ENGINEER'S FIELD REPORT

Date: 03/31/22

Date of Site Visit: 03/18/22
Site: Boonsboro Reservoir
Time of Site Visit: 10AM – 2PM
Weather: Sunny
Temperature Range: 60s

Work Order Number: 14421-004
Contract Number:
Project: Boonsboro Replacement Reservoir
Field Report Number: 02
Report By: L. Garcia Klochko

CC: Jeff Basford, Andy Cooper

Work in Process:	Present on Site:
Site visit to observe reservoir diving inspection	Laura Garcia Klochko (WRA) Town of Boonsboro – Town Manager Town of Boonsboro Utilities Superintendent and Public Works Superintendent Frederick County Dive Team (based out of New Market District Volunteer Fire Company)

Observations/Comments:
I arrived on site at 10am to observe the reservoir's inspection to be conducted by the Frederick County Dive Team. The Dive Team is based out of the New Market District Volunteer Company. During the first inspection, Commander Eaves led two other divers into the reservoir and coordinated with the lookout who remained outside. I observed the inspection via live feed video although the communication lines were not working properly so I was not able to communicate with the divers while the inspection was occurring.

During the initial dive the dive team entered the reservoir and started assessing the condition of reservoir's walls and floor. The team did an initial walk around but since the communication lines with the team's safety lookout on the outside were not working properly, the assessment was cut short. The team exited the reservoir and reported seeing several sunken areas at the bottom of the reservoir located along the eastern and southern edges of the reservoir floor.

Commander Eaves and I reviewed the video footage and discussed what the team had seen. He offered to enter the reservoir again by himself to get better footage and to perform dye tests at locations were the reservoir wall and floor had recessed and at the drain pipe which had a visible gap between the Hypalon liner and the pipe.

The videos from the second dive, files named MOV_009.mp4 and MOV_010.mp4, show many cracks in the concrete liner, mainly in the east and south side walls and floor area adjacent to these sides. No substantial dips or cavities were observed along the walls of the reservoir. The sunken areas identified by the divers were observed along the eastern and southern sides of the reservoir, where the walls meet the reservoir floor; and are approximately 2 to 3 inches deep. Additionally, an approximately 4- to 6-inch gap was observed at the connection of the drain pipe and the reservoir floor.

Figure 1 (next page) depicts the location of the observations and dye tests.

Commander Eaves performed three dye tests at the locations shown below. The first test was performed at the dip along the southern floor edge and the second test was performed at the dip observed on the northeast corner of the reservoir floor. Dye was suctioned or taken at neither of these locations. The third test was performed at the gap

between the drain pipe and the reservoirs floor, here the dye was suctioned into the hole. This last test proves that water loss is occurring at this location.

Based on the divers' observations and first two dye tests, the Hypalon liner appears to be in good condition with no visible cracks or holes, even over the depressions and cracks of the concrete liner.

