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DIVISION OF MINING, LAND AND WATER

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Field Inspection of the Pebble Copper/Gold Project
July 26-27, 2007
Part I
Bill Cole

Overview

Bill Cole (Mining Section, DMLW, Anchorage) and Jeffrey Rogers and Matt Billings (Both in the Mining Section, DMLW, Fairbanks) flew to Iliamna on the morning of the 26th. We were greeted by Bob Cluff, Pebble Project Manager. After safety orientations for bears and helicopter travel, we visited the Pebble core logging facility, where we were given an overview of the project by Mr. Cluff and Jason McLaughlin, the head geologist at Pebble.

The Pebble deposit lies in a broad valley approximately 2 miles wide between Koktuli Mountain on the east, and unnamed mountains which rise to around 1,700' elevation to the west. The deposit is subdivided into the East and West Orebodies. The West Orebody was the first to be discovered, and has been better defined by drilling. Its east-west extent is from about halfway up the mountains to the west to approximately halfway across the valley. The orebody extends approximately 1 mile in the north-south direction, with its northern limit being just south of Upper Talarik Creek. The West Orebody is amenable to surface mining.

Current drilling activity is focused on the East Orebody. Presently, drilling has confirmed mineralization beneath an area approximately 3,000' east-west by 7,000' north-south along the east side of the valley. However, the limits of the orebody are currently open to the east, south, and at depth.

Northern Dynasty currently has seven drills operating, and seven helicopters supporting the operation. Maximum drilling depths are around 6,700 feet. The average depth is about 5,000 feet. All drilling is helicopter supported. There are no vehicles or equipment being transported over the ground at the project. This has eliminated the need for building roads to drill sites, resulting in substantially less damage to tundra and wetlands. The helicopter budget for 2007 is approximately $8 million. Approximately 150-160 people are working on the Pebble Project. The

number varies, as there are from 20 to 60 environmental workers on site at any given time.

In the afternoon we traveled to the project site by helicopter, with Bob Cluff as our guide. David Dorris, a consultant with Northern Dynasty, also accompanied us for the afternoon tour. We initially flew around the project area for an overview, then landed at drill #6, which was drilling toward the northern end of the East Orebody.

After inspecting Drill #6 we flew over to a knoll on the west side of the valley for an overview of the project. From this point we could view the entire drilling area, as well as the discovery outcrop for the deposit. (See photos #1-3.) Looking to the west from our viewpoint we saw a weather station on a broad ridgeline above. Mr. Cluff told us the ridge top is to be the millsite.

Photo #1. View from west side of the Pebble Deposit, looking east across the valley.

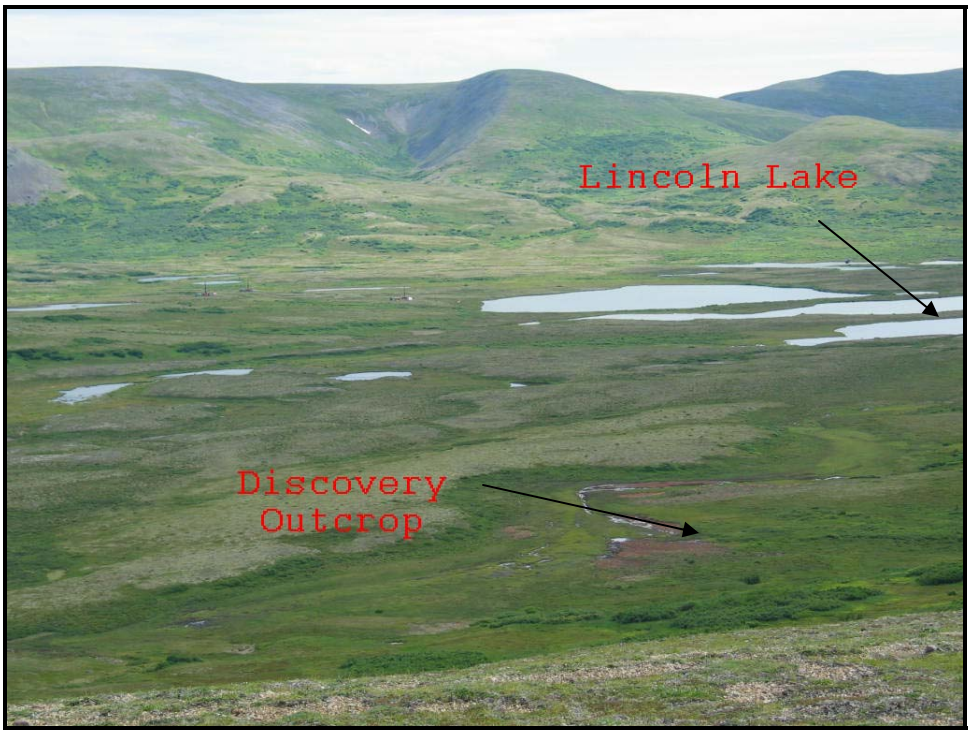

Photo #2. View SE across Pebble Deposit. Lincoln Lake, where we began the second day inspection, is at the far right.

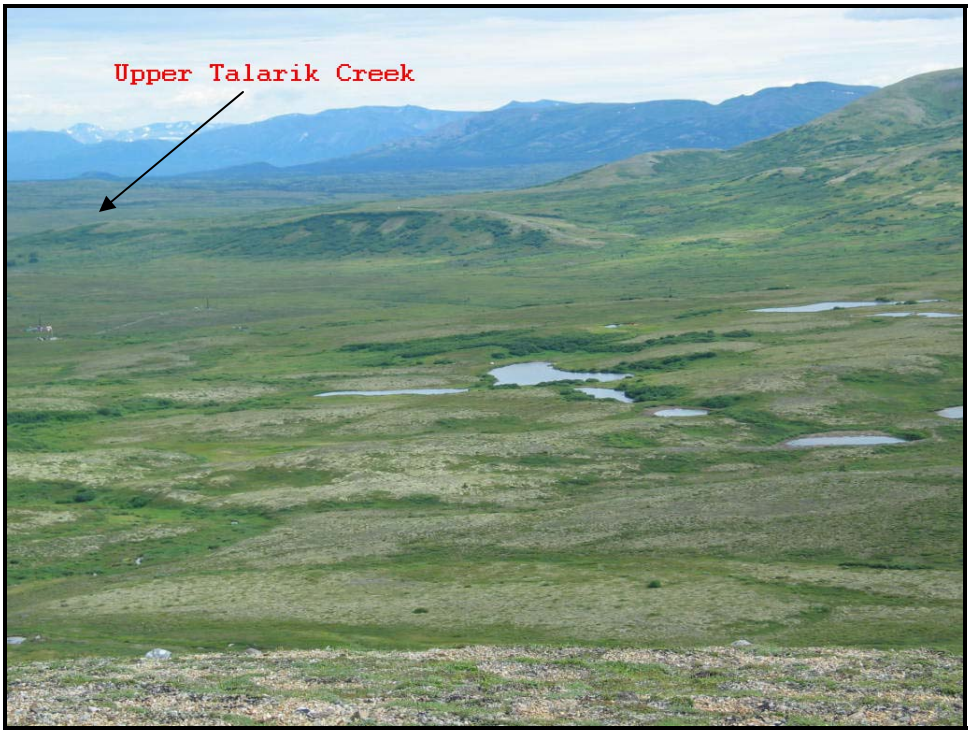

Photo #3. Northern portion of the Pebble Deposit. Upper Talarik Creek is in the background.

Northern Dynasty had originally planned to build their tailings pond in the valley where the deposit is located. The plan was to put the pond south of the mine, covering Frying Pan Lake and some of the uppermost drainages of the South Fork Koktuli River. They are re-thinking that plan because the tailings pond would now partially overlie the mine. Current thought is to put the tailings pond in an unnamed valley about 4 miles west of the deposit. This location is in the valley immediately west of the proposed mill location. (See photos #4-7.)

Photo #4. Weather station on ridge at proposed millsite. Drainage in the background is within the proposed tailings pond.

Photo #5. Aerial view looking south up the drainage where tailings pond is planned. A second dam would be required, probably somewhere around the curve in the distance.

