

ENVIRONMENTALLY ACCEPTABLE LUBRICANTS ANNUAL REPORT
ADDENDUM # 2 TO
ENVIRONMENTALLY ACCEPTABLE LUBRICANTS FEASIBILITY REPORT –
ROCKY REACH DAM
January 14, 2025

This Addendum 2 to the *Environmentally Acceptable Lubricant Feasibility Report – Rocky Reach Dam* (McMillen Jacobs Associates, 2020) is the annual environmentally acceptable lubricants (EAL) report required by Condition S11.B of National Pollutant Discharge Elimination System Waste Discharge Permit WA0991033. This addendum updates the information and analyses in the original report and in Addendum 1 to the original report, which was submitted to the Department of Ecology on May 1, 2024.

One EAL grease recommended in the original report, Panolin Margrease, is no longer available. Some equipment was converted to this grease prior to it becoming unavailable. Further analysis is currently underway to determine an acceptable alternative.

The following sections of this addendum update the EAL report:

Section 1: This section updates the table in Appendix B.4 – *EAL Implementation Analysis Summary* of the *Environmentally Acceptable Lubricant Feasibility Report – Rocky Reach Dam*. This table has been updated to show the current equipment lubricant status and to include references to additional information and comments.

Section 2: This section contains the additional information referenced in the table in Section 1.

Section 3: This section updates the EAL conversion schedule for the next three years.

Section 4: This section provides a progress update for the EAL conversions described in Addendum 1, which was submitted to Ecology in May 2024.

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January 14, 2025
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SECTION 1

ADDENDUM TO APPENDIX B.4 EAL IMPLEMENTATION ANALYSIS

Addendum to Appendix B.4 - EAL Implementation Analysis Summary

| EAL Implementation Analysis - Summary | | | | | | | | | | |
|---------------------------------------|---|--|------------------------|------------------|--|-----------------------------|------------------------|------------------|----------|-------------------------------|
| | Priority | Likelihood of Water Contact | Ease of Implementation | Cost Feasibility | Applicable Equipment | | | | | |
| | High | High | High | High | Bull gear, chain drive, pillow blocks (Not contained) | | | | | |
| | | Moderate | High | High | Sheaves, bearings, pillow blocks, chain drive, and couplings (minimally contained) | | | | | |
| | Moderate | Low | High | High | Sheaves, bearings, pillow blocks, chain drive, bull gear, and couplings (moderately contained) | | | | | |
| | | High | High | Moderate | Surface collector couplings and gate hoist hooks, blocks, lifting beams (submerged) | | | | | |
| | Low | Negligible | High | High | Bearings, couplings, bushings, pillow blocks, chain drive (Thoroughly contained) | | | | | |
| | | High | Moderate | Moderate | Tainter gate and orifice gate wire rope, Moffett crane wire rope, fish ladder wire rope, etc. | | | | | |
| | | High | Moderate | Low | COH hoist wire rope (submerged) | | | | | |
| ID | Primary System | Equip. Description | Floor | EI. | Original/Non-EAL Grease | Likelihood of Water Contact | Ease of Implementation | Cost Feasibility | Priority | Status/Reference |
| 1 | Adult Fish Ladder (RRFW) - Picket Barrier Hoist | Fish screening gates sheaves | Upper Fishway Deck | 717 | 248 Moly Syngard | Low | High | High | Moderate | Complete Renewable Bio HT 180 |
| 2 | Adult Fish Ladder (RRFW) - Picket Barrier Hoist | Fish screening gates zerks | Upper Fishway Deck | 717 | 248 Moly Syngard | Moderate | High | High | High | Complete Renewable Bio HT 180 |
| 3 | Adult Fish Ladder (RRFW) - Picket Barrier Hoist | Fish screening gates wire rope | Upper Fishway Deck | 717 | Not Lubricated | High | Moderate | Moderate | Low | Reference 1 |
| 4 | RRFW CS-S1 Operator | Limit Torques actuator - zerks | Upper Fishway Deck | 717 | 248 Moly Syngard | Moderate | High | High | High | Reference 2 |
| 5 | Adult Fish Ladder | Adjustable weir - pillow blocks | Upper Fishway Deck | 710 | 248 Moly Syngard | Moderate | High | High | High | Complete Renewable Bio HT 180 |
| 6 | Adult Fish Ladder | Adjustable weir - wire rope | Upper Fishway Deck | 710 | Not Lubricated | High | Moderate | Low | Low | Reference 3 |
| 7 | Juvenile Fish Ladder (BC-G1,-G6,-G7) | Radial gate - pillow blocks, zerks | Upper Fishway Deck | 710 | Huskey LVI-50 | Moderate | High | High | High | Complete Panolin Margrease |
| 8 | Trash Hopper | Sheaves, roller bearings, zerks | Upper Fishway Deck | 713 | Huskey LVI-50 | Low | High | High | Moderate | Reference 4 |
| 9 | Surface Collector | Travelling Screens - motor coupling | Upper Fishway Deck | 717 | 248 Moly Syngard | High | High | Moderate | Moderate | Complete Renewable Bio HT 180 |
| 10 | Surface Collector | Travelling Screens - chains and sprocket | Upper Fishway Deck | 717 | Huskey LVI-50 | Moderate | High | High | High | Complete Panolin Margrease |
| 11 | Forebay Intake Gate (ISFTP-S1, -S2) | Limit Torques - zerks | Upper Fishway Deck | 717 | 248 Moly Syngard | Moderate | High | High | High | Partial Reference 5 |

