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**IN THE SUPERIOR COURT FOR THE STATE OF ALASKA  
THIRD JUDICIAL DISTRICT AT ANCHORAGE**

NUNAMTA AULUKESTAI, *et al.*,

Plaintiffs,

vs.

STATE OF ALASKA, DEPARTMENT  
OF NATURAL RESOURCES,

Defendant,

And

PEBBLE LIMITED PARTNERSHIP,

Intervenor-Defendant.

Case No.: 3 AN-09-09173 CI

**PLAINTIFFS' PROPOSED  
FINDINGS OF FACT AND CONCLUSIONS OF LAW**

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## TABLE OF ACRONYMS

ACMP	Alaska Coastal Management Program
ADF&G	Alaska Department of Fish and Game
AHEA	Annual Hardrock Exploration Applications
AHPA	Alaska Historic Preservation Act
APMA	Annual Placer Mining Applications
ATV	All Terrain Vehicle
BIF	Best Interest Finding
CAE	Cominco Alaska Exploration
COE	U.S. Army Corps of Engineers
DEC	Department of Environmental Conservation
DNR	State of Alaska Department of Natural Resources
FH-	Fish Habitat Permit
LLO	Leasehold Location Order
MCH	Mulchatna Caribou Herd
MCO	Mineral Closure Order
MLUP	Miscellaneous Land Use Permit
MSDS	Material Safety Data Sheets
MTRS	Meridian, Township, Range, Section
NDM	Northern Dynasty Minerals
OHMP	Office of Habitat Management and Permitting
PLP	Pebble Limited Partnership
PPE	Personal Protective Equipment
SHPO	State Historic Preservation Officer
TDS	Total Dissolved Solids
TWUP	Temporary Water Use Permit

## **Authorities Principally Relied Upon**

### **Article 8 - Natural Resources**

#### **§ 1. Statement of Policy**

It is the policy of the State to encourage the settlement of its land and the development of its resources by making them available for maximum use consistent with the public interest.

#### **§ 2. General Authority**

The legislature shall provide for the utilization, development, and conservation of all natural resources belonging to the State, including land and waters, for the maximum benefit of its people.

#### **§ 3. Common Use**

Wherever occurring in their natural state, fish, wildlife, and waters are reserved to the people for common use.

#### **§ 4. Sustained Yield**

Fish, forests, wildlife, grasslands, and all other replenishable resources belonging to the State shall be utilized, developed, and maintained on the sustained yield principle, subject to preferences among beneficial uses.

#### **§ 8. Leases**

The legislature may provide for the leasing of, and the issuance of permits for exploration of, any part of the public domain or interest therein, subject to reasonable concurrent uses. Leases and permits shall provide, among other conditions, for payment by the party at fault for damage or injury arising from noncompliance with terms governing concurrent use, and for forfeiture in the event of breach of conditions.

#### **§ 10. Public Notice**

No disposals or leases of state lands, or interests therein, shall be made without prior public notice and other safeguards of the public interest as may be prescribed by law.

## § 11. Mineral Rights

Discovery and appropriation shall be the basis for establishing a right in those minerals reserved to the State which, upon the date of ratification of this constitution by the people of Alaska, were subject to location under the federal mining laws. Prior discovery, location, and filing, as prescribed by law, shall establish a prior right to these minerals and also a prior right to permits, leases, and transferable licenses for their extraction. Continuation of these rights shall depend upon the performance of annual labor, or the payment of fees, rents, or royalties, or upon other requirements as may be prescribed by law. Surface uses of land by a mineral claimant shall be limited to those necessary for the extraction or basic processing of the mineral deposits, or for both. Discovery and appropriation shall initiate a right, subject to further requirements of law, to patent of mineral lands if authorized by the State and not prohibited by Congress. The provisions of this section shall apply to all other minerals reserved to the State which by law are declared subject to appropriation.

## § 12. Mineral Leases and Permits

The legislature shall provide for the issuance, types and terms of leases for coal, oil, gas, oil shale, sodium, phosphate, potash, sulfur, pumice, and other minerals as may be prescribed by law. Leases and permits giving the exclusive right of exploration for these minerals for specific periods and areas, subject to reasonable concurrent exploration as to different classes of minerals, may be authorized by law. Like leases and permits giving the exclusive right of prospecting by geophysical, geochemical, and similar methods for all minerals may also be authorized by law.

## § 13. Water Rights

All surface and subsurface waters reserved to the people for common use, except mineral and medicinal waters, are subject to appropriation. Priority of appropriation shall give prior right. Except for public water supply, an appropriation of water shall be limited to stated purposes and subject to preferences among beneficial uses, concurrent or otherwise, as prescribed by law, and to the general reservation of fish and wildlife.

## § 14. Access to Navigable Waters

Free access to the navigable or public waters of the State, as defined by the legislature, shall not be denied any citizen of the United States or resident of the State, except that the legislature may by general law regulate and limit such access for other beneficial uses or public purposes.

## **I. PLAINTIFFS' PROPOSED FINDINGS OF FACT**

### **A. Introduction**

1. The Commissioner of the Department of Natural Resources for the State of Alaska (Commissioner) and the Director of the Division of Mining, Land and Water (Director) have affirmed the State's litigation position that the State is not required to undertake any public notice or conduct a public interest analysis for the exploration and water use activities at the Pebble Project pursuant to Article VIII of the Alaska Constitution. [Irwin 10/20/10 Depo. 119:16 to 121:13; Mylius, 12/17/10 Tr. 48:20-22.] The State maintains that its statutes, regulations, permitting procedures and conditions sufficiently fulfill its constitutional responsibilities and mitigate harm to reasonable concurrent users. [Fredericksen, 12/13/10 Tr. 162:13 to 163:25; 172:18-22; Irwin 10/20/10 Depo. Tr. 70:20-22.]

2. The State admits that it did not consider the effects of Pebble Project exploration and water use on reasonable concurrent users, beneficial uses, common use, sustained yield (except as the Alaska Department of Fish and Game (ADF&G) addresses it), maximum benefit of the people, public interest, and replenishable resources. [Irwin 10/20/10 Depo. 119:16 to 121:13; Krause 7/21/10 Depo. 110:5-15.]

3. The State also admits that prior to approving Pebble Project exploration activities it generated no written analyses or documentation reflecting consideration of the reasonably foreseeable effects of developing the Pebble mine. [Ex. 604 at 12, RFA #6.] The State further admits that neither before nor after issuance of the Pebble Project Miscellaneous Land Use Permit (MLUP), dated February 27, 2009, did it perform any economic analysis of the Pebble Project's exploration impacts on:

(a) subsistence (Ex. 601 at 2, RFA #3);  
(b) fisheries resources in the Bristol Bay region (Ex. 601 at 2, RFA #4);  
(c) wildlife resources (Ex. 601 at 3, RFA #5); or  
(d) guiding businesses (hunting or fishing) (Ex. 601 at 3, RFA #7); nor did the State analyze significant, permanent, temporary, or cumulative environmental impacts or damage caused by the Pebble Project's exploration and water use. (Ex. 601 at 3, RFA #8).

4. The substantial and long-term Pebble Project exploration activities have impinged on the reasonable concurrent users and on the conservation of land and water resources at the Pebble Project site. [See FF #5-17, 62, 66, 67, 69, 71, 72, 75, 77, 81, 85.] These Pebble Project exploration activities are of a scope and duration that far exceed the level of impact of those activities discussed in *Northern Alaska Env'tl. Ctr. v. State* (hereinafter *NAEC*), 2 P.3d 629 (Alaska 2000), which were found to warrant the preparation of a best interest finding. [See Evidence Table A – Pebble Project Compared to *NAEC*.]

5. The exclusion of other users, the long-term and potentially indefinite commitment of state resources, and the *de facto* irrevocability of the Pebble Project MLUPs and temporary water use permits (TWUPs) have resulted in a disposal of the State's interests without public notice and without safeguards of the public interest. [See FF #1, 2, 5, 6, 39, 40, 41, 42, 124, 125, 149, 151.]

## **B. Factual Background: Location, Resources, Concurrent Uses**

### **1. Location**

6. The Pebble Project is located in the interconnected watersheds of three important anadromous waters: the South Fork Koktuli River, North Fork Koktuli River and Upper Talarik Creek which are the major spawning tributaries of the Kvichak and Nushagak Rivers that feed into Bristol Bay. [Trasky, 12/14/10 Tr. 90:4-11; Cathcart, 12/15/10 Tr. 51:19-25; Woody, 12/14/10 Tr. 17:22-25; 26:17-24.] Bristol Bay is home to one of the richest fisheries in the world, providing “a major portion of all salmon harvest in the State of Alaska and the world annually.” [Ex. 877 at SOA 15331.]

### **2. Resources**

7. The headwaters areas where the Pebble Project is located are particularly important to the productivity of these river systems, contributing up to 60 per cent of the nutrients and the water which provide rearing habitat for species such as Coho and Chinook salmon. [Trasky, 12/14/10 Tr. 90:14-18.] The South Fork Koktuli River is one of the premier king salmon sportfishing streams in the Bristol Bay region. [Trasky, 12/14/10 Tr. 90:8-11.] People are drawn to this region to enjoy one of the “finest sport fishing and hunting areas of the world.” [Ex. 877 at SOA 15332.]

8. The Pebble Project area boasts superlative wildlife habitat, with designated essential winter and calving habitat for the Mulchatna Caribou Herd, “essential stream concentration” for brown bears, and moose wintering grounds. [Exs. 94, 95, 96, 97, 767.] The State admits that the Pebble Project Area provides “critical,” “important,” or “essential” habitat (as defined in the 1985 Bristol Bay Area Plan) to caribou and other wildlife. [Ex. 604 at 21, RFA #39.]

9. Fish surveys of the Pebble Project area have documented the presence of ten resident species of fish, including Arctic grayling, blackfish, burbot, Arctic char, lake trout, longnose sucker, Northern pike, smelt, rainbow trout, and whitefish. There are eight anadromous species including salmonids (sockeye, coho, Chinook and King salmon) and the facultatively anadromous Dolly Varden. Black fish, an important subsistence food when salmon runs are poor, are found in tundra ponds throughout the

area. [Ex. 588 at NA 5661; Woody, 12/14/10 Tr. 17:22-18:12; 30:9-13; 68:4-6; Trasky, 12/14/10 Tr. 114:21-42; Reiser, 12/16/10 Tr. 240:6-11.]

10. The hyporheic zone, in which surface waters and groundwaters mix, shelters unique fauna in the Pebble Project area. Up to 80 different species have been identified in the area's hyporheic zone, which can extend kilometers away from a stream or river. [Woody, 12/14/10 Tr. 29:16 to 30:1.] Fish embryos use the hyporheic zone for transport, and it is likely that this explains why salmon and burbot are found in small holes and ponds which have no obvious connection to an anadromous stream. [Woody, 12/14/10 Tr. 30:9-13.]

### 3. Concurrent Users

11. Alaska Natives from the region, including those Plaintiffs,<sup>1</sup> who are Native, have relied on the Pebble Project area and its environs for subsistence hunting, fishing, food-gathering, and cultural practices. [Ex. 588 at NA 5661; Andrew, 12/8/10 Tr. 69:4-8; 78:24 to 79:22; Delkittie, 12/10/10 Tr. 96:13-18; 99:13 to 100:22; Ex. 447 at 1, 30 (Fig. 1-1).] The area is also used for traplines and alternate travel routes during inclement weather. [Delkittie, 12/10/10 Tr. 98:24 to 99:1; 110:22 to 111:5.]

12. Hunters, fishermen and hunting guides have used the Pebble Project area for recreation and commercial uses. [Morris, 12/10/10 Tr. 26:25 to 28:2; Halford, 12/13/10 Tr. 91:5-25; Trasky, 12/14/10 Tr. 90:8-11; 109:10-13; Taylor, 12/9/10 Tr. 108:25 to 109:3.]

## **C. Magnitude of the Project: Scale, Investment, Public Importance**

### 1. The Pebble Project is of Significant Magnitude/Scale

13. Mineral exploration progresses through stages from early-stage exploration to advanced exploration. The stages are characterized, in the mining industry, by several factors, including the amount of money expended to conduct the exploration. Early stage exploration involves geological, geophysics, and geochemistry, and sediment sampling.

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<sup>1</sup> The Plaintiffs are: Nunamta Aulukestai ("Caretakes of our Land") a non-profit association of the village corporations of Koliganek, New Stuyahok, Ekwok, Dillingham, Aleknagik, Clarks Point, Manokotak, Togiak, and Levelock (Andrew, 12/8/10 Tr. 59:4-11); Rick Delkittie, a resident of Nondalton; Violet Willson, a resident of Naknek; Bella Hammond, a resident of Miller Creek on Lake Clark and wife of former Governor Jay Hammond; and Victor Fischer, a constitutional scholar and Alaska Constitutional Convention delegate. [Delkittie, 12/10/10 Tr. 95:3; Hammond, 12/10/10 Tr. 121:14; *Glover v. State Dept. of Transp.* 1274 P. 3d 1240, 1247 (Alaska 2008).]

Later stage exploration involves water quality sampling and delineation of the mineral deposit. When the first drill rig is employed, exploration approaches the advanced stage. Once the cost of exploration exceeds \$1 million, the project begins to approach the advanced exploration stage. [Chambers, 12/10/10 Tr. 54:19 to 55:7.]

14. The Pebble Project is one of the most extensive and expensive mineral exploration projects in Alaska's history. [Irwin 10/20/10 Depo. 194-19-21 ("Q: [I]s it fair to say it is one of the biggest mineral exploration projects? A: Yes."); Fredericksen, 12/14/10 Tr. 179:3-6 ("I think on any --any reasonable person would have to say that that's large scale drilling."); Fredericksen, 12/14/10 Tr. 184:6-9 ("Do you agree that this project is a magnitude that other mining companies and the public consider it significant? A Yes, ma'am."); Fredericksen, 12/14/10 Tr. 184:12-14 ("Q And do you consider the extent and duration of that project significant? A Certainly in recent years, yes.")]. The State and Nunamta Aulukestai, *et al.* (Nunamta) witnesses agreed that Pebble is "advanced mineral exploration. [Krause 7/21/10 Depo. 170: 3-8; 199:1 ("ten holes" is advanced exploration; "they're [Pebble] in an advanced exploration project."); Trasky, 12/14/10 Tr. 107:10 ("Very advanced."); Chambers, 12/10/10 Tr. 56:11-16 ("In 2003 we were definitely in the advanced stage.")]. The State Mineral Property Manager, Kerwin Krause, testified that drilling at the Pebble Project is not *de minimus*, because under his definition, any borehole that is greater than 300 feet deep is not a *de minimus* activity. [Krause 7/21/10 Depo. 165:14-21.] The Pebble Project boreholes have been drilled to depths approaching 7,000 feet. [Ex. 123.] Out of the 1084 holes for which depth information is available, 602 boreholes were reported to have depth greater than 300 feet [Exhibit 123.]

## 2. Multiple Permits Demonstrate the Significance of the Scale

15. Five different types of State permits or authorizations have been issued for Pebble Project exploration since 1989, totaling more than 85 individual permits, including amendments: (i) 29 MLUPs; (ii) 18 TWUPs; (iii) 38 Fish Habitat permits; (iv) one ACMP consistency evaluation; and (v) cultural resource survey permits. In the span of 21 years, and as to all of the separate permit approvals, there was but a single public notice and comment period pertaining to the ACMP review of just one year's exploration permit in 2007.<sup>2</sup>

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<sup>2</sup> In 2010, after this litigation was filed, there was an ACMP consistency review of the dock at Big Wiggly Lake. The dock was in violation of the ADF&G dock size specifications and also the Big Wiggly fuel storage facility closer than 100 feet to the water. Mr. Taylor testified that he discovered this violation after Nunamta Aulukestai, *et al.* (Nunamta), in the course of this litigation, had cited several water use violations, prompting him to investigate whether there might be other permit violations at the Pebble Project site. [Taylor 8/18/10 Depo. 195:23 to 196:9; Gleitsmann, 12/17/10 Tr. 122:3-13.]

(a) *MLUPs*

16. From 1989 through 2006, the Department of Natural Resources (DNR) issued MLUPs for Pebble Project exploration activities on an annual *basis*.<sup>3</sup> These permits purport to be authorizations to use state land “on a temporary basis” for a variety of purposes with “a range in duration from one to five years.” [Ex. 2043-2070; Ex. 190; *see also* [http://dnr.alaska.gov/mlw/permit\\_lease/index.cfm](http://dnr.alaska.gov/mlw/permit_lease/index.cfm) (last visited 1/23/11) (quoted in Order on Summary Judgment at 16).] The permits are intended for temporary, non-permanent uses such as floating lodges, log storage, scientific research, guide camps, *equipment* storage and commercial recreation uses. *Id.* However, the level of intensity, duration *or scope* of land uses at the Pebble Project are: (i) permanent, because discharges, drill holes and plugging material remain permanently on the land; (ii) long-term, because exploration has been ongoing for 21 years and is anticipated to continue; and (iii) of a significant scale and scope, with environmental impacts that far exceed those of a guide camp or log storage area.

(b) *TWUPs*

17. In January 2007, after 12 years of exploration, DNR issued the first nine TWUPs for the Pebble Project. [Exs. 932, 934, 936, 938, 940, 942, 944, 946, 948.] The TWUPs allowed water withdrawal from 20 streams and 18 ponds. [Ex. 932 at SOA 7636.] They allowed withdrawal of a total of 113,000 gallons of water per day (gpd) year round, based on the “average rig” withdrawing 16,500 gpd for an equivalent of 250 days/year of operations. [Ex. 932 at SOA 7807.] The annual limit to the water withdrawals was 28,350,000 gallons. [Ex. 932 at SOA 763.] The permits required a screened water intake structure with a mesh size of 0.25 inches and a water intake velocity limited to 0.5 feet per second (fps). There was no limit on the amount of water that could be withdrawn per minute. [Ex. 932 at SOA 7634.]

18. In July 2007, PLP sought and received an amendment to the TWUPs to allow withdrawal of an additional 16,500 gpd for a total of 129,000 gpd with an annual limit of up to 32,475,000, because it was adding an eighth drill rig to the seven previously authorized. [Ex. 933 at SOA 7631.] No additional water sources were identified. [Ex. 933 at SOA 7623.] The DNR permitter for the Pebble Project exploration, Kerwin

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<sup>3</sup> MLUPs were issued by DNR every year from 1989 through 2010, except 2000 and 2001. [Exs. 190, 2043-2071.] In 1995, a 4-year MLUP was issued. [Ex. 2063.] In 2002, a 5-year MLUP was issued. [Ex. 2057.] There were ten amendments to the 2002 (5-year) permit as exploration activity increased. [Ex. 2049-2053; 2055-2060.] In 2009, a 2-year MLUP was issued. [Ex. 2043.] The 2009 permit has been amended twice. [Ex. 2044, 2045.]



Krause, admitted that it was not possible to identify the location of drill holes or water sources from the 2007 TWUP permitting map. [Krause, 7/21/10 Depo. 129:6-19.] Dr. Smith testified that the TWUP water source map was inadequate to identify water sources such as ponds and streams. [Smith, 12/9/10 Tr. 192:4 to 195:5.]

19. In May 2009, DNR issued two additional TWUPs for withdrawals from eight additional streams and three additional ponds. [Ex. 2081 at SOA 12343; Ex. 2082 at SOA 12750.] The permits were conditioned on having a screened water intake structure with a mesh size of 0.25 inches and a water intake velocity limited to 0.5 fps and a withdrawal rate of 25 gpm. [Ex.2082 at SOA 12751.] Neither the 2007 nor the 2009 permits identified the point of diversion or the point of return of the water. [Bettis, 12/16/10 Tr. 71:1-16.] Dr. Smith testified that the State and PLP had inconsistent identification for water sources for each borehole and that the State had no information on actual water use in its database. [Smith, 12/7/10 Tr. 178:12 -179:18; 201:16-18.] This lack of information as to actual water use was confirmed by Ms. Bettis, the water use permitter at DNR. [Bettis 12/ 16/10 Tr. 71:17-18 (“Q: You didn’t measure the water being used did you? A: No I did not.”).]

20. In 2010, after Nunamta informed the Court of possible water use violations, Pebble Limited Partnership (PLP) was found to have violated its TWUPs by taking water from 45 unpermitted sources in the three affected drainages (North Fork Koktuli, South Fork Koktuli and Upper Talarik Creek) between 2007 and 2009. [Ex. 345.] In a settlement agreement with PLP, the State required significant changes to the water withdrawal procedures, including: (i) submission of maps showing water sources; (ii) identification of intake points within each stream reach; (iii) identification of each drill hole, TWUP and Fish Habitat permit associated with each water source; (iv) a plan for coordination and training of field staff, geologists, engineers, drillers and other workers involved in the placement of intake hoses; (v) provision of GPS identification of each intake, submitted by email to DNR and ADF&G; (vi) photographic evidence of each intake point prior to and after intake equipment had been placed and removed; (vii) appointment of a field inspector to be responsible for confirming water sources and TWUPs and checking locations; and (viii) submission of a water withdrawal plan. *Id.*

21. In 2010, DNR issued nine additional TWUPs. [Exs. 2072-2080.] The permits were conditioned on having a pump intake diameter of no greater than 1.5 inches and a maximum 25 gpm output. There was no identification of intake structure or velocity in the TWUPs, although the Fish Habitat permit addressed this requirement. [Ex. 2072 at SOA 69934; Ex. 2106.] The permits allowed water withdrawals from an additional 27 streams and 22 ponds. [Exs. 2072-2080.]

22. From 2007 through 2010, DNR issued TWUPs for withdrawal of a significant amount of water (more than 5,000 gallons from a single source in a day) from

55 permitted streams and 43 permitted ponds. [FF #17-21 .] In addition, PLP used 45 unpermitted sources of water. [Ex. 345.]

(c) *Fish Habitat Permits*

23. In 1991, the Alaska Department of Fish and Game (ADF&G) issued a Fish Habitat permit for seismic surveys to be conducted on the Pebble site. [Ex. 2127.] No other Fish Habitat permits were issued to PLP or its predecessors until 2007, despite the fact that seismic activity and water withdrawals were occurring at the site. [Ex. 2035 at SOA 4403.]<sup>4</sup>

24. In January 2007, concurrent with the TWUP permits, PLP obtained seven Fish Habitat permits for water withdrawals from streams identified in the 2007 TWUPs. [Exs. 2124, 2123, 2121, 2102, 2117, 2116, 2114.] The permits were for a single season and were set to expire on December 31, 2007. [*Id.*] The permits specified a velocity of 0.4 fps and a screen mesh size of 2.4 mm (.09 inches) (Ex. 2124 at SOA 4554), and limited the withdrawal rate to 15 gpm.<sup>5</sup>

25. In December 2007, ADF&G issued “Amended” Fish Habitat Permits for the same water bodies and extended the permits so they would expire in five years. [Ex. 2115, 2118, 2119, 2122, 2125.] The 2007 amendments contained the same fish screen and velocity requirements.

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<sup>4</sup> In 2006 a single Fish Habitat Permit was issued for water withdrawal from the North Fork of the Koktuli River to Alaska Earth Sciences. [Ex. 2126.] That permit was for 5,000 gpd (or less) and the withdrawal rate was 5-10 gpm. [*Id.*] It is not clear that this permit was for Pebble Project exploration activities because it identified a different hardrock mining application. However, this permit demonstrated that other operators were withdrawing water in the vicinity of the Pebble Project from the same water source, the North Fork Koktuli River and there was no cumulative impact analysis of these combined water withdrawals from the same source. [*Compare* Ex. 2126 to Ex. 2090.]

<sup>5</sup> In addition, the permits incorporated the standards of GCD 8, which had a different mesh (0.04 inches, or 1 mm) and velocity restriction of 0.5 fps. [Ex. 2117 at SOA 4558.] The inspection reports confirm that the TWUP restriction (0.25-inch mesh screen size) rather than the more restrictive GCD 8 restriction (0.04-inch mesh) was used by PLP. [*See* Exs. 177 at SOA 54035; 310 at SOA 4554, 4558; 2008 at SOA 15976, 15980 (9/23-24/08 inspection report); 2012 at SOA 15831 (5/7/08 inspection report—1/4” on Rig 2); 2017 at SOA 68691 (10/4/07 inspection report—1/4”); 2019 at SOA 69803 (9/13/07 inspection report—1/4”); 2020 at SOA 15996 (9/6/07 inspection report—1/4”), 16002 (intake cover missing); 2116 at SOA 4462, 4465; 2117 at SOA 4588; 2119 at SOA 4576; 2121 at SOA 4570; 2123 at SOA 4564; 2124 at SOA 4544; 2125.]

26. In October 2009, after Nunamta pointed out the water withdrawal violations in open court, ADF&G issued three new Fish Habitat permits for additional water sources. [Exs. 2111, 2106, 2109.] These permits changed the fish screen size and intake velocity, to be consistent with the ADF&G criteria for the species of fish present: 0.1 fps velocity and 1-mm screen mesh. [Ex. 2106 at SOA 11802; Trasky, 12/14/10 Tr. 113:22 to 115:18.]

27. In February 2010, PLP and DNR entered into a settlement agreement that addressed the water use violations. [Ex. 345.] In May-June 2010, ADF&G issued multiple amendments to the three 2009 Fish Habitat Permits (Exs. 2107, 2108, 2110, 2112, 2113) and to the original 2007 permits (Exs. 2089-2105). These amendments required a specific cylindrical fish screen with inner and outer screens, a screen mesh of 1 millimeter, a maximum water velocity at the screen surface of 0.1 fps, and a pump rate not to exceed 25 gpm. [Ex. 2110 at 1.]

28. In September 2010, ADF&G issued a new Fish Habitat Permit for the Big Wiggly Lake dock specifying the size of the dock and the distance of a walkway to the fuel storage tanks of 102 feet. [Ex. 2088.]

*(d) ACMP Consistency Determination*

29. The initial exploration applicant at the Pebble Project (Cominco) claimed that the project was not in the coastal zone. [Ex. 2070 at SOA 3673.] There is no evidence of any ACMP review from 1989 through 2006. There has been only one ACMP consistency review of the Pebble Project, which was limited to the exploration activities that Northern Dynasty Minerals undertook in 2007. [Ex. 2172; Smodey, 12/17/10 Tr. 126:10-13.] There has never been an ACMP review of Pebble Project exploration water use, because the water use was “carved out” of the 2007 ACMP process. [Smodey, 12/17/10 Tr. 132:4-8.] The consistency review in 2007 was for the exploration with 198 boreholes. [Ex. 2171.] The 2009-2010 Pebble Project exploration permits allowed the drilling of more than twice that number of holes – 425. [Ex. 2043.] There has never been an ACMP review of the whole Pebble Project exploration – the other 1,069 boreholes that have been drilled or water withdrawals from the 150 ponds and streams that have been used as water sources.

30. The ACMP review process mandates a public notice and comment period. [AS 46. 40.096(c).] In avoiding any ACMP review of Pebble Project exploration activities, except in one exploration year, the State has sidestepped the public notice and comment that would have been afforded by the ACMP review process.

(e) *Cultural Resource Survey Permits*

31. Prior to 2004, no cultural resource survey permits were issued for Pebble Project exploration, nor has the State conducted an analysis of the impacts of exploration activities on cultural resources in the area. In 2004, PLP obtained its first permit and began submitting cultural resource survey reports. [Exs. 446 (2004); 549 (2005); 550 (2006); 551 (2007); 552 (2008).]

3. The Magnitude of Impacts at the Pebble Project Is Extensive

32. The area impacted by the helicopters at the Pebble Project has been extensive. PLP indicated that helicopters should endeavor to maintain “a minimum horizontal separation [from caribou] of one mile [as] has been previously recommended by state habitat biologists” in order to protect the Mulchatna Caribou Herd from the stress and disturbance caused by closer encounters with helicopter noise. [Ex. 2043 at SOA 5281.] When helicopters land or take off at a drill site, the recommended buffer cannot be observed. There have been 1,269 boreholes drilled in the region, and the only access to the borehole sites is by helicopter, with five or six flights per day per hole. [Ex. 123; De Husson, 12/08/10 Tr. 147:7-8.] Therefore, caribou habitat has been adversely affected within a one-mile radius of each drill site, where helicopters land and take off multiple times per day for the duration of drilling at that location. Mr. Smith mapped a 1-mile buffer around each drill site using GPS coordinates provided by PLP, calculating that in all, 98 square miles (62,581 acres) of caribou habitat had been impacted by the helicopter traffic since 1989. [Ex. 123, Smith, 12/7/10 Tr. 207:12-18; Dem. Ex. 1004 at NA 6463.]

33. It was not until after Nunamta filed this lawsuit that the State investigated the number of boreholes and water sources for the Pebble Project. [Ex. 345.] The State permitter, Mr. Krause testified in his deposition that he had no idea how many holes were drilled, and to find out the number, the State consulted reclamation reports. [Krause 7/21/10 Depo. 87:11-14.] The reclamation reports, however, show that only 521 holes were completed. [See Exs. 2032-2042; Evidence Table E.] In fact, approximately 1,269 boreholes have been drilled at the Pebble Project site. [Smith, 12/7/10 Tr. 186:9-23, *citing* Ex 123; Ex. 465.]

34. It is not possible to quantify the actual surface disturbance to tundra or soils by Pebble Project exploration because there are no State or PLP records of the extent of ground-disturbing activities such as blasting, test pits, seismic lines, drilling fluid discharges and other human disturbances. However, some calculations can be made based upon the testimony at trial. Mr. Wober testified that a typical drill site occupies an area 10 meters by 25-30 meters, or approximately 300 square meters. [Wober, 12/7/10 Tr. 144:21 to 145:1.] Multiplying this area by 1,269 boreholes equals 380,700 square

meters, approximately 94 acres, of disturbed land. Mr. Wober also testified that the Big Wiggly fueling station is about 30 meters by 50 meters, stating “it’s not a very compact layout.” [Wober, 12/7/10 Tr. 146:5-8.] He indicated that the area disturbed by the camp is approximately “30 yards wide...by 300 to 350 meters long.” [Wober, 12/7/10 Tr. 145:24 to 146:2.] This would result in more than 10,000 square meters of ground disturbed - an area larger than 2 football fields. These calculations do not include the much larger areas of tundra affected by the discharge of drilling fluids.

35. There was also disturbance from the digging of test pits which were estimated to be 3 feet by 4 feet by 8 feet deep, yet there is no reliable estimate of how many test pits were dug. [Ex. 2035 at SOA 4397.] For example, 141 test pits were permitted in 2004. [Ex. 2055 at SOA 3971.] These were estimated to be 2 feet wide and 9 feet deep, but no length was specified. The 2004 Affidavit of Annual Labor indicates that 106 test pits were completed. [Ex. 392 at SOA 6666.] But there is a discrepancy within the Affidavit; the map on the next page (Exhibit 392 at SOA 6667) identifies the locations of only five pits. The 2005 reclamation report shows 71 test pits were completed. [Ex. 2035 at SOA 4400; Dem. Ex. 6456.] Depending upon the depth of these pits, hundreds of cubic yards of soil and tundra were disturbed.

36. The total acreage of surface disturbance (and the volume of soil displaced) from the digging of sumps and trenches is also unknown. There is scant evidence on trenches, although Mr. Delkittie described one trench 60’ long and 10.5 feet wide. [Delkittie, 12/10/10 Tr. 104:20-23.] Mr. Wober testified that sumps are 5 feet by 5 feet by 20 feet. Therefore, the typical sump would displace 500 cubic feet (18 cubic yards) of surface material. [Wober, 12/7/10 Tr. 73:4-7.] Since there are generally two or three sumps per site, approximately 36 to 54 cubic yards of material are disturbed at each drill site. [Wober, 12/7/10 Tr. 73:12-13.] Sumps were not used until 2002-2003, so approximately 1,100 post-2002 boreholes had sumps associated with them.<sup>6</sup> [Krause 7/21/10 Depo. 174:21 to 175:7.] For 1,100 boreholes, the total disturbance would amount to 36,900 to 54,000 cubic yards of material just from the construction of sumps at the Pebble Project. The sumps are not lined (Krause 7/21/10 Depo. 104:15-20), so any drilling fluids, cuttings, contaminants, and acid drainage that migrates from the pit will impact a greater subsurface area. [Krause 7/21/10 Depo. 104: 23 to 105:4.] A DNR inspection report noted: “The trench and sump pit system is inadequate owing to marshy conditions.” [Ex. 2017 (10/4/2007 inspection report) at SOA 68699.]

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<sup>6</sup> Approximately 1,100 boreholes were drilled after 2002. [Ex. 123; Dem. Ex. 472; Table D.]

#### 4. Monetary Investment

37. The State has expended considerable staff time to process the more than 85 permits for the Pebble Project. In addition, since 2004, the State has billed more than \$2 million worth of expenses under the Memorandum of Understanding for “Services Associated with the Review and Authorization Process for the Pebble Gold-Copper Project.” [Ex. 879.] The reimbursable expenses covered under the agreement include exploration-related activities such as “land use permitting on state land.” [Ex. 879 at SOA 72904.] The exploration costs to PLP (and its predecessors) are estimated to be between \$300 and \$400 million, *just since 2002*. [Taylor, 12/9/10 Tr. 153:4-18.]

#### 5. Public Importance

38. The Pebble Project is of significant public importance and is so considered by the State Mining Section Chief. [Fredericksen, 12/14/10 Tr. 179:24 to 180:1 (“Q: Do you consider the Pebble project to be one of public importance A: Yes.”).] It is also considered of public importance by local, state, national and international media. [Andrew, 12/8/10 Tr. 69:19-23; 69:12 to 71:2; 73:16 to 74:13.]

### **D. Impacts to Land, Water, Reasonable Concurrent Use, and Common Use**

#### 1. Impacts from Water Withdrawals

39. Pebble Project exploration activities have consumed significant quantities of water over the course of more than two decades. The utilization of water for mineral exploration the Pebble Project is classified by the State as a “consumptive use” of water.<sup>7</sup> [Prokosch, 12/16/10 Tr. 112:5-7.] The Pebble Project exploration also uses water in what the State defines as a “significant” amount.<sup>8</sup> [Bettis, 12/16/10 Tr. 254:9-10.] Despite the

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<sup>7</sup> 11 AAC 93.970(33): “non-consumptive water use” means the instream use of water, or the diversion of water where the quantity of water diverted is not diminished except by evaporation or transpiration and the water is returned to its original source at the original point of diversion immediately after its use.

<sup>8</sup> 11 AAC 93.035(a): A significant amount of water is that amount of water for which an application for a water right or an application for a temporary water use authorization is required, as described in (b) of this section.

(b) A person shall file an application for a water right under 11 AAC 93.040 or for a temporary water use authorization under 11 AAC 93.220 before

(1) the consumptive use of more than 5,000 gallons of water from a single source in a single day;

(2) the regular daily or recurring consumptive use of more than 500 gpd from a single source for more than 10 days per calendar year;

fact that the water use at the Pebble Project occurred over a 21-year period, 16 years of which water was actually used, the State deemed the use of water “temporary” and issued nine TWUPs for an *additional* five years in 2007. [See Exs. 932, 934, 936, 938, 940, 942, 944, 946, 948.] Prior to issuing permits, DNR performed no analysis of the individual or cumulative impacts of the previous Pebble Project water withdrawals. DNR offered no justification for issuing a *five-year* TWUP when the activity for which the TWUP was sought in 2007 was a single year of exploration. [Ex. 2048 at SOA 4744.]

40. The documentary evidence establishes - and the State admitted - that no water use permits were issued for exploration from 1989 through 2006, although the State allowed water use without such permits. [Ex. 603 at 2, RFA 2; Bettis, 12/16/10 Tr. 63:5-7.] The State further admitted that the amount of water used during some years from 1989 through 2006 qualified as a “significant amount” as defined by 11 AAC 93.035. [Ex. 603 at 2, RFA 3.]

41. State officials disagreed as to why the State had for years allowed water use for Pebble Project exploration in the absence of any water use permit. Ms. Bettis, the DNR TWUP permit writer, testified that the reason was that DNR’s Pebble Project permitter for the Mining Section, Mr. Krause had erroneously believed that no permit was required for withdrawals of less than 30,000 gpd from a single source, whereas actually, a permit was required for withdrawals exceeding 5,000 gpd from a single source. [Bettis, 12/16/10 Tr. 61:17-25.] Ms. Bettis’ recollection was disputed by Mr. Krause. He testified that he “thought they [PLP] were required to have a water permit.” [Krause 7/21/10 Depo. 24:13-15.] Ms. Bettis’ supervisor, Gary Prokosch, acknowledged that it was the Water Section, not the Mining Section, that was responsible for the issuance of water permits.<sup>9</sup>

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- (3) the non-consumptive use of more than 30,000 gpd (0.05 cubic feet per second) from a single source; or
  - (4) any water use that may adversely affect the water rights of other appropriators or the public interest.

<sup>9</sup> “Q: So it is someone within the Division of the Water Section has that responsibility? A: If they -- yes.

Q: If they didn't do it, who is their boss, who would be responsible, would it be someone of your level of....

A: It would be the Water Management head, head of the Water Management Unit, and then after that, then it would be me. Ultimately, it's me...

Q: So from '95 until 2007, it was ultimately your responsibility if the water permits were not required; is that correct?

A: It would be my responsibility if they were not issued. I mean, the applicant appears to me that they made applications for it. I mean, we may not have acted on those applications or we may have. I don't know in some of those cases.

42. No matter which arm of DNR bore the responsibility, and no matter what gave rise to DNR's internal misunderstandings, the TWUP program was administered in such a way that hundreds of millions of gallons of state water were allowed to be withdrawn for the Pebble Project from ponds and streams from 1988 through 2006 with no oversight, no permits, no public notice, and no prior analysis of the impacts. Even after the State awoke to the realization that water had been withdrawn for years with no permits, there is no evidence that the State made any effort to analyze the cumulative effects of the water withdrawals over the years, or to ascertain the sources of water to ensure that no damage had occurred. Mr. Prokosch testified that he would not analyze the water use prior to 2007 "because I don't have a permit to compare it with." [Prokosch 7/22/10 Depo. 156:22-23.]

43. The TWUP program was never intended to perpetuate long-term and intensive uses of water. When the TWUP legislation (AS 46.15.155) was adopted in 2001, the Chief of the Division of Mining Land and Water stated:

Most of the temporary water use permits are for things like construction camps and when the agencies determine there is no environmental harm, a 15 to 40 day wait to halt construction in mid-summer is a problem. In areas where we think there is likely to be harm, we can public notice it and we are not prohibited from doing it.

*State Water Use: Hearing on S.B.139 Before the S. Res. Comm. 2001 Leg., 22<sup>nd</sup> Sess. (Ak. 2001) (statement of Mr. Bob Loeffler, Chief of the Division of Mining, Land and Water).*

44. The State offered no evidence of any analysis by the State, at the time it issued the 2007 TWUPs, to determine whether there was sufficient water in the streams and ponds designated as proposed water sources to accommodate the requested water withdrawals. Mr. Prokosch testified that neither DNR staff nor Pebble was required to measure pond depths, and that DNR did not verify the locations, surface areas or depths ponds designated as water sources. [Prokosch 7/22/10 Depo. 145:12-15; 149:12-13.] The only information in the record or offered at trial to justify issuing the 2007 TWUPs was a chart in Exhibit 2139, which Ms. Bettis claimed established that "that there was a sufficient volume of water from the proposed sources to accommodate the volume of

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Q: Have you ever checked your files to see?

A: I've answered that question already. I've checked. I found no records."

[Prokosch 7/22/10 Depo. 219:20 to 220: 19.]



water requested for the [Pebble] mineral exploration program.” [Bettis, 12/16/10 Tr. 57:15-18.] That chart consists of calculations, based on surface area of the pond or lake, radius, depth, and ice thickness, using a “cone method” to determine total water volume and under-ice water volume. [Ex. 2139.]

45. There are several insurmountable problems with relying on the Exhibit 2139 chart as evidence that the State analyzed the impacts of water withdrawals, sought or possessed adequate information upon which to base such analysis, or determined that there was sufficient water, prior to issuing permits:

- (a) The chart invoked by Ms. Bettis was not created at the time the TWUPs were issued but was created two years later, after this litigation was filed. Mr. Prokosch acknowledged at his deposition that the chart was created after the litigation was commenced. [Prokosch 7/22/10 Depo. 144:3-7.] Mr. Prokosch testified that the only portions of Exhibit 2139 that existed when the TWUPs were issued were the pages calculating pond surface areas. [Ex. 2139 at SOA 22028-22034.]
- (b) The chart does not establish that there was sufficient under-ice water volume to sustain the drilling operations. To the contrary, according to the data in the chart, when the total available under-ice volume of water for each pond is divided by the 16,500-gpd authorized withdrawal rate, half the ponds used as water sources (9 ponds) would dry up in less than 3 days of use. Of the remaining ponds, 8 would dry up in less than 6 days. See Evidence Table H. Given that most drilling operations lasted longer than a week, the water in the ponds would be completely exhausted in the absence of a significant recharge rate. There is no evidence that DNR had any information about the pond recharge rates. Mr. De Husson’s testimony that ponds were being completely dewatered during his shifts, and that fish were being sucked out of the low-water ponds, confirms that the pond volumes in winter could not sustain the withdrawals, to the detriment of the fish and other aquatic organisms. [De Husson, 12/8/10 Tr. 140:20 to 141:18]
- (c) The chart contains a significant miscalculation. The surface area of Pond #10, which was calculated at the time of the permit application, was incorrectly transcribed to the State’s chart. The actual surface area of Pond #10 was calculated to be 97,833 square feet. [Ex. 2139 at SOA 11031.] The area for Pond #10 on the chart in Exhibit 2139 is listed as 978,333 square feet, or ten times the actual surface area. That error was carried through in the chart’s volume calculation for Pond #10, yielding a significant overestimation of the under-ice volume of water that PLP could safely withdraw. See Evidence Table H.
- (d) The maps that DNR relied upon to issue the TWUPs were of such poor quality and inadequate scale that it was impossible for DNR to gauge accurately the

size of the ponds or streams. Mr. Prokosch discussed Pond #10 at his deposition, and estimated from the TWUP map (Ex. 944 at SOA 7660) that Pond #10 was “a fairly large lake,” possibly ten to fifteen acres in size.” [Prokosch 7/22/10 Depo. 148:6-10 (“Well, considering there is, what, 43,583 feet an acre, a square mile is -- I would say that's a fairly large lake. I don't know how big it is. I would guess possibly ten, 15 acres in size. That's just my guess.”).] The actual surface area of Pond #10 was calculated to be 97,833 square feet – approximately 2 acres. [Ex. 2139 at SOA 11031.]

46. DNR had equally scant information on water volumes in smaller tributaries. Mr. Prokosch testified that he did not know the percentage of flow withdrawn from tributaries and that he made no analysis of how much water could be withdrawn unless the stream had a gauge on it. He assumed if a stream were frozen it would not be a water source. [Prokosch 7/22/10 Depo. 193:24-25; 194:6 to 195:5.] There were no restrictions on the volume of water that could be withdrawn under ice, nor any requirement that a certain percentage of flow be left for fish species for overwintering. [Prokosch 7/22/10 Depo. 217:11-21.] By contrast, in connection with such activities as oil exploration on State land in the North Slope, DNR limits water withdrawals from ponds to 15% of the under-ice volume if sport fish are overwintering, and 30% of the under-ice water volume if other fish species are present. [*Id.*] When it issued the TWUPs, DNR did not have information on the presence of specific fish species in each proposed water source. [Prokosch, 12/16/10 Tr. 110:5-11.]