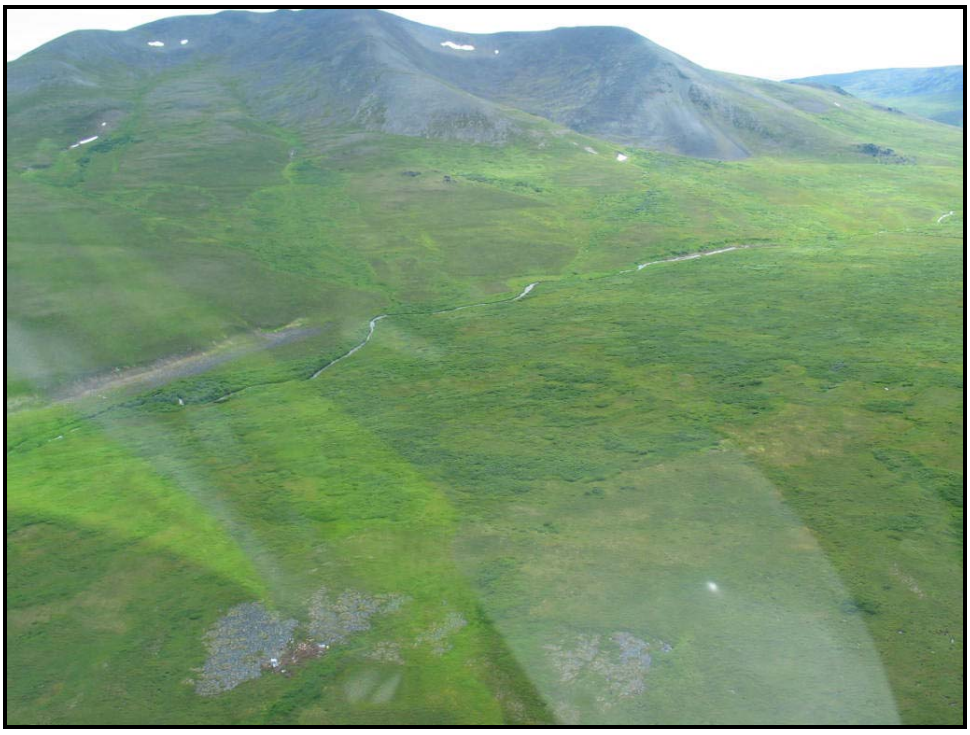

Photo #6. Valley of proposed tailings pond.

Photo #7. North end of the proposed tailings pond area. The dam would be in the middle distance, approximately where the ridgeline steepens to the left.

We left our viewpoint and flew over to look at the new site for the tailings pond. We did not land in the valley. After circling the valley several times, we flew to Big Wiggly Lake to inspect Northern Dynasty's main fuel storage facility. We landed at Big Wiggly and spent about 20 minutes examining the facility. That concluded our afternoon tour of the Pebble Project. We arrived back in Ilimana at about 4:30 PM, having spent about 3 hours at the project site. In Iliamna Mr. Cluff gave us a PowerPoint presentation on the Pebble Project.

On the second morning we were dropped at the north end of Lincoln Lake (See photo #2.) just before 8:00 AM. Our party consisted of Bill Cole, Jeff Rogers, Matt Billings, and Tim Ring, a Northern Dynasty employee who acted as our bear guide.

We initially walked a large loop over the West Orebody. We saw a number of drill sites from 2004, as well as several geotechnical monitoring holes. (See photos #8-10.) We spent some time on the discovery outcrop for the Pebble deposit, then walked up to the old camp that is now being used for storage and as an emergency shelter. We left the camp and walked east to a site being used for storage of water lines and pumping equipment, then north toward Upper Talarik Creek. We walked along the creek for a short distance, then crossed to the north side to inspect a hole drilled this spring, and the site of a small diesel spill. We then crossed back over

Upper Talarik Creek and inspected drills #7 and #1, and two water pumping sites. We followed the hose carrying drilling fluid discharge up the hill from drill #1 to the point where the fluid was being discharged into a previously dry depression. We examined that discharge, and another depression being used for drilling discharge from two other drills in the area. We concluded our inspection shortly after 1:30 in the afternoon. We were transported back to Iliamna by helicopter, where we spoke with Bob Cluff about the operation. We returned to Anchorage later that afternoon.

Details of our inspection tour follow. Our overall impression, gained over the two day inspection, is that the Pebble exploration project is an unusually clean, well run operation.

Drilling Operations

We did not see any rotary drills doing geotechnical work during this inspection. We only observed diamond core drilling operations. Geotechnical holes are only being drilled to a maximum depths of around 400'. The core holes are being drilled to depths of over 6,000'. We did observe a number of previously drilled monitoring wells. It was unclear exactly when these wells were drilled, but there was very little surface disturbance around them. (See photos #8, 9, and 10.)

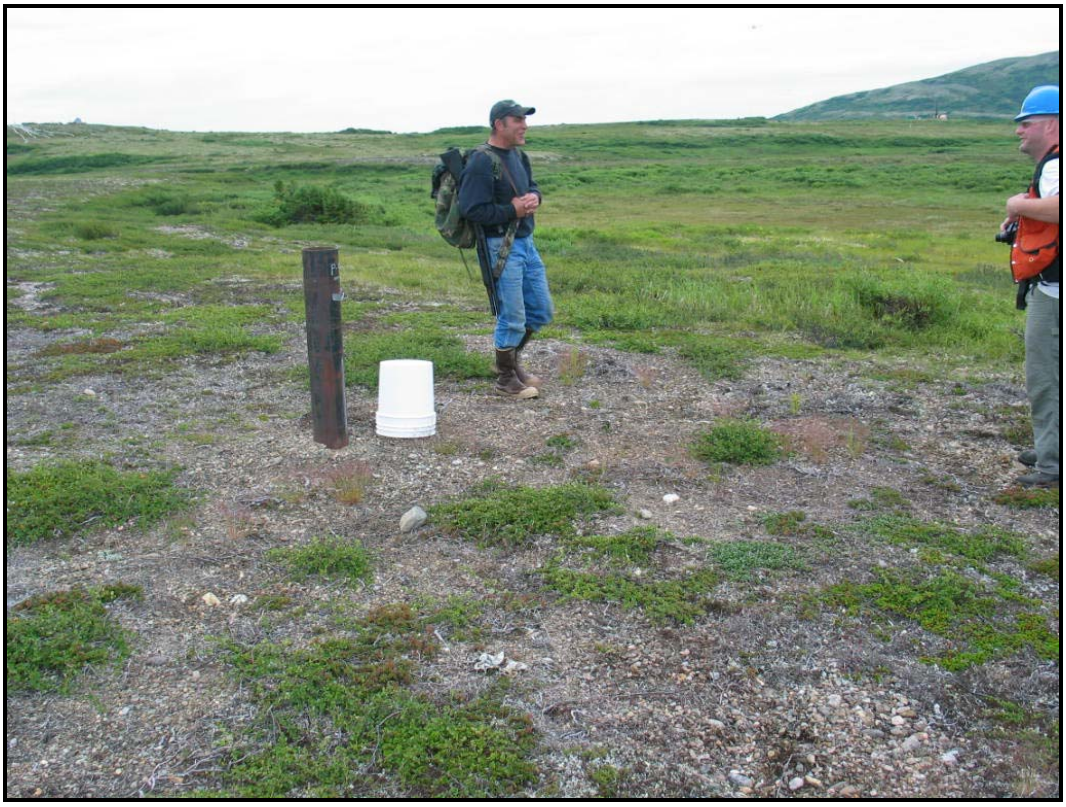

Photo #8. Piezometer well #P4.

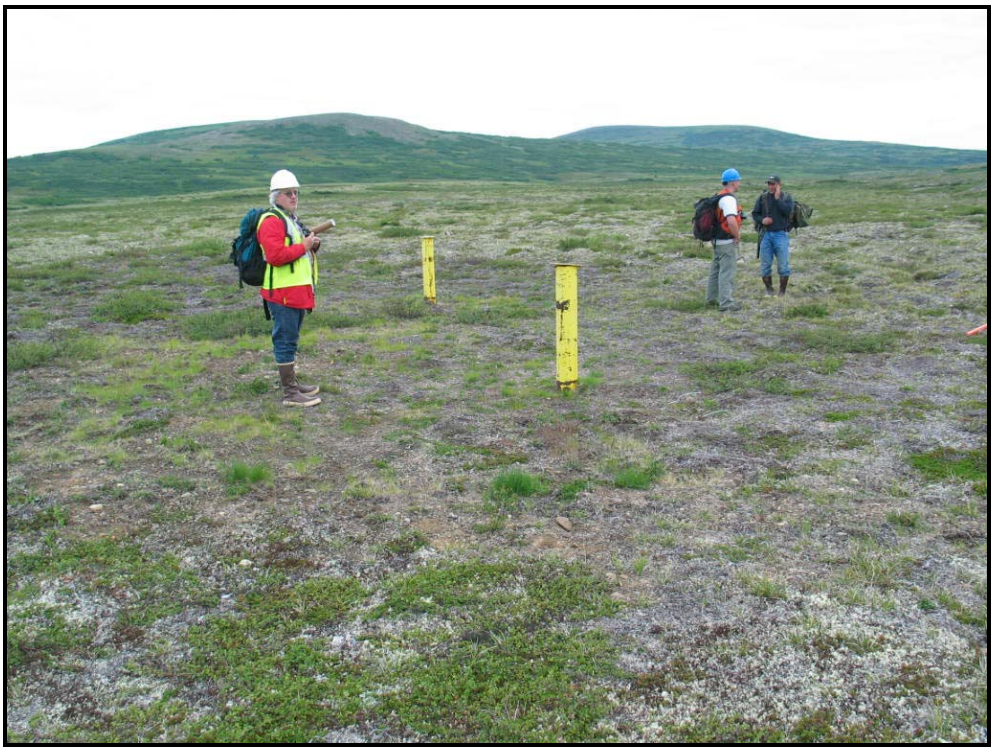

Photo #9. Piezometer wells P4A.

