EXHIBIT 1

MEMORANDUM

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Date: July 31, 2017

To: David Keller and Scott Greacen, Friends of Eel River

From: Greg Kamman

Subject: Review Comments: PAD and SD1
FERC Relicensing of PVP

This memorandum presents a summary of comments developed during review of the Scoping Document 1 (SD1) dated June 1, 2017 and Pre-Application Document (PAD) dated April 2017 associated with Federal Energy Regulatory Commission (FERC) relicensing of the Potter Valley Project (PVP). The focus of my review was to evaluate and comment on the completeness of the issues, alternatives and studies presented in the SD1 and PAD. My comments to the SD1 and PAD and recommendations for additional studies follow.

1. Page 7 of the SD1 states that PG&E needs to maintain at least 10,000 ac-ft of minimum reservoir storage due to concerns of bank instability in the reservoir and the potential for sloughing of material that would block the needle valve and create high turbidity in dam releases and increased downstream sedimentation. SD1 does not propose a project alternative that would ameliorate this problem, which will likely continue to worsen with future reservoir sedimentation. Per our recent communications, it is my understanding that PG&E committed (during the 2016 Potter Valley Drought Working Group meetings) to re-examine the actual minimum reservoir storage in Lake Pillsbury required for sediment stability and avoidance of clogging or debris blockage of the needle valve. This information is necessary to determine revised limits to low water storage elevations and volumes below 10,000 ac-ft. This information is requisite for revised considerations on storage and operations at Lake Pillsbury to meet current RPA-required minimum flows especially during dry years. Therefore, the project should characterize the current and future impacts on downstream sedimentation due to the reservoir bank instability and Scott Dam operations.

2. The bottom of page 7 of the SD1 states that Van Arsdale Reservoir capacity has decreased from 1457 ac-ft to 390 ac-ft. How has the reduction in reservoir capacity affected the performance of the fish ladder and intake screens and fish return channel? What would be the consequences for fish passage and safety of further reservoir filling? What current and future sediment and debris management operations are required to maintain optimal (safe) function of the fish passage (ladder) and screening?

3. The bottom of page 8 of the SD1 states that flow capacity through the PVP intake fish screens has been halved due to "current mechanical limitations." What are the consequences for screen performance and fish passage and health? Are there benefits to returning flow through the fish screens to full capacity? What would the costs be of restoring the screens to full capacity? How were they degraded? Although the theoretical combined capacity for both screens is currently 240 cfs, how often and for how long is either screen out of commission to be cleaned or maintained, which would presumably only provide 120-cfs flow capacity?

4. Pages 11-14 of the SD1 summarize project operations including the water rights and water supply agreement that controls how much water is diverted through the PVP power plant. The next to last paragraph on page 13 of the SD1 states, "*After passing through the Potter Valley Powerhouse, a portion of the powerhouse outflow is diverted via canals to PVID for consumptive use. The remaining outflow is abandoned to the East Fork Russian River. This abandoned water from powerhouse operations adds significant inflow to Lake Mendocino and benefits downstream users.*" Hydrologic analyses completed as part of the Russian River Fish Habitat Flows and Water Rights Project DEIR (dated August 2016) included ResSim[1] modeling of the Russian River, including the Calpella Reach. The Calpella Reach includes the East Fork Russian River drainage area above the USGS flow gauge. The gauge is located a short distance upstream of Lake Mendocino and measures flow from a 92.2 square mile drainage area that includes the Potter Valley watershed along with water diverted from the Eel River, including the Potter Valley watershed, and is located a short distance upstream of Lake Mendocino.

   In addition to instream flows, the ResSim model accounts for power, agricultural (including frost protection) and municipal water demands on the Russian River. However, the 2016 Grinnell report in Appendix G of the Russian River Fish Habitat Flows and Water Rights Project DEIR shows that power, agricultural and municipal demands together do not account for all of the water losses measured in the Calpella, or in other downstream reaches of the Russian River. Grinnell (2016) states that the excess water losses are attributed to "*direct depletion through diversion of streamflow, diversion of underflow, or indirect stream depletion due to stream-aquifer interaction.*" The ResSim streamflow losses also include demands for frost protection.