47. Mr. Smith’s GIS analysis of the TWUP maps established that the low resolution and water data quality of these maps precluded an accurate assessment of location or size of the water bodies. [Smith, 12/7/10 Tr. 192:7 to 195:5; Dem. Ex. 1004 at NA 6454<sup>10</sup>; Smith, 12/7/10 Tr. 50:17-18 (“Were there some instances where you couldn’t determine whether there was a pond there at all? A: That’s correct.”).]

48. DNR observed “drought conditions” at the Pebble Project site and documented that “[s]mall lakes around Iliamna were observed to be dry or had noticeable low water levels.” [Bettis, 12/16/10 Tr. 64:5 to 66:14; Ex. 2020.] However, the State took no action to amend or condition any of the TWUPs or to curtail water use or even monitor the water sources to see if they had sufficient water for continued withdrawals as well as reasonable concurrent uses, fish, or wildlife.

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<sup>10</sup> Mr. Smith was reviewing the same TWUP map that led Mr. Prokosch to estimate as 10-15 acres a pond that, in actuality, was only 2 acres. [*Compare* Ex. 2084 at SOA 8126 to Ex. 944 at SOA 7660; Prokosch 7/22/10 Depo. 148:6-10; Ex. 2139 at SOA 11031.]

49. Ms. Bettis testified that she inspected the Pebble Project on October 4, 2007, and that “we noticed one water well that was not in use was not capped.” [Bettis, 12/16/10 Tr. 69:17-18.] The inspection report noted: “Wells used as water sources need to be capped when not in use to prevent contamination of groundwater, e.g. Well No 6347.” [Ex. 2017 (10/4/07 inspection report) at SOA 68690.] However, subsequent inspection reports never documented that this problem was either re-examined or fixed.

50. The testimony of Mr. Cathcart and Dr. Reiser was not relevant to the issue of whether public trust resources have been adversely impacted, because their analyses focused on basin-wide rather than the localized impacts of water withdrawals. [Cathcart, 12/15/10 Tr. 112:24 to 113:3.] While water withdrawals for Pebble Project exploration might not adversely affect the water volumes in the larger rivers in the region (that is, in the totality of a major basin or drainage), withdrawals from small tributaries and ponds can diminish or restrict their volume to the degree that the spawning or overwintering fish would be impacted. [See FF #72.] DNR has never requested that PLP provide relevant data from monitoring wells for use in evaluating these impacts. [Krause 7/21/10 Depo. 181:9-21.] Water withdrawals can affect water chemistry, by affecting the amount of water available for dilution. [Moran, 12/9/10 Tr. 57:9-12.] When water is taken from one location and discharged in another, the volume of water available for dilution at the intake location is decreased, and there are chemical changes in the water as it migrates from the discharge location through the water table. [Moran, 12/9/10 Tr. 58:1-5.]

51. DNR did not require PLP or its predecessors to identify the specific streams or ponds from which water was withdrawn for exploration activities until 2007 and did not require that the water sources be surveyed for the presence of fish. [Bettis, 12/16/10 Tr. 63:5-6.] DNR inspection reports confirm that there was “no fish sampling” from ponds from which water was withdrawn. [Ex. 2021 at SOA 16005-16006.] DNR staff who issued TWUPs did not measure the volume of water being withdrawn. [Bettis, 12/16/10 Tr. 71:16-17.]

52. The State admitted that “[i]ts field inspectors do not normally collect water samples” to determine impacts on water quality from exploration activities (Ex. 604 at 17, RFA #26) and that the State has not sampled nor required sampling of water sources before issuing TWUPs for the Pebble Project (Ex. 604 at 17-18, RFA #27).

53. The Affidavit of Annual Labor records submitted to the State for 2006 through 2009 indicate 156 drill holes were completed. [Exs. 520, 521, 393, 522; Dem Ex. 472; Evidence Table E.] Yet, PLP’s 2007, 2008 and 2009 drillhole data and watersource maps indicate that 400 drill holes were completed. [Exs. 123, 465, Dem. Ex. 472, Evidence Table D.] DNR did not require the submission of detailed and accurate information on the location of drill holes and the location of water sources, did not investigate the information it had, and did not enforce the permit requirements it imposed

until after Nunamta filed this lawsuit. DNR was unaware of numerous and obvious violations of its TWUPs until Nunamta informed the Court of potential violations in September and October 2009. [Exs. 2128; 996; Tr. Status Conference Hearing 9/11/09 at 21-22; Tr. Hearing Motion for TRO 10/21/09 at 27-29.]

54. DNR failed to inspect pumps used for water withdrawals. Mr. Wober testified that three kinds of pumps were used for water withdrawal: an electric sump pump (15gpm); a borehole pump (22 gpm); and a larger sump pump (20-60 gpm). He testified that PLP used larger capacity pumps in order to have greater lift to move water uphill. [Wober, 12/7/10 Tr. 109-110; 121:22; 123:8; 115:16-29.] Mr. De Husson confirmed that significant amounts of water flowed through a centrifugal pump “with a 3 inch hose.” [De Husson, 12/8/10 Tr. 152:4-8; Dem Ex. 198A at SOA 69870.] Without knowing the size of pump used for water withdrawals, and no actual knowledge of the amount of water withdrawn, water use at the Pebble Project has been significantly underestimated.

55. The failure of the State to have an accurate representation of site conditions at the Pebble Project means that resources were not accurately assessed. The inability of the Chief of the Water Section to accurately determine the pond size from the poor quality TWUP maps and DNR’s failure to perform any analysis of past water withdrawals demonstrates that DNR’s administration of state water resources with respect to the Pebble Project was significantly deficient and failed to protect reasonable concurrent users or the water and fisheries resources. There was potential harm, and actual harm, from the significant and long-term water withdrawals with no legal safeguards. While the settlement of the water use violations may have, temporarily, cured some of these violations, without an institutional change in the way TWUPs are administered for the Pebble Project, public scrutiny, and continued agency vigilance, the water resources of the Pebble Project region are, and continue to be, at risk.

## 2. Impacts to Fish

56. The Plaintiffs introduced extensive evidence that the Pebble Project exploration drilling and water use has impinged on reasonable concurrent uses or common uses at the Pebble site. This evidence included analyses of water withdrawals, discharges to tundra of muds and cuttings and drilling activities in the Pebble Project area, and focused on their impacts on fish or fish habitat. [FF #65, 66, 68, 69, 71 72.]

57. Bristol Bay is “the world’s greatest sockeye salmon resource” and “has the highest genetic biodiversity [of salmon] on the planet.” [Woody, 12/14/10 Tr. 17:13-21.] It is home to five species of salmon; eight anadromous species; Dolly Varden, a facultatively anadromous species that uses salt water when food supplies are low in fresh water; and ten resident fish species, including whitefish. [Woody, 12/14/10 Tr. 17: 22 to

18:12; *see also* Reiser, 12/16/10 Tr. 170:1-14 (anadromous and resident fish).] These fish reside in the main river drainages: Nushagak, Kvichak, Wood, Naknek, Ugashik, Egegik, and Togiak, as well as in tundra ponds. [Woody, 12/14/10 Tr. 24:6-16; 18:13 to 19:16.] The headwaters of the Nushagak and Kvichak Rivers are in the Pebble Project area. [Woody, 12/14/10 Tr. 24:22-25.]

58. The Upper Talarik Creek and the North and South Forks of the Koktuli River are major salmon spawning tributaries of the Nushagak and the Kvichak River drainages and important sport fishing streams – the South Fork Koktuli being the number one King Salmon sport fishing stream in the Bristol Bay region. [Trasky, 12/14/10 Tr. 90:4-11.] Recent research in Alaska and elsewhere now shows that these headwater areas are particularly important in the productivity of these stream systems contributing up to 60% of the nutrients and the water and providing the majority of the rearing habitat for species such as coho and Chinook salmon. [Trasky, 12/14/10 Tr. 90:12-19.]

59. Mineral Closing Order 393 (MCO 393) closed 64 streams, including uplands 100 feet on each side of the streams' ordinary high water mark, to mineral entry. [Ex. 877 at 15336-15338.] MCO 393 was supported by a best interest finding (BIF) by the DNR Commissioner which declared that continued salmon propagation and production was a significant water use in Bristol Bay and found that mining would be incompatible with significant fisheries and recreational values. [Ex. 877 at SOA 15336.] The MCO stated:

Temporary or permanent destruction or modification of spawning beds that can result in failure to spawn or complete or partial mortality of eggs, alevins, or fry. The primary causes are: reduction of dissolved oxygen, increase in the percentage of silt and sand in the spawning gravel, reduction in intergravel flow rates, scouring of the spawning gravels subsequent to spawning, removal of stream gravels, or complete covering of the spawning beds with sediment.

[Ex. 877 at SOA 15334.] While MCO 393 primarily addressed placer mining impacts, it nonetheless closed the area to all mining activities because of the potential impact to fisheries (salmon) resources. [Trasky, 12/14/10 Tr. 101:11-12.]

60. At the same time, the DNR Commissioner approved Leasehold Location Order #1 (LLO #1). Similar to MCO 393, the stated basis for restricting 1.9 million acres to mining only under lease in the Upper Mulchatna and Eastern Iliamna Lake Tributaries, including portions of the Pebble Project area, was because of the potential use conflicts with fisheries, recreation and wildlife habitat :

Mineral development in the upper Mulchatna and eastern Iliamna Lake drainages has the potential for surface use conflicts with the fish and wildlife resources, especially with the propagation and production of salmon.”

[Ex. 434 at SOA 015708.]

These conflicts could also jeopardize the economy of the Bristol Bay region. Mining in these areas has the potential to negatively affect salmon spawning and rearing habitat and degrade water quality by the production of excessive sediment loads. Turbidity resulting from increased sediment loads can effectively hinder fish surveys and disrupt management of the entire fishery.

[Ex. 434 at SOA 015708.]

61. The salmon in Bristol Bay are particularly diverse because there are hundreds of different spawning populations that are different in their morphology, behavior, and genetics, and these populations have adapted to the water chemistry of their natal streams over thousands of years. [Woody, 12/14/10 Tr. 25:1-23.] The rivers, streams, and ponds in Bristol Bay are interconnected, within and between the different river drainages, by the hyporheic zone – the horizontal and vertical areas around waterbodies where surface waters and ground waters mix. [Woody, 12/14/10 Tr. 26:11-24; 29:16 to 30:17; 33:23 to 34:24.] Salmon and other fish spawn and use the hyporheic zone as a migration corridor between waterbodies, including isolated ponds. [Woody, 12/14/10 Tr. 30:2 to 31:5.)

62. Fewer than half of the waters in Alaska have been inventoried for salmon, and even fewer have been surveyed for resident fish. [Woody, 12/14/10 Tr. 44:16-23; *see also* Ex. 588 at NA 5662-5664.] No comprehensive fish study has been conducted in the Pebble Project area; data on fish presence are incomplete and inadequate to determine that exploration activities at the Pebble Project have not impacted any fisheries in the region. [Woody, 12/14/10 Tr. 44:24 to 45:7.] The State admitted it has no records of requiring PLP or its predecessors to conduct monitoring at the Pebble Project to determine if discharges associated with the exploration are harmful to fish or aquatic life. [Ex. 604 at 18-19, RFA #30.] The State also admitted that exploration activities, since begun in 1989, may have not fully avoided spawning areas during spawning seasons “since not all areas of fish spawning have been fully identified within the project area.” [Ex. 604 at 27, RFA #59.]

63. Big Wiggly Lake “has been specified as being important for the spawning, rearing or migration of anadromous fish.” [Ex. 2115.] Nevertheless, DNR allowed a fuel station that stores 5,000 gallons of fuel closer than 100 feet to the lake as well as allowing fuel transfers over water. [Gleitsmann, 12/17/10 Tr. 222:16 to 223:13.]

64. Dr. Woody, a fisheries scientist who has conducted field research on salmon in the Bristol Bay region for 20 years, surveyed over 100 streams in the Pebble Project area and found salmon in three of every four streams – including spawning, rearing and migrating salmon – and that 98% of the streams contained species important for subsistence. [Woody, 12/14/10 Tr. 34:25 to 35:19.] Dr. Reiser, on the other hand, attempted to explain a chart (Dem. Ex. 3068) that purportedly showed the actual or potential presence of fish in water withdrawal sites in the North Fork Kaktuli River, South Fork Kaktuli River, and Upper Talarik Creek; however, the numbers did not add up, nor did the chart show conclusive data regarding fish presence. [Reiser, 12/16/10 Tr. 185:24 to 188:14.]

65. Water chemistry is directly impacted by the geology of an area. [Zamzow, 12/10/10 Tr. 142:13 to 143:13; Woody, 12/14/10 Tr. 31:6-18.] The Pebble prospect is primarily a copper deposit that includes other metals, such as zinc, cadmium, and silver. [Woody, 12/14/10 Tr. 31:19-25.] Copper is one of the most toxic elements to aquatic life, and can affect the ability of salmon to smell, which is how they find their way to their natal streams, identify predators, prey, kin, and mates. [Woody, 12/14/10 Tr. 31:25 to 32:4.] The detrimental impacts to salmon from copper occur at the parts per billion level, and there can be more than an additive effect to copper’s toxicity when copper and zinc are together. [Woody, 12/14/10 Tr. 32:5 to 33:15; 77:14 to 78:4; *see also* 70:7 to 71:14; Trasky, 12/14/10 Tr. 118:18 to 119:21.] [*See also* FF #142-151 re: acid rock drainage.]

66. In addition to the metals present in the Pebble deposit, the drilling muds, specifically EZ Mud Plus, was found to be toxic to crustaceans and minnows, and the polyacrylamides break down into ammonia, which is very toxic to fish; once a fish is exposed to ammonia, secondary exposures can be even more harmful. [Woody, 12/14/10 Tr. 46:4-23; 72:17 to 73:5.] Dr. Moran stated that “there are several [groundwater] monitoring wells that show levels of metals and other anions that if freshwater fish were exposed to them, those would be toxic.” [Moran, 12/9/10 Tr. 82:2-7.] Based upon EPA analysis and five other studies, DEC confirmed that the petroleum distillate in EZ Mud Plus has a LC<sub>50</sub> of 2.8 mg/l for rainbow trout, a species that is present at the Pebble site. [Ex. 556 at SOA 22807.] The LC<sub>50</sub> means that there will be mortality of 50% of the fish exposed to the substance. [Nakanishi, 12/13/10 Tr. 149:20 to 150:5.] DEC further concluded that the concentration of the petroleum distillate in the hole “is approx 2 orders

of magnitude greater than the LC50 level [for rainbow trout.]” [Ex. 556 at SOA 22822.] [See also FF #130-131 re: discharge and toxicity of drilling muds and cuttings.]

67. The State admitted it has not conducted any monitoring or testing to evaluate impacts on fish and aquatic life as a result of explosives used in the Pebble Project area. [Ex. 604 at 23, RFA #44.] Seismic shocks in the form of dynamite blasting activities at the Pebble Project may also cause fish in the incubation stage to become infertile triploids, impairing future reproduction of salmon. [Woody, 12/14/10 Tr. 46:24 to 47:17.] The documentary evidence and Dr. Smith’s testimony established that seismic lines crossed waterways, anadromous waters and waters within MCO 393. [Ex. 2035 at SOA 004403; Smith 12/7/10 Tr. 187:10-20; 191:6-12; 193:2-6; 193:19-23; Dem. Ex. 6458.] Mr. Trasky testified that, based on his review of the maps of seismic testing at the Pebble Project, he had concluded that the dynamite charges are likely to have been set off too close to streams, making blasting shock impacts to fish more likely than not. [Trasky, 12/14/10 Tr. 109:22 to 110:11.] Mr. Taylor, PLP Vice President of the Environment, said he had no knowledge of the extent of seismic lines, so his testimony regarding the lack of impacts should be given little weight. [Taylor, 12/9/10 Tr. 161:4-20.] The available information demonstrates that Pebble seismic blasting has impinged on fish resources.

68. Even if PLP had adhered to setbacks for blasting, the current State of Alaska setback standards used for seismic activities are likely ineffective. The setbacks were based upon “theoretical setbacks that [were] developed in conjunction with a physicist from Dupont back in the 70’s” and were never fully tested. The one time tests of seismic blasting were undertaken in the field in Alaska, they verified that “you could kill fish in the waters of Resurrection Bay by setting off charges on shore.” [Trasky, 12/14/10 Tr. 110:12-19.] However, no blasting standards for Alaska conditions, or Pebble-specific conditions, were developed. Given the importance of the spawning habitat to the fisheries in the region, the State should have taken steps to ensure that blasting standards were effective at the Pebble Project site, and that they were followed. Mr. Trasky established that “the seismic shock waves are propagated much better in wet environments [such as the hyporheic zone or wetlands present in the Pebble Project area] than dry ground”, making the standard setbacks insufficient to protect fish in a wet environment. [Trasky, 12/14/10 Tr. 110:20 to 111:5.]

69. The exploration drilling activities at Pebble can kill fish and, on at least one occasion observed by a witness, did so. Gordon De Husson, a driller’s helper who worked at the Pebble Project in 2006 and 2008, testified that at one of the drill sites where he worked, the hoses froze after a kettle lake was pumped dry, shutting off the flow of water for drilling. [De Husson, 12/8/10 Tr. 136:12 to 140:2.] When the water was restarted, approximately 200 fish fry shot “off into the snowy tundra.” [De Husson, 12/8/10 Tr. 140:4 to 141:21.] This is but one instance of a direct fish kill at the Pebble



Project, and as noted by Dr. Woody, it was a “direct impact on fish.” [Woody, 12/14/10 Tr. 77:2-10; 79:9-19.]

70. The U.S. Fish and Wildlife Service published a study in 2008 entitled, “A Pilot Study to Conduct a Freshwater Fish Inventory of Small Tundra Ponds on the Bristol Bay Coastal Plain, Alaska, 2006,” Alaska Fisheries Data Series Number 2008-10, which found that water withdrawals for mining projects could have direct impacts on fish:

Mining projects may require a source of freshwater for extraction and mine operations, and could capture headwater streams as a water source. Water removal from a system may result in alteration or destruction of aquatic habitat, and can alter stream flow and sediment transport dynamics. Changes in water quality could result in a direct fish kill, disrupt the aquatic food chain, and destroy freshwater and near-shore marine habitat.

[Ex. 588 at NA 5661.]

71. The water withdrawals at the Pebble Project have likely been underestimated, leading to inaccurate assumptions about impacts and sizes of pumps. Dr. Jaime Cathcart, a hydrologist for PLP, performed calculations for water use at each exploration core drill site at the Pebble Project in 2007, 2008 and 2009 based upon the pumping capacity of 15 gallons per minute, and that pumping capacity was supplied by Gernot Wober, the Site Manager for PLP; it was not independently verified by Dr. Cathcart. [Cathcart, 12/15/10 Tr. 124:13 to 125:12; 129:19-21; 151:22 to 152:6; 152:7-19; 152:20 to 152:3.] Gernot Wober testified that there are three kinds of pumps used: electric sump pumps (15 gallons per minute (gpm)), borehole pumps (22 gpm), and larger sump pumps 20-60 gpm. [Wober, 12/7/10 Tr. 121:22 to 123:8.] Mr. De Husson testified that the big centrifugal pump used for pumping out the reservoir (Ex. 763 (photo)) was also used at kettle ponds. [De Husson, 12/8/10 Tr. 167:11-16.] Based upon photographs taken at the Pebble Project, centrifugal pumps with significantly larger pumping volume (300 to 3200 gallons per minute) have been used, which is of particular concern in small streams and ponds, especially in winter when the available water is at its lowest during the year. [Evidence Table H; Trasky 12/14/10 Tr. 111:17 to 113:19; *see also* photos of pumps in Exs. 2001 (8/3/10 inspection report) at SOA 74910; 2009 (8/27/08 inspection report) at SOA 15881, 15887; 2007 (10/28-29/08 inspection report) at SOA 15859, 15865, 15866; 2011(6/17-18/08 inspection report) at SOA 15929; 2018 (9/26-27/07 inspection report at SOA 15965; 2019 (9/13/07 inspection report) at SOA 69806; 2021 (8/22/07 inspection report) at SOA 16009; 2023 (7/26-27/07 inspection report) at SOA 16049.]

72. Another factor affecting the volume of water withdrawn was the amount of ice present during winter pumping. Dr. Cathcart testified that the amount of ice formed

on ponds in the winter would impact the amount of water available for drilling, which corroborated Mr. De Husson's testimony that a "kettle lake had been sucked to the point to where it was no longer reaching water." [Cathcart, 12/15/10 Tr. 154:20 to 155:4; De Husson, 12/8/10 Tr. 137:24-25.] Gary Prokosch, DNR Water Section Chief, admitted that DNR never inquired about whether the water taken in winter was depleting the streams:

Q: Do you know whether or not they took water in the winter that caused the depletion of either streams or lakes to the point where there was not moving water? A: I don't know that. Q: Did you ever inquire? A: I never inquired.

[Prokosch 7/22/10 Depo. 108:5-10]

Q: So for those tributaries where you didn't have the information but they were withdrawing water in winter, you didn't have information on what percentage of the flow they were taking? A: I don't.

[Prokosch 7/22/10 Depo. 194:25-195:4.]

There were no water use gauges used at the Pebble Project to determine the amount of water removed from any given stream or pond until after this lawsuit was filed. [Prokosch, 12/16/10 Tr. 112:12 to 113:7; Cathcart, 12/15/10 Tr. 154:15-19.] Evidence Table H establishes that the water available under ice in winter was limited, and half of the permitted ponds would dry up after three days' worth of pumping, and that of the remainder, only one would have sufficient volume to pump for more than six days. Since the driller time sheets established that most drilling took longer than six days, the evidence established that water available for fish was severely or entirely eliminated in winter. The experience of Mr. De Husson in 2008 when the pond his rig was using as a water source dried up repeatedly verifies this fact. [De Husson, 12/8/10 Tr. 136:20 to 138:10.]

73. Dr. Cathcart's water use calculations only evaluated surface water use in the Pebble Project area, not the hydrologic impact on groundwater. [Cathcart, 12/15/10 Tr. 148:5-20.] Those calculations were performed specifically for this lawsuit in August of 2010; there was no evidence of such calculations having been previously performed. [Cathcart, 12/15/10 Tr. 150:17 to 151:9.] Dr. Cathcart testified that the impact from the water withdrawals would be temporary because "the system will replace itself, it will replenish the water that's been taken out." [Cathcart, 12/15/10 Tr. 166:4-17.] However, Dr. Cathcart's testimony did not account for the time it would take the hydrologic system to be "replenished" when the discharge occurs at some distance from the intake point, nor did Dr. Cathcart consider changes to the water's chemistry as it flows through the geology. [See Moran, 12/9/10 Tr. 57:9 to 58:5.]

74. Another impact to fish from water withdrawals at the Pebble Project is the absence of adequate fish screens on the water intakes. There are two purposes for using

fish screens on these intakes: (1) the screens must be small enough to physically prevent fish from entering; and (2) the screens must control the velocity at the screen surface (approach velocity) low enough not to impinge fish and kill them. [Trasky, 12/14/10 Tr. 114:10-18.] From 1991 to 2007, there is no evidence in State or PLP records that any fish screens were used. [Trasky, 12/14/10 Tr. 113:22 to 114:7; Wober, 12/7/10 Tr. 133:17-19; 136:6-11.] No fish habitat permits were issued that required fish screens. [See Exs.31-42.] Beginning in 2007 and 2008, a box screen design was used by PLP, and “in 2009, they commenced with the cylindrical screen.” [Reiser, 12/16/10 Tr. 190:14-19.]

75. In 2007, the fish habitat permit required a 3/32 inch screen and velocity at the screen surface not to exceed 0.4 f/s. [Trasky 12/14/10 Tr. 115:19 to 116:16; Ex. 2124 at SOA 4554.] In addition, the fish habitat permit incorporated generally consistent determination, GCD8, which required a mesh size of 0.04 inches (1 millimeter) and a velocity of 0.5 f/s. [Trasky, 12/14/10 Tr. 116:17 to 118:14; Ex. 177 at SOA 54035.] These fish screen sizes and velocities “did not protect the fry of the sockeye, white fish and other species that have very small juveniles from entering the screen intake and actually being sucked in.” [Trasky, 12/14/10 Tr. 115:6-18.] Mr. Trasky testified that there was “a good chance that [PLP] sucked up the fry on these species in these intakes.” [Trasky, 12/14/10 Tr. 115:6-8.]

76. Dr. Reiser, on the other hand, testified that the box screens used in 2007 and 2008 had two layers of screens: the outer one of one-quarter-inch mesh, and the inner of one-eighth-inch mesh, which he found to be protective of fish. [Reiser, 12/16/10 Tr. 196:14-22; 199:17-25.] Dr. Reiser’s opinion is not credible because it is inconsistent with the fish habitat permit requirement (3/32 inches), GCD8 requirement (0.04 inches (1 mm)), and observations in inspection reports. Inspection reports regularly documented screens of 0.25 inches. [See Exs. 177 at SOA 54035; 310 at SOA 4554, 4558; 2008 at SOA 15976, 15980 (9/23-24/08 inspection report); 2012 at SOA 15831 (5/7/08 inspection report—1/4” on Rig 2); 2017 at SOA 68691 (10/4/07 inspection report—1/4”); 2019 at SOA 69803 (9/13/07 inspection report—1/4”); 2020 at SOA 15996 (9/6/07 inspection report—1/4”), 16002 (intake cover missing); 2116 at SOA 4462, 4465; 2117 at SOA 4588; 2119 at SOA 4576; 2121 at SOA 4570; 2123 at SOA 4564; 2124 at SOA 4544; 2125.] Dr. Reiser had never physically inspected the PLP fish screens; he only evaluated their adequacy through photographs. [Reiser, 12/16/10 Tr. 204:24 to 205:10.]

77. Mr. Trasky also testified that the fish screens must be maintained. When the fish screens are not completely submerged and/or there are root debris and leaves, the approach velocity increases substantially, causing fish impingement and entrainment. [Trasky, 12/14/10 Tr. 119:22 to 121:5; see also Ex. 2020 at SOA 16002 (9/6/07 inspection report – intake cover missing).] Mr. De Husson testified that fish screens were not maintained and that he did not see or maintain the fish screens. [De Husson, 12/8/10

Tr. 158:7-18. Mr. Trasky confirmed that it is unlikely that the fish screens were maintained, especially in the middle of the night, freezing cold, and rain. [Trasky, 12/14/10 Tr. 120:20 to 121:5.] Dr. Reiser's theoretical conclusions concerning the efficacy of PLP's fish screens were not credible because when making his analysis about fish screens, Dr. Reiser did not consider whether the fish screens were maintained. [Reiser, 12/16/10 Tr. 239:20-22.]

78. The requirement for proper use and maintenance of the intake structures was confirmed by Gary Prokosch; the intake structure must be underwater for it to work efficiently; and there must be six inches of water on top of it and six inches on the side. [Prokosch 7/22/10 Depo. 63:20-25; 64:9-15.] The April 17, 2008, inspection report also noted the importance of placement and maintenance of the screens and adequate access to the structures by inspection personnel:

For surface water sources: recommend that water depth, where the intake structure is placed, be measured on a routine basis to ensure that the structure is fully submerged and that water availability is of sufficient flow/quantity to meet water use needs. Fish-bearing water sources, routine evaluations also should document the integrity of the intake screen. Agency representatives must have access to intake structures from fish streams/lakes during inspections.

[Ex. 2014 at SOA 68671.] Ken Taylor, the Vice President of Environment for PLP also stated that the screens must be submerged to protect fish. [Taylor 8/18/10 Depo. 204:18-20.] Yet, DNR inspection reports document numerous fish screens that are not submerged. [Ex. 2009 at SOA 15888 (8/27/08 inspection report); Ex. 2010 at SOA 15914 (7/23/08 inspection report); Ex. 2011 at SOA 15928 (6/17-18/08 inspection report); Ex. 2012 at SOA 15836 (5/7/08 inspection report); Ex. 2019 at SOA 69807 (9/13/07 inspection report); Ex. 2020 at SOA 16002 (9/6/07 inspection report).]

79. Mr. Trasky noted that the larger pumps previously used by PLP with much higher velocity at the screen surface "could easily exceed what we now know the tenth of a foot per second that's required to extend protection to all the species [sic] fish there, of fish found in that area." [Trasky, 12/14/10 Tr. 115:13-18.] The standard for velocity at the screen-water interface in the 2007- pre-litigation 2009 fish habitat permits and GCD8 were "too high to prevent impingement." [Trasky, 12/14/10 Tr. 117:15 to 118:9.] The current fish habitat permits would be inadequate to protect fish if larger pumps are used. [Trasky, *id.*] After this lawsuit was filed, in 2009, the State began implementing the more protective 0.1 f/s velocity standard in the permits, confirming Mr. Trasky's opinion that for the fish species present, the 0.1 f/s velocity was essential:

At a withdrawal rate of 25 gallons per minute, this screen exceeds the Division of Habitats' most restrictive screening criteria of a screen mesh size not to exceed 1.0 millimeter and maximum water velocity at the screen surface of 0.1 feet per second. This screen will be protective of the most sensitive life stages of fish occurring in the project area.

[Exs. 2106 at SOA 11892; 2109 at SOA 11889; 2111 at SOA 5515; 2089 at SOA 63356; 2090 at SOA 59240; 2092 at SOA 59264; 2094 at SOA 59233; 2096 at SOA 59227; 2097; 2098; 2099 at SOA 59258; 2100 at SOA 59281; 2101 at SOA 59255; 2103 at SOA 59236; 2105 at SOA 59288; 2107; 2110; 2112; *see also* Trasky, 12/14/10 Tr. 118:10-17.]

80. In undertaking his analysis of the impacts of water withdrawals through the intake structures, Dr. Reiser erred in his conclusions. Dr. Reiser did not use the proper approach velocity of 0.1 f/s, which is the standard utilized in Alaska and the fish habitat permits for the Pebble Project; instead, he used a standard employed by the National Marine Fisheries Service, which is 0.2 f/s. [Reiser, 12/16/10 Tr. 197:18 to 198:6.] In fact, Dr. Reiser was not even aware of the standard approach velocity required by the ADF&G fish habitat permits for the Pebble Project. [Reiser, 12/16/10 Tr. 236:16-18.]

81. Mr. Wober testified that PLP used sump pumps and fish screen boxes until 2009, then switched to borehole pumps and cylindrical fish screens. [Wober, 12/7/10 Tr. 129:6-13; 133:9-22.] It was not until late 2009 that PLP began using cylindrical fish screens with one millimeter screen mesh – a measure that met the screen mesh requirement in GCD8, which had been required since 2007. [See Exs. 2106 at SOA 11892; 2109 at SOA 11889; 2111 at SOA 5515; 2089 at SOA 63356; 2090 at SOA 59240; 2092 at SOA 59264; 2094 at SOA 59233; 2096 at SOA 59227; 2097; 2098; 2099 at SOA 59258; 2100 at SOA 59281; 2101 at SOA 59255; 2103 at SOA 59236; 2105 at SOA 59288; 2107; 2110; 2112; Reiser, 12/16/10 Tr. 190:14-19; Ex. 177 at SOA 54035.]

82. Dr. Reiser, PLP's expert in Fisheries Science, did not employ the available physical data regarding impacts to fish and fish habitat. Instead Dr. Reiser used a model called Physical Habitat Simulation, or PHABSIM, to generate "weighted usable area, which is an index of habitat, in order to evaluate the water withdrawals at the Pebble Project. [Reiser, 12/16/10 Tr. 174:3-15; 177:21 to 178:3.] The modeling obtained the result that there was no difference in the amount of habitat from the water withdrawals for the Pebble Project, and that therefore there has been no permanent harm to fish habitat for the various life stages of fish. [Reiser, 12/16/10 Tr. 210:13-18; 224:12-18.]

83. Dr. Reiser's findings are not credible because: (1) only three species of salmon – Chinook, Coho, and Sockeye – in the spawning and juvenile life stages were evaluated – and no resident species were included; (2) the "worst case scenario" evaluated for flow was summer, but winter is the lowest flow time of year; (3) only

surface water was evaluated, leaving out any evaluation of the hyporheic zone; and (4) the actual volume of the water withdrawals is unknown, only estimated. [Reiser, 12/16/10 Tr. 219:6-10; 220:14-24; 227:6-11; 230:19 to 231:11; 232:6 to 233:13.] Further, as Dr. Woody testified, the PHABSIM model is disfavored in Alaska because it has not been modified to Alaska conditions, which include temperatures that regularly drop below 20 degrees, and at times, reach temperatures of 40 degrees below zero in the Bristol Bay Region where “upwelling ground water provides a thermally stable incubation environment in the hyporheic zone [that] can facilitate survival of embryo – salmon embryos through sub zero conditions.” [Woody, 12/14/10 Tr. 35:20 to 36:14; 38:25 to 39:18.] Moreover, the PHABSIM model is not used to evaluate impacts from exploration activities, but only to predict the physical characteristics of particular habitat for a particular life stage. [Woody, 12/14/10 Tr. 43:14-19.] Dr. Reiser admitted that federal agencies have raised concerns about the use of the PHABSIM model for the Pebble Project, and those issues have not all been addressed. [Reiser, 12/16/10 Tr. 228:11 to 229:6.]

84. Dr. Woody testified that in order to visually establish a causal connection between exploration activities at Pebble and impacts to fish, one “would have to be in the area at the time of a particular impact” because “when they die, [fish] are generally gobbled up by the predators that are always in wait for them.” [Woody, 12/14/10 Tr. 61:17 to 62:8.] Mr. DeHusson established that causal connection when he testified to his observations of the adverse impacts to fish fry in a kettle pond that were sucked into a pump and discharged to the snowy tundra. [De Husson, 12/8/10 Tr. 136:12 to 140:2; 140:4 to 141:21.] Based upon the exploration activities occurring at the Pebble Project, her scientific field work, Mr. De Husson’s testimony, and literature, Dr. Woody concluded that there have been chronic and acute impacts to aquatic life in the Pebble area. [Woody, 12/14/10 Tr. 48:15 to 50:23.] Mr. Trasky also concluded that exploration activities at the Pebble Project have had an impact on aquatic life due the water intake structures “entraining or impinging fish in the intakes”, water withdrawals “drawing down ponds or streams below the levels necessary to support aquatic life particularly in the winter”, seismic explosions too close to streams, and discharge of drilling muds and cuttings. [Trasky, 12/14/10 Tr. 122:6-13; 146:19-24; *see also* FF #67, 71, 74, 75, 50, 51, 130, 131, 132; Evidence Table H regarding the impacts of water withdrawals and discharges of drilling muds and cuttings at the Pebble Project.] Dr. Reiser even conceded that the water withdrawals in the tributaries may harm fish due to lower water flow:

If there are fish present and there were no screening techniques employed, the pumping rates were excessive and exceeded and created a situation where you had approach velocities that exceeded the criteria, there is potential, yes, if that was the case, but in this case with the measures that Pebble has implemented, I don’t think there would be any effect.

[Reiser, 12/16/10 Tr. 229:22 to 230:3.]

85. The DNR Mining Section has never taken fish samples or used other scientific methods to determine whether the discharges from exploration activities at the Pebble Project have had impacts. [Fredericksen, 12/14/10 Tr. 186: 16-23.] Since no fish screens were required, and there is no documentation that fish screens were used at any time before 2010 that could adequately protect fish, it is certain that fish were adversely impacted by the water withdrawals for the exploration activities at the Pebble Project. The screens that were employed from 2007 through 2009 (pre-litigation) also resulted in adverse impacts to fish because they were of an inadequate size and allowed an approach velocity that exceeded that necessary to protect the fish species and life stages present at the Pebble Project site.

86. In sum, the fish populations in Bristol Bay currently are diverse and healthy. Both salmon and resident fish species are found within the Pebble Project area and on the orebody itself. The many rivers, streams, lakes, and ponds and interconnected hydrogeology, including the hyporheic zone fed by the high groundwater table, provide unique habitat for these species. The exploration and water use activities at the Pebble Project are impacting the fish and habitat because: (1) water withdrawals have resulted in ponds being sucked dry of water in winter, a critical time for sensitive life stages of fish; (2) the water intake structures did not have adequately sized screens until 2010, and have not been properly operated or maintained, impinging and entraining fish; (3) the chemicals used in drilling muds are toxic to fish at certain concentrations that are exceeded during the drilling process; (4) the heavy metals within the orebody, especially copper, are toxic to fish at very low concentrations and mobilized by acid rock drainage; (5) water withdrawals have likely been underestimated because larger pumps are used to take water than were used for estimating water use; (6) seismic blasting has apparently occurred in close proximity to streams, making impacts to young fish likely; and (7) in at least one instance, fish were directly killed as a result of water withdrawal from a kettle pond. A preponderance of evidence therefore establishes that exploration and water use activities at the Pebble Project have impinged fish habitat and adversely impacted reasonable concurrent users and common uses.

### 3. Impacts to Wildlife

87. The Pebble Project area is rich in wildlife. In 1984 and 2005, DNR identified the area of the Pebble Project as “essential” habitat for caribou, moose and bear. [Exs. 94, 95, 96, 97, 767.] The range of the Mulchatna Caribou Herd (MCH) – one of the largest caribou herds in Alaska – includes the valley where the Pebble deposit is located. [Woolington, 12/15/10 Tr. 188:21 to 189: 10; Ex. 443 at SOA 26065.]

88. A 1992 study noted that the MCH was a “healthy caribou herd in southwestern Alaska which has been expanding in range and number for the past decade.” [Ex. 443 at SOA 26065]. In the early years of Pebble Project exploration, prior to the increasingly intensive exploration activities, ADF&G conducted studies of wildlife resources in the Pebble Project area. [Exs. 443, 444.] These ADF&G studies documented:

- a. Moose: Moose were found in the riparian areas along rivers (including the Koktuli River), and these riparian areas were identified as key wintering areas. Harvest data indicated substantial moose hunting effort in and around the Pebble Project ore body. [See Ex. 444 at SOA 26209-26211; 26212.]
- b. Bears: Brown bears extensively used the salmon streams of the Pebble Project area as a seasonal source of food. The hills around the Pebble Project ore body were used as preferred denning habitat due to the fact that the immediate area near the ore body contains some of the only topography conducive to bear denning. [See Ex. 444 at SOA 26209; 26211; 26212.]
- c. Furbearers: Harvest data indicated important use by trappers and a high percentage of harvests taken in the area around the proposed mine site. [See Ex. 444 at SOA 26212-26213.]
- d. Caribou: Seasonal ranges of the MCH included the proposed Pebble Mine site, and there is evidence that caribou remained in the vicinity of the proposed mine site throughout the year. An area near the proposed mine site was documented as a calving area for the herd, and calving in this area had been documented by ADF&G for six of nine years. ADF&G found that the area was used for subsistence and attracted hunters from all over the world. [See Ex. 443 at SOA 26063-26067.]

89. The State admitted that it is likely that some migratory birds have bred, within the Pebble Project Area. [Ex. 604 at 30, RFA #71.]

90. In 1994, ADF&G again surveyed caribou resources in the Pebble Project area and concluded that “if mining activities displaced the caribou from their winter grounds, the impacts would be felt throughout the range of the herd.” [Ex. 404 at 12.] The calving areas are immediately adjacent to the proposed mine site, and many of the caribou that calved in that area were estimated to be part of a group of about 1,000 – 1,500 caribou remaining in the vicinity of the proposed mine site throughout the year. [Ex. 404 at 13.] ADF&G concluded that these data highlighted the dynamic nature of the MCH and the potential for far-reaching impacts of the proposed mine. [See Ex. 404 at 13.] Likewise, ADF&G confirmed that large numbers of post-calving caribou were present in the project area in late June/early July. [Ex. 339.]



91. When DNR approved Leasehold Location Order #1 (LLO #1), the stated basis for restricting 1.9 million acres to mining only under lease in the Upper Mulchatna and Eastern Iliamna Lake Tributaries, including portions of the Pebble Project area was because of the potential use conflicts with fisheries, recreation and wildlife habitat: “Mineral development in the upper Mulchatna and eastern Iliamna Lake drainages has the potential for surface use conflicts with the fish and wildlife resources, especially with the propagation and production of salmon.” [Ex. 434 at SOA 15708.]

92. Since 2002 when the activities at the Pebble Project intensified, subsistence users, local guides, scientists, and state employees all agree that there has been a decline in the wildlife present at the Pebble Project site. Mr. Bobby Andrew, a Dillingham resident and subsistence user, testified that “[t]he number of fish in the spawning areas on the Mulchatna River has changed and the last trip when I went moose hunting on the Koktuli, as well as going up the Mulchatna River, there had been some change and the -- we didn’t see any moose this past trip...Nor caribou.” [Andrew, 12/08/10 Tr. 77:12-16.] Mr. Rick Delkittie, a Nondalton Native and also a subsistence user, testified that “they [the caribou] all moved out. They’re all gone. There is no caribou out there right now.” [Delkittie, 12/10/10 Tr. 101:20-22.]

93. Hunting guide Steve Morris testified that “the animals aren’t there like they used to be.” [Morris, 12/10/10 Tr. 47:17-18.] He also attributed the decline in wildlife principally to Pebble Project activities. [Morris, 12/10/10 Tr. 51:7-20.] Similarly, Rick Halford, another hunting guide who flies frequently in the area, testified that he has not “seen a moose up in there for a long time” and that there “used to be an awful lot of caribou and you seldom see caribou there now. I don’t think I’ve seen a caribou up on top maybe one animal standing by himself in the last two or three years.” [Halford, 12/13/10 Tr. 112:16-18.] Mr. Woolington, the area biologist for ADF&G confirmed that there was no calving documented in the area in the radio collaring program “for the past couple of years.” [Woolington, 12/15/10 Tr. 216:6-8.]

94. The State conceded that upland hardrock exploration activities may be disruptive to caribou during calving periods when such activities are conducted in the vicinity of the calving. [Ex. 604 at 22, RFA #40.] The State also admitted that upland hardrock exploration activities may be disruptive to caribou if such activities are conducted on caribou wintering grounds. [Ex. 604 at 22, RFA #41.]

95. ADF&G, in commenting on the Pebble Project exploration application in 2007, recommended that there be a prohibition on exploration drilling and blasting from June 15 – July 15 to minimize potential impacts to post-calving caribou aggregations, and possible restrictions during the calving period (May). [Exc. 339.] That recommendation was not adopted in the final permit. [Krause 7/21/10 Depo. 146:9-22.]

96. Mr. Trasky testified that it is “very clear that the level of activities that were occurring [at Pebble] have been the type – and duration have shown to displace caribou, moose, and brown bears from essential habitat.” [Trasky, 12/14/10 Tr. 122: 15-18.] Mr. Trasky confirmed that these impacts are long-term, “over eight years or more.” [Trasky, 12/14/10 Tr. 123: 5-6.] He also testified that the scientific literature confirms that the harm to calving caribou due to helicopter traffic is because it causes caribou to expend more energy which can lead to “[h]igher mortality in the calves and adults.” [Trasky, 12/14/10 Tr. 121:12.] Mrs. Hammond, who had flown over the area hundreds of times in the past, confirmed that she had witnessed “a lot of helicopter activity” at the site in the past three or four years. [Hammond, 12/10/10 Tr. 123:22-124:10.] She testified that in her experience flying with her husband for predator control trips, that wildlife run from the sound of fixed-wing aircraft and that caribou would “run as fast as they could go...very, very fast” at the sound of aircraft. [Hammond, 12/10/10 Tr. 125:12-23.] In her experience “helicopters are noisier” than fixed wing aircraft. [Hammond, 12/10/10 Tr. 126:24-25.] Mr. Woolington testified that the census count for caribou takes place in late March, early April (pre-calving season) and that the caribou run from the helicopter noise. [Woolington, 12/15/10 Tr. 175:9-10; 176:9-10.]