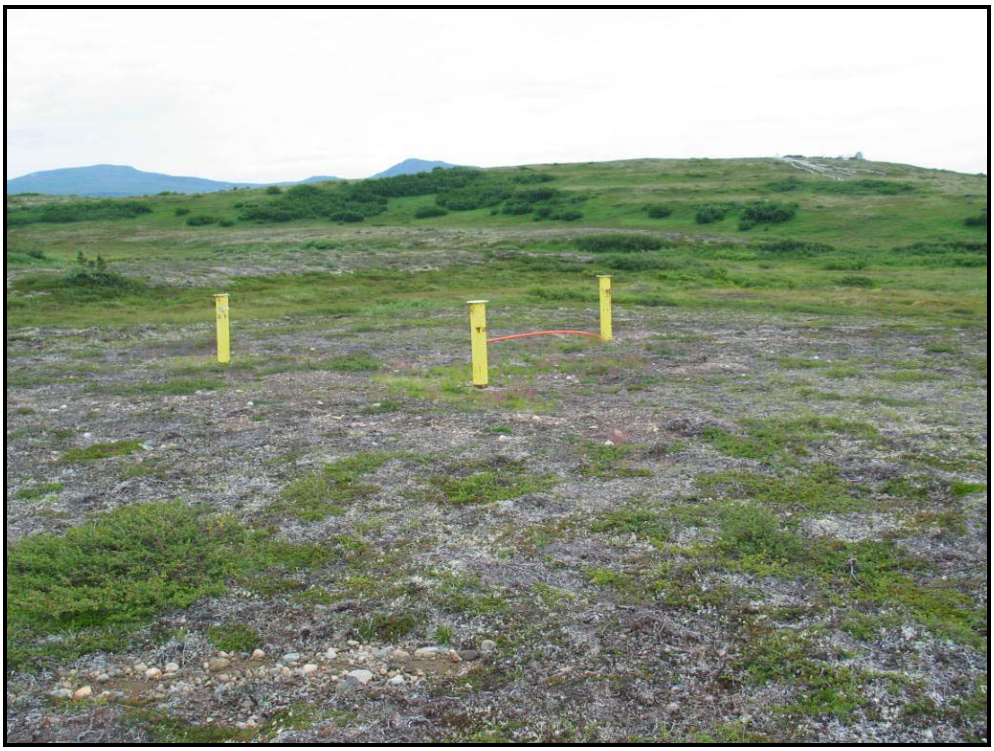

Photo #10. Piezometer wells P6 M, S, &D.

Site preparation is done before holes are drilled. A sump is dug using a small, track mounted backhoe, (See photos #11-13.) and a small trench is dug from the hole location to the sump for drainage of cuttings and drilling fluids into the sump. The backhoe is airlifted from site to site. Tundra above the sump is dug up and stockpiled, to be replaced after drilling. The work area is covered with tundra mats. These are large wood pallets, constructed with 2x6 boards with 4x4s cross members for support. (See photo #11, and drill photos below.) Timbers are placed on the tundra to support the drill, or in some cases steel supports are placed on the tundra mats. Most structures and equipment for drilling are placed on the tundra mats. This reduces damage to the tundra or wetlands substantially. After the hole is completed, the mats are air lifted to the next location.

Photo #11. New drill site ready for the drill.

Photo #12. Drainage ditch and sump at new drill site.

Photo #13. Small backhoe used for digging sumps. The backhoe is air lifted between sites.

When the hole is completed, it is grouted from bottom to top. Drill rods are lowered to the bottom of the hole, and grout is injected as the pipe is raised out of the hole, filling it completely. Northern Dynasty has a compelling interest in properly plugging their core holes, particularly in the East Orebody. Any poorly plugged holes will act as direct groundwater conduits from the surface overburden into the underground mine.

The sump is refilled, and the stockpiled tundra is placed back over it. Since 2006, Northern Dynasty has been spreading straw and seeding with grass to help stabilize the site. Most of the 2007 drill sites already have some vegetation growing on them. (See photos of reclaimed drill sites below.)

Water for drilling is being pumped primarily from nearby small ponds and recently drilled holes. Because the small ponds freeze solid during the winter, some holes drilled this past winter and spring were supplied from Upper Talarik Creek. (See report from April 5, 2007 inspection.) None of the ponds being pumped from are deep enough to have fish. Ponds less than 4-5 feet deep freeze solid during the winter.

Various additives are mixed into the water for drilling. These additives are intended to maintain hole integrity and prevent fluid loss. Northern Dynasty has provided Material Safety Data Sheets for all of the additives, and they are largely benign. In high concentrations two of the additives do have toxicity to fish, however, and must be kept from fish bearing water bodies.

The return drilling fluids and cuttings flow into the sump, where most of the cuttings settle out in the pit. Some of the drills are recirculating the drilling fluids, but many are not. For most holes the fluids are pumped out of the sump and discharged either onto the tundra or into dry depressions in the tundra. These fluids are largely water, with powdered rock from the drilling, clay, and lesser amounts of other additives. If a hole is in or near a wetland the fluids are pumped to higher ground, well away from the wetland. This keeps the ground cuttings, clay and drilling additives out of wetlands and other bodies of water. The practice results in the deposition of finely ground rock, bentonitic clay, and other additive materials being deposited on the tundra. Where the fluids have been discharged directly onto tundra, there is only a small buildup. Gray coatings of clay were seen in areas where drill fluids have been recently discharged, but in areas where drilling was done in previous years there was no evidence of the coatings, and the tundra appears healthy. Apparently, rain washes the clay off the vegetation and no lasting harm is done. The practice is a responsible means of disposing of drilling fluids.

There is some concern in places where multiple wells are being discharged into topographic depressions. This practice can result in considerable amounts of clay material being deposited in the depression. (See photo #14.) It might be better to discharge the water over a larger area. However, by depositing the clays and cuttings

in only a few depressions, there will be less area to reclaim after drilling. Alternately, Northern Dynasty might use a flocculant in their sumps, precipitating the clays in the pits, for later burial. Another alternative is to recirculate the drilling fluids. We are talking to Northern Dynasty personnel about the possibilities.

Sumps could not be dug for some of the holes drilled this past winter and spring (fewer than 10) because the ground was frozen. (See photos 46 and 47 in Part II of this report.) Cuttings and drilling fluids from these holes were discharged directly onto the ground. This is a customary practice, and is generally allowed. However, Lena Brommeland, of Northern Dynasty, has informed me that they are currently working to identify drill locations for the coming winter and dig appropriate sumps in advance. This should result in few, if any holes having their cuttings deposited directly onto the tundra.

Photo #14. Clay deposited in a dry depression by discharged drilling fluids.

During our visit we inspected three drills. The first was drill #6, which we visited with Bob Cluff on Thursday afternoon. We inspected drills #7 and #1 during our walk over the project area on Friday. Each drill rig has certain facilities for drilling, safety, and environmental protection. These are:

- Crew quarters, for shelter and safety in the event that weather prevents the helicopters from changing worker shifts. The crews have sufficient food and heating fuel for several days. (Photo #16)
- Storage structure – usually a Quonset hut. (Photo #15, Tan colored structure)
- Tundra matting – discussed above.

