

Electronically filed on June 25, 2014

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

**Subject: Wallowa Falls Hydroelectric Project (FERC Project No. 308-007)
Response to Deficiency of License Application and Request for Additional
Information**

Dear Ms. Bose:

PacifiCorp Energy is submitting this letter, with enclosures, in response to the Federal Energy Regulatory Commission's (Commission) March 27, 2014 Deficiency of License Application and Request for Additional Information for the Wallowa Falls Hydroelectric Project (Project). The Commission's specific information requests and the corresponding responses are provided below.

This letter and its enclosures have been filed electronically along with our Confidential Information Notice. The security classification of each component in this packet is shown in the enclosure list of both letter and Notice.

PacifiCorp is submitting this cover letter and electronic copy of the Response to Deficiency of License Application and Request for Additional Information including Attachments to the entities on the enclosed Distribution List. All documents can be viewed on PacifiCorp's website at (<http://www.pacificorp.com/es/hydro/hl/wf.html#>) under the "Final License Application tab".

If you have any questions concerning these documents, please contact Russ Howison at 503.813.6626.

Sincerely,



Mark Sturtevant
Managing Director, Hydro Resources

eFile: Kimberly D. Bose, Secretary
Via eLibrary at www.ferc.gov

The security classification of each enclosed document is identified in the Enclosure Chart.
If identified as Privileged, Protected or Critical Energy Infrastructure Information (CEII), DO NOT RELEASE.

CONFIDENTIAL INFORMATION NOTICE

June 25, 2014

eFile:	Kimberly D. Bose Regional Engineer, FERC/DC Via eLibrary at www.ferc.gov
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Subject: Wallowa Falls Hydroelectric Project (FERC Project No. 308-007)
Deficiency of License Application and Request for Additional Information

With this Notice is a packet of information from PacifiCorp Energy which contains public- and security-classified documents. The following table displays each document's function and title as well as its confidential classification as defined in 18 CFR 388.112 and in the Federal Energy Regulatory Commission's "Guidance Notice Clarifying Procedures for Submitting Non-Public Materials" (March 12, 2009). When a document is classified "Privileged" or "CEII", please ensure there is no unauthorized disclosure.

Encl:	Confidential Information Notice – Public
	Letter – Public
	Attachment A - Proof of publication of notice - Public
	Attachment B - FERC letter dated September 3, 1982 - Public
	Attachment C - Geotechnical Engineering Evaluation, Wallowa Falls Tailrace Reroute – 30% Design Joseph, Oregon, December 2013 - Public
	Attachment D - Correspondence to Oregon DLCD, dated September 3, 2013 - Public

Thank you for your attention to this request. If you have any questions concerning the classifications of these documents, please contact those cited in the letter.

Distribution List
Wallowa Falls Hydroelectric Project (FERC Project No. 308-007)
Deficiency of License Application and Request for Additional Information

Federal Government Agencies

Advisory Council on Historic Preservation, John Eddins, Program Analyst, Old Post Office Building, 1100 Pennsylvania Avenue, NW, Suite 803, Washington, DC 20004

Bureau of Indian Affairs, Northwest Regional Office, Attn: FERC Coordinator, 911 NE 11th Avenue, Portland, Oregon 97232-4169

Bureau of Land Management, Lands and Minerals Adjudication Section, Attn: FERC Withdrawal Recordation, P.O. Box 2965, Portland, Oregon 97208-2965

FERC – Portland Regional Office, Attn: Matt Cutlip, 805 SW Broadway, Suite 550, Portland, OR 97205

EPA Region 10, Oregon Operations Office, 805 SW Broadway, Suite 500, Portland, OR 97205

NMFS, Eastern Oregon Habitat Office, Attn: Spencer Hovekamp, 3502 Highway 30, LaGrande, OR 97850

NMFS Northwest Regional Office, Hydropower Division, Attn: Keith Kirkendall, 1201 NE Lloyd Blvd, Suite 1100, Portland, OR 97232

U.S. Army Corps of Engineers, PO Box 2870, Portland, OR 97208-2870

U.S. Bureau of Land Management, State Director, PO Box 2965, Portland, OR 97208-2965

U.S. Bureau of Reclamation, Klamath Basin Area Office, 6600 Washburn Way, Klamath Falls, OR 97603-9365

U.S. Coast Guard, MSO Portland, 6767 N Basin Avenue, Portland, OR 97217-3929

U.S. Forest Service, Daniel Gonzales, Energy Coordinator, PNW Forestry and Range Sciences Lab, 1401 Gekeler Lane, La Grande, OR 97850

USDOJ NPS, Pacific West Region, Outdoor Recreation Planner, Attn: Susan Rosebrough, 909 1st Avenue, Suite 500, Seattle, WA 98104-1059

USDOJ, Office of Environ Policy & Compliance, Attn: Allison O'Brien, Acting Environmental Officer, 620 SW Main Street, Portland, OR 97205

USFWS, La Grande Fish & Wildlife Office, Attn: Gretchen Sausen, 3502 Hwy 30, LaGrande, OR 97850

USFWS, La Grande Fish & Wildlife Office, Attn: Gary Miller, 3502 Hwy 30, LaGrande, OR 97850

Wallowa-Whitman National Forest, Attn: Sweyn Wall, PO Box 905, Joseph, OR 97846

Native American Groups

Bureau of Indian Affairs, Umatilla Agency, P.O. Box 520, Pendleton, OR 97801

Confederated Tribes of the Colville Reservation, Attn: Arrow Coyote, P.O. Box 150, Nespelem, WA 99155

Confederated Tribes of the Colville, Guy Moura, Interim Program Manager, P.O. Box 150 Nespelem, WA 99155

Confederated Tribes of Umatilla, Catherine Dixon, Principle Investigator, 46411 Timine Way, Pendleton, OR 97801

Nez Perce Tribe, Keith Patrick Baird, P.O. Box 365, Lapwai, ID 83540-0365

Federal Representatives and Senators

Honorable Ron Wyden, United States Senate, 223 Dirksen Senate Office Building, Washington, DC 20510-3703

State Government Agencies

ODEQ, Water Quality Division, Attn: Marilyn Fonseca, 811 SW 6th Avenue, Portland, OR 97204

ODEQ, Water Quality Division, Attn: John Dadoly, 700 SE Emigrant Ave - Suite 330, Pendleton, OR 97801

Oregon Dept of Agriculture, Attn: Jim Johnson, Natural Resources Division, 635 Capitol Street NE, Salem, OR 97301-2564

ODFW, Attn: Ken Homolka, 3406 Cherry Avenue, NE, Salem, OR 97303

ODFW, Attn: Tim Hardin, 3406 Cherry Avenue, NE, Salem, OR 97303

ODFW, Energy, Infrastructure & Eco, Systems Services Division, Attn: Joe Zisa, Division Supervisor, 2600 SW 98th Avenue, Ste 100, Portland, OR 97266-1325

ODFW, Attn: Elizabeth Moats, Hydro Coordinator NE Region, 107 – 20th St., La Grande, OR 97850

ODFW, Enterprise Field Office, Attn: Jeff Yanke, 65495 Alder Slope Road, Enterprise, OR 97828

Oregon Dept of Land Conservation and Development, Attn: Paul Curcio, Director, 635 Capital Street NE, Ste. 150, Salem, OR 97301

Oregon State Marine Board, 435 Commercial Street, NE, Salem, OR 97310-0001

OPRD, State Historic Preservation Officer – Roger Roper, 725 Summer St NE, Suite C, Salem OR 97301

OPRD, Attn: Jim Hutton, NE District Manager, 65068 Old Oregon Trail, Meacham, OR 97895

OPRD, Attn: Jim Morgan, 725 Summer Street NE, Suite C, Salem, OR 97301-1266

OPRD, Attn: Kammie Bunes, 725 Summer Street NE, Suite C, Salem, OR 97301-1266

OSU Extension Services, Attn: Director, Extension Administration 101 Ballard Hall, Corvallis, OR 97331-3606

Water Resources Department, Attn: Mary S. Grainey, 725 Summer Street NE, Suite A, Salem OR 97301

Wallowa Soil and Water Conservation District, Attn: Cynthia Warnock, 401 N.E. 1st Street – Suite E, Enterprise, OR 97846

Wallowa-Whitman National Forest, Attn: Steve Ellis, Forest Supervisor, P.O. Box 907, Baker City, OR 97814-3840

Wallowa-Whitman National Forest, Attn: Tony King, Zone Archaeologist, 201 E 2nd Street, Joseph, OR 97846

City, County and Municipal Government Agencies

City of Baker, Attn: Planning Department, P.O. Box 650, Baker City, OR 97814

City Administrator's Office, 108 N.E. 1st St., Enterprise, OR 97828

City of Haines, P.O. Box 208, Haines, OR 97833

City of Joseph, Attn: Donna Warnock, City Recorder, PO Box 15, Joseph, OR 97846

City of La Grande, Planning Division, P.O. Box 670, La Grande, OR 97850

City of Lostine, 128 Highway 82, Lostine, OR 97857

City of Wallowa, Attn: Lori Waters, P.O. Box 487, Wallowa, OR 97885

Joseph Chamber of Commerce, P.O. Box 13, Joseph, OR 97846

Wallowa County Planning Dept., Attn: Harold Black, 101 S. River St., Room B-1, Enterprise, OR 97828

Wallowa County Board of Commissioners, Mike Hayward, Chairman, 101 S. River Street, Rm 202, Enterprise, OR 97828

Wallowa County Board of Commissioners, Susan Roberts, Commissioner, 101 S. River Street, Rm 202, Enterprise, OR 97828

Wallowa County Board of Commissioners, Paul Castilleja, Commissioner, 101 S. River Street, Rm 202, Enterprise, OR 97828

Wallowa Lake Rural Fire Protection District, Attn: Chief Matt Walker, P.O. Box 922, Joseph, OR 97846

Utilities

Mid-West Electric Consumers Association, Attn: Thomas P. Graves, 4350 Wadsworth Blvd – Suite 330, Wheat Ridge, CO 80033-4641

National Rural Electric Cooperative, Wallace F. Tillman, General Counsel, 4301 Wilson Blvd, Arlington, VA 22203

Public Utility Commission of Oregon, Attn: Secretary, P.O. Box 1088, Salem, OR 97308-2148

Southwestern Power Resources Commission, Attn: Ted Coombes, Exec. Director, PO Box 471827, Tulsa, OK 74147-1827

Non-Governmental Office

Lovinger, Norling, Kaufmann, Attn: Jeffrey Lovinger, 825 NE Multnomah St., Suite 925, Portland, OR 97232

Interested Parties

Flying Arrow Resort, Ron Woodin, 59752 Wallowa Lake Hwy, Joseph Or 97846

Robert B. Heckendorn, 84747 Talemene Drive, Wallowa Lake, OR 97885 - Mail to: 611 Hathaway Street, Moscow, ID 83843

Schedule A - Deficiencies

- 1) Section 5.17(d)(2); Please provide proof of publication of notice (twice) in local newspapers of the filing of your application as required by section 5.17(d)(2) of the Commission's regulations.

PacifiCorp Response:

Proof of publication of notice (twice) as required by section 5.17(d)(2) is provided in Attachment A.

- 2) Exhibit F; Your application does not conform to section 5.18(a)(5)(i) (see sections 4.61(e) and 4.41(g)(3)) of the Commission's regulations. Specifically, Exhibit F does not include a supporting design report to demonstrate that existing and proposed structures are safe and adequate to fulfill their stated functions. Please provide two copies of the supporting design report.

PacifiCorp Response:

PacifiCorp has reviewed its records of consultation with the Commission regarding the Commission's Order No. 122 and Section 12.21 of the Commission's Regulations. In a letter dated July 6, 1982, Pacific Power¹ filed with the Commission a report titled "Analysis of Hypothetical Failure, Wallowa Falls Project, East Fork Wallowa River, Project No. 308, July 1, 1982." (Attachment B). This report presents the results of a study of the hypothetical failure of Wallowa Falls dam and penstock for the purpose of identifying the potential downstream impacts. The report makes the following three conclusions:

- a. Because of the small storage volume, failure of the dam would result in a minimal impact.*
- b. Because of the limited hydraulic capacity, the impact of failure of the penstock would not be significant.*
- c. No condition exists at the project that can result in a reasonably foreseeable emergency that would endanger life, health or property.*

The transmittal letter requested the Commission grant an exemption for the Project from the Emergency Action Plan requirements (EAP) of Part 12, Subpart C of the Commission Regulations.

In a letter dated September 3, 1982 (Attachment B) the Commission's Regional Engineer granted the EAP exemption and recognized the East Fork Wallowa River's ability to absorb peak flows in the event of failure of the dam and that the dam has adequate factors of safety for sliding or overturning in the event it is overtopped. Given the low hazard rating of the dam PacifiCorp has not prepared supporting design information for existing facilities beyond what is provided in this submittal and the previously filed Preliminary Application Document and the Final License Application.

¹ Pacific Power is a predecessor of PacifiCorp

In the application, PacifiCorp proposed to modify the Project tailrace by re-routing it from its current configuration discharging into the West Fork Wallowa River by constructing a buried 30-inch (76.2 cm) diameter, approximately 1,000-foot long (305 m), pipe discharging into the bypassed reach of the East Fork Wallowa River (PacifiCorp 2014). A detailed description of the proposed facility is included in Volume I, Exhibit A of the application and four conceptual design drawings are provided in Volume III, Appendix C.

Based on phone conversations of June 5, and 23, 2014 between Russ Howison, PacifiCorp and Ms. Kim Nguyen of Commission Staff, PacifiCorp understands that additional information describing geotechnical conditions in the proposed tailrace reroute alignment would satisfy the deficiency.

A report titled Geotechnical Engineering Evaluation, Wallowa Falls Tailrace Reroute – 30% Design Joseph, Oregon, December 2013 is included in Attachment C.

References

PacifiCorp. 2014. Wallowa Falls Hydroelectric Project FERC No. P-308 Final License Application for Minor Water Power Project Under 5 MW (Volumes I-V). February 2014. Portland Oregon

Schedule B – Additional Information

- 1) Exhibit A; Please provide the “undepreciated” net investment in Table 1 on page 28.

PacifiCorp Response: *As of December 31, 2013, total net investment (also referred to as “Original Cost”) is \$2,887,198, accumulated depreciation is \$2,355,065, for a net book value of \$532,133.*

- 2) Page 29 references a “Table 4-1.” However, this table is not included in your filing. Please provide the missing table.

