

Field Monitoring Report -- Pebble Copper/Gold Exploration Project --

Personnel: Roger Allely (DNR), Stormy Hought (ADF&G), Jeff Norberg (geologist to Pebble), Clint Roehl (bear guard), Glenn Summa (Astar pilot)	Inspection Date: 10-20-11
	Site Contact: Jeff Norberg
	APMA #: A116118
<ul style="list-style-type: none"> ■ Inspection Type: 	<ul style="list-style-type: none"> ■ Wildlife Observed:
<ul style="list-style-type: none"> ● Complete: 	<ul style="list-style-type: none"> ○ Bear: 2 grizzlies, ~ 8 & 15 miles N of Iliamna on return leg.
<ul style="list-style-type: none"> ○ Partial: 	<ul style="list-style-type: none"> ○ Caribou:
<ul style="list-style-type: none"> ○ Follow-up: 	<ul style="list-style-type: none"> ○ Moose:
<ul style="list-style-type: none"> ○ Response to Public Complaint: 	<ul style="list-style-type: none"> ○ Waterfowl:
	<ul style="list-style-type: none"> ○ Fish:
<ul style="list-style-type: none"> ■ Weather Conditions: 	<ul style="list-style-type: none"> ○ Other:
<ul style="list-style-type: none"> ○ Temperature: ~ 40° F 	
<ul style="list-style-type: none"> ○ Wind: 20-30 mph North wind 	
<ul style="list-style-type: none"> ○ Precipitation: none 	
<ul style="list-style-type: none"> ○ Visibility: 20-30 miles 	
<ul style="list-style-type: none"> ○ Sky Conditions: broken overcast 	
<ul style="list-style-type: none"> ○ Ground Conditions: beginning freezeup 	
<ul style="list-style-type: none"> ■ Comments: Everything appears in compliance, drilling operation are clean and orderly. The problem artesian well is anticipated to be successfully abandoned within a few days. Followup with the company is required. 	
<ul style="list-style-type: none"> ■ Recommendations: none 	
<ul style="list-style-type: none"> ■ Actions Needed: none. 	

Drill Hole/Site No.: 11541	Date: 10-20-11
Rig No.: 2	Time: 1200-1230
Activity: Active drilling	
<ul style="list-style-type: none"> ■ Condition of Drilling Site: good, clean & neat. Pipe stacked atop deck. 	<ul style="list-style-type: none"> ■ Sump Pit (continued):
<ul style="list-style-type: none"> ○ Distance from waterbody: 780 feet measured from GPS data. 	<ul style="list-style-type: none"> ○ Location and extent of discharged material: standing water only in sumps, no new input due to lost recirculation downhole.
<ul style="list-style-type: none"> ○ Location of fuel storage: 2 sites, SW and E corners., in aluminum bins with 18" min. sidewalls 	<ul style="list-style-type: none"> ○ Topsoil, muck, tundra stockpiled: yes, atop geotextile on tundra
<ul style="list-style-type: none"> ○ Sorbent pads present: yes – several blue barrels in 2 locations. 	<ul style="list-style-type: none"> ○ Hose color: none – trench and overflow discharge distributes H2O from sump onto tundra to dissipate as sheet flow
<ul style="list-style-type: none"> ○ Tundra mat: yes, approx. 40'x60' dimensions 	No sediment or staining evident on tundra from any past treated water discharge.
<ul style="list-style-type: none"> ○ Pipe off tundra: yes – all on deck 	<ul style="list-style-type: none"> ■ Drill Water Supply: Standardized exploration drilling supply rate of 22 gpm.
<ul style="list-style-type: none"> ○ Litter: none visible 	<ul style="list-style-type: none"> ○ Stream, lake/pond: stream
<ul style="list-style-type: none"> ○ Trash containment: 2x30 gallon trash cans 	<ul style="list-style-type: none"> ○ Location: 780 feet WNW of drill rig
<ul style="list-style-type: none"> ○ Sanitary facilities: Wooden privy with wings for aerodynamic stabilization during sling transport 	<ul style="list-style-type: none"> ○ Adequate water flow and depth for fish passage in streams: yes by visual estimation the stream is approx. 10' wide by 1' deep, flowing about 2 ft/sec = ~20cfs.
<ul style="list-style-type: none"> ○ Any spills or staining: none visible 	Evidence of significant impacts to riparian vegetation or stream banks: none – small path to outtake site untrampled, grass in good shape
<ul style="list-style-type: none"> ○ General impression: Good operation— clean, tidy, no bypass water leaving drillsite at present. 	<ul style="list-style-type: none"> ○ General impression of water body (i.e. clear, turbid, tannic): Clear
	<ul style="list-style-type: none"> ○ Intake description: Submerged Johnson well screen with internal secondary intake
<ul style="list-style-type: none"> ■ Drilling Activity: active, at 600 feet, target depth 1500 ft. 	<ul style="list-style-type: none"> ○ Structure clear of debris: yes
<ul style="list-style-type: none"> ○ Drill additives in use: Extreme One. 	<ul style="list-style-type: none"> ○ Mesh size: ~ 1mm -- standardized for all drill water supply intakes
<ul style="list-style-type: none"> ○ Recirculation tank: dry, all water lost downhole 	<ul style="list-style-type: none"> ○ Submerged: yes – for at least 6" over its entire ~ 8 ft. length
<ul style="list-style-type: none"> ○ Water discharged: no bypass or recirculation to treatment sumps at time of visit. 	<ul style="list-style-type: none"> ○ Fuel/generator location to source: ~ 150 ft. to SE – see GPS coordinates

