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**NovaGold Canada Inc.**

→ Grace

TOP  
08.12/06

To: File  
From: Scott Petsel  
RE: The Exploration and Subsequent Condemnation of the Galore Creek Valley Tailings Disposal Facility and Plant Site.  
Date: June 21st, 2006

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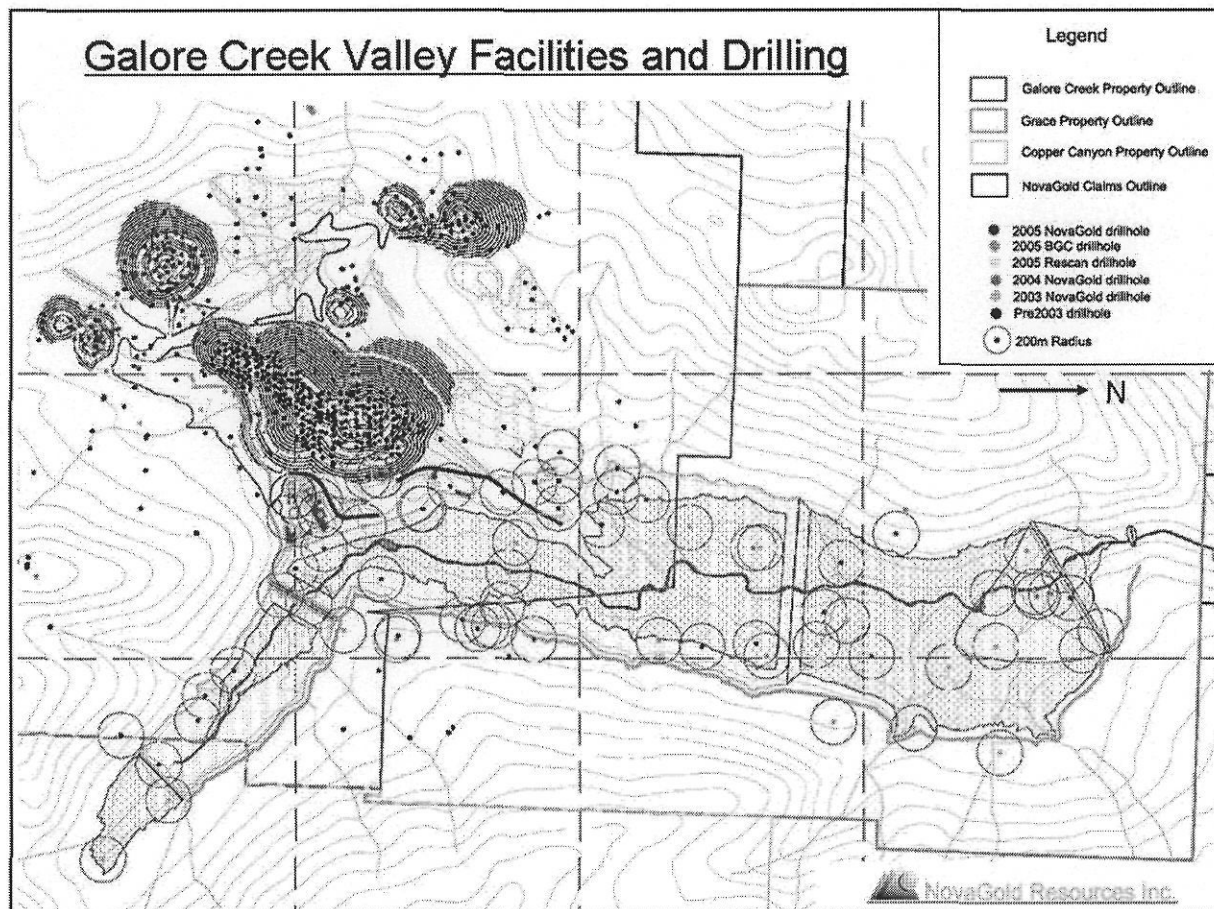
As NovaGold continues to advance the Galore Creek deposit toward final design and eventual construction the question has been raised as to whether the tailings disposal facilities and plant site areas have been adequately explored and thereby condemned. The dam and northern portion of the tailings facility are centered on the Grace claims in the Galore Creek Valley.

To begin the discussion, one must review the brief history of the relevant actions taken on the project since the beginnings of NovaGold's involvement in 2003. An attempt to relate an understanding of the basic geology of the Galore Creek drainage and NovaGold's exploration philosophy and strategy with regards to exploration on the project is also warranted. Geophysics has been used as a major tool to explore the area and is discussed in detail. Results of exploration to date will be reviewed as evidence of condemnation.

We at NovaGold believe the area in consideration, with minimal or no additional work, to be properly explored and condemned by the results to date, so in closing, the adequacy of the work undertaken will be summarized.

Figure 1 below shows the pits, tailings and waste impoundment and plant site facilities along with the drilling done to date on the property. Those holes that are within or bounding the facilities are identified with a larger circle of a 200m radius. This diagram will be the basis of discussion going forward.

Figure 1.