97. Mr. Trasky testified that the caribou are “faithful to those [calving] areas and only abandon them if there’s some external force...that causes them to do that” but that caribou “don’t use the Pebble area anymore apparently, so they obviously are using some other area to calve.” [Trasky, 12/14/10 Tr. 142: 22-24.] Mr. Woolington confirmed that last May ADF&G documented, for the first time, caribou calving in game unit 18 when they had previously calved in game unit 17. [Woolington, 12/15/10 Tr. 185:1-7.] Mr. Woolington further testified that the MCH’s numbers were down and that it is at “the bottom end of the intensive management population goals.” [Woolington, 12/15/10 Tr. 197:12-13.]

98. The State’s inspection reports document the lack of wildlife around the Pebble Project site. For most of the 2007-2009 inspection periods, DNR reported no actual observations of bear, moose, waterfowl, fish, or caribou, but did report observing a “beaver dam but no beavers.” [Ex 2017 at SOA 68690.] On other visits, DNR documented very little wildlife presence, and for three years of DNR’s observations, the inspectors only reported limited wildlife observations: a raven; an unidentified raptor; three ground squirrels; a bald eagle; marmot; foxes; a robin; ptarmigan, swans; unidentified birds; a sow and two cubs “five miles east”; and three brown bears one-half mile north, and one sighting of six caribou six miles north of Frying Pan Lake. [Exs. 2004 at SOA 15777; 2005 at SOA 15798; 2006 at SOA 15821; 2007 at SOA 15853; 2008 at SOA 15975; 2009 at SOA 15878; 2010 at SOA 15905; 2011 at SOA 15916; 2012 at SOA 15829; 2013 at 1; 2014 at SOA 68671; 2020 at SOA 15994.] In 2010, after this lawsuit was filed, there was one report that documented two brown bears, six caribou and

some birds (Ex. 2001 at SOA 74905), while another reported one brown bear and various waterfowl (Ex. 2003 at SOA 2003).

99. Despite the fact that the 1992-1994 ADF&G studies and the 1984 and 2005 Bristol Bay Area Plan documented significant wildlife use of the Pebble Project area, and the possibility of Pebble Project activities displacing caribou from their wintering grounds, potentially affecting the herd (Exs. 2086 at 3-26, 2087 at SOA 014555 to SOA 014590, 404 at 8-14, 94, 95 at SOA 005419, 95, 96 at SOA 005424), DNR undertook no examination of whether the permitted exploration or water use activities were affecting wildlife or fish for 16 years of exploration activity. Specifically, the DNR has not:

- a. Conducted any study to determine the cause of the MCH's decline. [Woolington, 12/15/10 Tr. 197:21-23.]
- b. Conducted any study to determine if the activities at the Pebble Project are the cause of the herd's decline. [Woolington, 12/15/10 Tr. 198:10-13.]
- c. Collected any data on the impact of thousands of low-altitude helicopter flights. [Woolington, 12/15/10 Tr. 198:19-21; Taylor, 12/9/10 Tr. 159:3-25-160:1.]
- d. Analyzed whether exploration activities at the Pebble Project have affected the moose population. [Woolington, 12/15/10 Tr. 210:9-12.]

100. Mr. Woolington testified that he had not made any recommendations for stipulations in the MLUP for upland hardrock mining within Game Unit 17, even though that was within the scope of his duties at ADF&G. [Woolington, Tr. 192:17 to 193:1.] He further testified that it "was not his role" to have knowledge of the mechanized equipment operating at the site, nor how many workers are on the site or how many holes had been drilled at the project. [Woolington, 12/15/10 Tr. 193:15-22.] Mr. Woolington testified that he had not personally observed caribou reacting to thousands of helicopter flights such as those which have occurred at the Pebble Project. [Woolington, 12/15/10 Tr. 203:7-10.] He also testified that ADF&G was not monitoring the effect of helicopter activity at the Pebble Project site. [Woolington, 12/15/10 Tr. 195:17-23.]

101. The testimony of Mr. Taylor that "there are enough regulatory restrictions on the activities that are occurring out there to minimize any potential impacts" is unsupported in light of the admitted lack of analysis by the State. [Taylor, 12/09/10 Tr. 150:11-14.] When asked whether the studies Mr. Taylor relied upon to support his opinion that caribou are not displaced by helicopter activity, he conceded that those studies did not involve the intensity of helicopter activity that has occurred at the Pebble Project site. [Taylor 12/9/10 Tr. 158:17 to 160: 10.]

102. Activities associated with advanced exploration activities are a cause for the decline in wildlife at the Pebble Project site. DNR permitted helicopter-supported exploration and data collection requiring multiple trips per day, totaling hundreds of trips per season, ferrying crews, fuel and equipment to and around the Pebble Project site. [De Husson, 12/08/10 Tr. 147:7-8 (five or six flights per shift); Trasky, 12/14/10 129:14-15 (40,000 over the past 8 years).] DNR inspection reports documented “extensive helicopter activity with 3-4 helicopters airborne simultaneously.” [Ex. 2021 at SOA 16006.] DNR documented that moving a single rig “requires 24 helicopter sling loads.” [Ex. 2016 at SOA 15934; Ex. 2021 at SOA 16006.] Mr. Trasky testified that the “movement and acoustical disturbance from helicopters has been shown to displace caribou, brown bear and moose from essential habitat.” [Trasky, 12/14/10 Tr. 118:17-19\*\*.] Brown bears are displaced from salmon streams, caribou from calving areas and wintering areas, causing them to expend energy that they wouldn’t normally expend. [Trasky, 12/14/10 Tr. 108:17-22.] Mr. Trasky also testified that it is very likely that the helicopter flights displaced wildlife from the Pebble Project area. [Trasky, 12/14/10 Tr. 108:25 to 109:1.]

103. In addition to helicopter activity there have been an estimated 22,000 site-days of drilling (combined days of drilling at all sites), more than 20 miles of seismic surveys that cross salmon streams, and up to ten drill rigs on site simultaneously. [Trasky, 12/14/10 Tr. 106:3-7.] Mr. Trasky relied upon scientific studies documenting that these types of activities caused brown bear to avoid traditional denning areas and displaced them from preferred feeding areas. [Trasky, 12/14/10 Tr. 141:25 to 142:2.]

104. In light of the Pebble Project area’s designation as essential habitat for caribou, moose, and brown bear, the history of wildlife use in the area, and the importance of wildlife to reasonable concurrent users, as well as the inherent conflict of intensive, advanced mineral exploration activities, it was incumbent upon the State to evaluate the impacts of the Pebble Project exploration activities on wildlife before permitting these activities. The documented decline of wildlife in the Pebble Project area establishes by a preponderance of the evidence that exploration activities have impinged upon wildlife habitat and adversely impacted reasonable concurrent users.

#### 4. Impacts to Subsistence

105. In December 2006, the Subsistence Division of the Alaska Department of Fish and Game (ADF&G) published Technical Paper No. 302, “Subsistence Harvest and Uses of Wild Resources in Iliamna, Newhalen, Nondalton, Pedro Bay, and Port Alsworth, Alaska, 2004.” [Ex. 447.] The Technical Paper included a summary of the discussion points of the community members about the Pebble Project. The study documented “the continuing importance of subsistence hunting, fishing, and gathering to the residents of the southwest Alaska communities of Iliamna, Newhalen, Nondalton,

Pedro Bay, and Port Alsworth”, and in 2004, “virtually every person in the 5 communities participated in subsistence activities and used wild resources.” [Ex. 447 at 224.] The study area was within the Kvichak River-Iliamna Lake-Lake Clark drainage area, a part of the Bristol Bay watershed, with the Pebble Project at the headwaters “located 18 miles to the northwest of the community of Iliamna near Frying Pan Lake, and 18 miles southwest of the community of Nondalton.” [Ex. 447 at 1, 30 (Fig. 1-1).]

106. The Technical Paper made the following findings:

- Figure 7-1 illustrates subsistence harvest estimates for each study community in 2004 in pounds usable weight per person. Newhalen had the highest harvest with 692 pounds per person, followed by Iliamna (469 pounds per person), Nondalton (358 pounds per person), Pedro Bay 306 pounds per person, and Port Alsworth (133 pounds per person). These are substantial harvests, especially considering that the average American family purchases about 222 pounds of meat, fish, and poultry per person per year (Fall 1990:77). Harvests were also diverse: in Newhalen, there were 12 different resources used by more than half the community’s households. In Pedro Bay, 10 kinds of wild resources were used by over 50% of the households, followed by Nondalton (9 resources), Iliamna (8 resources), and Port Alsworth (8 resources) Table 7-1). [Ex. 447 at 213, 225, 237.]
- All 147 households in the 5 study communities of Iliamna, Newhalen, Nondalton, Pedro Bay, and Port Alsworth used subsistence foods in the 2004 study year. Most residents engaged in subsistence activities (Fig. 7-3): 36% hunted (an estimated 196 people); 76% fished (412 people); 19% trapped (105 people); 81% gathered wild plants (439 people); 91% were involved in at least one harvest activity (491 people); and 90% processed subsistence resources (439 people). For the 5 communities combined, the subsistence harvest in 2004 was 315.8 pounds per person, or just under one pound per person per day. Although the bulk was salmon, followed by large land mammals and other fish, almost all households used wild plants, and many used birds, bird eggs, small game, marine invertebrates, and marine mammals. [Ex. 447 at 214, 227.]
- Sharing of these resources bound families together in networks of mutual support and obligation. Further, subsistence activities and uses created a context in which people shared traditional knowledge about harvest locations, fish and wildlife populations and behavior, and respectful relationships with the natural world. In short, subsistence hunting, fishing, and gathering were vital components of the economy and way of life of these communities in 2004, as they have been for centuries. [Ex. 447 at 214.]

107. When presenting the findings of the study, the Technical Paper included a full summary of the discussion points of the community members, which included specific comments on the Pebble Project. [See Ex. 447 at 221-223.] Some of the comments were:

- Subsistence foods are healthier for people than foods bought in stores and need to be protected. Local community residents do not want to have to rely on processed foods. [Ex. 447 at 222.]
- There is a large amount of sharing going on between villages as well as within each community. For example, Newhalen residents share with Nondalton and Kokhanok. [Ex. 447 at 222.]
- Mining advocates say, "Subsistence won't change." [But] there has already been a net loss. Subsistence has changed already. The subsistence lifestyle has changed. Every year they (people working on mine planning) are here longer. The mine is already here. [Ex. 447 at 223.]
- The movements of the few caribou that are in the area have been disturbed in recent years by helicopter traffic. [Ex. 447 at 223 (from Iliamna/Newhalen).]
- Caribou movements are disturbed by helicopter traffic noise, causing the caribou to move farther away from Nondalton. [Ex. 447 at 223(from Nondalton).]
- Community residents continue to use their traditional trapping and hunting areas around Groundhog Mountain, which could be impacted by a mine. [Ex. 447 at 223 (from Nondalton).]

108. The Technical Paper's findings and the participants' comments were borne out by the testimony at trial. Lance Trasky testified that he had read the report and confirmed its findings of the importance of subsistence to the villages as well as to the reliability of such reports and the researchers that undertook the study. [Trasky, 12/14/10 Tr. 90:20 to 91:19.] The evidence established that there were concerns raised by individuals about the adverse impacts and conflicts with subsistence use at the Pebble Project in the 2007 Alaska Coastal Management Program review. [Ex. 2172; Smodey, 12/17/10 Tr. 122:20 to 123:7.] The comments specifically highlighted that the impact of the Pebble Project exploration activities on subsistence resources had not been reasonably evaluated. [Ex. 2172 at SOA 4477.]

109. In addition, the State conceded that upland hardrock exploration activities may be disruptive to caribou during calving periods when such activities are conducted in

the vicinity of the calving. [Ex. 604 at 22, RFA #40.] The State also admitted that upland hardrock exploration activities may be disruptive to caribou if such activities are conducted on caribou wintering grounds. [Ex. 604 at 22, RFA #41.]

110. Mr. Trasky testified that the caribou are “faithful to those [calving] areas and only abandon them if there’s some external force...that causes them to do that.” [Trasky, 12/14/10 Tr. 142:22-24.] Mr. Trasky also testified that it is “very clear that the level of activities that were occurring [at Pebble] have been the type – and duration have shown to displace caribou, moose, and brown bears from essential habitat”(Trasky, 12/14/10 Tr. 122: 15-18), and confirmed that these impacts are long-term, “over eight years or more” (Trasky, 12/14/10 Tr. 123: 5-6). Mr. Woolington testified that the MCH’s numbers were down and that it is at “the bottom end of the intensive management population goals.” [Woolington, 12/15/10 Tr. 197:12-13.]

111. Mr. Trasky also testified that the scientific literature confirms that the harm to calving caribou due to helicopter traffic is because it causes caribou to expend more energy which can lead to “[h]igher mortality in the calves and adults.” [Trasky, 12/14/10 Tr. 121:12.] Mr. Woolington testified that the census count for caribou takes place in late March, early April (pre-calving season) and that the caribou run from the helicopter noise. [Woolington, 12/15/10 Tr. 175:9-10; 176:9-10.] [See also FF #96 re: impacts to wildlife.]

112. Rick Delkittie, a plaintiff in this case and a resident of Nondalton, testified that he uses the Pebble Project area for subsistence hunting and traveling for subsistence. [Delkittie, 12/10/10 Tr. 96:13-18.] Mr. Delkittie subsistence hunts in the Pebble Project area for birds (geese and ducks) in the spring; moose, caribou, porcupine, and beaver in the fall; and moose and caribou in the winter. [Delkittie, 12/10/10 Tr. 96:19 to 97:1; 97:25 to 98:1; 98:7-14.] Mr. Andrew has undertaken subsistence in the area around the Pebble Project, but not on the claims themselves. [Andrew, 12/8/10 Tr. 78:24 to 79:22.]

113. Mr. Delkittie testified that his subsistence way of life is very important because the land provides food; there is no store. [Delkittie, 12/10/10 Tr. 97:2-9.] “The wild game caught out there that we have in our freezer is probably about 60%.” [Delkittie, 12/10/10 Tr. 100:3-5.] The Pebble Project area has special spiritual significance. The people of Nondalton use the land for hunting for village members that have passed on as a way to provide for the family and to celebrate the life lost, and the lands in the Pebble Project area are specifically used for these activities. [Delkittie, 12/10/10 Tr. 99:13 to 100:22 (“It’s really important, especially the spiritual aspect of our tribe. It helps with healing and have [sic] good closure for the family who lost loved ones.”).] Similarly, Mr. Andrew testified about the importance of subsistence to him, his family, the Nunamta board members and their constituents, going so far as to say that

without as many subsistence resources, “For me, I think I’d starve.” [Andrew, 12/8/10 Tr. 78:1-15; 81:14-22.] Bella Hammond stated:

[Subsistence is] a lifeline to many, many people, myself included because I’ve always been a subsistence user and I grew up in that lifestyle. I know what it means to people, and it would be like having the heart torn out of a person to threaten that way of living. . . .

[Hammond, 12/10/10 Tr. 130:20-24.]

114. Mr. Delkittie continues to hunt in the Pebble Project area, but he finds fewer and fewer caribou in the area, and in the past few years, he has not gotten a caribou in that area. [Delkittie, 12/10/10 Tr. 100:23 to 102:4.] Based on his observations, Mr. Delkittie attributes less game and birds in the area to the noise at the Pebble Project. [Delkittie, 12/10/10 Tr. 101:11-22; 115:9 to 116:13.] Bobby Andrew, spokesman for Nunamta Aulukestai, a plaintiff in the case and a resident of Aleknagik, has also observed the significant decline of caribou in the region, and testified to the correlation between a more noticeable decline and the time exploration activities significantly increased at the Pebble Project site in 2003 or 2004. [Andrew, 12/8/10 Tr. 75:16 to 76:20.] Mrs. Hammond also testified to her observations in dozens, if not hundreds, of flights regarding the reaction of wildlife, including caribou to the loud noise from airplanes, and by observation, helicopters. [Hammond, 12/10/10 Tr. 125:1-23; 126:22 to 127:2.]

115. Mr. Andrew also testified that he and the Chairman of the Nunamta Board of Directors have traveled each year since 2004 to the Chairman’s property on the Swan River where the Mulchatna River and the Swan River meet, and have observed a steady decline in the number of fish in the spawning areas there. [Andrew, 12/8/10 Tr. 76:21 to 77:16.]

116. The State and PLP, on the other hand, offered no evidence that exploration activities at the Pebble Project are not having an adverse impact, and in fact, have made no effort to make such a determination. [Irwin 10/20/10 Depo. 78:7-8 (“[Subsistence is] not in DNR’s realm. I think you should ask that maybe of Fish and Game.”); Prokosch 7/22/10 Depo. 94:18-19 (Subsistence “is not one of those things we blanketly [sic] consider.”); Krause 7/21/10 Depo. 196:6-10 (“Nobody in DNR would look at subsistence.”); Fredericksen, 12/14/10 Tr. 187:4-6 (Q. Have you ever conducted any analysis of the impacts to recreational, commercial or subsistence users? A No, ma’am.)] DNR made no effort to ascertain whether there was reasonable concurrent use of the site or to issue its permits subject to reasonable concurrent use. Yet, despite having never evaluated the impacts to subsistence, DNR concluded that exploration would not limit access to subsistence resources, reduce subsistence resources or increase the use of subsistence resources by non-rural residents. [Ex. 2172 at SOA 4476.]



117. Mr. Taylor admitted that he visited the Pebble Project site in his official ADF&G capacity and formed the opinion at that time that he “wasn’t concerned about subsistence because of the [hunting] policy the company had in place”, even though the policy does not address impacts to subsistence; it merely limits employees who can hunt and fish on the site, to those who are residents of the Iliamna Lake area who customarily engage in subsistence. [Taylor 8/13/10 Depo. 137:13-20; *see also* Ex. 3051.]

118. In summary, the concerns raised by the public and the ADF&G Technical Paper documenting the importance of subsistence in the region, and the testimony presented by the Plaintiffs documenting negative impacts on subsistence hunting and fishing establish by the great weight of evidence that the Pebble Project exploration has impinged on the subsistence use of the Pebble Project area.

##### 5. Impacts to Hunting and Recreation

119. Hunters and hunting guides – who are reasonable concurrent users of the Pebble Project site – have been adversely impacted by the Pebble Project and have had their reasonable concurrent use eliminated. [Morris, 12/10/10 Tr. 32:3-6 (“The Pebble activities have pretty much rendered these areas unable to conduct a hunting operation.”).] The area contained abundant wildlife and hunting opportunities in the 1990s, prior to the intensive Pebble Project exploration. [Trasky, 12/ 14/10 Tr. 109:16-18.] Guides successfully used the area (Guide Unit 1702) in the 1990s. [Exs. 486; 19; Morris, 12/19/10 Tr. 13:23 to 24:2 (“I probably averaged 30-40 clients a year from ’93 to 2001”); 31:11-12.] It was considered “very good” for guiding. [Morris, 12/19/10 Tr. 31:18-19.]

120. However, hunting guides have ceased guiding in the area due to the mineral exploration activities at the Pebble Project, such as helicopter traffic and seismic work. [Morris, 12/10/10 Tr. 32:9-13 (“The helicopter activity in itself is enough that you can’t bring a paying client out there, put him in a spike camp. Any one of those dozen units that I used to use, they’ll see more helicopters in one day than there will be game.”); 34:13 to 36:3 (hunters displaced because of seismic work); 36:17 to 37:25 (noting that other hunting guides have also decreased their use of the Pebble Project Area); 48:12-14 (“It is much more difficult to have a hunt now, to have a successful hunt than it was in the past.”); *see also* Halford, 12/13/10 Tr. 112:6-18 (noting that he would not take clients to the Pebble Project Area to go hunting because of the lack of wildlife and the noise and mineral exploration activity in the area).]

121. The loss of revenue to guides previously using the area is substantial. One guide noted that he previously generated \$100,000 to \$120,000 in gross income annually from taking clients to the Pebble Project Area (Morris, 12/10/10 Tr. 36:25 to 37:3), but

that he no longer takes clients there because of the exploration activities (Morris, 12/10/10 Tr. 47:12-14, 17-22 (“Q: Can you use that area for your hunting guide, I mean, can you use it successfully for your hunting guide business? ”..[T]he animals aren’t there like they used to be and it’s more the activity of Pebble, that you would not land, put up a camp, and have somebody sit there and watch more helicopter activity than wildlife in any given time in that area that I used to use, period.”); *see also* Hammond, 12/10/10 Tr. 126:22 to 127:2 (noting that helicopters are noisier than fixed wing aircraft)).

122. The State failed to analyze these impacts to hunters and hunting guides, or other recreational or commercial users. [See, e.g., Frederickson, 12/14/10 Tr. 187:4-63 (DNR has never conducted an analysis of the impacts to recreational or commercial users of the exploration activities at the Pebble Project site); Krause 7/21/10 Depo. 198:1-5 (impacts to recreational hunters “never came up”).] Commissioner Irwin testified that he is not familiar with and does not use the concepts of reasonable concurrent use, sustained yield, beneficial use, maximum benefit of the people, or replenishable resources in his oversight of DNR. [Irwin 10/20/10 Depo. 118:18 to 121:13.] He further testified that he did even know whether or not DNR was responsible for considering them. [Irwin, 10/20/10 Depo. 120:21-25.]

123. In summary, hunters and hunting guides have been demonstrably adversely impacted by the intense exploration activity at the Pebble Project. Hunting opportunities have been eliminated by the helicopter activity and by the intense human presence, affecting both the recreational use and the commercial use of the area. This has resulted in significant financial impacts, as well as eliminating the use and enjoyment of the area for hunting. The State failed to consider the exploration activity’s effects on hunters who are reasonable concurrent users of the area.

## 6. Impacts from Discharges of Drilling Muds and Acid Rock

### a. *Exploration drilling activities at the Pebble Project have resulted in contamination from discharges of drilling muds to land, wetlands, and waters.*

124. The State and PLP admit that the drilling of bore holes and the concomitant discharge of drilling fluids have occurred since exploration began in 1988, and that since 1995, when a statutory exemption to AS 46.03.100 was enacted, the State has not regulated such discharges. [Nakanishi, 12/13/10 Tr. 127:5 to 130:6.]

125. Drilling muds, which cool the drill bit and assist in drilling, have been used extensively for exploration drilling at the Pebble Project. [Ex. 3053 at 1.] PLP’s Director of Site Operations Gernot Wober testified that following a press conference at which questions had been raised regarding the chemical composition of the drilling mud, EZ

Mud Plus, used by PLP, he drafted a “Briefing Fact Sheet” (hereinafter “Wober Briefing Fact Sheet”) regarding EZ Mud Plus. [Wober 12/7/10 Tr. 79:14-24; 80:8-23; 85:25 to 86:8; Ex. 3053.]

126. The State claimed to have worked with an independent consultant, Robert Loeffler, to analyze drilling muds. [Ex. 556 at SOA 22773, 22776.] DEC apparently viewed Mr. Loeffler, who was hired as a consultant by the Lake and Peninsula Borough, as a neutral consultant as DEC documents stated that Mr. Loeffler “was not repping a mining company here.” [Ex. 556 at SOA 22773.] Mr. Loeffler was, in fact, an ex-business partner of the Chief Executive Officer of PLP, John Shively, a fact about which DEC employee Allan Nakanishi claimed at trial that he was unaware. [Nakanishi, 12/13/10 Tr. 126:17 to 127:4.]

127. Mr. Loeffler drafted a memo for the Lake and Peninsula Borough to which he attached the Wober Briefing Fact Sheet, but he did not identify the attachment as having been prepared by PLP employee Gernot Wober, and passed it off as his own work. [Compare Ex. 556 at SOA 022828-022832 to Ex. 3053; Nakanishi, 12/13/10 Tr. 126:6-14] Based upon Mr. Wober’s sworn testimony that Mr. Wober had, in fact, prepared the original memo, Mr. Loeffler appears to have misrepresented the source of his research. [Compare Loeffler Memo: Ex. 556 at SOA 22867-22870 to Wober Memo: Ex. 3053.]<sup>11</sup> In any case, the Loeffler memo/Wober Briefing Fact Sheet was used by the

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<sup>11</sup> A revealing exchange occurred between DEC and Mr. Loeffler concerning the content of the memo. On August 7, 2009, Mr. Loeffler wrote an email to Mr. Nakanishi, stating:

I finally wrote the stupid mud memo. Can you guys review it and see that it’s accurate? You can probably ignore the first part about the advertisement – but the rest is somewhat technical and I would like to be correct. Also I’m having my business partner read it for tone and English (and I’ll probably send it to a few others, including the Mfgr.)

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I would like to tell the Lake and Pen boro [sic] that it’s been reviewed by DEC (though I won’t if you don’t want me to).  
[Ex. 556 at SOA 22824 (underlining added).]

Mr. Nakanishi responded:

Thanks for the opportunity to review. I’ve made some minor edits/comment on the Toxicity section of your report. I think that this report clearly summarizes answers to what I would assume would be typical questions regarding the use of drilling muds.

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State as a basis for its determination that the drilling muds were not harmful and that EZ Mud Plus was acceptable for use. [Nakanishi, 12/13/10 Tr. 141:14 to 142:3; 148:10 to 150:19.]

128. Dr. Zamzow reviewed the information and Material Safety Data Sheets (MSDS) for EZ Mud Plus and found that EZ Mud Plus is a polymer and emulsion. [Zamzow, 12/10/10 Tr. 150:5-21.] This was confirmed by DEC's resident expert on drilling mud toxicity studies. [Ex. 556 at SOA 22791.] Dr. Zamzow found that the emulsion contains a petroleum distillate, which is significantly more toxic than the polymer, and that the petroleum distillate contains water soluble components that are likely to transport constituents of petroleum into groundwater. [Zamzow, 12/10/10 Tr. 167:19 to 168:21; 164:3-12; Ex. 556, SOA 22830.] The State admitted that prior to December 22, 2005, it did not require the submission of MSDS sheets for drilling muds or additives for upland hardrock exploration activities. [Ex. 604 at 32, RFA #78.]

129. Sodium bentonite is another compound used in the PLP drilling process. [Wober, 12/7/10 Tr. 99:3-13.] Dr. Zamzow testified that sodium bentonite is not stable in that it "has the ability to donate a lot of sodium ions to the environment." [Zamzow, 12/10/10 Tr. 168:22 to 169:22; Ex. 556 at SOA 22831.] In addition, Dr. Moran testified

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To answer your question about telling your client that it's been "reviewed by DEC" – I don't see a problem with letting your client know that we've shared information sources and conferred with each other on the findings. It's really a semantic difference, but I'd be concerned with giving the impression that DEC implicitly "approved" the report.

[Ex. 556 at SOA 22839.]

Mr. Loeffler then responded:

Allan,

Thanks. I will not say or imply "approved." I think there is a difference and it is important....

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....Finally, I am having parts of the memo reviewed by others....And I asked Pebble Limited Partnership to look at the part where I describe their procedures (and they told me some procedures I wasn't aware of).

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So, there will be a few changes but nothing that changes the conclusions.

[Ex. 556 at SOA 22850.]

Mr. Loeffler did not indicate that Mr. Wober had written the Briefing Factsheet about which Mr. Wober testified on the witness stand. [See Ex. 556.]

that bentonite is not a chemically stable compound and when mixed with water has a pH of 9.5. [Moran, 12/9/19 Tr. 79:11-15.]

130. Five studies that were referenced in DEC's files found that, on average, a concentration of 2.8 mg/l of the petroleum distillate portion of the emulsion in EZ Mud Plus was the LC<sub>50</sub> for rainbow trout (Ex. 556 at SOA 22807), although elsewhere in the same file, DEC employee Marc Bentley found that the LC<sub>50</sub> for rainbow trout is 2.5 mg/l (Ex. 556 at SOA 22798). An LC<sub>50</sub> is the scientific test to determine the concentration of a chemical that kills 50% of a sample population. Mr. Nakanishi testified that this is the same LC<sub>50</sub> that had been determined for the fathead minnow. [Nakanishi, 12/13/10 Tr. 149:20 to 150:5.] Therefore, at a 2.8 mg/l concentration of the petroleum distillate in EZ Mud Plus, 50% of the rainbow trout exposed would die.

131. The concentration of EZ Mud Plus applied at the Pebble site was calculated to be to be 625 mg/L "going down the hole." [Ex. 556 at SOA 22821-22822.] The State concluded that the concentration of the emulsion in the hole "is approx 2 orders of magnitude greater than the LC50 level." [Ex. 556 at SOA 22822.] In fact, even the Loeffler memo/Wober Briefing Fact Sheet admitted that "the theoretically available concentration within the well itself is above the level likely to cause acute toxicity to fish." [Ex. 556 at SOA 22827.]<sup>12</sup> Despite this fact, DEC claimed that the lethal effect would be diluted because the boreholes were at least 100 feet from surface water. [Nakanishi, 12/13/10 Tr. 150:6-19.]

132. Yet, there was no evidence that the drilling fluids containing EZ Mud Plus were kept 100 feet from surface water. The evidence established to the contrary that lethal concentrations reached wetlands, and likely reached surface water. [Ex. 477A; 478A; Smith, 12/7/10 Tr. 210:7-15.] Dr. Smith testified, based upon the GIS mapping of the 1,269 boreholes drilled at the Pebble Project and the waters listed in the National Hydrologic Survey that: (1) 49 drill holes were within 25 feet of a water body; (2) 47 drill holes were within 50 feet of a water body; and (3) a total of 162 drill holes were located within 100 feet of a water body. [Smith, 12/8/10 Tr. 51:20 to 52:11.] Thus, more than 12% of the holes were drilled within 100 feet of surface water, and according to DEC's own analysis, could cause harm at those distances.

133. The State admitted that the Pebble Project area has wetlands as defined by federal agencies (Ex. 604 at 29, RFA #65), and that the State has not mapped the wetlands within the Pebble Project area (Ex. 604 at 29, RFA #66). In 2004, DNR

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<sup>12</sup> In the final version of the Loeffler memo/Wober Briefing Fact sheet, this conclusion changed to: "Thus, the concentrations of EZ Mud Plus within the bore-hole itself or immediately at the discharge point would demonstrate a *theoretical* toxicity to fish." [Ex. 556 at SOA 22870 (emphasis in original).]

inspectors confirmed, with photographic evidence, that there were “disbursements (sic) of drilling fluids and muds beyond the sump area at drilling locations in wetland areas” and expressed concern “that the clay size fraction in the mud not become disbursed (sic) in the wetland environment, any more than necessary.” [Ex. 2030 (5/20/04 inspection report) at SOA 3790.] Yet drilling fluids and muds continued to be discharged in wetlands, and the State has taken no action to regulate, prohibit or mitigate the practice. [Nakanishi, 12/13/10 Tr. 127:5 to 130:6.] As Mr. Nakanishi testified “There are some drill sites that may be or appear to be within wetlands.” [Nakanishi, 12/13/10 Tr. 129:24-25; *see also* Benkert, 12/16/10 Tr. 143:25 to 144:1.] This was confirmed in an inspection report from 2004 and by Mr. Wober: “We have drills in wetlands, so there is some discharge into wetlands.” [Wober, 12/7/10 Tr. 74:16-17; Ex. 2030 at SOA 3789-3790.] The October 4, 2007, inspection report also found that the “[t]rench and sump pit system is inadequate owing to marshy conditions” at Drill Site No. 7385. [Ex. 2017 at SOA 68699.] Mr. Gleitsmann and Mr. Halford took photographs that confirmed that drilling occurred in wetlands in 2009 and 2010. [Gleitsmann, 12/17/10 Tr. 220:19-22; Halford, 12/13/10 Tr.103:17-20; Ex. 186 at NA 4667.]

134. DEC took the position that there were no lethal concentrations of pollutants from EZ Mud Plus in wetlands or water bodies, based on the assumption that drill holes were 100 feet from wetlands or water bodies, but DEC made no effort to determine whether the drill holes were within 100 feet of a water body. [Nakanishi, 12/13/10 Tr. 152:5-13.] Mr. Nakanishi also testified that DEC never took any measurements or lab data to determine whether or not water quality standards have been met at the Pebble site. [Nakanishi, 12/13/10 Tr. 134:17-21.] Further, while some State employees testified that the 100-foot setback is a state permit requirement, DNR permitter Kerwin Krause testified that there is no state requirement that prohibits discharges within 100 feet of water bodies. [Krause 7/21/10 Depo. 234:9-13.]

135. Drilling discharges at the Pebble Project are likely to have occurred within the 100-year flood plain. The State admitted, “It is likely that at least some of the area within the Pebble Project Site is within the 100-year flood-plain.” [Ex. 604 at 30-31, RFA #72.]

136. The PLP MLUP applications confirm that a variety of drilling fluids or additives were used for exploration to facilitate drilling. [Ex. 2043 at SOA 5293-5295, listing twelve drilling fluids/additives used in PLP’s exploration activities.] Those drilling fluids are poured into the borehole with water, which comes back as “return fluid” that is deposited in sumps or sprayed on the tundra. [De Husson, 12/8/10 Tr. 131:22 to 132:13.] DNR and PLP presented no evidence that they maintained records of the amount of drilling fluids used each year. Moreover, only a few of the driller timesheets recorded the use of the compounds. [*See, e.g.*, Ex. 3122 at PLP 30098.]

However, the incomplete PLP purchase records (which cover only portions of 2008-2010) establish that thousands of gallons of the fluids were purchased each year for use at the Pebble Project. [Ex. 749; Wober, 12/7/10 Tr. 109:6-10.] For example, for part of 2008, PLP produced receipts for 12,000 gallons of EZ Mud Plus purchased for use and subsequently discharged on state land or into surface or subsurface waters in the Pebble Project area.<sup>13</sup> In addition, the evidence presented at trial established that 25-50 five-gallon containers of drilling fluids or additives (such as Penetrol) were delivered every day or every other day to a drill site and that half were placed in the drill shack to warm up each shift, with the remainder left outdoors on pallets. [De Husson, 12/8/10 Tr. 199:14 to 200:1; Dem. Ex. 188A at SOA 69659.]

137. The drilling muds are toxic when they are discharged to the tundra. Dr. Zamzow testified that the salt in the drilling muds is toxic to vegetation, that she had personally observed bare patches in the Pebble Project area and had noted documentation of such patches in DNR inspection reports. [Zamzow, 12/13/10 Tr. 79:7 to 82:11; 82:25 to 84:6.] Dr. Chambers testified that due to the geochemical instability of the drilling muds discharged to the surface and into sumps, there is a significant risk that metals, including antimony, selenium, arsenic, thallium, zinc and molybdenum, may leach into the environment. [Chambers, 12/10/10 Tr. 68:9 to 69:23.] Mr. Wober testified that the testing of sumps did not begin at the Pebble Project until 2009 (after this litigation was initiated) and that the testing shows the presence of dissolved metals. [Wober, 12/7/10 Tr. 103:14-23.]

138. The impacts of these toxic drilling muds discharges have been cited in state inspection reports over the years: (1) “Consider moving upland discharge points frequently or dispersing discharge over a larger area to avoid impacting ground cover vegetation and potentially altering water quality in kettle ponds adjacent to discharge locations” [Ex. 2008 at SOA 15976 (9/23-24/08 inspection report)]; (2) “State regulatory agencies and the PLP should further discuss the relative merits of handling drill fluids by discharge onto the ground, discharge into dry depressions, or recirculation”, and “The

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<sup>13</sup> See Ex. 749 invoices showing the 2008 purchase of:  
832 five-gallon cans 4/10/08 (Ex. 749 at PLP 24843)  
+ 1,088 five-gallon cans 8/5/08 (Ex. 749 at PLP 24846)  
+ 128 five-gallon cans 8/5/08 (Ex. 749 at PLP 24847)  
+ 192 five-gallon cans 10/16/08 (Ex. 479 at PLP 24850)  
+ 128 five-gallon cans (Ex. 749 at PLP 24851)  
+ 32 five-gallon cans (Ex. 749 at PLP 24853)  
= 2400 five-gallon cans  
= 12,000 gallons.

This figure does not include the other twelve drilling additives, such as Extreme #1, also purchased in 2008 and also discharged onto the tundra,. [Ex. 749 at PLP 24852.]

discharge of excess water directly onto the ground in a concentrated stream could cause erosion. The effects of direct discharge should be evaluated, and possibly some sort of diffuser should be placed to reduce damage. Something as simple as a sheet of plywood, possibly with a rough surface, might be effective” [Ex. 2007 at SOA 15854 (10/28-29/08 inspection report)]; and (3) photos showing that the discharge seeps into the ground, leaving clay on the tundra (Ex. 2023 at SOA 16030).

139. Photographs in state inspection reports also demonstrate that vegetation has not recovered at drill site years after reclamation. [Exs. 2001 at SOA 74916 (DDH 9464), 74917 (DDH 8441), 74918 (DDH 7378); 2003 at p. 8 (DDH 8429), p. 9 (DDH 8432), p. 12 (DDH 9470 and 9471), pp. 14-15 (DDH 8412), and p. 16 (DDH 8440); 2023 at SOA 16033 (DDH 4136) and 16034 (DDH 4155).] Mr. Benkert, an ADF&G employee who participated in three inspections at the Pebble Project, testified that one or more sites had not successfully been reclaimed. [Benkert, 12/16/10 Tr. 146:1-15; 147:7-20.] Mr. Delkittie also testified that he has seen dead vegetation at the older drilling sites when he has been in the Pebble Project area engaged in subsistence hunting and when he worked at the site in 2005. [Delkittie, 12/10/10 Tr. 105:19-25; Dem. Ex. 206; Delkittie, 12/10/10 Tr. 108:23 to 109:10.]

140. The evidence also established that it was necessary for workers to wear personal protective equipment (PPE) to prevent exposure to caustic or toxic chemicals used at the Pebble Project site. [De Husson, 12/9/10 Tr. 12:17 to 13:16.] The industrial gloves used by workers deteriorated “almost like the shrinkage [or] melting” and “did not last long” and would give off a stench when they would dry out. [De Husson, 12/9/10 Tr. 13:17 to 14:21.] In addition, the boots worn at the Pebble Project would “break down 20-30% faster” than boots worn for North Slope oil work. [De Husson, 12/9/10 Tr. 16:2-10.]

141. Based upon the foregoing facts, tens of thousands of gallons of drilling muds and additives used at the Pebble Project contain toxic chemicals that have been discharged to the land and wetlands at the Pebble Project. The caustic nature of these chemicals is evident from the accelerated deterioration of PPE used by workers at the site. The evidence shows that concentrations of chemicals lethal to aquatic life reached wetlands and surface water. These toxic contaminants have also reached groundwater through the boreholes drilled at the Pebble Project site and through percolation from surface discharges and the sump pits. In addition, surface discharges have killed surface vegetation that has not recovered after reclamation. As a result, Nunamta has shown by a preponderance of the evidence that drilling muds and additives have contaminated the Pebble Project area.



- b. *Exploration drilling activities at the Pebble Project have resulted in acid rock drainage from bore holes and drill cuttings.*

142. The Pebble deposit is a sulfide ore deposit, and the cuttings from the exploration boreholes contain sulfide material such as pyrite (“fool’s gold”) which is acid-generating in the presence of oxygen and water. [Stelljes, 12/15/10 Tr. 79:7-18; Moran, 12/9/10 Tr. 38:15-22.] The acid-generation process is accelerated in the presence of bacteria. [Moran, 12/9/10 Tr. 41:8-19; Zamzow, 12/10/10 Tr. 148:9-19; Zamzow, 12/13/10 Tr. 47:15-24.] The drilling of exploratory wells generates a fine material (“rock flour”), which floats to the top with the drilling muds and is discharged directly onto the tundra or pumped into sump pits. [Zamzow, 12/10/10 Tr. 159:9-23; Stelljes, 12/15/10 Tr. 86:24 to 87:9.] This fine material reacts upon contact with oxygen and water to generate acid. [Zamzow, 12/10/10 Tr. 159:20 to 160:1.] The acidification process may be rapid (taking a matter of weeks) or slow (continuing over decades) depending on the other rock material mixed with the reactive sulfide rock flour and the rate of bacterial growth; therefore, this contamination is long-term. The sealing of bore holes does not necessarily stop the acid-generation process. [Moran, 12/9/10 Tr. 41:24 to 42:15.]

143. The State admitted that it has not required PLP or its predecessors to conduct monitoring at the Pebble Project site to determine if groundwater has been contaminated as a result of the exploration activities. [Ex. 604 at 19, RFA #32.] Dr. Moran testified that when drill holes are plugged with grout/cement, acid rock drainage reactions would initially cease, but experience and the scientific literature demonstrate that the plugs will degrade over time and that contamination occurs over the long-term. [Moran, 12/9/10 Tr. 92:15 to 93:10.] Dr. Moran also testified that oxygen levels in groundwater at the Pebble Project are very high, providing an increased capacity to sustain long-term acid rock drainage. [Moran, 12/9/10 Tr. 93:17 to 95:25.] Dr. Stelljes, on the other hand, testified that the drilling fluids seal the holes and there is “no way for the stuff in the well to get out of the well in the subsurface.” [Stelljes, 12/15/10 Tr. 87:13-14.] While Dr. Stelljes’ testimony may apply under ideal conditions, it is not persuasive with respect to numerous drillholes throughout the Pebble Project area, as to which the evidence established that drill holes were inadequately plugged, or as to which there is no evidence that plugging was actually undertaken. [See Evidence Table G; FF #157, 158, 160, 161, 162, 163, 168.] In addition, Dr. Stelljes himself admitted that a drill hole can be a pathway for contaminants, if it is not sealed or if there are highly soluble anions or cations. [Stelljes, 12/15/10 Tr. 99:12 to 100:2; 100:11 to 101:6.]

144. Dr. Zamzow testified that the sump pits in the Pebble Project area are subjected to a fluctuating water table that creates a “wetting and then drying atmosphere over and over.” [Zamzow, 12/10/10 Tr. 159:8 to 160:4.] Because the sumps are situated in permeable material, it is likely that the cyclic wetting, drying and re-wetting exposes dried solid material within the pit to air, followed by a period of saturation when water

may carry the material out of the sump. [Zamzow, 12/10/10 Tr. 160:5-19. *See also* Moran, 12/9/10 Tr. 61:22 to 63:17.]

145. Dr. Stelljes, on the other hand, stated that the sumps, which are “sealed” with drilling muds, are, in effect, caulked like a bathtub and that materials within the sump are “entombed in place.” [Stelljes, 12/15/10 Tr. 88:3-15.] However, Dr. Stelljes’ testimony did not appear to take account of actual conditions at the Pebble Project site, wherein the cycle of wetting and drying, it can be expected that cracks will develop in the sodium bentonite “seal”, and that during wetting periods, material will move out of the sump, both laterally and vertically. [Moran, 12/9/10 Tr. 34:12-24; 82:25 to 83:4; 84:25 to 85:2.] Neither the State nor PLP have tested the sump areas or analyzed them for contamination, and there is no “caulk” placed on top of the holes or sumps. [See Zamzow, 12/10/10 Tr. 159:20 to 160:4; 160:17-18; Zamzow, 12/13/10 Tr. 88:24 to 89:3; Zamzow, 12/17/10 Tr. 272:11 to 273:6; Wober, 12/7/10 Tr. 103:4-6; Nakanishi, 12/13/10 Tr. 134:17-23; Krause 7/21/10 Depo. 210:17-18.] Dr. Stelljes’ testimony also ignored the results of the humidity cell testing at the Pebble Project that has found that finely ground reactive rock subjected to wetting and drying acidifies in 1 to 15 years. [Zamzow, 12/10/10 Tr. 160:20 to 162:17.]