<ul style="list-style-type: none"> ○ Artesian zone encountered: none 	<ul style="list-style-type: none"> ○ Catch basins for fuel supply: aluminum tubs with approx 1.5 ft high sidewalls
<ul style="list-style-type: none"> ■ Sump Pits: Three (3) total 	<ul style="list-style-type: none"> ○ Sorbent pads: yes, in 1 large blue barrel ○ Hose color: yellow ~2" for supply, covered with 1"-2" Neoprene cladding
<ul style="list-style-type: none"> ○ Location: downhill northerly from rig. 	
<ul style="list-style-type: none"> ○ Discharge trench: dry 	<ul style="list-style-type: none"> ■ Other Comments: Water supply pump and fuel storage are 114 feet south of submerged wellscreen intake in stream. Drill rig is 780 feet south of stream intake. Distances were measured in GIS from points taken with a Garmin GPS on ground or while hovering overhead in a helicopter.
<ul style="list-style-type: none"> ○ Dimensions of pits: each 20'Lx6'Wx4-5' deep 	
<ul style="list-style-type: none"> ○ In use: yes – all 3 full. 	



Fuel containment at water supply pumping facility.



Water supply identifier for DDHH 11541 at takeout point.



Submerged well screen in stream, DDHH 11541.



Drill rig #2, pipe stacked on tundra pad, DDHH 11541.



Upper sump pits, empty recirc. tank, DDHH 11541.



Lower sump pit and excavated material, DDHH 11541.



Fuel containment and cleanup kit, next to drill rig #2.



Fuel containment and cleanup kits by warming hut.

