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MEMORANDUM

To: LIHI Governing Board
From: Fred Ayer
Date: November 30, 2006

Re: **Application for Low Impact Hydropower Certification**
Black Bear Lake Hydroelectric Project
Black Bear Lake, Alaska (FERC #10440)

Introduction

This memo reviews the application for Low Impact Hydropower Certification by the Alaska Power and Telephone Company (APT) for the Black Bear Lake Hydroelectric Project. The FERC Project Number is 10440. This memo also introduces some of the fascinating issues that we will have to work our way through if we are to accept applications from Alaskan hydro projects.

Background

Before I discuss the Black Bear Lake Low Impact Certification application, I wanted to share some background concerning Alaskan hydro projects. As you know we received three applications from APT in May of this year. The projects in this filing are:

> *The Dewey Lakes Hydroelectric Project* is a 943 kilowatt project located in Southeast Alaska, at the head of Taiya Inlet, which branches off the north end of Lynn Canal, and within the community of Skagway's city limits.
>
> *The South Fork Hydroelectric Project* is a 2 megawatt Facility that was completed in December 2005, and is located on the South Fork of the Black Bear Creek, Prince of Wales Island, Alaska.
>
> *The Black Bear Lake Hydroelectric Project* is a 4.5 Mw hydro project at Black Bear Lake on Prince of Wales Island, Tongass National Forest, Alaska.

Today you have before you my report and recommendations for the Black Bear Lake Project. However, you will notice that you do not have before you either of the Projects filed with Black Bear Lake in May. This is because after an initial review of the three projects, I discovered that the South Fork dam had been constructed after August 1, 1998 and made the determination that the project did not meet our criteria. After review of the Dewey Lake Project, I identified a water quality issue that needs more time to resolve. As a result of this determination, I decided to put the South Fork Project and the Dewey lake Projects on hold.

During the same time, I worked with the applicant and the LIHI Board to get a determination on the Goat Lake Hydro Project that it was not a pump storage project. Once the LIHI Board came to the conclusion that the Goat Lake Project was not a pump storage project, the applicant filed an application for the Goat Lake Project on October 23, 2006.

I would like to share what I have learned about Alaska hydro projects and their applicability to our Low Impact certification program and criteria. I think there are four issues we should discuss and perhaps establish policies if necessary. Here are the issues:

§401 Water Quality Certification – Apparently, the state of Alaska, as a result of resource agency staff workloads, has adopted a policy where they waive §401 certification on hydro projects filed with FERC. This means that the state has voluntarily given up the very powerful tool of mandatory conditioning authority. As I understand it, if the Department of Environmental Conservation (DEC) or other state agencies make recommendations for protection of water quality, the best they can hope for is a 10(j) fish and wildlife recommendation. Although FERC accepts a large percentage of 10(j) recommendations, they don't have to—which is the most significant loss by Alaska's waiver policy. I believe we should research this issue more thoroughly and I propose having a recommendation for the Board during the first quarter of 2007, until this is better understood and/or resolved we should not process applications for projects that do not have a §401 issued after 1986, unless the applicant can obtain a letter from the Alaska DEC that states that the project meets state water quality standards. This would affect one of the APT filings; Dewey Lakes.

5MW Floor for FERC Jurisdiction in Alaska – Part of the Energy Policy Act of 2005, Section 823c, is titled Alaska State jurisdiction over small hydroelectric projects. This part of the Act says that the Federal Energy Regulatory Commission will discontinue exercising licensing and regulatory authority over projects in the State of Alaska that are under 5 MW. This section also requires the State to develop regulations that FERC will ultimately have to approve prior to relinquishing their authority. At the present time the state has produced a proposed rulemaking that I understand has been essentially shelved. So while there is a pause in the action, I'm assuming that the state will eventually take over jurisdiction of the 5MW or less projects.

Connection to the "Lower 48" grid – For years there has been a desire to establish a connection to the continental U.S. and develop and export Alaskan hydro electricity to the this beckoning market. The State of Alaska has a budget of $3 million to develop a feasibility study for transmission facilities that would bring electricity via Canada to the Pacific Northwest. Should the connection become reality we will see significant hydro development.

The "Alaska is Different" thing –I know the Board has heard this phrase from me on several occasions, usually referring to the energy situation in that state---no grid and many unconnected communities burning diesel (there isn't much of a choice of fuels in Alaska) because there is no way to import hydro. In this memo, I wanted to raise this issue and expand on it. As I review these projects from Alaska, several themes begin to emerge:

1. Alaska is a big state and because of the distances and difficulties traveling within the state, many hydro proceedings are lightly attended and/or done via mail or internet. I wonder how or if the ILP will be used in Alaska.

