

CITY OF SEATTLE

BOUNDARY DAM 3 GENERATOR REHABILITATION DB PROJECT

1. Rehabilitation work began on Units #55 and #56 and remain on-going. You have proposed to start on Unit #51 in 2017 and complete it in 2020, start on Unit #54 in 2018 and complete it in 2021, and, start on Unit #52 in 2019 and complete in in 2022. Clearly there is overlap on the rehabilitation of all the Boundary Dam Units, both the work now on-going and the work that you propose. What is not clear is how the overlap in workload on all Units is supported by the proposed team. Are there different teams working on Units #55 and #56?

Work on units 55 and 56 will be completed before this contract is awarded. With respect to units 51, 52, and 54, please see the more detailed schedule attached to these responses. That schedule shows that the physical work on each unit will occur during planned unit outages that last approximately 10 months, with a 2 month gap between them. SCL will not have more than one unit out of service at a time. The majority of the design will occur prior to the first outage; however, once each generator outage begins, there will be an initial period where there will be additional design to address the specific condition of each generator. This information cannot be ascertained until the outage period.

2. Given the multi-year overlap in hydroelectric generator Units #51, #52, and #54, it appears that over the next six (6) years, during 2019 and 2020 all three Units will be in rehabilitation, during 2018 and 2021 two of the three Units will be in rehabilitation with only one Unit in rehabilitation in 2017 and 2022. The proposed staffing organization chart and allocated time does not scale similarly nor does it demonstrate availability commensurate with this volume of workload. Please explain (1) How your proposed staffing and availability will support the proposed workload, (2) Who in fact is the single person responsible for this program and (3) Why no one on the organization chart is allocated as available 100%?

1) Please see the more detailed schedule provided with these responses. Because SCL will not have more than one unit out of service at a time, the SCL workload will be steady and consistent during the construction phase of all three units. The SCL staffing plan is appropriate based on SCL's experience with the work on Boundary Dam Units 55 and 56 and the work at Diablo Dam. In fact, SCL has performed an analysis of staffing needs for this project and adjusted the staffing for this project based on lessons learned from these two previous projects.

2) There are multiple people responsible for this project, and we have provided a more detailed organization chart for SCL that will hopefully provide some insight into the reporting structure and depth of staffing.

Project Management:

Mike Haynes is the **SCL Power Generation Officer**, SCL executive level person responsible for all Seattle City Light power generation activities and ultimately the execution of this program

Wanda Schulze is the **Capital Program Manager** for SCL and is responsible for the management of the all capital projects related to power generation.

Josh Jackson is the **Project Manager** who will be the central person for day to day management of the project. He is listed on the organizational chart as assigned to this project for 80% of his time because he is also the Project Manager for a related project at Boundary Dam that must be coordinated with this project. Having Josh as the PM for both projects is essential for the coordination of the two projects. Josh has the authority from SCL to manage the scope, schedule, and budget.

Engineering and Construction Support

The organizational chart provided with the application list the SCL department heads responsible for various aspects of the project. Their responsibilities include the other projects at SCL, and they will have specific people working for them who will, at various times, be assigned full time on the project. Again, please refer to the more detailed organizational chart provided with these responses.

Faz Kasraie is the **Manager of Electrical Engineering** for SCL who will have full time staff on site when necessary for the project. **Hans Gutman** and **Caleb Rush** work for Faz and will be assigned to this project.

Mike Nordin is the **Manager for Construction Management** who will be assigning full time personnel during the actual construction of the project. Please refer to Exhibit B provided with the application. **Jade Mott** and **Tim Lorkowski** work for Mike and will be assigned to this project.

Dan Kirschbaum is the **Mechanical Engineering Supervisor** for SCL who will assign an engineer on site full time, plus 3 support engineers in the office. Please refer to Exhibit B provided with the application. **Bob Fuchs** and **Robert Gordon** work for Dan and will be assigned to this project.

Outside Subject Matter Experts

Karen Graham is a Senior Project Manager with HDR, an international engineering company. Karen will be the primary point person with HDR providing support to Josh, and she has extensive experience in generator rehabilitation. Karen has a team of subject matter experts in the design, fabrication, construction, and commissioning of hydroelectric generators. Their level of involvement will be scaled to match the needs of the project.

3. Please describe your lessons learned in the two (2) prior Design-Build Hydroelectric Generator rehabs and how those lessons learned have translated into doing the next three Hydroelectric Generator rehabs differently?