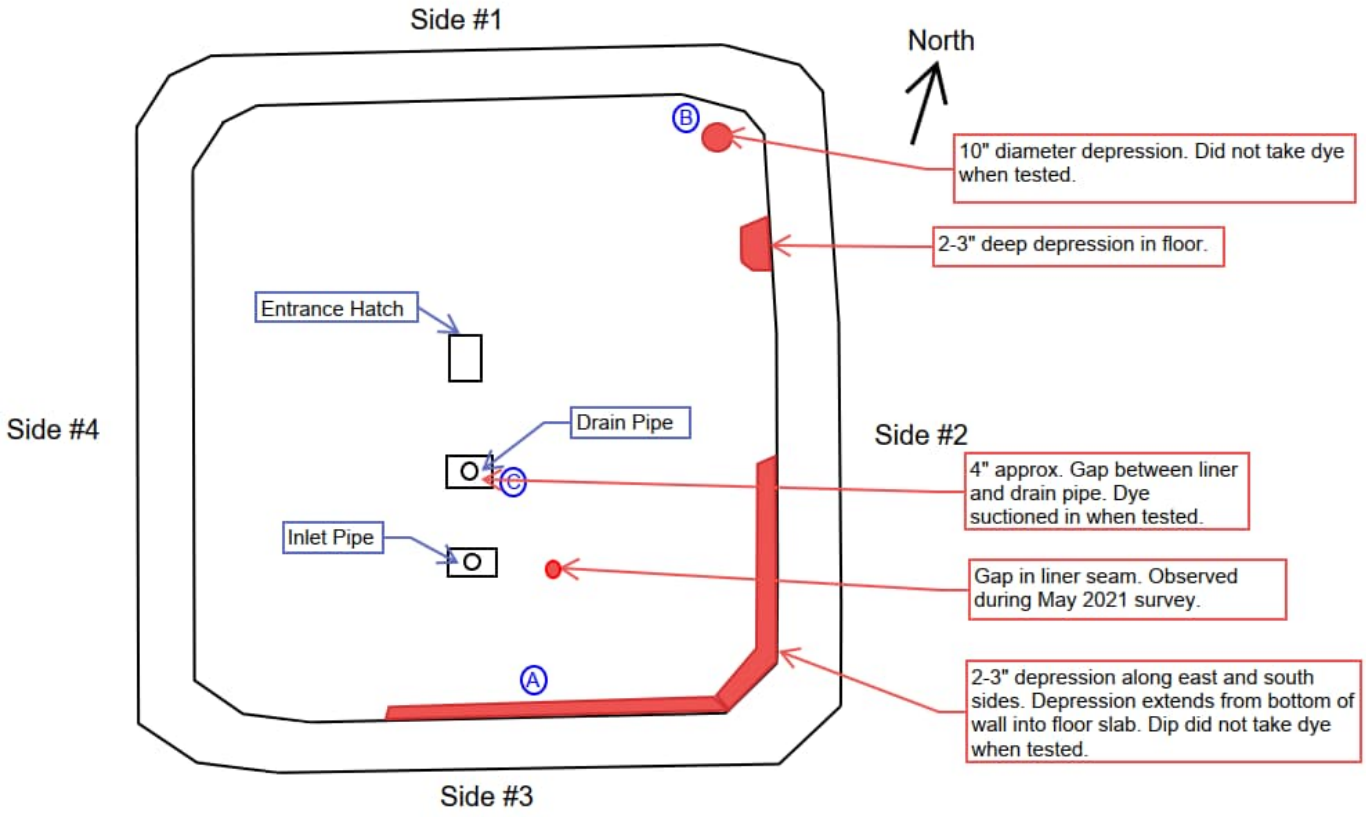


Figure 1: Dive Survey Inspection Notes

In addition to the latest survey's videos, we also reviewed an inspection report from WRA and some historical photographs from 1985 when the reservoir was lined with the current Hypalon liner and the previous diving survey video, recorded in 2021.

The historical photographs depict the deteriorated condition of the previous asphalt liner and the sequence of how said liner was removed and the new Hypalon liner was installed. The 1985 inspection report noted that the reservoir's floor concrete slab already had some minor cracks.

During the previous dive survey, performed in May 2021 by the Frederick County Dive Team, the divers identified a hole in the seam of the liner. This gap was highlighted by the diver by putting a glow stick in the liner's gap. This gap is adjacent to the inlet pipe. This location was not tested during the most recent survey.

Recommendations:

The cracks and depressions in the concrete liner are not a concern due to the age of the reservoir. These cracks do not appear to be a recent development as some of them were noted in the 1985 field report. Since the Hypalon liner appears to be in good condition along the reservoir's walls and floor and there is no indication of cracks at or along the sunken areas, we anticipate that the embankments are well protected from water infiltrating the berms' soil masses.

As a temporary solution, we recommend the leak by the drain pipe and the gap in the seam adjacent to the inlet pipe be covered by tightly packed sandbags, in order to lessen the current water loss. For a more permanent solution, the reservoir would have to be drained and the liner patched in accordance with the manufacturer's instructions. The patching instructions provided by the manufacturer (Burke Environmental Products) have been attached to this report.

CSPE REPAIR METHODOLOGY

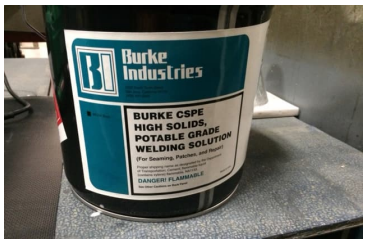
Chlorosulphonated Polyethylene (CSPE) is a cross linked synthetic rubber that can be successfully repaired throughout the product life using a simple 4 step process. Repairs have been carried on CSPE liners and covers over 20 years old with repairs outlasting the life of the original material.

1. Clean the area to be repaired with a non-toxic cleaner that does not contain phosphate, bleach, alcohol or ammonia e.g. “Simple Green Cleaner” or equivalent. Scrub the area with a heavy duty nylon pot scrubbing pad and wipe off with a clean rag. Use no water and do not dilute the cleanser.

2. Scrub the area to be repaired with Xylene/Xylol to re-activate the CSPE. Use a separate heavy duty nylon pot scrubbing pad. Wipe off with a clean rag. The surface of the CSPE will feel a little tacky.

3. Apply Burke Industries Welding Solution (adhesive) to both mating surfaces with a 75mm paint brush.

Insert



4. Apply heat using a Leister Triac hand gun (or similar), immediately after the application of the adhesive, between both sheets and using a heavy duty hand roller stitch/roll right behind the nozzle of the heat gun.

Insert
Picture

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