- Fuel storage. All fuel tanks on the project are double walled aluminum tanks. All are placed in a lining with at least 120% capacity. Many have more than 120% capacity. (Photo #16)
- Fuel is slung to the drills in 118 gallon, double walled aluminum tanks. The tanks are placed in a large, heavy aluminum container, then the fuel is pumped into the main fuel storage tank. The purpose of the aluminum container is to eliminate the risk of tearing the plastic containment liner. (Photo #17)
- Spill kit and scrubber barrel. The spill kit contains absorbent materials for cleaning up spills. The scrubber barrel is filled with a material that separates petroleum products from water. Any accidental mixture of petroleum and water is poured in the top. Hydrocarbons are trapped by the material, and water flows out of a hole at the base of the barrel. (Photos #16 and 18)
- Toilet facility with a burner for disposal of wastes. (Photo #16)
- Sump for settling drill cuttings out of the drill return. (Photo #19)
- Trash container (Photo #20)

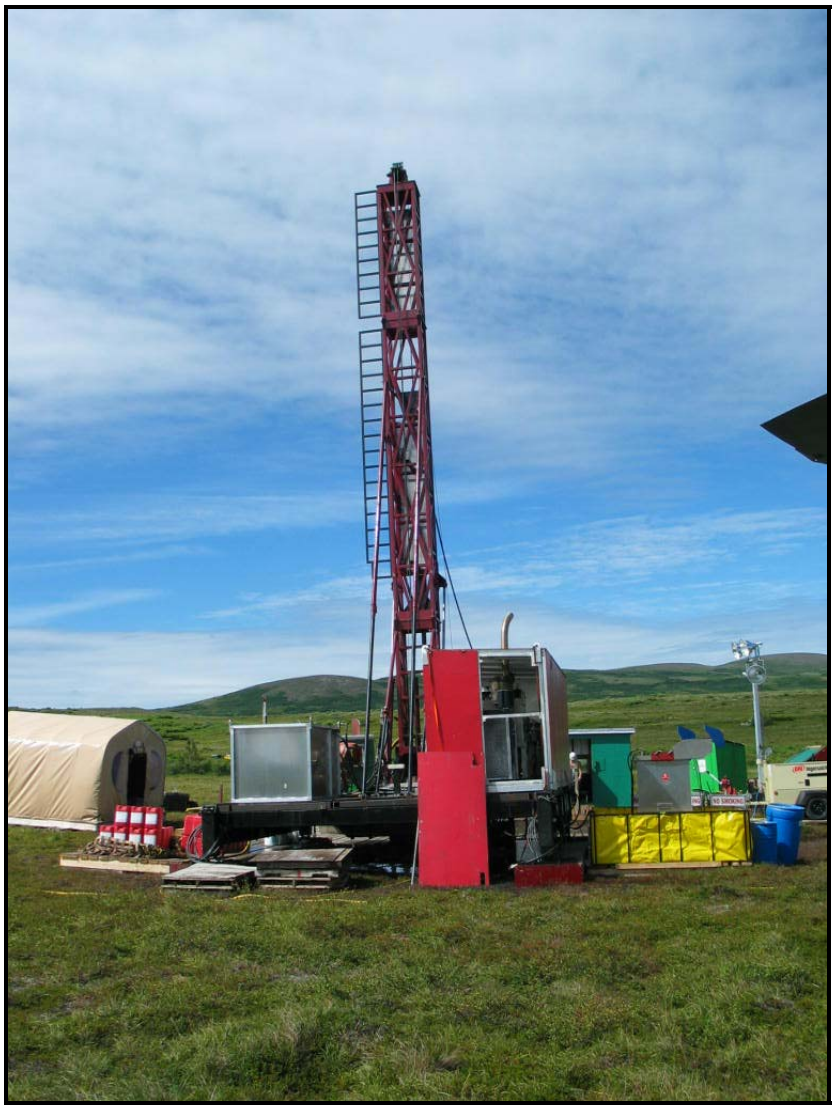

Photo #15. Drill #6.

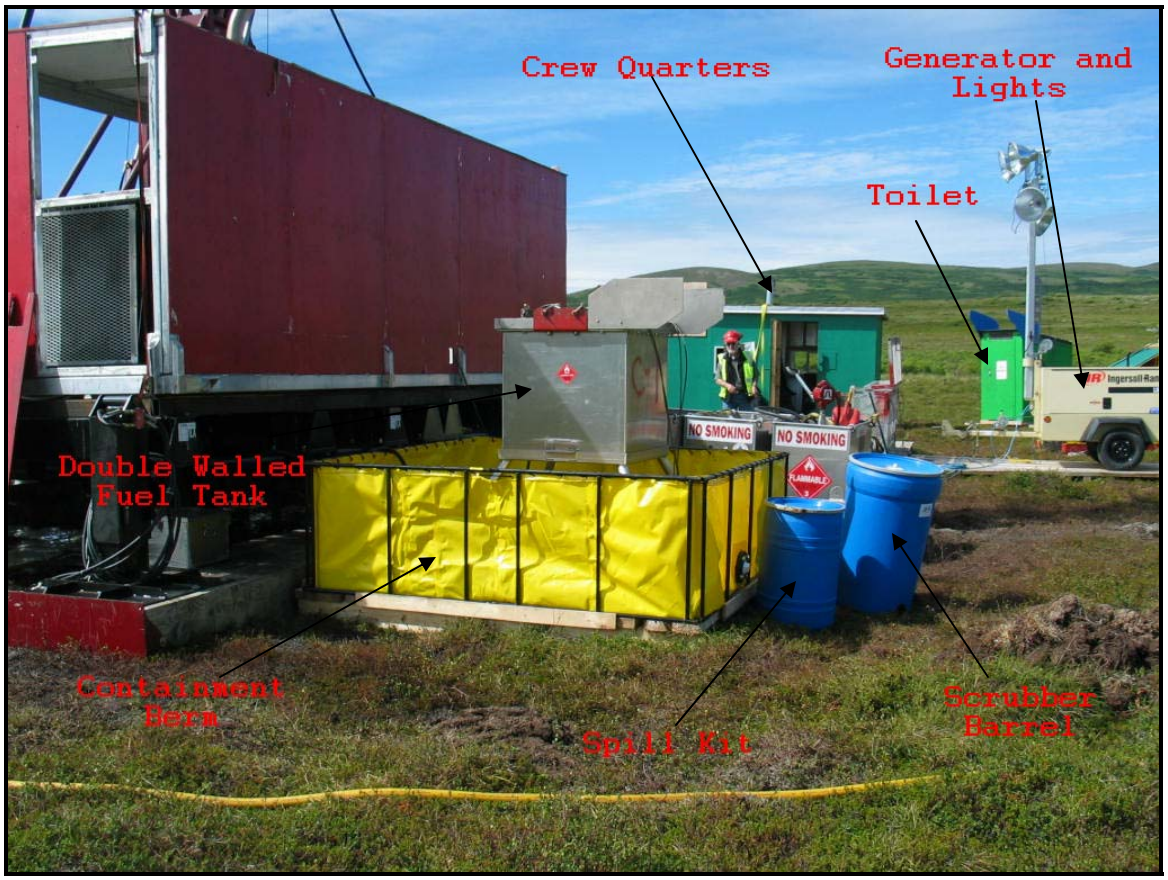

Photo #16. Drill #6 and facilities.

Photo #17. Double walled, 118 Gal. fuel transport tanks in aluminum containment.

Photo #18. Petroleum absorbent material in a scrubber barrel.

Photo #19. Sump at drill #6.

Photo #20. Trash container at drill #6.

Drill #7 (See photo #21) was operating in a lowland about 300 yards south of Upper Talarik Creek, close to a wetlands. The drilling return was being pumped about 150 yards up hill away from the wetland. The water seeps into the ground over a short distance. (See photos #24-26.)

Photo #21. Drill #7.

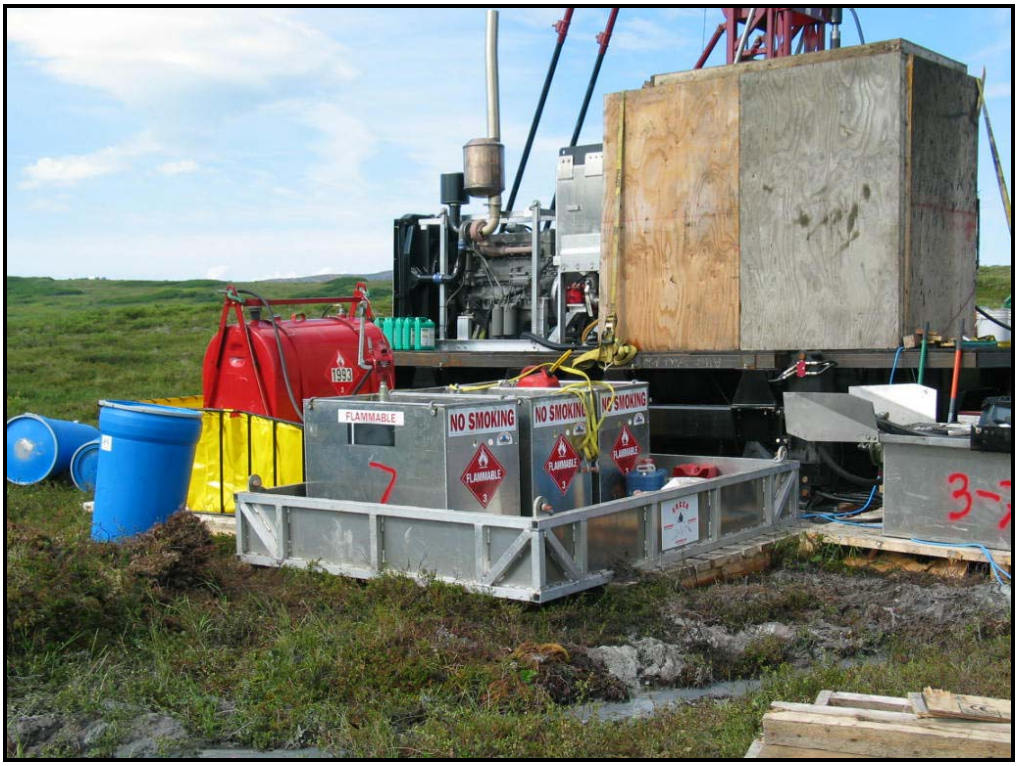

Photo #22. Fuel storage, containment, and spill materials at drill #7.