SCL has carefully examined its previous projects and tailored the procurement and contract for this project to address lessons learned from these projects. These lessons include:

- a. A lesson learned from the first Boundary Dam project was the need to assign dedicated construction management personnel full time on site during the construction. In the

Diablo project, having full time construction management personnel has been very beneficial, and this practice will continue for this project.

- b. One of the recurring issues has been the need for the Design-Builder to be fully prepared to work at a remote site and be self-sufficient with minimal reliance on the already busy SCL personnel who work full time at the facility. Therefore, SCL has developed project goals and procurement criteria to select the most appropriate Design-Builder, and contract requirements to further manage this issue. This lesson learned also emphasizes the need for qualifications focused selection. The failure of the Design-Builder to be fully prepared to work in a remote location can cause significant cost to SCL, and low bid procurement does not provide any mechanism to evaluate the proposer's capacities in this area.
 - c. Schedule and meeting the outage dates is the foremost concern of this project. Failure to complete the work within the outage dates will likely cost more money than the cost differential between bidders in a design-bid-build procurement. In addition, all of the likely proposers are technically capable of providing the services; however, not all of them have appropriate management plans that will minimize the risk for timely completion. Therefore, SCL has included selection criteria that emphasizes project management and execution more than final price. SCL is also considering including incentive payments that will reward schedule milestones.
 - d. When each generator outage begins, the generator is disassembled. The only time that anyone can assess the actual condition of the generator and what will be necessary to complete the project will be at this time. SCL has included progressive design-build elements in its contract to address this issue. In addition to an initial validation period for the overall project, the Design-Builder will conduct an additional validation period and collaborative re-assessment for each generator after it comes out of service
 - e. SCL personnel changes on previous projects emphasized the importance of a consistent project team. Therefore, SCL has increased focus on making sure that there is a plan to minimize personnel changes and mitigate the impact of personnel changes if they occur.
4. Please provide a copy of the Project Charter that you have described as completed for this program of projects.

Please see the Project Charter attached.

5. Will this project be covered under a CWA (Community Workforce Agreement)?

No, the City's CWA does not cover projects in remote locations such as Boundary.

6. Will this project require a WMBE Inclusion Plan?

Yes, part of the proposal process will include a social equity and inclusion plan and approach including a proposed aspirational goal to include women, minority, and small business opportunities.

Seattle City Light - Boundary Dam Generator Overhaul Design-Build Project Overview Schedule

