams. At the next reconditioning, these areas should be ground and welded to a smooth condition to ensure proper coating service life. **See Video Captures 7 through 9.**
- The horizontal stiffener at the shell is stitch welded on the top, and bottom sides. This should be seal welded as required by AWWA D-100-96. **See Video Captures 10 through 12.**
- The safety grating over the top of the wet riser is not permanently attached and the grating has been moved several feet to one side, the grating is not OSHA compliant due to not having an egress opening. Replace with an OSHA compliant grating. **See Video Capture 13.**
- The stiffener angles on the reservoir side of the drywell tube are intermittently welded these should be seal welded as required by AWWA D-100-96. **See Video Capture 14.**

- Remove the reservoir interior ladder as it is not welded to the drywell tube, the bottom section is suspended/attached by two (2) clevises and may be a safety concern. See **Video Capture 15 and photo 16.**
- Install one (1) 24-inch diameter pressure style manway in the tower bowl with an access ladder from the top platform. See **photo 17.**
- Install an additional pressure style manway in the bottom of the wet riser 180 degrees from the existing manway for additional ventilation and to comply with confined space entry regulations.

Interior Wet Coating Condition:

The coating condition on the interior wet area of the reservoir appears to be in fair to good condition with only 2 to 5 % coating failures to the tower below the High Water Level (HWL). The tank should be cleaned out and a through inspection performed within 5 years to determine if the coating is repairable and when repairs or replacement should be performed. Most coatings of this type are repairable up to 10-12 years of age depending on the integrity of the coating and the adhesion characteristics to the steel substrate. See ROV video. The interior wet coating should continue to protect the tower interior for approximately 5 more years. The interior wet coating is not classified as lead based paint. See **test results in Appendix B.**

Exterior Structural:

- Relocate the aviation obstruction to a separate support bracket. The light is currently attached to the vent cover not allowing the vent cover to be removed to service the vent screen. See **photo 18.**
- Replace roof access manway doors with a single water-tight door that properly overlaps the manway curb. See **photos 19 and 20.**
- Install three (3) 24-inch diameter ventilation manways within 3-feet of the roof edge and 120 degrees apart for compliance with OSHA Confined Spaces Entry ventilation requirements.
- Replace the roof center hand railing mid-rail with an OSHA compliant mid-rail and add a toe-board to the hand railing. Remove the rolling roof ladder support and weld the ladder permanently into place. Remove the hand railing from the roof ladder and install an OSHA compliant hand railing, safety cage and safety climb device to the roof and shell ladder. Remove the inoperable winch from the ladder and balcony. See **photos 21 through 24.**

- Install new vertical posts to the balcony hand railing, and an OSHA compliant mid-rail. Replace all bolted connections with seal welded connections to bring the balcony hand railing into OSHA compliance. **See photos 25 and 26.**
- Modify the overflow pipe outlet with a Health Department approved screen and screen retainer. Modify the overflow drain into a concrete catch basin. **See photo 32.**
- The visible foundations of the support columns and the dry riser/wet riser of the reservoir appeared to be in good condition with no repairs needed at this time.
- The reservoir has one 24-inch diameter vent on the roof. This does not appear to provide adequate ventilation. Ventilation capacity should be verified by checking the available venting area versus the maximum inflow and outflow rates. **See photo 18.**

Exterior Coating Condition:

The coating on the exterior of the reservoir floor appears to be in fair to poor condition. Approximately ninety (90) percent of the roof and upper torus contains top coat delaminations and coating failures. The upper torus has 25% corrosion mainly on the south side. The coating does not appear to be repairable due to its age and should be re-inspected within 5 years to determine when replacement is recommended. The exterior coating should continue to protect the tower for approximately 5 more years. See photos in Appendix A. The exterior coating is not classified as lead based paint. **See test results in Appendix B.**

Interior Dry Structural:

- Install a ladder safety climb device to the drywell tube ladder as required by OSHA and relocate antenna coaxial cables that interfere with safe climbing of the ladder. **See Photo 33.**
- It may be more cost effective at the time of reconditioning to remove the spiral staircase in the dry riser and replace it with an OSHA compliant ladder system. **See photos 35 through 37.**

Interior Dry Coating Condition:

The coating on the interior dry area appears to be in fair to good condition except to the interior of the drywell tube, exterior of the wet riser and bowl (sweating portions of the interior dry). The coating on the drywell tube, wet riser and the exterior of the bowl will require replacement within 5 to 7 years while the coating on the remained of the dry riser should last 10 to 15 years. The coating on the interior dry is classified as lead based paint. **See test results in Appendix B.** The tower should be re-inspected in approximately 5 years to determine when replacement of the interior dry should be scheduled.