2. While agencies in many jurisdictions complain that they do not have adequate staff or budgets, I know of nowhere else that the state has given up a powerful tool like §401 conditioning authority because they "didn't have the time!"

3. Alaska has projects where new dams will be built, but these dams are so small and high up in the drainage, that their impact might be less than existing dam projects. Might we consider looking at these "new" structures as "Low Impact?"

Project Summary

Facility location: The Black Bear Lake Hydroelectric Project is a 4.5 Mw hydro project at Black Bear Lake on Prince of Wales Island, Tongass National Forest, Alaska. The Project is located at Sections 1 and 12; T73S, R82E, CRM about 8.6 miles east of Klawock.

Installed capacity: 4.5 Megawatts (MW)

Average annual generation: 23 gigawatt-hours

FERC license: FERC No. 10440 which expires in 2045.

Date application posted to website: May 19, 2006

Date public comment period closes: July 19, 2006

Background

It took 5 years to license the Black Bear Lake Hydroelectric Project (BBL Hydro). Total project costs were approximately $10 Million. The BBL Hydro project is a 4.5 MW hydroelectric project at Black Bear Lake on Prince of Wales Island, approximately 15 miles NE of Klawock. The lake's spill elevation is 1687 feet msl, with a surface size of 215 acres. With the licensed 15 foot drawdown, the lake provides approximately 3200 acre-feet of storage.

The lake is used as a reservoir, rather than using a dam, which is accomplished by using a siphon. The project is load-following with the only restriction being that startups and stops cannot exceed 1 cfs per hour, but operations may follow load.

Because there are rainbow trout in the lake, a screened intake is used to prevent fish from going into the penstock. A siphon, which is set up on the crest of land at the edge of the lake, is used initially to draw water out of the lake. Once the siphon is established, water passes through both an HDPE and steel penstock to the valve house where flow can be turned on or shut off without losing the siphon. The valve house also has a bypass pipe for bypassing flows to the creek when additional water is needed in the anadromous reach below the powerhouse. When the valve is opened at the valve house, the water flows through approximately 4,900 feet of pipe, some of which is buried and other above ground, to the powerhouse and the turbine.

The water is pressurized by the amount of head the project has (i.e. 1,500 foot drop in elevation) and the small nozzle (needle) the water must pass through as it strikes the runner (a series of spoon-like protuberances on a wheel) in the turbine, which in turn turns the generator creating electricity.

The electricity then goes to the substation where a step-up transformer adjusts the current to the voltage that is wanted on the electrical grid,in this case 34.5 kV. Switchgear in the powerhouse is located in the office where the operations are monitored and adjusted to meet load demand. Operations are also set up to monitor them from a remote location (i.e. one or more of our central offices).

As mentioned, there are rainbow trout in the lake that were stocked there in the 50's. ADF&G had been concerned that the Project's annual drawdowns may be impacting the trout's sustainability by dewatering their spawning beds. Population surveys were conducted for 7 years and a habitat survey was conducted in 2002.

The habitat survey found spawning habitat not just at the lake outlet but around the lake and at differing elevations, indicating that the lake trout spawn at other locations than just the lake outlet and are able to spawn when the lake experiences summer drawdowns.

There are also salmonid species that use the creek below the projects tailrace, i.e. chum,pinks, sockeye, coho, and dolly varden. Because of this the Project is required to have a minimum flow in the creek that varies from month to month.

Monitoring of the anadromous reach was completed after five years in which no impacts were found from project operations.

Although, the original license required development of recreational facilities at Black Bear Lake with the U.S. Forest Service (FS), once the conceptual design was investigated on-site it was determined that it would be impractical. Presently, the FS has developed an off-site location for a recreation cabin on the Island that the licensee will fund through a contractual agreement of $200,000, which was paid to the FS in January 2006.

Facility Description

The Black Bear Lake Hydro Project consists of the following features:

(1). A 215 acre reservoir (Black Bear Lake) at elevation 1,687 with storage capacity of 3,200 acre feet

(2). A 600-foot-long Siphon, 30-inch-diameter HDPE penstock with a vacuum pump assembly and structure at the high point elevation of 1,695 msl.

(3). A 30-inch HDPE penstock with a total length of 4,900-feet (820-feet buried intake and siphon, 1,930-feet supported on concrete saddles, and 2,150-feet buried to the powerhouse).