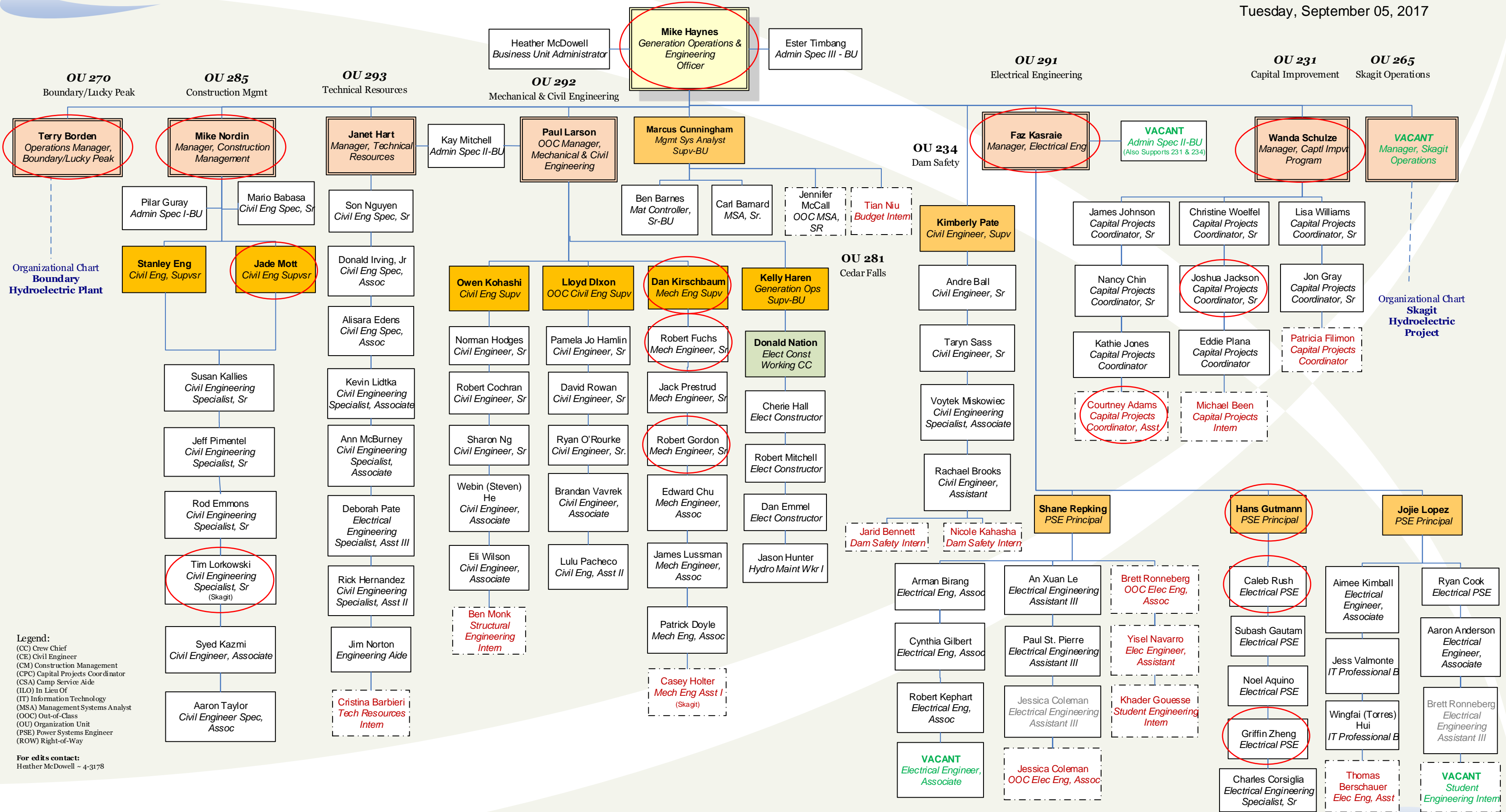
ID	Task Name	2018		2019				2020				2021				2022													
		Sep	Nov	Jan	Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul										
1	Design-Build Contractor Procurement	Design-Build Contractor Procurement																											
2	Project Validation Period	Project Validation Period																											
3	Project Design Phase	Project Design Phase																											
4	Component Manufacturing (Offsite)	Component Manufacturing (Offsite)																											
5	Unit 51 Manufacturing	Unit 51 Manufacturing																											
6	Unit 54 Manufacturing	Unit 54 Manufacturing																											
7	Unit 52 Manufacturing	Unit 52 Manufacturing																											
8	Unit 51 Out of Service	Unit 51 Out of Service																											
9	Unit 51 Design Validation	Unit 51 Design Validation																											
10	Unit 51 Construction	Unit 51 Construction																											
11	Unit 54 Out of Service	Unit 54 Out of Service																											
12	Unit 54 Design Validation	Unit 54 Design Validation																											
13	Unit 54 Construction	Unit 54 Construction																											
14	Unit 52 Out of Service	Unit 52 Out of Service																											
15	Unit 52 Design Validation	Unit 52 Design Validation																											
16	Unit 52 Construction	Unit 52 Construction																											
17	Closeout	Closeout																											

Generation Operations & Engineering Seattle Organization Chart

OU 260

Seattle City Light Generation Operations & Engineering

Tuesday, September 05, 2017



Organizational Chart
Boundary
Hydroelectric Plant

Organizational Chart
Skagit
Hydroelectric
Project

Legend:
 (CC) Crew Chief
 (CE) Civil Engineer
 (CM) Construction Management
 (CPC) Capital Projects Coordinator
 (CSA) Camp Service Aide
 (ILO) In Lieu Of
 (IT) Information Technology
 (MSA) Management Systems Analyst
 (OOC) Out-of-Class
 (OU) Organization Unit
 (PSE) Power Systems Engineer
 (ROW) Right-of-Way

For edits contact:
 Heather McDowell ~ 4-3178

Purpose

The PROGRAM Charter defines the high-level approach to managing three separate but related projects. It authorizes the existence of a project, and provides the project manager with the authority to apply organizational resources to the initial project activities.

