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FEDERAL ENERGY REGULATORY COMMISSION
Washington, D. C. 20426

OFFICE OF ENERGY PROJECTS

Project No. 803-121 – California
DeSabla-Centerville Project
Pacific Gas and Electric Company

November 19, 2024

VIA FERC SERVICE

Stephanie Maggard
Pacific Gas and Electric Company
300 Lakeside Drive
Oakland, CA 94612

Subject: 2023 Project Canal Failure, Overtopping, and Erosion Incidents

Dear Ms. Maggard:

This is in response to your January 30, 2024, letter providing additional information regarding three canal operational incidents and their ensuing environmental effects at the DeSabla-Centerville Project No. 803. The following is our response to the additional information you provided, and addresses the additional information provided by the resource agencies.

As discussed below, the adverse environmental effects from the August 9, 2023 Butte Canal failure were preventable, and will be considered a violation of your project license. As a result, we are requiring additional action from this incident. In addition, the March 2023 incidents along the Butte and Hendricks Canals will be considered a violation of your project license for failure to timely report the incidents.

Background and License Requirements

By letter dated November 29, 2023, Federal Energy Regulatory Commission (Commission) staff requested additional information regarding multiple canal operational incidents resulting in adverse environmental effects, which occurred on the Hendricks Canal and Butte Canal in March 2023, and on the Butte Canal on August 9, 2023. We also requested additional information from the resource agencies regarding the three incidents.

Various Commission regulations pertain to the three incidents. License Article 8 requires that you install and maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines.[1] The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. License Article 19 requires you to take reasonable measures to prevent soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution.

In addition, the Commission's regulations under the Federal Power Act (FPA), 18 CFR §12.10 require that licensees report by email or telephone to the Regional Engineer any condition affecting the safety of a project or projects works. The initial report must be made as soon as practicable after that condition is discovered, preferably within 72 hours, without unduly interfering with any necessary or appropriate emergency repair, alarm, or other emergency action procedure.

August 9, 2023, Butte Canal Failure

Overview

As reported previously, on the morning of August 9, 2023, you increased flow to the Butte Canal by increasing diverted water from 35 cubic feet per second (cfs) to 55 cfs at the upstream Butte Creek Diversion Dam. When conducting a manual review of the data the following morning (August 10, 2023) at 6:45 a.m., the gaging data indicated a gradual flow drop beginning at approximately 9:10 p.m. on August 9, 2023, to approximately 25 cfs at the time of your review on August 10. You subsequently discovered a portion of the Butte Canal that was nearly entirely breached with water that had flowed beneath the bank side gunite liner for several hours after seepage appeared to erode a hole through the bottom of the canal to the downstream side where the subsequent flow eroded a channel down the hillside into Butte Creek. You reduced diversions from the diversion dam and notified the resource agencies. You also noted elevated turbidity in Butte Creek further downstream on the afternoon of August 10, 2024, and later discovered a debris fan in Butte Creek downhill of the breach location from the canal and hillside erosion. In total, your report states that approximately 6,700 cubic yards of hillslope material was eroded. Of this, 3,900 cubic yards was washed downstream, and 2,800 cubic yards remained in a debris fan along Butte Creek. You subsequently removed approximately 2,600 cubic yards of material and deposited it in an

[1] Order Issuing License (Major) (11 FERC ¶ 62,207), issued June 12, 1980.

upland location. You report that since the incident, the Butte Canal remains out of service.

Additional Incident Information and Response

In your filing, you provided additional information related to the incident. You report that during routine inspections several months prior to the incident, you identified the eventual canal failure location as a potential area of concern. Specifically, you state that during a May 31, 2023, geohazard assessment, you identified the site as requiring potential follow-up. However, you determined that the site had no noticeable seepage at the berm toe, no saturation of the berm, and little berm settlement. Therefore, the site was given lower priority behind other locations along the canal for repairs. You also state that at the time of the incident, you were in the process of developing a plan and schedule for addressing the inspection findings.

Regarding your detection and response to the incident, you state that your monitoring system appropriately recorded flow levels along the Butte Creek Canal leading up to the incident. However, your alarm system was not formatted correctly and failed to alert operators of a loss of up to 38 cfs, or 69-percent of the flow from the Butte Canal over the course of 9.5 hours. While you did not provide flow information to corroborate whether the decrease was gradual or instantaneous, it was severe enough to prompt a response from your project operator, who opened the upstream spill gate upon noting the irregularity. In addition, you later modified your alarm setting protocols to detect a similar future occurrence, including a 5-10 cfs reduction from the baseline flows.