Photo #23. Sump pump at drill #7. Pump is in a containment structure due to proximity to wetland.

Photo #24. Drill #7 discharge onto tundra.

Photo #25. Drill #7 discharge onto tundra. Water seeps into the ground over a short distance.

Photo #25. Clay residue left on tundra from drilling discharge.

We also inspected drill #1 on the second day. According to the driller's estimate, the hole was making 15-20 gallons of water per minute into the hole, but there was no artesian flow to the surface. There have been no artesian flows from any wells drilled to date in 2007. This hole is located near the 2006 hole that produced a strong artesian flow. (See Southwest Alaska Mine Inspection Tour, 6/14/06-6/16/06 report, by Bill Cole.) Drilling fluids are being pumped approximately 3/8 mile up hill and discharged into a previously dry depression. (See photos #27 and 28.) No drill water is being discharged into any existing water body.

Photo #27. Hose carrying drilling fluids uphill to a topographic depression.

Photo #28. Topographic depression with discharged drilling fluid.

Field Inspection of the Pebble Copper/Gold Project
July 26-27, 2007, Part II

Bill Cole

Drill Hole Reclamation Photos
2004

These photos are of holes over the West Ore Body. They are a few of many that we observed.

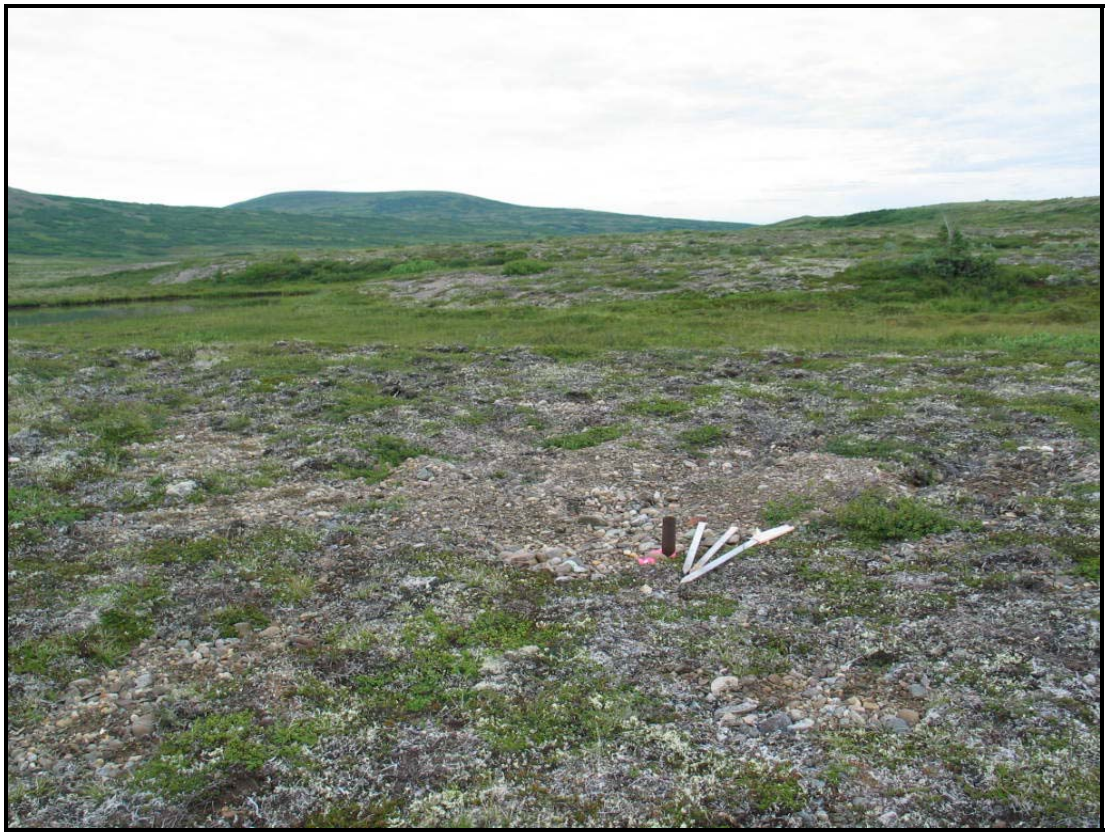

Photo #29. DDH 4136

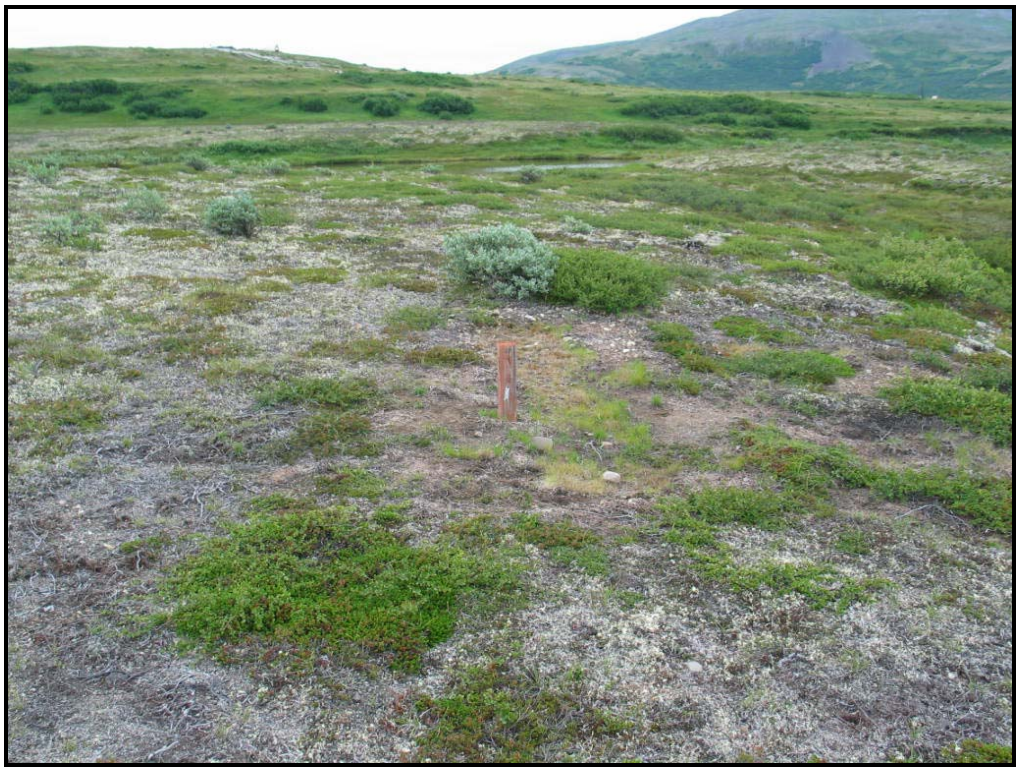

Photo #30. DDH 4155

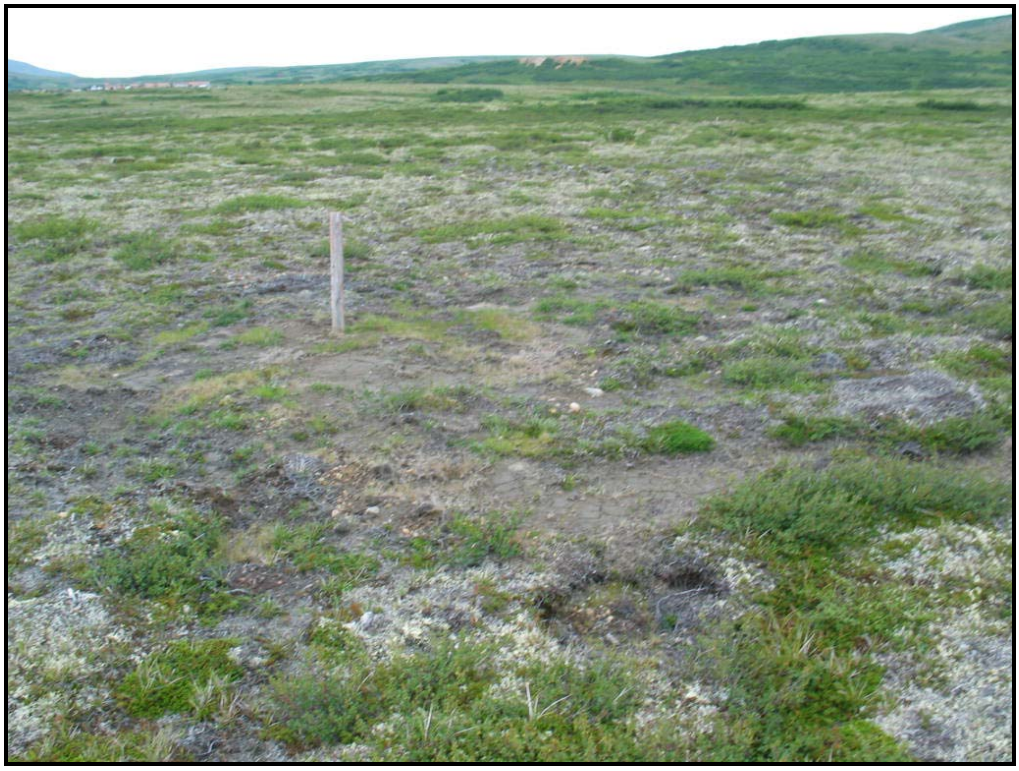

Photo #31. DDH 4176

Photo #32. DDH 4285

Photo #33. DDH 4275

Photo #34. Jeff Rogers of DMLW at DDH 4214. Metal oxides associated with the discovery outcrop can be seen in background.

2006

We only visited one drill site from 2006, DDH 6350.

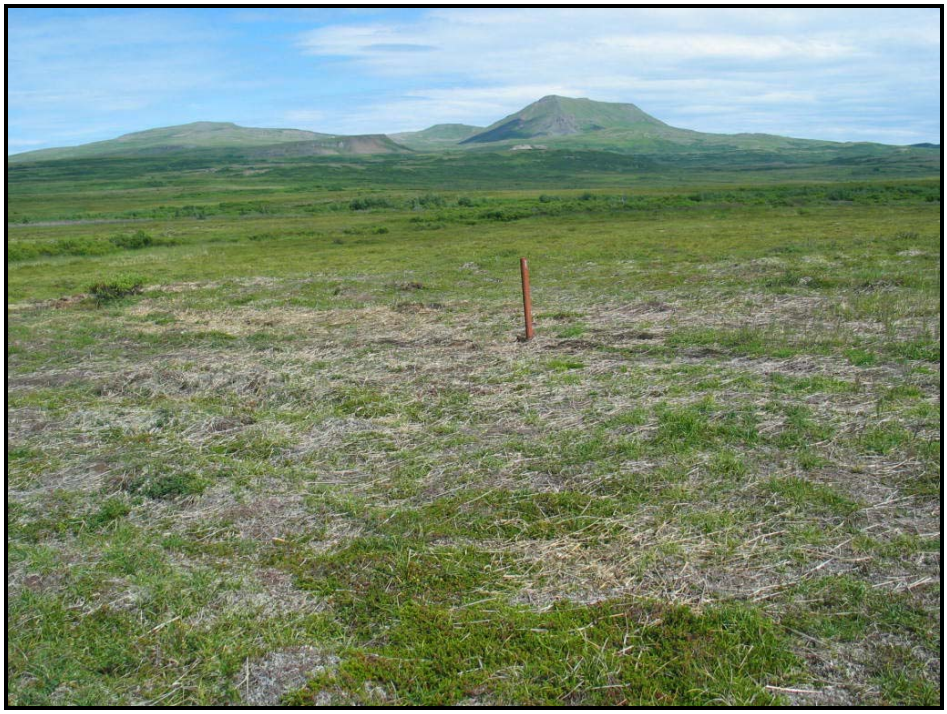

Photo #35. DDH 6350

Photo #36. DDH 6350 reclamation.

Photo #37. DDH 6350 reclamation

2007

Photo #38. DDH 7364

Photo #39. Reclamation at DDH 7364. Site has been treated with straw to prevent erosion, and seeded with grass. Note new vegetation.

Photo #40. Reclamation at DDH 7362.

Photo #41. Reclamation at DDH 7362.

Photo #42. DDH 7361

Photo #43. Reclamation at DDH 7361

Photo #44. Reclamation at DDH 7367

Photo #45. Reclamation at DDH 7367

Photo #46. DDH 7358. This is one of the holes drilled during the spring without a sump.

Photo #47. Reclamation at DDH 7358

Fuel Storage Site at Big Wiggly Lake