PacifiCorp Response: *The reference to Table 4-1 on page 29 of Exhibit A is an error. The statement should read “Table 1 includes monthly values for generation under high-load (peak) and low-load period (off-peak) conditions”.*

- 3) Please provide the source for the annual power value of \$58.49 in Table 2 on page 29.

PacifiCorp Response: *PacifiCorp produces an “official” 30 year market power price forecast at the end of each quarter which is used in the company’s financial analysis models. To compute the remaining 12 years in the analysis, the final year values are inflation adjusted for each subsequent year. The \$58.49 value is the result of the 42 year nominal levelized computation of the Mid-Columbia market power price forecast dated December 31, 2013.*

- 4) In Table 3 on page 31, you provide two different capital costs (i.e., \$260,000 and \$257,000) for modifying the existing low level outlet at the East Fork dam. It’s unclear why the capital costs for modifying the same project feature are different. Please provide an explanation of the two different capital costs for modifying the existing low level outlet.

PacifiCorp Response: *In order to meet the proposed minimum in-stream flow (MIF) release at the dam of 4 cubic feet per second, the low level outlet headgate will need to be modified or replaced. The \$260,000 would be specifically applied toward design, fabrication, and installation of the minimum release component of the low level outlet. In order to implement the proposed sediment management program for forebay flushing, the low level outlet superstructure will be replaced or retrofitted to more reliably open and close under hydraulic head. The \$257,000 would be specifically applied toward design, fabrication, and installation of the low level outlet superstructure. The total capital cost of improvements associated with the low level outlet is \$517,000.*

- 5) Exhibit G; Please provide a representative latitude/longitude location point for Pacific Park Campground.

PacifiCorp Response: *A representative latitude/longitude location point for Pacific Park Campground is 45° 16' 4.7" N, 117° 12' 51.1" W.*

- 6) Exhibit E - Coastal Zone Management Act; In section 1.3.4, you state that the project is not located within the state's coastal zone and is not subject to the Coastal Zone Management Act; therefore, you state that no consistency certification is needed from the Oregon Department of Land Conservation and Development (Oregon DLCD) regarding the project's effects on the coastal zone. You also state that the Oregon DLCD concurred with your findings in an email dated September 3, 2013. However, you did not file any documentation of your consultation with Oregon DLCD in the project record. Please include in your response to this AIR any correspondence you have received from Oregon DLCD regarding the project's effects on the coastal zone.

PacifiCorp Response:

Copy of correspondence received from Oregon DLCD, dated September 2, 2013 provided in Attachment D.

- 7) Recreation Resources; In their comments on the PLP, both the U.S. Forest Service and Oregon Parks and Recreation Department recommended that you implement several modifications or additions to your proposed recreation enhancement measures. Because you did not adopt these measures as part of your proposed action, section 5.18 of the Commission's regulations requires that you include your reasons for not adopting the measures based on project-specific information (*see* section 5.18(b)(5)(ii)(C)), and estimate the cost of any specific measure filed in the project record by agencies, Indian tribes, or the public (*see* section 5.18(b)(5)(ii)(E)). Therefore, for items (A) through (G) below, please provide an explanation for why you did not adopt the measure and an estimated capital and any annual operation and maintenance costs for the measure:

(A) moving the entrance to the Pacific Park Campground farther north;

(B) providing an off-road trailhead and an equestrian camp on the east side of the road that would include parking to accommodate at least five horse trailers and five passenger cars, a bulletin board, a fee tube, and restrooms;

(C) establishing an equestrian campground loop with eight sites;

(D) resolving the landownership of 7.25 acres of land north of the Little Alps Day Use area to increase parking space for the Little Alps Day Use Area and Pacific Park Campground to alleviate traffic congestion on the Joseph-Wallow Lake Highway;

(E) establishing a 30,000-square-foot bivouac campground with ten walk-in sites at the location of the Little Alps Day Use Area;

(F) installing a sign to direct hikers at the user-created trail by the Eagle Cap Pack Station between the East and West Fork Trails (*while you propose to install a sign at the entrance of a proposed new trail originating at the Pacific Park Campground entrance along with a map showing trail networks in the area along*

the ridge west of the campground, it is not clear whether you propose to install signs in the areas where trails connect), and

(G) changing the Pacific Park Campground policy to allow for same day arrivals to accommodate overflow use from nearby campgrounds to help meet recreation demand in the area.

PacifiCorp Response: *PacifiCorp acknowledges there may be regional demand and/or a general need for the measures identified in items (A) through (G) above. However, PacifiCorp maintains that the requested measures do not have an appropriate nexus to the Project nor are they commensurate with the scope of Project effects. In addition, the requested measures are prohibitively expensive and do not meet the goal of providing cost-effective recreation facilities under a new minor hydropower license. PacifiCorp's Project and non-project lands currently provide important public access to National Forest System lands via three off-license easements with the federal government. The proposed Project will improve public information and access as well as overnight camping, hiking, and interpretive opportunities at a cost-effective level commensurate with Project effects.*

Individual responses and/or cost estimates for items (A) through (G) above are provided below.

(A) A northern entrance would require constructing a new access road from the Joseph – Wallowa Lake Highway to the campground. The new road would have to pass either through the Little Alps Day Use Area (a distance of at least 450 feet over sloping terrain) or, as depicted in a conceptual map developed by Oregon Parks and Recreation Department, through land owned by the Blue Mountain Council of the Boy Scouts of America (at a distance of approximately 600 feet). The current campground loop configuration is not uncommon for campgrounds of comparable size and an additional entrance is not essential to campground function. In addition, the proposed site of the campground host is by design, near the current entrance. This proposed campground host location has the advantage of placing the host in a location easily seen by visitors needing the host's assistance including those; entering and exiting the campground, using the trail system, and by people/tourists using the turn-around area of the Joseph-Wallowa Lake Highway.

The estimated capital cost for a new entrance and road through Little Alps Day Use Area to Pacific Park Campground is \$150,000. The estimated annual operation and maintenance costs of this measure are \$2,000.

(B) The estimated capital cost for providing an off-road equestrian trailhead is \$164,000. The estimated annual operation and maintenance costs of this measure are \$2,000.

(C) The estimated capital cost for providing an 8-unit equestrian camp is \$364,000. The estimated annual operation and maintenance costs of this measure are \$5,000.

(D) The 7.25 acre parcel north of the Little Alps Day Use area is private property owned by the Boy Scouts of America and is outside of the current and proposed Project boundaries. PacifiCorp maintains it is beyond the scope of the FERC licensing process to resolve any issues outside of Project lands. Additionally, there is currently little evidence of traffic congestion on the Joseph-Wallowa Highway adjacent to the day use area, and while trailhead parking occurs along the highway, traffic congestion was not identified as an issue during scoping or development of the recreation studies.

(E) The estimated capital cost for providing a 30,000-square-foot bivouac campground with ten walk-in sites in the Little Alps Day Use Area is \$37,000. The estimated annual operation and maintenance costs of this measure are \$3,000.

(F) The only trail related sign proposed for the Pacific Park Campground area is the "New Trailhead Sign" indicated in the lower right corner of the Recreation and Aesthetic/Visual Resource Management Plan Attachment A-3 (Final License Application, Volume III, Appendix M. No additional signs are proposed at trail junctions.

(G) PacifiCorp plans to implement this policy under a new license after the proposed campsite host site is constructed to better meet local overflow demands and accommodate first-come users when campsites are available. The effectiveness of the new policy will be reviewed at the annual meeting as described in 3.2 (Annual Recreation and Aesthetic/Visual Resources Review Meeting) of the RRMP.

- 8) Aesthetic Resources; During the pre-filing study plan meetings, you indicated that you had evaluated measures to address powerhouse noise; however, you do not describe or evaluate any of these measures in your license application (e.g., powerhouse insulation, berms or other structures to minimize powerhouse noise). To support staff's analysis of aesthetics at the project, please provide more information on the measures that you evaluated during pre-filing to address powerhouse noise, including any project-specific reasons for not incorporating these measures into your proposed action.

PacifiCorp Response: *The noise emitted from the Wallowa Falls Hydroelectric Project powerhouse is typical for high-head Pelton impulse turbines. As described in Appendix C (Noise Level Readings) of the Aesthetics and Visual Resources Technical Report, sound readings from 25 locations within the Study Area (including several Wallowa Whitman National Forest trails) were taken to provide data related to noise at the Project. Noise readings of common sounds were provided in the appendix for comparison purposes. The study results presented in Appendix C indicate noise emitted from the powerhouse is at a decibel level slightly above or comparable to the level associated with a normal conversation (60 decibels). The highest reading taken immediately adjacent to the powerhouse was 69 decibels.*

No applicable county, state, or US Forest Service standards were identified by PacifiCorp or the stakeholders during the two-year study period that existing Project-generated noise levels could be compared with to determine a Project-related noise impact. No formal proposals were made by study participants regarding what would be acceptable noise levels from the powerhouse (the source of the noise in question). Therefore, at the time the application was filed, no standards or suggested metrics that could be used to evaluate the success or benefit of potential noise reduction measures had been identified.

Various noise reduction measures were discussed by meeting participants during the pre-filing study plan meetings, including the examples provided in the Commission's request. However, none of these measures were evaluated due to the lack of clear auditory standards or noise impacts associated with the Project. The interior walls and ceiling of the powerhouse building are currently insulated with 6-inch thick blanket-type insulation. Additional insulation of the powerhouse is not expected to result in any significant noise reduction. There are relatively few openings in the powerhouse structure from which sound may escape. Installing berms or a cover over the existing concrete lined tailrace flume may reduce noise emission from the powerhouse but no formal evaluation of the potential success of these measures has been conducted. Given the data provided in the Aesthetics and Visual Resources Technical Report – Appendix C, no noise reduction measures were proposed in the application.

In a phone conversation on June 19, 2014, between Dan Gonzalez of the U.S. Forest Service and Russ Howison of PacifiCorp, PacifiCorp was made aware of Oregon Administrative Rule (OAR) chapter 340, division 35 which established statewide maximum permissible environmental noise levels for both existing and new commercial and industrial uses. While this rule establishes the applicable limits, the State of Oregon dissolved its noise control program in 1991. As a result, the Oregon Department of Environmental Quality no longer maintains noise staff or enforces these regulations directly. However, the rules may be applied and enforced by other state agencies or local jurisdictions overseeing the approval of a given project. PacifiCorp is currently reviewing the applicability of OAR 340, Division 35 to the Project and will report the outcome of this evaluation to FERC. IF the rules are found to be applicable, PacifiCorp will secure the services of an acoustical engineer to assist in evaluating the existing data against these standards.

PacifiCorp is concerned that the costs associated with additional design, evaluation and construction of sound reduction measures would outweigh any potential benefit.

- 9) **Cultural Resources:** In section 3.3.8, you state that the National Register of Historic Places (National Register) eligibility determinations involving historic resources are pending based on the Oregon State Historic Preservation Office's (Oregon SHPO's) concurrence. Please include in your AIR response, the Oregon SHPO's findings on your National Register eligibility determinations.

PacifiCorp Response: *In a letter dated June 24, 2014 PacifiCorp submitted the Final Technical Report for Cultural Resources to the Oregon SHPO, affected tribes, and U.S. Forest Service for review and concurrence regarding the study results and National Register eligibility determinations. PacifiCorp will file the results of this consultation*

including the findings of the Oregon SHPO regarding PacifiCorp's National Register eligibility recommendations upon receipt from the Oregon SHPO.

- 10) Developmental Analysis:** In section 2.2.2, you propose to install a water level indicator in the tailrace reroute collection basin that would be connected to the existing forebay headgate control system. You indicate that this system would eliminate the need for the emergency spillway channel that was described in the Preliminary Licensing Proposal to address operational failures and emergency situations. Per section 5.18(b)(5)(ii)(E) of the Commission's regulations, please provide the capital and any annual operation and maintenance costs of the proposed water level indicator system.

PacifiCorp Response: *The estimated capital cost for providing a water level indicator in the tailrace reroute collection basin is \$10,000. The estimated annual operation and maintenance costs of this measure are less than \$1,000.*

Attachment A

AFFIDAVIT OF PUBLICATION

In The Matter Of: **Pacificorp**

Advertisement for – Hydro – Wallowa 3x8" advertisement

This is to certify that the above advertising for Pacificorp appeared in:

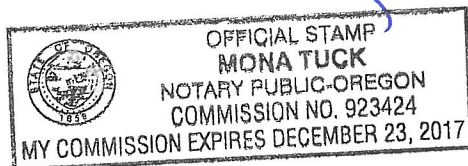
Newspaper name The Observer & Baker City Herald

On (Date) March 12, 2014

Mona Tuck
Signature

Sworn to before me this 21 day of March 2014.

Mona Tuck
Notary Public



AFFIDAVIT OF PUBLICATION

STATE OF OREGON)
County of Wallowa) ss.

I, Robert Ruth, being first duly sworn, depose and say that I am the Editor of the **WALLOWA COUNTY CHIEFTAIN**, a newspaper of general circulation, published in Enterprise in the aforesaid County and State, as defined in Section 58, Oregon Laws and that the

PacifiCorp – Notice of Application Wallowa Falls Hydroelectric Project

a printed copy of which is hereto annexed, was published in the entire issue of said newspaper for 1 week in the issue of

March 12, 2014

Robert C Ruth

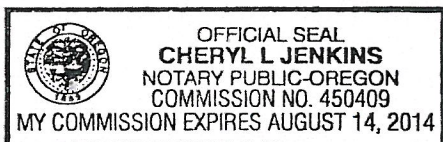
Subscribed and sworn to before me this day of

April 1, 2014

Cheryl L Jenkins

Notary Public for Oregon

(My Commission expires 08/14/14)



Wallowa County Chieftain

209 NW First Street P.O. Box 338
Enterprise, OR 97828

Keeping you informed

Notice of application and biological assessment for Wallowa Falls Hydroelectric Project

AS PART OF THE FEDERAL ENERGY REGULATORY COMMISSION (FERC) process, PacifiCorp has filed its Final License Application and Biological Assessment for the Wallowa Falls Hydroelectric Project (FERC No. 308). Comments and questions are welcome.

The documents listed below for the Wallowa Falls Hydroelectric Project are available for public review at the following location:

Wallowa County Library, 207 NW Logan, Enterprise, Oregon 97828.