(4). A 44-foot by 67-foot powerhouse with two horizontal Twin-Jet Pelton turbines operating with a gross head of 1,490-feet

(5). A 4.5-mile long 34.5 kV overhead transmission line

Public comment

There were no public commenters on the application.

General conclusions

The project appears to be consistent with LIHI criteria. The conversations I had with State and Federal Resource agency staff only reinforced this conclusion and while there have been flow issues, the applicant has been responsive and worked to correct the problems. In general, the agency staffers were very positive about the Black Bear Lake Project and supported its certification as Low Impact.

Recommendation

Based on the positive feedback from resource agencies (See Contact Summary) and confirmation that there have not been significant problems, I believe the Black Bear Lake Project meets the LIHI criteria and should be certified as Low Impact. The Board might want to consider conditioning the certification in line with the suggestion made by the NMFS:

If the situation of recurrent reductions from prescribed instream flows continues, the applicant will explore a comprehensive alteration of prescribed flows through license modification in consultation with all of the state and federal resource agencies.

Low Impact Certification Criteria

A. Flows:

Criteria
Is the facility in Compliance with Resource Agency Recommendations issued after December 31, 1986 regarding flow conditions for fish and wildlife protection, mitigation and enhancement for both the reach below the tailrace and all bypassed reaches?

The Project operates in accordance with a FERC license article that requires minimum flows that vary by month. The flows are specifically designed to maintain the salmon habitat below the project tailrace. In FERC's 1992 Environmental Assessment (EA) they note that no agency filed comments on the minimum flow proposed by the applicant. However in 1989 and 1990, the National Marine Fisheries Service (NMFS) stated that if the flows proposed by the applicant were the same as those proposed for the 1982 project proposed by the State of Alaska, they were still in agreement. The flows proposed by AP&T, are similar but not identical to the 1982 proposed project. (see Table 2 below from AP&T's FERC license order).

Table 2. Minimum instream flow schedule for Black Bear Lake Project as proposed by AP&T (Source: Alaska Power and Telephone Co. 1991, as modified by staff).

Month	Existing Mean Monthly Flow (cubic feet per second)	Proposed Minimum Flow (cubic feet per second)	Percent Reduction of Mean Monthly Flow	Existing Percent Exceedence[1]
January	30	9	70	75
February	19	12	37	50
March	15	9	40	57
April	18	15	17	50
May	37	22	41	85
June	40	15	62	99
July	26	19	27	58
August	22	17	23	46
September	31	24	23	40
October	43	20	53	75
November	34	15	56	65
December	22	9	59	65

[1] The percent of the time the existing flows spilled at the lake outlet of Black Bear Lake are greater than AP&T's proposed minimum flows.

During the 2003-2005 period the Prince of Wales Island has experienced drought conditions, and the area has suffered from limited winter snowpack and reduced summer precipitation. In order to ensure adequate water for late summer and fall salmonid runs, the agencies have allowed the applicant to operate the project below required minimum instream summer flows. In 2005, the applicant began using diesel to supplement the hydro in early June to allow inflow above the the minimum stream flow to recharge the reservoir so there would be flows to meet the important late summer and fall salmonid runs. The NMFS suggested in email dated May 2, 2006: "If the situation of recurrent reductions from prescribed instream flows continues, APT should consider a comprehensive alteration of prescribed flows through license modification in consultation with all of the state and federal resource agencies."

There have also been several occurrences (less than six according to the applicant) where the project has lost its siphon , the most recent occurring on October 12, 2005. Loss of the siphon shuts the Project down and reduces/elminates instream flow. The applicant notifies agency staff and files incident reports with FERC. According to an October 17, 2005 filing with FERC the October 12, 2005 incident started when the siphon failed at 3:45am and tripped the Project off-line, Power was restored with diesels by 4:30 am and the hydro was back on line at 6:15 pm. The filing with FERC goes on to describe how applicant has taken the following corrective measures to reduce the occurrence of siphon losses: Increased maintenance, SCADA training, and investigating design changes. In discussions with agency staff, they described the applicant as working diligently to solve this problem and the occurrences have decreased over time.

YES.

PASS.

B. Water Quality:

Criteria

1) Is the Facility either:
a) In compliance with all conditions issued pursuant to a Clean Water Act Section 401 water quality certification issued for the facility after December 31, 1986? Or
b) In Compliance with the quantitative water quality standards established by the state that support designated uses pursuant to the federal Clean Water Act in the Facility area and in the downstream reach?

