



US Army Corps of Engineers
BUILDING STRONG

Ice Harbor Lock and Dam
Annual Oil Accountability Report
For August 14, 2015 to December 31, 2015

1. **PURPOSE:** To provide results of monitoring and assessment for Ice Harbor Lock and Dam (“Project”) pursuant to the Oil Accountability Program (OAP) that was adopted pursuant to the Settlement Agreement between USACE and Columbia Riverkeeper, that was attached to the Order of Dismissal (E.D. Wash. No. 2:13-md-2494-LRS), dated August 14, 2014.

This Oil Accountability Report is provided for informational purposes only, and is not final agency action within the meaning of the Administrative Procedure Act or any other applicable provision of law. Oil Accountability Reports are not intended to, and do not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

2. **INSPECTIONS (MONITORING):** All oil-filled operating equipment (55 gallons or greater), bulk oil storage containers, and high-risk equipment at the Project shall be periodically inspected for leaks and to ensure the oil level is in the normal operating range, as outlined in the below table.

Equipment	Frequency
Turbine Guide Bearings (6 each)	Monthly
Lower Guide Bearings (6 each)	Monthly
Upper Guide Bearings (6 each)	Monthly
Thrust Bearing (6 each)	Monthly
Governor System (Sump tank, Accumulator, blade & gate servos, oil head and piping) (6 each)	Monthly
Wicket Gate Lubrication (Farval 6 each)	Weekly
Transformers (8 each)	Monthly
Potential Transformers (9 each)	Monthly
Head Gate Hydraulic Oil Tank (1 tank)	Monthly
Head Gate Reservoir top pipe chase (2 tanks)	Monthly
Head Gate Cylinders (18 each)	Monthly
Turbine Oil Dirty Tank (1 tank)	Monthly
Turbine Oil Clean Tank (1 tank)	Monthly
Transformer Oil Clean tank (1 tank)	Monthly
Transformer Oil Dirty tank (1 tank)	Monthly
Tail Race Crane (1 each)	Monthly
Intake Crane (1 each)	Monthly
Freight Elevator (1 each)	Monthly
Spillway Gearboxes (20 each)	Monthly

Equipment	Frequency
Spillway 90 degree Gearboxes (10 each)	Monthly
Pump 8 - North Non-Overflow Sump Pump (Shaft Oiler, 1 each)	Monthly
Spillway Crane (1 each)	Monthly
STS Screen Gearboxes (18 each)	Monthly
South Shore Fish Pump Gearboxes (8 each)	Monthly
South Shore Fish Pump Farval Grease System (2 each)	Weekly
South Shore Fish Hydraulic System (2 each)	Monthly
South Fish Ladder Entrance Weir NFE-1 North end Tailrace, North weir	Monthly
South Fish Ladder Entrance Weir NFE-2 North end Tailrace, South weir	Monthly
South Fish Ladder Center Entrance Weir SFE-1, Upstream weir	Monthly
South Fish Ladder Center Entrance Weir SFE-2, Downstream weir	Monthly
South Fish Pump House Sump Pump (Shaft Oiler)	Monthly
North Fish Ladder Entrance Weir labeled EW-1, North weir	Monthly
North Fish Ladder Entrance Weir, labeled NFE-2 South weir	Monthly
North Shore Fish Pump Derrick Crane Hydraulic Power Unit (1 each)	Monthly
North Shore Fish Pump Gearboxes (3 each)	Monthly
North Shore Fish Pump Farval Grease System (3 each)	Weekly
North Fish Pump Hydraulic Power Unit (1 each)	Monthly
North Fish Pump house Sump Pump (Same pump as Navlock Pump 4)	Monthly
Downstream Gate	Monthly
Navlock Drain Tainter Valve HPU (2 each)	Monthly
Navlock Drain Tainter Valve Farval Grease System (2 each)	Weekly
Navlock Fill Tainter Valve HPU (2 each)	Monthly
Navlock Fill Tainter Valve Farval Grease System (2 each)	Weekly
Upstream Gate	Monthly
Navlock Pumps (4 each)	Monthly

Ice Harbor Project conducted 74 oil accountability related inspections from 14 August, 2015 to 31 December, 2015. Each inspection encompasses numerous pieces of equipment (for example, all equipment that is located in the powerhouse is included in one monthly inspection) listed in the above table based on location of the equipment; there is not an inspection for each individual piece of equipment. If an inspection indicates that there may be a discernible loss of oil, then the inspection is followed-up with an assessment as outlined below.

3. **ASSESSMENTS:** Leaks or observable changes in oil level that indicate a discernible loss of oil that is not associated with normal operations (not within the normal operating range) require an assessment. Oil levels on some equipment fluctuate within the normal operating range depending on oil temperatures and position of the equipment. When a leak is reported, maintenance staff will assess it to determine the severity. Any potential leak to the environment (i.e. to waterways) will be dealt with immediately. Other leaks that are not to the environment will be repaired as soon as possible. Small leaks are often deferred until the next time the equipment is scheduled to be out of service, however steps are taken to capture any leaking oil such as placing drip pans or absorbent pads.

These assessments are documented by utilizing Facilities Equipment Maintenance (FEM) work orders.

- a. Assessment Criteria. A work order is generated on the following:
 - i. Any equipment with high or low levels or alarms.
 - ii. Malfunctioning automated grease systems.
 - iii. All class 2 and 3 leaks on identified equipment. Leaks are classified as follows:

Leak Severity

Class 1 – Wet, seepage of fluid, but not enough to form drops.