Drill Hole/Site No.: 11540	Date: 10-20-11
Rig No.: 6	Time: 1240-1312
Activity: Active drilling to 4000' target depth, currently at 1548 ft.	
<ul style="list-style-type: none"> ■ Condition of Drilling Site: good, clean & neat. Some hydrocarbon staining on deck. 	<ul style="list-style-type: none"> ■ Sump Pit (continued):
<ul style="list-style-type: none"> ○ Distance from waterbody: Stream outtake point is 995 ft to the east. 	<ul style="list-style-type: none"> ○ Location and extent of discharged material: Clear water bypassing, approx. 75-90% of intake rate of 22 gpm discharging onto tundra. No recirculated water being pumped uphill to discharge point at time of visit.
<ul style="list-style-type: none"> ○ Location of fuel storage: in aluminum tub on N side of drill shack 	<ul style="list-style-type: none"> ○ Topsoil, muck, tundra stockpiled: yes, segregated and piled next to trenches
<ul style="list-style-type: none"> ○ Sorbent pads present: yes 	<ul style="list-style-type: none"> ○ Hose color: white – 3x hoses approx. 4" laid uphill for ~ 600' for discharge of clarified water and sheetflow distribution onto tundra, redundancy due to ensuing freezeup problems.
<ul style="list-style-type: none"> ○ Tundra mat: yes, deck at least 60' x 40'. 	No sediment evident on tundra from any past treated water discharge.
<ul style="list-style-type: none"> ○ Pipe off tundra: yes – all on deck 	<ul style="list-style-type: none"> ■ Drill Water Supply: Standardized exploration drilling supply rate of 22 gpm.
<ul style="list-style-type: none"> ○ Litter: none visible on site 	Stream, lake/pond: stream
<ul style="list-style-type: none"> ○ Trash containment: Aluminum winged dumpster stationed approx. 20 ft. south of deck. 	<ul style="list-style-type: none"> ○ Location: approx. 995 feet E of drill rig
<ul style="list-style-type: none"> ○ Sanitary facilities: winged wooden privy 	<ul style="list-style-type: none"> ○ Adequate water flow and depth for fish passage in streams: yes – 10s of cfs apparent flow viewed from air. Dimensions estimated 10-12 ft. wide, 2 feet deep, flowing at least 2 ft/sec.
<ul style="list-style-type: none"> ○ Any spills or staining: none visible on tundra 	<ul style="list-style-type: none"> ○ Evidence of significant impacts to riparian vegetation or stream banks: none visible
<ul style="list-style-type: none"> ○ General impression: clean, good operation 	<ul style="list-style-type: none"> ○ General impression of water body (i.e. clear, turbid, tannic): Clear
	<ul style="list-style-type: none"> ○ Intake description: Submerged ~ 8 ft. long Johnson well screen.
<ul style="list-style-type: none"> ■ Drilling Activity: active, at 1548 feet, target depth 4,000 ft. 	<ul style="list-style-type: none"> ○ Structure clear of debris: yes
<ul style="list-style-type: none"> ○ Drill additives in use: Extreme One, Penetrol. 	<ul style="list-style-type: none"> ○ Mesh size: ~ 1 mm -- standardized for all drillwater intakes
<ul style="list-style-type: none"> ○ Recirculation tank: full 	<ul style="list-style-type: none"> ○ Submerged: yes – for its full length

<ul style="list-style-type: none"> ○ Water discharged: est. few gpm from drill flowing in trench to sump pits. 	<ul style="list-style-type: none"> ○ Fuel/generator location to source: at least 100 ft. W of stream. – see GPS coordinates
<ul style="list-style-type: none"> ○ Artesian zone encountered: none 	<ul style="list-style-type: none"> ○ Catch basin for fuel supply: aluminum tub with approx 1.5 ft high sidewalls
<ul style="list-style-type: none"> ■ Sump Pits: Five (5) total 	<ul style="list-style-type: none"> ○ Sorbent pads: yes, in 1 large blue bbl. ○ Hose color: yellow ~2" for supply, covered with 1-2" Neoprene cladding
<ul style="list-style-type: none"> ○ Location: 10-150 ft. NE of drill rig. 	
<ul style="list-style-type: none"> ○ Discharge trench: Keyway 1' wide x1' deep extends approx. 40 feet to 1st sump pit. 	<ul style="list-style-type: none"> ■ Other Comments: H₂O ~ 10-20 to gpm of supply water being bypassed to hose outlet onto tundra, approx. 90 ft E of drill rig. Water quickly absorbed into tundra downgrade to E of hose outlet. ■ Water supply pump and fuel storage are 215 feet NW of submerged well screen intake in stream. Drill rig is 995 feet WNW of stream intake. Distances measured from points taken with a Garmin GPS on ground or while hovering overhead in a helicopter.
<ul style="list-style-type: none"> ○ Dimensions of pits: each 20'Lx5'Wx4-6' deep 	
<ul style="list-style-type: none"> ○ In use: yes – all 5 full. 	





