

**BLUE LAKE EXPANSION PROJECT**

Report No. 22

Month ending September 30, 2014

**SCOPE**

- 83 ft. dam raise with modified tunnel system and new 15.9 MW powerhouse (\$89 million)
- Eight supply contracts for Owner-Furnished equipment and materials (\$16 million)

**PROJECT HIGHLIGHTS DURING THIS MONTH**

- September 1 – Began grouting the dam contraction joints below elevation 403.
- September 6 – Experience rainfall causing a slide on the Blue Lake Road.
- September 10 – Completed grouting of the dam expansion joints below elevation 403.
- September 10 – FERC (Justin Nettle) inspected the jobsite.
- September 11 – Executive Partnering meeting was held in Sitka.
- September 13 – The concrete tunnel plug was completed in the existing intake tunnel.
- September 16 – Transformer T4 was replaced in the Blue Lake switchyard.
- September 16 – Penstock anchor block 5 was completed.
- September 16 – The new FVU turbine case was placed in position.
- September 19 – BLU 5 and BLU 3 are ready for wet testing.
- September 20 – Penstock section 10 was placed.
- September 23 – Placed final spillway concrete at block M3.
- September 23 – Began flushing and rock removal from upper tunnel.
- September 25 – Completed flushing and rock removal from upper tunnel. About 70 cubic yards was removed.
- September 26 – Both tunnels were inspected for debris prior to filling tunnels.
- September 28 – Tunnel liner painting was completed.
- September 29 – Placed final spillway concrete at block M4.
- September 29 – Tunnel and penstock were closed up in preparation for filling.
- September 29 – Tunnel was filled in preparation for wet testing.
- September 30 – Water entered BL-5 and wet testing commenced.
- September – ASRC McGraw completed the grubbing and clearing the burn area at the upstream end of Blue Lake.
- September – ASRC McGraw completed the installation of the debris booms required by contract 8.
- September – ASRC continued to build out the service and raw water systems and control room.
- September – Bruce Belley completed the control station and SCADA system installation.
- September – Barnard crews completed 8 major concrete placements on the dam, including M1 crest slab, M3/425, M4/417, and 425, M5/417, Cutoff wall to El 440, M6 parapet wall and M7 parapet wall.

We expect that the surface finish on the lower spillway placements will have to be repaired.

**COST SUMMARY - updated 9/30/2014**

Project Element	Current Contract Total or Projected Amount	Payments	
		Paid this Month	Paid to Date*
Supply Contracts			
Contract 1 - Turbine Generator Equipment	\$11,801,058	\$437,476	\$11,791,883
Contract 2 - Switchgear	\$647,672	\$15,396	\$612,799
Contract 2A/2B - SS/Raw Water Switchgear	\$300,000	\$0	\$208,547
Contract 3 - Gates and Hoist	\$780,185	\$0	\$703,376
Contract 4 - Penstock	\$836,315	\$0	\$795,778
Contract 5 - 69 kV Transformers	\$603,406	\$0	\$543,130
Contract 6 - Bridge Crane Equipment	\$270,518	\$0	\$272,298
Contract 7 - Steel Building	\$1,145,712	\$0	\$1,090,788
Contract 8, Debris Management**	\$2,258,714	\$581,884	\$1,150,610
Contract 9, General Construction	\$94,884,196	\$5,753,259	\$82,388,232
Temporary Filtration**	\$1,651,424	\$89,000	\$698,528
Diesel Fuel	\$1,260,000	\$50,227	\$167,700
Remaining Project Costs			
License Amendment	\$1,400,000	\$2,540	\$1,296,160
Engineering	\$9,498,393	\$4,800	\$11,930,684
Construction Management	\$8,076,201	\$466,230	\$7,180,952
City Performed Work	\$1,495,000	\$131,028	\$2,257,580
Incentive Payment	\$1,600,000	\$0	\$0
Cost of Bond Issuance/Reserve Account	\$3,500,000	\$0	\$0
<b>TOTALS</b>	<b>\$142,008,794</b>	<b>\$7,531,839</b>	<b>\$123,089,044</b>
<b>ESTIMATED TOTAL PROJECT COST</b>	<b>\$145,256,724</b>		

\*Paid to Date includes unpaid retainage

### COST CHANGES THIS MONTH

- We have authorized a change item to install a rock trap in the lower tunnel.  
The generation outage will be extended a total of 4 days to perform this work.

