Appendix A

Madoc Elevated Tank Video Inspection (Authorized Inspection Services Inc., 2019)

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Madoc Elevated Tank Video Inspection

Client	:	OCWA
Representative	:	Amber Coupland, Operations Manager
Project	:	Internal video inspection and external visual, where accessible.
Method	:	Submersible video ROV with colour camera and lighting.
Object	:	Elevated vertical concrete tank, full of water and in-service
Location	:	Madoc, ON
Date	:	August 20, 2019
AIS Job no.	:	20190820-01-OCWA

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1.0 Introduction:

At the request of the Ontario Clean Water Agency, as part of normal due diligence and routine maintenance, an underwater video survey, using a disinfected submersible ROV with lighting and high-resolution camera, was performed inside the Madoc elevated tank, while in-service and full of water. The main reasons for the survey were to check the overall condition of the tank and components, type and amount of floor sediment, identify any significant cracking or other anomalies. The entire video survey was recorded and a copy of the inspection, in DVD format, is supplied with this report.

2.0 Equipment:

Submersible video ROV with high-resolution tilt camera and lighting.

3.0 Conclusions:

3.1 The inlet-outlet carbon steel pipe portion which penetrates up through the elevated water tank floor appears to be corroded with heavy scale and deposits seen.
3.2 Sediment, small bits of debris and material with a powdery concrete appearance is seen across the upwardly convex floor of the tank. Styrofoam sections, as in previous surveys, seen floating on the surface.
3.3 There is what appears to be suspended, floating concrete “dust” on the water surface.
3.4 No obvious damage was seen in the tank concrete vertical structural and wall sections, where accessible for inspection. Some horizontal indications seen which appear minor.
3.5 The screened vent located at the peak of the domed roof appears in good condition. A structural lifting assembly located on the roof top is clamped and bolted to the roof vent nozzle. The topside roof hatchway is intact and was locked after inspection completed.
3.6 The tank roof has some areas of damaged insulation, as noted in previous inspections. Areas of insulation sheet metal, underside of the tank to tower transition, are corroded.
3.7 The underside of the tank floor, viewed from ground level, appears in good condition.
3.8 The external tower ladder appears intact although installed cable interferes with usage of a harness fall-arrest slider. A double lanyard system was used to climb the tower.
3.9 The overflow pipe appears intact and is screened on the bottom outlet end.
3.10 Valves and piping inside the tower skirt at grade level are mostly insulated.

The disinfection of the ROV and umbilical cable was performed immediately prior to entering the elevated tank using sodium hypochlorite and potable water supplied by OCWA personnel who also witnessed the video survey. Dried residue from the sodium hypo remained on the lens dome of the front, submersible camera viewer however this did not prevent areas of interest being viewed, inspected and recorded. A copy of the video survey is included with this report. For future inspections, the elevated tank “as-built” drawings should be available, if practical.

4.0 Recommendations:

4.1 OCWA personnel to review the inspection video and this report.
4.2 Rearrange the communication cable running down the front of the vertical external ladder to allow a fall-arrest slider to be used in future climbs up the tower.
4.3 Request from AIS NDE information on other services relating to, for example: cleaning, further inspection and any required repairs.
4.4 Plan to drain and enter the elevated tank for cleaning during 2020 or when practical and take the opportunity, at that time, to perform further inspections on the inlet-outlet pipe.
4.5 Continue to monitor the sheet metal on the external under-edge of the elevated tank insulation which was found to be corroded. Plan to repair/replace in future.
4.6 Plan to assess and perform repairs on the tank roof insulation, where damaged or missing.

5.0 Inspection/Discussion:

The video ROV and umbilical were disinfected, immediately prior to entering the tank, using sodium hypochlorite and potable water supplied by OCWA operations then lowered into the top of the elevated tank through the square roof top hatchway adjacent to the access ladder. The ROV was "flown" to areas of interest on the floor, drain, inlet-outlet nozzle and up and down the walls and vertical concrete reinforcement members.