Crew working with drill pipe stacked on deck, rig #6.



Fuel containment bin next to drill rig #6.



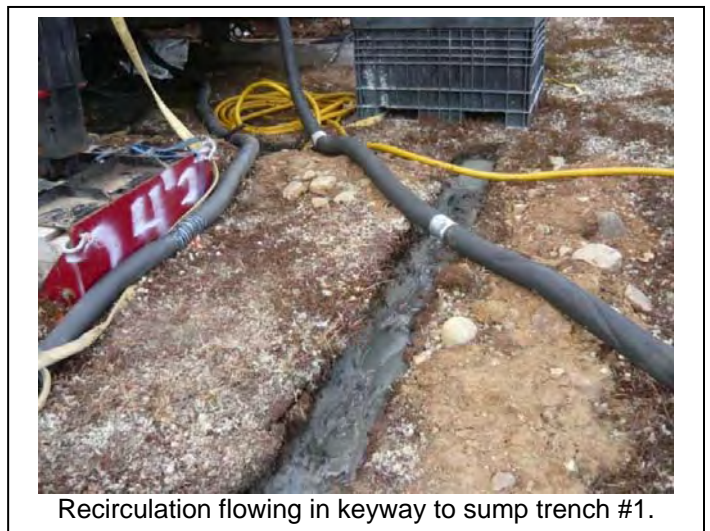
Extreme One additive used in drilling operations.



Winged dumpster in use at rig #6, drillhole site 11540.



Bypass drill water discharge resorbed into tundra.



Recirculation flowing in keyway to sump trench #1.



Keyway inlet into first sump pit, rig #6, site 11540.



Sump trench #3, (4 in background), soil stockpiles.



Sump trench #3 outlet to trench #4, soil stockpiles.



Sump trenches 4&5, Godwin redistribution pump.



Godwin pump platform, fuel containment, generator.



Recirculation tank, three compartments full, one empty.



Blue suction hose to Godwin pump, sump trench #5.



Recirculation tank, three compartments full, one empty.



White outfall hoses running uphill from Godwin pump.



Godwin pump with blue intake & white outlet hoses.

Abandoned Drill Hole/Site No.: 09462	Date: 10-20-11
	Time: 1318-1340.
<ul style="list-style-type: none"> ■ Plugged: In progress. Crew has added phases of gravel, drill paper, cement, and barite in attempts to seal off artesian flow. ■ Cemented: Incomplete. ■ Standing pipe: ~ 2 ft stickup above tundra. ■ Sump pit filled in: yes. ■ Water discharge trench filled in: n/a ■ Site revegetated: 60-70% visual estimate ■ Date revegetated/reclaimed: unknown ■ Artesian water present: yes, attempting to seal off. ■ Any spills or staining: none visible. ■ Comments/General impression: Artesian flow issues began at about 65 ft. depth, where a few feet of drilling encountered a flow increase from 10 to 90 gpm. 	
<p>Lots of water issued from the hole. It was producing 55-70 gpm; presently flow is about 35-40 gpm due to partially successful efforts to stem & seal off producing zones around 40 feet below grade.</p>	
<p>Approximately 20 ft. of casing remain in the hole; the driller thinks there's a break in the casing around the 15 ft. depth.</p>	
<p>Water is upflowing through subsurface materials, discharging to the ground surface in an area 10-20 feet wide, extending 40-80 ft. east of the drill rig. Freezing conditions are creating ice buildup in the discharge zone. Stake and flagging mark a point approximately 70 ft. east of the rig. Some groundwater is discharging into the filled sump pits.</p>	
<p>Overland flow has created discolored, possibly iron stained zones on the surface 10-15 feet wide. One extends from the rig pad approximately 20 feet, the other extends from approximately 30 to 100 feet east of the rig pad.</p>	
<p>Overland water flow disappears into tundra approx. 150 ft. E of the drill hole.</p>	
<p>The sumps are filled and mounded, tundra materials are separately stockpiled.</p>	



North portion of drill pad, drillhole site no. 09462



South portion of drill pad, drillhole site no. 09462



Panorama showing icing and associated staining on tundra from artesian upwelling, extending up to 100 feet east of drill pad.