   Summaries of the unaccounted-for stream flow losses and frost protection demands derived from the ResSim model for selected river reaches are provided in the table attached to the end of this memorandum (Attachment A). The minimum, average and maximum monthly losses (period 1910 through 2013) for the four upper river reaches (Calpella, Hopland, Cloverdale and Healdsburg) and Dry Creek are presented under

[1] The Reservoir System Simulation (ResSim) software developed by the U.S. Army Corps of Engineers, Institute for Water Resources, Hydrologic Engineering Center is used to model reservoir operations at one or more reservoirs for a variety of operational goals and constraints. The software simulates reservoir operations for flood management, low flow augmentation and water supply for planning studies, detailed reservoir regulation plan investigations, and real-time decision support.

the heading "Water Budget Loss" in the center of each table. Water loss values are in acre-feet (AF). Frost protection diversions occur from March 1 through May 15 of any given year and monthly minimum/average/maximum values are broken out from total streamflow losses and tabulated in the three right-hand columns of each table. For comparison, the minimum/average/maximum monthly river reach flow rates are presented under the heading "Baseline Flow". Average total annual loss and flow volumes are also presented at the bottom of each table. The percentage value listed in the cell immediately right of the Water Budget Loss average annual total value in each table is the percent loss relative to average total annual flow. The percentage value listed in the lower right hand corner of each table represents the amount of frost protection water relative to stream flow loss.

One interesting finding from the data presented in Attachment A is that the **unaccounted-for streamflow loss rates are notably higher in the Calpella Reach than in downstream reaches**. Average total monthly unaccounted stream flow losses in the Calpella Reach range between 1550 and 2090 ac-ft during June through September. These loss rates equate to mean daily flow rates of 25 to 34 cfs. For comparison, the minimum (floor) flow release requirements below Cape Horn Dam are on the order of 3- to 5-cfs during the same June through September period (Figure 5.1-1 of PAD). **Non-permitted water rights and diversions may be contributing to significant stream flow losses, which if curtailed, could allow for increased flows in the Eel River[2].** Thus, the EIS should provide a more detailed water budget, accounting for how diverted Eel River water and East Branch Russian River water is seasonally used and lost through the Potter Valley Irrigation District and Calpella Reach area. Regardless of how PG&E proposes to modify the existing project boundary (see second paragraph of Section 3.2.1 of SD1 on page 14), this water budget analysis should include the entire Potter Valley and East Branch Russian River watershed to the confluence with the Main Stem Russian River or Lake Mendocino.

5. Section 3.3 (Dam Safety) on pages 14-15 of the SD1 states, "*As the proposal and alternatives are developed, the applicants must evaluate the effects and ensure that the project would meet the Commission's dam safety criteria found in Part 12 of the Commission's regulations and the engineering guidelines (http://www.ferc.gov/industries/hydropower/safety/guidelines/eng-guide.asp)*." However, none of the FERC engineering studies related to dam safety are included in Table 1 (page 19) of the SD1 or Section 6.2 (Potential Studies and Analyses) starting on page 6-4 of the PAD. At a minimum, I expected to see: hydrologic studies associated with determination of probable maximum flood; geotechnical studies associated with dam stability; and Emergency Action Plan; and proposed monitoring

[2] Losses due to groundwater recharge probably aren't significant given the relatively small groundwater basin size and shallow water table conditions in Potter Valley. DWR's California's Groundwater Bulletin 118 states that, "*Hydrographs from 1967 to about 1995 for two alluvial wells showed only minor seasonal fluctuations and water levels in most cases at or near the ground surface*." Regarding groundwater storage capacity of the Potter Valley groundwater basin, Bulletin 118 also states, "*Groundwater in storage was estimated to range from 9000 to 10,000 ac-ft*."

and inspection. Regardless, the stipulated engineering studies should be included in the comprehensive list of project Potential Studies and Analyses.