Northern Dynasty's main fuel storage facility is located at the informally named Big Wiggly Lake, about 3 ½ miles north of the Pebble deposit. The lake is named for its very irregular shoreline. There are two fuel containments. The older containment holds two 1,000 gallon tanks, and is located 100' from the lake. The newer containment is 200' from the water, and has three 1,000 gallon tanks. (See photos #48 and 49.) Both containment liners have at least 120% capacity relative to the tanks within. All structures are placed on tundra mats except a large white container filled with spill control materials. That container is held above the tundra by 4x4 timbers. (See photos #51 and 54.) There is also a boardwalk from the off loading area to the larger containment. (See photo #49.) In addition to the large container with spill materials, spill kits and scrubber barrels are situated at both containments. There are also float booms to contain any spills onto the lake, and fire extinguishers. (See photos #52 and 53.) A Northern Dynasty employee is stationed at the fuel depot during the work day, and has a quonset hut to work from.

Fuel is transported from Iliamna either by a Beaver on floats in 200 gallon shipments, or by helicopter in the 118 gallon aluminum tanks. The helicopter slung loads are dropped into a lined wooden containment on the tundra mats. There is a helipad and lined containment for slinging fuel tanks at both fuel containment depots. (See photos #48 and 50.) Fuel is pumped from the plane or helicopter slung tanks into the larger storage tanks. In the event of a spill occurring en route from Iliamna, there is a line of containers filled with spill materials extending from Iliamna to Big Wiggly Lake. The last container in the line can be seen from Big Wiggly Lake on a knoll at the north end of Koktuli Mountain. It is a white structure, possibly a container like the one at Big Wiggly, but I did not ask Mr. Cluff about the details.

Two bright blue helicopter pads each with a large "H" can be seen in the Big Wiggly photos. These wooden helipads are placed at many of the drilling sites for the Hughes 500D helicopters to land on. The reason for the pads is that the Hughes 500D's have a downward pointed exhaust that can scorch the tundra when the machine is on the ground.

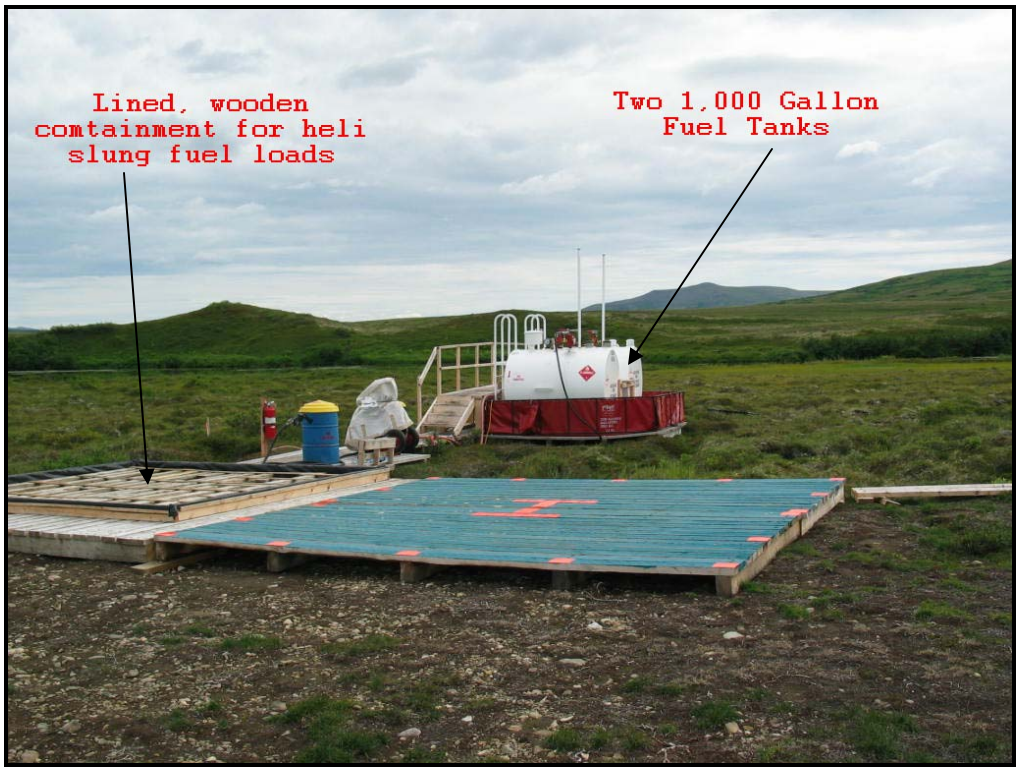

Photo #48. 2,000 gallon fuel containment at Big Wiggly Lake.