- **Volume I:** Initial Statement, Exhibit A – Project Description and Exhibit G – Project Maps
- **Volume II:** Exhibit E – Environmental Report
- **Volume III:** Exhibit E – Appendices
- Biological Assessment for Bull Trout

Electronic copies of the Final License Application and corresponding Biological Assessment is also available for review on the PacifiCorp website at **pacificorp.com/wallowafalls** under the "Final License Application" tab.

Additional copies of the Wallowa Falls Relicensing Documents may be obtained by contacting:
Kim McCune, PacifiCorp, Sr. Project Coordinator,
825 N.E. Multnomah, Suite 1500, Portland,
OR 97232.



Public Notice

AFFIDAVIT OF PUBLICATION

In The Matter Of: Pacificorp

Advertisement for – Public Notice Wallowa Hydro – 3x8” advertisement

This is to certify that the above advertising for Pacificorp appear in

Newspaper name

Baker City Herald

On (Date)

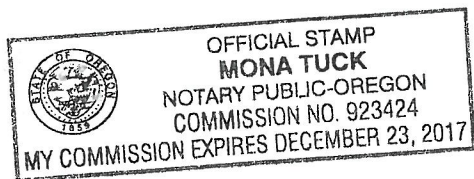
April 21, 2014

Signature

[Signature]

Sworn to before me this 21 day of April 2014.

[Signature]
Notary Public



AFFIDAVIT OF PUBLICATION

In The Matter Of: Pacificorp

Advertisement for – Public Notice Wallowa Hydro – 3x8” advertisement

This is to certify that the above advertising for Pacificorp appear in

Newspaper name

Glenns Orcutt - The Observer

On (Date)

April 21 2014

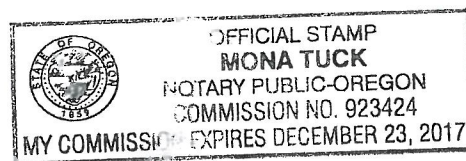
Glenns Orcutt

Signature

Sworn to before me this 28 day of April 2014.

Mona Tuck

Notary Public



AFFIDAVIT OF PUBLICATION

In The Matter Of: Pacificorp

Advertisement for – Public Notice Wallowa Hydro – 3x8” advertisement
This is to certify that the above advertising for Pacificorp appear in

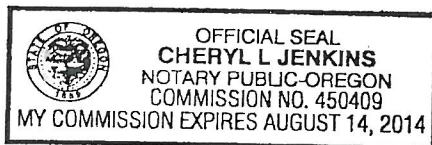
Newspaper name Wallowa County Chieftain

On (Date) April 23, 2014

Robert C Ruth
Signature

Sworn to before me this 8th day of May 2014.

Cheryl L Jenkins
Notary Public



Keeping you informed

Notice of application and biological assessment for Wallowa Falls Hydroelectric Project

AS PART OF THE FEDERAL ENERGY REGULATORY COMMISSION (FERC) process, PacifiCorp has filed its Final License Application and Biological Assessment for the Wallowa Falls Hydroelectric Project (FERC No. 308). Comments and questions are welcome.

The documents listed below for the Wallowa Falls Hydroelectric Project are available for public review at the following location: **Wallowa County Library**, 207 NW Logan, Enterprise, Oregon 97828.

- **Volume I:** Initial Statement, Exhibit A – Project Description and Exhibit G – Project Maps
- **Volume II:** Exhibit E – Environmental Report
- **Volume III:** Exhibit E – Appendices
- Biological Assessment for Bull Trout

Electronic copies of the Final License Application and corresponding Biological Assessment is also available for review on the PacifiCorp website at **pacificorp.com/wallowafalls** under the “Final License Application” tab.

Additional copies of the Wallowa Falls Relicensing Documents may be obtained by contacting: Kim McCune, PacifiCorp, Sr. Project Coordinator, 825 N.E. Multnomah, Suite 1500, Portland, OR 97232.

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Additional copies of the Wallowa Falls Relicensing Documents may be obtained by contacting:
Kim McCune, PacifiCorp, Sr. Project Coordinator,
825 N.E. Multnomah, Suite 1500, Portland,
OR 97232.



Public Notice

March 3, 2014

Wallowa County Library
207 NW Logan
Enterprise, Oregon 97828-1028

Attn: Librarian

Re: Wallowa Falls Hydroelectric Project (FERC No. P-308); Final License Application

Enclosed is a hardcopy of the documents referenced below that PacifiCorp recently filed with the Federal Energy Regulatory Commission on February 28, 2014 regarding the relicensing of the Wallowa Falls Hydroelectric Project.

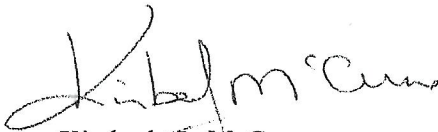
Pursuant to 18 CFR Section 5.2 of the Federal Code of Regulation regarding relicensing a Hydroelectric project, all documents are to be made available to the public for review as requested. Please note that Volumes IV and V are not included in this mailing as they are confidential and not for public distribution.

This final license application for the Wallowa Falls Hydroelectric Project (FERC No. P-308) consists of the following volumes:

- **Volume I:** Initial Statement, Exhibit A – Project Description and Exhibit G – Project Maps
- **Volume II:** Exhibit E – Environmental Report
- **Volume III** - Exhibit E Appendices
- **Volume IV:** Exhibit F – General and Preliminary Design Drawings (CEII)
- **Volume V:** Cultural Resources – Traditional Cultural Properties (CONFIDENTIAL)

The Final License Application, associated Exhibits and Appendices are also available for review on the PacifiCorp web site (<http://www.pacificorp.com/es/hydro/hl/wf.html>) under the “Final License Application” tab.

Sincerely,



Kimberly L. McCune
Sr. Project Coordinator

cc: Russ Howison, PacifiCorp

March 4, 2014

Wallowa County Library
207 NW Logan
Enterprise, Oregon 97828-1028

Attn: Librarian

Re: Wallowa Falls Hydroelectric Project (FERC No. P-308); Biological Assessment

Enclosed is a hardcopy of the document referenced below that PacifiCorp recently filed with the Federal Energy Regulatory Commission on February 28, 2014 regarding the relicensing of the Wallowa Falls Hydroelectric Project.

Pursuant to 18 CFR Section 5.2 of the Federal Code of Regulation regarding relicensing a Hydroelectric project, all documents are to be made available to the public for review as requested.

- **Wallowa Falls Biological Assessment for Bull Trout**

The Biological Assessment is also available for review on the PacifiCorp web site (<http://www.pacificorp.com/es/hydro/hl/wf.html>) under the "Final License Application" tab.

Sincerely,



Kimberly L. McCune
Sr. Project Coordinator

cc: Russ Howison, PacifiCorp

Attachment B

PACIFIC POWER & LIGHT COMPANY

920 S.W. SIXTH AVENUE • PORTLAND, OREGON 97204 • (503) 243-1122

~~Benny~~
~~Hand 14~~
~~Almanor~~
File

901.2

Jack T. Stiles
Vice President

July 6, 1982

Mr. William F. Kopfler, II
Regional Engineer
Federal Energy Regulatory Commission
333 Market Street, Sixth Floor
San Francisco, CA 94105

Dear Mr. Kopfler:

Federal Energy Regulatory Commission Order No. 122 requires the filing of Emergency Action Plans for licensed projects which include Pacific's Wallowa Falls Project No. 308. The project consists of an 18 foot high log crib diversion dam forming a forebay of about 0.2 acres, a 17 cfs capacity 5680 foot long 16 inch and 18 inch diameter penstock and a powerhouse developing 1173 feet of head.

No condition exists at the project that can result in a reasonably foreseeable emergency that would endanger life, health or property. The dam is monitored and has adequate factors of safety for sliding and overturning. Our evaluation indicates that even if the dam or penstock were to fail, the impact would not be significant. For your information and use, attached are three copies of a report entitled "Analysis of Hypothetical Failure, Wallowa Falls Project", dated July 1, 1982.

In view of the above and in accordance with Section 12.21(a) of the Commission's Regulations, Pacific requests an exemption for the Wallowa Falls Project from the Emergency Action Plan requirements of Part 12, Subpart C of the Regulations.

Sincerely,



JTS/lt (Sds)

Attachment

cc: Messrs. Moench
Hedberg
Rowell
deSousa
Hercher
Mitchell

ANALYSIS OF HYPOTHETICAL FAILURE

WALLOWA FALLS PROJECT

EAST FORK WALLOWA RIVER, OREGON

PROJECT NO. 308

Pacific Power & Light Company

July 1, 1982

ANALYSIS OF HYPOTHETICAL FAILURE

WALLOWA FALLS PROJECT

EAST FORK WALLOWA RIVER, OREGON

PROJECT NO. 308

Pacific Power & Light Company

July 1, 1982

CERTIFICATE

This is to certify that this report was prepared by the undersigned with the assistance of R. W. Barney and R. A. Landolt of the Civil Engineering Department, Pacific Power & Light Company, 920 S. W. Sixth Avenue, Portland, Oregon 97204.



Stanley A. deSousa
July 1, 1982



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APPENDIX

1. Introduction

This report presents the results of a study of the hypothetical failure of Wallowa Falls Dam and penstock, which are located on the East Fork Wallowa River in Oregon. The considerations of a failure do not reflect in any way on the safety, adequacy or integrity of the dam or other facilities. The failures are strictly hypothetical and are studied for the purpose of developing the impact downstream under "what if" hypothetical considerations.

SdeS
7/1/82

2. Summary and Conclusions

The effects of a hypothetical failure of Wallowa Falls Dam were investigated by using the National Weather Service computer program DAMBREAK. The failure of the dam during a flood condition increases the river flow by an insignificant amount. The failure during average flow conditions would result in outflow well within the annual flows of the river. The flow would return to the base flow within 15 minutes. The failure of Wallowa Falls Dam would have no impact outside the river channel.

The following conclusions are based on the data presented in this report.

- a. Because of the small storage volume, failure of the dam would result in a minimal impact.
- b. Because of the limited hydraulic capacity, the impact of failure of the penstock would not be significant.
- c. No condition exists at the project that can result in a reasonably foreseeable emergency that would endanger life, health or property.

3. Project Description

The project is shown in Figures 1 and 2 and consists of an 18-foot high dam approximately 120 feet long forming a forebay with an area of about 0.2 acres on the East Fork of Wallowa River, a 250-foot long 8-inch pipe which diverts water from Royal Purple Creek into the forebay, a concrete and timber intake structure with one 24-inch slide gate leading to a sluice pipe and one 24-inch slide gate with trash racks leading into a steel penstock 5680 feet long, 2800 feet of 18-inch diameter pipe and 2880 feet of 16-inch diameter pipe, and an indoor type power house with a single 1500 horsepower impulse type turbine driving a generator rated at 1375 KVA. The hydraulic capacity of the penstock is 17 cfs and the total developed head is 1173 feet.

The project is located in the State of Oregon, County of Wallowa, on the East Fork of Wallowa River approximately 7 miles south of the Town of Joseph. The project is partially within and is immediately upstream of the 43,000 acre-foot capacity Wallowa Lake.

The dam is a rock-filled log crib structure with plank and plywood facing on the upstream face and on the spillway. The spillway crest is at elevation 5792 and has a capacity of 400 cfs with the water in the pond at elevation 5795 which is the top of the dam. The dam forms a pond with a total storage capacity of less than one acre-foot. Because of the heavy bed load in the stream, the pond is generally filled with sediment except in the immediate vicinity of the intake structure.

Downstream of the dam the East Fork of the Wallowa River is a cascading stream with a steep gradient of about 960 feet of drop per

mile. The 55-year average flow of the stream is about 22 cfs with a maximum of 450 cfs and a minimum of 7 cfs during the 1924-1979 period. Because of the steep gradient and its cascading nature, the East Fork does not provide an environment that can support a fishery. There is very limited access to the river below the dam and there are no developments except for a few cabins and a campground at the south end of Wallowa Lake.

3.1 Surveillance

Wallowa Falls Dam is an unattended diversion structure which is routinely visited during the summertime by the operator who is headquartered at the powerhouse. Access to the dam is via a two-mile long steep trail that can only be negotiated with snow shoes during the snowy season. The dam is annually inspected by Federal Energy Regulatory Commission Staff and at least once a year by Pacific's engineers. The dam is monumented and annual surveys are made of the vertical and horizontal displacement of the top.

4. Failure Considerations

It is emphasized that the considerations of a failure do not reflect in any way on the safety, adequacy or integrity of Wallowa Falls Dam or other facilities. The failures are strictly hypothetical and are studied for the purpose of developing the impact downstream.

Wallowa Falls Dam was constructed in 1921 and although there has been some deterioration in some of the log ends the structure is still adequate. Evaluation of the stability of the dam indicates adequate factors of safety for sliding and overturning even when the dam is being overtopped.

The hydraulic capacity of the project is less than 20 cfs and any flow resulting from a rupture or total failure of the penstock would return to the River. The impact would be local and minimal.

4.1 Failure Modes

The dam consists of a rock-filled log crib constructed on adequate foundation. It is highly improbable that such a structure would suffer a sudden and complete failure.

For the purpose of this analysis, two failure conditions are considered: (A) during average flow in the river and (B) during peak flood flow. Both failures are assumed to be initiated by complete failure of some logs resulting in a breach in the structure.

4.2 Failure Analysis

The National Weather Service (NWS) computer program DAMBREAK, Flood Forecasting Model developed by Dr. D. L. Fread was used to determine the flow hydrographs resulting from a hypothetical failure of Wallowa Falls Dam.

4.2.1 Assumptions - Case A

- a. Base flow equals 20 cfs, which is about the average flow at the dam.
- b. Pond elevation at 5792, which is at the crest of the spillway.
- c. Breach is 20 feet wide at the bottom and is trapezoidal in shape having 1 to 1 side slopes.
- d. Bottom of breach is at elevation 5785, which is one foot below the top of the concrete intake structure.
- e. Total breach time from beginning of failure to total breach development is 10 minutes.

4.2.2 Assumptions - Case B

- a. Inflow increases at rate of 2 cfs per minute from 200 cfs to a peak of 450 cfs which is the maximum flow of record.
- b. Pond elevation is at 5795, which is at the crest of the dam when failure starts.
- c. Breach is 20 feet wide at the bottom and is trapezoidal in shape having 1 to 1 side slopes.
- d. Bottom of breach is at elevation 5785 which is one foot below the top of the concrete intake structure.