6. Section 3.5.2 of the SD1 indicates that no party has suggested project decommissioning, however SCWA considers and analyzes a "No Potter Valley Project Diversions" alternative in the Russian River Fish Habitat Flows and Water Rights Project DEIR (dated August 2016). SCWA's rationale in considering the No PVP Diversion alternative is provided on pages 5-25 and 5-26 of the Russian River fish flow DEIR and includes the following text.

   "As discussed above, the FERC proceedings that led to the 2004 PVP license amendment were lengthy and controversial, and it is likely that that the new FERC proceedings regarding the PVP also will be lengthy and controversial. Because the PVP affects fishery species listed under the Endangered Species Act in both watersheds, it is foreseeable that NMFS will evaluate the fishery effects of the PVP on both the Eel and the Russian River fisheries. It also is foreseeable that FERC will prepare an EIS that will evaluate the fishery effects and other environmental and economic impacts associated with alternative PVP scenarios. The alternatives likely to be analyzed in a new EIS include continuation of existing operations, alternative scenarios under which diversions from the Eel River into the Russian River would be modified or reduced, and also a scenario in which the PVP would be decommissioned. It is not clear how long this FERC process will take or what its ultimate outcome will be.

   To address these uncertainties and to bracket the range of potential FERC actions regarding the PVP, this EIR includes both scenarios under which PVP flows into the Russian River watershed remain at existing (post-2006) levels and a scenario under which PVP flows into the Russian River would be reduced to zero. The assumption that PVP flows into the East Fork Russian River will remain at present levels is reasonable, given the history of the FERC proceedings regarding the PVP that led to the 2004 license amendment and the historical reliance of Mendocino and Sonoma counties on the diversions. While the Water Agency does not believe that a scenario of no future flows from the PVP into the Russian River watershed is likely, the Water Agency nevertheless has conducted modeling to analyze the potential cumulative impacts of such a scenario (the No PVP scenario). The No PVP scenario assumes FERC would issue an order that would result in no future PVP diversions from the Eel River into the Russian River watershed. Concurrent implementation of the Proposed Project and No PVP scenario are modeled and analyzed in Section 5.7, "Cumulative Impacts and Mitigation Measures," of this chapter."

7. The geographic scope of project analysis (Section 4.1.2 of the SD1) on the Eel River is too limited as it only considers the River from Lake Pillsbury downstream to the confluence with the Middle Fork Eel River. The PAD states (last sentence in Section 3.3.3), "*Below the Middle Fork Eel River, potential hydrologic effects of the Project are significantly diminished due to inflow from the Middle, South and North Forks of*

the Eel River, and the Van Duzen River." This statement may be true during high winter flows, but increasing summer water demands along the entire Eel River and tributaries has led to serious concerns about the cumulative impacts of summer diversions.   The following sections from the 2016 Eel River Action Plan describe the current plight of salmonids in the Eel River basin due to cumulative summer diversions.

> Pages 18-19 of the Plan state, "*Low summer discharges is a region-wide impediment to coho salmon and steelhead recovery, and has been recognized as such by several state and federal resource agency programs. The California Coho Recovery Strategy (CDFG 2004) states: "A substantial amount of coho salmon habitat has been lost or degraded as a result of water diversions …in some streams the cumulative effect of multiple small legal diversions may be severe." The NMFS SONCC Coho Recovery Plan (NMFS 2014) identified 'altered hydrologic function', including water diversion, as a key stressor (limiting factor) to juvenile coho salmon throughout the Eel River basin. NMFS (2014) also expressed concern regarding the downward trend in summer baseflow and reduced juvenile survival in the South Fork Eel River and Outlet Creek, perhaps the two strongest and most important coho salmon runs in the Eel River basin. The North Coast Regional Water Quality Control Board (NCRWQCB) has identified the task of developing an 'instream flow water quality objective' as a high priority. The instream flow objective would ensure natural hydrologic connectivity is maintained and protected in a manner that supports beneficial uses, including salmonid fish populations (NCRWQCB Water Temperature Policy Statement 2013)*."