## CONSTRUCTION SCHEDULE MILESTONES: PLANNED/ACTUAL

Construction Start	11-20-2012 / 12-03-2012	Sub. Comp. BLU #3	10-24-2014/
Drainage Tunnel Comp.	07-01-2013 / 05-05-2013	Sub. Comp. FVU	11-12-2014/
Tunnel ex. complete	08-19-2013 / 07-24-2013	Sub. Comp. BLU#5	11-22-2014/
Intake Structure complete	06-04-2014/06-04-2014	Substantial Completion	02-01-2015/

### NOTES ON PROJECT SCHEDULE

- The most recent look-ahead schedule submitted by Barnard shows the following work to be performed in October:
  - Dam contraction joint grouting above elevation 403' will begin October 20.
  - The dam concrete is scheduled to be complete the second week in October.
  - The large crane demobilization will begin late October
  - The generation outage is scheduled to be completed October 18. Barnard expects to beat that date.
- The CM team and Electric Department continue working on the City-performed work tasks to ensure these activities are completed on time.
- The contract duration of the generation outage is now 65 days.

### OTHER ITEMS OF INTEREST

- Due to having adequate water in Green Lake we expect to continue with minimal diesel generation during the Generation Outage.
- The following Site Service representatives will be on site as required to wet test the turbine generators:
  - Currents Consulting
  - Unit Electrical Engineering
  - Clifton Labs
  - Hyundai
  - Gilkes
  - WRE
  - TS&H Automation
  - Electric Power Systems
- It will be necessary to keep the Indian River onsite for a period of about 1 month after the generation outage so that it may be operated during the final testing of the Blue Lake Units.

## **PROJECT RISK PROFILE**

A discussion of the major risk areas follows below. As a general rule risks are measured as follows:

**LOW:** Probability of less than 10%, or mitigation cost less than \$1 million.

**MODERATE:** Probability of more than 30%, or mitigation cost up to \$5 million.

**HIGH:** Probability of more than 60%, or mitigation cost likely more than \$5 million.

The City's project team believes the following risk areas will dominate the potential for increases in overall Project cost. We also believe these areas pose the greatest risk for schedule delays.

***Construction Schedule:*** In Barnard's most recent (September 30, 2014) schedule, the end of the generation outage is scheduled for October 18. Based on work progress to date we expect to beat this date. The completion of the balance of plant items (service water, cooling water, heating and ventilation, etc.) in the powerhouse are the biggest areas of concern for meeting this date.

***CURRENT RISK: LOW***

***Weather and Lake Levels:*** Water levels in Blue Lake and Green Lake are better than expected at the end of September.

***CURRENT RISK: VERY LOW***

***Temporary Water Filtration Plant:*** During the ongoing generation outage of the Blue Lake tunnel, the City will be getting its drinking water from a temporary water filtration plant at Indian River. The City Water Department is operating the plant with assistance from CH2MHILL and the supplier.

***CURRENT RISK: VERY LOW***

***Other:*** This is a broad combination of bad things that might happen such as: earthquakes; construction site accidents; floods; extreme winter weather; fire; labor unrest; etc. We expect that many of these risks would be covered by insurance at least in part.

***CURRENT RISK: LOW***

## PROJECT PHOTO RECORD THIS MONTH

Photos are taken of each work area each month from a fixed location to document construction progress by work area. Relevant photos of the project for this month are provided on the following pages.



**Figure 1. Dam and Left Abutment Area, Barnard crews completed 8 major concrete placements on the dam, including M1 crest slab, M3/425, M4/417, and 425, M5/417, Cutoff wall to El 440, M6 parapet wall and M7 parapet wall.**



**Figure 2. Intake Portal and Right Abutment, The concrete tunnel plug was completed in the existing intake tunnel. Tunnel and penstock were closed up in preparation for filling.**



**Figure 3. Gate House Location, Began flushing and rock removal from upper tunnel by opening a valve on the bulkhead gate and opening the fixed wheel gate. The bulkhead gate was later removed for filling of the tunnel.**



