1 INTRODUCTION

1.1. Background

The proposed Chakachamna Hydroelectric Project (Chakachamna Project or Project) is located approximately 85 miles west of Anchorage and 42 miles west north west from the Chugach Electric Association (CEA) Beluga substation that feeds power to the "Railbelt" grid system. The power potential of the Project has been investigated for more than 60 years with the first studies conducted by the U.S. Geological Survey (USGS) in 1948 and published in a report entitled Report on Reconnaissance of Lake Chakachamna. Additional studies were carried out initially by the U.S. Bureau of Reclamation and later by the U.S. Army Corps of Engineers (USACE). Power potential from Chakachamna, depending on various development scenarios, ranges between 300 and 400 megawatts (MW) based on a 50% plant factor. While this is a substantial amount of power, neither federal agency chose to pursue the project because each was vying for its own much larger project in the 1960s: Susitna (1,600 MW) for the Bureau of Reclamation and Rampart (6,400 MW) for the USACE.

The State of Alaska, through the Alaska Power Authority (APA), carried out the most definitive investigations of the potential development of Chakachamna (Cited hereafter as Bechtel, 1983). Although the Power Authority had begun investigations of the Susitna Hydropower Project in the late 1970s, it chose to investigate the merits of Chakachamna as well. Chakachamna was viewed at the time as a fairly straightforward project that could be brought on line prior to Susitna to meet the growing power needs of the Railbelt (the load center from Fairbanks to Anchorage and the Kenai where roughly 70 percent of Alaska's population resides).

The Power Authority contracted with Bechtel Engineering (Bechtel) to evaluate the viability of the Chakachamna Project in the late 1970s and early 1980s. The Bechtel studies resulted in the recommendation of a 330 MW development that would include a 183-meter (m) (600-foot) long and 15-m (49-foot) high rockfill embankment structure located at the outlet of Chakachamna Lake, a lake tap at Chakachamna Lake and a tunnel to an underground powerhouse and tailrace at the McArthur River. Section 1.3 below describes how this early configuration has evolved in response to stakeholder questions and comments into the project being proposed by TDX.

The Chakachamna Project was ultimately put aside in deference to the Susitna hydropower project; the latter was ultimately terminated in 1985 when the price of oil fell below $10 per barrel. Hindsight suggests that the Railbelt market may well have been better served by the smaller Chakachamna Project.

1.2. The Power Market

Total energy demand in the Railbelt is approximately 5 billion kilowatt hours (KWH) annually. The market is served by six utilities, each with their own protected service territories that are regulated by the Regulatory Commission of Alaska (RCA). Four of the utilities are cooperatives, and two are municipally owned. The preponderance of electricity comes from natural gas-fired generation, but hydropower comprises approximately 20 percent of the total with coal and oil-

fired generation providing the balance. The availability of natural gas to the Railbelt as a feedstock for home heating and power generation is beginning to wane. Of the approximately 9 trillion cubic feet (TCF) of natural gas reserves found in the Cook Inlet area since the mid-1960s, less than 2 TCF remains, and most of that has been committed. While Cook Inlet has historically been an exporter of liquefied natural gas (LNG), it is anticipated that it will become an LNG importer in the near future. Because of this anticipated natural gas shortage, the electric utilities in the Railbelt are looking for alternative sources of power generation. Some are evaluating coal-fired power plants while others are hoping for new discoveries of natural gas or an eventual in-state pipeline from the North Slope gas fields. New coal or natural gas fired generation would be expected to result in the cost of electricity rising dramatically.

TDX identified Chakachamna Project as a potentially significant source of power and received its preliminary permit in November, 2006 to explore the feasibility of bringing this resource to market. Recently, a Regional Integrated Resources Plan (RIRP) process has been initiated by the Alaska Energy Authority (AEA), which will result in a 50-year, long-range plan identifying combinations of generation and transmission (G&T) capital improvement projects in the Railbelt Region of Alaska. TDX anticipates that the results of the RIRP will play a significant role in determining the potential role of the Project in providing power for the Railbelt.

1.3. Project Summary

TDX is proposing a project that entails the interbasin transfer of water from a lake-tap near the outlet of Chakachamna Lake through an approximately 11-mile long, 21-ft diameter hard-rock tunnel to an underground powerhouse that would discharge to the McArthur River. The total head would be approximately 900 feet, and the powerhouse elevation would be approximately 200 feet. It is estimated that the project could produce roughly 1,300 gigawatt hours (GWh) average annual energy from an installed capacity of 300 MW. A control weir and fish passage facilities would be located at the outlet of Lake Chakachamna. Upstream and downstream fish passage would be provided under the entire range of hydrologic conditions through an operating plan that maintains a minimum pool that would provide access via the existing river channel during key migration periods, and fish passage facilities that are available when the lake level is not high enough to develop flow down the Chakachatna River. The power produced would be distributed to an existing substation on the Railbelt grid in central Alaska via approximately 42 miles of newly constructed 230-kilovolt transmission lines.

