

OFFICIAL COORDINATION REQUEST FOR NON-ROUTINE OPERATIONS AND MAINTENANCE

COORDINATION TITLE – 22 LWG 04 T1 T2 Gasket Repair

COORDINATION DATE – 24 March 2022, Updated ~~8 March 2023 August 9 30 June 8 April 2022~~

PROJECT - Lower Granite Dam

RESPONSE DATE – ~~8 March 6 February 2023 23 August 2022 7 April 2022~~

Description of the problem- Granite is in the development process of replacing T1 and T2 transformer gaskets and oil recondition work to prevent an expected failure due to the equipment reaching operational life expectancy. This work is expected to take up to 12 weeks per transformer but can be divided into separate 4-week periods to cover each of the three phases (A, B, C) per transformer. There is no spare transformer available to replace a single-phase transformer at Lower Granite. The available spare was used at Little Goose after T2-C experienced a failure in 2021. It is recommended that LWG proactively complete this work to avoid a transformer failure similar to the one that occurred at LGO and to have the outage be in a controlled timeframe to minimize impacts to fish passage.

GSU transformer Banks T1 and T2 were manufactured by Westinghouse in 1975 and 1978 respectively. They are three winding, single-phase transformers. T1 is fed by Units 1 through 4 and T2 is fed by Units 5 and 6. The Army Corps has many transformers in their fleet, and the primary age groupings where transformer replacements are presently occurring are from 50 – 70 years. When a transformer reaches 60 years of age, it is highly recommended that plans are in-place for its replacement. Lower Granite's T1 has been in service for 46 years and T2 has been in service for 43 years. All transformers are leaking insulating oil into the containment with T1-A and T1-C being the most severe. Transformer T1-C also has elevated levels of dissolved gases in the oil. Additional transformer components have either exceeded their operational design life, are no longer supported by equipment manufacturers, and/or do not meet present industry standards.

Work must be performed during dry weather and when relative humidity is less than 60%, which precludes conducting the work during the typical maintenance period December-March. Because both transformers feed a single line out from the project, a full powerhouse outage (minus Unit 5 for station service) will be needed when working on all three phases for T1. T1 (Units 1-4) can be operated when work is being conducted on T2. The proposed schedule would be to start T1 (T1a) in November/December 2022, tentative start date 28 November. T1c repairs will occur 28 November 2023 through 31 January 2024 7-31 August 2023 and T1b is tentatively scheduled for repair October 2024. T2 work repairs are to be determined but likely would occur during July-November of 2024. ~~July to avoid impacting unit priority order during sockeye salmon passage and then complete September and October.~~

LWG will need to remove ESBSs during the scheduled BPA outage 14-17 November in preparation for T1a work in November 2022. Then the intake crane used for ESBS removal will need to be relocated to the other end of the Project to provide room for the contractor's equipment and work.

Type of outage required- A full powerhouse outage will be needed while servicing T1

except operation of Unit 5 or 6 for station service. Units 5 & 6 can return to service at night. Units 5-6 will be out of service during T2 work.

Impact on facility operation (FPP deviations)- Work on T1 requires deviation for unit priority order. ESBSs will need to be removed prior to transformer work in November.

Impact on unit priority- Units will be operated outside of priority order during the T1 outage.

Impact on forebay/tailwater operation- Operating outside of unit priority order will impact tailrace conditions and attraction flow.

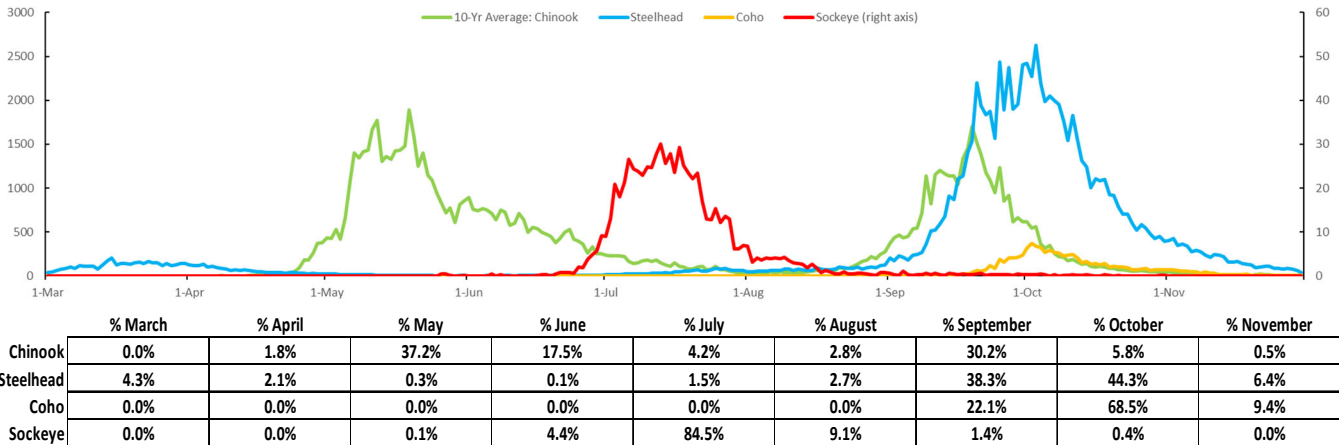
Impact on spill- LWG will spill excess water while operating unit 5 for station service power for the duration of transformer work.