146. The State admitted that before issuing TWUPs and MLUPs it did not conduct or require an analysis of the underlying ore minerals at the Pebble Project to determine whether exposure to air and groundwater during exploration might create acidic or other toxic by-products. [Ex. 604 at 18, RFA #28.] The State also admitted that the cuttings from exploratory drilling were deposited directly on the tundra prior to 2003-2004. [Krause 7/21/10 Depo. 175:1-5.] Even after 2004, when sumps were in use, the sumps were not – and still are not – lined. [Krause 7/21/10 Depo. 104:15-20.] As acid is generated from exposure of cuttings to water and oxygen, “meteoric water” (groundwater derived from precipitation) will carry the acid with it. [Chambers, 12/10/10 Tr. 56:17 to 57:21; Wober, 12/7/10 Tr. 102:16-25.] DNR inspection reports confirmed that the acid-generating rock was placed in the sumps. [Ex. 2021at SOA 16005 (8/22/2007 Inspection Report) (“At each drilling rig, settling sumps (Figure 4) are dug to allow rock flour to settle from the drilling water.”).] Mr. Wober testified that all of the drill cuttings from the borehole are deposited in the sumps or on the tundra, the cuttings in the sumps have acid generating potential, and that 85-90% of drill holes have sulfides in the cuttings. [Wober, 12/7/10 102:24 to 103:3; 108:5-10.] Depositing drill cuttings into sumps allowed water (which contained sulfide ore/acid) to percolate into the ground. [Krause 7/21/10 Depo. 104:23 to 105:4; *see also* Cathcart, 12/15/10 Tr. 163:4-15.] Ms. Bettis testified that even if water is discharged onto the “uplands,” it will migrate to ponds and streams. [Bettis, 12/16/10 Tr. 76:3-8 (“The water seeps into the soil, and it can percolate through the soil until it hits the groundwater. Once it hits the groundwater, it can flow with the groundwater until it seeps into ponds or into tributaries or the streams.”).] Mr. Krause corroborated Ms. Bettis’ testimony, stating that water will “percolate down

through the glacial materials” (Krause 7/21/10 Depo. 233:15-17), and that DNR had undertaken no analysis of the chemical composition of the discharge to determine whether the practice was appropriate (Krause 7/21/10 Depo. 232:14-19).

147. DNR inspection reports confirmed during a site inspection that the water table was only 60 feet below the ground surface and that drill water encountered *below* the ground water was being pumped into sumps “where it was percolating below the ground.” [Ex. 2016 (10/17/2007 Inspection Report) at SOA 015934.] At that site, seven 160-foot holes were drilled, creating seven pathways for contamination of groundwater. [Ex. 2016 (10/17/2007 Inspection Report) at SOA 015934.]

148. Dr. Zamzow, relying upon water quality data in PLP’s Report Series F, established that acid, heavy metals, and salts have been introduced into groundwater. [Zamzow, 12/13/10 Tr. 84:17 to 85:4; 86:2-12; Ex. 3120.] Other witnesses confirmed the presence of acid-generating potential: Moran, 12/9/10 Tr. 50:2 to 51:17 (not all bore holes have been plugged, and even if they had been, the acid-generating reactions would continue, though more slowly); Taylor, 12/9/10 Tr. 156:20 to 158:10 (confirming the discharge of drilling muds to uplands); Trasky, 12/14/10 Tr. 118:18 to 119:21 (stating concern about acid generation and impacts to fish); Fredericksen, 12/14/10 Tr. 185:12 to 186:7 (potential, but the State has never tested it); Irwin 10/20/10 Depo. 143:15 to 144:15.]

149. The water chemistry at the Pebble Project is stable outside of the ore body. [Zamzow, 12/10/10 Tr. 144:5-14; Stelljes, 12/15/10 Tr. 72:2-15.] On the ore body, the water chemistry is variable. [Zamzow, 12/10/10 Tr. 141:23 to 142:12.] Most of the exploratory drilling at the Pebble Project has occurred within the ore body. [Zamzow, 12/10/10 Tr. 158:21 to 159:3; Ex. 123; Smith, Dem. Ex. 1004 at NA 6455;] Pebble and Nunamta experts analyzed the stability of the water chemistry and whether acid rock drainage is occurring by reviewing ground water quality data from monitoring wells for anomalies in electrical conductivity, concentrations of dissolved metals in relation to pH, anomalous temporary concentrations of dissolved metals, and changes in ferrous iron and manganese, which can represent increased activity of bacteria [Zamzow, 12/10/10 Tr. 145:16 to 146:9; Stelljes, 12/15/10 Tr. 62:6 to 63:11; 79:2-18.] The State did not review the data from the monitoring wells at any time prior to or during Pebble exploration. [Krause 7/21/10 Depo. 181:15-21.] Some of the sites with anomalous water chemistry were discussed at trial:

- Dr. Zamzow established that Well PQ4, which is on the ore body, shows changing water chemistry – acidity increasing over time in an oxic environment (strongly positive ORP), release of ferrous iron, and the copper concentration doubling – that appears to indicate acid rock drainage. [Zamzow

12/10/10 Tr. 147:16 to 150:14; Zamzow, 12/13/10 Tr. 39:23 to 40:23; 41:12 to 42:14; Ex. 3120 at PLP 4484 and 4548.] Dr. Stelljes disagreed with Dr. Zamzow's conclusion that water chemistry in PQ4 is changing and may indicate acid rock drainage; however, the basis for his disagreement was not persuasive. He claimed that a specific sampling date was outside control limits and the sample was "tossed out as not being representative." [Stelljes, 12/15/10 Tr. 92:3 to 93:9.] Dr. Zamzow's testimony, however, did not single out a particular sampling date, and the sampling data for PQ4 were never "tossed out" but remained in Report Series F as reliable data. [See Ex. 3120 at PLP 4638.]

- Dr. Zamzow testified that Well SRK5M, which is also on the ore body, showed a sharp decrease in pH in the August 18, 2007, sampling event while the lab data showed a sharp increase in aluminum, arsenic, cadmium and chromium in the May 12, 2007, sampling data. [Zamzow, 12/10/10 Tr. 150:15 to 154:2; Ex. 3120 at PLP 4485 and 4555.] Dr. Zamzow noted that one would generally see a decrease in pH and increase in acidity and metals concentrations at the same time and opined that likely the pH data were incorrectly entered as having been taken in August rather than May, when the water table rises as snow melts and "could have moved something from outside the area through the aquifer and this well picked it up." She noted that there was a decrease in cations (calcium, etc.) that also indicated an increase in fresh water. [Zamzow 12/10/10 Tr. 153:12-19; Zamzow, 12/13/10 Tr. 55:9 to 57:1; 59:17 to 63:1.] In addition, Dr. Zamzow stated that this would be "characteristic of opening up fresh reactive rock to water and oxygen and again that could be faulting or fracturing from natural events, but because of the location, it would seem reasonable to think that it may be related to drilling into reactive rock." [Zamzow, 12/10/10 Tr. 153:23 to 154:2.]

Dr. Stelljes again disagreed with Dr. Zamzow's testimony on the ground that the low pH value was "outside of control limits and would not be quantitatively addressed in any kind of data analysis." [Stelljes, 12/15/10 Tr. 94:20 to 95:1.] Dr. Stelljes based that "outlier" analysis on the data validation and quality control review, which Dr. Stelljes testified consists of three steps: (1) laboratory quality control to determine whether the results conform with requirements for representativeness and accuracy; (2) independent review by another firm for validation and rejection of data points that do not meet certain criteria; and (3) review of all of the data for outliers that don't conform to the distribution of the data and are not used quantitatively. [Stelljes, 12/15/10 Tr. 90:10 to 91:24.]

However, Dr. Stelljes' conclusion was not borne out by his own testimony, because the Quality Assurance Program Plan (QAPP) for the Pebble Project does not utilize the three steps that Dr. Stelljes himself identified, and the data in Report Series F itself confirm that the entire quality assurance program *eliminated* outliers as follows:

The QAPP details the frequency for collection and analysis Quality Assurance (QA) samples that are submitted to a separate laboratory for an independent check of the primary laboratory results. After completion of the analysis by the laboratories, the results for each sampling event are submitted to a project chemist for verification and validation which includes a review of QA/QC sample results and a comparison of the dissolved and total results. Laboratory data not meeting QAPP criteria may be assigned qualifier flags as estimated values or rejected from the dataset. The largest source of rejected results has been due to suspected contamination of dissolved metals sampled that can occur during the sample collection and field filtration. A total of 78,358 individual dissolved metal and cation results were produced from baseline program samples from 2004-2007. Of these, 4310 results or approximately 5.5% of the dissolved metal and cation results were rejected from the dataset due to suspected contamination of the samples that is apparent when the dissolved result is significantly higher than the associated total metals result. Note that this data release contains only the validated primary sample results, the QA/QC sample results and any rejected primary results are not presented or included in the statistical summaries for each location.

[Ex. 3120 at PLP 4638 (emphasis added); *see also* Zamzow, 12/13/10 Tr. 43:23 to 45:20.]

Dr. Stelljes also stated,

If you're looking for whether or not there's been an impact or a release of chemicals or something, you will typically find that you don't have a consistent low variability set of data. You'll have a few loc – a few samples that will be much [higher] in concentrations than the other ones, which demonstrates the – the contamination that's moving past that sample location and surface water.

[Stelljes, 12/15/10 Tr. 58:11-18.] Dr. Stelljes did not rebut Dr. Zamzow's testimony regarding increased acidity and corresponding increased concentrations of heavy metals.

- Well MW5D was also discussed by Dr. Zamzow as having changing water chemistry. In that well, Dr. Zamzow testified that the drop in pH from alkaline to relatively neutral in combination with a change in oxidation reduction potential (ORP) from strongly negative to relatively strongly positive indicated the type of conditions that would be observed under acid drainage, and likely resulted from increased air oxygen. [Zamzow, 12/10/10 Tr. 154:24 to 155:16; Ex. 3120 at PLP 4481.] She also noted that the ferrous iron was changing, indicating bacterial reactions; changing ORP and the development of hydrogen sulfide over time are not indicators of stable water chemistry. [Zamzow, 12/10/10 Tr. 155:16 to 156:5; Zamzow, 12/13/10 Tr. 63:2 to 65:20; Ex. 3120 at PLP 4481.] Dr. Stelljes again disagreed with Dr. Zamzow's testimony on the ground that the well data was an outlier. [Stelljes, 12/15/10 Tr. 93:10-19.] However, as discussed previously, the QAPP had already removed outlier data, and in addition, Dr. Zamzow's testimony covered the trend for all of the data for Well MW5D, not one data point. [See Ex. 3120 at PLP 4638; Zamzow, 12/10/10 Tr. 154:3 to 156:14.]

While Dr. Moran also theorized that the pH reduction from 10 to 7 – which is a significant decrease in pH – in Well MW5D over a three-year period could have occurred because the well was completed incorrectly, he testified that it was also possible that the reduced pH could be attributed to acid rock drainage. [Moran, 12/9/10 Tr. 76:5 to 77:20; 94:18 to 95:18.] In response to a question from the Court, Dr. Moran testified that a complete data set to the present would be required to make a more positive conclusion. [Moran, 12/9/10 Tr. 95:15-25.]

150. Dr. Zamzow testified that to a reasonable degree of scientific certainty “if you have fresh sulfide rock, water and oxygen, acid rock drainage will occur depending on the other minerals in the area, so it will be – if it's only sulfide yes, it will occur”, and it could occur in 1 to 15 years. [Zamzow, 12/13/10 Tr. 84:17 to 85:3; 86:2-12. *See also* Moran, 12/9/10 Tr. 88:15-23.] She also testified that exploration drilling is having an impact on water chemistry. [Zamzow, 12/13/10 Tr. 85:20 to 86:1.]

151. These facts demonstrate that the Pebble deposit is a sulfide ore body whose cuttings, from exploratory drilling, will generate acid rock drainage in the presence of water and oxygen. The State admitted that before issuing TWUPs and MLUPs it did not conduct or require an analysis of the underlying ore minerals at the Pebble Project to determine whether exposure to air and groundwater during exploration might create

acidic or other toxic by-products. The State also admitted it has not required PLP or its predecessors to conduct monitoring at the Pebble Project site to determine if groundwater has been contaminated as a result of the exploration activities. The rock flour generated from the drilling of boreholes has routinely been discharged to sump pits where it is exposed to oxygen and water. The wastewater discharges to the tundra also contain this acid-generating material. The data from several monitoring wells indicate changing water chemistry indicative of acid rock drainage, showing by a preponderance of the evidence that the Pebble Project has impacted the chemistry of ground and surface waters in the Pebble Project area.

## 7. Impacts to Lands

### *a. Contamination from Fuel Spills*

152. According to Evidence Table F, between March 2006 and September 2010, Pebble Project exploration activities caused the uncontrolled release of approximately 426 gallons of hydraulic oil, diesel fuel, antifreeze, and other contaminants.

### *b. Impacts to Vegetation*

153. The State and PLP both admitted that exploration activities at the Pebble Project site have long-term impacts to vegetation. [Wober, 12/07/10 Tr. 98:8-11 (“A: [O]ften tundra takes more than one year to come back. Q: So that would be a long term effect? A: Yes.”); Benkert, 12/16/10 Tr. 147:3-16; 148:23 to 149:9 (describing some sites having “mixed results” with “some vegetation growth” that “hadn’t really taken off” and noting one site in particular that was “kind of a failure”).] In fact, DNR Inspection Reports noted numerous drill holes with significant re-vegetation issues. For example:

- a. Drill Hole #7368 “had a more visible footprint with bare soil observed.” [Ex. 2020 at SOA 15813.]
- b. Drill Hole #5331 had a visible footprint and bare patches. [Ex. 2011 at SOA 15923.]
- c. Drill Hole #8429 had poorly growing and dead vegetation. [Ex. 2003.]
- d. Drill Hole 8432 had limited vegetation growth, with bare soil present. [Ex. 2003.]
- e. Drill Hole #9466 had slow vegetation regrowth. [Ex. 2003.]
- f. Drill Holes # 9471 and 9470 had “areas of exposed soil ... where vegetation did not take.” [Exhibit 2003.]
- g. Drill Hole #8412 had no re-growth of vegetation. [Ex. 2003.]
- h. At Drill Hole #8440, “[m]ost of the vegetation [was] dead and not growing back.” [Ex. 2003.]

- i. At Drill Hole #9464, “much of the site has not ... revegetated.” [Ex. 2001 at SOA 74916.]
- j. At Drill Hole 8441, “[t]undra [was] replaced to extent possible, but has not survived. Very limited grass is growing around the edges of the reclaimed areas.” [Ex. 2001 at SOA 74917.]
- k. At Drill Hole 7378, tundra was replaced, but growth of vegetation was “quite limited.” [Ex. 2001 at SOA 74918.]

154. Despite the fact that DNR recognized that it is better to use native vegetation or seed material (Krause 7/21/10 Depo. 182:15-19), and to preserve the natural vegetation and seed material (Krause 7/21/10 Depo. 183:13-14), the State failed to require PLP and its predecessors to use native vegetation or seed material. [Krause 7/21/10 Depo. 183:1-3; 182:15 to 183:19.]

155. Witness testimony confirmed that much of the vegetation at the Pebble Project drill sites fails to regrow following exploration activities. [Delkittie, 12/09/10 Tr. 103:17-21 (describing typical drill site as characterized by dead vegetation); 105:19-25 and 108:23 to 109:3 (describing dead tundra and vegetation at old Cominco drill sites in the Pebble Project area); Zamzow, 12/13/10 Tr. 83:22 to 84:1 (“Q: Did you see any data reports that indicated there was contamination on the surface to vegetation? A: The—several of the DNR inspection reports had photos of dead vegetation and I personally saw a bare area.”); Trasky, 12/14/10 Tr. 123:7-14 (“Q: [D]id you observe any impacts or evidence to either vegetation upon which wildlife might rely for food or other – is there vegetative impacts? A: I – I certainly saw in the inspection reports vegetation that was affected by both the development activities, and you know, the drilling and the discharge of muds on the tundra.”); Gleitsmann, 12/17/10 Tr. 202:12-24 (areas where buildings moved from previous year, showing “shadows in the vegetation where you can see that something has been there” [Ex. 3056.001]); 204:13 to 205:17 (area where med port was, shows an unvegetated area that has not recovered one year later [Ex. 3056.013]); Ex. 3055.68 (photo of camp; visual evidence of scarring of land and tundra).]

156. The State failed to impose any limit on the number of helicopters permitted for use at the Pebble Project site for exploration purposes or a requirement to land only on helipads. [See Exs. 2041 – 2071.] However, DNR recognized in its inspection reports the need for wooden helipads because “the Hughes 500D’s have a downward pointed exhaust that can scorch the tundra when the machine is on the ground.” [Ex. 2023 at SOA 16044.] Yet, numerous photos show helicopters on the tundra, and not on the pads. [See, e.g., Exs. 3055.17-.18; 3055.20; 3055.02 (showing helicopter on tundra; photo taken from a helicopter on tundra, as evidenced by rotor in corner of photo); see also DeHusson, 12/08/10 Tr. 199:4-7 (“Q: So when you were working out at the site, there was no helicopter pad at your drill site? A: No, they landed at whatever ground was suitable, depending on weather conditions and water saturations.”.)]



157. Despite these impacts, no one has ever conducted a study to quantify the effect of exploration activities on vegetation. [Wober, 12/07/10 Tr. 98:24 to 99:1.]

*c. Numerous Disturbances Adversely Impacted or Impinged on Reasonable Concurrent Use at the Pebble Site*

**Big Wiggly Fuel Storage**

158. There is a large-scale fuel storage area at Big Wiggly Lake, including “two helicopter landing pads and there’s the fuel tanks and this is the fuel farm that’s being used with a Beaver floatplane that brings the fuel for the helicopters in there and the helicopters refuel here.” [Gleitsmann, 12/17/10 Tr. 153:16-22]. This intensive activity in the region of anadromous lakes and streams has affected the ability of users to enjoy the region.

159. Mr. Gleitsmann, testified that the fuel dock had been moved 30 feet from 2009 – 2010. [Gleitsmann, 12/17/10 Tr. 156:20 to 157:2 (“it shows that the entire installation has been moved completely over to the middle of the peninsula, whereas last year, it was further this way. Q So you observed that it had been moved from year to the next? A. Right”) Compare Ex. 3055.23 (2009) to Ex. 3056.02 (2010).] Mr. Gleitsmann’s photographs confirmed that the disturbed area from the prior year’s fuel storage was closer to the water than the current 100-foot setback location of the tanks. The photos depict an eroded culvert (flagged with orange cones) leading from the disturbed area directly into Big Wiggly Lake. [Ex. 3056.2.] The dates of Mr. Gleitsmann’s photographs (October 2009 and September 2010) establish that it was only after Nunamta filed this lawsuit that this “additional precaution in case of a leak” was taken. [Gleitsmann, 12/17/10 Tr. 203:2-3; *compare* Ex. 3055.23 to Ex. 3056.2.]

**Disturbances from Structures**

160. The State never made any analysis of the cumulative numbers of acres disturbed by the structures on the site. [Fredericksen, 12/14/10 Tr. 195:10-12.] Mr. Gleitsmann testified that there are areas where buildings moved from the previous year “shows shadows in the vegetation where you can see that something has been there.” [Gleitsmann, 12/17/10 Tr. 202:12-24; Ex. 3056.001 Ex. 3056.013.] The Gleitsmann photos showed geotechnical installations with facilities in the background, (Gleitsmann, 12/17/10 Tr. 169: 5-6); an industrial site, with housing for snow machines visible in a garage-like structure, disturbed ground, and several buildings (Ex. 3055.28); seismic lines being laid, with equipment on tundra (Ex. 3055.66); the camp – an extensive facility with visual evidence of scarring of land and tundra (Ex. 3055.68).

## **Underground Disturbances from Drilling**

161. Mr. Fredericksen testified that he did not consider the subsurface disturbance of drilling as a disturbance to land because “there is nothing in our regulations or statutes that talks about underground disturbance.” [Fredericksen, 12/14/10 Tr. 195:19-22.]

## **Buried Waste**

162. The evidence established that there was at least one instance where waste was buried on the site. [Ex. 190 at SOA 003566; Ex. 2065.] Mr. Nakanishi, testified that PLP had requested and was granted a permit to dispose of 50 cubic yards of solid waste by burial within the trench including: metal drill rods, water line hose, four sacks of hardened lime and ten five-gallon pails of waste drill mud called clear mud, scrap wood, pallets, 2x4's, ashes would be buried in the trench. [Nakanishi, 12/13/10 Tr. 136:12 to 137:2.]

## **Helicopters**

163. DNR permitted helicopter-supported exploration and data collection requiring multiple trips per day, totaling hundreds of trips per season, ferrying crews, fuel and equipment to and around the Pebble Project site. Mr. Trasky testified to an estimate of approximately 40,000 helicopter trips. That was a conservative estimate in light of the testimony of Mr. De Husson who documented that there were an average of five to six helicopter trips per day (two shifts) to each site bringing supplies; and the documentary evidence that it took 24 slingloads to move a rig.

164. The documentary evidence submitted to DNR [Ex. 123] identifies the number of days on site for 371 boreholes= 6,042 total “site days.” 371 boreholes is 29% of the 1269 boreholes [Ex. 123 + Ex. 465]. Dividing 1269 by 371 =3.42. Then multiplying 3.42 X 6042 provides an estimate for the total number of “site days” = 20,667 site days. Conservatively estimating only two trips to each site per day renders a figure 41,334 helicopter trips, which was Mr. Trasky’s estimate.

## **Boreholes/Drill Rigs**

165. DNR permitted the drilling of hundreds of exploratory boreholes with diamond core, reverse circulation and rotary drills. The boreholes have ranged from 600 feet in depth in the 1989 application to 7000 feet in depth in more recent applications. [Exs. 2070; 2043.] The DNR records and PLP records confirm 1269 boreholes. [Ex. 123; Ex. 465.] The number of drill rigs DNR permitted to operate per season varied from one in the 1989 season to twelve drill rigs in 2009-2010. [Ex. 2070 at SOA 3672; Ex. 2043 at

SOA 5279.] Quest rigs were 18,500 pounds and required 24 sling loads to move them. [Ex. 2016 at SOA 015934].

### **Test Pits/Trenches/Sumps**

166. The Test Pits, Trenches and Sumps are discussed in FF #34-36 *supra*.

### **Seismic Surveys**

167. Seismic Surveys/Explosives: DNR permitted thousands of feet of seismic lines for seismic surveys. These surveys required the use of high-velocity explosives such as Pentolite at various intervals along the lines. The seismic lines permitted each year increased from ten lines totaling 1,000 feet in 1991 to 34 lines totaling 220,000 feet in 2009. [Dem. Ex. 472; Evidence Table D.] DNR also permitted seismic “shots.” These were explosive charges using three dynamite sticks per shot, with as many as 2500 shots and 975 pounds of dynamite per season. The 2006 DNR incorporated a condition which allowed shallow-hole explosives with “minimum offsets” from streams, depending upon the charge. The offsets DNR developed were 37 feet (1 lb. charge); 52 feet (2 lb. charge); 82 feet (5 lb. charge) and 116 feet (10 lb. charge). [Ex. 2051 at SOA 4242.] It must be noted that all but one of those distances are within the 100-foot buffer required by MCO 393.

#### *d. Impacts to Archeological Resources*

168. Several exhibits contain information about the archeological resources at the Pebble Project site. [Ex. 161, 319, 320, 321, 322, 323, 324, 325, 326, 446, 549, 550, 551, 552, 544.]

169. No archeological or other cultural resource surveys were required by DNR in the initial years of exploration, and no permits for archeological surveys were issued. In 1992, the State Historic Preservation Officer (SHPO) commented that there had been no inventory or survey of archeological or historic resources in the Pebble Project. [Ex. 2132] Yet, DNR neither SHPO nor the Mining Section) took no action to require surveys for archeological, historical, or paleontological resources for another 12 years.

170. The ground-disturbing exploration activities such as seismic blasts, test pits, and drill site footprints impacted a significant area of cultural resource importance. [See FF #34-36, *supra*.]

171. Despite the disturbances from drilling, seismic explosions and pit excavation in the Pebble Project area, the State admitted it took no action, nor required

any applicant, to survey the State's cultural resources from 1988 to 2004. [Ex. 603 at 4, RFA #9].

172. The cultural studies were not commenced until the tenth year of exploration activities, in 2004. The initial survey was based solely on "the proposed [development] project alternative footprints" including "mine pit, meteorological monitoring stations, proposed and existing VHF repeaters, water reservoir, reactive rock storage areas, and low grade ore stockpile." [Ex. 161 at SOA 021731]. Notably, PLP's contractor determined "because all project components but the mine pit are subject to changes as proposed project alternatives solidify, much of the survey effort was dedicated to intensively sampling that area." [*Id.*] Only a few geotechnical test pits were surveyed in 2004. [Ex. 161 at SOA 21770-71]. Nonetheless some cultural resources were found. [Ex. 161: "an arrowhead" at SOA 21783 ; remains of a "modern camp at Frying Pan Lake." at SOA 21777.]

173. In subsequent years, the surveys likewise began to focus on the exploration drilling areas. [Ex. 552 at SOA 022054; Ex. 550 at 021882.]

174. In 2006, the U.S. Army Corps of Engineers (COE) expressed concern to DNR that exploration activities were occurring before cultural resource surveys had been conducted, stating, "If they destroy a site, there's no point in surveying after it's busted. The survey is so they can avoid any sites." [Ex. 544.]

175. Since the drilling of boreholes and groundwater test bores was permitted year-round, DNR allowed the ongoing potential destruction of archeological and cultural sites winter-after-winter until the thaw had occurred. DNR permitted hundreds of boreholes, thousands of feet of seismic line exploration (and associated explosives holes), and hundreds of shallow test pits with no survey of cultural resources.

*e. Hazards and Visual Impacts*

176. All drill sites have "four-by-four posts in the ground, and in some areas, there are steel pipes in the ground." [Delkittie, 12/10/10 Tr. 99:5-7.] Photographic evidence confirmed the ubiquitous protruding pipes and 4 X 4 stakes from many boreholes. [Ex. 3055 at photos: 3055.054; 3056.37; 3055.040; 3055.38; 3055.39-.54; 3055.56; Gleitsmann, 12/17/10 Tr. 170:1 to 172:5.] These were describes as having a "steel foundation" such that a man "could not push over." [Gleitsmann, 12/17/10 Tr. 171:21 to 173:4.] The evidence established that these presents a significant hazard to subsistence or recreational users who cross the property, particularly in winter, on snow machines: "if you run into one of those, you could get hurt and damage your vehicle and not make it back home." [Delkittie 12/10/10 Tr. 99:5-7.]

## **E. Plugging Did Not Mitigate or Eliminate Harm**

177. DNR did not seek or review complete data on how many holes were drilled at the Pebble Project until five months after this case was filed. Roger Allely, the engineering geologist for DNR who prepared the drillhole map (Ex. 23), testified that he did not receive the GPS information on the drill hole locations, depths, and water sources (for only 123 holes) at the Pebble Project until December 9, 2009. [Allely, 12/6/10 Tr. 82:24 to 83:4.] Until that time, DNR's information as to the number and location of drill holes was limited to that contained in Affidavits of Annual Labor. Those affidavits show a total of approximately 711 holes. [See Ex. 472.] However, according to PLP's records, approximately 1,269 holes have been drilled. [Ex. 123; Ex. 465.] Thus, until five months after this litigation was filed, the State was in possession of documentary information pertaining to only 56% of the holes actually drilled. This limited the State's ability to accurately evaluate potential impacts of water use, discharges, sumps, helicopter use, and other activities at the Pebble Project.

178. DNR has not attempted to ascertain whether or how many of the drill holes at the Pebble Project have been "plugged," despite having the authority to do so.<sup>14</sup> Additionally, the State has not imposed any requirement on PLP to affirmatively state or provide information to the State that the holes are actually plugged or how they are plugged. [Mylius, 12/17/10 Tr. 99:5 to 102:17.] Furthermore, nothing in the State's statutes or regulations define what is meant by "plugging" or how it is to be accomplished. [Mylius, 12/17/10 Tr. 99:5 to 102:17.] As a result of DNR's inaction: (1) no real oversight is occurring with respect to the plugging of the drill holes; and (2) because "plugging" is undefined, it is vague, unenforceable and leaves constitutionally protected resources at risk.

179. DNR, after initially imposing no requirements for plugging holes at the Pebble Project, has incorporated plugging requirements in MLUPs; these requirements have changed over the period of exploration activities at the Pebble Project. The MLUPs issued from 1989 to 1992 did not contain any plugging requirement. [Exs. 2070, 2069, 2067, 2066.] In 1993 and 1997, DNR included the requirement that drill holes "be capped." [Exs. 2065 at SOA 3564; 2062 at SOA 3516.] In 1999, DNR included the requirement that all drill holes "be plugged." [Ex. 2061 at SOA 3485.] From 2002 through September 2009, DNR included the requirement that all drill holes:

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<sup>14</sup> Fredrickson, 12/14/10 Tr. 184:15-20 ("Q: Have you ever conducted any analysis of the plugging of the bore holes to determine how many bore holes were plugged? A: No, ma'am. Q: Has anybody in the State of Alaska? A: Only the Pebble Partnership would know that.").

be plugged for a minimum of 10 feet (within the top 20 feet) of the drill hole with bentonite holeplug. The remainder of the hole will be backfilled to the surface with drill cuttings. If water is encountered in any drill holes, a minimum of seven feet of bentonite holeplug shall be placed immediately above the static water level in the drill hole.

[Exs. 2043 at SOA 5255; 2060 at SOA 4745; 2046 at SOA 5068.] Following initiation of this lawsuit, DNR changed the permit language to make cement an option for backfilling: “The remainder of the hole will be backfilled to the surface with drill cuttings *or cement*.” [Exs. 2044 at SOA 5384; 2045 at SOA 63348, emphasis added; *see also* Krause, 7/21/10 Depo. 35:10-19 (“Q: Is there any requirement that they plug the wells with cement? A: Not from top to – or from bottom to top, no. Q: What is the requirement for plugging a well? A: Basically, they put the cuttings back down as much as they can and then they basically use various heavy muds, Bentonite muds, to plug the well and then just cap it with cement, the upper 20 feet or something. Q: Is that the standard practice? A: It is.”; however, *see* Wober, 12/07/10 Tr. 108:5-11 (“Q: Is any other material, say material from other cuttings or anything, put in [the drill hole]? A: No, it’s just the grout itself. Q: So the only thing that goes into the hole is that which you mix in the hopper and put back down into the hole to grout it? A: That’s right.”)]

180. Since 2002, some Pebble permits contained a “letter of intent to do reclamation” form that states, “Complete filling of the drill holes, from bottom to top, with a bentonite holeplug, benseal mud, or equivalent slurry is also permitted and is considered to be the preferred method of hole closure.” [Exs. 2057 at SOA 4078; 2046 at SOA 5195; 2043 at SOA 5289; 2045.] Identification of what is “permitted” and “considered a preferred method of closure” does not constitute a mandatory requirement for plugging of the hole from bottom to top at the Pebble Project. It is merely an *optional* method of hole plugging that PLP and its predecessors were not required to, and did not, employ. These plugging criteria, that DNR changes without any justification, have no articulated or rational basis in regulation or statute, and fail to achieve the level of plugging necessary to prevent acid rock drainage or the migration of drilling fluids.

181. There are no consistent PLP data on whether, or to what degree, holes have been plugged. PLP’s own Geology Logs (2002- 2010) indicated that few holes had been plugged or cemented. Of the 768 holes identified in these logs, there is no indication of plugging for 671 holes and no indication of cementing for 681 others. [Ex. 913; Dem. Ex. 596.] PLP contended that the Geology Logs did not accurately provide that information and that its “driller time sheets” more accurately indicated whether a hole had been plugged. [Wober, 12/07/10 Tr. 22:19-22; 158:15-18.] Yet those driller time sheets contain no information on plugging or cementing prior to 2006. [See Ex. 525.] Mr. Wober testified that he searched for, but did not find, any indication of whether holes had been plugged or cemented prior to 2002. [Wober 9/29/10 Depo. 29:1-5.] Mr. Wober

further testified that the driller time sheets since 2007 indicate whether holes have been plugged or grouted.<sup>15</sup> The driller time sheets themselves (*see* Exhibit 525) record a significant number of drill holes for which there is no indication of plugging or grouting, and no indication that the holes were backfilled to the surface with drill cuttings or cement or that they were filled “from bottom to top”:

- In 2006, 9 of 15 core holes (60%) had no indication of plugging noted on the driller time sheets.<sup>16</sup>
- In 2007, 18 of 44 core holes (41%) had no indication of plugging noted on the driller time sheets.<sup>17</sup>
- In 2008, 6 of 45 core holes (13%) had no indication of plugging noted on the driller time sheets.<sup>18</sup>
- In 2009, 15 of 33 core holes (46%) had no indication of plugging noted on the driller time sheets.<sup>19</sup>

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<sup>15</sup> Wober, 12/07/2010 Tr. 27:14 to 28:9 (“Q: [I]nitially whether or not the hole is capped or plugged, on what piece of paper is that noted? A: The main source for that information would be the drillers’ time sheets. Q: So the drillers’ time-sheets indicate whether or not the hole has been plugged? A: That’s correct. Q: And that’s in every case? A: I’d have to say yes. Q: For every hole? A: I believe so. Q: For every shift? A: Holes aren’t capped every shift. They’re just capped – or they’re plugged at the end of the drill hole which would be – so it would be one of the time-sheets or sometimes two because it could take two shifts to plug the holes. So it would just be at the end of the duration of the drilling for that one hole. Q: And the person who actually plugged the hole would record that? A: That’s correct.”)

<sup>16</sup> *See* Drill Holes #6340 (PLP 028024); #6342 (PLP 027997 – 028024); #6344 (PLP 027875 – 027905); #6346 (PLP 025802); #6348 (PLP 027670 – 027723; 027761 – 027777); #6350 (PLP 027620 – 027667); #6352 (PLP 027585 – 027594); #6353 (PLP 027544 – 027585); and #6355 (PLP 027467 – 027497).

<sup>17</sup> *See* Drill Holes #7357 (PLP 028559 – 028646); #7359 (PLP 028178 – 028593); #7360 (PLP 028375 – 028545); #7361 (PLP 028385 – 028546); #7373 (PLP 028954 – 029137); #7377 (PLP 028826 – 028950); #7386 (PLP 028677; 030753 – 030797; 029200 – 029578); #7387 (PLP 025714; 025720; 025803 – 025872); #7389 (PLP 029356 – 029446); #7390 (PLP 029391 – 029421); #7391 (PLP 029337 – 029385); #7392 (PLP 029330 – 029366); #7395 (PLP 029289 – 029313); #7396 (PLP 029288 – 029306); #7397 (PLP 029263 – 029275); #7398 (PLP 029230 – 029276); #7399 (PLP 029240 – 029259); and #7400 (PLP 029213 – 029225).

<sup>18</sup> *See* Drill Holes #8402 (PLP 030300 – 030415; 030368 – 030394); #8408 (PLP 030445 – 030476); #8413 (PLP 025236 – 025266; 030533 – 030551); #8438 (PLP 025474 – 025478; 025482 – 025486; 025488); #8443 (PLP 031181 – 031200); and #8444 (PLP 031351 – 031368).

Taken together, these time sheets show no indication that 39% of the core holes drilled from 2006 through 2009 were plugged. [Ex. 525.] These driller time sheets contain drilling time sheet data for 137 exploratory drill holes and 260 monitoring wells (for a total of 397 holes).

182. The State and PLP have failed to establish any reliable means of determining whether the drill holes have been plugged “top to bottom” which is especially troublesome given the broken, faulted nature of the region’s bedrock. [Wober, 12/17/10 Tr. 58:12-18; 60:18-25.] The driller time sheets do not indicate with any consistency whether, as to those holes for which an effort at plugging was undertaken, that effort entailed the “preferred method” of plugging (*i.e.*, bottom to top), nor whether the effort was successful.<sup>20</sup> For example:

- Driller time sheets for drill hole #6356 affirmatively indicate that only the top 2,000 feet of a 6,425-foot hole were sealed. [Ex. 525 at PLP 26017.]
- At drill hole #6343, the driller time sheet from September 16, 2006 indicates that the night shift “complete[d] grouting hole and start[ed] teardown.” [Ex. 525 at PLP 27916.] However, the next day, the day shift poured 14 pails of bentonite pellets down the hole, and then moved on to the next drill hole location. [Ex. 525 at PLP 27915.] The time sheets do not indicate why additional plugging materials were needed, whether the materials were sufficient to plug the hole, or whether the workers followed up to make sure the hole was successfully plugged.<sup>21</sup>
- At drill hole #6345, the drillers encountered an artesian well that they spent at least four days trying to seal:
  - August 17, 2006: “Dayshift – First attempt did not seal off water – Cement again and let sit over nite [sic].” [Ex. 525 at PLP 27832.]

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<sup>19</sup> See Drill Holes #9450 (PLP 027436 – 027440); #9451 (PLP 027429 – 027435); #9452 (PLP 027292 – 027302); #9453 (PLP 027360 – 027374); #9454 (PLP 027222 – 027231); #9455 (PLP 027283 – 027291); #9456 (PLP 027217 – 027221); #9463 (PLP 027197 – 027203); #9468 (PLP 027248 – 027256); #9469 (PLP 027318 – 027324); #9470 (PLP 027182 – 027184); #9471 (PLP 027170 – 027182); #9472 (PLP 027240 – 027247); #9473 (PLP 027310 – 027317); and #9477 (PLP 027232 – 027236).

<sup>20</sup> See also Zamzow, 12/13/10 Tr. 78:19 to 79:3 (“I recall that one [drill hole] was roughly 4000 feet deep that they spent two weeks trying to grout or control and eventually ended up throwing timbers down it and it sounded like walking away it’s – they can be very difficult for me to read as far as what sections were grouted and how deep. But certainly, there was mention of abandonment, there was mention of Artesian flows in several. It’s – from my review, I would say it appears that there were several that were not, probably not grouted top to bot – or bottom to top.”).

<sup>21</sup> Also, this hole was never inspected during a DNR Field Inspection. [See Exs. 2000 – 2028].



- August 18, 2006: “Dayshift – Pump 240 gallon [sic] heavy cement down HWT casing – Water stopped – Tear down. Weather to [sic] bad to start moving.” [Ex. 525 at PLP 27831.]
- August 19, 2006: “Dayshift – Reset up drill – drill out cement – pump 40 bags cement – Stop flow. By shift change, water starting to weep again.” [Ex. 525 at PLP 27830.]
- August 20, 2006: “Water still coming @ 30/gal/min. Pump more cement and quick seal. Water still weeping – set up base onto site “M” and return to pump cement till [sic] shift change. Water stopped.” [Ex. 525 at PLP 27829.]

183. The driller time sheets record instance after instance of difficult or unsuccessful efforts to plug holes, but contain no indication that workers routinely returned to see if the final cementing of each hole was successful. For example, drill hole #7366 began “weeping” when the drillers pulled the casing after attempting to grout the hole. [Ex. 525 at PLP 29151.] The drillers spent three days cementing the artesian flow, but driller time sheets fail to indicate whether those efforts were successful. [Ex. 525 at PLP 29142, 29147, 29151.] A lack of follow up is also apparent from DNR Inspection reports, wherein inspectors noted at least ten holes with significant problems; there is no record of follow-up inspections. [See Exs. 2000-2031, especially 2009 at SOA 15901 (DDH 8405), 15902 (DDH 8415); 2011 at SOA 15923, 15932 (#7362), 15924, 15933 (#7389); 2017 at SOA 68696 (#7359); 2019 at SOA 69801, 69805, 69808 (#6347).] At drill holes #7362 and #7389, inspectors found water discharging from unplugged holes and noted the need for follow-up to ensure that the drill holes were cemented and capped. [Ex. 2011 (6/17-18/08 inspection report) at SOA 15916, 15923, 15924, 15932, 15933.] No subsequent inspections checked these holes. [See Exs. 2000-2031.]

184. At several drill holes, drillers noted on their time sheets that they had exhausted the water source needed for their operations:

- #7358: “water source dried up.” [Ex. 525 at PLP 28516.]
- #8412: “water supply not keeping up.” [Ex. 525 at PLP 30827.]
- #8436: “need more water. Wait on water.” [Ex. 525 at PLP 31138-31139.]

Since plugging also requires water – to mix with the grout – an insufficient supply of water could jeopardize efforts to cap a hole. The driller time sheets yield no indication that these holes were plugged.<sup>22</sup>

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<sup>22</sup> Mr. De Husson confirmed that water sources dried up during drilling operations. [De Husson, 12/8/10 Tr. 137:24 to 138:10.] He further testified that holes might have cement on the bottom and the top, but that there was not enough grout to fully plug a hole. [“I just don’t see logically how 20 bags mixed with the 10, 15 gallons of water per

185. If the drill holes at the Pebble Project are not plugged at all, or are not successfully plugged, acid rock drainage may occur. [Zamzow, 12/13/10 Tr. 84:17 to 85:3; 86:2-12 (testifying that “if you have fresh sulfide rock, water and oxygen, acid rock drainage will occur depending on the other minerals in the area, so it will be – if it’s only sulfide yes, it will occur”); Trasky, 12/14/10 Tr. 110:11-20 (“I looked at the drill logs and it – for several hundred of these wells – and it didn’t look like many of them were either plugged or cemented, so there’s a real danger there that once the ground water is in, this can leak out through cracks and fractures into the ground water, gen – once this is – these seams are opened up, you once again have oxygen and oxygenated water exposing the sulfide ores and generating heavy metals and low pHs and washing into streams.”)] Even if the holes are completely and adequately plugged at the time of abandonment, the grout degrades over time, eventually leading to acid rock drainage and long term groundwater contamination. [Moran, 12/09/10 Tr. 92:21-24 (“[P]lugs start to degrade and cement, the cement grout can degrade over decades and there are studies to show that then you get groundwater contamination in the long-term.”)] [See also, FF #124-151.]

186. The Pebble Project area is characterized by artesian wells, geologic faults, and broken ground, making the drill holes harder to plug successfully and complicating any analysis of the effectiveness of plugging.<sup>23</sup> Of the 137 exploratory drill holes covered by driller time sheet data in Exhibit 525, 55 (40%) encountered a fault, 17 (12%)

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bag could cement a 2,000-foot hole. If it did, it would be very porous. It’s [sic] integrity would be very weak.” [De Husson, 12/8/10 Tr. 160:13-17.]