Class 2 – Seepage of fluid that forms drops.

Class 3 – Actively dripping.

Note: Spills or releases to the environment are assessed immediately via a Project Spill Prevention Controls and Countermeasures (SPCC) plan.

- b. Ice Harbor Project conducted 19 assessments from 14 August, 2015 to 31 December, 2015.
 - i. One assessment was related to a high oil level alarm on a main unit turbine bearing which was repaired. No oil was released to the environment.
 - ii. There were no assessments due to malfunctioning automated grease systems.
 - iii. 17 assessments were associated with class 2 or 3 leaks to areas inside the project but not to the environment. Five assessments were repaired, 1 was in progress at time of this report and 11 are scheduled for maintenance repair. Temporary measures, such as drip pans, are in place to capture any oil on equipment awaiting scheduled maintenance.
 - iv. One of these assessments resulted from a reported oil sheen at the navigation lock (NavLock) approach channel. The source of the sheen was not determined. It was reported publicly to the NRC #1135371 on December 9, 2015.
4. **INVENTORY:** There are design limitations within the oil systems internal to the dam (turbine, transformer, head gate oil systems) that limit our ability to determine exact oil quantity data as outlined below.
- i. The oil systems are closed loop systems which consist of oil storage tanks, piping, and several oil sumps for each main unit. There are level indicating devices on each tank and the sumps, although the devices were not designed to determine exact amounts of oil in the equipment. Rather, they were only intended to tell if the level was within normal safe operating levels. There is no method to determine how much oil is in the piping.
 - ii. Oil storage tank quantity level indication is in 50-gallon increments so it is not possible to determine the exact amount of oil in the storage tanks.

iii. Rags and absorbents are routinely used during maintenance to clean up oil. These rags and absorbents are disposed of but the amount of oil/grease cannot be determined.

a. **Turbine Oil:** The numbers provided below for turbine oil inventory that is utilized in the main units (generators) are a best estimate based on the data available and within the limitations discussed above.

Date	Gallons of Oil In System	Gallons Purchased Since Initial	Difference Difference = -1*(initial - current - purchased)
14 Aug, 2015 (initial)	49,040	N/A	N/A
18 Dec, 2015	48,655	0	-385

Note: The 385 gallons of unaccounted for oil is attributed to disposed of oil, losses to rags/absorbents during maintenance, and inaccuracies in the oil level indicating system. There were no oil spills or known losses to the environment. See section e. below for explanation of waste oil disposal practices.

b. **Transformer Oil:** The numbers provided below for transformer oil inventory are a best estimate based on the data available and within the limitations discussed above.

Date	Gallons of Oil In System	Gallons Purchased Since Initial	Difference Difference = -1*(initial - current - purchased)
14 Aug, 2015 (initial)	54,728	N/A	N/A
18 Dec, 2015	54,703	0	-25

Note: The 25-gallon difference is attributed to oil used to fill an oil purification unit. In November 2015, the oil in Transformer TW1 and Station Service Transformer TJO was purified to remove water from the oil. Approximately 25 gallons of oil remained in the filtration unit following the process. There were no other transformer oil additions or removals from the transformers during this period.

c. **Head Gate Hydraulic Oil:** The numbers provided below for head gate hydraulic oil inventory are a best estimate based on the data available and within the limitations discussed above. In addition to the above limitations, there is a third tank in the head gate system that measures in inches and is then converted to gallons. The gallon axis of the conversion chart is in 200 gallon increments only, so measurements are inexact.

Date	Gallons of Oil In System	Gallons Purchased Since Initial	Difference Difference = -1*(initial - current - purchased)
14 Aug, 2015 (initial)	18,456	N/A	N/A
18 Dec, 2015	18,429	0	-27

Note: The 27 gallons of unaccounted for oil is attributed to disposed of oil, losses to rags/absorbents during maintenance, and inaccuracies in the oil level indicating system. There were no oil spills or known losses to the environment. See section e. below for explanation of waste oil disposal practices.

- d. **Oil Used in Other Equipment:** This is the equipment listed under the Inspection section above that is not part of the turbine, transformer or head gate systems and the total amount of oil in those systems.

Date	Gallons of Oil In System	Gallons Purchased Since Initial	Difference Difference = -1*(initial - current - purchased)
14 Aug, 2015 (initial)	4520	N/A	N/A
18 Dec, 2015	4520	275	+275

- e. **Disposed of oil/grease:** Oil disposed of is not segregated by types of oil or its origin. All oil is combined into waste oil drums and then disposed of. The same applies to grease, various types of grease are all combined into a single drum for disposal.

Date	Gallons of Oil Disposed of:
9/14/2015	1080
Date	Gallons of Grease Disposed of:
11/23/2015	55

Note: These amounts are for a longer period than the period of this report. Unable to determine amounts from just this period.

- f. **Grease:** Grease beginning and ending inventories remain constant because of established warehouse min/max levels. Therefore, the amount purchased is typically the amount used. Grease is used to lubricate critical bearings/bushings and other equipment. It is either lost in rags during maintenance, disposed of as outlined in 'Disposed of oil/grease' section above, or, for certain in-water equipment, considered non-recoverable.
- i. **Amount Purchased/Used:** Ice Harbor purchased 97 gallons of grease during this period.
 - ii. **Automatic lubrication systems (Farvals):** Grease for automatic lube systems (Farvals) is tracked by amount added to the system. These systems automatically lubricate various pieces of equipment. Ice Harbor has 15 Farval systems. During this period 34 gallons of grease were added to the various systems.