Taken together, it appears that the loading on the Butte Canal berm from the flow increase in the Butte Canal on August 9, 2023, contributed to a seepage condition through the canal embankment that increased to the point that enough embankment soil was removed, resulting in the eventual failure of a section of the Butte Canal. The increase in flow to 55 cfs in and of itself appears to be within the range of normal operations and was less than the maximum operational limitation of 90 cfs. However, your alarm settings and operational staff were unable to timely identify the flow differential between upstream and downstream monitoring locations following the canal breach. Specifically, you did not identify the flow differential until an operator noted the discrepancy during a manual review of monitoring data several hours after the canal breach had begun. This indicates that the monitoring and response protocol at the time was inadequate to detect and alert project operators of the canal failure. Further, the event could have proceeded indefinitely were it not for a manual review of flow records on the morning after the canal breach had begun. This failure of the alarm to alert operations staff led to discharging a large amount (up to 38 cfs) of the canal flow onto an open slope for up to 9.5 hours.

You state that no alarms were triggered by the flow differential between upstream and downstream gages until you opened an emergency spill gate to relieve the canal of all flow upstream of the breach location. At that point, the flow alarm was triggered. In response, you have set the alarm points at both ends of the spectrum more conservatively. In the future, you also plan to monitor and analyze baseline canal flow data to account for power generation-influenced flow fluctuations within the canal.

Agency Reports and Environmental Effects

As detailed in your filing and in the subsequent reports filed by the resource agencies, the canal failure and extended erosion of the hillside led to impaired water quality, severe soil loss, stream sediment deposition, and adverse effects to aquatic resources. These effects were most pronounced in the days immediately following the incident, with ongoing effects to the aquatic environment in the ensuing months and likely into the future. We discuss the specific effects to these resources below.

Fishery Resources

Although your fishery monitoring was limited, your reports did not indicate any widespread mortality of fish species. However, the California Department of Fish and Wildlife's (California DFW) January 25 and March 27, 2024, letters provide an estimate of Chinook salmon mortality at the project following the canal failure and ensuing effects from elevated turbidity levels. Based on pre- and post-incident surveys, California DFW estimates that 51 of the estimated 95 documented spring-run Chinook salmon, plus an additional four directly-observed individuals, perished as a result of the elevated turbidity in Butte Creek. These four observed mortalities were directly observed with sediment in their gills, but otherwise appeared to be healthy prior to death.

California DFW concludes that the high turbidity and suspended solid concentrations in Butte Creek from the sediment deposition after the canal failure created sublethal and lethal conditions for spring-run Chinook salmon. California DFW also concludes that the recovery of spring-run Chinook salmon with sediment in their gills indicates a likely causation between the mortality and the canal failure. In total, the combined loss of up to 55 spring-run Chinook salmon constitutes a 59 percent loss of the 2023 spawning class.

Concerning Central Valley steelhead, California DFW states that it observed various life stages of steelhead in Butte Creek prior to, and following the canal failure, during snorkel surveys and juvenile monitoring. It also states that it is reasonable to expect that they experienced adverse effects from the sediment deposition and resulting

high turbidity and suspended sediment in Butte Creek. The National Marine Fisheries Service also expressed similar concern that elevated levels of suspended sediments in Butte Creek created lethal conditions and chronic adverse impacts for both steelhead and spring-run Chinook Salmon and the designated critical habitats for these species.

In response to the incident, you implemented a large-scale sediment removal project at the location of the deposited sediments below the Butte Creek canal failure location, which concluded in November 2023. These sediment removal activities have likely stopped or greatly reduced the potential for ongoing sediment introduction into Butte Creek. You have also conducted water quality monitoring, visual surveys for fish and amphibians, habitat surveys, benthic macroinvertebrate (BMI) assessments, and dedicated amphibian surveys.