Dates of impacts/repairs- Work will be completed November/December 2022, August 2023 and July-November 2024. Impacts to fish passage will occur during work on T1, primarily during August.

Length of time for repairs- Up to 24 weeks total spread between 2022, 2023 and 2024.

Analysis of potential impacts to fish

1. The 10-year average passage by run during the period of impact for adults and juvenile listed species, as appropriate for the proposed action and time of year;



The figure above shows the 10-year average fish counts at Lower Granite Dam and percent of each fish run per month. On average, less than 3% of Chinook salmon (2,666) and steelhead (2,388), no Coho salmon and 9.1% (65) of sockeye salmon pass Lower Granite Dam in August. In recent years, the late sockeye salmon passing Lower Granite Dam are primarily of upper Columbia River origin that have strayed into the Snake River, as determined from genetic analyses. During October, 5.7% (5,398) of Chinook salmon, 44% (39,0174) of steelhead , 69% (5,254) Coho and less than 1% of (3) sockeye salmon pass Lower Granite Dam on average. During November, an average of 6.4% (5,628) of steelhead, 9.4% (718) Coho salmon, less than 1% (477) of Chinook and no sockeye salmon pass Lower Granite Dam.

2. Statement about the current year's run (e.g., higher or lower than 10-year average);

Predictions for Chinook salmon and steelhead runs are higher to 2021 returns and near the 10-year averages. Sockeye salmon returns are predicted to be 200, significantly below the 10-year average of about 1,000 fish. Coho salmon run is predicted to be similar or higher than 2021 and significantly higher than the 10-year average.

3. Estimated exposure to impact by species and age class (i.e., number or percentage of run exposed to an impact by the action);

Percent of fish runs per month are shown above.

4. Type of impact by species and age class (increased delay, exposure to predation, exposure to a route of higher injury/mortality rate, exposure to higher TDG, etc.);

Operating outside of unit priority order during August and November while servicing T1 will impact attraction flow and potentially result in fish passage delays.

Summary statement - expected impacts:

Downstream migrants: Increased juvenile salmonid attraction to the bypass system when unit 5 and 6 are in operation. T1 work will be scheduled outside of the peak juvenile migration period.

Upstream migrants (including Bull Trout): Adult passage, including bull trout, may be delayed passing Lower Granite Dam during August and November during T1 outage. To minimize impacts to adult passage T1 work will be scheduled after the sockeye passage season and outside the peak fall Chinook season.

Lamprey: Adult lamprey may be delayed passing Lower Granite Dam during August during T1 outage.

Comments from agencies:

Call 31 March 2022 to discuss MOC:

Condor, NOAA stated that there are concerns for August powerhouse outage because of affects to water temperatures. November and 1 March -15 April outages acceptable. **Peery would pass this to the PDT** but the project has already raised concerns for doing this work in the spring because of the risk from inclement weather.