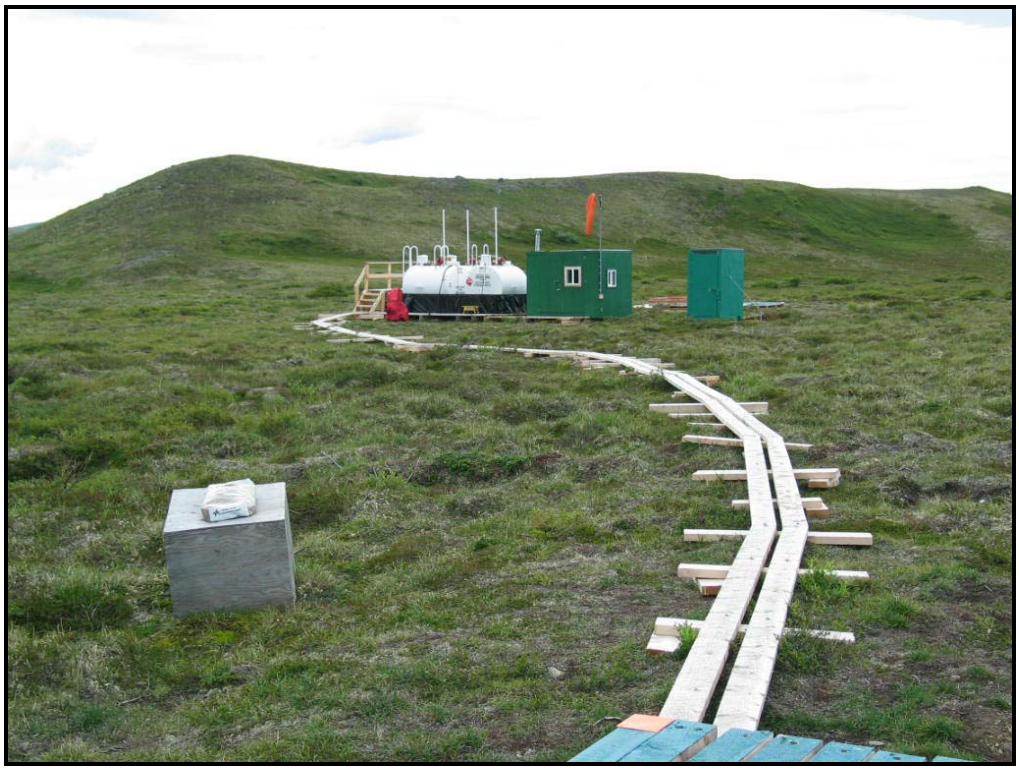

Photo #49. Boardwalk and 3,000 gallon fuel containment depot.

Photo #50. Lined containment for slinging fuel tanks in to 3,000 gallon fuel depot.

Photo #51. Quonset hut and white container filled with spill materials. Big Wiggly Lake is in the background.

Photo #52. One of two float booms for containing fuel spills on Big Wiggly Lake.

Photo #53. Large fire extinguisher at Big Wiggly fuel storage facility.

Photo #54. White container full of spill equipment. A first aid kit is on the door to the right.

Field Inspection of the Pebble Copper/Gold Project
July 26-27, 2007, Part III

Bill Cole

Water Source Photographs

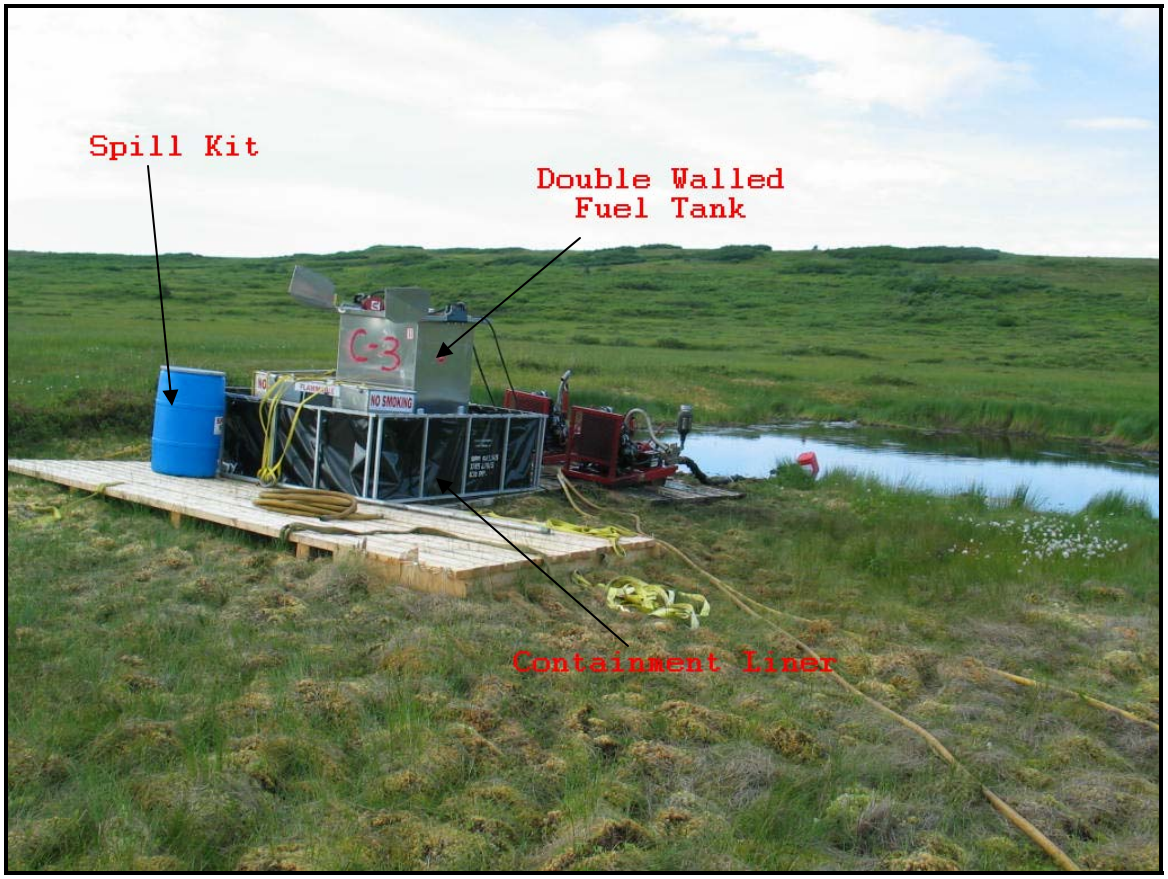

Photo #55. Water pumping facility taking water from a small pond.