1. Project Information

Project Name	Boundary Unit 51, 52 and 54 Overhaul
Project Number (s)	6351001; WAMS 1601183 (scoping & procurement)
Project Sponsor	Terry Borden
Project Manager	Chris Woelfel
Charter Prepared By	Chris Woelfel

2. Project Overview

This document is the “umbrella” charter for the three separate overhauls. We anticipate a single effort to address the planning, scoping, procurement and contracting for all three units. After the scoping and procurement phase are finished, we will prepare separate charters for U51 (Summit 6351), U 54 (Summit 6353) and U52 (Summit 6535).

This program will overhaul the three remaining Boundary Units (U51, 52 and 54). The goals are to:

- replace, re-furbish and/or re-use generator components so that the units provide forty years of trouble free operations, and
- upgrade capacity from ~160 MW to ~175 MW may be considered if justified by a Business Case Analysis.

The program will run for roughly six years (2016 -2021) and cost an estimated \$60 million. In keeping with past projects, a Contractor will perform the rewind work while SCL crews perform mechanical upgrades. The basic overhaul scope and process will be similar to the Unit 53 overhaul, except that Unit 53 was an emergency project.

At this time, this scope of work excludes U51, 52 and 54 transformer replacement.

3. Location of Project data

Project files will be stored on the I:/drive under 01 Projects_Boundary. All of the “umbrella” documents (scoping, consultant contract, design-bid procurement, etc.) will be stored in the Unit 51 folders, because it is the first unit.

Actual costs will be tracked by WAMs numbers and data will be available through Summit and Cognos. Forecasted costs and scheduled will be recorded in UI Planner

Scope changes will be stored in the project files, which are located on the I:/drive

4. Stakeholders

Stakeholder	Interests in the Project
SCL Officers	Routine interest in major projects such as rewinds – due to costs and extended outages
PPD Director and Boundary Operation Manager	Has responsibility for safe and reliable operation of all PPD hydro facilities. Manages Boundary crews.
Team members	Electrical and mechanical engineers Boundary crews Shops Consultant (to be determined) for scoping Design-Build (to be determined) contractor for construction Procurement staff from SCL and FAS
Power Marketing	Plan outages and arrange for power purchases
System Control Center	Plan outages

5. Conceptual Project Plan

What follows is the top down conceptual project plan. Additional work is necessary for the team to develop a detailed bottom up Project Plan.

5.1. In Scope Deliverables

Deliverable	Deliverable Description
Consultant Contract for three units	Contract for Consultant to: <ul style="list-style-type: none"> Phase 1: assess conditions, analyze options, prepare scoping study; Phase 2: support Design-Build solicitation; review DB design products; Phase 3: provide engineering support and construction administration services during construction
Design-Build (DB) contract for three units	Design-Build contract to overhaul three units

Consultant Contract for construction management	Manage day-to-day construction management services while the DB Contractor performs work
<p>DB Contractor Work</p> <p>For Unit 51, 52 and 54 overhaul</p>	<p>Preliminary description <i>(will be revised during scoping)</i>:</p> <p>Replace:</p> <ul style="list-style-type: none"> • Stator core • Stator winding (circuit rings, support rings, cleats, RTDs, PDA couplers, monitoring devices) <p>Evaluate for a 40 year life and replace, repair, refurbish or re-use (TBD):</p> <ul style="list-style-type: none"> • Stator frame • Field poles • Exterior bus • Instrument transformers and transformer bushing • CTs, PTs, ground switch, surge protection • Neutral grounding transformer & resistor • Rotor new pole keys, re-insulate DC leads and copper bus connection • Thrust Runner and hardware • Brake Segments • Brakes / Jacks add brake dust connection system • Stator Air Coolers • Thrust bearing oil pot cooler • Slip Rings • Thrust Bearing Support & Springs • Thrust Bearing with added High Pressure Lift • Rotor Spider Hardware • VibroSystM (Air Gap and unit vibration monitoring) (TBD) • New Fire detection and suppression system <p>Inspect, clean and perform NDE – Non Destructive Evaluation</p> <ul style="list-style-type: none"> • LBB • Rotor spider • Generator Shaft • Generator Thrust Block
SCL Work for Unit 51, 52 and 54 Overhaul	<p>Preliminary description <i>(will be revised during scoping)</i>:</p> <p>Stationary Seal Rings</p> <ul style="list-style-type: none"> • Lower seal ring replacement • Upper seal ring replacement • Curb ring inspection/repair