- e. Total breach time from beginning of failure to total breach development is 10 minutes.

4.2.3 Summary of Results - Case A

Based on the assumptions listed in section 4.2.1 and the numerical simulation of the hypothetical failure of Wallowa Falls Dam by using the NWS DAMBREAK computer model, the following findings were made:

- a. The maximum discharge after the dam failure, including the 20 cfs base flow, is less than 105 cfs.
- b. Peak flow occurs at 0.06 hours or less than 4 minutes after the start of failure.
- c. The peak flow is in the range of annual flood flows of the river.
- d. The outflow from the dam will return to the base flow of 20 cfs in 10 minutes.
- e. The maximum flow in the East Fork at the confluence with the West Fork Wallowa River is about 75 cfs.
- f. Figures 3 and 4 are the East Fork discharge hydrograph at the dam and at the confluence with the West Fork.

4.2.4 Summary of Results - Case B

Based on the assumptions listed in section 4.2.2 and the numerical simulation of the hypothetical failure of Wallowa Falls Dam by using the NWS DAYBREAK computer model, the following findings were made.

- a. The maximum discharge after the dam failure is essentially the same as the peak of the flow--451 cfs vs. 450 cfs.

b. Figure 5 is the discharge hydrograph at the dam.

APPENDIX

Figure 1 - Outline of Wallowa Falls Project

Figure 2 - Diversion Dam

Figure 3 - Computed Outflow Hydrograph at Wallowa Falls Dam -
Failure During Average Flow Conditions

Figure 4 - Computed Discharge Hydrograph, East Fork Wallowa River
at Confluence with West Fork

Figure 5 - Computed Outflow Hydrograph at Wallowa Falls Dam -
Failure During Peak Flow Conditions

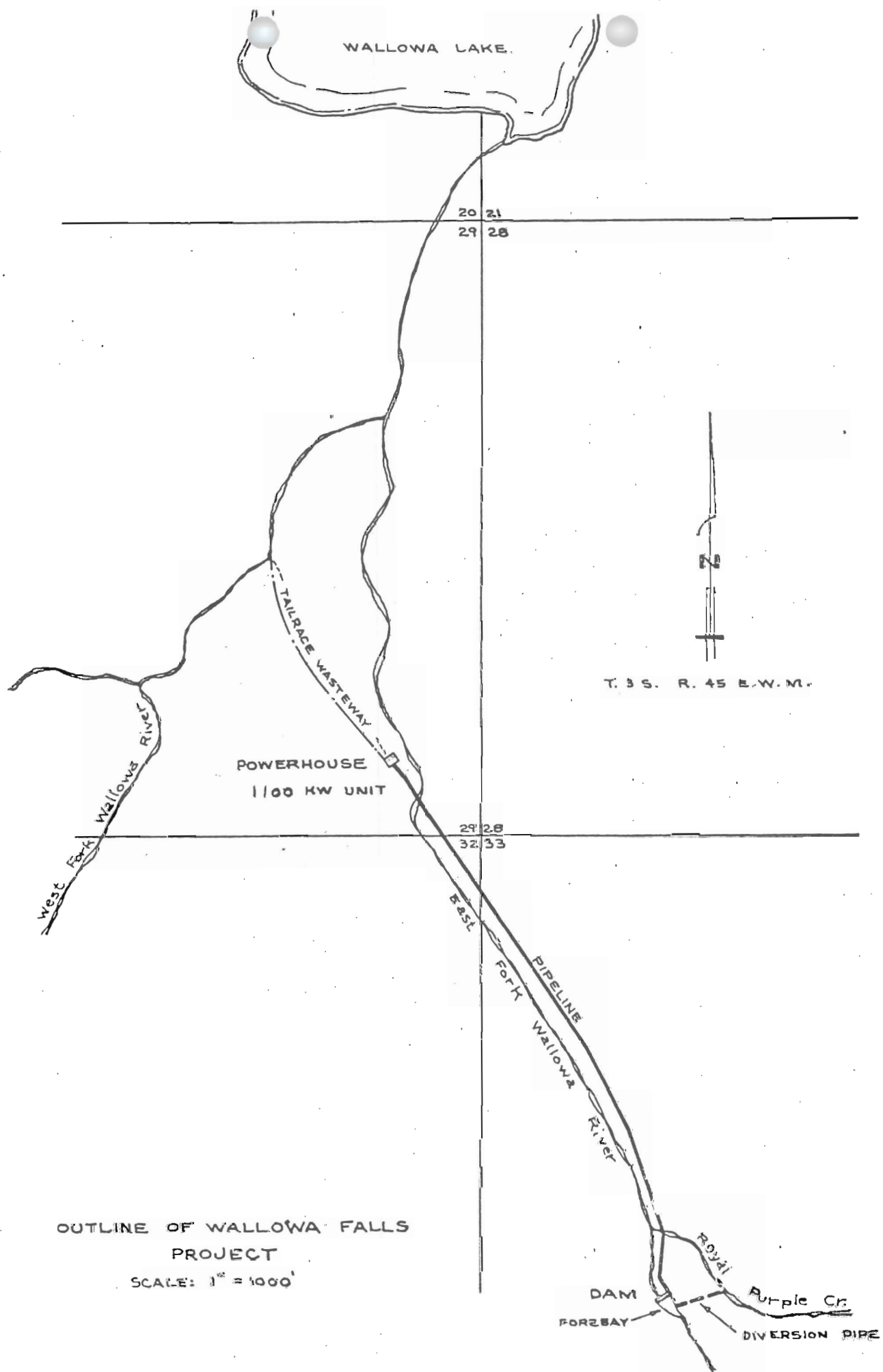


FIGURE 1



NOTE: ALL ELEVATIONS ARE REFERRED TO MEAN SEA LEVEL



SCALE 1000:1

PROJECT NO. 308
WALLOWA FALLS HYDROELECTRIC PROJECT
DIVERSION DAM
PACIFIC POWER & LIGHT COMPANY
PORTLAND OREGON

FIGURE 2

COMPUTED OUTFLOW HYDROGRAPH
WALLOWA FALLS DAM
FAILURE DURING AVERAGE FLOW CONDITIONS

DISCHARGE HYDROGRAPH FOR WALLOWA RIVER STATION NUMBER 1
BELOW WALLOWA FALLS AT MILE 100.00

GAGE ZERO = 5781.00 MAX ELEVATION REACHED BY FLOOD WAVE = 5782.20

FLOOD STAGE NOT AVAILABLE

MAX STAGE = 1.20 AT TIME = 0.06 HOURS

MAX FLOW = 105 AT TIME = 0.06 HOURS

HR	STAGE	FLOW	0	100	200	300	400	500
0.0	0.6	20	I *	I	I	I	I	I
0.01	0.8	36	I *	I	I	I	I	I
0.02	0.9	59	I *	I	I	I	I	I
0.03	1.1	80	I *	I	I	I	I	I
0.04	1.2	95	I *	I	I	I	I	I
0.05	1.2	103	I *	I	I	I	I	I
0.06	1.2	105	I *	I	I	I	I	I
0.07	1.2	103	I *	I	I	I	I	I
0.08	1.2	98	I *	I	I	I	I	I
0.09	1.1	89	I *	I	I	I	I	I
0.10	1.0	71	I *	I	I	I	I	I
0.11	0.9	58	I *	I	I	I	I	I
0.12	0.9	53	I *	I	I	I	I	I
0.13	0.9	48	I *	I	I	I	I	I
0.14	0.8	45	I *	I	I	I	I	I
0.15	0.8	41	I *	I	I	I	I	I
0.16	0.8	37	I *	I	I	I	I	I
0.17	0.7	28	I *	I	I	I	I	I
0.18	0.6	21	I *	I	I	I	I	I
0.19	0.6	20	I *	I	I	I	I	I
0.20	0.6	20	I *	I	I	I	I	I
0.21	0.6	20	I *	I	I	I	I	I
0.22	0.6	20	I *	I	I	I	I	I
0.23	0.6	20	I *	I	I	I	I	I
0.24	0.6	20	I *	I	I	I	I	I
0.25	0.6	20	I *	I	I	I	I	I
0.26	0.6	20	I *	I	I	I	I	I
0.27	0.6	20	I *	I	I	I	I	I
0.28	0.6	20	I *	I	I	I	I	I
0.29	0.6	20	I *	I	I	I	I	I
0.30	0.6	20	I *	I	I	I	I	I
0.31	0.6	20	I *	I	I	I	I	I
0.32	0.6	20	I *	I	I	I	I	I
0.33	0.6	20	I *	I	I	I	I	I
0.34	0.6	20	I *	I	I	I	I	I
0.35	0.6	20	I *	I	I	I	I	I
0.36	0.6	20	I *	I	I	I	I	I
0.37	0.6	20	I *	I	I	I	I	I
0.38	0.6	20	I *	I	I	I	I	I
0.39	0.6	20	I *	I	I	I	I	I
0.40	0.6	20	I *	I	I	I	I	I
0.41	0.6	20	I *	I	I	I	I	I
0.42	0.6	20	I *	I	I	I	I	I
0.43	0.6	20	I *	I	I	I	I	I
0.44	0.6	20	I *	I	I	I	I	I
0.45	0.6	20	I *	I	I	I	I	I

FIGURE 3

COMPUTED DISCHARGE HYDROGRAPH EAST FORK WALLOWA RIVER AT CONFLUENCE WITH WEST FORK

DISCHARGE HYDROGRAPH FOR WALLOWA RIVER ... STATION NUMBER 31
BELOW WALLOWA FALLS AT MILE 101.50

GAGE ZERO = 4430.33 MAX ELEVATION REACHED BY FLOOD WAVE = 4431.29
FLOOD STAGE NOT AVAILABLE

MAX STAGE = 0.96 AT TIME = 0.24 HOURS
MAX FLOW = 75 AT TIME = 0.24 HOURS

HR	STAGE	FLOW	0	100	200	300	400	500
0.0	0.5	20	I *	I	I	I	I	I
0.01	0.5	20	I *	I	I	I	I	I
0.02	0.5	19	I *	I	I	I	I	I
0.03	0.5	19	I *	I	I	I	I	I
0.04	0.5	19	I *	I	I	I	I	I
0.05	0.5	19	I *	I	I	I	I	I
0.06	0.5	19	I *	I	I	I	I	I
0.07	0.5	19	I *	I	I	I	I	I
0.08	0.5	19	I *	I	I	I	I	I
0.09	0.5	19	I *	I	I	I	I	I
0.10	0.5	19	I *	I	I	I	I	I
0.11	0.5	19	I *	I	I	I	I	I
0.12	0.4	18	I *	I	I	I	I	I
0.13	0.4	18	I *	I	I	I	I	I
0.14	0.4	17	I *	I	I	I	I	I
0.15	0.4	17	I *	I	I	I	I	I
0.16	0.4	17	I *	I	I	I	I	I
0.17	0.4	17	I *	I	I	I	I	I
0.18	0.4	17	I *	I	I	I	I	I
0.19	0.5	19	I *	I	I	I	I	I
0.20	0.6	27	I *	I	I	I	I	I
0.21	0.7	44	I *	I	I	I	I	I
0.22	0.9	61	I *	I	I	I	I	I
0.23	0.9	71	I *	I	I	I	I	I
0.24	1.0	74	I *	I	I	I	I	I
0.25	1.0	73	I *	I	I	I	I	I
0.26	0.9	70	I *	I	I	I	I	I
0.27	0.9	66	I *	I	I	I	I	I
0.28	0.9	61	I *	I	I	I	I	I
0.29	0.8	57	I *	I	I	I	I	I
0.30	0.8	52	I *	I	I	I	I	I
0.31	0.8	48	I *	I	I	I	I	I
0.32	0.7	44	I *	I	I	I	I	I
0.33	0.7	40	I *	I	I	I	I	I
0.34	0.7	36	I *	I	I	I	I	I
0.35	0.6	34	I *	I	I	I	I	I
0.36	0.6	31	I *	I	I	I	I	I
0.37	0.6	29	I *	I	I	I	I	I
0.38	0.6	26	I *	I	I	I	I	I
0.39	0.5	24	I *	I	I	I	I	I
0.40	0.5	22	I *	I	I	I	I	I
0.41	0.5	21	I *	I	I	I	I	I
0.42	0.5	20	I *	I	I	I	I	I
0.43	0.5	19	I *	I	I	I	I	I
0.44	0.4	18	I *	I	I	I	I	I
0.45	0.4	18	I *	I	I	I	I	I

FIGURE 4

COMPUTED OUTFLOW HYDROGRAPH
WALLOWA FALLS DAM
FAILURE DURING PEAK FLOW CONDITIONS

DISCHARGE HYDROGRAPH FOR WALLOWA RIVER STATION NUMBER 1
BELOW WALLOWA FALLS AT MILE 100 00

GAGE ZERO = 5781 00 MAX ELEVATION REACHED BY FLOOD WAVE = 5783.18
FLOOD STAGE NOT AVAILABLE

MAX STAGE = 2.18 AT TIME = 2.13 HOURS
MAX FLOW = 451 AT TIME = 2.18 HOURS

ENTER NEXT ACTIVITY ==>
MAX FLOW = 451 AT TIME = 2.18 HOURS

HR	STAGE	FLOW	0	100	200	300	400	500
0.0	1.5	200	I	I	*	I	I	I
0.1	1.6	204	I	I	*	I	I	I
0.2	1.6	217	I	I	I	*	I	I
0.3	1.7	231	I	I	I	*	I	I
0.4	1.7	244	I	I	I	*	I	I
0.5	1.7	256	I	I	I	*	I	I
0.6	1.8	268	I	I	I	*	I	I
0.7	1.8	281	I	I	I	*	I	I
0.8	1.8	293	I	I	I	*	I	I
0.9	1.9	305	I	I	I	*	I	I
1.0	1.9	317	I	I	I	*	I	I
1.1	1.9	329	I	I	I	*	I	I
1.2	1.9	341	I	I	I	*	I	I
1.3	2.0	353	I	I	I	*	I	I
1.4	2.0	366	I	I	I	*	I	I
1.5	2.0	378	I	I	I	*	I	I
1.6	2.1	390	I	I	I	*	I	I
1.7	2.1	402	I	I	I	*	I	I
1.8	2.1	414	I	I	I	*	I	I
1.9	2.1	426	I	I	I	*	I	I
2.0	2.2	438	I	I	I	*	I	I
2.1	2.2	448	I	I	I	*	I	I
2.2	2.2	451	I	I	I	*	I	I
2.3	2.2	450	I	I	I	*	I	I
2.4	2.2	450	I	I	I	*	I	I
2.5	2.2	450	I	I	I	*	I	I
2.6	2.2	450	I	I	I	*	I	I
2.7	2.2	450	I	I	I	*	I	I
2.8	2.2	450	I	I	I	*	I	I
2.9	2.2	450	I	I	I	*	I	I
3.0	2.2	450	I	I	I	*	I	I
3.1	2.2	450	I	I	I	*	I	I
3.2	2.2	450	I	I	I	*	I	I

FIGURE 5

FEDERAL ENERGY REGULATORY COMMISSION
333 MARKET STREET, 6th FLOOR
SAN FRANCISCO, CA. 94105

September 3, 1982

*Primary
Lands
File
901.2*

Mr. Jack T. Stiles
Vice President
Pacific Power & Light Company
920 S.W. Sixth Avenue
Portland, OR 97204

Dear Mr. Stiles:

We have reviewed your report "Analysis of Hypothetical Failure, Wallowa Falls Project," FERC Project No. 308, dated July 1, 1982. The study was submitted pursuant to the requirements of Part 12, Subpart C of the Regulations. As indicated in your transmittal letter of July 6, 1982, you are seeking an exemption from filing an emergency action plan (EAP) in accordance with Section 12.21 of the Commission's Regulations.