> Page 22 of the Plan states, "*In summary, the natural summer low-flow conditions annually occurring in the Eel River have significantly worsened in recent years and decades, resulting from past and ongoing human land use activities (e.g., timber harvest, rural development, marijuana production), as well as the severe, though not unprecedented, drought that has struck the region in 2013 and 14. These conditions severely challenge juvenile salmonids' capacity to survive increasingly harsh temperature and flow conditions. Already threatened, salmonid populations are being further, potentially critically, impaired throughout the region. Solutions to these key environmental problems are made more difficult by the lack of clear state policy protecting streamflow and the resources and beneficial uses dependent on those flows, as well as the lack of resources (primarily state agency staff scientists) necessary to address these problems*."

Given these stated concerns, it would be prudent for the project to analyze the cumulative effects of reduced summer flow on the Eel River from the project area to Pacific Ocean. Further justification for expanding the geographic scope of the study is that the blockwater releases in late summer 2014, intended to help keep temperatures down for juvenile steelhead in the upper river, actually reconnected surface flows at the mouth of the Eel. So, project operations clearly do affect river conditions as far down as the mouth during the summer dry period.

8. The PVP Project diverts water to Lake Mendocino and the Russian River. Given the dependence on Lake Mendocino water in meeting Russian River minimum instream flow thresholds and associated aquatic habitats, it seems logical that any potential changes to PVP operations would potentially have an impact on the Russian River down to the confluence with Dry Creek. Below Dry Creek, Lake Sonoma also supplies flows necessary to meet Russian River minimum flow needs. Section 3.4.3 (Potentially Affected Tributary Rivers and Stream; page 3-16) of the PAD also states, "*Although PG&E does not control releases from Lake Mendocino, the water diverted by the Project ultimately affects the Russian River to its confluence with Dry Creek*."

   Appendix G of the Russian River Fish Habitat Flows and Water Rights Project DEIR indicates that releases from Lake Mendocino are managed to maintain minimum instream flows and provide water to downstream demands by agriculture and municipal users. Lake Mendocino releases to the Russian River are controlled by frequent observation of flow measurements at USGS gauges. As flows recede during the dry season, the minimum flow compliance point transitions from upstream to downstream flow gauges. The furthest minimum flow compliance point based solely on Lake Mendocino releases is Healdsburg (pg. 2-20, Appx. G of DEIR).

   In addition to the losses described in item 4 above, the Russian River Fish Habitat Flows and Water Rights Project DEIR also quantified unaccounted for losses in the Hopland, Cloverdale and Healdsburg reaches located between Lake Mendocino and Dry Creek (see Attachment A). Many of these losses are attributable to unpermitted diversions and, if eliminated, would leave more water in the river and result in higher flows at minimum flow compliance points/gauges. In turn, this would reduce the volume of releases needed from Lake Mendocino to meet the downstream minimum instream flow needs.

   Therefore, an important study needed as part of the PVP FERC relicensing project includes a detailed seasonal (monthly) accounting on the legal and illegal uses of water on the Russian River between Lake Mendocino and Dry Creek to evaluate to what degree, if any, Eel River diversions are needed to meet the legal water demands on the Russian River. Understanding to what degree Eel River diversions are needed in meeting Russian River water demands is important in determining the flexibility in PVP operations.

9. Both the SD1 and PAD indicate that there are no geologic and soils resources issues that need to be analyzed for either cumulative or site-specific effects. However, I believe there are a number of geology and soils resources issues that should be addressed, including:

   a. Seismic hazards to project dams, canals and pipelines due to the presence of active faults in and around the project area (Figure 5.6-5 in PAD);

   b. Groundwater resources as numerous aquifers that sustain municipal and agricultural demands within and downstream of the project area are affected by reservoir storage and river flows in both the Eel and Russian River watersheds;
   c. Flood risks associated with dam break of Scott and Coyote dams; and
   d. Reservoir and river sedimentation associated with reservoir management, maintenance and releases.