Addendum to Appendix B.4 - EAL Implementation Analysis Summary

| EAL Implementation Analysis - Summary | | | | |
|---------------------------------------|-----------------------------|------------------------|------------------|--|
| Priority | Likelihood of Water Contact | Ease of Implementation | Cost Feasibility | Applicable Equipment |
| High | High | High | High | Bull gear, chain drive, pillow blocks (Not contained) |
| | Moderate | High | High | Sheaves, bearings, pillow blocks, chain drive, and couplings (minimally contained) |
| Moderate | Low | High | High | Sheaves, bearings, pillow blocks, chain drive, bull gear, and couplings (moderately contained) |
| | High | High | Moderate | Surface collector couplings and gate hoist hooks, blocks, lifting beams (submerged) |
| Low | Negligible | High | High | Bearings, couplings, bushings, pillow blocks, chain drive (Thoroughly contained) |
| | High | Moderate | Moderate | Tainter gate and orifice gate wire rope, Moffett crane wire rope, fish ladder wire rope, etc. |
| | High | Moderate | Low | COH hoist wire rope (submerged) |

| ID | Primary System | Equip. Description | Floor | EI. | Original/Non-EAL Grease | Likelihood of Water Contact | Ease of Implementation | Cost Feasibility | Priority | Status/Reference |
|----|------------------------|---|--------------------|-----|-------------------------|-----------------------------|------------------------|------------------|----------|----------------------------|
| 12 | Juvenile Fish Ladder | Fish screen gates - pillow blocks, zerks | Upper Fishway Deck | 707 | Mobil Unirex EP | Moderate | High | High | High | Complete Panolin Margrease |
| 13 | VBS Screen Cleaner | Couplers, motor bearings, and pillow blocks | Transformer Deck | 717 | Huskey LVI-50 | Low | High | High | Moderate | Complete Panolin Margrease |
| 14 | Intake Gantry - COH | Trolley - wheel bearings, zerks | Transformer Deck | 717 | Mobil Unirex EP | Low | High | High | Moderate | Reference 6 |
| 15 | Intake Gantry - COH | Hoist - bearings, gear reducer, couplings, bushings, pillow block | Transformer Deck | 717 | Mobil Unirex EP | Negligible | High | High | Low | Reference 7 |
| 16 | Intake Gantry - COH | Hoist - wire rope | Transformer Deck | 717 | Mobilarma 798 | High | Moderate | Low | Low | Reference 8 |
| 17 | Intake Gantry - COH | Truck - zerks, bearings, couplings, seals | Transformer Deck | 717 | Mobil Unirex EP | Low | High | High | Moderate | Reference 6 |
| 18 | Intake Gantry - COH | Aux. hoist - hoist chain | Transformer Deck | 717 | Fuchs Renolit LZR | Negligible | High | High | Low | Reference 9 |
| 19 | Tainter Gates 2-10 | Hoist - shaft pillow blocks, end bearing, zerks | Spillway | 721 | 248 Moly Syngard | Low | High | High | Moderate | Reference 10 |
| 20 | Tainter Gates 2-10 | Hoist - wire rope | Spillway | 721 | Loob-it | High | Moderate | Moderate | Low | Reference 10 |
| 21 | Tainter Gates 2-10 | Hoist - bull gear | Spillway | 721 | Silver Streak | High | High | High | High | Reference 10 |
| 22 | Tainter Gates 2-10 | Hoist - chain drive, couplings | Spillway | 721 | Chevron Coupling | Low | High | High | Moderate | Reference 10 |
| 23 | Tainter Gates 1, 11,12 | Hoist - shaft pillow blocks, end bearing, zerks | Spillway | 721 | 248 Moly Syngard | Low | High | High | Moderate | Reference 10 |
| 24 | Tainter Gates 1, 11,12 | Hoist - wire rope | Spillway | 721 | Loob-it | High | Moderate | Moderate | Low | Reference 10 |