Our review indicates that your studies adequately demonstrate the ability of the East Fork Wallowa River to absorb the peak flows in event of failure of the dam during average river flows (20 cfs) as well as the maximum recorded flood flow (450 cfs). The studies show that the peak flows after the dam failure would be within the range of the recorded floods that have been retained in the river channel with little effect to the downstream area. Furthermore, the report emphasizes that evaluation of the stability of the dam indicates that the dam has adequate factors of safety for sliding and overturning in the event that the dam is being overtopped.

We hereby inform you that an exemption from filing an EAP is granted. However, this exemption is subject to the provisions of the Part 12, Section 12.21(c) and (d) of the Commission's Regulations.

Your cooperation is appreciated.

Sincerely,

W. F. Koppler, II
W. F. Koppler, II
Regional Engineer



December 11, 2013
File: MO13144A

Mr. Chris Boyd, PE, LEED AP
Project Manager
McMillen, LLC
1401 Shoreline Drive, Suite 100
Boise, Idaho 83702

RE: **Geotechnical Engineering Evaluation**
Wallowa Falls Tailrace Reroute – 30% Design
Joseph, Oregon

Greetings Chris,

Strata, A Professional Services Corporation (STRATA) has completed the authorized geotechnical engineering evaluation for the proposed Wallowa Falls Tailrace Reroute – 30% Design project located in Joseph Oregon. The purpose of our geotechnical engineering evaluation was to explore the subsurface conditions at the site and to provide geotechnical recommendations to assist project planning, design and construction. The attached report summarizes our field and laboratory test results and presents our geotechnical engineering opinions and recommendations. We provided a draft report for project team review dated November 19, 2013. This report supersedes our previous draft report dated November 19, 2013.

The proposed tailrace reroute alignment is underlain primarily by colluvium comprising large boulders and cobbles with a gravel, sand and silt matrix. Hollow-stem auger exploration equipment was refused in this material in 2 of our explorations, and coring equipment was used to penetrate the subsurface profile. The following report provides specific geotechnical recommendations for site earthwork, foundation design, and other geotechnical related design and construction aspects.

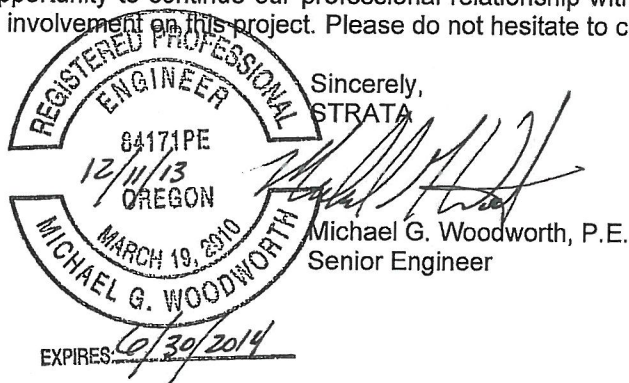
Our opinion is proposed construction success will depend upon implementing our report recommendations, conducting good construction practices, and providing the necessary construction monitoring, testing, and consultation to document that work has been completed as recommended. We recommend that STRATA be retained to provide these construction phase services, and facilitate geotechnical design continuity.

We appreciate the opportunity to continue our professional relationship with McMillen, LLC. We look forward to our continued involvement on this project. Please do not hesitate to contact us if you have any questions or comments.

Andy Abrams

Andrew J. Abrams, P.E.
Project Engineer

AJA/MGW/ac



Sincerely,
STRATA
[Signature]
Michael G. Woodworth, P.E.
Senior Engineer

Geotechnical Engineering Evaluation
Wallowa Falls Tailrace Reroute – 30% Design
Joseph, Oregon

PREPARED FOR
Mr. Chris Boyd, P.E., LEED AP
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1401 Shoreline Drive, Suite 100
Boise, Idaho 83702

McMILLEN

PREPARED BY
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December 11, 2013

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Geotechnical Engineering Evaluation
Wallowa Falls Tailrace Reroute – 30% Design
Joseph, Oregon

INTRODUCTION

Our geotechnical engineering evaluation's purpose was to explore site subsurface conditions and provide geotechnical recommendations assist project planning, design and construction for the proposed tailrace rerouting at the Wallowa Falls Hydroelectric project located at the south termination of Wallowa Lake Highway in Joseph, Oregon. We performed our services referencing our authorized proposal dated October 14, 2013. In performing our scope of services we accomplished the following:

1. Coordinated exploration with Dig line of Oregon to locate underground utilities prior to exploration. We also coordinated exploration with McMillen to obtain permission to access the site for exploration.
2. Subcontracted a track-mounted drill rig to accomplish 3 borings extending 16.5 to 31.5 feet deep.
3. Performed laboratory testing on soil and rock samples with reference to ASTM International procedures.
4. Accomplished engineering analyses to develop geotechnical opinions and recommendations for the following project aspects:

- Earthwork

- Excavation characteristics
- Groundwater considerations
- Undocumented fill
- Subgrade preparations
- Wet soil/wet weather construction
- Structural fill material

- Intake and outfall foundation design

- Allowable bearing pressure (for shallow foundations)
- Estimated settlement
- Subgrade modulus for mat foundation design

- Lateral earth pressures for abutment or below grade wall design

- Static equivalent fluid pressures (at-rest, active and passive pressures)
- Dynamic equivalent fluid pressures (at-rest, active and passive pressures)
- Drainage considerations

- Site drainage

- Surface drainage
- Foundation/wall drainage

- Additional recommend services

- Plan and specification review
- Construction testing and inspection



5. Prepared and provided a draft geotechnical report dated November 19, 2013 summarizing our exploration and laboratory test results, as well as preliminary geotechnical design and earthwork recommendations for consideration by McMillen and PacifiCorp representatives.
6. Provided this geotechnical revised report upon receiving and incorporating project team comments on our draft report. This report supersedes our previous draft.

PROJECT UNDERSTANDING

Our project understanding is based on our discussions with you, our interactions with you and the project team while on-site during a project meeting on August 20, 2013, and reviewing project preliminary drawings dated June 17, 2011. We understand PacifiCorp plans to construct a new tailrace to collect and direct the outfall from their Wallowa Falls hydroelectric powerhouse located at the south termination of Wallowa Lake Highway in Joseph Oregon. The reroute project is primarily intended to reduce the potential for protected fish species (Bull Trout) from entering the tailrace. The new tailrace intake structure could include a concrete tailrace collection basin directing water to a 30-inch-diameter HDPE pipe. The pipe will transport water to an energy dissipater and concrete outfall structure and into the East Fork of the Wallowa River located east of the powerhouse. The intake structure will likely include cast-in-place concrete walls with concrete slabs-on-grade. Pipe installation is planned via traditional cut and cover (open trench) installation techniques.

PacifiCorp has retained McMillen, LLC (McMillen) to accomplish 30% design plans to assist with Federal Energy Regulatory Commission (FERC) permitting for the project prior to accomplishing final design. McMillen requested STRATA accomplish subsurface exploration along the planned alignment to provide geologic information with respect to excavation characteristics, trench backfilling, and other project design and construction aspects. Pavement recommendations were omitted from our services, as disturbance to existing pavements is unlikely and if required, reconstruction will match the existing pavement section and ODOT requirements.

FIELD AND LABORATORY EVALUATION

Field Exploration

STRATA observed 3 exploratory borings at the site on October 22, 2013, to depths of 16.5 to 31.5 feet beneath the existing ground surface. Plate 1, *Site Map*, presents the approximate exploration locations. STRATA described and classified the subsurface conditions encountered during the exploration referencing the USCS. Appendix A presents exploration logs and a USCS explanation, which should be used to interpret soil terms on the logs and throughout this report



We advanced borings using a track-mounted, CME 850 drill rig equipped with 8-inch outside diameter hollow-stem augers and HQ rock coring equipment. Where practical, we obtained select disturbed soil samples using 2-inch outside-diameter split-spoon samplers. We documented SPT N-values and obtained soil samples by driving the split-spoon samplers using a 140-pound hammer with a drop height of 30 inches and counting the number of hammer blows required to advance the 18-inch-long samplers from 6 to 18 inches below the sampling interval. SPT N-values are presented on the exploratory logs and have not been corrected for sample diameter, overburden pressure, rod length or dilation effects. Where auger exploration methods were refused, we accomplished rock coring in approximate 5 foot intervals and documented percent recovery and rock quality designation (RQD). Following drilling completion, we backfilled each boring with soil cuttings and a bentonite seal.

Subsurface Conditions

In boring B-1 at the ground surface, we encountered fill consisting of loose and moist to wet, gray to black silty gravel with sand extending to a depth of 4.5 feet. At the ground surface in B-2 and B-3 we encountered silt with sand and gravel topsoil that was brown, soft and moist, containing vegetation and organic material up to 24 inches deep. Beneath topsoil and fill, we encountered native colluvium comprising gravel with sand, cobbles and boulders. Hollow-stem auger exploration equipment was refused on these coarse boulders at depths of 8 and 5 feet in B-1 and B-2, respectively. In these locations, we accomplished HQ rock coring to penetrate large boulders. In each exploration location, colluvium was encountered to exploration termination depths. We provide photographs of core retrieved from our explorations in Appendix B.

We encountered groundwater within B-1 at a depth of 4.5 feet beneath the ground surface. We anticipate groundwater is coincident with Wallowa Creek levels and will fluctuate seasonally with precipitation and infiltration.

Laboratory Testing

We returned soil samples collected in the field to our laboratory for further classification and testing. We accomplished laboratory testing referencing ASTM procedures. Specifically, we accomplished the following laboratory tests:

- Natural moisture content
- Atterberg limits
- Modified Proctor
- Grain size distribution
- Soil pH & resistivity



We present index laboratory test results on boring logs in Appendix A and on the test result summary sheets in Appendix C. We will retain soil samples for 90 days and discard after this time period unless we are notified to store the samples for an extended period of time.

GEOTECHNICAL OPINIONS AND RECOMMENDATIONS

The following geotechnical recommendations are presented to assist in the planning, design and construction of the proposed tailrace rerouting at the Wallowa Falls Hydroelectric project located at the south termination of Wallowa Lake Highway in Joseph, Oregon. Our recommendations are based on the results of our field exploration observations, laboratory testing, our experience with similar soil conditions and our proposed construction understanding.

From our field exploration, laboratory testing, and engineering analysis, our opinion is the primary geotechnical issues associated with the planned construction are:

- Difficulty in excavating into the coarse boulder and cobble colluvium encountered 5 to 8 feet below the ground surface,
- Difficulty preparing coarse boulder and cobble structural subgrades, and
- Excavating below existing groundwater and stream water levels.

The text below specifically outlines our opinions and recommendations regarding these and other soil and geologic conditions, and relies on geotechnical continuity, communication between all project team members and good construction practices to achieve the desired project outcome.

Earthwork

Excavation Characteristics

Near surface fill and topsoil encountered within the upper 1 to 4.5 feet below the existing ground surface is expected to be excavatable using conventional techniques and equipment. Coarse boulder and cobble colluvium encountered beneath surficial soil refused hollow-stem auger exploration. Excavation beyond 1 to 2 feet into this coarse and dense mixture of boulders, cobbles, and gravel may require large trackhoes and dozers with ripper shanks. Further, deeper excavations may require blasting or hydraulic hammers. We did not encounter competent bedrock in our explorations.

The following considerations can be incorporated into the project specifications, or used as a general guide to facilitate excavation requirements for coarse boulders. Regardless of whether the information is incorporated into final project specifications, McMillen, PacifiCorp and the earthwork contractor should consider the following with respect to accomplishing rock excavation.

- Excavation and earthwork contractors are ultimately responsible for the method for boulder excavation and safety.



- Boulder excavation includes removal and disposal. Experience has shown that a minimum 7,500-lb hoe ram is required to breakout boulders larger than typical excavators can lift.
- Boulder excavation shall be measured as the neat cut lines required for construction plus 1 foot laterally on each side of the excavation. Breakout and required backfill beyond these limits shall not be paid.
- For reuse as structural fill, excavation must reduce the excavated spoils to a maximum 8-inch particle size.

Temporarily excavate, slope, shore or brace excavations in accordance with the *Occupational Safety and Health Administration* (OSHA) guidelines regulations and local codes. Site soil encountered in our explorations is Type C soil, which can be temporarily sloped as steep as 1.5H:1V (horizontal to vertical) when they remain in a dry condition and excavations are less than 20 feet deep per OSHA's requirements. Construction vibrations, seepage, or surface loading can cause excavations to slough or cave and should be avoided. Ultimately, the contractor is solely responsible for site safety and excavation configurations and maintaining OSHA approved personnel for excavation monitoring. Excavations must be planned carefully, allowing water collection points and utilizing conventional sumps and pumps to remove nuisance water from runoff, seeps, springs, or precipitation. Backfill excavations immediately to reduce degradation when exposed to runoff. Coordinate construction activities and excavation backfilling as rapidly as possible following excavation to reduce the potential for subgrades to degrade under construction traffic.

