

1 Q. **Refurbishment of Day Tank.**

2 With reference to the 2022 CFM report (Schedule 1, Attachment 3), please provide a copy of the
3 referenced completed required calculations from the Fifth Edition of the API 653 Section
4 6.4.2.2.1.

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7 A. Please refer to IC-NLH-003, Attachment 1 for a copy of the requested calculations.

8 Newfoundland and Labrador Hydro (“Hydro”) had requested CFM to prepare these calculations
9 to help determine if it could be prudent to seek deferral of the next out-of-service inspection
10 date with the provincial regulator. The inspection date had previously been established as 2023
11 in accordance with the 2013 report.¹ Hydro’s effort was in response to the extension of the
12 Holyrood Thermal Generating Station operation from March 2023 to March 2024. On the basis
13 of the calculations provided in April 2022, CFM has recommended an inspection nine years from
14 the last inspection, which would be in 2022.

15 These recent calculations suggest that the tank floor will be at the minimum thickness of 0.1
16 inches by September of 2022 as per API 653². Due to the lead time for steel plates (upwards of
17 eight months), as well as the requirement for a total plant outage to complete the day tank
18 inspection and refurbishment, Hydro is seeking approval to initiate the project as soon as
19 possible with completion of the work in 2023. This is aligned with the recommendations from
20 the 2013 report.

21 Completing the next inspection in 2023 will result in a calculated minimum remaining thickness
22 value marginally below the allowed minimum thickness of 0.1 inches. The calculated thickness
23 would be less than 10% below the minimum in May of 2023, when the day tank would be
24 expected to be removed from service after the winter operating season. Please refer to Hydro’s
25 response to IC-NLH-009 for details regarding Hydro’s measures to mitigate and contain a

¹ “Application for Approval of Various Supplemental Capital Projects at the Holyrood Thermal Generation Station,” Newfoundland and Labrador Hydro, June 6, 2022, sch. 1, att. 1, p. 6 of 109.

² *Tank Inspection, Repair, Alteration, and Reconstruction*, API Standard 653, 2014.

- 1 potential fuel oil spill from the day tank. Hydro will continue to monitor the day tank and
- 2 implement these measures in advance of completing the required inspection in 2023.



API 653 Fifth Edition - Calculations as per Section 6.4.2.2.1

The subsequent inspection interval can be calculated from the measured tank bottom corrosion rate and remaining minimum thickness in accordance with API 653 Section 4.4.5.

$$MRT = (\text{Minimum of } RT_{bc} \text{ or } RT_{ip}) - Or (StPr + UPr)$$

Where:

MRT is the minimum remaining thickness at the end of interval Or . This value must meet the requirements of Table 4.4, 4.4.5.4, and 4.4.6;

Or is the in-service interval of operation (years to next internal inspection) not to exceed that allowed by 6.4.2;

RT_{bc} is the minimum remaining thickness from bottom side corrosion after repairs;

RT_{ip} is the minimum remaining thickness from internal corrosion after repairs;

$StPr$ is the maximum rate of corrosion not repaired on the top side. $StPr = 0$ for coated areas of the bottom. The expected life of the coating must equal or exceed Or to use $StPr = 0$;

UPr is the maximum rate of corrosion on the bottom side. To calculate the corrosion rate, use the minimum remaining thickness after repairs. Assume a linear rate based on the age of the tanks. $UPr = 0$ for areas that have effective cathodic protection.

Based on inspection data and the history of the Day Tank, a leak was observed in 2013. As the bottom plate was replaced in 1998 with material having a nominal thickness of 0.25", a linear corrosion rate, UPr , can be calculated as follows:

$$t_{nom} := 0.25 \text{ in}$$

$$t_{min} := 0 \text{ in}$$

$$O_i := 2013 \text{ yr} - 1998 \text{ yr} = 15 \text{ yr}$$

$$UP_r := \frac{t_{nom} - t_{min}}{O_i} = 0.017 \frac{\text{in}}{\text{yr}}$$

The following equation can be rearranged to determine the operating interval from 2013, when a patch plate having a nominal thickness of 0.25" was installed in the area where a leak was present. Note that the value for MRT is taken from API 653 Table 4.4.

$$MRT = (\text{Minimum of } RT_{bc} \text{ or } RT_{ip}) - Or (StPr + UPr)$$

$$Or = \text{Minimum of } RT_{bc} \text{ or } RT_{ip} - MRT / (StPr + UPr)$$

$$RT_{bc} := 0.25 \text{ in}$$

$$MRT := 0.10 \text{ in}$$

$$O_r := \frac{RT_{bc} - MRT}{UP_r} = 9 \text{ yr}$$

Since the patch plate was installed in 2013, the next internal inspection is required in 2022.

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