Addendum to Appendix B.4 - EAL Implementation Analysis Summary

| EAL Implementation Analysis - Summary | | | | | | | | | | |
|---------------------------------------|--|--|------------------------|------------------|--|-----------------------------|------------------------|------------------|----------|-------------------------------|
| | Priority | Likelihood of Water Contact | Ease of Implementation | Cost Feasibility | Applicable Equipment | | | | | |
| | High | High | High | High | Bull gear, chain drive, pillow blocks (Not contained) | | | | | |
| | | Moderate | High | High | Sheaves, bearings, pillow blocks, chain drive, and couplings (minimally contained) | | | | | |
| | Moderate | Low | High | High | Sheaves, bearings, pillow blocks, chain drive, bull gear, and couplings (moderately contained) | | | | | |
| | | High | High | Moderate | Surface collector couplings and gate hoist hooks, blocks, lifting beams (submerged) | | | | | |
| | Low | Negligible | High | High | Bearings, couplings, bushings, pillow blocks, chain drive (Thoroughly contained) | | | | | |
| | | High | Moderate | Moderate | Tainter gate and orifice gate wire rope, Moffett crane wire rope, fish ladder wire rope, etc. | | | | | |
| | | High | Moderate | Low | COH hoist wire rope (submerged) | | | | | |
| ID | Primary System | Equip. Description | Floor | EI. | Original/Non-EAL Grease | Likelihood of Water Contact | Ease of Implementation | Cost Feasibility | Priority | Status/Reference |
| 25 | Tainter Gates 1, 11,12 | Hoist - bull gear | Spillway | 721 | Silver Streak | Moderate | High | High | High | Reference 10 |
| 26 | Tainter Gates 1, 11,12 | Hoist - chain drive, couplings | Spillway | 721 | Chevron Coupling | Negligible | High | High | Low | Reference 10 |
| 27 | Middle Spillway Entrance (HS-1) | Actuator - zerks | Spillway | 717 | 248 Moly Syngard | Moderate | High | High | High | Reference 11 |
| 28 | Middle Spillway Entrance (MSE) | Dewater pump -zerk | Spillway | 640 | Huskey LVI-50 | Negligible | High | High | Low | Reference 12 |
| 29 | Middle Spillway Entrance (MSE, RG-1 Operator) ¹ | Fish Intake gate - wire rope | Spillway | 640 | Not Lubricated | High | Moderate | Low | Low | Reference 13 |
| 30 | Middle Spillway Entrance (MSE, RG-2 Operator) ¹ | Rish intake gate - zerks, pillow blocks, couplings | Spillway | 640 | 248 Moly Syngard | Moderate | High | High | High | Complete Renewable Bio HT 180 |
| 31 | Left Powerhouse Entrance (LPE, RG-1) ² | wire rope | Tailrace Deck | 650 | Not Lubricated | High | Moderate | Low | Low | Reference 15 |
| 32 | Fish Unwatering Pump | Zerk | Tailrace Deck | 650 | 248 Moly Syngard | Moderate | High | High | High | Reference 16 |
| 33 | Left Powerhouse Entrance (LPE, RG-1 and RG-3) ³ | Pillow blocks, couplings, chain drive | Tailrace Deck | 650 | 248 Moly Syngard | Moderate | High | High | High | Complete Renewable Bio HT 180 |
| 34 | Left Powerhouse Entrance (LPE, RG-3) ³ | Wire rope | Tailrace Deck | 650 | Not Lubricated | High | Moderate | Low | Low | Reference 15 |

Notes:

1. System description corrected to read RG-2 instead of RG-1
2. System description corrected from Right Powerhouse Entrance (RPE, RG-1 and RG-3)
3. System description corrected from Fishway Regulating Gates

