

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

Personnel:	Inspection Date: August 3, 2010
Bill Cole, DNR, Mining Section	Site Contact: Jim Male, Jeff Norberg
Melinda O'Donnell, DNR, DCOM	APMA #: A106118
<b>■ Inspection Type:</b> <ul style="list-style-type: none"> <li>○ Complete: Inspected two active drill rigs, the Big Wiggly Fuel facility, and five abandoned drill sites.</li> <li>○ Partial:</li> <li>○ Follow-up:</li> <li>○ Response to Public Complaint:</li> </ul>	<b>■ Wildlife Observed:</b> <ul style="list-style-type: none"> <li>○ Bear: Two brown bears observed along Upper Talarik Creek</li> <li>○ Caribou: Six caribou sighted near Frying Pan Lake</li> <li>○ Moose: None</li> <li>○ Waterfowl: None</li> <li>○ Fish: None</li> <li>○ Other: Various birds</li> </ul>
<b>■ Weather Conditions:</b> <ul style="list-style-type: none"> <li>○ Temperature: Approximately 50° F</li> <li>○ Wind: 20-25 mph</li> <li>○ Precipitation: None</li> <li>○ Visibility: 10 miles, except where obscured by clouds</li> <li>○ Sky Conditions: Overcast, cloud ceiling around 3,000'</li> <li>○ Ground Conditions: Dry</li> </ul>	<b>■ Water level at Frying Pan Lake: Full</b> <ul style="list-style-type: none"> <li>○ Observed inflow: Not observed</li> <li>○ Observed outflow: Not observed</li> </ul>
<p><b>Comments:</b> At both active drill rigs the water take sites had appropriate signage according to current water take policy.</p> <p>Reclamation success at inspected drill sites was varied, as was the case for the June inspection. Issues with revegetation appear to be occurring at drill sites on rocky soil with sparse vegetation.</p> <p>Asked Jeff Norberg if anything had been done to improve reclamation success at DDHs 8429, 8432, 8412, and 8440 during the June 15 and 16 inspection. Mr. Norberg said that the plan is to work on those locations in August.</p>	

Did not see many drilling additive containers around drill rigs. Inquired about drilling additives being used. Jeff Norberg said that Pebble has begun storing only limited quantities of additives at the drills. The additives currently being used are: Penetrol, Extreme 1, QuikTrol Gold, QuikGel, Vegetable Oil, Grout (Bentonite), Grout (Portland Cement).

Both drills observed were recirculating drilling fluid. The drilling fluid first flowed through three settling sump pits. A pump in the third pit moved the fluid back to a recirculating tank next to the drill. In the tank, fluid moved through three baffled sections to further settle out cuttings, then was fed back to the drill. Excess fluids were being pumped from the third sump to be discharged onto the tundra.

**Recommendations:** DNR and Pebble Partnership personnel will research better methods of reclaiming drill sites on rocky ground. Early consultations with industry consultants indicate that 5-10 years is a reasonable time to expect revegetation of disturbed tundra. Over time, the tundra will revegetate on its own; however, it may be possible to enhance revegetation by seeding or fertilization.