	<p>Wicket Gates, Bushing, Seals, Linkages and Pins</p> <ul style="list-style-type: none">• Wicket gate journal replacements• Purchase spare wicket gate bushings• Purchase full set of Parker self-energized seal rings• Convert linkage bushings from Thordon to Kamatics (if needed)• Purchase spare linkage bushings• Linkage pins inspection <p>Babbitt Bearings</p> <ul style="list-style-type: none">• UGG & TGB - Babbitt bearing inspection and purchase spares if needed• TGB segmented journal puck and cups inspection and purchase spares if needed <p>Carbon Seal Ring Carrier</p> <ul style="list-style-type: none">• Carbon seal ring and pressure plate: inspect/replace; purchase spares if needed, possibly replace carbons with "Thordon like" material• Inspection ports installation in carbon seal ring, if needed• NDE (non-destructive evaluation) dowel hole connection in shaft for carbon seal ring carrier <p>Servo Motors</p> <ul style="list-style-type: none">• Servo-motors inspection, cleaning and minor repair (contracted out)• Brakes and Jacks could go with Servo Motors (similar work) but within Generator boundaries – if Brake Dust added might be better for the OEM to have the entire group. <p>Turbine Runner</p> <ul style="list-style-type: none">• Runner to turbine shaft dowels: fabricate and install new• Cavitation repairs if needed• Manufacture new bolts with purchase of Super Nuts for coupling connection. <p>Operating Ring</p> <ul style="list-style-type: none">• Thordon bearing strip inspection, replace if needed, purchase spares if needed
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	<p>Non-destructive Evaluation of reused Components</p> <ul style="list-style-type: none"> • Headcover • Upper Draft tube curb ring extension (added by our crews) • Shaft Coupling bolts (Turbine to Gen Shaft) • Headcover closure studs • TGB Oil coolers <p>Instrumentation, Alarming and Tripping</p> <ul style="list-style-type: none"> • Instrumentation review • RTD calibration • Alarm and trip set point confirmation for all bearing temperatures • Install Rittmeyer penstock flow meters <p>Miscellaneous</p> <ul style="list-style-type: none"> • Cooling water pipe inspections and pipe wall thickness (if OEM replaces coolers then this should go to them to adapt to the new coolers, but this is unlikely) • Air Cooler discharge riser redesign from air cooler return header, confirm pipe hanger design – source of leaks in the past. • Air coolers: cleaning, gasket replacement; Nord-lock fasteners, Crispin valves on coolers, increase support with new brackets, if OEM does not replace coolers. • • Oil sampling ports installation on LBB and TGB pots. • Air Admission box area on Headcover inspection for vibration problems and redesign to resist vibration and cracking
Unit 54 overhaul	See above
Unit 52 overhaul	See above

5.2. Out of Scope

The following items are not currently in the scope:

- Turbines will not be replaced.
- Transformers for Units 51, 52 and 54 may be replaced during the overhaul outages, however the transformer replacements are a separate project.
- Exciter upgrades

- Overhauling servo-motors

Any of these items can be added through the change management process.

5.3. Project Approach

This is phased approach, and it is similar to the methodology used for Diablo Unit 31/32 overhauls:

- Phase 1. Conditions assessment, evaluate options, prepare scoping study
- Phase 2. Solicit Design-Bid firm; prepare designs
- Phase 3A. Unit 51 overhaul and commissioning
- Phase 3B. Unit 54 overhaul and commissioning
- Phase 3C. Unit 52 overhaul and commissioning

5.4. Contracting and Consulting Approach

The project teams anticipates the following approach:

During the planning phase, a consultant will lead the scoping and evaluation work. This phase will include support from PPD engineers and minor support from Boundary crews.

We anticipate using a Design-Build approach for the overhauls. So, the generator overhaul (rotor, stator, and frame) design work will be done by the DB contractor with support from the consultant and PPD engineers. The consultant is likely to be the lead technical reviewer. Similar to Unit 53, much of the mechanical improvements will be designed by PPD engineers.

During the construction phase, the DB contractor will perform the generator overhaul. SCL crews from Boundary and Shops will make the mechanical upgrades. The consultant will serves as the technical expert for the DB contractor's work. Construction management will likely be performed by a joint effort between SCL's construction management group and an independent construction expert (i.e., "owner's rep") reporting directly to SCL.