Addendum to Appendix B.4 - EAL Implementation Analysis Summary

| EAL Implementation Analysis - Summary | | | | | | | | | | |
|---------------------------------------|--------------------------|---|------------------------|------------------|--|-----------------------------|------------------------|------------------|----------|------------------|
| | Priority | Likelihood of Water Contact | Ease of Implementation | Cost Feasibility | Applicable Equipment | | | | | |
| | High | High | High | High | Bull gear, chain drive, pillow blocks (Not contained) | | | | | |
| | | Moderate | High | High | Sheaves, bearings, pillow blocks, chain drive, and couplings (minimally contained) | | | | | |
| | Moderate | Low | High | High | Sheaves, bearings, pillow blocks, chain drive, bull gear, and couplings (moderately contained) | | | | | |
| | | High | High | Moderate | Surface collector couplings and gate hoist hooks, blocks, lifting beams (submerged) | | | | | |
| | Low | Negligible | High | High | Bearings, couplings, bushings, pillow blocks, chain drive (Thoroughly contained) | | | | | |
| | | High | Moderate | Moderate | Tainter gate and orifice gate wire rope, Moffett crane wire rope, fish ladder wire rope, etc. | | | | | |
| | | High | Moderate | Low | COH hoist wire rope (submerged) | | | | | |
| ID | Primary System | Equip. Description | Floor | EI. | Original/Non-EAL Grease | Likelihood of Water Contact | Ease of Implementation | Cost Feasibility | Priority | Status/Reference |
| 35 | Tailrace Crane - Moffett | Truck - wheel bearings, zerks | Tailrace Deck | 650 | Chevron Ultra Duty EP | Moderate | High | High | High | Reference 18 |
| 36 | Tailrace Crane - Moffett | Main hoist - wire rope | Tailrace Deck | 650 | Not Lubricated | High | Moderate | Low | Low | Reference 18 |
| 37 | Tailrace Crane - Moffett | Main hoist - hooks, lifting beam, block zerks | Tailrace Deck | 650 | 248 Moly Syngard | High | High | Moderate | Moderate | Reference 18 |
| 38 | Tailrace Crane - Moffett | Hoist trolley - pulley/shaft bearing | Tailrace Deck | 650 | Chevron Ultra Duty EP | Low | High | High | Moderate | Reference 18 |
| 39 | Tailrace Crane - Moffett | Orifice gate hoist - bearings | Tailrace Deck | 650 | Chevron Ultra Duty EP | Moderate | High | High | High | Reference 18 |
| 40 | Tailrace Crane - Moffett | Orifice gate hoist - wire rope | Tailrace Deck | 650 | Not Lubricated | High | Moderate | Low | Low | Reference 18 |
| 41 | Tailrace Crane - Moffett | Orifice gate hoist - zerks, hooks, lifting beam | Tailrace Deck | 650 | 248 Moly Syngard | High | High | Moderate | Moderate | Reference 18 |
| 42 | Wing Gates | Zerks | Tailrace Deck | 650 | 248 Moly Syngard | Moderate | High | High | High | Reference 19 |
| 43 | Wing Gates | Zerks | Lower Fishway Walkway | 635 | 248 Moly Syngard | Moderate | High | High | High | Reference 19 |
| 44 | Orifice Gate Hoist | Wire rope | Lower Fishway Walkway | 635 | Loob-it | High | Moderate | Moderate | Low | Reference 20 |
| 45 | Orifice Gate Hoist | Zerks, pillow blocks, sheave block | Lower Fishway Walkway | 635 | 248 Moly Syngard | Moderate | High | High | High | Reference 21 |