Groundwater Considerations

We encountered groundwater in B-1 at a depth of 4.5 feet, located immediately adjacent to the existing tailrace structure. We expect groundwater levels at the site will fluctuate with seasonal variations in Wallowa Creek, as well as precipitation and infiltration. Due to the coarse-grained nature of the site soil, groundwater can readily infiltrate site excavations below the groundwater table, and can cause caving and sloughing. Further, excavations for the intake structure adjacent to the existing tailrace will require stream rerouting, coffer dam construction or other means to allow for sufficient dewatering to the structure's bearing elevation. The Contractor is responsible for site dewatering and must maintain sumps, pumps, or other measures to rapidly remove water from excavations to reduce caving potential and maintain water levels below subgrade elevations. We recommend project specifications clearly delineate requirements for handling and disposing of water removed from excavations.

Undocumented Fill

We encountered undocumented fill in B-1 located in the existing gravel parking area adjacent to the existing powerhouse. Localized fill deposits with varying composition, consistency, and debris may be encountered across the site and between exploration locations, but will likely not



impact planned tailrace construction, outside of the planned intake structure. Also, based on our current project understanding and preliminary drawings prepared by McMillen, we expect the excavations to achieve the planned intake structure bearing elevation will remove undocumented fill beneath this structure. If fill remains after excavation to pipe inverts, we recommend it be removed to expose native colluvium and prepared as described in the *Subgrade Preparations* report section.

Subgrade Preparations

Prepare subgrades beneath all planned permanent site improvements and structures according to the following conditions prior to placing structural fill, foundation or slab support aggregate:

- Expose coarse boulder and cobble colluvium and compact the resulting surface referencing the *Structural Fill* report requirements to create a dense, interlocking surface free of loose soil, debris, and standing water.
- A minimum 6-inch-thick leveling course comprised of crushed aggregate can be placed and compacted to structural fill requirements to increase constructability over coarse colluvium.

Subgrade preparation procedures described above can help identify areas susceptible to subgrade pumping and rutting. After attempting moisture conditioning and failing to achieve compaction, remove pumping or rutting subgrade areas to depths between 12 to 18 inches at owner's direction. Replace over-excavations with granular structural fill or crushed surfacing. Once prepared and approved by McMillen or STRATA, it is the contractor's sole responsibility to protect subgrades from degradation from traffic, poor drainage, precipitation or other sources.

Wet Weather Soil Conditions

Ideally, perform earthwork construction during dry weather conditions. Earthwork should not be performed immediately after rainfall or until soil can dry sufficiently to allow construction traffic without disturbing the subgrade. Depending on precipitation, runoff and groundwater conditions, the site soil will be slightly over optimum moisture content. Contractor shall expect these conditions and be prepared to install runoff management facilities and to replace wet or disturbed soil with granular structural fill.

Structural Fill Material

All fill placed for supporting structures, hardscapes and for constructing access roads and parking areas must be placed as structural fill. Project structural fill products are described in Table 1. The on-site soil we encountered during construction can be used as structural fill, provided it meets the requirements in Table 1. Reusing the coarse colluvium comprising cobbles and boulders will require processing to remove or crush particles larger than 8 inches in diameter.



Table 1. Structural Fill Products and Allowable Use

Structural Fill Product	Allowable Use	Material Specifications
General Structural Fill	All site grading, utilities and fill placement including exterior foundation wall backfill, foundation over excavations	<ul style="list-style-type: none"> • Soil must be classified as GP, GM, GW, SP, SM, and SW according to the USCS. • Soil may not contain particles larger than 8-inches in median diameter. • Soil must consist of inert earth materials with less than 3 percent organics or other deleterious substances (wood, metal, plastic, waste, etc).
Granular Structural Fill	Over-excavations, temporary haul roads, temporary platforms, general structural fill	<ul style="list-style-type: none"> • Soil must meet general structural fill requirements. • Soil must contain 50 to 80 percent passing the No. 4 sieve. • Soil may not contain more than 12 percent passing the No. 200 sieve.
Crushed Aggregate	Slab support, utility bedding, granular structural fill	<ul style="list-style-type: none"> • Soil must meet granular structural fill requirements. • Soil meeting gradation requirements presented in Table 2. • Soil contain at least 1 fractured face on the material retained on the No. 4 sieve

Table 2. Crushed Aggregate Gradation Requirements

Sieve Size	Percent Passing
1 1/2"	100
3/4"	90-100
1/2"	80-100
No. 4	46-66
No. 40	8-24
No. 200	10.0 max
Sand Equivalent	40 min

Compaction Criteria

All structural fill must be compacted to at least 92 percent of the maximum dry density referencing ASTM D 1557 (Modified Proctor). Fill placed outside any utility trench, foundation, flatwork, or road section can be placed as non-structural fill (i.e. landscape fill), providing there are no structures (flatwork, signs, etc.) planned directly above the landscape fill. We recommend landscape fill be compacted to at least 88 percent of the maximum dry density of the soil referencing ASTM D1557 (Modified Proctor).

Structural fill products must be moisture conditioned to near-optimum moisture content and placed in maximum 12-inch-thick, loose lifts. The above assumes large compaction equipment with a roller weight of at least 5 tons or greater is used to attempt compaction. If smaller or lighter



compaction equipment is provided, the lift thickness may have to be reduced to meet the compaction requirements above.

Coarse Soil Compaction

Any fill material with greater than 30 percent retained above the $\frac{3}{4}$ -inch sieve is considered “oversize soil” and is too coarse for Proctor density testing. However, such material may be used as Granular Structural Fill other project fill placement provided it meets the requirements in Table 1 above. Coarse soil must be compacted using a “method specification” developed during construction based on the material characteristics and the contractor’s means and methods. At a minimum, STRATA recommends any oversize soil be placed in maximum 12-inch lifts and compacted with 5 complete passes of a 5-ton, vibratory roller. Vibratory rollers must have a dynamic force of at least 30,000 pounds per impact, per vibration and at least 1,000 vibrations per minute. Oversize soil must be compacted to a dense, interlocking, and unyielding surface.

Intake and Outfall Structures Foundation Design

Design and construction details for the proposed intake and outlet structures are not yet finalized, however we expect they will require typical shallow spread footings or a mat foundation. We recommend all undocumented fill and topsoil be removed from beneath planned foundations. Shallow spread footings and mat foundations must be supported on coarse boulder colluvium subgrades, or on structural fill placed over colluvium subgrades. Prepare foundation subgrades as stated in the *Subgrade Preparation* section of this report.

General

Observing the foundation construction process and final foundation bearing surfaces helps confirm allowable bearing pressures and settlement estimates and is an important part of the geotechnical design process. Exterior footings must extend at least 30 inches below the final exterior ground surface to help protect against frost action. Where structural fill will be placed beneath footings, it should extend a minimum of 6 inches horizontally for each 1 foot depth beneath the footings. The horizontal dimension is measured from the edge of the footing.

Foundations must be structurally designed to conform to the latest edition of the *International Building Code* (IBC). The foundation bearing pressures presented below can be increased 30 percent to account for transitory live loads such as seismic and wind. In our opinion, long-term live loads such as equipment, fixtures, furniture, files, etc. should be considered in the total dead structural loads for the project. Our analyses utilized a factor of safety against bearing capacity failure of 3.0 or greater. Settlement estimates and other design criteria are unfactored.



Design Criteria

Shallow foundations including mat foundations bearing over structural fill or colluvium prepared as stated in the *Site Preparation* section of this report may be designed using a maximum allowable bearing pressure of 5,000 psf. Foundations cast directly on coarse boulders, cobbles, and sand or on a crushed aggregate leveling course can utilize a base friction coefficient (f_s) of 0.50. These coefficients must be reduced by 1/3 if concrete is not cast directly on soil, such as for pre-cast foundations. Using good construction practices, we estimate foundations bearing on subgrades prepared as recommended herein will realize less than 1 inch total and 0.5 inches of differential settlement in a 30-foot span.

Seismicity

We expect the 2012 IBC will be utilized for project structural design. Section 1613.3 in the 2012 International Building Code (IBC) outlines procedures for evaluating site ground motions and design spectral response accelerations. Based on our field exploration and knowledge of the upper 100 feet of the soil profile, we recommend a Site Class C be utilized as a basis for structural seismic design. STRATA did not perform a site-specific seismic response study. We referenced the Maximum Considered Earthquake (MCE) maps from the IBC to develop individual seismic response criteria as presented in Table 3 below.

Table 3. Seismic Response Criteria, Proposed Wallowa Falls Tailrace Reroute

<u>Parameter</u>	<u>Value (g)</u>
Site Coefficient, F_a , Site Class C	1.2
Site Coefficient, F_v , Site Class C	1.661
S_{MS} - 0.2 Second MCE Spectral Response Acceleration ($S_{MS} = S_S \times F_a$)	0.523 ¹
S_{M1} - 1.0 Second MCE Spectral Response Acceleration ($S_{M1} = S_1 \times F_v$)	0.237 ¹
S_{DS} - 0.2 Second Design Spectral Response Acceleration ($S_{DS} = S_{MS} \times 0.667$)	0.349 ¹
S_{D1} - 1.0 Second Design Spectral Response Acceleration ($S_{D1} = S_{M1} \times 0.667$)	0.158 ¹
Peak Ground Acceleration	0.189 ¹

¹Values from 2012 IBC, and 2008 United States Geologic Survey (USGS) seismic hazard maps.

²Values of peak ground acceleration based on 2% probability of exceedence in 50 years.

³Values for location Latitude 45.267 and Longitude -117.213

Liquefaction is commonly a concern for loose, fine grained sand that is saturated. Foundations will bear over a dense, coarse mixture of boulders, cobbles, gravel, and sand that is



not anticipated to be susceptible to liquefaction. Therefore, in our opinion the risk of liquefaction for this project is negligible.

Lateral Earth Pressures

The intake and outlet structures may include below-grade wall construction. Below-grade walls should be designed to resist lateral earth pressure from the retained soil adjacent to the structure and surcharge from equipment, slopes, or vehicles adjacent to the walls. We recommend design of below-grade walls not subjected to hydrostatic conditions (i.e. with fully drained backfill) use the equivalent fluid pressures from Table 4 below.

Table 4. Lateral Earth Pressures (no hydrostatic conditions)
Granular structural fill in the active zone ($\Phi=40^\circ$)

Rankine Lateral Earth Pressure Case	Equivalent Fluid Pressure (EFP)
At-rest case (no wall movement)	50 pcf*
Active case (wall movement away from soil mass)	30 pcf*
Passive case (wall movement toward soil mass)*	625 pcf**

* (pounds per cubic foot) Based on saturated unit weight

**Has been adjusted for 1/2-inch of lateral deflection

We recommend design for below-grade walls subject to hydrostatic forces from saturated backfill conditions use the EFPs from Table 5 below.

Table 5. Static Lateral Earth Pressures (with hydrostatic conditions)
Granular backfill in the active zone ($\Phi=40^\circ$)

Rankine Lateral Earth Pressure Case	Equivalent Fluid Pressure (EFP)
At-rest case (no wall movement)	90 pcf*
Active case (wall movement away from soil mass)	80 pcf*
Passive case (wall movement toward soil mass)*	250 pcf**

*Includes soil buoyant unit weight and the unit weight of water.

**Has been corrected for up to 1/2-inch of lateral deflection.

The above soil equivalent fluid pressure values assume a triangular stress distribution and the use of on-site soil, or imported crushed surfacing compacted to structural fill requirements. Lateral surcharge pressures, due to equipment, traffic, etc., have not been included in the above lateral earth pressure recommendations. The lateral earth pressure coefficient of 0.5, acting over the entire wall height, could be used to estimate the lateral earth pressure induced on walls due to adjacent surcharge loads.

Site Drainage

Site grading design and construction must allow for positive drainage of surface runoff water away from the proposed structures and not be allowed to infiltrate slopes or foundation and slab subgrades. Runoff or water migrating along the ground surface must be conveyed away from the



structure by an appropriately designed series of ditches, swales or other surface water management procedures.

GEOTECHNICAL DESIGN CONTINUITY

We base this report's information on preliminary design and construction concepts provided by McMillen. The tailrace alignment, intake and outfall structure configuration and layout, loading conditions, as well as site geometry, can significantly alter our opinions and design recommendations. Often, precluding geotechnical involvement throughout the design process creates lost opportunities for efficiency between design iterations, project specifications, and plan drawing development. Therefore, it is critical that STRATA provide geotechnical continuity for final planning and design for the planned construction as individual aspects become available during design development phases.

EVALUATION LIMITATIONS

This report has been prepared to assist project planning design and construction from a geotechnical perspective for the proposed tailrace reroute project at the Wallowa Falls hydroelectric powerhouse located at the south termination of Wallowa Lake Highway in Joseph, Oregon. Our geotechnical findings and opinions have been developed based on the authorized subsurface exploration and laboratory testing, as well as our understanding of the project at this time. Our geotechnical design recommendations are specific to the planned development and infrastructure construction and should not be extrapolated to other future site developments without allowing adequate geotechnical consultation.

Our services consist of professional opinions and findings made in accordance with generally accepted geotechnical engineering principles and practices in eastern Oregon at the time of this report. This acknowledgment is in lieu of all warranties either express or implied.

The following plates accompany this report.

