US Army Corps of Engineers
BUILDING STRONG

The Dalles Lock and Dam

Annual Oil Accountability Report

14Aug2015 – 11Jan 2016

1.0 Purpose.

To provide results of monitoring and assessment for The Dalles Lock and Dam ("Project") pursuant to the Oil Accountability Plan (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 a 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.

2.0 Inspections (Monitoring).

All oil-filled operating equipment (55 gallons or greater), bulk oil storage containers, and high-risk equipment at the Project shall be inspected, at a minimum, monthly for leaks and to ensure the oil level is in the normal operating range. The Dalles Project's inspection frequencies are as follows:

Generation units	
MU governor system	Monthly
MU bearing levels	Weekly
SS governor system	Monthly
SS bearing levels	Weekly
FU governor system	Monthly
FU bearing levels	Weekly
Transformers	
Main and fish unit transformers	Daily
SS Transformers	Daily
Transformer oil water separator	Monthly
Transformer coolers	Monthly
Storage	
1st floor storage tanks	Weekly
4th floor satellite accumulation	Weekly
Nav lock satellite accumulation	Weekly
Warehouse Annex	Monthly
Fish unit oil drainage sump	Monthly

OWS oil storage tank	Daily
Other	
SS penstock hydraulic reservoir	Monthly
Cranes	
Hammer head crane	Monthly
E Crane	Monthly
Tailrace gantry crane	Monthly
Spillway gantry crane	Monthly
PUD Trash rake crane	Monthly
10 Ton crane	Monthly
35 Ton crane	Monthly
55 Ton crane	Monthly
Gates	
Spillway gate gearbox 1-23	Monthly
I & T sluiceway end gates	Monthly
Motorized Intake chain gates(skimmer)	Monthly
East fishway	
Weirs 154-159, JP1-JP6, E1-E3	Monthly
Weirs W1-W3, S1-S2	Monthly

Bypass channel	Monthly
East crowder window washer	Monthly
North fishway	
Weirs N1	Monthly
North crowder window washer	Monthly
Navigation lock	
Tainter valves	Weekly
Upstream gate machine rooms	Weekly
Downstream gate machine rooms	Weekly
Fishlock	
Fishlock approach channel weirs	Monthly
Fishlock valve room	Monthly
Top of the Fishlock silo	Monthly
Grease systems	
Wicket gate bushings	Weekly
Spillway gate trunnions	Weekly
Navlock Tainter gate trunnions	Weekly
General	
Mobile generators (120V)	Monthly

Mobile air compressor	Monthly
Genie manlift	Monthly

Spillway Emergency Generator	Monthly

2.1 Summary.

The Dalles Project conducted 1020 inspections during the period of August 14, 2015 - January 11, 2016. An inspection may result in the need to an assessment. The criteria for generating an assessment follows in the next section.

3.0 Assessments.

Leaks or observable changes in oil level that indicate a discernible loss of oil that is not associated within normal operating range require an assessment. When a leak is reported, maintenance will assess it to determine the severity. Any 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.

3.1 Assessment Criteria.

A work order will be generated on the following:

- Any equipment with high or low levels or alarms.
- Malfunctioning automated grease systems.
- At the inspectors discretion
- *All* class 3 and class 2 leaks on high risk equipment given the following definitions:

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 (i.e., to waterways) are assessed immediately via a Project Spill Prevention Controls and Countermeasures (SPCC) plan.

3.2 Summary.

The Dalles Project conducted 31 assessments during the period of 14 August, 2015 -11 January, 2016. None of the assessments resulted in a discharge to navigable waters. Following is a summary of the assessments:

- Cranes-Five assessments were associated with class 2 or 3 leaky hoses or seals on crane assets. Four have been resolved, one is awaiting scheduled maintenance.

- Powerhouse-Sixteen assessments were associated with internal powerhouse assets: Eleven class 2 or 3 leaks on seals, gaskets or o rings, five for level variations; three of these are awaiting scheduled maintenance, three are in progress and ten have been resolved.
- Navigation lock-One assessment on a stripped grease fitting has been resolved.
- Spillway-Seven assessments were conducted associated with leaky seals. These seven gearbox seals are awaiting parts and funding.
- Transformers-Two assessments were conducted. One resolved a level variation and one associated with a class 2 leak is awaiting scheduled maintenance.
  Temporary measures, such as drip pans, are in place to capture any oil on equipment awaiting scheduled maintenance.

4.0 Inventory.

This inventory covers turbine oil, transformer oil, various bulk oils in high risk equipment, and grease for automated greasing systems.

4.1 Turbine Oil.

Inventory of turbine oil that is utilized in the main units (generators) is a best estimate. It is currently impossible to get exact amounts due to several factors that are outlined below.

- The oil system is a closed loop system which consists of oil storage tanks, miles of piping, and several oil sumps for each main unit. There are level indicating devices on the equipment; however they were not designed to determine exact amounts of oil in the equipment, they were only intended to tell if the level was within normal safe operating levels. These levels also fluctuate during operation (e.g., the level is higher during operations due to heating of the oil). There is no method to determine how much oil is in the piping, so transfer numbers are imperfect due to the large amount of use this system gets. The storage tank levels are subject to oil draining back from the equipment and oil that has collected in the pipes.
- 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.
- The total estimated capacity of the system (minus the piping and storage) is 183,620 gallons. There is 2,170 gallons of oil in storage for a total quantity of 185,790 gallons of turbine oil. Oil in piping is not known and is not included in this volume. The storage tanks and piping used to replenish the system will be the largest variable in what we use to generate numbers for reporting fluctuations in the system. Due to ongoing maintenance activity we were unable to obtain a baseline (i.e. no units being worked on, so all of the oil in storage is reserve and there is less oil moving through pipes) until November 1, 2015. This is the baseline we will use moving forward.