Addendum to Appendix B.4 - EAL Implementation Analysis Summary

| EAL Implementation Analysis - Summary | | | | | | | | | | |
|---------------------------------------|------------------------|---------------------------------------|------------------------|------------------|--|-----------------------------|------------------------|------------------|----------|----------------------------|
| | Priority | Likelihood of Water Contact | Ease of Implementation | Cost Feasibility | Applicable Equipment | | | | | |
| | High | High | High | High | Bull gear, chain drive, pillow blocks (Not contained) | | | | | |
| | | Moderate | High | High | Sheaves, bearings, pillow blocks, chain drive, and couplings (minimally contained) | | | | | |
| | Moderate | Low | High | High | Sheaves, bearings, pillow blocks, chain drive, bull gear, and couplings (moderately contained) | | | | | |
| | | High | High | Moderate | Surface collector couplings and gate hoist hooks, blocks, lifting beams (submerged) | | | | | |
| | Low | Negligible | High | High | Bearings, couplings, bushings, pillow blocks, chain drive (Thoroughly contained) | | | | | |
| | | High | Moderate | Moderate | Tainter gate and orifice gate wire rope, Moffett crane wire rope, fish ladder wire rope, etc. | | | | | |
| | | High | Moderate | Low | COH hoist wire rope (submerged) | | | | | |
| ID | Primary System | Equip. Description | Floor | EI. | Original/Non-EAL Grease | Likelihood of Water Contact | Ease of Implementation | Cost Feasibility | Priority | Status/Reference |
| 46 | Orifice Gate Hoist | Couplers | Lower Fishway Walkway | 635 | Chevron Coupling | Moderate | High | High | High | Reference 21 |
| 47 | Fish Sampling Facility | Crowder - pillow blocks | West Bank | 675 | Huskey LVI-50 | Moderate | High | High | High | Complete Panolin Margrease |
| 48 | Fish Sampling Facility | Process water pumps - zerks | West Bank | 675 | Huskey LVI-50 | Low | High | High | Moderate | Complete Panolin Margrease |
| 49 | Fish Sampling Facility | Sampling screen - trucks, chain drive | West Bank | 675 | Huskey LVI-50 | High | High | High | High | Reference 22 |
| 50 | Fish Sampling Facility | Tainter gate - pillow blocks,zerks | West Bank | 675 | Huskey LVI-50 | High | High | High | High | Complete Panolin Margrease |

SECTION 2

REFERENCES FOR ADDENDUM TO APPENDIX B.4

REFERENCES FOR ADDENDUM TO APPENDIX B.4

The following is a list of references as shown in the *Status/Reference* column in the table of Section 1. These references indicate the corresponding ID #'s, equipment descriptions, and additional information relevant to EAL conversion.

REFERENCE 1:

ID#: 3

Primary System/Equipment: Adult Fishladder (RRFW) - Pickett barrier hoist wire ropes

- Likelihood of water contact: **High**
- Priority: **Low**

The galvanized wire ropes come pre-injected with lubricant by manufacturer prior to purchase with a non-EAL lubricant but are not lubricated as part of any established preventative maintenance schedule once received on site. The wire ropes are replaced when certain criteria are met, such as a percentage of broken strands or an appreciable loss of wire rope diameter due to corrosion. Stainless steel wire rope conversion would be cost prohibitive due to the replacement of supporting equipment such as drums and sheaves to accommodate a larger diameter wire rope.

REFERENCE 2:

ID#: 4

Primary System/Equipment: RRFW CS-S1 Operator

- Likelihood of water contact: **Moderate**
- Priority: **High**

The CS-S1 actuator controls a sluice gate at the adult fishladder exit. This gate is used to help maintain a consistent level of water in the upper ladder to optimize fish passage. Modulation of this gate is directly influenced by changing headwater elevations and therefore is essential in maintaining compliant operation of our adult fishladder. Due to the criticality of this equipment and the functional unknowns with an EAL, the operational risk of converting the actuator to EAL is too high at this time.

REFERENCE 3:

ID#: 6

Primary System/Equipment: Adult Fishladder (RRFW) - Adjustable Weir -Wire rope

- Likelihood of water contact: **High**
- Priority: **Low**

The wire ropes on the adjustable weir are galvanized. The galvanized wire ropes are pre-injected by manufacturer prior to purchase with a non-EAL lubricant but are not lubricated as part of any established preventative maintenance schedule. Moving the wire rope to stainless steel would require costly changes to supporting assets.

REFERENCE 4:

ID#: 8

Primary System/Equipment: Juvenile Fish Bypass (JFB) trash hopper sheaves, roller bearings, zerks

- Likelihood of water contact: **Low**
- Priority: **Moderate**

The trash hopper is the only effective means of removing collected river debris harvested by the intake trashrakes. This asset assembly is critical to the function of the JFB. Due to the low probability of grease

reaching the water, the functional unknowns with an EAL, and the critical nature of the trash handling system, converting the system to EAL is too high of a risk at this time.