<sup>23</sup> Stelljes, 12/15/2010 Tr.100:17-19 (“[T]he subsurface at Pebble is – has a lot of fractured bedrock and a lot of interconnections”); see also Moran, 12/9/10 Tr. 34:5-11 (“[T]he top roughly 80 to 100 feet of sediments in much of the area are unconsolidated sediments, mostly sands and gravels. This comes right from the company’s own consultants and then that’s largely water saturated and that they sit on top of fractured bedrock in most of the area, all of which seem to be in hydrogeologic connection.”), 34:14-20 (“If we think of the 80 to 100 feet of sediments on the surficial zones, they are very permeable. All the testing that the company has made public and other topics we can discuss later, indicate that the water moves freely horizontally. There’s very good indication that it moves vertically and that these sediments also underlie the rivers, the streams.”); 36:10-11 (“[T]he area is significantly fractured, significantly faulted.”). See also Zamzow, 12/13/2010 Tr. 69:25 to 70:8 (“[W]e know that when they drilled these, they ran into fractures. Some of them were quite large, some of them took weeks to try to fill. I’m not sure, some of them I think may have never been filled from the drilling logs that I saw, so you are – you’re causing water to enter again fresh rock. If you cement that hole from bottom to top, you still have those fractures and how those – how water migrates through those I’m not sure you know.”); 70:17 (characterizing the Pebble Project Area has a “highly fractured bedrock area.”).

encountered an artesian zone,<sup>24</sup> and 35 (26%) required the cementing of an artesian zone, a fault, or both. [See Ex. 525.] Drill hole #7376, is an example of the difficulty PLP had in plugging or sealing in faults because the cement actually disappeared: “Day [Shift] – Service Drill, Wait for cement to cure. Night [Shift] – Trip in, No cement found. Possibly going into fault. – 17-1800’.? Cement hole.” [Ex. 525 at PLP 29370.] This situation also happened at drill hole #7358, where cement the workers had been putting down the hole in previous shifts disappeared. [Ex. 525 at PLP 28462.]

187. The State had no information concerning the amount and variety of drill muds and grout used at each drill site. [Exs. 2043 to 2071.] Furthermore, PLP maintained that the two sources of information to determine the quantity of grout used to plug the drill holes would be in the driller time sheets. [Wober, 12/07/10 Tr. 24:14-18 (the driller time sheets and the receipts would be the two sources to determine the amount of grout used).] However, the driller time sheets do not describe the quantity of grout used, except in limited circumstances. [See Ex. 525.] There is no other evidence of the amount of grout purchased or used from 1989 through 2007. PLP provided invoices of grout purchases only for the years 2008-2010. [Ex. 749.] Those invoices confirm that holes were not grouted “top to bottom” because the amount of grout purchased was significantly less than the amount needed per hole. The evidence of the grout invoices proves that 87% of the linear feet of the holes were not fully grouted in 2008 and 93% of the holes were not fully grouted in 2009. [See Table G.]

188. In summary, DNR had scant information on the exploration activity at the site, including the number of holes drilled. The State of Alaska has not attempted to ascertain whether or how many of the drill holes at the Pebble Project have been plugged. Additionally, the State has not imposed any requirement on PLP to affirmatively state or provide information to the State that the holes were actually plugged or how they were plugged, despite having the authority to do so. DNR has identified disparate plugging requirements over the period of exploration activities at the Pebble Project. There is no consistent PLP data on whether, or to what degree, holes have been plugged. Neither the Geology Logs nor the driller time sheets establish when and how drill holes were plugged, or if the plugging was successful at problematic holes. Moreover, the driller time sheets contain no information about plugging or cementing prior to 2006. The State had no information concerning the amount and variety of grout used at each drill site. The evidence of the grout invoices proves that 87% of the linear feet of the holes were not fully grouted in 2008 and 93% of the holes were not fully grouted in 2009. [See Table G.] These facts of the inadequate plugging of holes at the Pebble Project, the presence of

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<sup>24</sup> However, the driller time sheets fail to accurately account for all artesian flows. For example, DNR Inspection Report noted artesian flows at drill holes #7388, #8416, and #8414 that were not noted on the driller time sheets. [Exs. 2016 at SOA 15936; 2010 at SOA 15908, 15906 ; 525 at PLP 29372-29490, 25121-25159, 25574-2576.]

faults, fractures, and artesian zones, and the presence of acid rock drainage establish by a preponderance of the evidence that subsurface groundwater contamination has occurred at the Pebble Project. [See also FF #124-151].

#### **F. Notice, MCO 393, LLO #1**

##### **1. Notice was Non-existent or Ineffective**

189. The State has admitted that it does not generally provide public notice of MLUPs. [Mylius, 12/17/10 Tr. 47:14-16.] The State apparently provides public notice “if issues are particularly controversial”, but that notice is only an online notice. [*Id.*] The State further admitted that the online notice it issued for the Pebble Project exploration did not comply with the legal requirements in statute for public notice. [*Id.*]

190. The DNR online public notices of upland hardrock mining exploration do not provide minimal information of identification of the applicant or mining activities to be undertaken that would inform the public of whether to provide comments, but instead refer to the area to be explored by meridian, township, range and section (MTRS) and/or by mining district. [Exs. 26, 166.] The decision to not include “any identifiable name or any identifiable location” and just include the mining district was a “conscious decision” on the part of DNR’s Mining Section Chief. [Fredericksen, 12/14/10 Tr. 164:10 to 165:6.] The failure to include an identifiable name or location precluded the public from having effective notice of the Pebble Project exploration. [Andrew, 12/8/10 Tr. 60:7-8; 62:18-20; Hammond, 12/10/10 Tr. 127:7-9; 128:18-20.]

191. Plaintiff Bella Hammond testified that she specifically requested to Commissioner Irwin that the public be provided notice of the Pebble Project exploration; yet, Mrs. Hammond received no notice of the exploration. [Hammond 12/10/10 Tr. 129:18 to 130:14.] Commissioner Irwin recollected that Mrs. Hammond had met with him, but said he “didn’t specifically recall” that she requested notice about the Pebble Project. [Irwin, 10/20/10 Depo. 44:22-24.]

192. DNR also does not provide public notice of TWUPs and did not provide notice of the TWUPs issued for Pebble Project exploration. [Bettis, 12/16/10 Tr. 59:20-21; 73:12-14; Prokosch, 12/16/10 Tr. 114:14-17.]

193. DNR (Mr. Prokosch) claimed to have provided notice to Nunamta’s counsel about the Pebble Project TWUPs “sometime in 2009” but there is no document in the record to establish that the notice was timely or that it was provided, and Mr. Prokosch “could not remember the exact date” if notice had been provided. [Prokosch, 12/16/10 Tr. 85:12-17; 86:20-22.]

## 2. Mineral Closing Order 393 and Leasehold Location Order #1

194. Areas in the Bristol Bay region, including regions within the Pebble Project area, were closed to mineral entry under MCO 393. [Ex. 877.] That Order, adopted by the Commissioner of DNR in 1985, closed to mineral entry 64 streams, including 100 feet on each side of the streams' ordinary high water mark. The basis for MCO 393 was that continued salmon propagation and production was a significant water use in Bristol Bay and that mining would be incompatible with significant fisheries and recreational values. Since 1985, both the North Fork of the Koktuli River and Upper Talarik Creek have been closed to mineral entry pursuant to MCO 393. [*Id.*] The purpose of MCO 393 was "to protect the salmon from any impacts from future mining." [Trasky, 12/14/10 Tr. 101:11-12].

195. DNR did not assess the impacts to fish from water withdrawals by PLP or its predecessors in Upper Talarik Creek. Upper Talarik Creek is one of the 64 streams that DNR ordered closed to mineral activity under MCO 393 due to the potential impacts to fish. Nevertheless, DNR allowed water withdrawals for years despite MCO 393 and with no assessment of impacts to fish from the water withdrawals. DNR also allowed seismic activity to cross the area within MCO 393. [Smith, 12/7/10, Dem Ex. 1004 at NA 6458.] There is not a single document in DNR's Pebble Project permitting files that justifies DNR's departure from its prior order prohibiting mining activities within 100 feet of Upper Talarik Creek, or that justifies DNR's departure from the Commissioner's findings in MCO 393. There was no public notice, or any subsequent order, of any change in the interpretation of MCO 393.

196. At the time of the adoption of MCO 393, DNR simultaneously approved Leasehold Location Order #1 (LLO #1). [Ex. 434]. A leasehold location order restricts mining activities in designated areas of the state to mining under lease only pursuant to AS 38.05.205, rather than allowing mining under a claim pursuant to AS 38.05.195. LLO #1 allowed mining only under lease for 1.9 million acres in the Upper Mulchatna and Eastern Iliamna Lake Tributaries. In adopting LLO #1, DNR found that the land in question was subject to potential mining use conflicts with fisheries, recreation and wildlife habitat. [*Id.*]

197. Some of the claims in the Pebble Project area are subject to LLO #1. [Krause 7/21/10 Depo. Ex. 3A, 3B, 3D, 4A, 4B, 5, 6, 7.] Despite the fact that parts of the Pebble Project area are subject to LLO #1, DNR made at least four "mistakes" in failing to process those claims as "leasehold locations." [Krause 7/21/10 Depo. 65:8 to 78:8]. Pebble Project exploration activities took place on these leasehold location-restricted areas. [*Id.*]

## **G. Pebble Exploration and Water Use Disposed of Interests in Land and Water**

### **1. The Use of Land and Water by PLP is Functionally Exclusive**

198. The MLUPs and water use permits issued to PLP are non-exclusive on their face.<sup>25</sup> This facially non-exclusive possessory interest has become - over the 21 years of exploration at the Pebble site - functionally exclusive. The long-term presence by a single industry “occupant,” the geographic spread of the exploration activity, the numerous personnel on site, the noisy and intrusive helicopter traffic, and the widespread land disturbance results in functionally exclusive use of the land and water. The subsistence and recreational users can no longer use the area because the subsistence resources are diminished. [Halford, 12/13/10 Tr. 112:16-18; Delkittie, 12/10/10 Tr. 101:20-22.] The wildlife has become scarce, having vacated the area in the presence of the industrial activity. [Trasky, 12/14/10 Tr. 122:15-18.] Any buried cultural resources in the areas of disturbance before the cultural resource surveys began have, undoubtedly, been eliminated. [FF #168-175.]

199. The practice of PLP personnel is to meet those who arrive on the land with helicopters hovering or landing nearby. Mr. Smith described the reception when he went for a site visit when a helicopter hovered and then three helicopters came and landed with the personnel “greeting” him. [Ex. 587A at NA 5621; Ex. 587 at NA 5620.] While the personnel did not eject him from the land, he described the experience as “intimidating.” [Smith, 12/07/10 Tr. 174:12 to 175:1.] This PLP presence and practice is effectively exclusive.

200. The camp, the fuel depot, and the multiple drill sites give the landscape an appearance of an exclusive industrial site. [Ex. 3055 at 3055.9, 3055.10, 3055.11, 3055.68; Ex. 3056 at 3056.25, 3056.27.] This widespread presence is significantly more intensive than “a guide camp” or “a log transfer facility” - the kind of miscellaneous land use contemplated under DNR regulations - each of which have a limited geographic presence. The long-term nature of land occupation and the widespread presence of activity is an effectively exclusive use. [Ex. 123; Dem. Ex. 1004 at NA 6455.]

201. Once a core hole is drilled, no other individual is allowed to drill in the same location or to take samples. Mr. Krause testified that the “operation is pretty much

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<sup>25</sup> The MLUP provides: “A locator does not have exclusive use of the surface location. A locator may not restrict public access to the surface without approved authorization.” [Ex. 2043 at SOA 5256.] The TWUP provides: No water right or priority is established by a temporary water use authorization... Water so issued is subject to appropriation by others.” [Ex. 944 at SOA 7659.]

exclusive to the operator...no one else can use it.” [Krause, 7/21/10 Depo. 90:25 to 91:18 (“Q: So that’s sort of an exclusive us; is that correct? Was that a yes? A: Yes.”).]

202. The water use is exclusive in that water taken from the ponds and streams can no longer be used by others, or by the fish that need the instream flow. This is particularly true when PLP withdraws the entire amount of water from a stream or pond during winter. [De Husson, 12/8/10 Tr. 142:17-18.] DNR made no calculation of the available water in the ponds before issuing the TWUPs, and only made the calculations after this litigation commenced. [Prokosch 7/22/10 Depo. 145:12-15; 149:12-13; 193:24-25; 194:6 to 195:5.] In addition, DNR admitted that water use was permitted from the tributaries where no stream gauge data existed. [Prokosch 7/22/10 193:24-25; 194:6 to 195:5.] The evidence established that ponds were drawn down considerably, and in some cases, dried up. [Bettis, 12/16/10 Tr. 66:19-23; De Husson, 12/8/10 Tr. 142:17-18.] This made the water use exclusive, and impinged on reasonable concurrent use.

203. Mr. Prokosch described, in his deposition, the process for determining whether to adjudicate an *instream* flow reservation, whereby DNR calculates the flow of the river, and evaluates that against the amount requested. He described a case where the instream reservation sought to reserve more water than flowed in the river at low-flow periods and determined DNR would “need to look closely at what they requested” and that DNR would not normally allow “an instream reservation for the entire flow.” [Prokosch, 7/22/10 Depo. 174: 3-23.] DNR has a more stringent interpretation of an application that seeks to leave water in the stream as a reservation for fish and wildlife, than for a TWUP that allows water to be taken out of the stream for five years. DNR’s interpretation, as applied to PLP, effectively eliminates a general reservation for fish and wildlife with respect to the Pebble TWUPs and results in a functionally exclusive use.

## 2. The Permitting Scheme Allowed a Long-Term Commitment of Resources

204. The Pebble Project exploration began in 1988 and was first permitted by DNR in 1989. [Ex. 2071; Ex. 2070.] MLUPs were issued by DNR every year from 1989 through 2010, except 2000 and 2001. [Exs. 190, 2043-2071.] PLP and its predecessors reported no activity in some years. [Dem. Ex. 472; Evidence Table D (1994, 1995, 1996, 1998 -2001).] However, the fact that they obtained permits to operate, and could have operated, meant that there was a continuous occupation of the Pebble Project site for 21 years. This length of time is beyond “temporary” under any reasonable definition. In fact, the State and PLP employees who defined “temporary” in their depositions or at trial uniformly defined anything beyond 5 years as not “temporary.” [Krause, 7/21/10 Depo. 193:24 to 194:1 (“Q: In your administration, what do you consider temporary? A: one to five years.”); Prokosch, 7/22/10 Depo. 231: 21-24 (6 years is “not temporary”); Wober, 12/7/10 Tr. 96:11-12 (definition of long-term is “more than one year”).]

205. The effects of the PLP discharges and boreholes on state land are permanent. There has been, and can be, no removal of the hundreds of thousands of pounds of disposed material on the site.<sup>26</sup> [Evidence Table I.] The State does not require that the boreholes – whether plugged or not – be reclaimed by replacing cuttings or ensuring that the hole is stable with casing and plugging material. [Krause, 7/21/10 Depo. 209:18 to 210:2 (“Q: Does Pebble remove---other than structures, is it ever required to remove drilling muds, the you know cement plugs, anything like that from their drilling operations or do they just leave it in place. A: The ones that are pumped back down the holes? Q: Yeah (affirmative) A: No, they stay there. Q: So whatever they put back down the hole stays and is there for good? A: Yes.”).] The testimony also established that the effect of acid rock drainage is long-term and indefinite. This is permanent use of State land by PLP is potentially indefinite. In addition, if the development of a mine is permitted, there will be an unbroken commitment of state land to PLP for many additional years.

206. While some of the drill sites, seismic sites, test pits, camp areas, and wastewater discharge sites may appear to be reclaimed on the surface, those “reclamation” efforts address only cosmetic changes to the land surface (planting of non-native grasses). The reclamation does not address other impacts of exploration, including those resulting from discharges of drilling muds, inadequate fish screens on water intake hoses, displacement of other users, destruction of archeological sites and fuel spills. Additionally, the reclamation efforts fail to ameliorate the harmful effects of removal of water from a stream or pond during a critical life stage that may permanently destroy, or otherwise adversely impact, the genetic diversity of a fish species. The harmful character of these PLP activities is well-documented.

### 3. The MLUPs and TWUPs are Functionally Irrevocable

207. The MLUP states that it is “revocable at will.” [Exs. 2043 at SOA 5254; Ex. 2043 at SOA 5254-5258.] The TWUP cites 11 AAC 93.210, which provides that the TWUP is subject “to revocation if necessary to supply water to lawful appropriators of record or to protect the public interest.” [Ex. 932 at SOA 7365; Ex. 2072 at SOA 69435.]

208. The State admits that it can find no records of it ever revoking a miscellaneous land use permit issued in connection with upland hardrock mining. [Ex. 604 at 13, RFA #12.] It also admits that it can find no records of it ever revoking a temporary water use permit [Ex. 604 at 13, RFA #12.]

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<sup>26</sup> The State admits that it “has not routinely required” PLP to remove materials discharged into sumps or discharged onto the tundra since 1988. [Ex. 604 at 33, RFA #81.]



209. The State attempted to introduce records that it might revoke a TWUP or MLUP for upland hardrock mining, but those records and the testimony established that, to the contrary, the State had not done so and the situations in which it did suspend or “revoke,” the revocation was merely a “suspending of processing” the applications. [Fredericksen, 12/14/10 Tr. 167:1-23 (“Q: Okay. So you know of no instances where upland hard rock mining permit was revoked? A: I don’t know of any, no.”).] Furthermore, the permits were placer mining permits, not upland hardrock mining permits. [Ex. 689; Mylius, 12/17/10 Tr. 38:11 to 39:11.]

210. Three years of inspections of the Pebble Project discovered multiple violations of the permits. However, the State failed to suspend the permits. The Pebble Project TWUPs were suspended only after the initiation of this lawsuit by Nunamta, and that suspension was only for the wintertime period that PLP was not operating. [Fredericksen, 12/14/10 Tr. 161:1-10.] The only other example of a revocation was not supported with documentary or other evidence and it involved a placer mining permit. [Fredericksen, 12/14/10 Tr. 160:1-18.] The absence of records of suspension or revocation of a hardrock mineral exploration permit for the entire history of mineral exploration in Alaska confirms the functional irrevocability of these permits.

## **H. Evidence Tables (Attached)**

**A. NAEC Comparison.** Table A compares the extent and intensity of the exploration activities at the Pebble Project site with those of the proposed utility easement - the Fairbanks Intertie – in *Northern Alaska Environmental v. State*, 2 P.3d 629 (Alaska 2000), wherein the court found the right-of-way permit was “functionally irrevocable” because of: (1) the sheer magnitude of the project, as demonstrated by the concomitant financial resources and its public importance; and (2) the nature and extent of the potential impacts of the proposed project, which were such that the impacts and structures could not be removed, and the land vacated, without leaving permanent and deleterious damage. *Id.* at 638-639. The magnitude, cost, duration, and geographic extent of the exploration activities undertaken at the Pebble Project are greater than those proposed for the Fairbanks Intertie.

**B. Water Use Data.** Table B sets forth reasonable estimates of water use by drill hole for each year at the Pebble Project. DNR maintained no records of actual water use at the Pebble Project, and PLP did not submit either measurements or estimates of water use to the State. Therefore, the estimated use was calculated using the only available record evidence about Pebble’s water use. Exhibit 3093 reports PLP’s own estimate that it used 29,948,400 gallons of water to drill 137,991 feet. This means that approximately 217 gallons of water were required to drill one foot. Each year’s average drill hole depth was, therefore, multiplied by 217 to determine the estimated, average amount of water used at each drill hole. These figures—extrapolated from

PLP's data—show that PLP and its predecessors were allowed to withdraw a significant amount of water<sup>27</sup> from single sources between 1989 and 2006 without any water use permits. The State conducted no analysis of the impacts of water withdrawals on reasonable concurrent users, on common use, or to fish and wildlife.

**C. Inspection Report Data.** Table C demonstrates that the State had little or no information about the plugging or abandoning of holes at the Pebble Project site. This table aggregates information from all of the Pebble Project inspection reports written by the DNR from 2003 to 2010. The State did not inspect the Pebble Project until 2003 and then inspected only 7% of the drill sites. Of those inspected, DNR failed to follow up on problems, and failed to establish that holes were properly plugged or abandoned. The inspection reports indicate that fewer than 2% of the holes were confirmed to have been plugged. The reports contain no information on the adequacy of the plugging method. DNR failed to follow up on problems identified during its inspections.

**D. Drilling/Exploration Activities.** Table D aggregates data on drilling activities at the Pebble Project from 1988 to 2010. (Ex. 472) By comparing the number of holes completed as reported contemporaneously by the Pebble permittee (in the affidavits of annual labor) with the number of holes reported after this lawsuit was filed, Table D demonstrates that the State failed to have adequate records of nearly half (44%) of the exploration holes. The table illustrates that information in DNR's files regarding the exploration activities at the Pebble Project is inconsistent and unreliable. It shows the acceleration of activities at the Pebble Project from early exploration to advanced exploration, as there were increases in the numbers of people on the site, amounts of fuel stored, permitted seismic lines, and amounts of water used each year. As confirmed by Dr. Chambers' testimony, Table D shows that Pebble exploration ramped up significantly in 2002-2003. [Chambers, 12/10/10 Tr. 54:4-11; 12/09/10 Tr. 186:14 to 187:12; Fredericksen Dem. Ex. 2194.]

**E. Annual Reclamation Report Data.** Table E demonstrates that the State had reclamation information on fewer than half of the drill holes at the Pebble Project. Table E incorporates the number of completed drill holes reported on the Annual Reclamation Reports submitted over the life of the exploration activities at the Pebble Project. It shows the number of holes that the applicant did not reclaim. These figures, when compared to the number of drill holes, illustrate that DNR lacks

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<sup>27</sup> A "significant" amount of water is defined as the consumptive use of more than 5,000 gallons per day of water from a single source of water on a single day or the use of more than 500 gallons per day from a single source for more than 10 days in a calendar year. 11 AAC 93.035(b)(1) and (2).

accurate reporting information about the number of drill holes actually and properly completed.

**F. Fuel Spill Report Data.** Table F aggregates the Spill Reports data submitted to DEC between March 2006 and September 2010 for spills at the Pebble Project site. The table characterizes each spill by type, volume, and reason. During this time frame, exploration activities caused the uncontrolled release of approximately 426 gallons of hydraulic oil, diesel fuel, antifreeze, and other contaminants. These spills occurred at 26 sites. Therefore, each spill averaged 19 gallons. No records exist for spills prior to March 2006. Thus, the State has no idea how many spills - or the volume of any spills - may have occurred at more than 850 drill holes, twice the number of holes for which the State does have data.

**G. Amount of Grout Required to Plug Boreholes Compared to Data on Available Grout.** Table G compares an estimated amount of grout required to plug each drill hole from bottom to top with the amount of grout PLP actually purchased during 2008 and 2009, according to PLP invoices. [Ex. 749.] Grout is purchased in 50-pound bags. Each bag can fill 10-13 linear feet of borehole.<sup>28</sup> By comparing the total linear feet of boreholes drilled (from Ex. 123) with the number of linear feet that could be completely filled with the purchased grout, it can be determined whether the holes were filled top-to-bottom. Table G demonstrates that it would have been impossible to fill all of the holes drilled in 2008 and 2009 from top to bottom with the amount of grout purchased by PLP. Table G demonstrates that the boreholes were not plugged from top to bottom; and that a significant percentage of the linear feet of holes in 2008 (87%) and 2009 (93%) were not grouted.

**H. Water Use Data from Ponds in Winter.** Table H uses the State's pond volume table [Exhibit 2139] to determine how many days a drill rig could operate in winter - using the ponds permitted for use in the TWUPs as a single source of water - before

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<sup>28</sup> Mr. Wober, when asked how much grout was necessary to fill a drill hole responded that he did not know. ["Q: How much grout is used for [plugging a hole from bottom to top.] A: I don't know. A lot. I don't know a volume. The drill foreman has a volume calculation for what he needs, depending on the depth of the hole and then he can figure out how many bags of grout he needs to mix to be able to pump down that hole." Wober, 12/7/10 Tr. 58:20-24.]

The only person with the foundation and knowledge to establish the amount of grout necessary for plugging a hole was Mr. De Husson, the driller's assistant. Mr. De Husson established that a 2000-foot hole needs 3-4 pallets (50 bags/pallet) of grout to be filled from top to bottom. [DeHusson, 12/08/10 Tr. 149:2-4.] Thus, dividing 2000 feet by 150 bags = 13 feet per bag of grout. Dividing 2000 feet by 200 bags = 10 feet per bag. So a range of 10-13 linear feet can be plugged with each bag.

draining that pond. The calculation assumes a water withdrawal of 16,500 gallons per day for the rig/water source and no recharge.<sup>29</sup> Table H incorporates the hand-written portions of Ex. 2139, and records the under-ice water volume (in gallons) in a spreadsheet format. The under-ice water volume is then divided by 16,500 gpd water usage to arrive at a total number of days that water could be pumped from the pond. The table establishes that half the ponds used as water sources (9 ponds) would dry up in less than 3 days of use. Of the remaining ponds, 8 would dry up in less than 6 days.

Table H also demonstrates that DNR made a significant error in its calculations of the volume of Pond #10. The pond calculation in Ex. 2139 at SOA 11031 was erroneously transferred to the DNR water volume chart Ex. 2130 at SOA 11027, and was in error by a magnitude of ten. Thus, instead of having 47 days' worth of under-ice water available, there were only 4.7 days of water available.

The number of days' worth of water in each pond is clearly insufficient to drill an average hole at the Pebble Project; the driller timesheets indicate that many holes took weeks to months to complete. [See Ex. 525.]

**I. Grout Purchase Data.** Table I shows the amount of grout and drilling muds purchased by PLP from April 2008 through September 2010. The data in Table I are taken from the invoices in Exhibit 749. During this two-year time period, PLP purchased more than 400,000 pounds of grout and drilling muds. All of this material – much of which has toxic components - was discharged onto the tundra or disposed of in the drill holes. Approximately 300 holes were drilled in that period. It is likely that there was an equivalent discharge for the more than 900 holes drilled from 1989-2008. That means that more than 1.5 million pounds of drilling muds and grout have been discharged and disposed of since 1989, and remain on the Pebble Project site. The State has not required PLP to remove that material, and it remains permanently on State lands and waters.

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<sup>29</sup> This 16,500 gallons-per-day volume is based on the testimony of Gary Prokosch, the DNR Water Section Chief, who testified that the PLP withdrawal rate was between 16,500 -21,000 gallons per day. [Prokosch 7/22/10 Depo. 79:17-19; 83:22.] This is less than the 15 gallons per minute (21,000 gallons per day) allowed in the 2007 Fish Habitat Permits/TWUPs (Ex. 2125) and significantly less than the 25 gallons per minute (36,000 gallons per day) allowed in the 2010 Fish Habitat Permits/TWUPs (Ex. 2105).

## **I. Witnesses**

### **1. Plaintiffs' Witnesses**

#### **(1) Bobby Andrew**

Bobby Andrew is a Native Alaskan from Dillingham, Alaska educated in Aleknagik, Dillingham and Dyke Spencerian College in Ohio. [Andrew, 12/08/10 Tr. 54:20-22; Tr. 55:5-9.] After retiring, he became involved in many different organizations in the Dillingham region. [Andrew, 12/08/10 Tr. 56:7-9.] Currently, he serves as a board member and spokesperson for Nunamta. [Andrew, 12/08/10 Tr. 56:12-13.] He helped coordinate Nunamta's efforts to convene meetings to inform and educate people about the Pebble Project. [Andrew, 12/08/10 Tr. 56:22 to 59:25.]

Mr. Andrew testified about the subsistence use of the Pebble Project region by Nunamta members, [Andrew, 12/08/10 Tr. 69:2-11; 78:1 to 81:22], his personal subsistence use of the Nushagak River and the Koktuli River areas for fishing, and hunting, [Andrew, 12/08/10 Tr. 78:16 to 79:18], and the cultural and spiritual importance of subsistence to the Native Alaskans in the Bristol Bay Region [Andrew, 12/08/10 Tr. 78:1-4 (subsistence is a "way of life"); 78:7-12.] He further testified to what Nunamta has done as an organization in response to exploration activities at the Pebble site and the lack of notice by the State regarding those exploration activities. [Andrew, 12/08/10 Tr. 60:2 to 77:25.]

#### **(2) David Chambers, Ph.D.**

David Chambers holds a Master's degree in Geophysics and a Ph.D. in Environmental Planning from the University of California, Berkley. [Chambers, 12/09/10 Tr. 173:8-11.] He worked as an exploration geophysicist for mineral, geothermal, and oil and gas exploration projects for fifteen year in every Western state, including Alaska, as well as British Columbia and Egypt. [Chambers, 12/09/10 Tr. 173:14-17; Tr. 174:2-5.] For the past twenty years, he has focused on the environmental impacts of mining. He currently directs the Center for Science and Public Participation. [Chambers, 12/09/10 Tr. 173:17-24.] Dr. Chambers provides technical expertise to public interest groups and tribal governments on the environmental impacts and has authored several papers. [Chambers, 12/09/10 Tr. 174:9-24.] The Court qualified Dr. Chambers as an expert in the field of geophysics, with expertise in the environmental impacts of mining. [Chambers, 12/09/10 Tr. 177:21-24.] Dr. Chambers rendered an opinion on geophysics, the stage of Pebble exploration, and the potential for acid drainage and metal leaching at the Pebble Project area. [Chambers, 12/09/10 Tr. 179:9-22.] His opinion included analysis of the miscellaneous land permits, temporary water

use permits, affidavits of annual labor, and DNR inspection reports related to the Pebble Project. [Chambers, 12/09/10 Tr. 185:4-10.]

### **(3) Gordon DeHusson**

Gordon DeHusson worked as a driller's assistant at the Pebble Project in 2006 and 2008, with Foundex and Quest drilling companies, respectfully. [DeHusson, 12/08/10 Tr. 113:23 to 114:12.] Mr. DeHusson began working on oil exploration projects on the North Slope in 1989. [DeHusson, 12/08/10 Tr. 113:7-10.] He has spent approximately thirteen years working on the North Slope. [DeHusson, 12/08/10 Tr. 113:7-15. Mr. DeHusson testified about the drilling practices at the Pebble Project site in 2006 and 2008. [DeHusson, 12/08/10 Tr. 118:1 to 226:9; 12/09/10 Tr. 12:18 to 21:9.]

### **(4) Rick Delkittie**

Rick Delkittie is a Native Alaskan from Nondalton, Alaska. [Delkittie, 12/10/10 Tr. 94:23 to 95:5.] He has worked on the North Slope, guided hunters in the vicinity of the Pebble Project (Units 17 and 19), and has worked as a fire fighter, public safety officer, mayor, vice president of the Nondalton village corporation, and a commercial fisherman. [Delkittie, 12/10/10 Tr. 95:8-21.] Mr. Delkittie worked at the Pebble Project as a bear guard and reclamation worker and testified about his work experience on the Pebble Project site. [Delkittie, 12/10/10 Tr. 102:15-21.] He has conducted subsistence activities in the Pebble Project area for "[f]orty-some years." [Delkittie, 12/10/10 Tr. 96:13 to 97:1; 97:10 to 99:2; 99:24 to 100:17.] He has used the area to hunt and trap for birds, moose, caribou, black bear, porcupine, and beaver. [Delkittie, 12/10/10 Tr. 96:19 to 97:1; 97:10 to 99:2; 110:22 to 112:8.] Mr. Delkittie testified about the Pebble Project's impacts to his fishing, hunting and spiritual subsistence practices.

### **(5) Rick Halford**

Rick Halford has lived in Alaska for forty-four years. [Halford, 12/13/10 Tr. 89:23-25.] He has worked in the National Guard and as a registered guide and air taxi operator, obtaining his guiding and commercial pilot's licenses in the early 1970s. [Halford, 12/13/10 Tr. 90:1-14.] He has been licensed to guide in most of Alaska, including the Pebble Project area, since approximately 1973. [Halford, 12/13/10 Tr. 90:14-19; 91:5-14.] He has flown over the area for Fish and Game, for personal reasons as he had a home in Dillingham, and to show family and clients wildlife. [Halford, 12/13/10 Tr. 91:14-25.] He has flown over the Pebble Project area extensively since the 1970s and has been on the ground at the site numerous times. [Halford, 12/13/10 Tr. 92:12 to 93:5.]

Mr. Halford also served as a state legislator for twenty-four years. [Halford, 12/13/10 Tr. 90:20-23.] During his tenure in the legislature, he served once as majority leader of the House, four or five times as majority of the leader of the Senate, twice as president of the Senate, and as chairman of the resources, finance rules, judiciary, and other committees. [Halford, 12/13/10 Tr. 91:1-4.]

Mr. Halford testified about on-the-ground conditions, wildlife activity and impacts, and guiding wildlife viewers and hunters in the Pebble Project area, and how those conditions and activities have been impacted by the mineral exploration activities. [Halford, 12/13/10 Tr. 91:8 to 112:18.]

#### **(6) Bella Hammond**

Former First Lady of Alaska Bella Hammond lives in Lake Clark, Alaska, where she homesteaded with her husband in the early 1950s. [Hammond, 12/10/10 Tr. 121:13-14; 123:10-12.] Her family is from the Dillingham area of Bristol Bay, Alaska, which is where she grew up. [Hammond, 12/10/10 Tr. 121:15-18.] Mrs. Hammond fished commercially from childhood until approximately twelve years ago [Hammond, 12/10/10 Tr. 122:1-6.] She often accompanied her husband in his work as the Governor of Alaska, a trapper, a guide, a fisherman, a pilot, and a Fish & Wildlife Service employee. [Hammond, 12/10/10 Tr. 121:25 to 1; 124:10 to 125:3.] She has flown over the Pebble Project area hundreds of times, beginning in the early 1950s. [Hammond, 12/10/10 Tr. 123:6-24.] Mrs. Hammond testified about helicopter activity at the Pebble Project site, impacts to caribou and other wildlife, and the lack of public notice regarding the exploration activities. [Hammond, 12/10/10 Tr. 122:21 to 124:9; 125:8 to 130:14.]

#### **(7) Robert Moran, Ph.D.**

Robert Moran holds a Ph.D. in Geological Sciences, with an emphasis in water geochemistry and expertise in geochemistry, hydrogeology, and hydrology. [Moran, 12/09/10 Tr. 21:19-22; 22:23 to 23:1.] He focused his graduate studies on water chemistry issues related to mining. [Moran, 12/09/10 Tr. 21:22 to 22:4.] Dr. Moran has worked as a private consultant for mining companies, governments, non-governmental organizations, and a variety of other groups. [Moran, 12/09/10 Tr. 22: 8-17.] Dr. Moran has experience overseeing the design, implementation, and management of monitoring well drilling, reviewing and evaluating data from exploration drilling programs, and assessing the geochemistry of natural and contaminated waters and sediments related to mining, and hazardous waste and water supply development [Moran, 12/09/10 Tr. 23:1-6; Tr. 23:10-13.] Dr. Moran has experience with contamination issues related to copper, gold, and molybdenum mine sites. [Moran, 12/09/10 Tr. 24:5-17. He has published in the three fields of hydrology, hydrogeology, and geochemistry. [Moran, 12/09/10 Tr. 23:14 to 24:4.]

The court qualified Dr. Moran as an expert in the fields of hydrology, hydrogeology, and geochemistry. [Moran, 12/09/10 Tr. 33:1-13.] He offered an opinion on the hydrologic connections between surface and ground water and the potential chemical impacts from drilling and abandonment activities. [Moran, 12/09/10 Tr. 28:2-9.] He based these opinions on research and analysis of the publicly available data from Northern Dynasty Minerals and PLP, including the driller time sheets and 2005 baseline studies; USGS data; the Miscellaneous Land Use Permits, Temporary Water Use Permits, Affidavits of Annual Labor, and DNR Inspection Reports; and an aerial fly over. [Moran, 12/09/10 Tr. 33:19-23; 35:2-10; 35:25 to 36:7; 38:4-14; 42:16-24; 50:7-10.]

#### **(8) Steven Morris**

Steven Morris is a registered hunting guide in the State of Alaska and a network analyst for Conoco Phillips. [Morris, 12/10/10 Tr. 7:8-10.] He obtained his guiding license in 1989. Previous to that, he worked as an assistant guide, beginning in 1980. [Morris, 12/10/10 Tr. 7:13-15.] He has held guiding permits in the Pebble Project area from approximately 1991 to the present, which allowed him to operate out of a large wall tent “permanent” camp and several spike camps. [Morris, 12/10/10 Tr. 8:2-21; 12:13-21; 21:12-18.] Mr. Morris testified about the significant economic impacts of the Pebble Project exploration on hunting and on his guiding business.

#### **(9) Stuart Smith, Ph.D.**

Dr. Smith holds a Ph.D. in Range Ecology and has spent his professional career in Graphical Information Systems (GIS). He managed GIS Programs in Washington State for the Department of Natural Resources and the Office Archeology and Historic Preservation for 12 years. He has operated his own consulting business since 2003. [Smith, 12/06/10 Tr. 93] His experience and expertise is in acquiring, analyzing and tracking GIS data with a spatial component and involving the mapping of water bodies, wetlands, topographic features, utilizing data “layers” to depict these features. [Smith, 12/06/10 Tr. 94.] He has published in the areas of his expertise. [Smith, 12/6/10 Tr. 94: 4-14.]

Dr. Smith was qualified at trial to testify as an expert in the field of Geographical Information Systems. [Smith, 12/6/10 Tr. 94:24-25 to 96:1.] Dr. Smith’s testimony and expert opinion were rendered on (1) the availability of GIS data for the Pebble Project; (2) the quality and sufficiency of the maps for the Pebble Project; (3) the accuracy and sufficiency of borehole and water location data that relate to the Pebble, specifically on the State’s Drilling Map (Exhibit 23); (4) the accuracy and sufficiency of the pre 2007- and post 2007 maps that are part of the Pebble Project applications for MLUPs; [Smith, 12/6/10 Tr. 91-92.] Dr. Smith also demonstrated the location of Pebble exploration



activities (seismic, and IP surveys, soil test areas, test pits, boreholes, water sources, camp structures, fuel storage areas) with respect to topographic, resource and geographic features at the Pebble site such as water bodies, wetlands, Mineral Closing Order 393 boundaries, Anadromous Waters, archeological resources and documented fish presence. Dr. Smith offered extensive evidence to support his conclusions including State and PLP documents, photographic evidence, and evidence from government GIS databases including the National Wetlands Inventory and the National Hydrologic Survey. Dr. Smith utilized Arc Globe GIS software a demonstrative aid. The ARC Globe software utilized Dr. Smith is a complex technology, whose computing intensity approaches work done in fluid dynamics. [Smith, 12/6/10 Tr. 96:20 to 97:8; Ex. 1004.]

#### **(10) Lance Trasky**

Mr. Trasky has a Bachelor's Degree in fisheries from Michigan State University and completed two years of graduate studies in fisheries at Central Michigan University. [Trasky, 12/14/10 81:9-11.] He has thirty five years of experience as a fisheries management biologist, as a fisheries research biologist for the Yukon River, as a habitat biologist and regional supervisor for the Alaska Department of Fish and Game. [Trasky, 12/14/10 81:14-17.] As regional supervisor, Mr. Trasky was responsible for the habitat and restoration division of the Southcentral Region, which includes Bristol Bay, Yukon Kuskokwim Delta, Cook Inlet, Prince William Sound, the Copper River Delta, Kodiak Island, North Pacific, and the southern Bering Sea. [Trasky, 12/14/10 Tr. 82:12-17.] In this position, he implemented the protections of Anadromous Fish Act and the Fish Ways Act; managed the State's 32 game refuges, critical habitats and sanctuaries; and reviewed large industrial projects, including mining exploration and development, to analyze the impacts of those activities on fish and wildlife habitat and human use of fish and wildlife. [Trasky, 12/14/10 Tr. 83:5-16.] He also was the Department's lead for the development of the 1984 Bristol Bay Area Plan, as well as numerous other area plans within the region. [Trasky, 12/14/10 Tr. 83:17-21.] He was involved extensively in state permitting, especially fish habitat permits, permits under the Alaska Coastal Management Program, and miscellaneous land use permits. [Trasky, 12/14/10 Tr. 84:19 to 85:3.] He has extensive experience in the area of wildlife biology. As part of his work for the State of Alaska, he was involved in numerous land use planning efforts, where it was his responsibility to protect fish and wildlife habitat. [Trasky, 12/14/10 Tr. 87:8-11.] This required a working knowledge of the scientific literature on wildlife habitat and the impacts of various development activities. [Trasky, 12/14/10 Tr. 87:11-22.] For the past five years, he has been running his own firm, specializing in habitat biology. [Trasky, 12/14/10 81:17-19.] Mr. Trasky has written numerous technical reports on a wide variety of subject, including oceanographic studies in the Gulf of Alaska and Kachmak Bay, the effects of seismic exploration on fish and wildlife, fisheries management, fisheries research, and surveys on the abundance and distribution of anadromous fish. [Trasky, 12/14/10 Tr. 82:18-25.]

The court certified Mr. Trasky as an expert in the fields of fish and wildlife habitat, fisheries biology, and the permitting process in Alaska as related to fish and wildlife management [Trasky, 12/14/10 Tr. 88:23 to 89:9.] Mr. Trasky offered an opinion on the fish and wildlife habitat in the Pebble exploration area, the impacts of exploration on that habitat, and the DNR permitting process from 1989 through 2010. [Trasky, 12/14/10 Tr. 89:12-17.] He based these opinions on his personal experience and expertise, conversations with other scientific experts, and a review of the DNR inspection reports, miscellaneous land use permits, temporary water use permits, fish habitat permits, drill logs, subsistence reports, land use plans (BLM and State), all the publicly available information on the DNR and PLP websites on fish and wildlife at the Pebble Project site, Dr. Woody's reports, the anadromous water catalog information, Fish and Game wildlife reports, and scientific literature on the effects of the activities occurring at the Pebble Project site, such as helicopter overflights and seismic exploration. [Trasky, 12/14/10 Tr. 84:5-18.]

**(11) Carol Ann Woody, Ph.D.**

Carol Ann Woody holds a Ph.D. in Fisheries Science from the University of Washington and a M.S. in Aquatic Biology from the University of Wisconsin. [Woody, 12/14/10 Tr. 12:8-11.] She has over eighteen years of experience working as a fisheries biologist, wildlife biologist, and fisheries research scientist, including working as a fisheries research scientist in the Bristol Bay area with the U.S. Fish and Wildlife Service and the U.S. Geological Survey, researching sockeye salmon escapement into Lake Clark National Park and genetic studies of the region's genetic diversity. [Woody, 12/14/10 Tr. 14:5-15.] [Woody, 12/14/10 Tr. 12:13-15; Tr. 13-19; Tr. 14:4-6.] Dr. Woody has worked in Russia, British Columbia and the U.S. to establish monitoring, inventory, and restoration programs related to fisheries resources. [Woody, 12/14/10 Tr. 13:7-10.] She has also provided expert input and recommendations regarding impacts to fisheries for the Galore Creek mine project. [Woody, 12/14/10 Tr. 15:3-12.]

Since 2006 she has run her consulting firm: Fisheries Research and Consulting. [Woody, 12/14/10 Tr. 16:20 to 17:1.] Her specialties are in fisheries, genetics, ecology, behavior, habitat use, and essential habitats. [Woody, 12/14/10 Tr. 13:13-16.] Dr. Woody has published over 25 papers in peer review journals and edited a book for the American Fisheries Society on sockeye salmon ecology and management. [Woody, 12/14/10 Tr. 13:21-24.] She has served as the President and Vice President of the Alaska Chapter of the American Fisheries Society. [Woody, 12/14/10 Tr. 12:15-17.] Currently, she serves on the Environmental Concerns Committee for the western division of the American Fisheries Society. [Woody, 12/14/10 Tr. 12:17-19.]

Dr. Woody's research in the Bristol Bay region has included identification of essential habitats for salmon, including identifying important and essential habitats for subsistence species in the Bristol Bay region [Woody, 12/14/10 Tr. 12:20-25]; conducting a series of ecological studies on different types of fisheries resources in the Bristol Bay region, including telemetry and genetic studies [Woody, 12/14/10 Tr. 12:23-25]; modeling of habitat fish actually use versus what habitat is available; inventorying and monitoring studies, and providing information related to mitigating the potential impacts of development. [Woody, 12/14/10 Tr. 16-21.] Dr. Woody has for the past few years conducted the first fish surveys of many streams in the region. [Woody, 12/14/10 Tr. 17:1-6.]