**Figure 4. Dam Staging area, no change this month.**

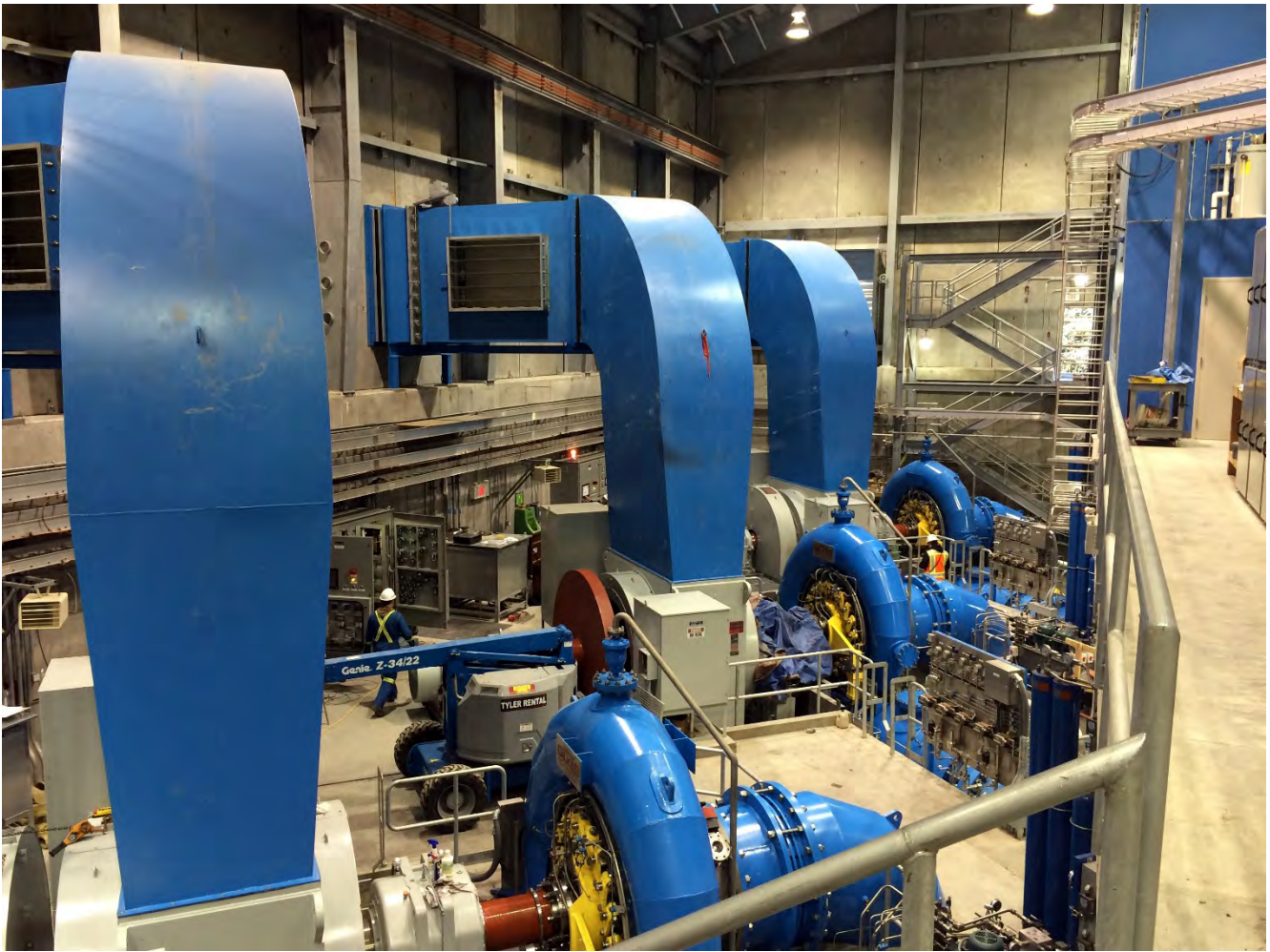




**Figure 5. Lower Portal Area, Penstock anchor block 5 was completed.**



**Figure 6. Powerhouse Site, ASRC continued to build out the service and raw water systems.**



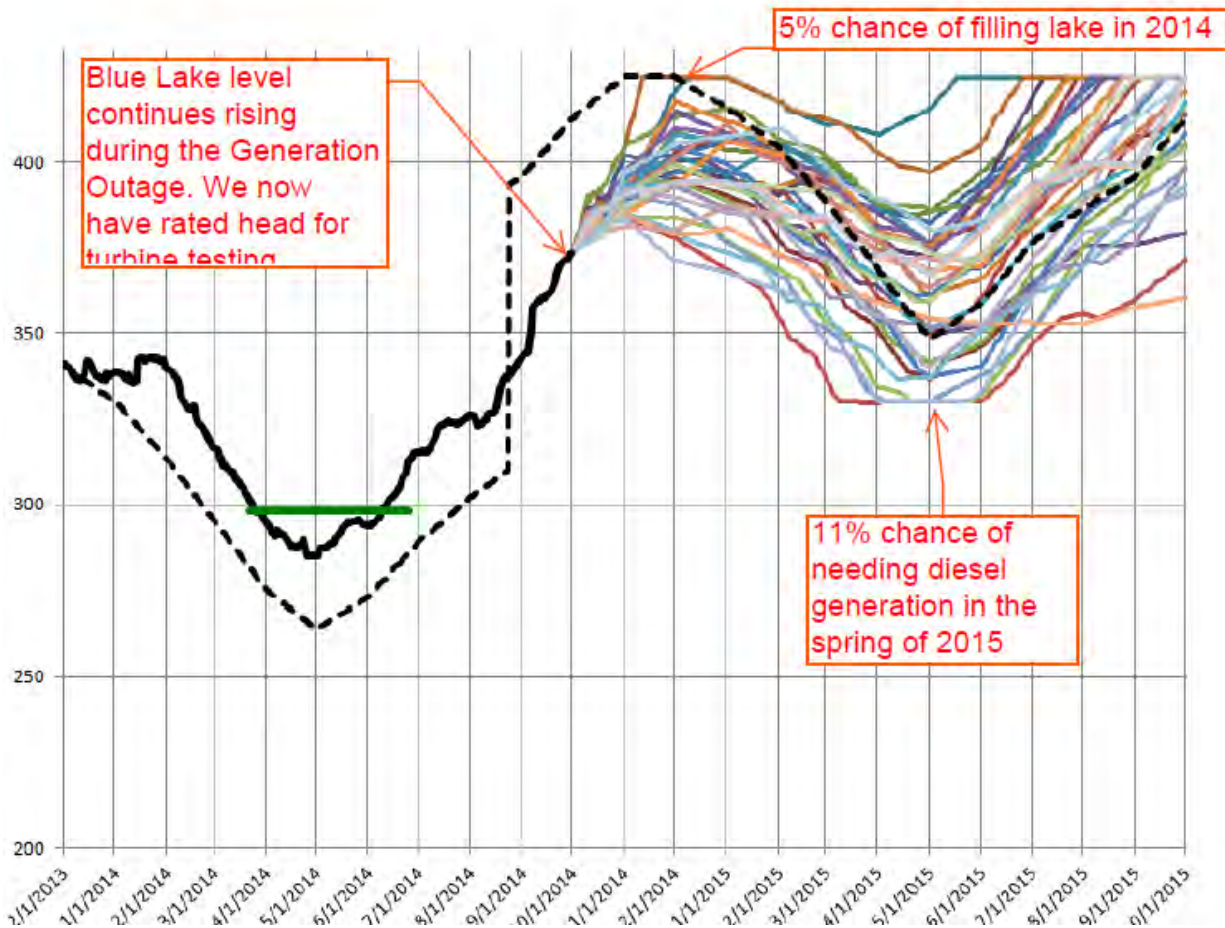
**Figure 7. Powerhouse Interior, Water entered BL-5 and wet testing commenced. Bruce Belley completed the control station and SCADA system installation.**

## Blue Lake Level Forecast

Case 30. Start October 2, 2014. Multi-year simulation using 36 year hydrologic record. 117,000 MWH system load and dry year inflows. Blue Lake powerhouse is now shut down until mid October, 2014 at the end of the generation outage. Generation outage started on August 17, 2014, seven days earlier than previously assumed. In each of these 36 simulations, D4 diesel is run 10 hours each day during the Generation Outage at an average output of 3 MW. [This is not the current operating case in which we have virtually no diesel operation. Therefore the probability of spill is slightly over-estimated].