REFERENCE 5:

ID#: 11

Primary System/Equipment: RRFW forebay intake gate actuators ISFTP-S1 and S2

- Likelihood of water contact: **Moderate**
- Priority: **High**

ISFTP-S1 actuator was converted to an EAL, Bio HT 180 EP2, in February of 2021. Refer to Section 3 of the Conversion Schedule for actuator ISFTP-S2 conversion.

REFERENCE 6:

ID#: 14 and 17

Primary System/Equipment: Intake Gantry Crane (COH) – Trolley and truck wheel bearings, zerks, couplings, and seals

- Likelihood of water contact rating: **Low**
- Priority: **Moderate**

The COH intake gantry crane was assembled and commissioned in 2018. This asset is a critical component to our preventative and corrective maintenance programs. The intake gantry is used to set unit head gates and when called upon, the crane is essential in delivering headgates into a unit in a runaway state. The crane must function, without question, when called upon. With the low probability of grease making contact with water, the functional unknowns with an EAL, and the criticality of the asset, the conversion of the trolley wheel bearings to EAL is too great of a risk at this time.

REFERENCE 7:

ID#: 15

Primary System/Equipment: Intake Gantry Crane (COH) – Hoist bearings, gear reducers, coupling, bushings, and pillow blocks.

- Likelihood of water contact rating: **Negligible**
- Priority: **Low**

The hoist assets are protected with secondary containment trays and therefore the risk of grease contacting water is negligible. This, coupled with the asset's criticality and functional unknowns with an EAL makes the conversion of the hoist asset to an EAL an unnecessary risk at this time.

REFERENCE 8:

ID#: 16

Primary System/Equipment: Intake Gantry Crane (COH) – Hoist wire rope

- Likelihood of water contact rating: **High**
- Priority: **Low**

The hoist wire ropes are a 6x36 EIPS IWRC and are galvanized. The ropes are pre-injected by manufacturer prior to purchase with a non-EAL lubricant but are not lubricated as part of a routine lubrication schedule. The wire ropes are instead inspected for corrosion, loss of steel, and broken strands and would be subject to replacement if certain criteria were met. Converting the wire ropes to stainless steel is cost prohibitive. Stainless steel is not as strong as steel, which would likely call for an increase in the diameter of the wire rope, thereby forcing a complete replacement of the upper and lower sheave assemblies as well as the wire rope drums. It is for this reason that the conversion of the wire ropes to stainless steel is an infeasible option.

REFERENCE 9:

ID#: 18

Primary System/Equipment: Intake Gantry Crane (COH) – Auxiliary hoist chain

- Likelihood of water contact: **Negligible**
- Priority: **Low**

The trolley house auxiliary hoist chain is lubricated every 1,000 hours of operation. The hoist is used infrequently and is primarily intended to hoist tools, equipment, and 55-gallon barrels of oil up to the trolley house. Because the chain is never in contact with water, conversion to an EAL is unnecessary.

REFERENCE 10:

ID#: 19 through 26

Primary System/Equipment: Tainter gates 1 through 12

Project 438618 – RR Spillway Modernization is in active development within our Project Delivery (PD) team. Most of the bridge components are expected to be replaced, including the hoisting ropes. The hoisting ropes would be changed to stainless steel which would not require lubrication. The District is directing the use of EAL options where feasible, and secondary containment where EAL use is not feasible. Early discussions indicate the modernization of the spillway will occur in two phases, with the schedule prioritizing high use gates (gates 4 through 8). The second phase will closely follow the first phase and will include the remaining gates, (gates 1 through 3 and gates 9 through 12). Currently the project is anticipated to start in 2026.

REFERENCE 11:

ID#: 27

Primary System/Equipment: RRFW Middle spillway entrance HS-1 actuator zerks

- Likelihood of water contact: **Moderate**
- Priority: **High**

The HS-1 actuator controls a sluice gate at the middle spillway entrance (MSE). This gate is used to maintain sufficient attraction water at the MSE, via a conduit fed by the headwater reservoir. This Limitorque actuator was replaced 2024. Due to its critical role in maintaining compliance with our fishway operations and the functional unknowns with an EAL, the risk of conversion to an EAL is too great at this time.

REFERENCE 12:

ID#: 28

Primary System/Equipment: RRFW middle spillway entrance (MSE) dewatering pump zerk

- Likelihood of water contact: **Negligible**
- Priority: **Low**

Due to the unlikelihood of grease reaching water, and the low priority status, there is no justification for moving the motor bearings over to an EAL.