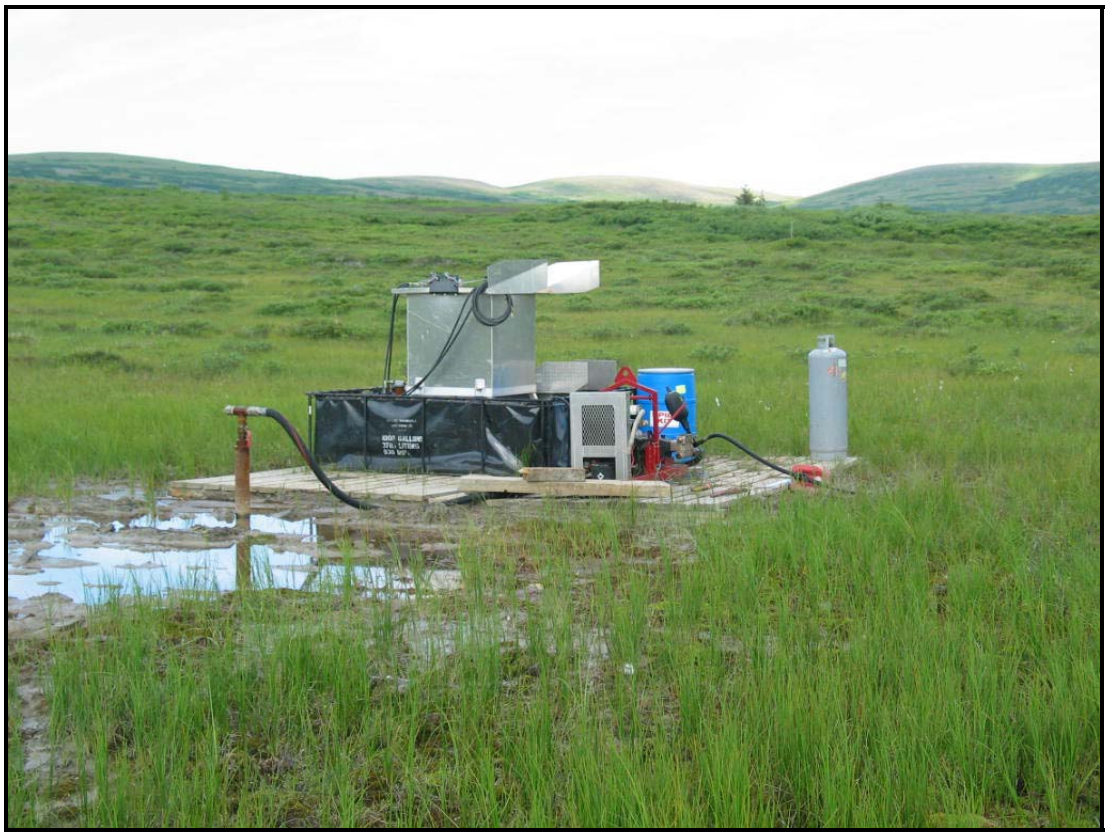

Photo #56. Water pumping facility taking water from a recently drilled hole.

May, 2007 Diesel Spill Site

On May 9, 2007 Northern Dynasty had a small spill of 2-5 gallons of diesel fuel while slinging a fuel tank away from DDH 7366. The tank nozzle caught on the containment wall and broke, spilling the diesel. The diesel spilled onto the tundra approximately 200 yards east southeast of the hole. At the time, the tundra was frozen, so the spill only penetrated a few inches. The light backhoe was used to scoop up the contaminated soil. An area of tundra approximately 7'x10' was removed and taken to Oregon for disposal. The spill was properly reported at the time. We inspected the spill site on July 27th. The soil had a very faint smell of diesel when we held it to our noses, but the site appears to have been cleaned more than adequately. (See photos #57 and 58.)

Northern Dynasty has made several design changes to minimize the chances of this type of spill occurring in the future. Among these changes is the redesign and purchase of top loading double walled tanks, such that the nozzles cannot catch on the containment wall.

Photo #57. May 9, 2007 diesel spill site.

Photo #58. May 9, 2007 diesel spill site.

Upper Talarik Creek

We spent part of the second day walking the Upper Talarik Creek area. We walked down to the creek near where its uppermost tributaries come together. We generally followed the drainage downstream for roughly a half mile, past the area of the May spill. (See photos #59-61.) We saw no inappropriate substances, such as diesel fuel or drilling fluids, in or near the creek. We did not see any fish or large wildlife. There were, however, obvious signs of beaver activity. (See photo #61.)

Photo #59. Uppermost Upper Talarik Creek drainage.

Photo #60. Upper Talarik Creek.

Photo #61. Beaver lodge and dam on Upper Talarik Creek.

Discovery Outcrop

For the most part, the Pebble mineralization does not crop out at the surface, but there is a discovery outcrop located in a wetland area over the West Orebody. It is about 200 yards north of the old exploration camp which is now being used for storage. (See photos #62 and 63.) This outcrop was first sampled by Phil StGeorge of Tec Cominco in the early 1980's. There is heavy iron oxide staining on colluvium over a north-south trending wetland for several hundred feet. (See photos #64 and 65.) There is a small area of broken outcrop toward the south end of the metal oxide stained area. The rock is heavily silicified and veined, with strong clay alteration as well. There are a lot of iron oxides after sulfides, with some cavities after sulfide minerals. (See photo #66.)

In places we noted oily looking bacterial films in the wetland water. These develop due to bacteria metabolizing the iron and manganese. The films can be distinguished from oil because when broken up, they stay broken apart and do not flow back together. (See photo #67.) (Ref: http://pubs.usgs.gov/gip/microbes/intro.html)

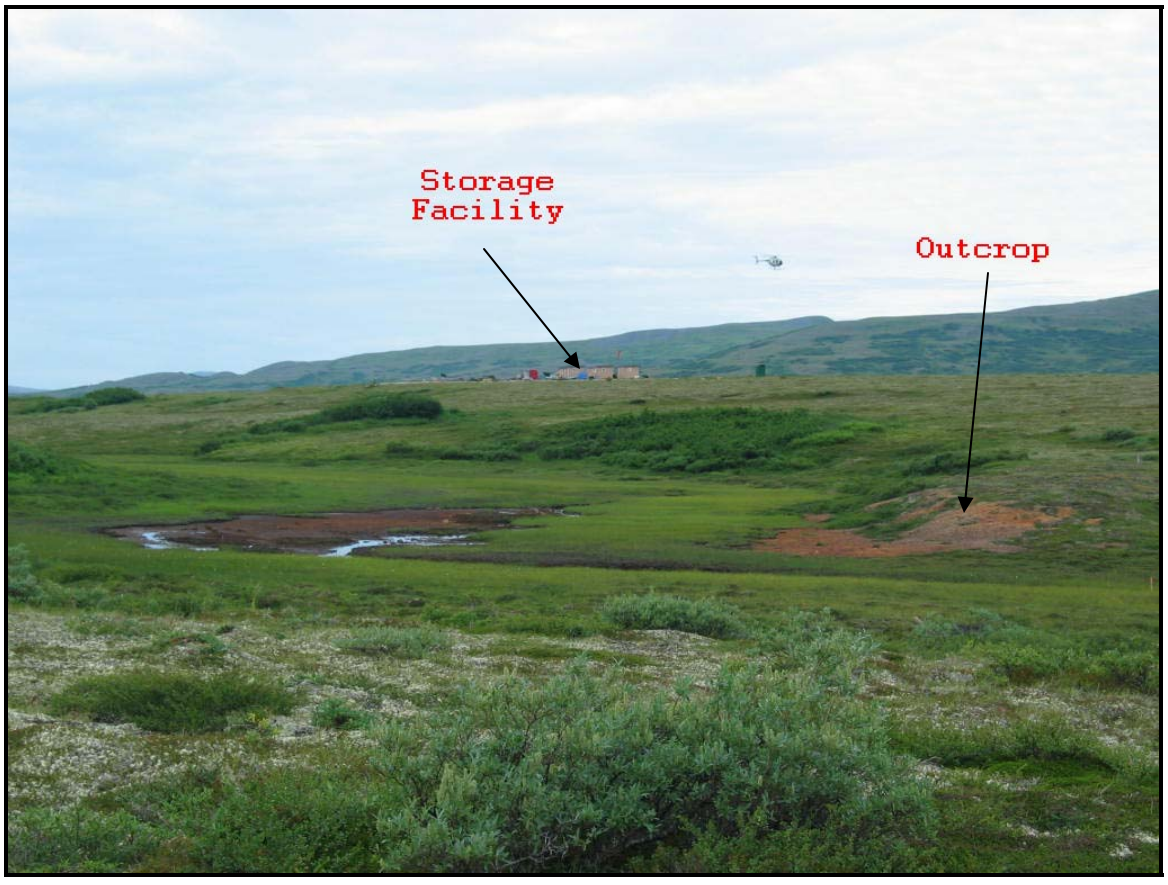

Photo #62. Discovery outcrop.

Photo #63. Discovery outcrop and wetland.

Photo #64. Heavy iron and manganese oxide staining in discovery area.

Photo #65. Iron oxide in wetland near discovery outcrop.

Photo #66. Alteration and veining in outcrop.

Photo #67. Bacterial film due to metabolism of metal oxides.

Storage Facility and Emergency Shelter Photographs

We briefly visited the old exploration camp which is now being used for materials storage and as a possible emergency shelter. Northern Dynasty has a lot of materials stored in the old camp, particularly drill steel. The site is quite active, with helicopters slinging equipment in and out regularly. (See photos #68 and 69.)

Photo #68. Old camp and storage facility over West Orebody.

Photo #69. Drill steel stockpiled at old camp.

Water Line Storage Facility Photographs

Photo #70. Waterline storage area.

Photo #71. Waterline storage facility.

Seismic Program

Northern Dynasty had planned to shoot a 185,000' seismic program in 2007. The purpose of the seismic work was geotechnical, largely to aid in planning dams and the tailings pond. The 2007 program was to have been a continuation of seismic work done in 2006. However, since Northern Dynasty currently does not intend to put their tailings pond in the valley over the deposit and Frying Pan Lake, they are not conducting any seismic work in the area this year.