Godwin pump platform, fuel containment, generator.



Distal/east end of surface ice plume, DH site 09462



Distal end of surface ice plume, looking west.



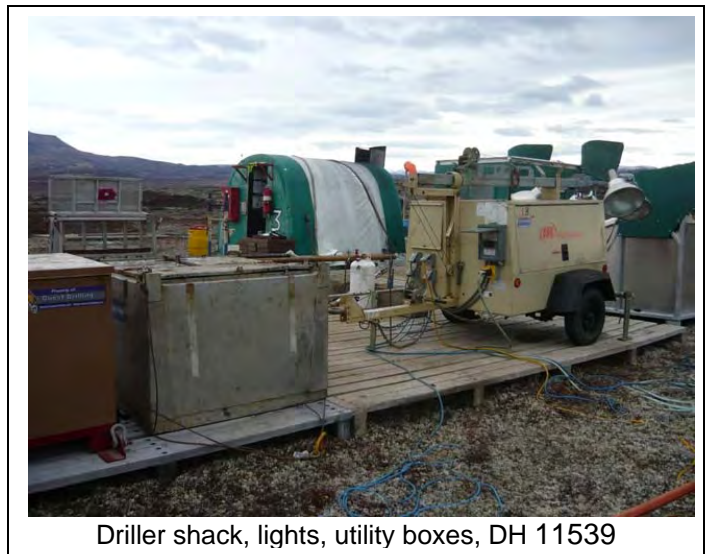
Mounded soil filling recirculation trenches.



Middle portion of artesian upwelling, showing surface icing and staining, DH 09462

Drill Hole/Site No.: 11539	Date: 10-20-11
Rig No.: 3	Time: 1348-1400
Activity: Active drilling past 2000' target depth, currently at 2338 ft.	
<ul style="list-style-type: none"> ■ Condition of Drilling Site: good, clean & neat. 	<ul style="list-style-type: none"> ■ Sump Pit (continued):
<ul style="list-style-type: none"> ○ Distance from waterbody: 690 feet from outtake point. Meandering stream flows by drill pad at least 200' south at closest point 	<ul style="list-style-type: none"> ○ Location and extent of discharged material: Pits are receiving approx. 75% of 22 gpm water supply as drill recirculation fluid. Decanted fluid flows from top of 3rd sump onto tundra, dissipates & absorbs as sheet flow.
<ul style="list-style-type: none"> ○ Location of fuel storage: aluminum tub, approx, 15' x 10', with 1.5' high sides, on W/back side of drill shack 	<ul style="list-style-type: none"> ○ Topsoil, muck, tundra stockpiled: yes, segregated and piled next to trenches
<ul style="list-style-type: none"> ○ Sorbent pads present: yes, one ~ 50 gal. blue bbl. 	<ul style="list-style-type: none"> ○ Hose color: no redistribution hoses used. Approx. 5-8 gpm of supply water being bypassed onto tundra, remaining ~ 15 gpm being used for drilling & being returned as recirculation.
<ul style="list-style-type: none"> ○ Tundra mat: yes, deck at least 60' x 30' 	No sediment evident on tundra from any past treated water discharge.
<ul style="list-style-type: none"> ○ Pipe off tundra: yes – all on deck 	<ul style="list-style-type: none"> ■ Drill Water Supply: Standardized exploration drilling supply rate of 22 gpm.
<ul style="list-style-type: none"> ○ Litter: none visible on site. Some trash appeared contained in 5 gal. buckets and bagged, under 4'x5'x3' open-ended wooden cover structure next to fuel containment tub. 	Stream, lake/pond: stream
<ul style="list-style-type: none"> ○ Trash containment: aluminum winged dumpster stationed off SE corner of deck. 	<ul style="list-style-type: none"> ○ Location: 128 feet S of generator station
<ul style="list-style-type: none"> ○ Sanitary facilities: winged privy 	<ul style="list-style-type: none"> ○ Adequate water flow and depth for fish passage in streams: yes – at least 10 cfs apparent flow viewed from air. Dimensions estimated 8-10 ft. wide, 1-2 feet deep, flowing 1-2 ft/sec.
<ul style="list-style-type: none"> ○ Any spills or staining: none visible on tundra 	<ul style="list-style-type: none"> ○ Evidence of significant impacts to riparian vegetation or stream banks: none apparent from the air 100-200 ft overhead.
<ul style="list-style-type: none"> ○ General impression: clean, good operation 	<ul style="list-style-type: none"> ○ General impression of water body (i.e. clear, turbid, tannic): Appears clear
	<ul style="list-style-type: none"> ○ Intake description: Submerged ~ 8 ft. long Johnson well screen.
<ul style="list-style-type: none"> ■ Drilling Activity: active, at 2,338 feet, passed target depth of 2,000 ft. Encountered ore at 2,295 ft. 	<ul style="list-style-type: none"> ○ Structure clear of debris: yes