The court qualified Dr. Woody to testify as an expert witness in the field of fisheries science. [Woody, 12/14/10 Tr. 17:7-12.] She offered her opinion on the biodiversity and sustainability of Bristol Bay's fisheries resources, factors that contribute to that biodiversity and sustainability, and the potential impacts of altered water flows and other impacts related to exploration activities at the Pebble site on those aquatic resources. [Woody, 12/14/10 Tr. 11:17 to 12:2.] Her opinions were based on her past experience, three years of field research in the Pebble Project area and a review of numerous documents, including fish habitat permits, temporary water use permits, miscellaneous land use permits, and DNR inspection reports. [Woody, 12/14/10 Tr. 16:2-19.]

**(12) Kendra Zamzow, Ph.D.**

Kendra Zamzow holds a Ph.D. in Environmental Sciences and Health, with an emphasis on environmental chemistry. [Zamzow, 12/10/10 Tr. 139:24 to 25:1.] She has published, taught, and participated in Technical Advisory Groups in her areas of expertise. [Zamzow, 12/10/10 Tr. 140: 16-18.] Since receiving her Ph.D., she has worked for the Center for Science and Public Participation on hard rock and coal mining issues in Alaska, Canada, and Wisconsin. [Zamzow, 12/10/10 Tr. 140:4-7.] Dr. Zamzow has conducted onsite research into water chemistry at the Pebble Project for the past two years.

Dr. Zamzow was qualified by the Court to testify as an expert witness in the field of environmental chemistry with a biogeochemistry specialty. [Zamzow, 12/10/10 Tr. 141:1-15.] She rendered an opinion on the water quality at the Pebble Project area and potential water quality impacts of mineral exploration activities at the site. [Zamzow, 12/10/10 Tr. 139:14-16.] Her Pebble-specific research and analysis included analysis of publicly available data from PLP, the USGS, the Alaska Department of Environmental Conservation, and Cominco, as well as her work at the Pebble site on other projects. [Zamzow, 12/10/10 Tr. 145:14-17; 146:10-14; 164:13-24; 12/13/10 Tr. 33:15-21.]

## 2. Defendants' Witnesses

### **(1) Roger Allely.**

Mr Allely is a hydrologist with the Department of Natural Resources, but has been doing engineering geology for the Mining Section since 1979. [Allely, 12/6/10 Tr. 81:16-23.] Mr. Allely provided foundation testimony for Exhibit 23, the map of drillholes at the Pebble Project from 1989-2009. [Allely, 12/6/10 Tr. 82:24 to 84:22.] He also testified that the GPS information for the map was provided by PLP (Exhibit 123) and that the data was accurate. [Allely, 12/6/10 Tr. 85:20 to 89:6.]

### **(2) Ronald Benkert.**

Mr. Benkert is a Habitat Biologist for the Alaska Department of Fish and Game. [Benkert, 12/16/10 Tr. 130:13-21.] His testimony illustrates the State's lack of oversight of the Pebble Project as well as PLP's inadequate protective measures. Mr. Benkert admitted that prior to 2007, ADF&G did not require the utilization of fish screens at the Pebble Project. [Benkert, 12/16/10 Tr. 141:11-17.] Mr. Benkert participated in three site inspections at the Pebble Project and testified that one or more sites had not successfully been reclaimed. [Benkert, 12/16/10 Tr. 146:1-15; 147:7-20.] He also admitted that on those site inspections – which covered very few of the drillhole sites – he was unable to tell whether some holes had been plugged because he “didn't have a flashlight to look down and see if they were plugged or not.” [Benkert, 12/16/10 Tr. 124:15-25]. In addition, for those holes he assumed were plugged he and he did not know the depth to which they were plugged This, demonstrates the state's general lack of knowledge and oversight of the activities at the Pebble Project site. [Benkert, 12/16/10 Tr. 144:13 to 145:3; 146:22 to 147:2.] In light of these admissions, Mr. Benkert's opinions that measures to protect fisheries resources over the life of the Pebble Project are sufficient should not be given any weight. [Benkert, 12/16/10 Tr. 139:2 to 140:13.]

### **(3) Patricia Bettis.**

Ms. Bettis is currently a petroleum land manager for DNR and previously worked in the water section. [Bettis, 12/16/10 Tr. 30:4-8.] She processed the first TWUPs ever issued for the Pebble Project – which were not issued until 2007. [Bettis, 12/16/10 Tr. 33:4-6.] Ms. Bettis confirmed that after issuance of the permit, she never measured the amount of water being withdrawn. [Bettis, 12/16/10 Tr. 71:17-18.] She also admitted that public notice was not provided for any of the TWUPs. [Bettis, 12/16/10 Tr. 73:12-14.] Ms. Bettis also testified that for the TWUP issued in July 2007, agencies were only given a two-day notice, even though the permit was to allow an increase in water withdrawals of over four million gallons with no identified source. [Bettis, 12/16/10 Tr. 73:15 to 74:9; Ex. 2084 at SOA 7629.] Despite the notoriety of the Pebble water use

violations, Ms. Bettis denied having any knowledge of PLP's violations of the permits issued by her. [Bettis, 12/16/10 Tr. 74:10-19.] Ms. Bettis erroneously testified that "the plugging of wells would have to be under the regulations of DEC, and yes, that is within the Temporary Water Use Authorization A2006-150." [Bettis, 12/16/10 Tr. 73:8-11]. However, DEC is not regulating the well plugging, and there is no plugging of wells addressed in TWUP A2006-150 or any other TWUP. [See Ex. 949.]

**(4) Mr. John Brown.**

Mr Brown is the regional Hazmat and Oil Spill Response Supervisor for the Department of Natural Resources. [Brown, 12/16/10 Tr. 117:5-11.] Mr. Brown confirmed that there has not been any water quality testing in the vicinity of releases that have occurred at the Pebble Project site, and that no one had determined whether a pond – where a 2010 spill occurred – had any aquatic species in it. [Brown, 12/16/10 Tr. 127:19 to 128:4.] Mr. Brown testified that DEC spill response efforts were limited to only electronic communications and had not included any site visits. [Brown, 12/16/10 Tr. 127:14-18.] He also testified that he was unaware of any investigation by the DEC into routine spills associated with drill rigs at the Pebble Project. [Brown, 12/16/10 Tr. 128:5-11.]

**(5) Jaime Cathcart, Ph.D.**

Dr Cathcart is a hydraulics and hydrology engineer [Cathcart, 12/15/2010 Tr. 111]. He works as a specialist hydrotechnical engineer for Knight Piesold Ltd., a company employed by PLP for the ultimate development of the Pebble Project. [Cathcart, 12/15/10 Tr.111:1-5.] Dr. Cathcart testified primarily about hydrology of watersheds within the Pebble Project region and offered his opinion on whether water withdrawals had affected the *entire watershed*. [Cathcart, 12/15/10 Tr. 112:24 to 113:3.] Dr. Cathcart's testimony should be given little weight because his studies suffered from numerous flaws: (1) he only examined data from three years, 2007-2009 (Cathcart, 12/15/10 Tr. 150:13-14); (2) he based his calculations on a 15-gallons-per-minute withdrawal rate and did no independent research to verify that number (Cathcart, 12/15/10 Tr. 152:11-19 – the withdrawal rate currently permitted at the project is 25 gpm (Ex. 2080)); (3) he was unaware of, and did not compare, the actual amount of water used at any of the holes he evaluated (Cathcart, 12/15/10 Tr. 153:1-3); (4) he testified that he did not establish water gauges before water began to be withdrawn for exploration activities, had no baseline with which to compare his findings, and in fact, PLP placed gauges in water sources far away from the actual water sources used (Cathcart, 12/15/10 Tr. 153:4 to 154: 19); (5) he limited his evaluation to only surface water and he was not at all familiar with groundwater (Cathcart, 12/15/10 Tr. 148:15-20); and (6) he did not consider wetlands in his analysis (Cathcart, 12/15/10 Tr. 161:4-10).

**(6) Ricky Fredericksen.**

Mr. Fredericksen is the Chief of the Mining Section at the Department of Natural Resources, Division of Mining, Land and Water. [Fredericksen, 12/13/10 Tr. 156:4-8.] Mr. Fredericksen showed a lack of familiarity with most aspects of permitting at the Pebble Project. He was not familiar with the term “mineral in character” which is within the foundational statute for the mining section he oversees. [Fredericksen, 12/14/10 Tr. 178:19-23; *see also* AS 38.05.185(a).] He was unfamiliar with GCD-24, or its terms, including “exploration sampling.” [Fredericksen, 12/14/10 Tr. 173:2 to 177:15.] He was “weakly” familiar with the ACMP. [Fredericksen, 12/14/10 Tr. 173:16-17.] He testified that it was not his responsibility to determine whether archeological surveys had been conducted at the site for prior years because it predated his tenure at DNR. [Fredericksen 12/14/10 Tr. 190:13-25.] Mr. Fredericksen’s testimony that he has observed no impacts to the area surrounding the Pebble Project site little weight because of his general lack of knowledge about the exploration and water use activities and about mining permitting, in general. [Fredericksen, 12/14/10 Tr. 173:14 to 178:18.] When asked whether he had determined whether there were any impacts from discharges to fish or whether he had inquired of another agency about impacts, he replied that he had done neither. [Fredericksen, 12/14/10 Tr. 186:16 to 187:3.] Similarly, he had never conducted analyses of impacts to subsistence, commercial or recreational uses, nor had he determined whether there were any impacts to cultural resources. [Fredericksen, 12/14/10 Tr. 187: 4-17.] Mr. Fredericksen testified that he had conducted no investigation of the cumulative amount of surface land disturbed, and that he did not consider boreholes to be a subsurface disturbance “because there is nothing in the [DNR] regulations or statutes that talks about disturbance.” [Fredericksen 12/14/Tr. 195:10-22.] Mr. Fredericksen readily admitted, however, that he thought of the Pebble project as “significant.” [Fredericksen, 12/14/10 Tr. 179: 20-23; 184:6-14.]

**(7) Lars Gleitsmann.**

Mr. Lars Gleitsmann is an earth scientist with a Master’s Degree in Physical Geography from German University. [Gleitsmann, 12/17/2010 Tr. 141:11-16.] Pebble Partnership hired him to take pictures of all man-made structures and disturbances at the Pebble site and called him as a lay witness to explain his photographs [Gleitsmann, 12/17/2010 Tr. 142:7-11.] Mr. Gleitsmann visited the Pebble site on October 1-2, 2009, and September 13, 2010. [Gleitsmann, 12/17/10 Tr. 142:19-24.] Mr. Gleitsmann only photographed a small sampling of Pebble Project’s boreholes and he was unable to document the borehole ID numbers or how many holes he viewed, therefore his testimony was not complete and was not an adequate representation of the areas of disturbance at the site. [Gleitsmann, 12/17/2010 Tr 199:13-19; 219:11-25; 220:1-3; 220:14-18.] Further, Mr. Gleitsmann could not accurately remember how many fuel tanks there were at the Big Wiggly facility (he testified there were six when there are

five) nor the shutter speed he was using when he was photographing some of the pictures, calling into question the foundation for his photographs and the accuracy of the rest of his testimony. [Gleitsmann, 12/17/2010 Tr. 157:20; 229:13-15.]

Mr Gleitsmann's eagerness to portray that there are no impacts at the Pebble Project revealed his bias. He had only been on the site on three occasions in two years, yet when questioned about whether "anyone carries big fuel drums out to the airplane" during fuel transfers at Big Wiggly lake, he testified "No, never." [Gleitsmann, 12/17/10 Tr. 159:7.] Since Mr. Gleitsmann had no experience in site management at Pebble, and since he clearly did not have information on fuel transfers for the past 20 years, his testimony had no basis. Likewise, he underestimated the depth of sumps as being "for a smaller person about waist deep." [Gleitsmann, 12/17/10 Tr. 164:16-18.] However, both Mr. Wober (PLP site manager) and Mr. De Husson (onsite driller's assistant) testified that the pits were 5- 6 feet deep. [Wober, 12/9/10 Tr. 73:4-7; De Husson, 12/8/10 Tr. 133:7-8.] Mr. Gleitsmann testified that he "would not think there is any unsuccessful reclamation out there." [Gleitsmann, 12/17/10 Tr. 200:17-20.] Yet, his own photographs revealed holes that had been abandoned and were still leaking drilling fluid that was running downhill (Ex. 3055.50; 3055.51; 3056.46), and vegetation that had not recovered after a year. (Ex.3056.37). While he had no training or experience in reclamation, his definition of "temporary" for purposes of reclamation was five years. [Gleitsmann, 12/17/10 Tr. 200:1-3].

#### **(8) Richard Mylius.**

Mr. Mylius is the Director of the Division of Mining, Land, and Water at the Department of Natural Resources. [Mylius, 12/16/10 Tr. 242:15-16.] The court should give Mr. Mylius's testimony little weight because he admitted that he was not aware of day-to-day decisions about exploration and temporary water use permits, and does not directly supervise those writing the permits. [Mylius, 12/16/10 Tr. 252:1 to 253:5.] He testified that "[a]ll land use permitting decisions are delegated to low-level staff" and "[m]ining permitting is delegated down." [Mylius, 12/17/10 Tr. 93:2-25.] Mr. Mylius also testified that he was "not qualified to answer questions about disposal, transfer or ownership," he did not "know if the land selected was mineral in character," he did not "know every step in the processing of all permits," and that he did not "know whether or not there [was] disposal of toxic material on the site", confirming his lack of knowledge about the exploration and temporary water use permitting processes. [Mylius, 12/17/10 Tr. 94:1-25). Mr. Mylius' testimony was also not credible because he testified that none of the Pebble Project claims were within the area of Leasehold Location Order #1 until newer claims were acquired in 2009, but various PLP claims are within the area of LLO#1. [Mylius, 12/17/10 Tr. 88:16 to 89:5; Krause 7/21/10 Depo. 71: 19-20; Tr.74:11-12; RTr.75:1.] Likewise, Mr. Mylius testified without any evidence to support his conclusion - and contrary to the plain language of MCO 393 - that "core drilling for

mineral exploration is allowed in within the footprint of MCO 393.” [Mylius 12/17/10 Tr. 88:13-15] Mr. Mylius admitted, however, that some reasonable concurrent users have been precluded or displaced by the exploration activities at the Pebble Project. [Mylius, 12/17/10 Tr. 60:20 to 61:30.]

**(9) Alan Nakanishi.**

Mr. Nakanishi is an engineer at the Department of Environmental Conservation and is the section manager of the Mining and Engineering Technical Services under the Waste Water Discharge Authorization Program within the Division of Water. [Nakanishi, 12/13/10 Tr. 119:2-9.] Mr. Nakanishi testified that, despite DEC’s responsibility for wastewater discharges, DEC has not required any permits for nor made any analysis of discharges of drilling muds or cuttings occurring at the Pebble Project site. [Nakanishi, 12/13/10 Tr. 118:21 to 119:9; 129:6-12; 130:3-6.] He indicated that while he did not know for certain, he believed that DEC had not performed any analysis prior to 2006 to determine whether a DEC permit would be required, except for possibly a solid waste permit. [Nakanishi, 12/13/10 Tr. 134:11-16; 137:9-21.] He confirmed that DEC had never taken any measurements, or any lab data of any kind to determine whether or not water quality standards were met or exceeded at the Pebble Project site. [Nakanishi, 12/13/10 Tr. 134:17-23.] Mr. Nakanishi testified he had not reviewed nor was he familiar with the U.S. Fish and Wildlife Service National Wetlands Inventory. [Nakanishi, 12/13/10 Tr. 135:16-25.] He also testified that DEC has not made a determination of whether there were wetlands at the site; however, he admitted that there appeared to be wetlands at the site. [Nakanishi, 12/13/10 Tr. 129:22 to 130:6.] In addition, Mr. Nakanishi testified that he did not know if there was any sedimentation from the Pebble Project occurring at the site. [Nakanishi 12/13/10, Tr. 132:12-25). He confirmed that DEC had undertaken no cumulative impact analysis of the spills or discharges at the Pebble Project site. [Nakanishi, 12/13/10 Tr. 141:11-25.]

**(10) Gary Prokosch.**

Mr. Prokosch is the Chief of the Water Resources Section of the Division of Mining, Land and Water within DNR. [Prokosch, 12/16/10 Tr. 82:4-8.] Mr. Prokosch’s testimony that DNR is sufficiently informed about how much water has been and is being withdrawn should be given no weight because he admitted that PLP did not report how much water they were using nor were there any gauges to monitor and measure water consumption. [Prokosch, 12/16/10 Tr. 112:21-25 to 113:1-7.] Mr. Prokosch maintained that PLP informed DNR of the kinds of pumps they used although he never verified that this information was correct. [Prokosch, 12/16/10 Tr. 113:10-24.] Mr. Prokosch also testified that there is no notice or posting when TWUPs are issued and the only place to find any information about this water use is on the State’s website after-the-fact. [Prokosch, 12/16/10 Tr. 114:11-17.] Mr. Prokosch testified that neither DNR staff



no Pebble was required to measure pond depth, and that DNR did not verify that there were specific ponds at the locations, or the size. [Prokosch 7/22/10 Depo. Tr. 145: 12-15; 149: 12-13.] . Mr. Prokosch testified that he did not know the percentage of flow in tributaries and that he made no analysis of how much could be withdrawn unless it was a stream that had a stream gage on it. [Prokosch 7/22/10 Tr. 193:24-25; 194:6 to 195:5.]

**(11) Dr. Dudley Reiser, Ph.D.**

Dr. Reiser is a Senior Fisheries Scientist and the President of R2 Resource Consultants, a small company that he “co-founded in 1992 that specializes in fisheries and fisheries engineering type work.” [Reiser, 12/16/10 Tr. 153:19-25.] PLP offered Dr. Reiser as an expert to give opinions on Fisheries Science. [Reiser, 12/16/10 Tr. 166:4 to 169:20.]

Dr. Reiser’s testimony is not credible for several reasons. First, he was not aware of the the actual or potential presence of fish in water withdrawal sites in the North Fork Koktuli River, South Fork Koktuli River, and Upper Talarik Creek. [Reiser, 12/16/10 Tr. 185:24 to 188:14.]

Second, in performing his analysis of the adequacy of fish screens used at the Pebble Project to protect fish, Dr. Reiser’s testimony is not credible because he found the box screens on the intakes site in 2007 and 2008 to be protective of fish when the screens did not meet the fish habitat permit requirement (3/32 inches), GCD8 requirement (0.04 inches (1 mm), and observations in inspection reports, and he never physically inspected the PLP fish screens; he only evaluated their adequacy through photographs. [Reiser, 12/16/10 Tr. 196:14-22; 199:17-25; 204:24 to 205:10.] He did not use the proper approach velocity of 0.1 f/s, which is the standard utilized in Alaska and the fish habitat permits for the Pebble Project; instead, he used a standard employed by the National Marine Fisheries Service, which is 0.2 f/s. [Reiser, 12/16/10 Tr. 197:18 to 198:6.] In fact, Dr. Reiser was not even aware of the standard approach velocity required by the ADF&G fish habitat permits for the Pebble Project. [Reiser, 12/16/10 Tr. 236:16-18.] Dr. Reiser also did not consider whether the fish screens were maintained. [Reiser, 12/16/10 Tr. 239:20-22.]

Third, Dr. Reiser used a model called Physical Habitat Simulation, or PHABSIM, to generate “weighted usable area, which is an index of habitat, in order to determine that there was no difference in the amount of habitat from the water withdrawals for the Pebble Project, and that therefore there has been no permanent harm to fish habitat for the various life stages of fish. [Reiser, 12/16/10 Tr. 174:3-15; 177:21 to 178:3; 210:13-18; 224:12-18.] His findings from the modeling are not credible because: (1) only three species of salmon – Chinook, Coho, and Sockeye – in the spawning and juvenile life stages were evaluated – and no resident species were included; (2) the “worst case

scenario” evaluated for flow was summer, but winter is the lowest flow time of year; (3) only surface water was evaluated, leaving out any evaluation of the hyporheic zone; and (4) the actual volume of the water withdrawals is unknown, only estimated. [Reiser, 12/16/10 Tr. 219:6-10; 220:14-24; 227:6-11; 230:19 to 231:11; 232:6 to 233:13.] Further, as Dr. Woody testified, the PHABSIM model is disfavored in Alaska because it has not been modified to Alaska conditions, which include temperatures that regularly drop below 20 degrees, and at times, reach temperatures of 40 degrees below zero in the Bristol Bay Region where “upwelling ground water provides a thermally stable incubation environment in the hyporheic zone [that] can facilitate survival of embryo – salmon embryos through sub zero conditions.” [Woody, 12/14/10 Tr. 35:20 to 36:14; 38:25 to 39:18.] Moreover, the PHABSIM model is not used to evaluate impacts from exploration activities, but only to predict the physical characteristics of particular habitat for a particular life stage. [Woody, 12/14/10 Tr. 43:14-19.] Dr. Reiser admitted that federal agencies have raised concerns about the use of the PHABSIM model for the Pebble Project, and those issues have not all been addressed. [Reiser, 12/16/10 Tr. 228:11 to 229:6.]

**(12) Louise Shannon.**

Ms Shannon is a geotechnical engineering consultant with Knight Piesold Limited and has been working at the Pebble site since 2005, excepting 2009. [Shannon, 12/17/10 Tr. 199:7-15.] In an effort to impeach Mr. Gordon De Husson concerning an artesian flow incident occurring in September of 2006, Pebble Limited Partnership had her testify via telephone about a video she had shot of the incident. Ms. Shannon’s testimony is not credible for two reasons. First, Ms. Shannon worked the day shift and she admitted that she took videos of at least two other artesian flows at wells in 2006 and saw three artesian flows from August 31 to September 19, 2006. [Shannon, 12/17/10 Tr. 203:10-25, 204:10-21.]<sup>30</sup> There is, therefore, no way to know if the video and her accompanying testimony concern the same artesian flow to which Mr. De Husson testified. And, second, if Ms. Shannon’s video and accompanying testimony depict the same artesian flow as testified to by Mr. De Husson, the video and testimony are irrelevant to the incident Mr. De Husson testified to – and should be given very little weight – because they portray the flow hours before Mr. De Husson began the night shift. [De Husson, 12/17/10 261:10-23.]

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<sup>30</sup> PLP failed to disclose these videos, despite a clear obligation to do so under Civil Rule 26 and also in response to Nunamta’s RFP #8. Since there was no remedy afforded at trial, the late-production constitutes grounds for a claim of spoliation of evidence since PLP failed to produce the evidence before the last day of trial, despite knowledge of its existence. *Allstate Insurance Company v. Dooley*, 243 P.3d 197, 200 (Alaska 2010).

While Ms. Shannon's testimony was offered to impeach Mr. De Husson, the effect of Ms. Shannon's testimony was to bolster Mr. De Husson's credibility. Ms. Shannon confirmed that "when you drill a hole, it's not artesian for a while and then it becomes artesian just a little bit and then as you go deeper, it can increase." [Shannon 12/17/10 Tr. 189:22 to 190:2.] This corroborated Mr. De Husson's testimony that the flow from the well he worked on began as a smaller artesian flow, similar to that depicted in the video. [De Husson, 12/17/10 Tr. .] Mr. De Husson testified that the well was not under control, yet the crew was advised to continue drilling. [De Husson, 12/17/10 Tr. .] He also testified that the main artesian flow was not encountered until 16-18 hours later, and when it hit, the water and was forced out the small 1.5-inch tube, creating a high volume of water shooting upwards to 60-90 feet in the air. [De Husson, 12/17/10 Tr. 262:20 to 265:25; De Husson 12/8/10 Tr. 123:10-15.] Ms. Shannon's testimony therefore validated Mr. De Husson's experience.

**(13) Melinda O'Donnell Smodey.**

Ms. Smodey works in the Division of Coastal and Ocean Management (DCOM) within DNR and is currently the project reviewer for the Pebble Project. [Smodey, 12/17/10 Tr. 121:6-11.] Ms. Smodey gave only brief testimony to lay the foundation for a single document, Exhibit 2172. [Smodey, 12/17/10 Tr. 121:15 to 125:17.] Ms. Smodey admitted that PLP had been "caught" not conducting a cultural resources survey for the project area prior to undertaking exploration activities. [Smodey, 12/17/10 Tr. 129:1-8.] She also admitted that the State had "carved out" the water use at the Pebble Project from a "whole project" review, thus denying the public the opportunity to comment on that issue through the ACMP process. [Smodey, 12/17/10 Tr. 132:4-11.]

**(14) Mark Stelljes, Ph.D.**

Dr. Stelljes is a Risk Assessment Scientist and an Environmental Toxicologist and is employed at the consulting firm, SLR International Corp. [Stelljes, 12/15/10 Tr. 22:13-16; 22:19-21; 25:8-18.] PLP offered Dr. Stelljes as an expert to give "opinions on environmental toxicology and ecology and...whether the exploration activity at Pebble has caused any harm to the environment or any change in water quality or whether the drilling activities have caused any harm to water quality or to organisms in the deposit area in the water drainages." [Stelljes, 12/15/10 Tr. 38:2-10.]

Dr. Stelljes' testimony is not credible for two primary reasons. First, while he testified that he found no impact to either ground or surface water at the Pebble Project site from acid rock drainage, he admitted that his only experience with bacteria's effect on acid rock drainage came from one study he implemented at the Pebble site, which has yet to be completed, and one bacteriology course he took in college. [Stelljes, 12/15/10

Tr. 35:14 to 36:17.] His testimony also ignored the results of the humidity cell testing at the Pebble Project that found that finely ground reactive rock subjected to wetting and drying goes acid in one to 15 years. [Zamzow, 12/10/10 Tr. 160:20 to 162:17.] Second, although he was offered as an expert on the impacts to organisms in the area, he was unaware of what animal species were even present at the Pebble Project site. [Stelljes, 12/15/10 Tr. 107:13 to 108:2.]

Dr. Stelljes' testimony also was not persuasive because he only reviewed publicly released water sampling data taken between 2004 and 2007; he had no role in setting up the sampling program, and he misrepresented the quality assurance protocol as not yet having removed outliers, when it, in fact, had already removed outliers, as stated in the document. [Stelljes, 12/15/10 Tr. 52:3-23; 90:10 to 91:24; Ex. 3120 at PLP 4638.] Dr. Stelljes' belief that drilling fluids completed sealed holes was also misleading given his admission that a drill hole can be a pathway for contaminants, if it is not sealed or if there are highly soluble anions or cations, the wetting and drying environment in the sumps that result in the drilling mud cracking, and that drillholes were not completely plugged. [Stelljes, 12/15/10 Tr. 87:13-14; 99:12 to 100:2; 100:11 to 101:6; [See Evidence Table J]; Moran, 12/9/10 Tr. 34:12-24; 82:25 to 83:4; 84:25 to 85:2.]

**(15) Ken Taylor.**

Mr. Taylor was designated as a manager of Pebble Limited Partnership by the Court as "Vice President, Environment," and Mr. Taylor indicated that he supervised a team responsible for permitting. [Taylor, 12/9/10 Tr. 102:7-18]. Despite his position with the company, Mr. Taylor exhibited a lack of familiarity with critical aspects of the Pebble Project permits and permitting process. Mr. Taylor testified that after this lawsuit was filed and after water use violations were identified, he "tried to figure out if there was anything that we needed a permit for that we didn't have a permit for, which frankly, is a very difficult task." [Taylor 8/13/10 Depo. 195:23-196:3.] Mr. Taylor's lack of knowledge and erroneous testimony about fundamental operational details and permits that are under his authority made his testimony less than credible, as did his evident bias that PLP's operations are compliant with legal requirements when the evidence shows the contrary.

Mr. Taylor erroneously stated that the TWUPs contained stipulations from the Department of Environmental Conservation. [Taylor, 12/9/10 Tr. 113:20-25.] No TWUPs contain DEC stipulations. [See, e.g., Exs. 932; 933.] Mr. Taylor also erroneously testified that the Pebble Project permits had been publicly noticed under the ACMP "on their [the DCOM] website and through published media." [Taylor, 12/9/10 Tr. 120:10-11.] In fact, there is no evidence in the record of a published notice of the Pebble Project under the ACMP. The current (2009-2010) drilling exploration permits

have had no published notice and do not appear on the ACMP website. [See Exs.2044; 2045.]

Despite his authority to oversee the exploration activities at the Pebble Project, Mr. Taylor had (1) no knowledge of the amount of water that had been used or disposed of on the site (Taylor, 12/9/10 Tr.160:15-17); (2) no knowledge of the extent of seismic lines (*Id.* at 161:19-20); (3) incorrect information on the size of sumps, claiming (contrary to the testimony of Mr. Wober, the PLP Site Manager) sumps were 4 X 8 X 6 (*Id.* at 162:10-11); and (4) he “wouldn’t have any idea” how many people had been on the Pebble site at any one time (*Id.* at 165:7-9) because he “does not keep records of the number of folks working out there” (*Id.* at 164:3-5). Further, he had no knowledge of the amount of fuel that was stored at the site, cumulatively over the years or during his tenure – whether it was thousands of gallons or millions of gallons. [Taylor, 12/9/10 Tr. 165:22-166:3; 166:20-25.] He was also unaware of how often the fuel storage tanks at Big Wiggly Lake are refilled [Taylor, 12/9/10 Tr. at 166:11.]

Mr. Taylor also erroneously believed that PLP’s water use was limited to less than 100,000 gallons per day on both the ADF&G fish habitat permits and the TWUPs. [Taylor, 12/9/10 Tr. at 171:10-17.] In fact, the water use permits allowed the use of up to 113,000 gpd in 2007 (Ex. 932 at SOA 007633) and that was *increased* to 129,000 gpd (Ex. 2072 at SOA 66933). Likewise Mr. Taylor erroneously testified that the U.S. Army Corps of Engineers (Corps) had determined that PLP was “in compliance” with regional conditions in Nationwide Permit 6 (NWP 6), based upon the Corps’ letter of June 1, 2009. [Taylor, 12/9/10 Tr. 174:24.] Yet, the Corps’ letter does not indicate that PLP is in compliance, but instead states that “[PLP] *must comply* with all terms and conditions associated with NWP 6.” [Ex. 3127, *emphasis added.*] Mr. Taylor further erroneously testified that the way PLP established its compliance to the Corps was “to provide a plan of operations.” [Taylor, 12/9/10 Tr. 175:1-3.] However, to demonstrate compliance, the Corps specifically stated that PLP is required “to submit a signed certification to [the Corps] once any work and required mitigation are completed.” [Ex. 3127.] No such certificate was introduced into evidence. Lastly, Mr. Taylor testified that it was not necessary to review whether there were PLP sediment discharges into wetlands in violation of the Corps’ Regional Condition E (Ex. 88 at NA 004757) because “we do our discharges in the uplands” and that he had seen no indication that there had been discharges into wetlands. [Taylor, 12/9/10 Tr. 175:18-23.] That testimony was contradicted by PLP’s Director of Site Operations Gernot Wober and by DEC employee Allan Nakanishi. [Wober, 12/7/10 Tr. 74:14-19; Nakanishi, 12/13/10 Tr. 129:22 to 130:2.]

Mr. Taylor also testified erroneously that reclamation occurs “fairly quickly” and that “if the holes are drilled during the spring or summer, all of those [reclamation] activities are done immediately following drilling.” [Taylor, 12/9/10 Tr 118:13-24.]

However the DNR inspection reports and testimony at trial established that numerous sites were not effectively reclaimed in the same season. [Ex. 2019 at SOA 69802 (Drill Hole 6347 “not plugged or reclaimed”); Ex. 2011 at SOA 15923 (in June 16-17 2008 DNR inspection of drill hole from 2005 (5331), “reclamation was ongoing” (3 years later)); Wober, 12/7/10 Tr. 98:2-8 (reclamation of vegetation not successful after “one year”); Delkittie, 12/10/10 Tr. 105:5-25 (old Cominco sites not reclaimed, vegetation looked dead); Dem. Ex. 206.]

Mr. Taylor admitted that he visited the Pebble Project site in his official ADF&G capacity and formed the opinion at that time that he “wasn’t concerned about subsistence because of the [hunting] policy the company had in place.” [Taylor 8/13/10 Depo. 137:13-20.] Yet, the PLP hunting/fishing policy does not address the Pebble exploration project’s impacts to subsistence, but merely limits employees who can hunt and fish on the site to those who are residents of the Iliamna Lake area who customarily engage in subsistence. [Ex. 3051.]

Mr. Taylor’s lack of familiarity with PLP’s permitting is likely the reason that during his tenure, PLP violated the water withdrawal permits and the Pebble Big Wiggly Lake fuel station and dock were improperly permitted. The Big Wiggly fuel station is used to store 5,000 gallons of fuel and is required by the permit terms to be 100 feet from a waterbody; however, it was 30 feet too close to the water, and photographic evidence established that the fuel had to be moved 30 feet farther from the lake. [Gleitsmann, 12/17/10 Tr. 222:16 to 223:11.] In addition, the fuel unloading dock “was too big” for the permit that was issued. [Taylor 8/13/10 Depo: 195:3.]

Mr. Taylor’s testimony should be given little weight in light of his scant familiarity with permitting and his project bias. Prior to beginning his work for PLP, Mr. Taylor was a Deputy Director at ADF&G – and had “oversight authority” over the Habitat Division, which had, and has, permitting jurisdiction over the Pebble Project. [Taylor, 12/9/10 Tr. 156:2-11.] He testified in his deposition that he did not make the actual permitting decisions for the Pebble Project while at ADF&G, but he admitted that he had “influence” over permitting decisions that were made during his tenure with ADF&G. [Taylor 8/13/10 Depo. 137:20-24.]<sup>31</sup> Mr. Taylor’s lack of concern for the

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<sup>31</sup>The actions of State employees who leave State service are subject to AS 39.52.180(a), (Executive Branch Ethics Act). Under that statute a two-year prohibition applies to certain post-state employment activities. For two years after leaving state service, a former state officer may not “represent, advise, or assist a person for compensation regarding a matter that was under consideration by the administrative unit served by that public officer, and in which the officer participated personally and substantially through the exercise of official action.”

Pebble Project's exploration impacts while at ADF&G may have been due to his impending decision to leave ADF&G to work for PLP, after he learned – through his work at ADF&G – that the Pebble Project had potential for a “long-term” and “major” mining project for a “large ore body.” [Taylor 8/13/10 Depo. 140:6-25.] Mr. Taylor's employment with PLP commenced *only one day*, after he left his employment with ADF&G. [Taylor, 12/9/10 Tr. 155:21 to 156:1.]

**(16) Gernot Wober.**

Mr. Wober is the Director of Site Operations for the Pebble Project. [Wober, 12/7/10 Tr. 18:12-13.] Mr. Wober did not provide credible testimony because he did not know very basic information about the job that he now performs. He did not know whether drillholes had been plugged prior to 2002. [Wober, 12/7/10 Tr. 41:4-20.] Mr. Wober never physically checked whether holes have been plugged as indicated on the driller timesheet, nor did he know if anyone from the State of Alaska verified whether holes were plugged. [Wober, 12/7/10 Tr. 42:6-9.] Despite this lack of knowledge about the plugging of holes, more than once, Mr. Wober affirmed that all holes were grouted from top to bottom, but then later admitted that he did not know if this was actually true. [Wober, 12/7/10 Tr. 58:9-18; 61:11-14; 72:5-9.] He did not know how much grout it would take to plug a hole bottom to top, but acknowledged that it would be “a lot.” (Wober, 12/7/10 Tr. 58:19 to 59:2; 69:20-22.) Mr. Wober did not know whether permits to discharge into wetlands were obtained from the State or the U.S. Army Corps of Engineers, and mistakenly believed the U.S. Army Corps of Engineers is a state agency. [Wober, 12/7/10 Tr. 74:20 to 75:14.] He also did not know the frequency of inspections of the Pebble Project prior to his tenure on the Project. [Wober, 12/7/10 Tr. 90:6-18.]

While Mr. Wober's gaps in knowledge pertaining to his job serves to underscore the woeful lack of oversight and general ignorance of the activities and impacts occurring at the Pebble Project site, Mr. Wober admitted that PLP does place drills in wetlands and there is some discharge into wetlands. [Wober, 12/7/10 Tr. 74:16-17]. He also admitted that the drilling muds and cuttings in the sumps touch groundwater because it is “right there.” [Wober, 12/7/10 Tr. 96:15-24.]

**(17) Mr. James Woolington.**

Mr. Woolington is the area management biologist for game management unit 17 for the Alaska Department of Fish and Game, Division of Wildlife Conservation. [Woolington, 12/15/10 Tr. 167:12-15; 23-25.] Mr. Woolington's testimony was largely irrelevant to the issues in this litigation because he testified that ADF&G had not conducted any studies to determine the cause of the Mulchatna caribou herd's decline nor had it conducted any studies to determine if exploration activities at the Pebble Project site was a cause of this decline. [Woolington, 12/15/10 Tr. 197:14 to 198:9.] Mr.

Woolington conceded that he had no idea what kind of long-term impacts thousands of aircraft flights would have on caribou herds and that no one in ADF&G even knew the level of aircraft use or was monitoring aircraft use. [Woolington, 12/15/10 Tr. 201:17 to 203:10; 195:11-21.]



## II. CONCLUSION OF LAW

### COUNT 1

#### *Violation of the Public Trust Doctrine Alaska Constitution, Article VIII*

1. Article VIII of the Alaska Constitution ensures the protection and balanced development and conservation of state land and water resources. Article VIII also codifies the “public trust doctrine” in Alaska. The public trust doctrine provides that the State holds certain resources, such as fish, wildlife, minerals and water in trust for public use, and that the State owes its citizens a fiduciary duty to manage these resources for the common good of the public as beneficiary. The public trust doctrine is applicable to the State’s management, use and disposal of resources held in trust for the citizens of the State of Alaska including the lands and waters in the area known as the Pebble Project.<sup>32</sup> Any balancing between public and private purposes at the Pebble Project should begin with a presumption in favor of public use, access, and enjoyment. *See Metlakatla Indian Cmty. v. Egan*, 362 P.2d 901, 913 (Alaska 1961); *Baxley v. State*, 958 P.2d 422, 434 (Alaska 1998); *In Re Water Use Permit Applications*, 9 P.3d 409, 455 (Hawaii 2000).

2. The existing State statutory and regulatory permitting scheme exempts all upland hardrock mining exploration activity, including all water use deemed “temporary,” from the statutory best interest finding process and all public notice provisions. Those statutes and regulations were relied upon by the State, acting through the Department of Natural Resources (DNR) in its administration of the Pebble Project permits. As applied to the Pebble Project, the statutes and regulations relied upon by the State do not fulfill the constitutional mandates of Article VIII. The State’s constitutional duties – as carried out by DNR with respect to Pebble exploration – are undertaken as trustee of the public trust resources protected by Article VIII and are subject to close scrutiny.<sup>33</sup> DNR was required to, but did not, fulfill its responsibility to protect, control

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<sup>32</sup> A trustee’s duties generally include but are not limited to the following: administer the trust, afford loyalty to the beneficiary of the trust, refrain from delegating the trust, communicate and provide information about the trust, act only in the best interest of the trust beneficiary, exercise reasonable care and skill and preserve property. Restatement (Second) of Trusts §§ 169-183.

<sup>33</sup> *Owsichek v. State*, 763 P.2d 488, 494 (Alaska 1988) (creation of exclusive guide areas subject to close scrutiny); *see also CWC Fisheries, Inc. v. Bunker*, 755 P.2d 1115, 1119 (Alaska 1988) (prohibiting conveyance of trust resources unless it is in furtherance of a specific public trust purpose or it can be accomplished without “substantial impairment of the public’s interest.”); *accord Citizens for Responsible Wildlife Management v. State*, 103 P.3d 203 (Wash. 2004) (government action violates the public trust doctrine unless the state has “promoted the public’s interest” or, at least, “has not

and regulate the use of Alaska's resources for the benefit of the people appropriate to the State's public trust responsibilities. *See Moore v. State*, 553 P.2d 8, 29 (Alaska 1976).

3. The State of Alaska, acting by and through DNR, by granting permits for upland hardrock mining exploration and significant so-called "temporary" water use at the Pebble Project without analysis or findings addressing the direct, indirect and cumulative impacts of these uses on the public domain, failed to fulfill its fiduciary public trust duty to manage state resources for the common good. *See Kuitsarak Corp. v. Swope*, 870 P.2d 387 (Alaska 1994); *Baxley*, 958 P.2d at 434; FF #2, 3, 30, 62, 99, 100, 101, 109, 146.

4. The State of Alaska, in its administration of upland hardrock mining exploration and water use permits at the Pebble Project, violated Article VIII by failing to consider or apply the maximum use policy, the maximum benefit policy, the common use mandate, the sustained yield principle, and the requirement to safeguard the public interest. *See Baxley*, 958 P.2d at 434; *Brooks v. Wright*, 971 P.2d 1025, 1031-1032 (Alaska 1999); *Moore*, 553 P.2d at 29; *Kachemak Bay Cons. Soc'y v. Dep't of Nat. Res.*, 6 P.3d 270, 280 (Alaska 2000); FF #108.

5. The State of Alaska, in its administration of upland hardrock mining exploration and water use permits at the Pebble Project, violated Article VIII by failing to consider actual and potential adverse impacts to public trust resources and by failing to make any analysis or findings that these resources would be developed and conserved consistent with the public trust doctrine. *See Baxley*, 958 P.2d at 434; *Brooks*, 971 P.2d at 1031-1032; FF #4, 99, 100, 101, 116, 117, 143, 146, 155.

6. The State of Alaska, in its administration of upland hardrock mining exploration and water use permits at the Pebble Project, violated Article VIII by failing to determine whether the bodies of water that were used are navigable or are public water, and by failing to ensure free access and passage to, and use of, the navigable and public water of the state consistent with the public trust doctrine. *See CWC Fisheries, Inc.*, 755 P.2d at 1119.

7. The State of Alaska, by failing to conduct any prior analysis of the impacts of upland hardrock mining exploration on public trust resources at the Pebble Project, violated the State's fiduciary duty to protect the public trust and improperly deferred all

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substantially impaired it."); *Montana Environmental Information Center v. DEQ*, 988 P.2d 1236, 1246 (Montana, 1999) (applying strict scrutiny to the question of whether arsenic wastewater discharges into mixing zones violated constitutional environmental provisions).

analysis of upland hardrock mining until the development stage, after significant adverse impacts from exploration have already occurred. See *Baxley*, 958 P.2d at 434; *Brooks*, 971 P.2d at 1031-1032; *Moore*, 553 P.2d at 29; FF #39, 40, 66, 67, 68, 69, 72, 74, 75, 77, 79, 81, 85, 109, 114, 120, 121, 124, 125, 126, 137, 138, 139, 140, 141, 142, 143, 144, 145, 147, 148, 150, 152, 154.