**Actions Needed:** None



Figure #1. Fuel Storage and Secondary Containment at Big Wiggly Lake

Drill Hole/Site No.: DDH 10497	Rig No.: 3
Activity: Drilling, about 900'	Date: 8/3/10
<p>■ Condition of Drilling Site:</p> <ul style="list-style-type: none"> <li>○ Distance from waterbody: 1,200'</li> <li>○ Location of fuel storage: Adjacent to drill</li> <li>○ Sorbent pads present: Yes</li> <li>○ Tundra mat: Yes</li> <li>○ Pipe off tundra: Yes</li> <li>○ Litter: None</li> <li>○ Trash containment: Yes</li> <li>○ Sanitary facilities: Yes</li> <li>○ Any spills or staining: No</li> <li>○ General impression: Clean site</li> </ul>	<p>■ Sump Pit (continued):</p> <ul style="list-style-type: none"> <li>○ Location and extent of discharged material: Discharge approximately 300' west, uphill from the drill. Extent of discharge unobserved.</li> <li>○ Topsoil, muck, tundra stockpiled: Yes</li> <li>○ Location of secondary sump pit: See above</li> <li>○ Hose color: White</li> </ul>
	<p>■ Drill Water Supply:</p> <ul style="list-style-type: none"> <li>○ Stream, lake, kettle pond: Stream</li> <li>○ Location: 1,200' west of drill</li> <li>○ Adequate water flow and depth for fish passage in streams: Yes</li> <li>○ Evidence of significant impacts to riparian vegetation or stream banks: No</li> <li>○ Relative water level: full</li> <li>○ General impression of water body, i.e. clear, turbid, tannic: clear</li> </ul>
<p>■ Drilling Activity:</p> <ul style="list-style-type: none"> <li>○ Drill additives in use: See comments above</li> <li>○ Water recirculation: Yes</li> <li>○ Water discharged: Yes, periodically as needed</li> <li>○ Artesian zone encountered: None</li> </ul>	<ul style="list-style-type: none"> <li>○ Intake structure: Yes</li> <li>○ Structure clear of debris: Yes</li> <li>○ Mesh size: Unknown</li> <li>○ Submerged: Yes</li> <li>○ Pump location to source: 100' uphill</li> </ul>
<p>■ Sump Pit:</p> <ul style="list-style-type: none"> <li>○ Location: North side of drill</li> <li>○ Discharge trench: Yes</li> <li>○ Dimensions of pit: 3 pits: all 5'X10'X5'</li> <li>○ In use: Yes</li> </ul>	<ul style="list-style-type: none"> <li>○ Catch basin for fuel supply: Yes</li> <li>○ Sorbent pads: Yes</li> <li>○ Hose color: Yellow</li> </ul>

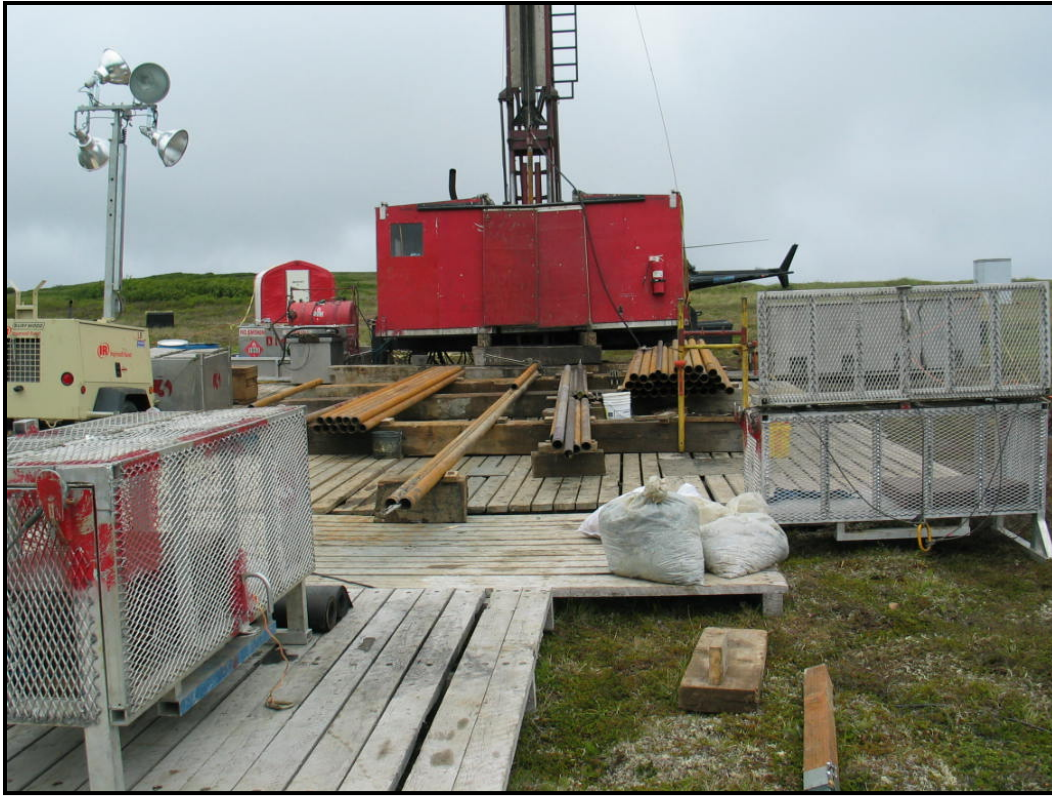


Figure #2. Drill #3 on DDH 10497. Note tundra pads.



Figure #3. Drill #3. Fuel containment, spill kit, and scrubber barrel.



Figure #4. Tundra stockpiled at DDH 10497.



Figure #5. Sump pits and mud recycling tank at DDH 10497  
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Figure #6. Water withdrawal point for DDH 10497. An electric pump in the water pumps water uphill to the main pump, 100' away.