We have today a Blue Lake water level of el. 374 which provides the rated head for testing of the new turbines. This is very good for load testing of the new turbine-generators.

### Blue Lake water level simulation

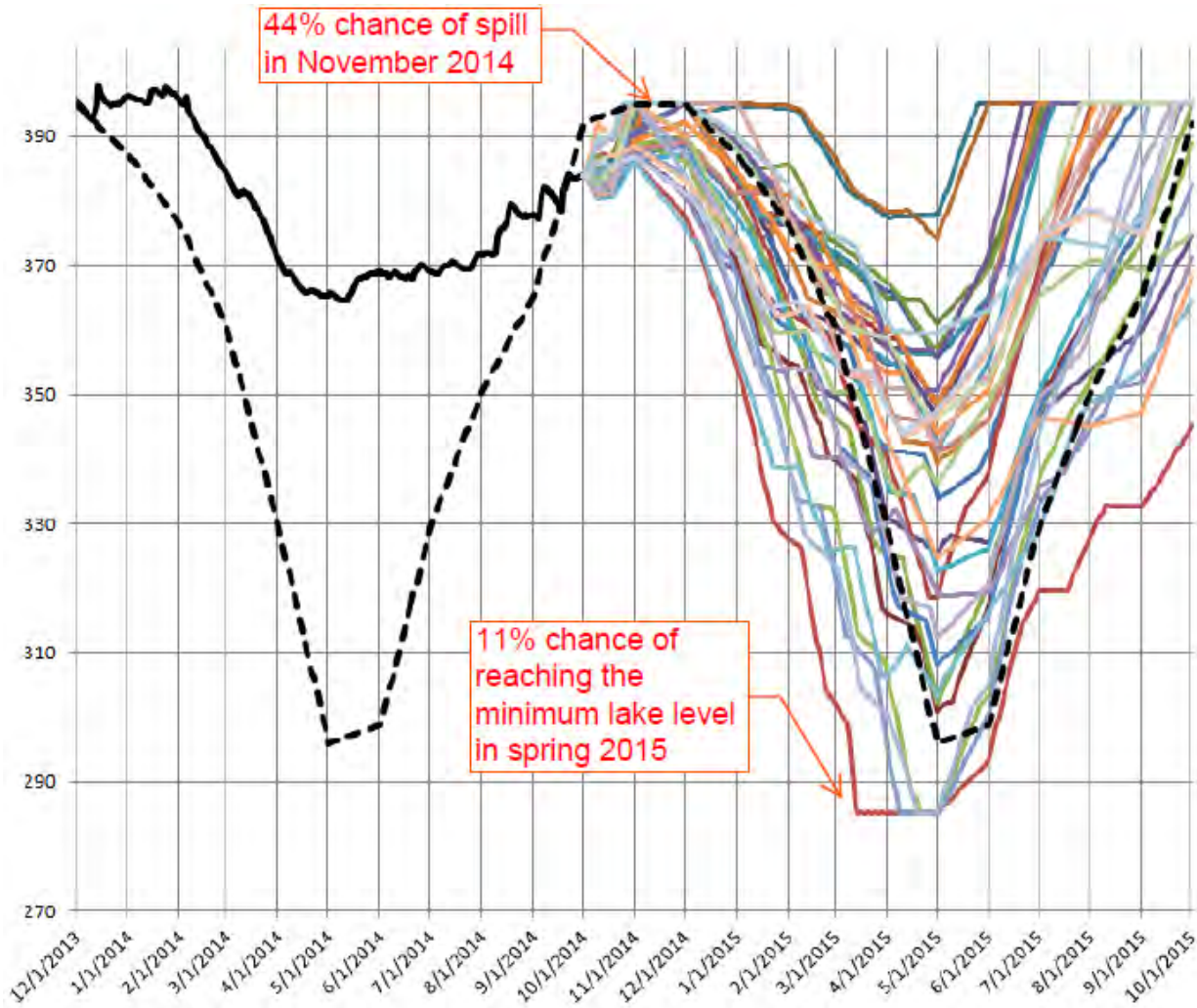


Total diesel generation predicted by this simulation:

Period	Dates	MWH of diesel	Cost at \$0.45 per kWh
Spring 2014	-	0	\$0
Generation Outage	Aug 17 – Oct 18, 2014	494	\$222,000
Spring 2015	Mar 30 – June 16, 2015	845	\$380,000

## Green Lake water level simulation

With average year inflows, the likelihood of spill from Green Lake in November 2014 is 44%. If we approach spill at Green Lake this winter the generation at Blue Lake will be backed off to ensure Blue Lake fills as much as possible.