Review of the available information indicates that the sediment release had a deleterious effect on fishery resources in Butte Creek. At a minimum, the information provided by California DFW indicates that more than half of the spawning class of spring-run Chinook salmon perished as a result of the sedimentation in Butte Creek. These effects are expected to be ongoing, potentially for multiple years, until fine sediment is purged from the watershed through high seasonal flows. We also expect lower adult spring-run Chinook returns in future years as a result of the adult mortality in 2023, likely decreased spawning success from sediment deposition in spawning areas, and likely lower juvenile survival from decreased food availability resulting from sediment effects on macroinvertebrates. While the latter two results are presumptive, the direct loss of more than 50 percent of the adult spawning population was observable and quantifiable.

Other Aquatic Resources

Concerning effects to other aquatic species, we are in receipt of your amphibian monitoring results from September and October 2023. The monitoring indicated the presence of adult, young-of-year, and larval foothill yellow-legged frog (FYLF) in Butte Creek during monitoring. Your monitoring did not indicate any injury, impacts, or mortality to FYLF of any life stage during surveys.

As stated by California DFW, it is likely that sediment in the low-velocity sections of Butte Creek likely had an adverse impact on FYLF through smothering tadpoles, decreased food availability, and inability to locate food during elevated turbidity levels. Similarly, the U.S. Fish and Wildlife Service (FWS) provided comments on the effects of the incident on FYLF. The FWS concludes that the incident resulted in the widescale elimination of suitable habitat for eggs and tadpoles in Butte Creek during 2023 as a result of sediments completely covering rocky substrates. The FWS also anticipates that

most of the 2023 cohort would have been tadpoles at the time of the incident and that surveys conducted in the fall 2023 should have detected similar numbers of tadpoles as the last surveys conducted in 2006. In comparison, there were very few observations in 2023, compared to the 402 to 5,270 tadpoles per monitoring event and 46 to 1,532 juvenile and young-of-year FYLF per monitoring event encountered during surveys in 2006. The FWS concludes that a significant portion of the 2023 cohort likely was lost due to this incident and is concerned that breeding in Butte Creek may be adversely affected for an extended period.

The FWS recommends that in 2024 (and in subsequent years, if appropriate) you conduct visual encounter survey studies at similar locations as 2006 so that more meaningful comparisons about FYLF presence and numbers can be made. The FWS also recommends that all your environmental monitoring data be consolidated to make more meaningful comparisons and conclusions.

Water Quality

In addition to the observable effects to fishery and other aquatic resources, your monitoring efforts for water quality illustrated extremely high levels of turbidity and suspended sediment immediately following the incident, including levels as high as 10,700 NTU, which exceeds lethal effect thresholds for Chinook salmon.[2] Though not as severe, turbidity levels spiked during the winter of 2023-2024 each time flows increased, presumably from the hillside sediments that were deposited in the Butte Creek stream channel and re-mobilized during high flow scouring events. These effects are presumed to be ongoing during subsequent high flow events but should diminish in future years as sediment moves through and down the watershed. These monitoring results were directly observable and quantifiable, but future adverse effects are presumptive in nature.

[2] Lethal effects of suspended sediment on juvenile and adult Chinook salmon in freshwater are predicted to occur at exposure concentrations of 2,981 to 8,103 mg/L for 3 hours, 1,097 to 2,981 mg/L for 7 hours, 148 to 1,097 mg/L for 1 day, 148 to 403 mg/L for 2 days, 55 mg/L to 403 for 6 days, 7 to 20 mg/L for 2 weeks, and 3 mg/L for 7 weeks to 11 months (Newcombe and Jensen 1996).

Conclusion

Review of the information provided indicates that the occurrence and extent of the incident were caused by multiple interacting factors, some of which were preventable. Of these factors, the most egregious is the fact that a failure of the Butte Canal went undetected for 9.5 hours until a manual review of your gaging readouts led to additional investigation into the incident. While earthen canal failures can occur in remote locations, we expect them to be promptly identified and alleviated. As stated above, your modification to your flow gaging alarm following the incident indicates that the previous configuration was wholly inadequate. In addition, you had previously identified the eventual canal failure location as an area of concern but had not yet reported it to the Commission or finalized plans for its repair, suggesting that you were aware of the potential risk at the failure location. Unfortunately, these combined factors led to the eventual canal failure.