Additional Observations:

There are 11 antennas on the tank. Antennas generally have the effect of dramatically increasing the cost of reconditioning water storage reservoirs. Lease agreements should be written to ensure the antenna owners are responsible for increase maintenance costs due to their presence. Installations should be reviewed to ensure that they do not interfere with normal use or maintenance of the tower, or present safety hazards or violate state or federal regulations. The security of the tower appears to be adequate with no improvements needed at this time.

Sediment:

The reservoir has approximately 12 inches of heavy sediment on the bowl. See ROV video. This is greater than normal amounts of sediment found in reservoirs. The reservoir should be cleaned periodically to maintain water quality in the system. KLM recommends that the reservoir be re-inspected and cleaned in approximately 5 years.

Site

The site appears to have adequate drainage away from the reservoir. Prior to reconditioning it should be determined if the buildings under the tank will hinder the use of a containment system.

KLM Engineering, Inc. Inspection Report
2.0. MMG EWT, Greenfield Tower, City of Milwaukee, WI

KLM ENGINEERING, INC.

Report prepared and certified by:



Jack R. Kollmer
Principal Associate/President
NACE Certified Coatings Inspector No. 691

Date: January 19, 2007

This report is a modified version of KLM Engineering's typical inspection report, based on an ROV Inspection. A complete floatdown evaluation, with KLM's standard inspection report (including an Engineer's Cost Estimate) is recommended prior to the preparation of reconditioning specifications in order to get complete information on existing coating conditions, required structural modifications, and all recommendations. KLM recommends that each water storage tank be inspected completely every three to five years. KLM's Floatdown Inspection can provide the most comprehensive evaluation of your reservoir.

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APPENDIX B

PAINT CHIP LEAD & CHROMIUM TEST RESULTS

ANALYTICAL LABORATORY REPORT

Tuesday, November 14, 2006 Page 1 of 2

CLIENT: KLM Engineering, Inc.
 PO Box 897, 3394 Lake Elmo Ave N
 Lake Elmo, MN 55042

DATE RECEIVED: Monday, November 13, 2006
 DATE COMPLETED: Monday, November 13, 2006
 PO/PROJECT #: MN 2372
 SUBMITTAL #: 36089

Preparation Method: EPA 600/R-93/200M-P (Total Metals in Paint Chips, Sonication)

Analysis Method: EPA 6010B (ICP-AES Method for Determination of Metals)

LAB NUMBER: 06-17917

Sampled By: Rod Ellis
 Job Location: Milwaukee, WI
 Sample Identification: 1 - Interior Wet

Date Sampled: Thursday, November 02, 2006
 Sample Description: Paint Chips

ELEMENT	RESULT (by weight)	REPORTING LIMIT
Lead	*ND	0.0050 %
Chromium	0.0026 %	0.0013 %

LAB NUMBER: 06-17918

Sampled By: Rod Ellis
 Job Location: Milwaukee, WI
 Sample Identification: 2 - Exterior Roof

Date Sampled: Thursday, November 02, 2006
 Sample Description: Paint Chips

ELEMENT	RESULT (by weight)	REPORTING LIMIT
Lead	0.0056 %	0.0050 %
Chromium	0.0047 %	0.0013 %

LAB NUMBER: 06-17919

Sampled By: Rod Ellis
 Job Location: Milwaukee, WI
 Sample Identification: 3 - Interior Dry - Wet Riser

Date Sampled: Thursday, November 02, 2006
 Sample Description: Paint Chips

ELEMENT	RESULT (by weight)	REPORTING LIMIT
Lead	0.79 %	0.0050 %
Chromium	0.037 %	0.0013 %

LAB NUMBER: 06-17920

Sampled By: Rod Ellis
 Job Location: Milwaukee, WI
 Sample Identification: 4 - Exterior Leg

Date Sampled: Thursday, November 02, 2006
 Sample Description: Paint Chips

ELEMENT	RESULT (by weight)	REPORTING LIMIT
Lead	*ND	0.0050 %
Chromium	*ND	0.0013 %

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SUBMITTAL #: 36089

Preparation Method: EPA 600/R-93/200M-P (Total Metals in Paint Chips, Sonication)

Analysis Method: EPA 6010B (ICP-AES Method for Determination of Metals)

Unless Otherwise Noted: 1.) All Of The Quality Control Meets The Requirements.
2.) The Condition Of Each Sample Was Acceptable Upon Receipt

Test Reviewed By: Megan Cornell, Senior Chemist

*Not Detected At The Reporting Limit

Megan Cornell

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