Plate 1: Site Map

Appendix A: Unified Soil Classification System (USCS) Exploration Boring Logs

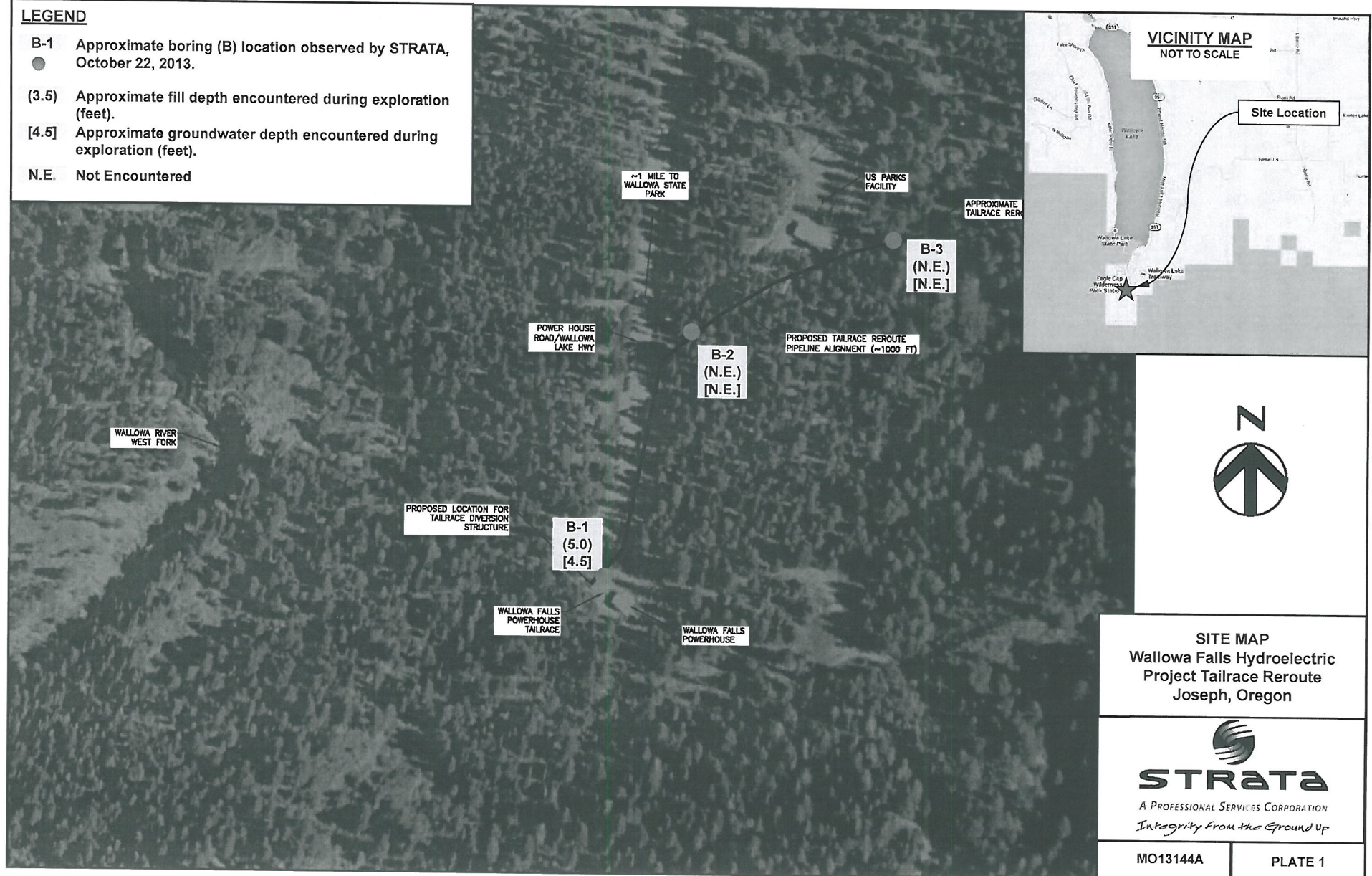
Appendix B: Core Photographs

Appendix C: Laboratory Testing



LEGEND

- B-1 Approximate boring (B) location observed by STRATA, October 22, 2013.
- (3.5) Approximate fill depth encountered during exploration (feet).
- [4.5] Approximate groundwater depth encountered during exploration (feet).
- N.E. Not Encountered



Reference: Base drawing provided by McMillen, LLC dated June 17, 2011. No Scale Intended

APPENDIX A

Unified Soil Classification System (USCS) Exploration Logs

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL NAMES
COARSE GRAINED SOIL	GRAVEL	CLEAN GRAVEL		GW	Well-Graded Gravel, Gravel-Sand Mixtures.
				GP	Poorly-Graded Gravel, Gravel-Sand Mixtures.
		GRAVEL WITH FINES		GM	Silty Gravel, Gravel-Sand-Silt Mixtures.
				GC	Clayey Gravel, Gravel-Sand-Clay Mixtures.
	SAND	CLEAN SAND		SW	Well-Graded Sand, Gravelly Sand.
				SP	Poorly-Graded Sand, Gravelly Sand.
		SAND WITH FINES		SM	Silty Sand, Sand-Silt Mixtures.
				SC	Clayey Sand, Sand-Clay Mixtures.
FINE GRAINED SOIL	SILT AND CLAY LIQUID LIMIT LESS THAN 50%			ML	Inorganic Silt, Sandy or Clayey Silt.
				CL	Inorganic Clay of Low to Medium Plasticity, Sandy or Silty Clay.
				OL	Organic Silt and Clay of Low Plasticity.
	SILT AND CLAY LIQUID LIMIT GREATER THAN 50%			MH	Inorganic Silt, Mica-ceous Silt, Plastic Silt.
				CH	Inorganic Clay of High Plasticity, Fat Clay.
				OH	Organic Clay of Medium to High Plasticity.
				PT	Peat, Muck and Other Highly Organic Soil

BORING LOG SYMBOLS

	Standard 2-Inch OD Split-Spoon Sample
	California Modified 3-Inch OD Split-Spoon Sample
	Rock Core
	Shelby Tube 3-Inch OD Undisturbed Sample

GROUNDWATER SYMBOLS

	Groundwater After 24 Hours
(7-3-07)	Indicates Date of Reading
	Groundwater at Time of Drilling

TEST PIT LOG SYMBOLS

BG	Baggie Sample
BK	Bulk Sample
RG	Ring Sample

Shorthand Notation:

BGS = Below Existing Ground Surface


N.E. = None Encountered

STRATA BH / TP / WELL - STRATA.GPJ - 11/7/13 11:50 - S:\2013\GINT\PROJECTS\MCMENG MO13144 WALLOWA FALLS TRAILRACE REROUTE - 70% B-1 TO B-3.GPJ

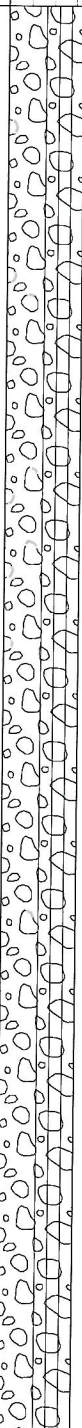
USCS Description	DEPTH (ft)	U.S.C.S. CLASS	SYMBOL	Sample Type	SPT Blows Per 6 Inches	SPT N ₆₀	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	REMARKS Note: BGS = Below Ground Surface
FILL - SILTY GRAVEL (BASE COURSE), (GM) gray, loose, moist	0	GM								
FILL - SILTY GRAVEL WITH SAND, COBBLES AND BOULDERS, (GM) black, loose, moist to wet		GM		BK	12 5 3	8				No sample recovery
	5				8 5 2	7				Auger refusal at about 8' BGS. Switch to coring.
COLLUVIUM - POORLY-GRADED GRAVEL WITH SAND, COBBLES AND BOULDERS, (GP-GM) blueish green to gray mottling, medium dense to to dense, wet		GP-GM		HQ						HQ Rock Core between 8 and 11 feet BGS RQD = 22% Recovery = 67%
	10				15 12 22	34				
	15			HQ						HQ Rock Core between 13 and 15 feet BGS RQD = 0% Recovery = 50%
					12 14 6	20				

Borehole Terminated at 16.5 Feet.

Loosely backfilled with soil cuttings and bentonite.

Client: McMillen, LLC	Boring Number: B-1		EXPLORATORY BORING LOG
Project: MO13144	Date Drilled: 10-21-2013		
Drill Rig: CME-850	Borehole Diameter: 8"		Sheet 1 Of 1
Depth to Groundwater: 4.5'	Logged By: AJA		

STRATA BH / TP / WELL - STRATA.GPJ - 11/7/13 11:50 - S:\2013\GINT\PROJECTS\WCMENG MO13144 WALLOWA FALLS TRAILRACE REROUTE - 70% B-1 TO B-3.GPJ

USCS Description	DEPTH (ft)	U.S.C.S. CLASS	SYMBOL	Sample Type	SPT Blows Per 6 inches	SPT N ₆₀	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	REMARKS Note: BGS = Below Ground Surface
TOPSOIL - SILT WITH SAND AND GRAVEL, (ML) dark brown, soft, moist	0	ML								
COLLUVIUM - POORLY-GRADED GRAVEL WITH SAND, COBBLES AND BOULDERS, (GP-GM) blueish green to gray mottling, medium dense to to dense, moist	5	GP-GM		I	5 7 50/1.0"	50+				<p>Auger refusal at 5' BGS. Switch to coring.</p> <p>HQ Rock Core between 5 and 7 feet BGS RQD = 39% Recovery = 72%</p> <p>HQ Rock Core between 8 and 12 feet BGS RQD = 0% Recovery = 57%</p> <p>HQ Rock Core between 13 and 14 feet BGS RQD = 0% Recovery = 40%</p> <p>HQ Rock Core between 14 and 17 feet BGS RQD = 100% Recovery = 70%</p> <p>HQ Rock Core between 18 and 20 feet BGS RQD = 0% Recovery = 100%</p> <p>HQ Rock Core between 21 and 26 feet BGS RQD = 39% Recovery = 86%</p> <p>HQ Rock Core between 26 and 30 feet BGS RQD = 0% Recovery = 38%</p>
				HQ						
				I	12 50/5.0"	50+				
				HQ						
				I	13 15 42	57				
				HQ						
				HQ						
				I	3 15 19	34				
				HQ						
					50/1.0"	50+				
				HQ						
					50/1.0"	50+				
				HQ						

Client: McMillen, LLC

Boring Number: B-2

Project: MO13144

Date Drilled: 10-22-2013

Drill Rig: CME-850

Borehole Diameter: 8"

Depth to Groundwater: N.E.

Logged By: AJA





EXPLORATORY BORING LOG

Sheet 1 Of 2

(Continued Next Page)

STRATA BH / TP / WELL - STRATA.GPJ - 11/7/13 11:50 - S:\2013\GINT\PROJECTS\CMC\MENG MO13144 WALLOWA FALLS TRAILRACE REROUTE - 70% B-1 TO B-3.GPJ

USCS Description	DEPTH (ft)	U.S.C.S. CLASS	SYMBOL	Sample Type	SPT Blows Per 6 Inches	SPT N ₆₀	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	REMARKS Note: BGS = Below Ground Surface
COLLUVIUM - POORLY-GRADED GRAVEL WITH SAND, COBBLES AND BOULDERS, (GP-GM) blueish green to gray mottling, medium dense to to dense, moist (continued)	30	GP- GM		HQ						
					21 17 12	29				

Borehole Terminated at 31.5 Feet.

Loosely backfilled with soil
cuttings and plugged up with
bentonite.

Client: McMillen, LLC

Boring Number: B-2

Project: MO13144

Date Drilled: 10-22-2013

Drill Rig: CME-850

Borehole Diameter: 8"

Depth to Groundwater: N.E.

Logged By: AJA



EXPLORATORY BORING LOG

Sheet 2 Of 2

STRATA BH / TP / WELL - STRATA GPJ - 11/7/13 11:50 - S:\2013\GINT\PROJECT\SMCMENG MO13144 WALLOWA FALLS TRAILRACE REROUTE - 70% B-1 TO B-3.GPJ

USCS Description	DEPTH (ft)	U.S.C.S. CLASS	SYMBOL	Sample Type	SPT Blows Per 6 inches	SPT N ₆₀	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	REMARKS Note: BGS = Below Ground Surface
TOPSOIL - SILT WITH SAND AND GRAVEL, (ML) dark brown, soft, moist	0	ML								Vegetation and organic material found to 24" BGS.
COLLUVIUM - MIXED GRAVEL, COBBLES, BUOLDERS, AND SAND, blueish green to gray mottling, medium dense to to dense, wet	5			I	35 7 16	23				
	10			I	49 12 17	29				
	15			I	23 17 19	36				
	20									

Borehole Terminated at 20.1 Feet.

50/1.0" 50+

Loosely backfilled with soil cuttings and bentonite.

Client: McMillen, LLC	Boring Number: B-3
Project: MO13144	Date Drilled: 10-22-2013
Drill Rig: CME-850	Borehole Diameter: 8"
Depth to Groundwater: N.E.	Logged By: AJA



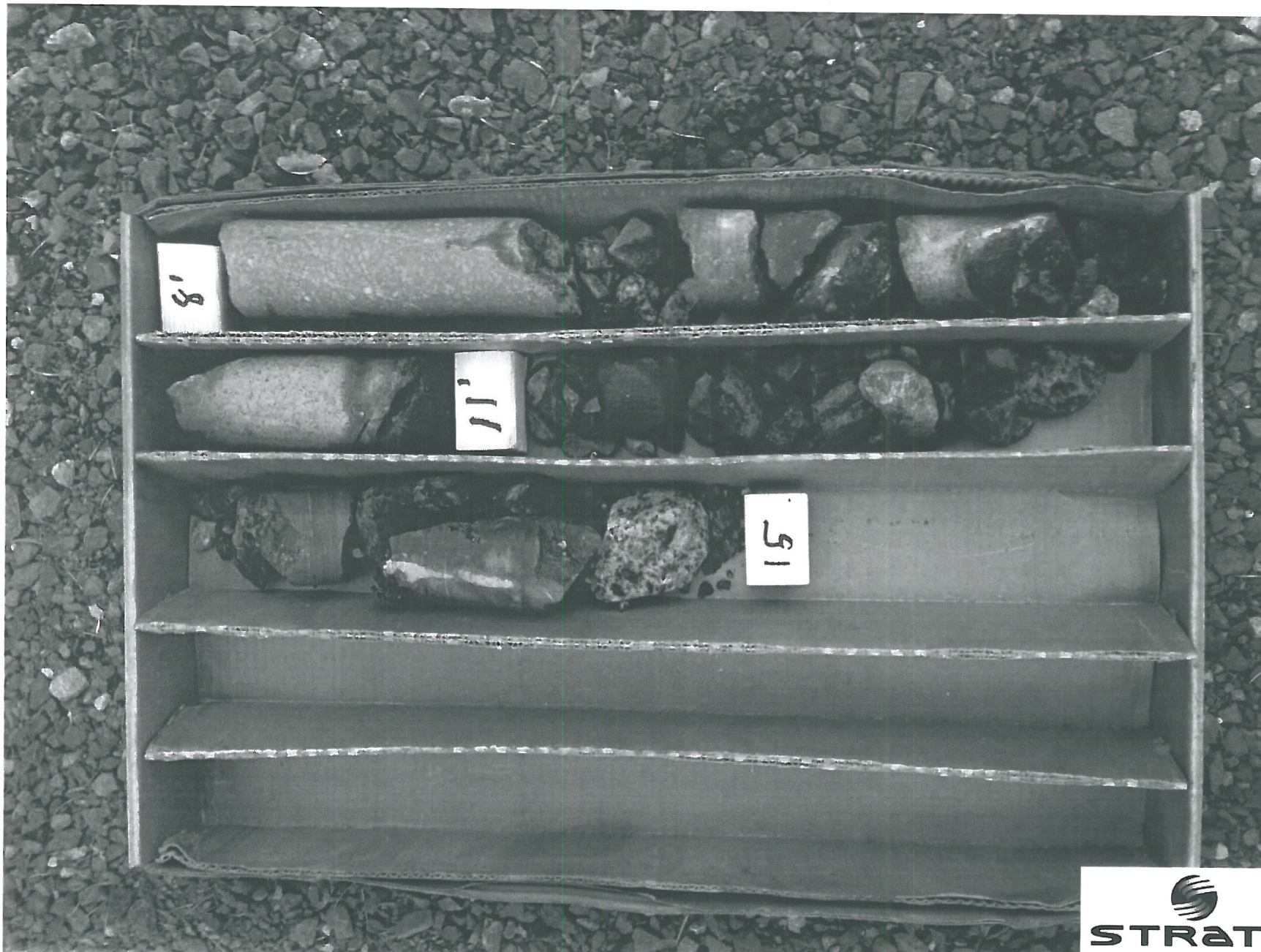
STRATA
A PROFESSIONAL SERVICES CORPORATION
Integrity from the Ground Up

EXPLORATORY BORING LOG

Sheet 1 Of 1

APPENDIX B

Core Photographs



Boring B-1: Rock core retrieved from 8.0 to 15.0 feet BGS.