<ul style="list-style-type: none"> ○ Drill additives in use: Extreme One. 	<ul style="list-style-type: none"> ○ Mesh size: ~ 1mm -- standardized for all drillwater intakes acc. to Jeff Norberg
<ul style="list-style-type: none"> ○ Recirculation tank: Empty – drill crew had to flush out sandy clay encountered in drilling. 	<ul style="list-style-type: none"> ○ Submerged: yes – for its full length
<ul style="list-style-type: none"> ○ Water discharged: 12-18 gpm estimated recirculation from drill flowing in trench to sump pits. 	<ul style="list-style-type: none"> ○ Fuel/generator location to source: Approximately 128 ft. W of stream, according to GPS coordinates
<ul style="list-style-type: none"> ○ Artesian zone encountered: none 	<ul style="list-style-type: none"> ○ Catch basin for fuel supply: Aluminum tub with approx 1.5 ft high sidewalls
	<ul style="list-style-type: none"> ○ Sorbent pads: yes, in 1 large blue bbl.
<ul style="list-style-type: none"> ■ Sump Pits: Three (3) total 	<ul style="list-style-type: none"> ○ Hose color: yellow ~2" for supply, covered with 1-2" Neoprene cladding
<ul style="list-style-type: none"> ○ Location: 40-150 ft. NE of drill rig. 	
<ul style="list-style-type: none"> ○ Discharge trench: 1'x1' extends approx. 8 feet to 1st sump pit. 	<ul style="list-style-type: none"> ■ Other Comments: Crew readying for acoustic probe tests downhole to determine fracture attitudes. ■ Water supply pump and fuel storage are 128 feet southwest of submerged wellscreen intake in stream. Drill rig is 690 feet southwest of stream intake. Distances were measured from points taken with a Garmin GPS on ground or while hovering overhead in a helicopter.
<ul style="list-style-type: none"> ○ Dimensions of pits: each 25'Lx8'W, 5-6' deep 	
<ul style="list-style-type: none"> ○ In use: yes – 1 & 2 full, 3 just beginning to fill. 	





Fuel containment and trash disposal near drill rig.



Fuel containment behind driller shack.



Recirculation flowing in keyway trench from drill rig.



Recirculation water flow filling sump pit #1.



Sump pits 1 and 2, DH site 11539



Outfall to sump pit #3, beginning to refill.



Sump pit #3 beginning to refill, DH site 11539.



Water source pump station, near creek, DH site 11539