**September 30, 2014**

**Summary of Temporary Filtration Project Status**

**Alternative Water Source Filtration System (Blue Lake Project):**

The Temporary Filtration Plant is on line, providing the City's municipal water.

**Summary of Titan 130 Diesel Turbine Project Status**

- Final fuel piping to tie bulk fuel tank to Titan fuel system is complete.
- Safety rails on retaining wall are complete.
- Formal letter sent to CG Power to confirm transformer repair in April 2015.
- Bid package will go out in Nov/Dec 2014 for required emissions testing in Jan/Feb 2015.
- SPCC plan for Jarvis must be updated to include new fuel storage.
- Initial design of roof to cover Titan installation is underway.
- Solar marketing team will be releasing story on Sitka installation in November 2014.

# **BLUE LAKE EXPANSION PROJECT MONTHLY CONSTRUCTION REPORT**

For Period Ending: SEPTEMBER 30, 2014

Prepared by: BARNARD CONSTRUCTION COMPANY, INC.

## **1. Progress of work**

### Environmental Protection

Barnard continues to install erosion and sediment control measures as required at the dam site, storage yard at Sawmill Cove Industrial Park and powerhouse area as ground disturbing activities continue. BMP maintenance and repair is ongoing as needed throughout the project site.

### Gate Chamber

Barnard completed the punchlist work in the gate chamber in September ahead of rewatering the tunnel.

### Gate House

Electrical work continued in the gatehouse. The fixed wheel gate and hoist were commissioned. The bulkhead gate was removed on September 29 to water up the tunnel for wet commissioning of the powerhouse.

### Dam Raise

Barnard crews completed 8 major concrete placements on the dam, including M1 Crest Slab, M3/425, M4/417 and 425, M5/417, Cutoff Wall to EL 440, M6 Parapet Wall and M7 Parapet Wall. BCCI began installation of the permanent handrail on the left abutment thrust block and M6/M7.

### Powerhouse

NAES, Gilkes and UEE continued commissioning the turbine/generator equipment through September in preparation for wet commissioning. NAES and Schmolk continued commissioning the balance of plant equipment as well.

NAES also continued installation and commissioning of all three units. NAES and Gilkes continue to work on punchlist items on all three units. NAES completed mechanical installation for the generator exhaust ducts. NAES will install the control panels for the ducts in early October.

The afterbay retaining wall was completed and staff gauge was installed. The afterbay cleaning was completed and approved. ASRC continued interior finishes as well as installation of handrail and grating on the turbine floor.

### Generation Outage

The generation outage continued through September. The tunnel was re-watered on September 29. Work completed in September includes:

- South Portal
  - Completed liner installation, grout and paint
  - Re-install existing penstock section.
- North Portal

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For Period Ending: SEPTEMBER 30, 2014

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- Completed liner installation, grout and paint
  - Completed intake tunnel plug placement and grouting
  - Flushed new tunnel.
  - Re-install penstock segment
- Lower Portal
  - Install new penstock.
  - Complete Anchor Block #5, including rock anchor installation and testing.
  - Complete liner installation, grout and paint.
  - Install new rock trap.
- Fish Valve Unit
  - Install and test TIV and TIV HPU
  - Install bypass guard valve
  - Install spiral case and draft tube and complete initial alignment
  - Form spiral case encasement and generator pad.
- Water Treatment Building
  - Complete installation of new equipment inside building
  - Electrical installation ongoing
- Rewatered Tunnel on September 29
- Flushed Tunnel through penstock drain valve.
- Commence wet Commissioning on Unit #5 on September 30.

### Switchyard

T4 Transformer was installed and brought online on September 16.

### Temporary Filtration Plant

The temporary filtration plant was in service throughout September providing drinking water to Sitka during the Generation Outage.