10. Page 4-49 of the PAD indicates herbicides and surfactants are used for vegetation management within the Potter Valley Project area on an annual basis. A proposed license modification (page 4-58 of the PAD) includes authorization for PG&E to apply herbicides and surfactants on USFS lands within the FERC Project boundary. However, the PAD and SD1 do not include any proposed studies or analyses to evaluate potential impacts of existing or increased herbicide application on water quality. Such impact assessments and studies should be included in the EIS.

ATTACHMENT A

CALPELLA REACH									
	Baseline Flow (AF)			Water Budget Loss (AF)			Frost Water (AF)		
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
JAN	1,767	30,322	106,067	0	0	0			
FEB	1,297	28,248	96,319	0	0	0			
MAR	1,620	17,751	81,379	0	96	419	0	96	419
APR	1,719	9,784	33,885	0	85	359	0	85	359
MAY	1,277	7,717	15,945	0	610	1,018	0	14	239
JUN	511	6,184	8,817	1,419	1,550	1,617			
JUL	62	5,526	6,391	1,914	2,090	2,438			
AUG	0	5,628	7,222	1,975	2,042	2,174			
SEP	0	5,469	10,300	1,565	1,575	1,595			
OCT	0	5,925	16,577	647	767	1,004			
NOV	2,729	9,655	43,083	0	0	0			
DEC	1,809	22,132	79,406	0	0	0			
TTLS		**154,340**			**8,816**	**5.7%**		**195**	**2.2%**

HOPLAND REACH									
	Baseline Flow (AF)			Water Budget Loss (AF)			Frost Water (AF)		
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
JAN	3,646	97,681	425,325	294	294	294			
FEB	2,938	93,990	379,918	258	260	267			
MAR	4,191	52,475	297,957	290	401	773	0	111	483
APR	2,680	25,770	115,521	351	505	849	0	98	414
MAY	2,862	13,756	32,067	628	1,002	1,305	0	16	276
JUN	3,801	10,677	14,694	1,460	1,570	1,626			
JUL	3,225	11,659	14,438	2,466	2,473	2,476			
AUG	16	12,377	14,981	2,538	2,587	2,684			
SEP	142	11,288	12,919	2,011	2,166	2,245			
OCT	71	10,412	25,463	1,334	1,565	2,021			
NOV	5,653	18,313	112,829	351	357	361			
DEC	5,841	60,313	261,249	300	302	302			
TTLS		**418,713**			**13,482**	**3.2%**		**225**	**1.7%**

CLOVERDALE REACH									
	Baseline Flow (AF)			Water Budget Loss (AF)			Frost Water (AF)		
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
JAN	5,134	140,015	633,894	17	17	17			
FEB	3,718	134,809	541,087	15	15	16			
MAR	6,181	81,265	421,745	18	52	242	0	34	224
APR	3,217	38,466	196,260	19	70	280	0	29	262
MAY	2,876	16,740	49,755	52	173	269	0	1	37
JUN	3,308	11,051	18,966	361	476	534			
JUL	3,000	11,364	13,989	399	497	547			
AUG	0	11,787	14,360	602	643	664			
SEP	0	10,823	12,585	594	611	620			
OCT	0	10,812	44,353	395	432	505			
NOV	5,822	25,268	170,719	27	30	31			
DEC	6,318	87,008	375,106	19	20	20			
TTLS		**579,406**			**3,035**	**0.5%**		**65**	**2.1%**

HEALDSBURG REACH									
	Baseline Flow (AF)			Water Budget Loss (AF)			Frost Water (AF)		
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
JAN	6,149	227,923	1,044,903	209	209	209			
FEB	5,499	221,480	914,805	186	188	193			
MAR	8,958	139,372	736,748	222	245	402	0	22	179
APR	4,522	65,619	365,031	249	278	428	0	18	161
MAY	2,951	23,090	92,669	334	376	414	0	1	18
JUN	2,718	12,269	29,771	348	575	691			
JUL	2,142	10,545	14,259	590	1,204	1,515			
AUG	0	10,397	12,633	842	1,529	1,877			
SEP	0	9,067	13,444	1,358	2,022	2,360			
OCT	0	10,877	90,511	767	1,070	1,224			
NOV	5,653	37,967	303,600	247	258	280			
DEC	6,024	136,488	636,626	214	214	214			
TTLS		**905,093**			**8,169**	**0.9%**		**41**	**0.5%**