YES

The State of Alaska issued their Certificate of Reasonable Assurance for the Black Bear Lake Hydroelectric Project on November 10, 1992. This certificate is issued in accordance with §401

of the Clean Water Act and provisions of the Alaska Water Quality Standards. The certificate incorporates mitigation measures identified in the FERC application (pages E-18/19, E-49, E65/67, and Appendix 6). The certificate says: "All of the mitigation measures are part of the [applicant's] proposal and are included in considerations upon which the State has developed its decision."

In conclusion the State asserts; "Having reviewed the application and comments received in response to the public notice, the Alaska Department of Environmental Conservation certifies that there is a reasonable assurance that the proposed activity, as well as any discharge that may result, is in compliance with the requirements of §401 of the Clean Water Act which includes the Alaska Water Quality Standards, 18 AAC 70, and the Standards of the Alaska Coastal Management Program, 6ACC 80."

If yes, go to B2.

2) Is the Facility area or the downstream reach currently identified by the state as not meeting water quality standards (including narrative and numeric criteria and designated uses) pursuant to Section 303(d) of the Clean Water Act?

NO.

PASS.

C. Fish Passage and Protection:

Criteria

1) Is the facility in compliance with Mandatory Fish Passage Prescriptions for upstream and downstream passage of anadromous and catadromous fish issued by Resource Agencies after December 31, 1986?

NA - Studies, including habitat surveys show that salmon do not spawn above natural barriers that are located 800-feet below the project tailrace. The flow above the project tailrace goes subterranean and then up wells below the project in an area called Lake Fork. Spring Fork is fed by natural springs. The habitat type is not good above the confluence of Lake Fork and Spring Fork because it is mostly steep gradient with large cobble. For these reasons fish passage is not an issue for this project.

NA = Go to C5

5) Is the Facility in Compliance with Mandatory Fish Passage Prescriptions for upstream or downstream passage of riverine fish?

NA- There are, however rainbow trout in the lake and a screened intake is used to prevent fish from going into the penstock. The valve house is designed to bypass flows to the creek below the powerhouse (the anadromous reach) when needed.

If YES, go to C6.

6) Is the facility in Compliance with Resource Agency Recommendations for Riverine, anadromous and catadromous fish entrainment protection, such as tailrace barriers?

YES - The facility is in compliance with recommendations from all resource agencies.

PASS.

D. Watershed Protection:

Criteria:

1) Is the Facility in Compliance with Resource Agency Recommendations, or, if none, with license conditions, regarding protection, mitigation or enhancement of lands inundated by the Facility or otherwise occupied by the Facility, or regarding other watershed protection, mitigation and enhancement activities?

YES – While there is no formal watershed protection plan, the licensee meets annually with the U.S. Forest Service, Craig Ranger District to discuss the Project. (see Recreation criteria)

PASS.

E. Threatened and Endangered Species Protection:

Criteria:

1) Are threatened or endangered species listed under state or federal Endangered Species Acts present in the Facility area and/or downstream reach?

NO- No state or federally proposed or listed threatened or endangered species are known to occur in the project area.

PASS.

F. Cultural Resource Protection:

Criteria:

1) **If FERC-regulated, is the Facility in compliance with all requirements regarding Cultural Resource protection, mitigation or enhancement included in the FERC license or exemption?**

YES.

PASS.

G. Recreation:

Criteria:

1) **If FERC-regulated, is the Facility in Compliance with the recreational access, accommodation (including recreational flow releases) and facilities conditions in its FERC license or exemption?**

YES - Although, the original license required development of recreational facilities at Black Bear Lake with the U.S. Forest Service (FS), once the conceptual design was investigated on-site it was determined that it would be impractical. Presently, the FS has developed an off-site location for a recreation cabin on the Island that the licensee will fund through a contractual agreement of $200,000, which was paid to the FS in January 2006.

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If yes go to G3.

2) **Does the Facility allow access to the reservoir and downstream reaches without fees or charges?**

YES.

PASS.

H. Facilities Recommended for Removal:

Criteria:

1) Is there a Resource Agency recommendation for removal of the dam associated with the Facility?

NO.

There have been no recommendations for removal of the dam.

PASS.

FACILITY IS LOW IMPACT

RECORD OF CONTACTS

Date of Conversation:	September 12, 2006
Application Reviewer:	Fred Ayer, Executive Director
Person Contacted:	Steve McCready, Alaska Department of Fish and Game
Telephone/email:	907-826-2498
Areas of Expertise:	Fisheries

Steve was familiar with the project and confirmed much of what AP&T had said in their application. He said the applicant was generally good to work with. The only problem he was aware of was that occasionally the siphon was lost which, depending on the time of year, dried up areas downstream of the project. He wasn't sure how frequently this occurred, but said that it was not a major disaster and if it took place during the rainy season it caused no problems. He confirmed that there was a self-sustaining population of rainbow trout in the lake that had been studied by the applicant to see how their operations and draw downs affected the trout population and his impression was that any effect was minimal. He thought the project was low impact.