REFERENCE 13:

ID#: 29

Primary System/Equipment: RRFW middle spillway entrance (MSE) RG-1 operator wire ropes

- Likelihood of water contact: **High**
- Priority: **Low**

The wire ropes are pre-injected by manufacturer prior to purchase with a non-EAL lubricant but are not lubricated as part of any established preventative maintenance schedule. The ropes are replaced when certain criteria are met, such as a percentage of broken strands or an appreciable loss of wire rope diameter due to corrosion. Stainless steel wire rope conversion would be cost prohibitive.

REFERENCE 14: This item, ID #30, has been completed. Reference has been removed.

REFERENCE 15:

ID#: 31 and 34

Primary System/Equipment: Left Powerhouse Entrance (LPE RG-1 and RG-3) hoist wire ropes

- Likelihood of water contact: **High**
- Priority: **Low**

The wire ropes pre-injected by manufacturer prior to purchase with a non-EAL lubricant but are not lubricated as part of any established preventative maintenance schedule. The ropes are replaced when certain criteria are met, such as a percentage of broken strands or an appreciable loss of wire rope diameter due to corrosion. Stainless steel wire rope conversion would be cost prohibitive.

REFERENCE 16:

ID#: 32

Primary System/Equipment: Fishway Unwatering Pump

- Likelihood of water contact: **Moderate**
- Priority: **High**

A new fishway unwatering pump has been installed to replace the remaining original unwatering pump. The new one has product/water lubricated shaft bearings.

REFERENCE 17: This item, ID #33, has been completed. Reference has been removed.

REFERENCE 18:

ID#: 35 through 41

Primary System/Equipment: Tailrace Crane – Moffett

Project 340774 - RR Tailrace Gantry Crane Replacement is in active development within our PD team. The use of EALs and secondary containment will be evaluated as part of the design. The new crane is expected to be in operation by 2025.

REFERENCE 19:

ID#: 42 and 43

Primary System/Equipment: RRFW wing gate gearboxes U-1, U-2, X-1, X-2, X-3, and X-4 zerks

- Likelihood of water contact: **Moderate**
- Priority: **High**

The wing gates are a pair of controllable gates set in a series that divide water flow and establish the proper gradient of flow into the channels of the lower fishway. There are two gearboxes per wing gate operator. A larger scale analysis of this system will occur in 2025 to look at alternatives. Conversion to EAL on these devices will be postponed pending this analysis.

REFERENCE 20:

ID#: 44

Primary System/Equipment: RRFW orifice gate wire ropes – 22 gates total

- Likelihood of water contact: **High**
Priority: **Low**

The orifice gates are used to provide additional adult fish entry options into the lower fishway.

In 2024, the orifice gates (OG) were not utilized during the operation of the adult ladder. This decision was made by operations to determine if there was a material impact to fish gaining access to the adult ladder. The results indicated there was no impact to adult salmon. Consequently, a decision was made to decommission all the orifice gates except for OG 2 and OG 18. These two OGs would still be serviced annually so they could be used in rare instances where a secondary entrance at both the left and right powerhouse entrances is needed. OG 2 and OG 18 will be converted to EALs. The remaining OGs will be completely disassembled, removed, and disposed.

The wire ropes are pre-injected with lubricant prior to purchase but are not lubricated as part of any established preventative maintenance schedule. The ropes are replaced when certain criteria are met, such as a percentage of broken strands or an appreciable loss of wire rope diameter due to corrosion. Stainless steel wire rope conversion would be cost prohibitive.

REFERENCE 21:

ID#: 45 and 46

Primary System/Equipment: RRFW orifice gate hoist operator pillow blocks, couplers, and sheave blocks

- Likelihood of water contact: **Moderate**
- Priority: **High**

In 2024, the orifice gates (OG) were not utilized during the operation of the adult ladder. This decision was made by operations to determine if there was a material impact to fish gaining access to the adult ladder. The results indicated there was no impact to adult salmon. Consequently, a decision was made to decommission all the orifice gates except for OG 2 and OG 18. These two OGs would still be serviced annually so they could be used in rare instances where a secondary entrance at both the left and right powerhouse entrances is needed. OG 2 and OG 18 will be converted to EALs. The remaining OGs will be completely disassembled, removed, and disposed.

Reference Section 3 Conversion Schedule for sheaves and bearings for OG 2 and OG 18.