DRY CREEK REACH									
	Baseline Flow (AF)			Water Budget Loss (AF)			Frost Water (AF)		
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
JAN	5,411	66,913	347,230	0	0	0			
FEB	5,051	71,118	332,707	0	0	0			
MAR	5,582	49,013	292,459	0	6	47	0	6	47
APR	4,644	22,094	154,398	0	5	43	0	5	43
MAY	5,187	9,031	33,217	7	16	36	0	0	5
JUN	4,954	6,152	10,032	801	828	882			
JUL	5,718	6,501	10,306	775	829	857			
AUG	5,718	6,745	11,216	833	879	968			
SEP	5,534	6,455	10,257	879	904	952			
OCT	4,836	6,664	19,694	868	944	983			
NOV	5,250	11,096	65,912	2	7	16			
DEC	5,411	35,802	163,217	0	0	0			

37,919 Total Avg. Losses (AF)

EXHIBIT 2

MILLER PACIFIC ENGINEERING GROUP

July 31, 2017
File: 1323.10bltr.doc

Friends of the Eel River,
c/o Kamman Hydrology & Engineering Inc.
7 Mt. Lassen Drive, Suite B-250
San Rafael, CA 94903

Attn: Mr. Greg Kamman and Mr. David Keller

Re: Geologic and Geotechnical Study Request
Scott Dam (Lake Pillsbury)
Lake County, California

Introduction

As requested, this letter summarizes our recommendations for additional geologic and geotechnical studies for Scott Dam, an existing concrete dam which impounds Lake Pillsbury on the upper mainstem of the Eel River in northeastern Lake County, California. We previously completed a preliminary evaluation which included reviewing provided documentation and files at the California Division of Safety of Dams (DSOD) in order to identify any geologic or geotechnical issues which may impact dam stability. The results of our preliminary evaluation were summarized in our letter issued on March 9, 2017.

Pacific Gas and Electric Company (PG&E) has filed a Notice of Intent (NOI) and Pre-Application Document (PAD) with the Federal Energy Regulatory Commission (FERC) for relicensing of the 9.2-megawatt Potter Valley Project. Scotts Dam and Lake Pillsbury are located within the upper reaches of the project area. As outlined in their Scoping Document 1 (SD1), FERC is preparing an Environmental Impact Statement (EIS) for the project and has requested project stakeholders identify any studies that would help provide a framework for collecting pertinent information for the EIS. In response to this request, this letter provides geologic- and geotechnical-related issues which we believe warrant additional evaluation as part of the EIS and future project planning.

Request for Additional Studies

Based on our review of the documents noted above, we recommend the following studies be included in evaluation and design efforts:

1. Evaluation of Sediment Loading

Based on our preliminary evaluation, there does not appear to be any analyses that included sediment loading on the upstream face of the dam. The site bathymetry indicates a moderate amount of sediment has built up within the reservoir over time. The sediments deposited against the dam would result in a higher lateral active pressure on the dam compared to water pressure. The sediment loading could result in higher estimated lateral displacements and should be evaluated as part of future studies of sliding analyses and lateral displacement.

2. Evaluation of Lateral Deformations using updated Seismic Loading

Updated seismic response and lateral deformation analyses should be performed to check that estimated deformations during future seismic events will not compromise the stability of Scott Dam. This evaluation is warranted as large deformations could potentially lead to instability of the dam thus posing a life-safety risk to downstream inhabitants. The requirement for evaluation of lateral deformations for similar dam projects is consistent with generally accepted practice within the Geotechnical Engineering profession.

Lateral seismic deformation analyses of the dam have been previously performed due to DSOD concerns. Several studies were performed in the 1990's using a seismic acceleration of 0.60g and full water loads on the upstream side of the dam. More recent analyses have used higher levels of seismic loading (0.65g), based on a magnitude 6.0 earthquake rupturing the entirety of the 20-km "locked" segment of the Bartlett Springs Fault Zone.