The project used two methods for estimating the amount of oil in the oil system:

- **Method 1 Drain and Add Estimate.** Drain and add totals are based on the amount of oil drained from and added to bearings and sumps. These totals do not include oils transferred out and then returned during maintenance.
- **Method 2 Tank Estimate**. The tank estimate uses the storage tanks as a marker for the fluctuation of oil in the system. Tracking reserve oil from the tanks used to replenish the system will show a trend of oil loss in the system. This survey was taken during maintenance and an estimate was made as to how much was reserve and how much was already appropriated. Future reports will be able to take this into account and survey between maintenance cycles.

Method 1 **Drain and Add Estimate**			**Method 2** **Tank Estimate**		
Initial est. system total	**1/11/2016 Drain & Add Estimate**	**Difference**	**Initial est. system total**	**1/11/2016 Tank Estimate**	**Difference**
185,790gal	185,125gal	-665gal	185,790gal	185,860gal	+70gal

The inaccuracy of the methods uses for estimating how much oil is in the equipment is demonstrated by a +70 net gain to -665 gallon net loss estimate. During this reporting period 220 gallons of turbine oil, 440 gallons of Oil Water Separator (OWS) sludge, and 250 gallons of mixed oil (containing some turbine oil) was recovered and disposed. Recovered and disposed of oil/grease are discussed in section 4.5.

4.2 Transformer Oil.

Inventory of transformer oil utilized in the main and station service transformers is a best estimate. It is currently impossible to get exact amounts due to several factors that are outlined below.

- The transformer oil system is a closed loop system which consists of oil storage tanks, miles of piping, and the actual transformers. There are level indicating devices on the equipment; however they were not designed to determine exact amounts of oil in the equipment, they were only intended to tell if the level was within normal safe operating levels. This system is less complicated than the turbine oil system, and for the most part is a static system. Because of this it is much easier to get a more accurate estimate than the turbine system but some of the limitations still apply.
- The total estimated capacity of the system (minus the piping and storage) is 200,716 gallons. There is 20,399 gallons of oil in storage for a total quantity of 221,055 gallons of turbine oil. Oil in piping is not known and is not included in this volume. The storage tanks and piping used to replenish the system will be the largest variable in what we use to generate numbers for reporting fluctuations in the system. Since this system has little dynamic use, we were able to establish a baseline for August 14, 2015.

The project used two methods for estimating the amount of oil in the transformer system:

- **Method 1 Drain and Add Estimate.** Drain and add totals are based on the amount of oil drained and added to transformers. These totals do not include oils transferred out and then returned during maintenance.
- **Method 2 Tank Estimate.** The tank estimate uses the storage tanks as a marker for the fluctuation of oil in the system. Transformer levels are fairly constant, so reserve oil from the tanks used to replenish the system will show a trend of oil loss in the system. This system does not get much use so the numbers will be more consistent than the turbine oil system.

Method 1 **Drain and Add Estimate**			**Method 2** **Tank Estimate**		
Initial est. system total	**1/11/2016 Drain & Add Estimate**	**Difference**	**Initial est. system total**	**1/11/2016 Tank Estimate**	**Difference**
221,055gal	220,848gal	-207gal	221,055gal	220,838gal	-217

During this reporting period 250 gallons of transformer oil and mixed oil (containing some transformer oil) was recovered and disposed. Recovered and disposed of oil/grease are discussed in section 4.5.

4.3 Other oils.

The high risk equipment on project (cranes, gates, weirs, etc.) are not a closed system but will be grouped together for a total sum. There are oil level indicating devices on the equipment; however they were not designed to determine exact amounts of oil in the equipment, but to ensure that the equipment is operating within normal levels, so these numbers are also an estimate. Most high risk equipment uses bulk 55 gallon drums of oil for replenishment. Oil is checked out of the warehouse and staged in powerhouse or navigation lock containment to be used as needed during maintenance activities.

August 14, 2015 est. group total	**Added to group**	**January 11, 2016 est. group total**	**Difference**
4,415 gal	55gal	4,470 gal	+55gal

A 55 gallon drum of oil was checked out of the warehouse and placed in working stock. During this reporting period 165 gallons of hydraulic oil was recovered and disposed. Recovered and disposed of oil/grease are discussed in section 4.5.

4.4 Grease.

The grease for automatic lube systems (Farvals, Alemites and Gracos) is tracked by amount added to the system. These systems automatically lubricate critical bearings/bushings

and is either lost in rags during maintenance, recovered from the oil water separator sludge tanks and shipped out for recycling, or for certain in-water equipment, considered non-recoverable.

The following table lists the amount of grease added to each system for the period August 14, 2015 through January 11, 2015:

Powerhouse Farvals	**Spillway Gracos**	**Navigation lock Alemites**
74.04gal	2.64gal	2.58 gal

During this reporting period 150 gallons of grease and 440 gallons of OWS sludge (containing grease) was recovered and disposed. Recovered and disposed of oil/grease are discussed in section 4.5.

4.5 Recovered and disposed of oil/grease.

Oil and grease recovered from equipment is stored in drums and then disposed of offsite by a third party vendor. Drums are segregated as turbine oil, transformer oil, hydraulic oil, oil water separator (OWS) sludge (usually a grease/oil/water mix), wicket gate sludge (oil separator sludge with a higher water content) or mixed oils where possible. Grease is not segregated by type and is usually mixed with absorbents.

The following table lists the amounts of grease/oil recovered/disposed of from August 14, 2015 through January 11, 2016:

Hydraulic oil	**Turbine oil**	**Transformer oil**	**Mixed oil**	**OWS sludge**	**Grease**
165 Gallons	220 Gallons	250 Gallons	275 Gallons	440 Gallons	150 Gallons