Figure #7. Water pump for DDH 10947. Note fuel containment, spill kit, and scrubber barrel.

Drill Hole/Site No.: DDH 10498	Rig No.: 4
Activity: Drilling at 941'	Date: 8/3/10
<ul style="list-style-type: none"> <li>■ Condition of Drilling Site:</li> </ul>	<ul style="list-style-type: none"> <li>■ Sump Pit (continued):</li> </ul>
<ul style="list-style-type: none"> <li>○ Distance from waterbody: 550'</li> </ul>	<ul style="list-style-type: none"> <li>○ Location and extent of discharged material: 600' to north, uphill from drill. Flowing about 200' downhill</li> </ul>
<ul style="list-style-type: none"> <li>○ Location of fuel storage: Adjacent to drill</li> </ul>	<ul style="list-style-type: none"> <li>○ Topsoil, muck, tundra stockpiled: Yes</li> </ul>
<ul style="list-style-type: none"> <li>○ Sorbent pads present: Yes</li> </ul>	<ul style="list-style-type: none"> <li>○ Location of secondary sump pit: See above</li> </ul>
<ul style="list-style-type: none"> <li>○ Tundra mat: Yes</li> </ul>	<ul style="list-style-type: none"> <li>○ Hose color: White</li> </ul>
<ul style="list-style-type: none"> <li>○ Pipe off tundra: Yes</li> </ul>	
<ul style="list-style-type: none"> <li>○ Litter: None</li> </ul>	<ul style="list-style-type: none"> <li>■ Drill Water Supply:</li> </ul>
<ul style="list-style-type: none"> <li>○ Trash containment: Yes</li> </ul>	<ul style="list-style-type: none"> <li>○ Stream, lake, kettle pond: Koktuli River</li> </ul>
<ul style="list-style-type: none"> <li>○ Sanitary facilities: Yes</li> </ul>	<ul style="list-style-type: none"> <li>○ Location: 500' south</li> </ul>
<ul style="list-style-type: none"> <li>○ Any spills or staining: No</li> </ul>	<ul style="list-style-type: none"> <li>○ Adequate water flow and depth for fish passage in streams: Yes</li> </ul>
<ul style="list-style-type: none"> <li>○ General impression: Clean, orderly</li> </ul>	<ul style="list-style-type: none"> <li>○ Evidence of significant impacts to riparian vegetation or stream banks: None</li> </ul>
	<ul style="list-style-type: none"> <li>○ Relative water level: Bank full</li> </ul>
<ul style="list-style-type: none"> <li>■ Drilling Activity:</li> </ul>	<ul style="list-style-type: none"> <li>○ General impression of water body, i.e. clear, turbid, tannic: clear</li> </ul>
<ul style="list-style-type: none"> <li>○ Drill additives in use: See comments above</li> </ul>	<ul style="list-style-type: none"> <li>○ Intake structure: Yes</li> </ul>
<ul style="list-style-type: none"> <li>○ Water recirculation: Yes</li> </ul>	<ul style="list-style-type: none"> <li>○ Structure clear of debris: Yes</li> </ul>
<ul style="list-style-type: none"> <li>○ Water discharged: Yes, intermittently as needed</li> </ul>	<ul style="list-style-type: none"> <li>○ Mesh size: Unknown</li> </ul>
<ul style="list-style-type: none"> <li>○ Artesian zone encountered: No</li> </ul>	<ul style="list-style-type: none"> <li>○ Submerged: Yes</li> </ul>
	<ul style="list-style-type: none"> <li>○ Pump location to source: 135' north</li> </ul>
<ul style="list-style-type: none"> <li>■ Sump Pit:</li> </ul>	<ul style="list-style-type: none"> <li>○ Catch basin for fuel supply: Yes</li> </ul>
<ul style="list-style-type: none"> <li>○ Location: South side of drill</li> </ul>	<ul style="list-style-type: none"> <li>○ Sorbent pads: Yes</li> </ul>
<ul style="list-style-type: none"> <li>○ Discharge trench: Yes</li> </ul>	<ul style="list-style-type: none"> <li>○ Hose color: Yellow</li> </ul>
<ul style="list-style-type: none"> <li>○ Dimensions of pit: 3 pits: 5'X20', 5'X10", 5'X10'</li> </ul>	
<ul style="list-style-type: none"> <li>○ In use: Yes</li> </ul>	



Figure #8. Tundra stockpiled at DDH 10498. Tundra is being piled to prevent dehydration.