8. The level of exploration at the Pebble Project required the State to take a hard look at the exploration activities and water use prior to issuing permits, considering such factors as: heavy metal concentrations, fish migration patterns, background water quality, oil spill impacts, turbidity and other impacts including cumulative impacts. *Kuitsarak*, 870 P.2d at 395-6; *Trustees for Alaska v. State, Dept. of Natural Resources*, 795 P.2d 805, 809 (Alaska 1990). The State may not disregard the cumulative potential environmental impact of the Pebble Project by a piecemeal or phased review because that may lead to insufficient consideration of cumulative impacts. *Thane Neighborhood Ass'n v. City & Borough of Juneau*, 922 P.2d 901, 908 (Alaska 1996), citing *Kuitsarak*, 870 P.2d at 396 n.30; *Trustees for Alaska v. Gorsuch*, 835 P.2d 1239, 1246 (Alaska 1992) (DNR may not ignore the cumulative impacts of mining and related support facilities including cumulative hydrologic impacts). See FF #1, 3, 51, 52, 53, 54, 55, 99, 100, 101, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 146, 149, 151, 156

9. The second *Thane* principle holds that “phasing is prohibited if it can result in disregard of the cumulative potential environmental impacts of a project.” *Thane*, 922 P.2d at 908. DNR has artificially segmented the Pebble Project in three respects: first, in reviewing each Pebble Project exploration and water use permit as a single annual, two-year, or five-year phase of the exploration project, DNR has failed to look at the “whole project” impacts of exploration and water use over the past 21 years, and with respect to reasonably foreseeable future exploration. See FF #3-20. DNR’s permitting of TWUPs for five years demonstrates that future exploration is, indeed, contemplated.<sup>34</sup> Second, DNR failed to consider the cumulative effect of the Pebble Project exploration in light of other mining activities in the region. See *Kuitsarak*, 870 P.3d at 396; FF #107. Third, DNR is required to consider reasonably foreseeable environmental, sociological and economic effects of potential development of the Pebble Project. *Hammond v. North Slope Borough*, 645 P.2d. 750, 760 (Alaska 1982); *Kachemak Bay Cons. Soc’y*, 6 P.3d at 280. Absent an analysis of past, present and reasonably foreseeable effects of the Pebble Project exploration and water use, DNR has failed to carry out its public trust responsibilities.

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<sup>34</sup> The more interlinked the components of a project are and the greater the danger that phasing will lead to insufficient consideration of cumulative impacts, the greater the need to bar phasing. *Kachemak Bay Cons. Society*, 6 P.3d at 277.

10. The Plaintiffs have therefore demonstrated that they have been harmed by the State's violation of its public trust responsibilities.

## COUNT II

*Violation of Article VIII, §§ 1, 2 and 8 of the Alaska Constitution  
Utilization, Development and Conservation of All Natural Resources  
For the Maximum Use Consistent with the Public Interest,  
For the Maximum Benefit of the People  
Subject to Reasonable Concurrent Uses*

11. DNR has administered upland hardrock mining exploration permits and TWUPs at the Pebble Project without analyzing or making any determination about impacts of mining exploration on the reasonable concurrent uses and users of resources, in violation of Article VIII, §§ 1, 2 and 8. *Hammond*, 645 P. 2d at 758; *Kachemak Bay Cons. Society*, 6 P. 3d at 276. DNR specifically failed to address reasonable concurrent users of public land, water, fish and wildlife, cultural resources and subsistence resources impacted by exploration activities at the Pebble Project. *See* FF #6, 7, 92, 93, 108, 112, 113, 114, 115, 116, 117, 119, 120, 121.

12. The level of exploration and water use activity affecting State resources at the Pebble Project was significant, particularly beginning in 2002. *See* FF #39, 40, 66, 67, 68, 69, 72, 74, 75, 77, 79, 81, 85, 109, 114, 120, 121, 124, 125, 126, 137, 138, 139, 140, 141, 142, 143, 144, 145, 147, 148, 150, 152, 154. Therefore, the State of Alaska, acting by and through DNR was required to balance the public interests in an open and transparent way, affording notice, and an opportunity to comment to the public before issuing exploration and water use permits. *See Northern Alaska Environmental Center v. DNR (hereinafter "NAEC")*, 2 P.3d 629, 635 (Alaska 2000).

13. The Legislature specifically exempted upland hardrock mining claims, leases, and revocable permits from the requirements for a BIF, and failed to enact any equivalent legislation to ensure compliance with Article VIII, §§ 1, 2 and 8 in the administration of permits for upland hardrock mining exploration that rise to the level of significance of the Pebble Project. *See* AS 38.05.035(e)(6)(D).

14. The Legislature specifically exempted TWUPs from the public interest criteria applied to water appropriations and failed to enact any equivalent legislation to ensure compliance with Article VIII, §§ 1, 2 and 8 in the administration of permits for water use of less than five years or more than five years if DNR administratively allows longer use through successive TWUPs. *See* AS 46.15.155.

15. In its administration of upland hardrock mining exploration and temporary water use permits at the Pebble Project, DNR has failed to consider or analyze: (a) public

interest criteria; (b) the benefit to the people; (c) the effect on fish and game resources, subsistence, and public recreational opportunities; (d) the effect on public health and cultural resources; (e) the effects of loss of water, wildlife or land resources or the harm to others; (f) the effect upon access to navigable or public waters; (g) whether the best interests of the State are served by upland hardrock mining exploration and temporary water use permits at the Pebble Project; and (h) whether reasonable concurrent uses of the public domain and interests therein are protected, all in violation of Article VIII, §§ 1, 2 and 8. *See* FF #1, 3, 51, 52, 53, 54, 55, 99, 100, 101, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 146, 149, 151, 156.

16. DNR has failed to consider the best interests of the State as articulated in MCO 393 and LLO #1, and failed to take a hard look at the potential impacts of mining exploration and water use on resources and on reasonable concurrent users of the resources at the Pebble Project, all in violation of Article VIII, §§ 1, 2 and 8. *Kachemak Bay Cons.*, 6 P.3d at 276; *Alaska Survival v. State*, 723 P.2d 1281, 1286 (Alaska 1986); *Southeast Conservation Council v. State*, 665 P. 2d 544, 548-49 (Alaska 1983); *see also* FF #1, 2, 62, 91.

17. The Plaintiffs have therefore demonstrated that they have been harmed by the State's violation of Article VIII §§ 1, 2 and 8.

### COUNT III

*Violation of Article VIII, §§ 3 and 4 of the Alaska Constitution  
Reservation of fish, wildlife and waters to the people for common use  
Maintenance of resources on the sustained yield principle*

18. Article VIII of the Alaska Constitution provides that state land and water resources shall be developed consistent with the public interest; for the maximum benefit of the people of Alaska; to reserve fish, wildlife and waters to the people for their common use; and to maintain these resources on a sustained yield basis. *See Owsichek*, 763 P.2d 488; *Pullen v. Ulmer*, 923 P.2d 54, 60 (Alaska 1996).

19. Through its inspection of mining exploration activities, DNR has been and remains aware of the significant adverse impacts from mining exploration and water use at the Pebble Project. Yet DNR, in issuing permits for Pebble Project exploration and related water use, has failed to reserve fish, wildlife and waters to the people for common use or to ensure that the replenishable resources are maintained on a sustained yield basis, subject to preferences among beneficial uses. There has been no determination by DNR of which users of the Pebble Project region are preferred or are beneficial in its administration and management of Pebble Project mineral exploration. DNR has permitted Pebble Project mining exploration and water use with no analysis of the natural resources impacted by the activities, and no determination of whether resources can be

utilized, developed or maintained on a sustained yield basis during those activities. DNR has, without analysis or justification, elevated mineral exploration at the Pebble Project to the highest preference in all situations with no justification for its decisions. In so doing, DNR has precluded the reservation of fish, wildlife and waters to the people for common use, and failed to ensure resources are maintained on a sustained yield basis in violation of Article VIII, §§ 3 and 4 of the Alaska Constitution. *See Owsichuk*, 763 P.2d 488; *Pullen*, 923 P.2d at 60. *See* FF #62, 66, 67, 68, 6972, 74, 75, 77, 81, 85, 92, 93, 99, 100, 101, 107, 108, 109, 110, 111, 114, 115, 116, 117, 147, 148, 150, 152, 154.

20. The fish, caribou, moose, bear, vegetation and furbearing resources at the Pebble Project site are important resources for the State and for the Alaska Natives and citizens who rely on those resources for subsistence. Since the State has a substantial interest in the continued health and viability of these resources, the impact on these resources from mining exploration and water use related thereto is an important factor DNR must consider when making its determination to permit these activities. In violation of Article VIII, §§ 3 and 4 of the Alaska Constitution, DNR failed to document its consideration of these resources in its permitting decisions, or to issue any finding reflecting analysis of constitutional requirements and potential impacts to these resources to ensure their reservation for common use, and their maintenance on a sustained yield basis, subject to preferences among beneficial uses. *See* FF #2, 3, 4, 6, 57, 58, 59, 60, 61, 85, 87, 88, 89, 90, 94, 95, 96, 97, 98, 105, 106, 107, 108, 112, 113.

21. The Plaintiffs have therefore demonstrated that they have been harmed by the State's violation of Article VIII, §§ 3 and 4.

#### COUNT IV

##### *Violation of Article VIII, §10 of the Alaska Constitution*

##### *No disposals or leases of state lands or interests therein without prior public notice and other safeguards of the public interest*

22. Article VIII, §10, provides that there shall be no disposals or leases of state lands, or interests therein, without prior public notice and other safeguards of the public interest, and that the Legislature may provide for issuance of permits for exploration of the public domain subject to reasonable concurrent use. AS 38.05.965(21) (“state land’ or ‘land’ means all land, including shore, tide, and submerged land, or resources belonging to or acquired by the state”); *see also Pebble Ltd. Partnership ex rel. Pebble Mines Corp. v. Parnell*, 215 P.3d 1064 (Alaska 2009) (state has a property-like interest in the waters based on its public trust responsibilities)..

23. The term “disposal” is not limited to final and permanent conveyances of property rights, but includes property interests of limited duration, such as permits and leases, including miscellaneous land use permits and permits that allow the consumptive

use of public water. AS 44.88.900(12) (defines “real property” as “land and rights and interests in land including, without limitation, interests less than full title such as easements, uses, leases and licenses.”). That the right transferred is of a limited nature does not preclude a permit from being a disposal cognizable under §10. Disposals include uses that are non-exclusive, such as the advanced mineral exploration activities at the Pebble Project that result in impingement on reasonable concurrent uses. *NAEC*, 2 P.3d at 637 (interpreting the statutory definition of the word “disposal” to include nonexclusive possessory interests in land). The fact that Pebble Project exploration and water use permits are approved by the DNR director (through his staff) rather than the Commissioner does not exempt such permits from being disposals under §10. *Id.*

24. The first prong of the *NAEC* test of functional irrevocability is satisfied by the Pebble Project exploration and water use permits: it is unlikely that these permits can be revoked because of (i) the sheer magnitude of the project, which covers 192 square miles, and so far, resulting in more than 1,200 boreholes, 34 miles of seismic lines, between 880,000 and 1 million linear feet of drilling, millions of gallons of public water being used, thousands of helicopter trips per year, and up to 120 workers on the site (*see* FF #); (ii) the concomitant financial investment of between \$300 and \$400 million by PLP since 2002, plus State investment in the Large Mine Team and permitting efforts for 7 years that has totaled more than \$2 million (*see* FF #); and (iii) the public importance of this project, acknowledged by the DNR Commissioner when he assigned it to be administered to the Large Mine Team and underscored by the attention the Pebble Project has received in local, state, national and international media (*see* FF #).

25. The Pebble Project exploration activities have the potential to cause, and have caused, harm to reasonable concurrent users, fulfilling the second prong of the *NAEC* test. The Pebble Project impacts cannot be removed, and the land vacated, without damage. Whereas the transmission line in the *NAEC* case presented “potential” and not “actual” harm, since the electrical transmission line had not yet been built, the evidence herein established that the Pebble Project exploration activities and water use have actually impinged on fish, wildlife, and reasonable concurrent users for many years. *See* Evidence Table A. The continuation of these activities will result in continued impingement. The Pebble Project has the significant potential to generate additional long-term harm through the generation of acid rock drainage as a result of drilling operations and the discharges of untreated cuttings and drilling fluids on state lands. These discharges and the drill holes themselves result in “permanent and deleterious changes in the underlying land” and cannot be removed from state land. *NAEC*, 2 P.3d at 638. These factors, coupled with the past and potential future impingement on reasonable concurrent uses, have rendered the exploration and water use permits not functionally revocable and therefore not exempted from the public notice and public interest analysis mandated by Article VIII §10. *NAEC*, 2 P.2d at 639. *See* FF #5-17, 62, 66, 67, 69, 71, 72, 75, 77, 81, 85.

26. The Pebble Project MLUPs and TWUPs issued by DNR are disposals of interests in state land and water requiring public notice and other safeguards of the public interest under Article VIII, § 10 of the Alaska Constitution. DNR has systematically failed to give notice of these MLUPs and TWUPs in violation of Article VIII, §10. *See* FF #1, 18.

27. DNR has issued exploration and temporary water use permits since 1989 for the Pebble Project with no constitutionally cognizable public notice or any Article VIII analysis.<sup>35</sup> DNR issued its most recent permits for exploration and water use activities at the Pebble Project in 2009 with a constitutionally insufficient and ineffective internet notice which DNR described as a “courtesy notice” and which did not identify the project by name or other geographically recognizable identification and thereby afforded no opportunity for effective public comment. The notice was not reasonably calculated to apprise Plaintiffs or the public of the pendency of the potential deprivation of the public interests at stake. *See State v. Greenpeace*, 96 P.3d 1056, 1064 (Alaska, 2004); *See also Hartford Electric Light Co. v. Water Resources Comm’n*, 162 Conn. 89, 291 A.2d 721 (1971) (insufficient published notice to general public constitutes due process violation).

28. The Plaintiffs have therefore demonstrated that they have been harmed by the State’s violation of Article VIII, §10.

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<sup>35</sup> The Legislature has established the type of notice required for a variety of DNR decisions involving public resources, including classification of land, closing land to mineral leasing, zoning of land, issuance of preliminary findings regarding siting of aquatic fish farms, and the sale, lease, or disposal of land in AS 38.05.945(b)(2):

- (A) Publication of a legal notice in newspapers of statewide circulation and in newspapers of general circulation in the vicinity of the proposed action at least once a week for two consecutive weeks;
- (B) Publication of a notice in display advertising form in the newspapers described in (A) of this paragraph at least once a week for two consecutive weeks;
- (C) Public service announcements on the electronic media serving the area to be affected by the proposed action; and
- (D) One or more of the following methods:
  - (i) posting in a conspicuous location in the vicinity of the action;
  - (ii) notification of parties known or likely to be affected by the action; or
  - (iii) another method calculated to reach affected parties.



## COUNT V

### *Violation of Article VIII, §13 of the Alaska Constitution Reservation of water for common use, fish and wildlife and appropriation among beneficial and concurrent uses*

29. The Alaska Legislature and DNR have created a statutory and regulatory scheme that categorizes uses of significant amounts of water as “temporary” even though the water sources may be used for at least five years or longer if an applicant reapplies for successive permits for the same project. *See* AS 46.15.155. Under this scheme, DNR permitted at the Pebble Project the use of hundreds of millions of gallons of public water through TWUPs with no public notice or analysis of the impacts of that water use on beneficial and concurrent users, in violation of Article VIII, §13. *See* Evidence Table B; FF #39, 40, 41, 42, 44, 124, 125, 149, 151.

30. DNR has administered TWUPs at the Pebble Project, without consideration of the public interest<sup>36</sup> or any analysis of impacts to navigation, fisheries, subsistence, wildlife resources and other beneficial and concurrent uses, in violation of Article VIII, §13.

31. In applying the TWUP scheme to the Pebble Project, and exempting the long-term consumption of hundreds of millions of gallons of water from public notice, DNR violated Article VII, §13.<sup>37</sup> DNR did not provide public notice or conduct an adequate public interest analysis of the water use when it issued TWUPs for the Pebble Project. *See* FF #1, 2, 5, 6.

32. Despite the Pebble Project’s utilization of significant amounts of water since 1989, DNR did not issue any TWUPs for the Pebble Project water use from 1989 through 2006. After 2007, as a significant amount of water continued to be used, DNR issued TWUPs. However, DNR failed to: (i) identify the point of intake or point of return; (ii) monitor the amount of water used; (iii) determine whether fish were present (or at what life stages) that might be impacted by water withdrawals; (iv) evaluate the direct, indirect or cumulative impact of water withdrawals on fish and wildlife,

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<sup>36</sup> DNR did not even consider the public interest criteria identified in AS 46.15.080.

<sup>37</sup> The Legislature established a temporary water use procedure, which exempts TWUPs from public notice, pursuant to AS 46.15.155(d). Under regulations promulgated pursuant to this statute, DNR permits the use of “significant” amounts of water without public notice. A “significant” amount is defined as the “consumptive” use of more than 5,000 gallons of water per day (gpd) from a single source. 11 AAC 93.035(b)(3)(1). Mining is a “consumptive” use of water.<sup>37</sup> The water use at the Pebble Project was “consumptive” and “significant” under state statutes as well as under the Article VIII.

particularly in winter; or (v) evaluate the cumulative impact of long-term water use from ponds and streams. In so doing, DNR allowed significant public water resources to be used and disposed of for an unlimited duration without the analysis of constitutionally required safeguards<sup>38</sup> in Article VIII, §13. *Tulkisarmute Native Community Council v. Heinze*, 898 P.2d 935, 952 (Alaska 1995) (DNR abused its discretion in issuing the permit because the permit application did not provide the information required to enable the DNR to determine the effects of dewatering on fish and wildlife and because the condition the DNR had imposed was “too vague to ensure the protection of salmon habitat.”). See FF #6-10, 42.

33. The Plaintiffs have therefore demonstrated that they have been harmed by the State’s violation of Article VIII, §13.

### **ASSERTED DEFENSES DO NOT CURE THE CONSTITUTIONAL VIOLATION**

32. Article VIII, §§11 and 12 do not control this case. Sections 11 and 12 establish procedures whereby a party interested in extracting minerals may acquire and maintain mineral rights but do not address how the State should manage the public land and water resources protected by §§1, 2, 3, 4, 8, and 10 and the public trust doctrine.<sup>39</sup>

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<sup>38</sup> The types of safeguards of the public interest which should have been applied are those safeguards which the Legislature has identified for similar long-term consumptive appropriations in AS 45.15.080: (a)(1) rights of a prior appropriator will not be unduly affected; (2) the proposed means of diversion or construction are adequate; (3) the proposed use of water is beneficial; and (4) the proposed appropriation is in the public interest.

(b) In determining the public interest, the commissioner shall consider

- (1) the benefit to the applicant resulting from the proposed appropriation;
- (2) the effect of the economic activity resulting from the proposed appropriation;
- (3) the effect on fish and game resources and on public recreational opportunities;
- (4) the effect on public health;
- (5) the effect of loss of alternate uses of water that might be made within a reasonable time if not precluded or hindered by the proposed appropriation;
- (6) harm to other persons resulting from the proposed appropriation;
- (7) the intent and ability of the applicant to complete the appropriation; and
- (8) the effect upon access to navigable or public water.

<sup>39</sup> See, e.g., *Chalovich v. State, Dept. of Nat. Res.*, 104 P.3d 125, 132 (Alaska 2004) (holding that regulations requiring cash payments in lieu of labor and deeming claims abandoned for failure to do so were consistent with Article VIII, §11); *Hayes II*, 960 P.2d at 562-64 (discussing individual’s right to discover locatable minerals on state-owned land); *Baxley*, 958 P.2d at 432-33 (refusing to address claim that BP forfeited lease under Article VIII, §§ 8 and 11 when it announced it would not develop

33. Article VIII, §§11 and 12 do not supersede §§1, 2, 3, 4, 8, and 10 and the public trust doctrine. To argue otherwise, as do the State and PLP, flies in the face of the plain language of the provisions themselves, as well as the stated intent of the framers. Indeed, Article VIII had its genesis in the framers' disaffection with industrial mining (and more particularly, the operations of a large copper mine). Territorial governor E. L. (Bob) Bartlett identified, in his opening remarks to the Constitutional Convention, the need for constitutional safeguards applicable to mining:

The story of Alaska natural resources has too often been one of exploitation with very little of the great wealth extracted going to pay for necessary governmental services and for the permanent development of a sound economy for the people. The Kennecott Copper operation was typical of the 19<sup>th</sup> century Robber Baron philosophy which still has a few advocates today. Copper in the value of over \$200 million was removed from the Chitina District; the area was high-graded with ores of lesser value disregarded. The operation was shut down in 1938. The tremendous production and investment left absolutely nothing of enduring value for the Territory and its citizens except a small ghost town which has become a minor tourist attraction.

*Meeting the Challenge*, by E.L. Bartlett, Alaska Constitutional Convention, November 8, 1955. Gov. Bartlett concluded by differentiating between Alaska's "underground" mineral wealth and its fisheries and marine resource wealth, asserting the latter to be of higher importance:

While the major future of wealth in Alaska may be underground, the *fisheries and marine resources of this area are the matters of highest importance* and deserve the most careful consideration of this convention and by future state legislatures.

*Id.* (emphasis added).

34. The Alaska Supreme Court has rejected the contention that mining is a public trust purpose worthy of protection under Article VIII:

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claims); *Ellis v. State, Dept. of Nat. Res.*, 944 P.2d 491, 496 (Alaska 1997) (holding that mineral closure order did not violate Article VIII, §11); *Sackett v. State, Dept. of Nat. Res.*, 1988 WL 1514905, \*2 (Alaska 1988) (holding that regulations limiting structures and equipment in pursuit of mineral claims did not violate Article VIII, §11); *Trustees for Alaska*, 736 P.2d 324, 336-39 (Alaska 1987) (holding that statehood act as applied to Section 11 required state to collect rents from mineral claimants). None of these cases suggest that §11 renders other provisions of Article VIII nugatory.

[A] mining claim is not a ‘public use,’ but rather an exclusive, depleting use of a non-renewable resource for private profit. We believe that even the most expansive interpretation of the scope of public trust easements would not include private mining enterprises.

*Hayes v. A.J. Associates (Hayes I)*, 846 P.2d 131, 133 (Alaska 1993).

35. Section 11 provides, simply, that prior discovery establishes a prior right to minerals and to permits or leases for their extraction, *see Hayes v. A.J. Associates, Inc. (Hayes II)*, 960 P.2d 556, 561-62 (Alaska 1998),<sup>40</sup> but does not state or imply that the rights of mining claimants automatically supersede those of other users of other resources on the same land. Indeed, the Alaska Supreme Court has specifically held that, consistent with §11 and pursuant to other sections of Article VIII, the State may close public land to mining or mineral location *altogether* as incompatible with significant surface uses. *See Ellis v. State, Dep’t of Nat. Res.*, 944 P.2d 491 (Alaska 1997). *A fortiori*, §11 does not trump the other safeguards, less severe than outright closure, afforded elsewhere in Article VIII.

## CONCLUSIONS AND REMEDIES

36. Plaintiffs use public lands, waters and resources in the Pebble Project region for subsistence, fishing, hunting, wildlife viewing, solitude, recreation, cultural practices, aesthetic enjoyment, commercial guiding and commercial fishing. The Plaintiffs’ continued use and enjoyment of public and privately owned lands and waters in the Pebble Project region have been harmed, and are threatened by, the State’s illegal issuance of TWUPs and MLUPs for the Pebble Project.

37. The State’s current administration and permitting on state lands of upland hardrock mining exploration activities at the Pebble Project is invalid and violates Article VIII of the Alaska Constitution.

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<sup>40</sup> Section 11 recognized that Congress would decide whether a leasing or location system would be implemented, stating that discovery and appropriation would initiate a right to patent of mineral lands “if authorized by the State and not prohibited by Congress.” Subsequently, the Alaska Statehood Act, Section 6(i), provided that the location-patent system was not to be incorporated into Alaska law for state-selected lands. *See Trustees for Alaska*, 736 P.2d 324. Thus, only a portion of §11 remained viable after statehood.

38. The State's current administration and permitting of temporary water uses of state waters in connection with upland hardrock mining exploration at the Pebble Project is invalid and violates Article VIII of the Alaska Constitution.

39. The MLUPs and TWUPs issued under the State's current permitting process for upland hardrock mining exploration and temporary water use related thereto for the Pebble Project are void and of no effect.

40. Plaintiffs are prevailing parties in this action.

Dated: January 31, 2011

Respectfully submitted,

TRUSTEES FOR ALASKA

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CERTIFICATE OF SERVICE:

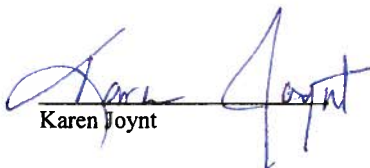
I hereby certify that on January 31, 2011, I served a copy of Plaintiffs' Proposed Findings of Fact and Conclusions of Law by email and First Class U.S. Mail to:

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**PEBBLE PROJECT COMPARED TO FAIRBANKS INTERTIE PROJECT – Table A**

<b>Long-term Impacts and Associated Activities</b>	<b>Pebble Project</b>	<b>Fairbanks Intertie<sup>1</sup></b>
	Exploration/Water Use Permits	Right of Way
Acres of Land Impacted	360 sq miles [watershed impacted] (Cathcart)=230,400 acres	1,319 acres
Acres of Land Rendered Unsuitable for Caribou During Drilling Activities <sup>2</sup>	(Ex. 2043) (Smith; (Dem. Ex. 1004 at NA 006463).) = 62,581 acres (98 sq miles)	
Est. Area of Wetlands Impacted	20- 30% in core deposit area (Smith)	867 acres
Miles of trail or seismic	34 miles of seismic (Exs. 335, 516, S-2035, S-2045, S-2051, S-2085)	65 mile path x 150 feet wide
Duration of project	1-5 year permits (21+ year renewals) (Exs. 190; 2043-2071 )	5 year permit <sup>3</sup> (30 year renewal)
Magnitude of Investment Since 2004	\$300-400 million (Pebble) (Taylor) \$ 2 million State (reimbursed) (Ex.879)	\$40 million
Number of helicopter trips (estimate based on 4-6 trips/day per hole times X days operating)	40,000 in 8-year period (Trasky, De Husson)	
Amount of Fuel Spilled (reported only since 2006)	426 gallons since 2006 <sup>4</sup> (Brown)(Summ. Table F)	
Number of drilled holes	1,269 (Exs. 23, 123, 611, 465) (1086 + 183 hydrological)	
Linear feet of drilling	888,220 (Fredericksen) 1,026,219 (including hydrological –Ex 123, 465)	
Amount of water use permitted 129 million 2007-2008 each year 132 million 2009-2010 each year	522,000,000 gallons (Exs. 932-949; 272-284)	
Amount of water used and discharged on the land with drilling muds and cuttings (est.)	216,167,805 gallons <sup>5</sup> (Ex. 3093)	
Amount of drill muds and grout purchased for use at the Pebble site, 2008-2010	404,250 pounds <sup>6</sup>	

<sup>1</sup> Northern Alaska Environmental Center v. State, 2 P. 3d 629 (Alaska 2000).

<sup>2</sup> PLP claims that it requires its employees to maintain a one mile buffer between helicopters and caribou to minimize impact to caribou. [Ex. 2043 at SOA 005281]. Assuming a one-mile buffer is adequate, this is the acreage of habitat rendered unsuitable by the 1,269 drill holes.

<sup>3</sup> The permit was effective “beginning February 22, 1999 and ending February 21, 2004” and a “right of way permit be issued and will be subject to 30 year renewal.” NAEC, 2 P. 3d at 633.

<sup>4</sup> Exs. 122, 126, 127,408,471, 494,556,614,692,695,700,701,831,954, 973; Table F.

<sup>5</sup> Calculations in Table C [217 gallons= (average water per foot) X (number of feet drilled per hole - 170,345) X (1269 holes) = 216,167,805 gallons.

<sup>6</sup> Ex. 749; see also Table I.

Estimated Water Use – Table B.

<b>Year</b>	<b># of Drill Holes Completed<sup>i</sup></b>	<b># of Feet Drilled<sup>ii</sup></b>	<b>Estimated Average Water Use Per Hole (Gallons)<sup>iii</sup></b>
<b>No Year Listed</b>	157	25,138	34,720
<b>1988</b>	26	7,602	63,364
<b>1989</b>	27	7,123	57,288
<b>1990</b>	25	10,021	87,017
<b>1991</b>	48	28,129	127,162
<b>1992</b>	14	6,609	102,896
<b>1993</b>	4	1,263	68,572
<b>1994</b>	-	-	
<b>1995</b>	-	-	
<b>1996</b>	-	-	
<b>1997</b>	20	14,696	159,495
<b>1998</b>	-	-	
<b>1999</b>	-	-	
<b>2000</b>	-	-	
<b>2001</b>	-	-	
<b>2002</b>	68	37,237	118,916
<b>2003</b>	67	71,238	230,671
<b>2004</b>	297	165,526	120,869
<b>2005</b>	116	82,454	154,287
<b>2006</b>	46	72,560	342,209
<b>2007</b>	90	151,732	365,862
<b>2008</b>	231	162,512	152,768
<b>2009 – 2010</b>	33	32,722	215,264
<b>Totals</b>	<b>1269</b>	<b>876,609</b>	<b>170,345<sup>iv</sup></b> <b>(estimated average water use for each hole from 1988-2010)</b>
<b>1269 X 170,345 =Est. Total Water Use: 216,167,805 gallons</b>			

<sup>i</sup> As reported on AK DNR Spreadsheet and 2007, 2008, and 2009 drillholes and watersources maps. Exhibits 23, 123 and 611.

<sup>ii</sup> Exhibits 23, 123 and 611 (note: 152 holes did not have feet drilled values; they are not included in calculation).

<sup>iii</sup> These figures are calculated by multiplying the average number of feet drilled per hole by 217 gallons. 217 gallons - the number of gallons per foot – is calculated based on data from Exhibit 3093, which reports PLP’s estimate of water used in 2008 (29,948,400 gallons) to drill 137,991 feet (or, 217 gallons/foot).

<sup>iv</sup> As 152 holes lacked depth information, the average depth of each hole was calculated by dividing 876,609 feet by 1117 holes (1269 holes minus 152). That average depth (785 feet) was then multiplied by 217 to calculate the estimated average water use per hole. Note that the calculations done by year were not adjusted to reflect the missing depth data for the 152 holes, and so are underestimates of the water used.

## INSPECTION REPORT<sup>i</sup> SUMMARY – Table C

<b>Total Number of Drill Holes Reported 1988-2010<sup>ii</sup></b>	<b>1,269</b>
<b>Total Number of Years Operating</b>	<b>16</b>
<b>Total Number of Years Inspections took Place</b>	<b>8</b>
<b>Number of Drill Holes Completed Before DNR Inspections Began<sup>iii</sup></b>	<b>389</b>
<b>Number of Inspections (by year) and total:</b> 1988-2002 – 0 2003 – 1      2004 – 2      2005 – 1      2006 – 3 2007 – 9      2008 – 8      2009 – 3      2010 – 4	<b>31</b>
<b>Number of Inspections Conducted in Winter Conditions:</b> (note: DNR permitted winter exploration every year <sup>iv</sup> )	<b>5</b>
<b>Number of Drill Holes Inspected:</b> includes sites evaluated in a narrative and on DNR form (note: some drill holes inspected more than once)	<b>91</b>
<b>Number of Active Holes Inspected:</b> Note: The number of active + abandoned holes is greater than total number inspected because some holes were inspected while both active and abandoned. Also, the total number is not the total number of times an inspector visited a drill hole, as some holes were inspected multiple times while active or abandoned.	<b>57</b>
<b>Number of Drill Holes Where an Inspection Found a Impingement on Public Resources or Inadequate Plugging but the Inspectors Failed to Follow-Up in a Subsequent Inspection:<sup>v</sup></b>	<b>10</b>
<b>Number of Abandoned Holes Inspected:</b>	<b>47</b>
<b>Number of Drill Holes Reported Not Plugged When Inspected:</b> (Excluding the 2 inspections where reclamation just began and one monitoring well)	<b>5</b>
<b>Number of Drill Holes Reported Where Unclear Whether Hole was Plugged</b> (1 of these, at least, subsequently plugged) (includes 2 where inspector merely said “believe so” or “Didn’t land but believe so”)	<b>21</b>
<b>Number of Drill Holes Reported Plugged When Inspected</b> (Note: one hole inspected twice in its abandoned state)	<b>22</b>
<b>Number of Abandoned Holes Reported Not Cemented:</b>	<b>4</b>
<b>Number of Abandoned Holes Reported Cemented:</b>	<b>5</b>

<sup>i</sup> See exhibits 2000 – 2031 State of Alaska Inspection Reports.

<sup>ii</sup> See exhibits 23, 123, and 611.

<sup>iii</sup> *Id.*



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<sup>iv</sup> See exhibits 2043 – 2071.

<sup>v</sup> This includes:

#6347: “Drill hole is not plugged or cemented yet and site has apparently not been reclaimed although there is straw/hay onsite indicative of seeding activities. Looking down the borehole a glare is apparent 10-20’ downhole.” Exhibit 2019 at SOA 069805.

Still not plugged when checked on during a later inspection. Exhibit 2017 at SOA 068690.

No further inspection reports mention that this hole was checked on again.

#7359: “Upper three feet of well casing should be removed to eliminate potential hazard threat.” Exhibit 2017 at SOA 068694.

No later inspection reports mention that this hole was checked on again.

#7362: “Reclamation work has been done at this site. Water appeared to be discharging from the hole. Pebble staff informed us reclamation of this site was ongoing. Future site visits need to follow up and ensure the hole is cemented and plugged.” Exhibit 2011 at SOA 015923.

No later inspection reports mention that this hole was checked on again.

#7389: “Reclamation work has been done at this site. Water appeared to be discharging from the hole. Pebble staff informed us reclamation of this site was ongoing. Future site visits need to follow up and ensure the hole is cemented and plugged.” Exhibit 2011 at SOA 015924.

No later inspection reports mention that this hole was checked on again.

#8405 & 8415: “It is not apparent whether or not DDH #8405 and DDH #8415 were plugged when sites were reclaimed; please confirm whether or not this is the case. Please determine whether the unreclaimed exploration trench is located on PLP claims and if so, please indicate when it will be reclaimed.” Exhibit 2011 at SOA 015878.

No later inspection reports mention that these holes were checked on again.

#8429, 9432, 8412, & 8440: “Asked Jeff Norberg if anything had been done to improve reclamation success at DDHs 8429, 9432, 8412, and 8440 during the June 15 and 16 inspection. Mr. Norberg said that the plan is to work on those locations in August.” Exhibit 2001 at SOA 074905.

No later inspection reports mention that these holes were checked on again, despite the fact that DNR inspected again in late August.

#8429 – “Site was reclaimed but vegetation is not growing well. Dead vegetation was main indicator of past drill activity at this site.” Exhibit 2003.

#8412 – “Vegetation is not regrowing at this site. Site was messy and in poor condition. What appeared to be bentonite was present in clumps on the ground. Standing water around drill hole.” Exhibit 2003

#8440 - “Most of the vegetation is dead and not growing back.” Exhibit 2003.

#8441 – “Area around hole is rocky, with little soil or vegetation. Tundra has been replaced to extent possible, but has not survived. Very limited grass is growing

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around the edges of the reclaimed areas. The fill material around the stand pipe has been eroded from an area about 4' – 6' wide around the pipe, and 3' deep.” Exhibit 2001 at SOA 074917.

Summary of Drilling Activities from 1989 to 2010 – Table D

Year	Permitted # of Drill Holes	# of Drill Holes Completed as Reported in the Annual Affidavits of Labor	# of Drill Holes Completed as Reported on AK DNR Spreadsheet and 2007, 2008, and 2009 drillholes and watersources maps. <sup>i</sup>	# of Feet Drilled <sup>ii</sup>	Permitted # of Drill Rigs	Permitted # of People	Permitted Amount of Fuel Stored / Location	Permitted Seismic Lines	Water Use in Gallons / Day Indicated on APMAs	Water use in Gallons / Week Indicated on APMAs	Actual Amount of Water Used By Year <sup>iii</sup>
No Year Listed			157	25,138							
1988	0 (application requested 20) <sup>iv</sup>	26 <sup>v</sup>	26	7,602	0 (application requested 1) <sup>vi</sup>	0 (application requested 7) <sup>vii</sup>	0 (application requested 110 gallons to be stored 500' away from nearest water body) <sup>viii</sup>	0 <sup>ix</sup>	12,960 – 14,400 (application requested 9-10 gallons per minute, 24 hours per day, 7 days per week) <sup>x</sup>	90,720 – 100,800 (application requested 9-10 gallons per minute, 24 hours per day, 7 days per week) <sup>xi</sup>	
1989	29 <sup>xii</sup>	27 <sup>xiii</sup>	27	7,123	1 <sup>xiv</sup>	7 <sup>xv</sup>	110 gallons stored 500' away from nearest water body <sup>xvi</sup>	0 <sup>xvii</sup>	application requested water use 24 hours per day, 7 days per week, but does not specify an amount besides indicating that the amount would be less than 0.5% of any natural stream <sup>xviii</sup>	application requested water use 24 hours per day, 7 days per week, but does not specify an amount besides indicating that the amount would be less than 0.5% of any natural stream <sup>xix</sup>	
1990	29 <sup>xx</sup>	25 <sup>xxi</sup>	25	10,021	1 <sup>xxii</sup>	7 <sup>xxiii</sup>	110 gallons stored 500' away from nearest water body <sup>xxiv</sup>	0 <sup>xxv</sup>	(same as 1989) <sup>xxvi</sup>	(same as 1989) <sup>xxvii</sup>	
1991	29 <sup>xxviii</sup>	44 <sup>xxix</sup>	48	28,129	1 <sup>xxx</sup>	7 <sup>xxxi</sup>	110 gallons stored 500' away from nearest water body <sup>xxxii</sup>	0 <sup>xxxiii</sup>	(same as 1989) <sup>xxxiv</sup>	(same as 1989) <sup>xxxv</sup>	
1992	20 <sup>xxxvi</sup>	22 <sup>xxxvii</sup>	14	6,609	2 <sup>xxxviii</sup>	"< 15" <sup>xxxix</sup>	165 gallons stored in 55 gallon drums without any fuel containment berms <sup>xl</sup>	0 <sup>xli</sup>	(same as 1989) <sup>xlii</sup>	(same as 1989) <sup>xliii</sup>	
1993	10 <sup>xliv</sup>	4 <sup>xlv</sup>	4	1,263	1 <sup>xlvi</sup>	"< 15" <sup>xlvii</sup>	165 gallons stored in 55 gallon drums without any fuel containment berms <sup>xlviii</sup>	0 <sup>xlix</sup>	n/a <sup>l</sup>	n/a <sup>li</sup>	
1994	-	0 <sup>lii</sup>	-	-	-	-	-	-	-	-	
1995	-	0 <sup>liii</sup>	-	-	-	-	-	-	-	-	
1996	-	0 <sup>liv</sup>	-	-	-	-	-	-	-	-	
1997	25 <sup>lv</sup>	(14,500' of drilling – no # of	20	14,696	2 <sup>lvii</sup>	approx. 25 <sup>lviii</sup>	500 – 600 gallons stored in 55 gallon drums with	56 miles wide-spaced IP	n/a <sup>lxi</sup>	n/a <sup>lxii</sup>	

Summary of Drilling Activities from 1989 to 2010 – Table D

Year	Permitted # of Drill Holes	# of Drill Holes Completed as Reported in the Annual Affidavits of Labor	# of Drill Holes Completed as Reported on AK DNR Spreadsheet and 2007, 2008, and 2009 drillholes and watersources maps. <sup>i</sup>	# of Feet Drilled <sup>ii</sup>	Permitted # of Drill Rigs	Permitted # of People	Permitted Amount of Fuel Stored / Location	Permitted Seismic Lines	Water Use in Gallons / Day Indicated on APMAs	Water use in Gallons / Week Indicated on APMAs	Actual Amount of Water Used By Year <sup>iii</sup>
		drill holes given) <sup>lvi</sup>					lined fuel containment berms located at “varies feet” from flowing waters <sup>lix</sup>	electromagnetic sensing <sup>lx</sup>			
<b>1998</b>	-	0 <sup>lxiii</sup>	-	-	-	-	-	-	-	-	
<b>1999</b>	20 <sup>lxiv</sup>	0 <sup>lxv</sup>	-	-	1 <sup>lxvi</sup>	12 <sup>lxvii</sup>	500 gallons stored in 55 gallon drums with lined fuel containment berms located “variable” feet from flowing waters <sup>lxviii</sup>	0 <sup>lxix</sup>	n/a <sup>lxx</sup>	n/a <sup>lxxi</sup>	
<b>2000</b>	-	0 <sup>lxxii</sup>	-	-	-	-	-	-	-	-	
<b>2001</b>	-	0 <sup>lxxiii</sup>	-	-	-	-	-	- (while no work was permitted, the Affidavit of Annual Labor indicates that geophysical work was performed) <sup>lxxiv</sup>	-	-	
<b>2002</b>	182 <sup>lxxv</sup>	approximately 60 holes; 37,993 feet <sup>lxxvi</sup>	68	37,237	2 <sup>lxxvii</sup>	16 <sup>lxxviii</sup>	550 gallons stored in 55 gallon drums with lined fuel containment berms at “variable” distances from flowing waters <sup>lxxix</sup>	0 <sup>lxxx</sup> (while no work was permitted, the Affidavit of Annual Labor indicates that geophysical work was performed) <sup>lxxxi</sup>	10,000 gal/day/drill <sup>lxxxii</sup>	70,000 gal/day/drill <sup>lxxxiii</sup>	
<b>2003</b>	70 <sup>lxxxiv</sup>	35 <sup>lxxxv</sup>	67	71,238	2 <sup>lxxxvi</sup>	16 <sup>lxxxvii</sup>	550 gallons stored in 55 gallon drums with lined fuel containment berms <sup>lxxxviii</sup>	0 <sup>lxxxix</sup> (while no work was permitted, the Affidavit of Annual Labor indicates that geophysical work was performed) <sup>xc</sup>	10,000 gal/day/drill <sup>xcii</sup>	70,000 gal/day/drill <sup>xciii</sup>	
<b>2004</b>	157 <sup>xciii</sup>	177 <sup>xciv</sup>	297	165,526	3 <sup>xcv</sup>	18 <sup>xcvi</sup>	550 gallons stored in 55 gallon drums with lined	0 <sup>xcviii</sup>	10,000 gal/day/drill <sup>xcix</sup>	70,000 gal/day/drill <sup>c</sup>	

Summary of Drilling Activities from 1989 to 2010 – Table D

Year	Permitted # of Drill Holes	# of Drill Holes Completed as Reported in the Annual Affidavits of Labor	# of Drill Holes Completed as Reported on AK DNR Spreadsheet and 2007, 2008, and 2009 drillholes and watersources maps. <sup>i</sup>	# of Feet Drilled <sup>ii</sup>	Permitted # of Drill Rigs	Permitted # of People	Permitted Amount of Fuel Stored / Location	Permitted Seismic Lines	Water Use in Gallons / Day Indicated on APMAs	Water use in Gallons / Week Indicated on APMAs	Actual Amount of Water Used By Year <sup>iii</sup>
							fuel containment berms <sup>xvii</sup>				
2005	167 <sup>ci</sup>	135 <sup>cii</sup>	116	82,454	4 <sup>ciii</sup>	16 <sup>civ</sup>	1300 gallons stored in lined containment berms <sup>cv</sup>	approximately 39,240 feet of seismic lines <sup>cvi</sup>	10,000 gal/day/drill <sup>cvi</sup>	70,000 gal/day/drill <sup>cvi</sup>	
2006	100 <sup>cix</sup>	32 <sup>cx</sup>	46	72,560	6 <sup>cx</sup>	10 – 60 <sup>cxii</sup>	1300 gallons (some stored in drums larger than 660 gallons) in lined containment berms further than 500' from the nearest water body <sup>cxiii</sup>	10 seismic lines of no more than 48,000 feet <sup>cxiv</sup>	12,000 gal/day (no mention of whether this is per rig or total) <sup>cxv</sup>	84,000 gal/day (no mention of whether this is per rig or total) <sup>cxvi</sup>	127,440 gallons to drill 2 holes
2007	198 <sup>cxvii</sup>	24 <sup>cxviii</sup>	90	151,732	10 <sup>cxix</sup>	10 – 60 <sup>cxx</sup>	5000 gallons stored 100' away from flowing waters in lined containment berms with 125% capacity of the storage tanks <sup>cxxi</sup>	69 seismic lines of no more than 185,000 feet <sup>cxxii</sup>	12,000 gal/day/rig <sup>cxxiii</sup> with an overall limit of 112,400 gal/day in effect from 01/16/2007 to 07/18/2007. <sup>cxxiv</sup> The combined overall daily limit changed to 129,900 gal/day on 07/19/2007. <sup>cxxv</sup>  (The overall limits are imposed by TWUPs; the per rig limit is indicated on the pertinent APMA.)	84,000 gal/week/rig <sup>cxxvi</sup> with an overall annual limit of 28,350,000 gallons imposed from 01/16/2007 to 07/18/2007. <sup>cxxvii</sup> The combined annual limit changed to 32,475,000 gallons on 07/19/2007. <sup>cxxviii</sup>  (The overall limits are imposed by TWUPs; the per rig limit is indicated on the pertinent APMA.)	27,032,400 gallons to drill 41 holes
2008	140 <sup>cxxix</sup>	38 <sup>cxx</sup>	231	162,512	12 <sup>cxxxi</sup>	10 – 120 <sup>cxxii</sup>	5000 gallons stored 100' away from flowing waters in lined containment berms with 125% capacity of the storage tanks <sup>cxxiii</sup>	69 seismic lines of no more than 185,000 feet <sup>cxxiv</sup>	16,200 gal/day/rig <sup>cxxv</sup>  129,900 gal/day total <sup>cxxvi</sup>	113,400 gal/week/rig <sup>cxxvii</sup>  32,475,000 gal/year total <sup>cxxviii</sup>	29,775,600 gallons to drill 46 holes

Summary of Drilling Activities from 1989 to 2010 – Table D

Year	Permitted # of Drill Holes	# of Drill Holes Completed as Reported in the Annual Affidavits of Labor	# of Drill Holes Completed as Reported on AK DNR Spreadsheet and 2007, 2008, and 2009 drillholes and watersources maps. <sup>i</sup>	# of Feet Drilled <sup>ii</sup>	Permitted # of Drill Rigs	Permitted # of People	Permitted Amount of Fuel Stored / Location	Permitted Seismic Lines	Water Use in Gallons / Day Indicated on APMAs	Water use in Gallons / Week Indicated on APMAs	Actual Amount of Water Used By Year <sup>iii</sup>
									(The overall limits are imposed by TWUPs; the per rig limit is indicated on the pertinent APMA.)	(The overall limits are imposed by TWUPs; the per rig limit is indicated on the pertinent APMA.)	
<b>2009 – 2010</b>	435 <sup>cxxxix</sup>	62 (as of 09/01/2009) <sup>cxl</sup>	33	32,722	12 <sup>cxli</sup>	10 – 120 <sup>cxlii</sup>	5000 gallons stored 100' away from flowing waters in lined containment berms with 110% capacity of the storage tanks <sup>cxliii</sup>	34 seismic lines of no more than 220,000 feet <sup>cxliv</sup>	February 26, 2009 – June 10, 2010: 16,200 gal/day/rig <sup>cxlv</sup>  June 11, 2010 – December 21, 2010: 27,000 gal/day/rig <sup>cxlvi</sup>  129,900 gal/day total <sup>cxlvii</sup>  (The overall limits are imposed by TWUPs; the per rig limit is indicated on the pertinent APMA.)	February 26, 2009 – June 10, 2010: 113,400 gal/week/rig <sup>cxlviii</sup>  June 11, 2010 – December 21, 2010: 189,000 gal/week/rig <sup>cxlix</sup>  32,475,000 gal/year total <sup>cl</sup>  (The overall limits are imposed by TWUPs; the per rig limit is indicated on the pertinent APMA.)	4,050,000 gallons to drill 33 holes
<b>Totals</b>	<b>1611</b>	<b>711 holes + 14,500'</b>	<b>1269</b>	<b>876,609</b>	<b>59</b>						

<sup>i</sup> Exhibits 23, 123 and 611.