Highlights of the video below with clock time in hours: minutes: seconds with a brief comment next to each:

10:04:05	Water surface near hatchway; test recording function, lights, ROV thrust motors
10:05:00	Moving down a section of wall, some what appear to be minor horizontal indications
10:06:40	View centre floor hatch cover, general views of floor sediment
10:09:00	Good views of floor bottom sediment, some iron rust-coloured bits
10:11:00	Looking up above water line; note concrete "dust" on water surface
10:13:00	Looking up ; view of overflow opening
10:14:00	Brief view of floating Styrofoam pieces
10:15:20	Moving down wall
10:18:00	Generally moving around floor bottom, general views of tank floor sediment
10:19:00	Good view of Styrofoam pieces which have been floating on surface for years
10:20:30	Moving down a section of tank wall to bottom
10:21:30	View of inlet-outlet pipe on tank bottom which has heavy scale and deposits
10:22:30	Views looking up at roof underside
10:23:15	Water surface views of what appear to be concrete "dust" floating.
10:27:00	(end recording)

Underside of roof, vent and overflow opening

Look right from hatchway at roof-wall interface

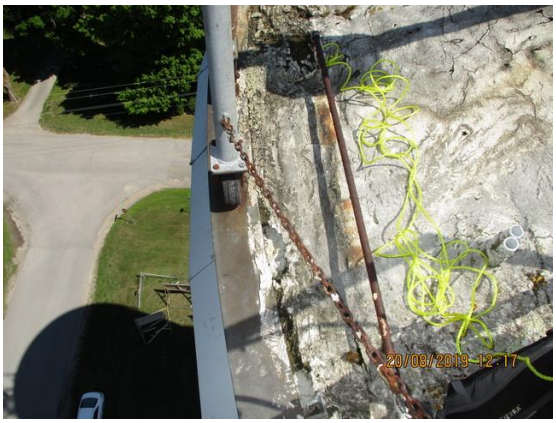
Looking across at tank underside and wall

Look left from hatchway at roof-wall interface

Roof vent appears intact and in good condition

Looking at topside of domed roof and vent

View top side landing and hoisting structure

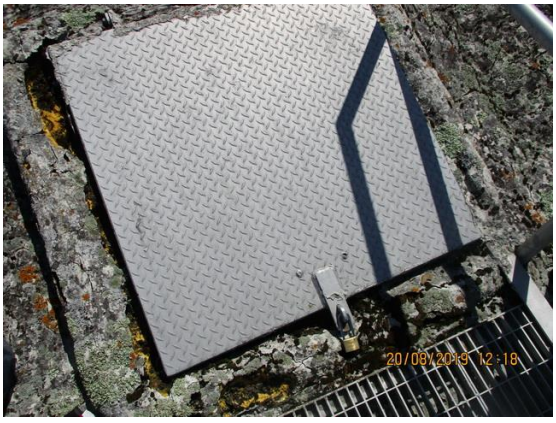


Tank roof edge near ladder; some insulation damage

Section of tank roof topside insulation

Tank roof section; some areas of insulation damage

Roof hatch open during video survey



Roof hatch secured with a new lock after survey

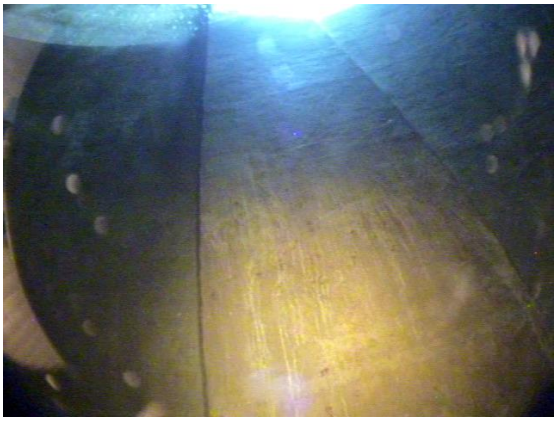
Inlet-outlet pipe appears corroded

Wide view of convex tank floor and sediment

Floor centre access hatch appears intact

View looking up typical section of tank wall

Outer floor sediment with white, powdery appearance



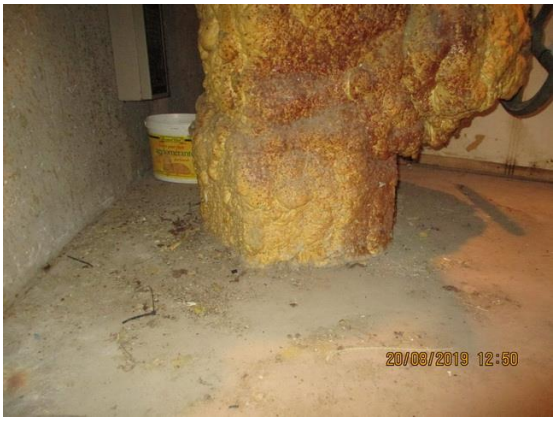
Underwater view up at vertical wall structure

Underside of tank edge insulation sheet metal corroded

Sheet metal joints stained under tank edge

Underside of elevated tank viewed straight up

View up elevated tank support structure



Floor-piping interface at grade level – no leaks seen

Bare section of outlet-inlet piping