We conclude that the events leading up to, and following the August 9, 2023, incident constitute a violation of your project license and the Commission's regulations. Your failure to configure your gaging alarm system to alert operators of a loss of 69 percent of the water in the Butte Canal for up to 9.5 hours constitutes inadequate gaging operations, and thus results in a violation of license Article 8. Cumulatively, your inadequate flow monitoring and alarm protocols and deferred response to a progressive environmental disaster from hillside erosion over more than 9 hours constitute an inadequate effort to prevent soil erosion on lands adjacent to streams or other waters, stream sedimentation, and water pollution, and thus result in a violation of license Article 19.

Additional Actions Required

Since the incident, we recognize the considerable effort you have implemented to prevent ongoing sedimentation and to assess the effects to Butte Creek. The results of this monitoring indicate that the sediment release had quantifiable short-term adverse effects to aquatic resources and water quality in Butte Creek, with longer-term adverse effects likely in the future. There were also likely immediate and long-term adverse effects to juvenile salmon, steelhead, amphibians, BMI, and water quality. To moderate the observable effects, we are requiring that you prepare a plan to mitigate the adverse effects for the loss of 54-59 percent (51-55 adults) of adult spring-run Chinook, or the assumed quantity of juvenile salmon that would have resulted from the partially-lost 2023 cohort. Mitigative action may include habitat improvement, fish stocking, fish passage improvements, funding for habitat improvement projects or brood stock rearing, or other similar measures. Any such proposal should offset the adverse effects to fishery resources from the August 2023 event and should be developed in conjunction with the

National Marine Fisheries Service (NMFS) and the California DFW. Within 90 days of the date of this letter, please file your proposed plan for fishery mitigation with the Commission and include documentation of consultation with NMFS and the California DFW.

Concerning, effects to FYLF and other amphibians, we agree with the FWS's conclusion that the incident likely had an adverse effect on tadpoles through smothering and decreased food availability. The low number of FYLF encounters in 2023 indicate that a significant portion of the 2023 cohort was lost. However, it is difficult to ascertain the exact degree of impact without a direct comparison to the previous monitoring efforts in 2006 using the same scale, methods, and locations of the previous study. To better assess the degree of adverse effect to FYLF in Butte Creek, we are requiring that you coordinate with the FWS and California DFW to conduct an ongoing FYLF population assessment to compare with the 2006 monitoring effort. Within 90 days, you must file a plan for additional FYLF monitoring in Butte Creek. The plan should also contain a contingency for mitigation to the Butte Creek FLYF population if monitoring confirms a significant loss of FYLF from the 2023 canal failure and sediment event. The plan must also contain documentation of consultation with the FWS and California DFW.

Regarding adverse effects to water quality and BMI, your monitoring indicated that extremely high turbidity levels occurred in Butte Creek immediately following the canal failure. Your monitoring also indicated that these levels subsided over time as sediment moved to downstream reaches, with additional smaller spikes following storm events. Sediment deposits appeared to remain along the lower velocity areas of the stream and in interstitial spaces for a prolonged amount of time but diminished after repeated high flow events. Although your filing did not include the results of your BMI monitoring under the California State Water Resource Control Board's Surface Water Ambient Monitoring Program, we expect a decrease in number and diversity of BMI resulting from sediment filling in interstitial spaces in the streambed and reduced habitat availability and complexity. Your efforts to remove 2,800 cubic yards of soil from the debris fan prevented additional ongoing sedimentation in Butte Creek. While you investigated the potential for selectively removing fine sediments from between cobbles, you concluded that it was unfeasible. We expect remaining sediments to gradually transport downstream and away from important aquatic habitat areas, especially during wet winter years. Therefore, no additional action is necessary at this time to mitigate effects to water quality and BMI abundance.

Finally, it is unclear from your filings whether you plan to bring the Butte Canal back into service and your corresponding timeline for doing so. If applicable, please provide a plan and schedule for bringing the Butte Canal back into service and for addressing any outstanding canal deficiencies identified during your monitoring efforts.

Alternatively, please indicate your plans for the ultimate disposition of Butte Canal, or for any plans for filing an amendment to your project license or modifying your relicense application to remove it from the project. Please provide this information within 90 days of the date of this letter.