<sup>ii</sup> Exhibits 23, 123 and 611 (note: 152 holes did not have feet drilled values; they are not included here).

<sup>iii</sup> See Exhibit 1004 and 611.

<sup>iv</sup> See Exhibit S2071 at SOA 003664, 003678.

<sup>v</sup> Exhibit 436.

<sup>vi</sup> See Exhibit S2071 at SOA 003664, 03677.

<sup>vii</sup> See Exhibit S2071 at SOA 003664, 003677.

<sup>viii</sup> See Exhibit S2071 at SOA 003664, 003678.

Summary of Drilling Activities from 1989 to 2010 – Table D

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- ix *See* Exhibit S2071 at SOA 003664.
- x *See* Exhibit S2071 at SOA 003664, 003678.
- xi *See* Exhibit S2071 at SOA 003664, 003678.
- xii Exhibit S2070 at SOA 003666, 003671.
- xiii Exhibit 503.
- xiv Exhibit S2070 at SOA 003666, 003671.
- xv Exhibit S2070 at SOA 003666, 003671.
- xvi Exhibit S2070 at SOA 003666, 003672.
- xvii *See* Exhibit S2070.
- xviii Exhibit S2070 at SOA 003666, 003672.
- xix Exhibit S2070 at SOA 003666, 003672.
- xx Exhibit S2069 at SOA 003650, 003657, 003660.
- xxi Exhibit 504 at SOA 006278.
- xxii Exhibit S2069 at SOA 003650, 003657, 003660.
- xxiii Exhibit S2069 at SOA 003650, 003657, 003660.
- xxiv Exhibit S2069 at SOA 003650, 003657, 003661.
- xxv *See* Exhibit 2069.
- xxvi *See* Exhibit S2070 at SOA 003666, 003672; Exhibit S2069 at SOA 003650, 003657 (permitting same activities as permitted in 1989).
- xxvii *See* Exhibit S2070 at SOA 003666, 003672; Exhibit S2069 at SOA 003650, 003657 (permitting same activities as permitted in 1989).
- xxviii Exhibit S2067 at SOA 003635, 003643, 003644.
- xxix Exhibit 505 at SOA 006297.
- xxx Exhibit S2067 at SOA 003635, 003643, 003644.
- xxxi Exhibit S2067 at SOA 003635, 003643, 003644.
- xxxii Exhibit S2067 at SOA 003635, 003643, 003645.
- xxxiii *See* Exhibit S2067.
- xxxiv *See* Exhibit S2070 at SOA 003666, 003672; Exhibit S2067 at SOA 003635, 003644 (permitting same activities as permitted in 1990).
- xxxv *See* Exhibit S2070 at SOA 003666, 003672; Exhibit S2067 at SOA 003635, 003644 (permitting same activities as permitted in 1990).
- xxxvi Exhibit S2066 at SOA 003581, 003587.
- xxxvii Exhibit 506 at SOA 006318.
- xxxviii Exhibit S2066 at SOA 003581, 003586.
- xxxix Exhibit S2066 at SOA 003581, 003586.
- xl Exhibit S2066 at SOA 003581, 003587.
- xli *See* Exhibit S2066.
- xlii *See* Exhibit S2070 at SOA 003666, 003672; Exhibit S2066 at SOA 003581, 003585 (“The proposed work is identical to the drill programs we permitted in the past few years.”).
- xliii *See* Exhibit S2070 at SOA 003666, 003672; Exhibit S2066 at SOA 003581, 003585 (“The proposed work is identical to the drill programs we permitted in the past few years.”).
- xliv Exhibit 190 at SOA 003576.
- xlv Exhibit 507 at SOA 6337.
- xlvi Exhibit 190 at SOA 003575.
- xlvii Exhibit 190 at SOA 003575.
- xlviii Exhibit 190 at SOA 003576.
- xlix *See* Exhibit 190 at SOA 003563 – 003579.
- l *See* Exhibit 190 at SOA 003576.
- li *See* Exhibit 190 at SOA 003576.
- lii Exhibit 508 at SOA 006347 (applying value of excess work of previous years toward assessment).
- liii Exhibit 509 at SOA 006358 (only work done was to prepare a drill pad at one site); Exhibit 510 at SOA 006360 (applying value of excess work of previous years toward assessment).
- liv Exhibit 511 at SOA 6370, 6380 (applying value of excess work of previous years toward assessment and making cash payment).
- lv Exhibit S2062 at SOA 3514, 3522.
- lvi Exhibit 512 at SOA 006381.
- lvii Exhibit S2062 at SOA 3514, 3521.
- lviii Exhibit S2062 at SOA 3514, 3520.

Summary of Drilling Activities from 1989 to 2010 – Table D

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- lix Exhibit S2062 at SOA 3514, 3522.
- lx Exhibit S2062 at SOA 3514, 3521.
- lxi Exhibit S2062 at SOA 003514, 003523 (30,000 gallons per day is the amount of permitted “make up water,” which is the “volume of water which must be taken from the stream and added to your settling ponds to replace water lost to evaporation and seepage into the ground”; no mention is made of water use related to drilling itself).
- lxii Exhibit S2062 at SOA 003514, 003523 (210,000 gallons per week is the amount of permitted “make up water,” which is the “volume of water which must be taken from the stream and added to your settling ponds to replace water lost to evaporation and seepage into the ground”; no mention is made of water use related to drilling itself).
- lxiii Exhibit 513 at SOA 006453 (no assessment work performed; applying value of excess work of previous years toward assessment).
- lxiv Exhibit S2061 at SOA 3483, 3494.
- lxv Exhibit 514 at SOA 006488 (no assessment work performed; applying value of excess work of previous years toward assessment).
- lxvi Exhibit S2061 at SOA 3483, 3493.
- lxvii Exhibit S2061 at SOA 3483, 3492.
- lxviii Exhibit S2061 at SOA 3483, 3494.
- lxix *See* Exhibit S2061.
- lxx Exhibit S2061 at SOA 003484, 003495 (10,000 gallons per day is the amount of permitted “make up water,” which is the “volume of water which must be taken from the stream and added to your settling ponds to replace water lost to evaporation and seepage into the ground”; no mention is made of water use related to drilling itself).
- lxxi Exhibit S2061 at SOA 003484, 003495 (70,000 gallons per week is the amount of permitted “make up water,” which is the “volume of water which must be taken from the stream and added to your settling ponds to replace water lost to evaporation and seepage into the ground”; no mention is made of water use related to drilling itself).
- lxxii Exhibit 515 at SOA 006512 (no assessment work performed; applying value of excess work of previous years toward assessment).
- lxxiii Exhibit 516 at SOA 006537 (performed geophysical survey and soil sampling survey, but did not drill any holes).
- lxxiv Exhibit 516 at SOA 006537, 006564 (conducted an I.P. geophysical survey and conducting a soil sampling survey).
- lxxv Exhibit 2057 at SOA 004048, 004058; Exhibit S2058 at SOA 003908, 003916, 003917; Exhibit S2059 at SOA 003894, 003903.
- lxxvi Exhibit 517 at SOA 006596 (no number of drill holes is listed, except for a hard-to-read map with numbered dots).
- lxxvii Exhibit S2057 at SOA 004048, 004058; Exhibit S2058 at SOA 003908, 003917; Exhibit S2059 at SOA 003894, 003903.
- lxxviii Exhibit S2057 at SOA 004048, 004055; Exhibit S2058 at SOA 003908, 003917; Exhibit S2059 at SOA 003894, 003903.
- lxxix Exhibit S2057 at SOA 004048, 004058; Exhibit S2058 at SOA 003908, 003917; Exhibit S2059 at SOA 003894, 003903.
- lxxx *See* Exhibit S2057; Exhibit S2058 at SOA 003908, 003920.
- lxxxi Exhibit 517 at SOA 006596 (conducted a type of ground geophysical surveys called ground magnetometer surveys)
- lxxxii Exhibit S2057 at SOA 004048, 004058; Exhibit S2058 at SOA 003908, 003120.
- lxxxiii Exhibit S2057 at SOA 004048, 004058; Exhibit S2058 at SOA 003908, 003120 (10,000 gal/day/rig X 7).
- lxxxiv Exhibit S2060 at SOA 003984, 003994, 003995.
- lxxxv Exhibit 518 at SOA 006629.
- lxxxvi Exhibit S2060 at SOA 003984, 003995.
- lxxxvii Exhibit S2060 at SOA 003984, 003995.
- lxxxviii Exhibit S2060 at SOA 003984, 003995.
- lxxxix *See* Exhibit S2060.
- xc Exhibit 518 at SOA 006601.
- xc i Exhibit S2057 at SOA 004048, 004058; Exhibit S2058 at SOA 003908, 003120.
- xc ii Exhibit S2057 at SOA 004048, 004058; Exhibit S2058 at SOA 003908, 003120 (10,000 gal/day/rig X 7).
- xc iii Exhibit S2055 at SOA 003971, 003982, 003955.
- xc iv Exhibit 392 at SOA 006666.
- xc v Exhibit S2055 at SOA 003971, 003955.
- xc vi Exhibit S2055 at SOA 003971, 003955.
- xc vii Exhibit S2055 at SOA 003971, 003955.
- xc viii *See* Exhibit S2055.
- xc ix Exhibit S2057 at SOA 004048, 004058; Exhibit S2058 at SOA 003908, 003120.
- c Exhibit S2057 at SOA 004048, 004058; Exhibit S2058 at SOA 003908, 003120 (10,000 gal/day/rig X 7).
- ci Exhibit S2052 at SOA 004380, 004388, 004414.
- cii Exhibit 519 at SOA 006706.
- ciii Exhibit S2052 at SOA 0043809, 004415.
- civ Exhibit S2052 at SOA 0043809, 004396.



Summary of Drilling Activities from 1989 to 2010 – Table D

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- cv Exhibit S2052 at SOA 0043809, 004415.
- cvi Exhibit S2173 at SOA 004365.
- cvi Exhibit S2057 at SOA 004048, 004058; Exhibit S2058 at SOA 003908, 003120.
- cviii Exhibit S2057 at SOA 004048, 004058; Exhibit S2058 at SOA 003908, 003120 (10,000 gal/day/rig X 7).
- cix Exhibit S2049 at SOA 004287, 004306, 004327, 004309.
- cx Exhibit 520 at SOA 006746.
- cxii Exhibit S2049 at SOA 004287, 4309.
- cxii Exhibit S2049 at SOA 004287, 4308.
- cxiii Exhibit S2053 at SOA 004368, 004374; Exhibit S2049 at SOA 004287, 004307, 4327.
- cxiv Exhibit S2049 at SOA 004287, 004306, 004309, 004310; Exhibit S2051 at SOA 004239, 004251.
- cxv Exhibit S2049 at SOA 004287, 004327.
- cxvi Exhibit S2049 at SOA 004287, 004327.
- cxvii Exhibit S2048 at SOA 4744, 4802.
- cxviii Exhibit 521 at SOA 006786.
- cxix Exhibit S2048 at SOA 4744, 4804.
- cxix Exhibit S2048 at SOA 4744, 4800.
- cxxi Exhibit S2048 at SOA 4744, 4802.
- cxii Exhibit S2048 at SOA 4744, 4803.
- cxiii Exhibit S2048 at SOA 004744, 004802.
- cxiv Exhibit S2083 at SOA 007633.
- cxv See Exhibit S2084 at SOA 007620.
- cxvi Exhibit S2048 at SOA 004744, 004802.
- cxvii Exhibit S2083 at SOA 007633.
- cxviii Exhibit S2084 at SOA 007620.
- cxix Exhibit S2046 at SOA 5067, 5151.
- cxix Exhibit 393 at SOA 006825.
- cxxi Exhibit S2046 at SOA 5067, 5187.
- cxii Exhibit S2046 at SOA 5067, 5149.
- cxiii Exhibit S2046 at SOA 5067, 5151.
- cxiv Exhibit S2046 at SOA 5067, 5186.
- cxv Exhibit S2046 at SOA 005067, 005151.
- cxvi Exhibits S2079, S2076, S2075, S2078, S2081, S2080, S2073, S2072, S2077, S2074, S2082.
- cxvii Exhibit S2046 at SOA 005067, 005151.
- cxviii Exhibits S2079, S2076, S2075, S2078, S2081, S2080, S2073, S2072, S2077, S2074, S2082.
- cxix Exhibit S2043 at SOA 005254, 005279; Exhibit S2045.
- cxl Exhibit 522 at SOA 006864.
- cxli Exhibit S2043 at SOA 005254, 005279; Exhibit 2045.
- cxlii Exhibit S2043 at SOA 005254, 005272; Exhibit 2045.
- cxliii Exhibit S2043 at SOA 005254, 005281; Exhibit 2045.
- cxliv Exhibit S2043 at SOA 005254, 005280; Exhibit 2045.
- cxlv Exhibit S2043 at SOA 005254, 005275.
- cxlvi Exhibit S2045.
- cxlvii Exhibits S2079, S2076, S2075, S2078, S2081, S2080, S2073, S2072, S2077, S2074, S2082.
- cxlviii Exhibit S2043 at SOA 005254, 005275.
- cxlix Exhibit S2045.
- cl Exhibits S2079, S2076, S2075, S2078, S2081, S2080, S2073, S2072, S2077, S2074, S2082.

**ANNUAL RECLAMATION REPORT SUMMARY – Table E**

<b>Year</b>	<b>Number of Diamond Drill holes (DDH) actually drilled each year reported in Annual Reclamation Reports</b>	<b>Number of DDH reclaimed each year reported in Annual Reclamation Reports</b>	<b>Total number of all holes(including DDH, geotech. monitoring) actually drilled each year reported in Annual Reclamation Reports</b>	<b>Total number of holes (including DDH, geotech. monitoring) drilled each year according to the AK DNR Spreadsheet and 2007, 2008, and 2009 drillholes and watersources map<sup>i</sup></b>
1988	-	-	-	26
1989	-	-	-	27
1990	-	-	-	25
1991	-	-	-	48
1992	-	-	-	14
1993	-	-	-	4
1994	0 <sup>ii</sup>	0 <sup>iii</sup>	0 <sup>iv</sup>	-
1995	0 <sup>v</sup>	0 <sup>vi</sup>	0 <sup>vii</sup>	-
1996	0 <sup>viii</sup>	0 <sup>ix</sup>	0 <sup>x</sup>	-
1997	18 <sup>xi</sup>	18 <sup>xii</sup>	18 <sup>xiii</sup>	20
1998	-	-	-	-
1999	0 <sup>xiv</sup>	0 <sup>xv</sup>	0 <sup>xvi</sup>	-
2000	-	-	-	-
2001	-	-	-	-
2002	68 <sup>xvii</sup>	68 <sup>xviii</sup>	68 <sup>xix</sup>	68
2003	68 <sup>xx</sup>	58 <sup>xxi</sup>	68 <sup>xxii</sup>	67
2004	-	-	-	297
2005	43 <sup>xxiii</sup>	Not indicated <sup>xxiv</sup>	114 <sup>xxv</sup>	116
2006	19 <sup>xxvi</sup>	Not indicated <sup>xxvii</sup>	36 <sup>xxviii</sup>	46
2007	-	-	-	90
2008	44 <sup>xxix</sup>	23 <sup>xxx</sup>	184 <sup>xxxi</sup>	231
2009	33 <sup>xxxii</sup>	22 <sup>xxxiii</sup>	33 <sup>xxxiv</sup>	33
<b>Total</b>	<b>293</b>	<b>189</b>	<b>521</b>	<b>1269</b>

<sup>i</sup> Exhibits 23, 123 and 611.

<sup>ii</sup> Ex. 2042.

<sup>iii</sup> *Id.*

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iv *Id.*  
v Ex. 2041.  
vi *Id.*  
vii *Id.*  
viii Ex. 2040.  
ix *Id.*  
x *Id.*  
xi *See* ex. 2039  
xii *Id.*  
xiii *Id.*  
xiv Ex. 2038.  
xv *Id.*  
xvi *Id.*  
xvii *See* ex. 2037.  
xviii *Id.*  
xix *Id.*  
xx Ex. 2036 at SOA 003795.  
xxi *Id.*  
xxii *Id.*  
xxiii Ex. 2035 at SOA 004397.  
xxiv *Id.*  
xxv *Id.*  
xxvi Ex. 2034 at SOA 004226.  
xxvii *Id.*  
xxviii *Id.* at SOA 004226-004227.  
xxix Ex. 2033 at SOA 004993.  
xxx *Id.*  
xxxi *Id.* at SOA 004988.  
xxxii Ex. 2032 at SOA 005677.  
xxxiii *Id.*  
xxxiv *Id.*

**Summary of Spill Reports from 03/12/2006 – 9/10/2010**

<b>Spill #</b>	<b>Date of Spill</b>	<b>Date Case Closed</b>	<b>Source Type</b>	<b>Substance</b>	<b>Type</b>	<b>Quantity (Gallons)</b>	<b>Cause</b>	<b>Cause Type</b>
06269907101 <sup>i</sup>	03/12/2006 <sup>ii</sup>	03/31/2006 <sup>iii</sup>	Other <sup>iv</sup>	Noncrude Oil <sup>v</sup>	Aviation Fuel <sup>vi</sup>	35 <sup>vii</sup>	Human Error <sup>viii</sup>	Rollover/Capsize, Accident <sup>ix</sup>
06269914801 <sup>x</sup>	5/28/2006 <sup>xi</sup>	12/08/2006 <sup>xii</sup>	-	Noncrude Oil <sup>xiii</sup>	Diesel <sup>xiv</sup>	90 <sup>xv</sup>	Equipment Failure <sup>xvi</sup>	Structural/Mechanical <sup>xvii</sup>
06269927402 <sup>xviii</sup>	06/23/2006 <sup>xix</sup>	06/23/2006 <sup>xx</sup>	Other <sup>xxi</sup>	Noncrude Oil <sup>xxii</sup>	Diesel <sup>xxiii</sup>	20 <sup>xxiv</sup>	Failure <sup>xxv</sup>	Structural/Mechanical <sup>xxvi</sup>
07269912901 <sup>xxvii</sup>	05/09/2007 <sup>xxviii</sup>	05/31/2007 <sup>xxix</sup>	Tank, other <sup>xxx</sup>	Noncrude Oil <sup>xxx</sup>	Diesel <sup>xxxii</sup>	80 <sup>xxxiii</sup>	Human Error <sup>xxxiv</sup>	Human Factors <sup>xxxv</sup>
07269925501 <sup>xxxvi</sup>	09/12/2007 <sup>xxxvii</sup>	09/24/2007 <sup>xxxviii</sup>	Tank, Other <sup>xxxix</sup>	Noncrude Oil <sup>xl</sup>	Diesel <sup>xli</sup>	12 <sup>xlii</sup>	Human Error <sup>xliii</sup>	Human Factors <sup>xliv</sup>
08269904601 <sup>xliv</sup>	02/15/2008 <sup>xlvi</sup>	02/27/2008 <sup>xlvii</sup>	Equipment <sup>xlviii</sup>	Noncrude Oil <sup>xliv</sup>	Hydraulic Oil <sup>l</sup>	30 <sup>li</sup>	Line Failure <sup>lii</sup>	Structural/Mechanical <sup>liii</sup>
08269913701 <sup>liv</sup>	05/16/2008 <sup>lv</sup>	06/13/2008 <sup>lvi</sup>	System <sup>lvii</sup>	Noncrude Oil <sup>lviii</sup>	Hydraulic Oil <sup>lix</sup>	5 <sup>lx</sup>	Failure <sup>lxi</sup>	Structural/Mechanical <sup>lxii</sup>
08269913801 <sup>lxiii</sup>	05/17/2008 <sup>lxiv</sup>	06/13/2008 <sup>lxv</sup>	Other <sup>lxvi</sup>	Noncrude Oil <sup>lxvii</sup>	Engine Lube Oil <sup>lxviii</sup>	3 <sup>lxix</sup>	Human Error <sup>lxx</sup>	Human Factors <sup>lxxi</sup>
08269914301 <sup>lxxii</sup>	05/22/2008 <sup>lxxiii</sup>	06/13/2008 <sup>lxxiv</sup>	Pipe or Line <sup>lxxv</sup>	Noncrude Oil <sup>lxxvi</sup>	Hydraulic Oil <sup>lxxvii</sup>	4 <sup>lxxviii</sup>	Line Failure <sup>lxxix</sup>	Structural/Mechanical <sup>lxxx</sup>
08269916501 <sup>lxxxi</sup>	06/13/2008 <sup>lxxxii</sup>	07/07/2008 <sup>lxxxiii</sup>	System <sup>lxxxiv</sup>	Noncrude Oil <sup>lxxxv</sup>	Hydraulic Oil <sup>lxxxvi</sup>	8 <sup>lxxxvii</sup>	Failure <sup>lxxxviii</sup>	Structural/Mechanical <sup>lxxxix</sup>
08269919701 <sup>xc</sup>	07/15/2008 <sup>xc</sup>	07/18/2008 <sup>xcii</sup>	Other <sup>xciii</sup>	Noncrude Oil <sup>xciv</sup>	Aviation Fuel <sup>xcv</sup>	18 <sup>xcvi</sup>	Line Failure <sup>xcvii</sup>	Structural/Mechanical <sup>xcviii</sup>
08269921001 <sup>xcix</sup>	07/28/2008 <sup>c</sup>	07/30/2008 <sup>ci</sup>	Equipment <sup>cii</sup>	Substance <sup>ciii</sup>	(Antifreeze) <sup>civ</sup>	2 <sup>cv</sup>	Line Failure <sup>cvi</sup>	Structural/Mechanical <sup>cvii</sup>
09269921501 <sup>cviii</sup>	08/03/2009 <sup>cix</sup>	-	-	Noncrude Oil <sup>cx</sup>	Diesel <sup>cx</sup>	10 <sup>cxii</sup>	Tank Overfill <sup>cxiii</sup>	Human Error <sup>cxiv</sup>
08269924601 <sup>cxv</sup>	09/02/2008 <sup>cxvi</sup>	08/17/2010 <sup>cxvii</sup>	Equipment <sup>cxviii</sup>	Hydraulic Oil <sup>cxix</sup>	Hydraulic Oil <sup>cxx</sup>	5 <sup>cxxi</sup>	Hydraulic oil hose fitting failed <sup>cxviii</sup>	Structural/Mechanical <sup>cxviii</sup>
08269924602 <sup>cxv</sup>	09/02/2008 <sup>cxv</sup>	10/08/2008 <sup>cxv</sup>	Equipment <sup>cxvii</sup>	Hydraulic Oil <sup>cxviii</sup>	Hydraulic Fluid <sup>cxvix</sup>	5 <sup>cxv</sup>	Faulty Fitting on Mud Tank <sup>cxv</sup>	Structural/Mechanical <sup>cxvii</sup>
08269926901 <sup>cxviii</sup>	09/25/2008 <sup>cxv</sup>	11/24/2008 <sup>cxv</sup>	-	Noncrude Oil <sup>cxv</sup>	Aviation Fuel <sup>cxv</sup>	40 <sup>cxv</sup>	Human Error <sup>cxv</sup>	Human Factors <sup>cx</sup>
08269932201 <sup>cxli</sup>	11/17/2008 <sup>cxlii</sup>	12/05/2008 <sup>cxliii</sup>	System <sup>cxliv</sup>	Noncrude Oil <sup>cxlv</sup>	Hydraulic Oil <sup>cxlvi</sup>	9 <sup>cxlvii</sup>	Failure <sup>cxlviii</sup>	Structural/Mechanical <sup>cxlix</sup>
09269922701 <sup>cli</sup>	08/15/2009 <sup>cli</sup>	09/02/2009 <sup>clii</sup>	Pipe or Line <sup>cliii</sup>	Noncrude Oil <sup>cliv</sup>	Hydraulic Oil <sup>clv</sup>	1.5 <sup>clvi</sup>	Ruptured Line <sup>clvii</sup>	Structural/Mechanical <sup>clviii</sup>
09269928801 <sup>clix</sup>	10/15/2009 <sup>clx</sup>	11/10/2009 <sup>clxi</sup>	Line or Hose <sup>clxii</sup>	Noncrude Oil <sup>clxiii</sup>	Hydraulic Oil <sup>clxiv</sup>	7 <sup>clxv</sup>	Hydraulic Line Failure <sup>clxvi</sup>	Structural/Mechanical <sup>clxvii</sup>
10269915201 <sup>clxviii</sup>	06/01/2010 <sup>clxix</sup>	07/15/2010 <sup>clxx</sup>	-	Noncrude Oil <sup>clxxi</sup>	Hydraulic Oil <sup>clxxii</sup> / Diesel Fuel <sup>clxxiii</sup>	1.5 <sup>clxxiv</sup>	Containment Overflow <sup>clxxv</sup> / thermal heat expansion from equipment fuel tank <sup>clxxvi</sup>	Structural/Mechanical <sup>clxxvii</sup>
-	07/08/2010 <sup>clxxviii</sup>	-	-	Noncrude Oil <sup>clxxix</sup>	Hydraulic Oil <sup>clxxx</sup>	15 <sup>clxxxi</sup>	Equipment Failure <sup>clxxxii</sup>	Structural/Mechanical <sup>clxxxiii</sup>
10269925301 <sup>clxxxiv</sup>	9/10/2010 <sup>clxxxv</sup>	-	-	Noncrude Oil <sup>clxxxvi</sup>	Hydraulic Oil <sup>clxxxvii</sup>	25 <sup>clxxxviii</sup>	Equipment Failure <sup>clxxxix</sup>	Structural/Mechanical <sup>clxxx</sup>
<b>TOTAL SPILLS: 22</b>	<b>TOTAL GALLONS REPORTED SPILLED BETWEEN MARCH 2006 AND SEPTEMBER 2010:</b> <b>426</b>							

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- <sup>i</sup> Exhibit 461.
  - <sup>ii</sup> Exhibit 461.
  - <sup>iii</sup> Exhibit 461.
  - <sup>iv</sup> Exhibit 461.
  - <sup>v</sup> Exhibit 461.
  - <sup>vi</sup> Exhibit 461.
  - <sup>vii</sup> Exhibit 461.
  - <sup>viii</sup> Exhibit 461.
  - <sup>ix</sup> Exhibit 461.
  - <sup>x</sup> Exhibit 494, SOA 088275.
  - <sup>xi</sup> <sup>xi</sup> Exhibit 494, SOA 088275.
  - <sup>xii</sup> <sup>xii</sup> Exhibit 494, SOA 088275.
  - <sup>xiii</sup> <sup>xiii</sup> Exhibit 494, SOA 088275.
  - <sup>xiv</sup> <sup>xiv</sup> Exhibit 494, SOA 088275.
  - <sup>xv</sup> <sup>xv</sup> Exhibit 494, SOA 088275.
  - <sup>xvi</sup> <sup>xvi</sup> Exhibit 494, SOA 088275.
  - <sup>xvii</sup> <sup>xvii</sup> Exhibit 494, SOA 088275.
  - <sup>xviii</sup> Exhibit 461.
  - <sup>xix</sup> Exhibit 461.
  - <sup>xx</sup> Exhibit 461.
  - <sup>xxi</sup> Exhibit 461.
  - <sup>xxii</sup> Exhibit 461.
  - <sup>xxiii</sup> Exhibit 461.
  - <sup>xxiv</sup> Exhibit 461.
  - <sup>xxv</sup> Exhibit 461.
  - <sup>xxvi</sup> Exhibit 461.
  - <sup>xxvii</sup> Exhibit 461.
  - <sup>xxviii</sup> Exhibit 461.
  - <sup>xxix</sup> Exhibit 461.
  - <sup>xxx</sup> Exhibit 461.
  - <sup>xxxi</sup> Exhibit 461.
  - <sup>xxxii</sup> Exhibit 461.
  - <sup>xxxiii</sup> Exhibit 461.
  - <sup>xxxiv</sup> Exhibit 461.
  - <sup>xxxv</sup> Exhibit 461.
  - <sup>xxxvi</sup> Exhibit 461.
  - <sup>xxxvii</sup> Exhibit 461.
  - <sup>xxxviii</sup> Exhibit 461.
  - <sup>xxxix</sup> Exhibit 461.
  - <sup>xl</sup> Exhibit 461.
  - <sup>xli</sup> Exhibit 461.
  - <sup>xlii</sup> Exhibit 461.
  - <sup>xliiii</sup> Exhibit 461.
  - <sup>xliv</sup> Exhibit 461.
  - <sup>xlv</sup> Exhibit 461.
  - <sup>xlvi</sup> Exhibit 461.
  - <sup>xlvii</sup> Exhibit 461.
  - <sup>xlviii</sup> Exhibit 461.
  - <sup>xliv</sup> Exhibit 461.
  - <sup>l</sup> Exhibit 461.

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- li Exhibit 461.
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  - lxxxv Exhibit 461.
  - lxxxvi Exhibit 461.
  - lxxxvii Exhibit 461.
  - lxxxviii Exhibit 461.
  - lxxxix Exhibit 461.
  - xc Exhibit 461.
  - xc<sup>i</sup> Exhibit 461.
  - xc<sup>ii</sup> Exhibit 461.
  - xc<sup>iii</sup> Exhibit 461.
  - xc<sup>iv</sup> Exhibit 461.
  - xc<sup>v</sup> Exhibit 461.
  - xc<sup>vi</sup> Exhibit 461.
  - xc<sup>vii</sup> Exhibit 461.
  - xc<sup>viii</sup> Exhibit 461.
  - xc<sup>ix</sup> Exhibit 461.
  - <sup>c</sup> Exhibit 461.



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cli Exhibit 973  
clii Exhibit 973  
cliii Exhibit 973  
cliv Exhibit 973  
clv Exhibit 973  
clvi Exhibit 973  
clvii Exhibit 973  
clviii Exhibit 973  
clix Exhibit 122, SOA 023032  
clx Exhibit 122, SOA 023032  
clxi Exhibit 122, SOA 023032  
clxii Exhibit 122, SOA 023032  
clxiii Exhibit 122, SOA 023032  
clxiv Exhibit 122, SOA 023032  
clxv Exhibit 122, SOA 023032  
clxvi Exhibit 122, SOA 023032  
clxvii Exhibit 122, SOA 023032  
clxviii Exhibit 700, SOA 088229.  
clxix Exhibit 700, SOA 088229.  
clxx Exhibit 700, SOA 088229.  
clxxi Exhibit 700, SOA 088229.  
clxxii Exhibit 700, SOA 088229.  
clxxiii Exhibit 701, SOA 088230.  
clxxiv Exhibit 700, SOA 088229.  
clxxv Exhibit 700, SOA 088229.  
clxxvi Exhibit 701, SOA 088230.  
clxxvii Exhibit 700, SOA 088229.  
clxxviii Exhibit 954, NA\_006436.  
clxxix Exhibit 954, NA\_006436.  
clxxx Exhibit 954, NA\_006436.  
clxxxi Exhibit 954, NA\_006436.  
clxxxii Exhibit 954, NA\_006436.  
clxxxiii Exhibit 954, NA\_006436.  
clxxxiv Exhibit 408, SOA 088254.  
clxxxv Exhibit 408, SOA 088254.  
clxxxvi Exhibit 408, SOA 088254.  
clxxxvii Exhibit 408, SOA 088254.  
clxxxviii Exhibit 408, SOA 088254.  
clxxxix Exhibit 408, SOA 088254.  
cxc Exhibit 408, SOA 088254.



**Grout Required to Plug Exploratory Drill Holes Compared to Amount of Grout Purchased<sup>i</sup> - Table G**

<b>Year</b>	<b>Linear Feet Drilled<sup>ii</sup></b>	<b>Estimated Amount of Grout Necessary to Plug Linear Feet Drilled from Bottom to Top<sup>iii</sup></b> <b>(# of 50lb bags)</b>	<b>Amount of Grout Actually Purchased<sup>iv</sup></b> <b>(# of 50lb bags)</b>	<b>Estimated Linear Feet Not Plugged Each Year Due to Lack of Grout</b>	<b>Percent of Estimated Linear Feet Not Plugged Each Year Due to Lack of Grout</b>
<b>2008</b>	157,743	12,134 – 15,774	1,534	137,800	87%
<b>2009</b>	32,722	2,517 – 3272	191	30,329	93%

<sup>i</sup> The grout represented on this table is the “volclay grout” used to “plug” or “grout” holes according to PLP’s grout purchase invoices. [Ex. 749.] In response to the Court’s question concerning the meaning of “plug” and “grout,” Mr. Wober testified: “[T]hey’re synonymous. The drillers use a number of words to describe completing and plugging the hole and moving off, and sometimes, they refer to grout as a bentonite, but it’s actually Volclay Grout.” [Wober, 12/07/10 Tr. 166:12-21.] This was confirmed in Mr. Wober’s discussion of the PLP invoices (Ex. 749):

Q: And in terms of these invoices, they appear to be invoices for EZ Mud, Penetrol, Quick-Gel. That’s the first page. The second page refers to something called CET/VOL/POW – CETCO Volclay Grout Powder?

A: Yes.

Q: Is that the kind of grout that you’re referring to that is used to plug the hole?

A: That’s correct.

Q: Is there anything else besides this type of powder that is put in the hole?

A: Specifically for the purpose of plugging holes?

Q: Yes for purposes of plugging?

A: My understanding it’s just the Volclay Grout that’s used for plugging holes. [Wober, 12/07/10 Tr. 109:6-18.]

<sup>ii</sup> Exhibit 123 (Total linear feet of exploratory drill holes; does not include the monitoring wells, as those would not be plugged).

<sup>iii</sup> Assuming 3 inch diameter of the drill hole and no faults or other abnormalities in the drill hole that would require additional grout. [DeHusson, 12/08/10 Tr. 149:2-4 (a 2000-foot hole needs 3-4 pallets (50 bags/pallet).] Therefore, each 50-lb. bag plugs approximately 10-13 feet.

<sup>iv</sup> Exhibit 749 at PLP 24844, 24849, and 24855.

**Days to Empty Ponds Under Ice - Summary Table H**  
 based on 16,500 gpd withdrawal rate and Ex. 2139 as SOA 01127

POND	Area of Pond in sq ft.	Radius Pond = radius of large cone ft	Total Depth= height of large cone ft	Ice Thickness = height of small cone ft	Depth of water =height of small cone ft	Lake volume=volume of large cone in cu ft	Total Lake Volume in gallons	Water Volume =volume of small cone in cu ft	Radius of ice bottom= calculated radius of small cone	Ice volume =volume of fustrum in cu ft	Check sum=sum of frustum and small cone in cu ft	Water Under ice gallons =sum -ice volume in gallons	Days it would take a drill rig to empty the pond under ice
1	64,282	143	5	3	2	107,137	801,440	6,857	57	100,280	107,137	51,293	3.1 days
2	25,112	89.4	5	3	2	41,853	313,082	2,679	36	39,175	41,853	20,040	1.2 days
3	122,771	197.7	5	3	2	204,618	1,530,648	13,096	79	191,523	204,618	97,964	5.9 days
4	81,849	161.4	5	3	2	136,415	1,020,455	8,731	65	127,684	136,415	65,312	3.9 days
5	30,693	98.8	5	3	2	51,155	382,665	3,274	40	47,881	51,155	24,491	1.4 days
6	36,156	107.3	5	3	2	60,260	450,776	3,857	43	56,403	60,260	28,852	1.7 days
7	100,438	178.8	5	3	2	167,397	1,252,216	10,713	72	156,683	167,397	80,138	4.8 days
8	34,530	104.8	5	3	2	57,550	430,503	3,683	42	53,837	57,550	27,550	1.6 days
9	84,400	163.9	5	3	2	140,667	1,052,262	9,003	66	131,664	140,667	67,347	4.1 days
10	97,833		5	3	2								4.7 days
10	978,333	558	5	3	2	1,630,555	12,197,398	104,356	223	1,526,199	1,630,555	780,637	47.3 days
11 north	16,071	71.5	5	3	2	26,785		1,714	29	25,071	26,785		
11 south	36,156	107.3	5	3	2	60,260		3,857	43	56,403	60,260		
11 total	52,227	128.9	5	3	2	87,045	656,141	5,571	52	81,474	87,045	41,673	2.5 days
12	25,898	90.8	5	3	2	43,163	322,881	2,762	36	40,401	43,163	20,661	1.2 days
13	115,098	191.4	5	3	2	191,830	1,434,988	12,277	77	179,553	191,830	91,838	5.6 days
14	9,041	53.6	5	3	2	15,068	112,716	964	21	14,014	15,068	7,211	.43 days
15	1,281	20.2	5	3	2	2,135	15,970	137	8	1,998	2,135	1,024	0.06 days
16	92,074	171.2	5	3	2	153,457	1,147,938	9,821	68	143,635	153,457	73,466	4.4 days
17	10,225	57.1	5	3	2	17,042	127,483	1,091	23	15,951	17,042	8,161	.5 days
18 north	128,500	202.2	5	3	2	214,167		13,707	81	200,460	214,167		
18 south	88,242	167.6	5	3	2	14,070		9,412	67	137,658	147,070		
18 total	216,742	262.7	5	3	2	361,237	2,702,240	23,119	105	338,118	361,237	172,942	10.5 days

**PLP GROUT AND DRILLING FLUID PURCHASES 2008-2010 – Table I**

<b>Date</b>	<b>Substance</b>	<b>lbs / unit</b>	<b>Quantity (units)</b>	<b>Total lbs</b>	<b>Exhibit 749 at</b>
4/10/2008	EZ Mud	50	832	41,600	PLP 024843
4/10/2008	Penetrol	45	448	20,160	PLP 024843
4/10/2008	Quik-Gel	50	672	33,600	PLP 024843
6/6/2008	Cetco Volclay Grout Powder	50	576	28,800	PLP 024844
6/23/2008	Baroid	50	110	5,500	PLP 024845
8/5/2008	EZ Mud Plus	50	1216	60,800	PLP 024846, 024847
8/8/2008	Pac R	50	34	1,700	PLP 024848
8/15/2008	Cetco Volclay Grout Powder	50	958	47,900	PLP 024849
10/16/2008	EZ Mud Plus	50	192	9,900	PLP 024850
11/1/2008	EZ Mud Plus	50	128	6,400	PLP 024851
11/19/2008	Extreme #1	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	PLP 024852
12/04/2008	EZ Mud Plus	50	32	1,600	PLP 024853
9/22/2009	<i>(illegible)</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	PLP 024854
10/09/2009	Cetco Volclay Grout Powder	50	191	9,550	PLP 024855
06/09/2010	Cetco Volclay Grout Powder	50	192	9,600	PLP 024856
06/09/2010	Benseal	50	48	2,400	PLP 024856
06/09/2010	Cement	<i>n/a</i>	<i>n/a</i>	-	PLP 024856
06/09/2010	Soybean Oil	<i>n/a</i>	<i>n/a</i>	-	PLP 024856
6/29/2010	Cetco Volclay Grout Powder	50	480	24,000	PLP 024857
6/29/2010	Extreme #1	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	PLP 024857
8/4/2010	Quik-Gel	50	480	24,000	PLP 24859
8/12/2010	Quik-trol Gold	40	36	1,440	PLP 24859
8/12/2010	Pell Plug	50	18	900	PLP 24859
9/7/2010	Quik-Gel	50	1,248	62,400	PLP 24861
9/13/2010	Cetco Volclay Grout Powder	50	240	12,000	PLP 24860
<b>Total Purchased: 404,250 pounds of material (plus material for which no quantity was provided)</b>					