5.5. Schedule

Task	2016	2017	2018	2019	2020	2021	2022
Consultant contract	X						
Scoping complete	XX	X					
Design-Build procurement		XXXX					
Design			XXXX				
U 51 overhaul				XX	X		
U 54 overhaul					XX	X	
U 52 over haul						XX	X

Closeout							XX
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Each outage is expected to start in July and last approximately nine months.

5.6. Cost

Original Estimate = Assumes \$20M each = \$60 M total

Cost Item	SCL Labor (loaded)	Consultants	DB Contactor	Vendor/ Purchase/ Misc.	Non-labor overhead	Total
Scoping Study	\$0.3M	\$1M	--	--	--	\$1.3M
Procure Contractor & design review	\$0.5M	\$1.4M	--	--	--	\$1.9M
U 51 overhaul	\$2.5M	\$1M	\$12M	\$1.4M	\$2M	\$19M
U 54 overhaul	\$2.5M	\$1M	\$12M	\$1.4M	\$2M	\$19M
U52 overhaul	\$2.5M	\$1M	\$12M	\$1.4M	\$2M	\$19M
	\$8.3M	\$5.4M	\$36M	\$4.2M	\$6M	\$60M

The cost estimates are based on the actual Boundary U53 and 56 with some input from the estimated Diablo Unit 31/32 overhaul costs. Since these are ball-park costs, contingencies are not shown.

5.7. Funding

Revised Cash flow Estimate pulled from UI Planner 4/8/16. These costs are based on the average actual costs from U53, U55 and U56 rewinds. The amount shown in the table below is about \$1.3M high due to inaccurate interest calculations.

Funding Source	2016	2017	2018	2019	2020	2021	2022	Total
U 51 #6351	\$1.1M	\$1.0M	\$13.2M	\$5.1M	\$1.8M	--	--	\$22.2M
U 54 #6353				\$13.0M	\$5.5M	\$1.8M	--	\$20.3M
U 52 #6535					\$13.3M	\$5.7M	\$1.8M	\$19.0M
Total CIP	\$1.1M	\$1.0M	\$13.2M	\$18.1M	\$20.7M	\$7.5M	\$1.8M	\$61.3 M

Key Risks and Issues

- The major risk is that Unit 51 (or other) will fail prior to the scheduled 2019 overhaul.
- In general, large projects come with the risk of schedule slippage.
- The powerhouse crane will begin to function poorly prior to the first outage in 2019.

5.8. Assumptions and Constraints

This charter assumes the scope will be similar to Unit 53 and we'll follow the Design-Build public works process. We assume the existing stator platforms can be used.

We accept the risk that Unit 51 or 54 may fail before the planned overhaul. If so, we will modify our plan to accommodate emergency repairs.

5.9. Regulatory Compliance

This project will require WECC testing.

5.10. Dependencies

The Boundary overhauls are scheduled to occur after the Diablo rewinds (scheduled for 2017 and 2018) are finished. This project may be coordinated with the Boundary transformers. The overhauls may require repairs to the powerhouse crane.

6. Program Organization

6.1. Governance Structure

Executive Sponsor:	Michelle Vargo
Project Steering Committee:	Michelle Vargo, Terry Borden, Faz Kasraie, Wanda Schulze
Project Sponsor:	Terry Borden
Stakeholders:	See Section 4
Program Manager:	Chris Woelfel

6.2. Contingency Use Approval Process

Contingency use will be addressed in the project charters (not the program charter).

6.3. Internal and External Communication Needs

Internal communication will be provided by: regular project meeting notes (bi-weekly), monthly status reports and quarterly management briefings. No external communications are planned at this time.

7. Adjustments to Standard Practices

At this time, there are no adjustments to standard practices.

8. Supporting Documentation


Information from previous Boundary and Diablo overhauls are available.

9. Quality Assurance Plan

A quality assurance plan will be developed as part of the scoping process.

10. Approvals

 4-11-16
 Project Sponsor, Terry Borden Date

 4-18-16
 Project Manager, Chris Woelfel Date

 4/20/16
 PM Resource Manager, Wanda Schulze Date

 5/6/2016
 Electrical Engineering Manager, Faz Kasraie Date

 5/6/2016
 Civil/Mech./Structural Manager, Paul Larson Date

 6/10/2016
 PPD Director, Michelle Vargo Date

11. Revision History

Revision Date	Version	Summary of Changes	Prepared By