REFERENCE 22:

ID#: 49

Primary System/Equipment: JFB fish sampling facility sampling screen trucks and drive chain

- Likelihood of water contact: **High**
- Priority: **High**

The sampling screen is deployed in the bypass conduit flume to divert juvenile salmon to a facility for counting. The screen is the only means in which to divert the fish and therefore is critical to facilitate the fish sampling process. The sampling of juveniles helps us to meet our HCP objectives which is a part of our licensing. When not in use, the screen is stored above water. Since the screen is in and out of water frequently, lubricating with an EAL would result in a significant increase in operation and maintenance costs to keep lubrication at a level where it is protecting the equipment, thus convert to an EAL would be infeasible

SECTION 3

CONVERSION SCHEDULE

EAL CONVERSION SCHEDULE

The following is a list of equipment and anticipated timeline for conversion to EAL. Due to inherent challenges with operations, resources, and outage requirements, the schedules only show the year for anticipated completion to allow for work within changing conditions.

- **ID#:** 45 and 46
Primary System/Equipment: RRFW orifice gate hoist operator pillow blocks, couplers, and sheave blocks
Scheduled Conversion: 2024 – 2026 (Convert some each year)

The orifice gates are used to provide additional adult fish entry options into the lower fishway. Most of the motor couplings have been moved over to jaw-type Lovejoys which have an elastomer element or cushion and therefore do not require grease. Gates that still need conversion to Lovejoy are OG 6 (Motor and coupling currently removed), OG 5, and OG 4 (motor currently removed). All pillow blocks and sheave blocks remain. Due to the quantity and time required, the conversion will occur over a 3-year period. Will be converted to BIO HT 180 EP2.

- **ID#:** 11
Primary System/Equipment: RRFW forebay intake gates ISFTP-S1 and S2
Scheduled Conversion: 2027

ISFTP-S1 was converted to Bio HT 180 EP2 in February of 2021. ISFTP-S2 is scheduled for a 3-year preventative maintenance inspection where the actuator is opened, cleaned, and inspected for internal component wear. The next PM execution date is scheduled for January/February of 2027. It is at this time the actuator will be converted over to BIO HT 180 EP2.

SECTION 4

CONVERSION SCHEDULE PROGRESS

EAL CONVERSION SCHEDULE PROGRESS

The following is a progress update to the EAL Conversion Schedule provided in Addendum 1 of the *Environmentally Acceptable Lubricants Annual Report* submitted in May 2024.

- **ID#: 30**
Primary System/Equipment: RRFW Middle Spillway Entrance (MSE) RG-1 operator
Scheduled Conversion: 2024

The MSE operator is used to deploy regulating stoplogs to either control the inflow of attraction water into the middle spillway entrance or to dewater the entrance for inspection during overhaul season. The two motor bearings, the pillow block bearings (4), and sheave blocks (2) will be converted to BIO HT 180 EP2.

COMPLETED JANUARY 2025 – WO #555435

- **ID#: 33**
Primary System/Equipment: RRFW Fishway regulating gates RG-1 and RG-3 chain drive.
Scheduled Conversion: 2024 (RG1 only)

Will convert the chain drive on RG-1 only at this time for testing and observation to ensure functionality for this equipment. RG-3 will be scheduled for conversion once there is operational assurance with this lubricant in this application. Converted to BIO HT 180 EP2.

COMPLETED JANUARY 2025 – WO #471347

- **ID#: 45 and 46**
Primary System/Equipment: RRFW orifice gate hoist operator pillow blocks, couplers, and sheave blocks
Scheduled Conversion: 2024 – 2026 (Convert some each year)

The orifice gates are used to provide additional adult fish entry options into the lower fishway. In 2024, the orifice gates (OG) were not utilized during the operation of the adult ladder. This decision was made by operations to determine if there was a material impact to fish gaining access to the adult ladder. The results indicated there was no impact to adult salmon. Consequently, a decision was made to decommission all the orifice gates except for OG 2 and OG 18. These two OGs would still be serviced annually so they could be used in rare instances where a secondary entrance at both the left and right powerhouse entrances is needed. OG 2 and OG 18 will be converted to EALs. The remaining OGs will be completely disassembled, removed, and disposed. Conversion of orifice gates OG 2 and OG 18 will be completed by the end of 2025. Demolition of the remaining orifice gates will begin in 2025 and concluded in 2026.