Boring B-2: Rock core retrieved from 5.0 to 21.5 feet BGS.



Boring B-2: Rock core retrieved from 21.5 to 30.0 feet BGS.

APPENDIX C

Laboratory Test Results



Index Laboratory Test Results Summary

Project: Wallowa Falls Tailrace Reroute
Report to: Mr. Chris Boyd, P.E. LEED AP
McMillen LLC
1401 Shoreline Drive
Boise, Idaho 83702

Report Date: 11/7/13
File Name: MCMENG MO13144A

Index Laboratory Test Results Summary

Boring	Depth (feet)	Lab Number	Description and remarks (classification)	Liquid Limit	Plasticity Index	In situ Moisture, %	In situ Dry Density, pcf	Passing No. 200, %	pH	Resistivity (ohms-cm)
B-1	1.0-3.0	PUL130234A		NP	NP	5.6	-	15.2	7.4	2,127.7
B-2	16.5-18	PUL130234C		-	-	-	-	-	7.2	3,125.0
B-3	15-16.5	PUL130234B		-	-	-	-	-	7.4	6,666.7

NP - Non Plastic

MOISTURE-DENSITY RELATIONSHIP CURVE

ASTM D 1557

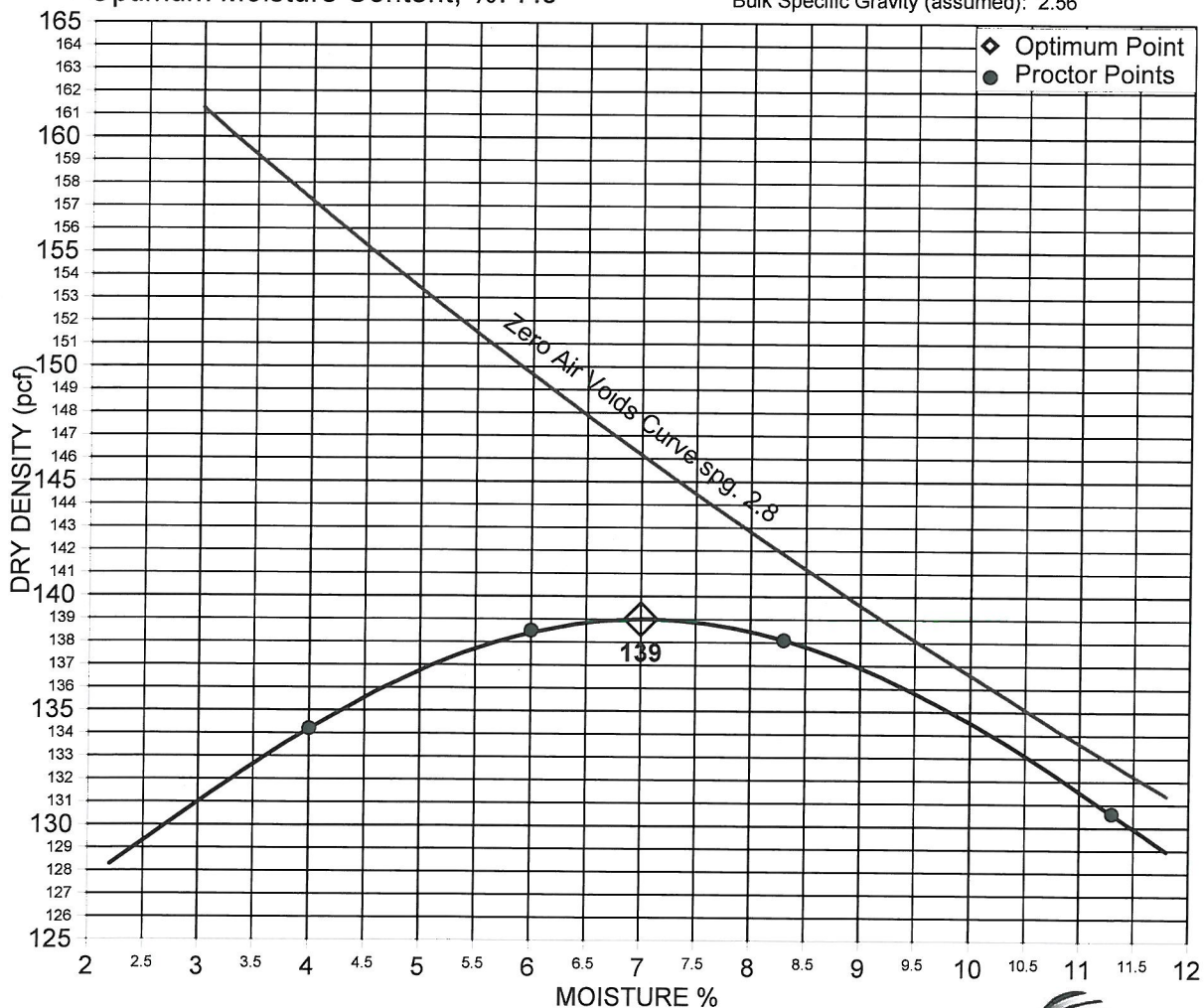
Method C

Project: Wallowa Falls Tailrace Reroute
 Client: McMillen LLC
 File Name: MCMENG MO13144A
 Lab Number: PUL130234A
 Sample Location: B-1 @ 1.0-3.0 Feet BGS
 Sample Material: Silty Sand with Gravel (SM)
 Date Tested: 10/25/13 By: JH
 Rammer Type: Mechanical

GRADING ANALYSIS		
SCREEN SIZE	% PASSING	AS TESTED
6 inch		
3 inch		
2 inch		
3/4 inch	88	100
3/8 inch	74	86
#4 screen		

Maximum Dry Density, pcf : 139.0
 Optimum Moisture Content, %: 7.0

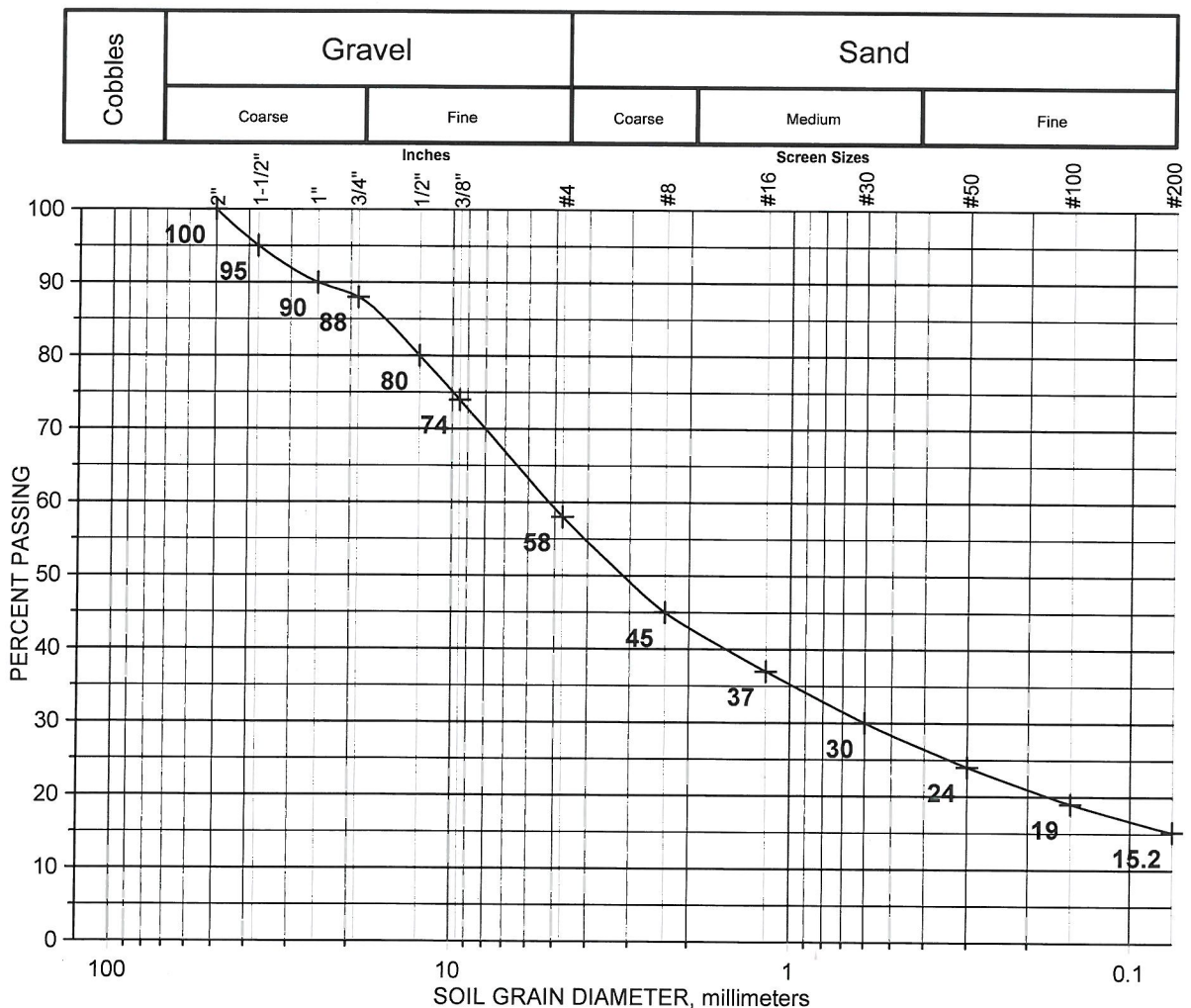
Corrected Dry Density, pcf: 141.0
 Corrected Moisture Content, 6.5:
 Coarse Aggregate Correction, %: 12.0
 Bulk Specific Gravity (assumed): 2.56



Reviewed By: Andy Abreg

GRADATION ANALYSIS ASTM D 422

Project: Wallowa Falls Tailrace Reroute
 Client: McMillen LLC
 Project Number: MCMENG MO13144A
 Lab Number: PUL130234A
 Sample Location: B-1 @ 1.0-3.0 Feet BGS
 Sample Description: Silty Sand with Gravel (SM)
 Date tested: 10/25/13 By: JH



Reviewed by: Andy Abner

McCune, Kimberly

From: Hickner, Juna <juna.hickner@state.or.us>
Sent: Tuesday, September 03, 2013 10:17 AM
To: Howison, Russ
Subject: RE: FERC Project No. 308, CZMA Applicability

Thanks for your inquiry, Mr. Howison. This message confirms that the proposed project is outside of the Oregon coastal zone and is not subject to review under the Coastal Zone Management Act.

Juna Hickner | Coastal State-Federal Relations Coordinator
Oregon Coastal Management Program
Oregon Dept. of Land Conservation and Development
635 Capitol Street NE, Suite 150 | Salem, OR 97301-2540
Office: (503) 373-0050 ext. 253 | Fax: (503) 378-6033
juna.hickner@state.or.us | www.oregon.gov/LCD

From: Howison, Russ [<mailto:Russ.Howison@pacificorp.com>]
Sent: Monday, September 02, 2013 1:27 PM
To: Hickner, Juna
Cc: McCune, Kimberly; Weatherly, Briana
Subject: FERC Project No. 308, CZMA Applicability

Dear Ms. Hickner

PacifiCorp Energy is currently in the process of applying for a new license from the Federal Energy Regulatory Commission (Commission) for the 1.1 mega-watt Wallowa Falls Hydroelectric Project (Project) on the Wallowa River in Wallowa County Oregon. Under section 307 (c)(3)(A) of the Coastal Zone Management Act (CZMA), 16 U.S.C. Section 1456 (3)(A), the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification.

The Project was constructed in 1921. The dam and impoundment are located at an elevation of approximately 6,000 feet and are above Wallowa Lake dam which does not allow anadromous fish passage. As such, the Project is not located within the state-designated Coastal Management Zone, which extends inland to the crest of the Coast Mountain Range, and the Project does not affect Oregon's coastal resources. Therefore, PacifiCorp suggests the Project is not subject to Oregon coastal zone management program review and no consistency certification is needed for the action of re-licensing.

I would greatly appreciate your response to this letter stating your concurrence that the project is not subject to further Oregon coastal zone management program review. Please call me at (503) 813-6626 or email me if you have any further questions regarding this Project.

Sincerely,
Russ Howison
Licensing Project Manager
PacifiCorp Energy