The proposed Project has undergone some modifications from the preferred alternative described by the Bechtel report in 1983. Many of these changes have been made in response to questions and concerns raised during extensive early consultation with resource agencies, Indian Tribes, and non-governmental parties (collectively, "stakeholders") about the risks posed to upstream and downstream migration of salmon. Other specifications have changed due to preliminary engineering and economic optimization analyses. Some key proposed changes from the earlier Bechtel concept include:

ENVIRONMENTAL RISK MITIGATION MEASURES

- Adding seasonal reservoir elevation restrictions and reducing power pool normal operating range to enhance fish migration
- Lowering elevation of power tunnel intake to reduce potential fish attraction

ENGINEERING AND ECONOMIC OPTIMIZATION MEASURES

- Decreasing diameter of power tunnel to 21 feet
- Decreasing installed capacity to 300 megawatts
- Decreasing powerhouse hydraulic capacity to 5,400 cubic feet per second
- Eliminating most of the power tunnel's proposed concrete lining through selection of a tunnel boring machine as construction method
- Reducing number of turbines to three
- Relocating and redesigning outlet structures to minimize exposure to potential glacial hazards
- Shortening length of new transmission line to 42 miles

CHANGES IN FISH PASSAGE FACILITIES

- Using same tunnel diameter as the power tunnel
- Providing a fish lock instead of ladder with multiple outlets
- Providing fish passage at the low weir in the river
- Reconfiguring the juvenile channels at the head of the tunnel to reduce flow velocities and provide smoother transition to the bypass flow in the tunnel

Additional technical information about the features and operation of the proposed Project are provided in Section 3.

1.4. Resource Issues and Proposed Study Approach

Project Area salmon contribute to commercial, sport, and subsistence fisheries in the Upper Cook Inlet area. Sockeye salmon are by far the most important commercial species. However, fish from westside streams, including the Chakachatna and McArthur Rivers, are believed to contribute a small percentage of the total Cook Inlet catch because of the numerical dominance of salmon from larger and highly productive systems such as the Kenai, Susitna, and Kasiloff rivers. Sport fishing for Chinook and coho salmon and rainbow trout occurs in the lower Chakachatna and McArthur Rivers but pressure is light because of difficult access. Set net fisheries (both commercial and subsistence) on the west side of Upper Cook Inlet would be expected to intercept fish en route to the Project Area.

Important impact issues relating to aquatic resources that have been identified include: maintenance of salmon passage into Chakachamna Lake and its tributaries; impact of lake drawdown on spawning salmon and lake trout; impact of reduced flow in the Chakachatna River; impact of increased flow in the McArthur River; false attraction of salmon to the powerhouse tailrace; and maintenance of existing tributary and slough fish use areas. The goal of the environmental study program and facilities design effort that will be undertaken in support of a license application is to accommodate fish passage, and through the regulation of instream flow releases, avoid or reduce downstream impacts in the Chakachatna and McArthur rivers and their floodplain systems.

Wildlife habitats are generally typical of those found in similar areas in south-central Alaska. The Trading Bay State Game Refuge encompasses the lower portions of the McArthur and Chakachatna Rivers. The refuge was established primarily to protect migratory bird habitats and

other wildlife species associated with the extensive wetlands and tide flats and to protect human use opportunities, especially hunting. Refuge values will need to be protected during Project development. Other potential impacts associated with terrestrial habitats include conflicts between birds and transmission lines, disturbance of wildlife during high impact activities such as blasting, loss of habitat from facility construction and waste rock disposal, increased human activity due to improved access, and loss of wetland function. Most impacts will be associated with changes in water distribution in the two river flood plain systems; as with aquatic resources, a significant study program will be required to update vegetation and wildlife information in the Project Area and to address specific potential impact issues.

As described in section 5 and Appendix 5-1 of this PAD, 43 resource studies have been identified to answer questions about the relationship between the Project and the environment. Developing the necessary information for a complete license application is hampered by a lack of existing information about the Project area; therefore, the proposed environmental study program needs to develop 1) a baseline period of record necessary to understand the interrelationships between proposed project characteristics and the environment; 2) a basic understanding of the key environmental functions and values in the area; and 3) a basis for determining project effects and appropriate Protection, Mitigation, and Enhancement (PME) measures to address those effects. A phased study program is being proposed as the most effective way to obtain the necessary information. TDX is therefore proposing to issue two Proposed Study Plans, PSP-1 and PSP-2, in 2009 and 2010 respectively.

PSP-1 will be limited to those studies that are necessary to develop a baseline period of record and to shed light on key environmental functions and values. TDX will issue PSP-2 in 2010 in order to describe the balance of the environmental program aimed at impact assessment and PME measure development.