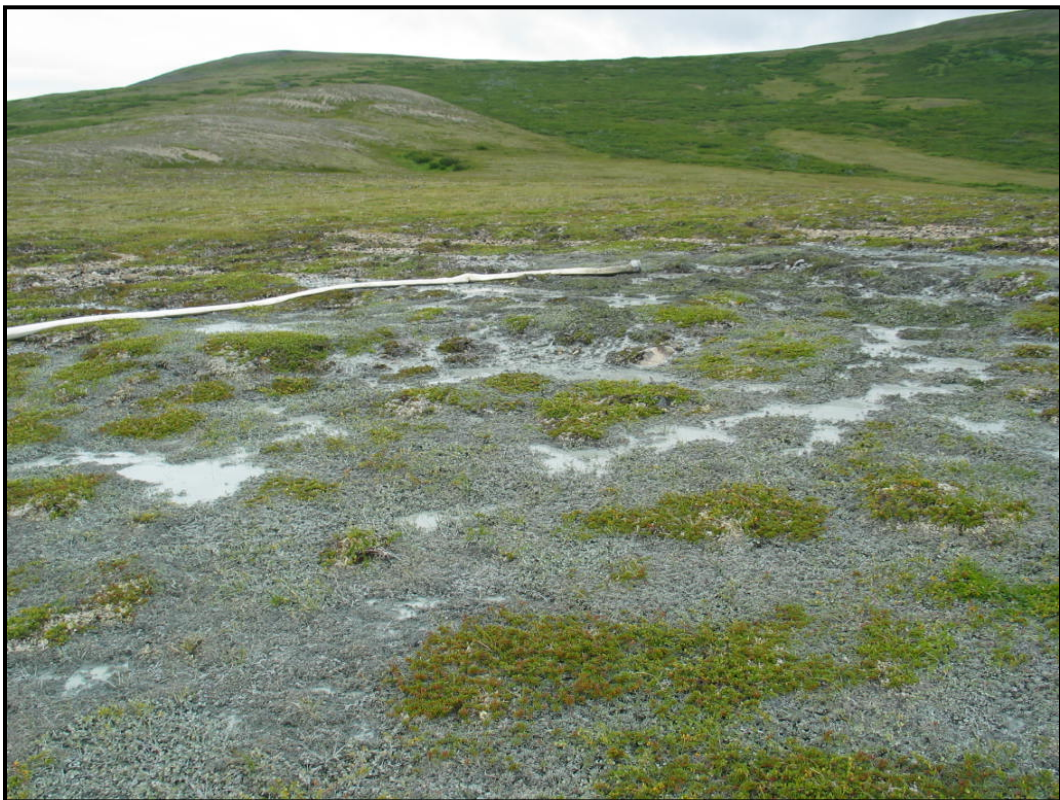


Figure #9. Discharge area from DDH 10498.





Figure #10. Water pump for DDH 10498. Note fuel containment, scrubber barrel, and spill kit.



Figure #11. Water intake signage for DDH 10498.



Figure #12. Water intake for DDH 10498

Abandoned Drill Hole/Site No.: DDH 9464

Date: 8/3/08

■ Plugged: Yes

■ Cemented: Not observed

■ Standing pipe: No

■ Sump pit filled in: Yes

■ Water discharge trench filled in: Yes

■ Site revegetated: Partially

■ Artesian water present: No

■ Any spills or staining: No

■ Comments/General impression: Area around hole is rocky, with little soil or vegetation. Tundra has been replaced to extent possible, and some is surviving. In other areas there is some revegetation occurring, but much of the site has not revegetated.