## **2. Status of Construction**

### **Status of Ongoing Major Construction Activities**

- Powerhouse Excavation – 99% complete
- Powerhouse Steel Building – 99% Complete
- Powerhouse Roof – 99% complete
- Precast Wall Panels – 99% complete
- Dam Raise – 53 of 53 monolith blocks placed.
- Dam Spillway – 8 of 9 placements
- Dam Parapet Walls and Crest Slab – 7 of 15 placements
- Left Abutment Thrust Block and Cutoff Wall – 9 of 9 placements completed.
- Powerhouse Concrete – 3320 CY placed to date.

See Section 1 above for construction work completed in September 2014.

## **3. Construction Issues**



## **BLUE LAKE EXPANSION PROJECT MONTHLY CONSTRUCTION REPORT**

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The debris boom anchor at EL 424 failed in September. Analysis is on-going as to the root cause of the failure. An alternate design has been completed and will be installed in early October.

### **4. Contract Status**

Barnard's key subcontractors for the Blue Lake Project are as follows:

<b>Name</b>	<b>Scope</b>
ASRC McGraw Constructors, LLC	Powerhouse Construction
Southeast Earthmovers, Inc.	Excavation
Blue Lake Tunnelers	Underground Construction
Crux Subsurface	Foundation Grouting, Micropiles, PRW's
O'Neill Surveying and Engineering	Land Survey
Baranof Materials Test Lab	Quality Control
NAES Power Contractors	Turbine-Generator Installation/Electrical

Barnard's key material suppliers for the Blue Lake Project are as follows:

<b>Name</b>	<b>Scope</b>
ASRC McGraw Constructors, LLC	Concrete Supply
Gerdau Reinforcing Steel	Concrete Reinforcing Steel
Haskell Corporation	Misc. Metal Fabrication

### **5. Critical Events and Dates**

Please see attached summary progress schedule updated August 31, 2014.

Critical Dates for the Blue Lake Project are as follows:

<b>Milestone</b>	<b>Date</b>	<b>Required Status of Construction</b>
1	07/01/2013	Drainage Tunnel Complete – <b>Completed May 6, 2013</b>
2	08/19/2013	Initial Intake Excavation Complete – <b>Completed July 21, 2013</b>
3	06/04/2014	Intake Structure Complete – <b>Completed June 4, 2014</b>
4	08/24/2014	Ready for Generation Outage – <b>Completed August 16, 2014</b>
5	65 days after start of Generation Outage	Substantial Completion of 1 <sup>st</sup> Blue Lake Turbine Generator
6	91 days after start of Generation Outage	Substantial Completion of 2 <sup>nd</sup> Blue Lake Turbine Generator
7	80 days after start of Generation Outage	Substantial Completion of Fish Valve Unit

### **6. Reservoir Filling**

The reservoir continues to fill and is now on the new dam – approximate elevation at end of September is 375.

## **BLUE LAKE EXPANSION PROJECT MONTHLY CONSTRUCTION REPORT**

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### **7. Foundations**

Not applicable for this report.

### **8. Sources of Major Construction Material**

The City and Borough of Sitka will be providing most of the major construction materials for this project. Please see list below.

<b>Contract No.</b>	<b>Vendor</b>	<b>Scope of Supply</b>
1	Gilbert Gilkes and Gordon, Ltd.	Turbines and Generators
2	Myers	12.47 kV Switchgear
3	Linita Design and Manufacturing	Bulkhead Gate, Fixed Wheel Gate and Hoist
4	T Bailey, Inc.	Penstock and Manifold
5	WEG Electric	69kV Transformers
6	Benchmark Industrial Services	Powerhouse Bridge Crane
7	CHG Building Systems	Powerhouse Building

Materials Received this Period:

### **9. Material Testing and Results**

Concrete testing is ongoing for the dam raise, gate chamber and powerhouse concrete.

No issues have been encountered to date.

### **10. Instrumentation**

Not applicable for this report.

### **11. Photographs**

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**Figure 1: Dam Raise**



**Figure 2: M4 Spillway Finish**

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**Figure 3: Lower Portal and Anchor Block #5**



**Figure 4: Penstock Drain Testing**

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**Figure 5: Powerhouse Panorama**

### **12. Erosion Control and Other Environmental Issues**

Barnard is continuing to install the required environmental protection measures on the project site ahead of ground disturbing activities. Ongoing maintenance of dewatering system at powerhouse excavation site will be required to maintain water quality in Sawmill Creek.

### **13. Other Items of Interest**