March 2023 Butte Canal Incident

In a September 22, 2023, report filed with the Commission's Division of Dam Safety and Inspections (D2SI), you reported a debris blockage to the Butte Canal that occurred sometime during a series of storms in March 2023. On March 17, 2023, following a series storms, you discovered a tree and debris pile blocking the canal, which backed up water in the canal and had overtopped the berm. The overtopping flows caused erosion and land sliding of the berm and slope downhill of the canal. You filed a 12.10(a) incident report on September 22, 2023, more than 6 months after the incident. Commission staff requested additional information regarding your ability to recognize the canal overtopping through monitoring and the rationale for the reporting delay.

In your response, you state that you detected the flow change and that high flow alarms were triggered. In response to the incident, you ceased diversions into the canal and dewatered them as much as possible by opening canal side gates. You intentionally paused deploying staff to the site until conditions were safe and removed debris that was blocking the canal on March 18, 2023. However, due to an internal oversight, you did not notify Commission SFRO staff of the storm damage until July 2023.

Review of the incident indicates that you properly detected and responded to the canal overtopping in a reasonable amount of time, given the site conditions and safety concerns. You took appropriate action to clear the debris from the Butte Canal and state that you are in the process of developing a repair plan to mitigate the additional erosion. It also appears that there was minimal adverse effect to environmental resources other than the erosion that occurred in the immediate vicinity of the canal overtopping. However, your failure to report the incident to Commission staff until July 2023, four months after the occurrence, constitutes a violation of 18 CFR §12.10. Since then, it appears that you have improved your reporting time, including notifying the Commission of the August 9, 2023, incident immediately after occurrence. Therefore, no enforcement action will be taken at this time. However, the incident will be taken into account during our review of similar future instances.

March 2023 Hendricks Canal Incident

In a separate September 22, 2023, report filed with D2SI, you reported a debris blockage and subsequent bank hillside collapse into the Hendricks Canal that occurred

sometime during a series of storms in March 2023. The soil and debris created a blockage that caused storm runoff to overtop the canal and erode the downhill side of the canal. You did not note the erosion in either a March 31, 2023, or May 2023 canal inspection, which you attribute to snow accumulation or vegetative cover along the canal berm, blocking any potential observation. However, the erosion was noted during a July 13, 2023, D2SI inspection. Commission staff requested additional information regarding your ability to recognize the canal overtopping through monitoring.

In your response, you state that you detected the flow change and that high flow alarms were triggered. In response to the incident, you ceased diversions into the canal and dewatered them as much as possible by opening a canal side gate. During additional canal inspections between May and June 2023, you cleared vegetation along the canal, which you state, likely previously obscured canal berm erosion that occurred during March 2023. You have since also filed a repair work plan with the Commission to backfill the erosion and restore the canal berm.

Review of the incident indicates that you responded to the Hendricks Canal overtopping in a reasonable amount of time, including removing debris and performing additional inspections. You took appropriate action to clear the debris and to prepare a plan to repair the erosion. However, your failure to detect a significant erosional feature through your response activities and routine inspections until four months after occurrence, as well the consequential failure to report the erosion until six months after the incident constitutes a violation of 18 CFR §12.10. Since then, it appears that you have improved your reporting time, including notifying the Commission of the August 9, 2023, incident immediately after occurrence. Therefore, no enforcement action will be taken at this time. However, the incident will be taken into account during our review of similar future instances.

Conclusion

Please file the information requested above within 90 days of the date of this letter. The Commission strongly encourages electronic filing. Please file the requested information using the Commission's eFiling system at https://ferconline.ferc.gov/eFiling.aspx. For assistance, please contact FERC Online Support at FERCOnlinesupport@ferc.gov; call toll-free at (866) 208-3676; or, for TTY, contact (202) 502-8659. In lieu of electronic filing, you may submit a paper copy. Submissions sent via the U.S. Postal Service must be addressed to: Debbie-Anne A. Reese, Secretary, Federal Energy Regulatory Commission, 888 First Street NE, Room 1A, Washington, DC 20426. Submissions sent via any other carrier must be addressed to: Debbie-Anne A. Reese, Secretary, Federal Energy Regulatory Commission, 12225 Wilkins Avenue, Rockville, Maryland 20852. The first page of any filing should include docket number P-803-121.

Thank you for your cooperation. If you have any questions regarding this matter, please contact me at 202-502-8171 or andrea.claros@ferc.gov.

Sincerely,

ANDREA CLAROS Digitally signed by ANDREA CLAROS Date: 2024.11.19 12:21:03 -05'00'

Andrea Claros
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cc: (via electronic mail)

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