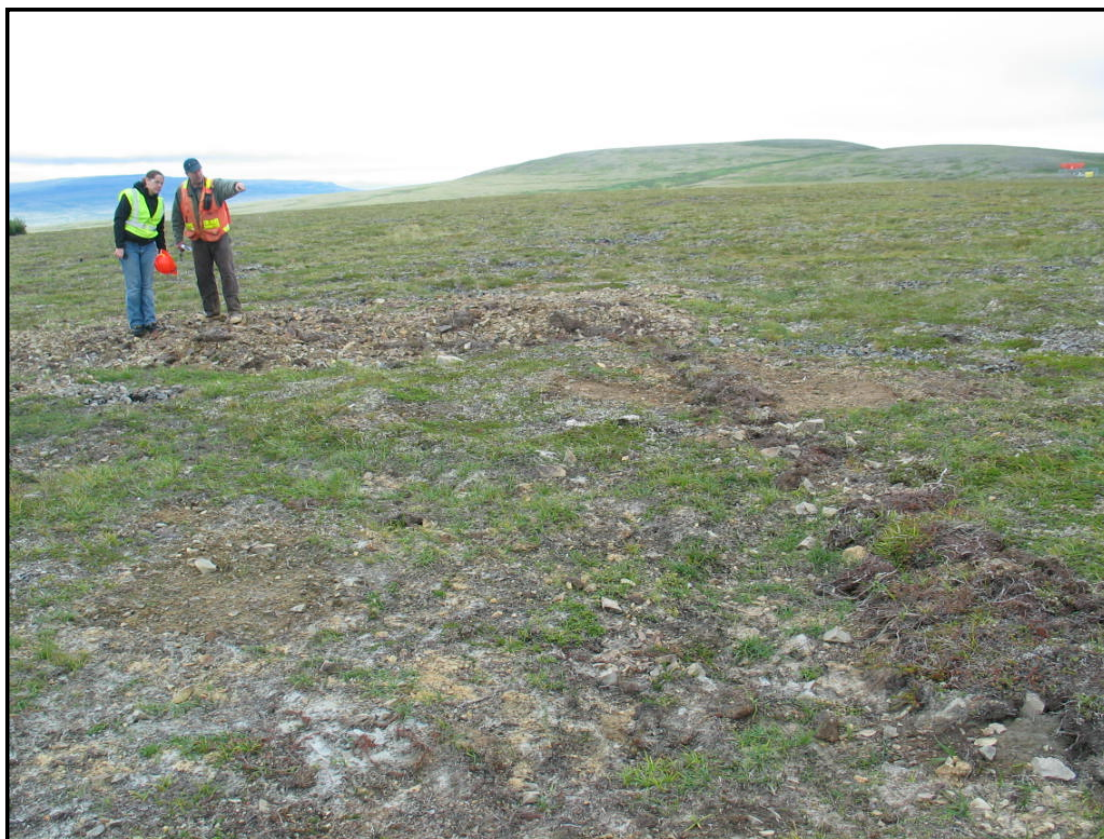


Figure #13. DDH 9464 reclamation.

Abandoned Drill Hole/Site No.: DDH 8441

Date: 8/3/10

■ Plugged: Unknown

■ Cemented: Not observed

■ Standing pipe: Yes

■ Sump pit filled in: Yes

■ Water discharge trench filled in: Yes

■ Site revegetated: Revegetation very limited

■ Artesian water present: No

■ Any spills or staining: No

■ Comments/General impression: 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 around the edges of the reclaimed areas. The fill material around the standpipe has been eroded out from an area about 4"-6" wide around the pipe, and 3' deep.



Figure #14. Reclaimed sump pit at DDH 8441. Note sparse grasses growing around edge of fill area.

Abandoned Drill Hole/Site No.: DDH 7378

Date: 8/3/10

■ Plugged: Yes

■ Cemented: Not observed

■ Standing pipe: No

■ Sump pit filled in: Yes

■ Water discharge trench filled in: Yes

■ Site revegetated: Partially

■ Artesian water present: No

■ Any spills or staining: No

■ Comments/General impression: Tundra has been replaced, but growth of the vegetation is quite limited.



Figure #15. Reclamation at DDH 7378.

Abandoned Drill Hole/Site No.: DDH 8417

Date: 8/3/10

■ Plugged: Yes

■ Cemented: Not observed

■ Standing pipe: No

■ Sump pit filled in: Yes

■ Water discharge trench filled in: Yes

■ Site revegetated: Yes

■ Artesian water present: No

■ Any spills or staining: No

■ Comments/General impression: Area around drill hole is rocky, with thin soil and limited vegetation. Reclaimed area was seeded with Kentucky Bluegrass to prevent erosion. The grass has taken well. Some other species are coming back as well, including fireweed, willow, and a natural grass observed to be growing nearby. Observed some areas of dead vegetation, but overall, vegetation is doing well.



Figure #16. Reclamation at DDH 8417. Seeded with Kentucky blue grass.



Figure #17. Willow, fireweed, and grass growing on disturbed area of DDH 8417.

Abandoned Drill Hole/Site No.: DDH 4293	Date: 8/3/10
■ Plugged: Yes	
■ Cemented: Not observed	
■ Standing pipe: No	
■ Sump pit filled in: Yes	
■ Water discharge trench filled in: Yes	
■ Site revegetated: Yes	
■ Artesian water present: No	
■ Any spills or staining: No	
■ Comments/General impression: This site was seeded with grass, and has revegetated well.	