Date of Conversation:	September 12, 2006
Application Reviewer:	Fred Ayer, Executive Director
Person Contacted:	John Dunker
Telephone/email:	907-465-2533
Areas of Expertise:	Water rights, flows and project operation

John's agency is responsible for issuing the water rights. He also gets involved when the applicant needs to depart from either the flow regime or lake levels. This happens periodically as a result of very dry water years which have occurred recently. John's agency meets with other agencies and the applicant to work out emergency operating regimes. He also mentioned the occasions that the siphon was lost and there was no flow into the creek. He thought this hadn't happened very often in the last couple of years. He also was aware that the applicant had made some modifications to the siphon and had improved communications. It was his sense that things had improved since the changes to the siphon and the improved communication. He said the applicant was generally good to work with and he thought the project was low impact.

Date of Conversation:	December 4, 2006
Application Reviewer:	Fred Ayer, Executive Director
Person Contacted:	Sue Walker, National Marine Fisheries Service
Telephone/email:	907-586-7646
Areas of Expertise:	Anadromous Fish and Hydropower Licensing

I had a nice lengthy conversation with Sue who has worked on several of APT's Hydro Projects and she speaks highly of the applicant and says their projects are better than other Alaska Hydro projects. She confirmed that there were two flow-related issues with the Black Bear Lake Hydro and that the loss of siphon issue, as far as she was concerned, was resolved. The other flow issue, lack of water from drought conditions, was not ATP's fault, but was as a result of climate change. Her point is that the drainage basin is a rain forest with high annual rainfall, but that annual rainfall dramatically reduced during 2003-2005 because of drought---which isn't supposed to happen in a rain forest. She is satisfied with the current operating scheme of "water rationing", but has suggested altering the flow requirements for the project if droughts continue to be a reoccurring phenomenon. Sue agreed with my suggested condition (a slight rewording of her suggestion in correspondence to APT) which would have the applicant explore a comprehensive alteration of prescribed flows through license modification in consultation with all of the state and federal resource agencies.

Sue has worked with ATP on a number of their projects and says they have been a good company to work with and their projects are generally better than those owned and operated by other companies. Sue supports Low Impact Certification for the Black Bear Lake Hydro Project.

Date of Conversation:	September 12, 2006 and several follow-ups
Application Reviewer:	Fred Ayer, Executive Director
Person Contacted:	Jim Ferguson, PhD, Statewide Hydropower Coordinator
Telephone/email:	907-267-2312
Areas of Expertise:	Hydropower Licensing and environmental effects

I had originally (September 12, 2006) attempted to contact Christopher Estes, but he was out and would not be in until September 25, 2006. Subsequently I got a call from Jim Ferguson, who explained that he was the guy to talk with. We had a nice chat and he sent me a series of questions concerning the LIHI process which I answered by email. We had a second conversation on November 2, 2006 which covered a number of subjects. When discussing the Black Bear Lake Project, Jim described the situation with the applicant's inability to meet salmon flows in some years as a result of drought conditions and the loss of a siphon.

In 2004 and 2005, the applicant working with the agencies, came up with a plan to "ration" water during drought conditions by reducing flow during the late spring fry-rearing and smolt outmigration period , and saving it for the more critical flows needed for upstream passage of adult salmon during the late summer months. Jim explained how the applicant reduced hydro generation and saved water by generating more diesel generated electricity.

Jim was also very helpful in explaining some of the issues confronting agencies in Alaska and how the Alaska hydro regulatory was quite different from what was going on in the lower 48. Jim filled me in on some of the differences. For example, the state of Alaska does not issue §401 certificates on FERC licensed projects as a result of being short staffed.

Date of Conversation:	December 1, 2006 (which was preceded by several calls)
Application Reviewer:	Fred Ayer, Executive Director
Person Contacted:	Jan Konisberg, HRC Alaska
Telephone/email:	907-248-3014

Jan has been incredibly helpful in my evaluation of the Black Bear Lake Project and has been a good objective source. He has also helped me better understand some of the difficult issues unique to Alaska. Jim's sense of the Black Bear Project was consistent with what I heard from others and he was supportive of the Project being certified and also felt that my suggested condition made sense.