Jon Roberts presented results of modeling on expected temperatures with four different scenarios for releasing Dworshak flows through August. The least impact to temperatures at end of August was from option to maintain a lower release of flow from Dworshak to reduce potential temperature rise in August and bank the water to ramp up release end of August/early September. This would results in predicted temperature of ~70 F in the tailrace of Lower Granite Dam 1 September. This assumed an average water year. **(slides were provided to FPOM).**

There was a discussion on the option to use a temporary transformer phase to allow power generation during the T1 work. Peery pointed out it took about 6 months to replace on transformer phase at Little Goose after the transformer blew there. **Peery will put together details of what use of a spare transformer would entail.**

Peery suggest the option of running more than one unit on speed-no-load to provide more turbine output. Current outage plan is to run unit 5 for station service, about 5 kcfs flow. A second turbine on speed-no-load would double this to about 10 kcfs. Holdren pointed out that only unis 4, 5, 6 can be operated this way and that 10 kcfs of turbine flow would be close to the minimum generation level for the project (12-15 kcfs) anticipated would be used in August. FPOM asked how much would this increase TDG levels? **Peery will investigate.**

VanDyke asked for typical humidity levels at Lower Granite during the year. **Peery will pull this together.**

From: Peery, Christopher A CIV USARMY CENWW (USA)
<Christopher.A.Peery@usace.army.mil>
Sent: Wednesday, December 7, 2022 12:09 PM
To: FPOM
Subject: 22 LWG 04 MOC T1T2 Gasket Repair and TDG Update

FPOM,

Per the attached MOC, Lower Granite has been operating Unit 5 at speed-no-load (8 kcfs) during daytime hours while work proceeds to repair/replace gaskets on T1a transformer. With current low flow river conditions (16-17 kcfs flow) this has been generating high dissolved gas levels of +130% TDG for some hours during the day. In consulting with RCC and BPA, we believe some deep spill during the day will actually help moderate TDG levels. As such, the project began spilling 2 stops of spill, one stop each in bays 2 and 8 per the FPP Table LWG-8, which results in about 3.4 kcfs of spill. We will be monitoring the situation through the day and tomorrow and report on the results. Please let me know if you have questions or comments.

Chris

From: Morrill, Charles (DFW) <Charles.Morrill@dfw.wa.gov>
Sent: Wednesday, December 07, 2022 12:52 PM
To: Peery, Christopher A CIV USARMY CENWW (USA) **Subject:** [Non-DoD Source] RE: 22 LWG 04 MOC T1T2 Gasket Repair and TDG Update

Thanks Chris !

Appreciate the update and the quick adjustments to reduce tdg !

I would appreciate seeing the MOC updated to include your email text, Chris.

Charlie

From: Peery, Christopher A CIV USARMY CENWW (USA)