Recent work by USGS indicates that the Rodgers Creek Fault, may in fact be a northern extension of the Hayward Fault. By virtue of nearly doubling the fault length (and therefore, potential rupture length), this fault system may be capable of larger-magnitude earthquakes and larger ground accelerations than previously thought. Depending on actual expected ground motions from the maximum credible earthquake on this fault system, the analyses may need to be revised to consider a design basis earthquake on the Hayward-Rodgers Creek system in addition to the Bartlett Springs Fault. The dam should also be evaluated using probabilistic earthquake ground motions with a 2% chance of exceedance in 50 years (2475 year return period) consistent with DSOD criteria.

Evaluation of the dam using updated seismic loading and sediment loading (as discussed above) should performed to determine stability and expected deformation during a seismic event.

3. Additional Evaluation of Landslide Complex at South (Left) Abutment

A large landslide complex exists above the left abutment, and may include a large (approximately 6,000 to 7,000 cubic yard) boulder of greenstone rock which was incorporated into the dam's left abutment. Landslide movement has been detected at several different locations and several different depths. The deepest recorded movement is about 110 feet below ground surface. It should be noted that the geologic map (plate 5.1-1 of the March 2010 PG&E report) only maps recent (i.e. post-dam construction) landslide movement as landslide material. Topographic features indicate that older landslide materials extend farther to the west and are currently mapped as colluvium and bedrock areas.

Evaluation of the large greenstone boulder incorporated into the left abutment is warranted to determine if is entrained in a larger landslide complex. If the greenstone boulder is part of a larger landslide complex, there would be an increased risk of potential dam instability which could pose a life-safety risk to downstream inhabitants. Additional evaluation is required to confirm the vertical and lateral extent of the landslide complex. This would include additional geologic mapping and subsurface exploration.

It should be further noted that the most recent Safety Review indicates that since 1969, measureable displacement in inclinometer 21 has occurred at depths up to 110-feet. More significant movement of shallower earthflows and landslides is occurring within the landslide complex. A monitoring program, including installation of several inclinometers, survey monitoring points, and other instrumentation within the landslide complex has been implemented by PG&E, but detailed data is not provided in their report and no conclusions regarding ongoing movements are provided. Also, there does not appear to be any inclinometers near the dam on the upstream side of the left abutment to monitor landslide movement. Additional inclinometers, along with pressure cells, are warranted for future monitoring.

The most recent Safety Review further indicates that no analysis of seismic slope stability of the landslide complex has been performed. The stability of the landslide and expected movement under seismic and high groundwater conditions should be performed to determine whether future landslide movement could damage the dam.

Additionally, a geotechnical concern is that the existing dam is acting as a strut across the canyon. The dam may be resisting landslide forces, directing landslide movement towards the east, and causing landslide material to “toe” out in the reservoir on the upslope side of the dam. Landslide forces on the dam are difficult to quantify, but can produce a combination of compression, uplift, and/or lateral loads on the dam. Additional analyses, as discussed above, are important to better understand the effect of the landslide on dam stability.

4. Evaluation of Gate Operations

With the exception of a single automated slide gate, gate changes at Scott Dam must be affected manually. This entails the operator driving over an hour to the dam and then sequentially opening or closing each gate one at a time creating a potentially significant dam safety threat. If the gates are closed during a high flow event and the operator is impeded from accessing the site (e.g. the road is blocked, the operator’s car is inoperable, the operator is unavailable, etc.) an emergency dam overtopping/spill event could occur. PG&E should conduct a study to upgrade Scott Dam to modern dam safety and operations standards. Specifically, PG&E should prepare a study and plan for providing remote, automated gate operations and control at Scott Dam. This should include built in redundancy and backup systems and use of an automated system operations such as SCADA or PLC.

We trust that this letter contains the information you require at this time. Please do not hesitate to contact me with any questions or concerns.

Very truly yours,
MILLER PACIFIC ENGINEERING GROUP

Scott Stephens
Geotechnical Engineer No. 2398
(Expires 6/30/17)

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