<Christopher.A.Peery@usace.army.mil>

Sent: Monday, February 6, 2023

To: FPOM

Subject: 22 LWG 04 MOC T1T2 Gasket Repair – Update

All,

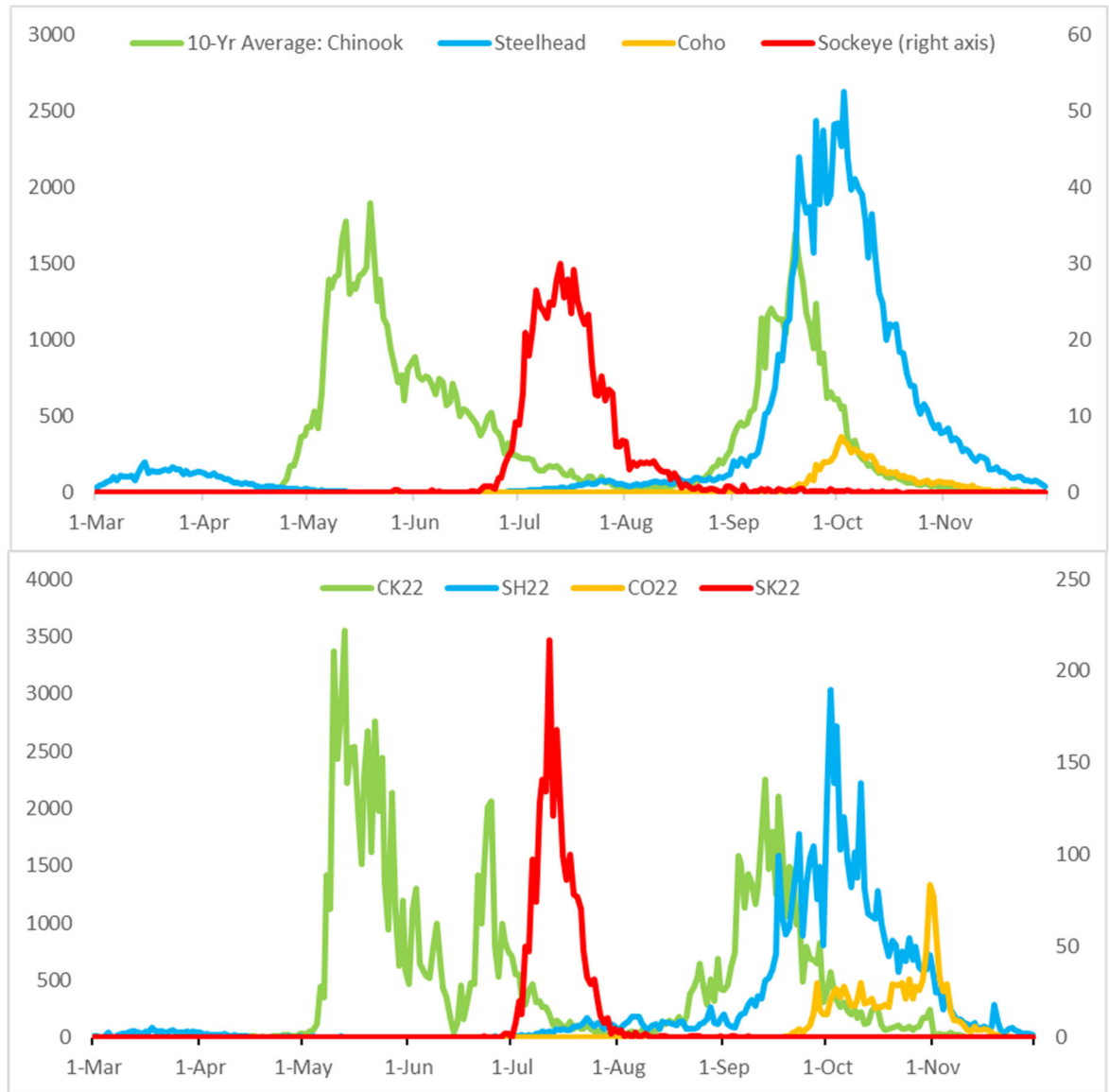
This is to provide an update to our planning for the Phase T1c gasket repairs at Lower Granite Dam. At last FPOM, we reported that the schedule was for this work to occur 28 August to 17 September. These dates concerned me because first half of September contains the start of the steelhead run and significant portion of the fall Chinook salmon passage at Lower Granite., as seen in the average and 2022 counts (below).

I asked Ricardo Walker, project PM, to ask TVA and the Project if the work could be advanced into August, specifically 7-31 August and both agreed this could happen. We are discussing with the parties to start work 0900 each day to allow some hours for adult passage with turbines 5&6 operating and switch to speed-no-load (8 kcfs) 0900 to late evening for work on the transformer. Turbines 5&6 would return to operation in the evenings until 0900 the following morning.

I asked Jon Robert's crew to model how this would affect temperature management in the tailrace at Lower Granite. His model results are attached. In general, using the above scenario and assuming an average temperature season, trying to maintain 68 F in the tailrace would likely result in a significant temperature spike late August/early September as Dworshak flow would need to be reduced to assure forebay elevations is at 1,535 ft on 1 September. This temperature spike would not occur if a tailrace temperature target of 69 F is adopted. Similar results occur with the 7 August and 28 August start dates. Temperature conditions are slightly better with the later start date. Again, these projections are based on average temperature conditions and assumes a 12 hour work day. If the daily outage is 10 hours or work is completed early, conditions will improve accordingly.

Ricardo has been working diligently to coordinate this work with parties involved and we need to set the date. I believe the better option is the 7-31 August date and adopting a 69 F tailrace target. I wanted you to have this information in advance of discussion at FPOM this week.

Chris



Final coordination results:

After Action update:

Please email or call with questions or concerns.

Thank you,
 Elizabeth Holdren
 Lead Supervisory Fisheries Biologist
 Walla Walla District
 Lower Granite Project
 Dworshak Dam
 Ph. (509)843-2263

Spare transformer;

Locate one. Rumor has it that there is a T1 transformer at John Day Dam

Transfer it to Lower Granite Dam

Prepare location to install

Pad and

Add all transmission infrastructure needed (replicate the system on the powerhouse)

Connection to existing three T1 phases

In order to be effective, power route would need to be separate and distant from existing transmission system to avoid same problems during an outage

Average humidity <https://www.weatherwx.com/hazardoutlook/wa/lower+granite+dam.html>

January 84%

February 81%

March 75%

April 68%

May 67%

June 63%

July 43%

August 38%

September 44%

October 59%

November 72%

December 83%