### A Brief History

In the summer of 2003, the Galore Creek project was optioned by NovaGold Resources Inc. from the Stikine Copper Joint Venture. In July of that year, access to the Galore Creek data files was granted by Kennecott, a Stikine Copper partner. A review of these files began for the development of general knowledge about the property prior to the commencement of field work slated for September of 2003. During the geologist's data review process much data, in the vaults of Kennecott's data room, was reviewed on surrounding properties. These properties included Eagle Plains' Copper Canyon Deposit and the Grace Claims of Pioneer Metals. The success of the 2003 drilling combined with the enthusiasm of the geologic staff for the exploration potential

of the surrounding ground prompted NovaGold to begin efforts to consolidate the district. Copper Canyon was an obvious acquisition target due to the significant drill intercepts and historic mineral inventory on the property. The Pioneer claims were also a good candidate for acquisition for a range of reasons that included; the proximity of the claims to Galore, the elongate trend of mineralization from the Central Zone to the NNE towards the Grace Claims, and known historical exploration activities on the site. A report in the Kennecott Data room, detailing geophysical work that had been done to date in the Galore Creek area and showing overlapping high magnetite and IP chargeability anomalies at Grace, that at the time were thought to be an indication of potential mineralization, specifically piqued the geologist's interests. Based on this data the recommendation was made to management to option the Pioneer ground.

In late 2003 the first discussions in the process of negotiations regarding the acquisition of separate claim groups in the Copper Canyon area from Silver Standard Inc. and Eagle Plains Resources were held. Discussions to acquire the Pioneer ground took place in late 2003, concurrent with discussions regarding the acquisition of Copper Canyon claims and were concluded by April 2004. In early 2004, plans were initiated to fly an airborne geophysical survey and to complete ground IP surveys on the Galore and Grace properties. After discussions with Pioneer, they provided NovaGold with a small portion of an airborne geophysical survey conducted over the Trophy claims that crossed a small portion of the Grace claims. This data was captured off old tapes drives they had acquired which were mostly corrupted. NovaGold already possessed an airborne survey over the core Kennecott holdings. Both NovaGold and Pioneer were of the belief that a combination of airborne magnetics and ground based IP surveys could help define new targets and/or better refine existing targets. Specific areas targeted were the northeastern projection of the Central Zone deposit on both the Galore and Grace Claim blocks. At that time the Pioneer ground was a very high priority exploration target.

Also during the 2004 field season, Hatch engineers were working to complete a scoping level engineering study for the Galore Creek resource. This work included detailed engineering

studies, environmental base line studies and geotechnical field work. Preliminary studies identified eleven different possible sites for tailings disposal. During the 2004 field season this was narrowed down to three areas for placing tailings: the More Creek drainage, Galore Creek Valley and Contact Creek west of Galore. At that time, the Galore Valley site was considered the third option because of its high priority exploration potential.

In the early summer of 2004 the ground and airborne geophysical surveys were being completed and geotechnical characterization of the potential dam sites was being initiated with drilling of dam foundations in the More Creek valley. Airborne surveys were completed by Fugro and the ground IP work by Frontier Geosciences. As the summer progressed drill targets were generated from the ground geophysical surveys which showed strong Induced Polarization (IP) highs indicating high sulfide concentrations. Drills were located on the highest potential target areas.

Concurrently with the exploration, geotechnical teams under BGC were realizing the dam foundations in both More Creek and Contact Creek were located in karst topography and were unsuitable for the intended purpose. Their focus for tailing disposal was re-trained on the Galore Creek valley. A reasonable assessment of the mineral potential down the valley was required from the Grace exploration drilling to allow for the engineers and geotechnical crews to pursue the valley as its number one option. The discussion continued until late in the summer of 2004 and the completion of all the drilling in the area of the tailings impoundment facility. The results of the 2004 drilling program on Pioneer Ground were disappointing. NovaGold knew that not all of the potential targets had been thoroughly discounted but the high priority targets generated from the IP geophysics had been significantly downgraded. IP was in 2004, the primary tool for target generation given the lack of exposure due to the high degree of glacial cover in the valley and due to delays in completion of the airborne magnetic and radiometric surveys. The IP survey was limited in scope from steep topography such that the survey was oriented just down the axis of the valley. Significant land remains to be explored away from the easier accessible axis of the valley. The over-riding implication is that the large IP anomalies generated were only pyrite

occurring marginally around the system, the so-called pyrite halo seen in porphyry systems around the world.

From this work engineering plans for the valley were allowed to continue given several factors; 1) the poor drill results, 2) the geologic implications toward condemnation and, 3) a simple analysis of the deposit size required to displace the dam's location into another valley. It was quite obvious that a Central Zone-sized deposit (2.5km X 600m) would not likely be found, given the current drill spacing and the size of the potassic alteration. Anything less would have challenges in development; the steep valley slopes acting to increasing the strip ratio and the thick section of overburden material in the area requiring shallower pit angles make the economics of a discovery in the valley bottom highly questionable.

During the winter of 2004/2005 the complete dataset for work completed on the Pioneer ground and the new property-wide airborne geophysical survey was released to Pioneer. NovaGold also released proprietary airborne data for Galore itself to aid Pioneer in their assessment. Pioneer, through their VP of exploration, possessed strong geophysical expertise and NovaGold welcomed their added insight. Due to that expertise NovaGold asked Pioneer to suggest added drilling based on their interpretation of the airborne data. Those recommendations were subsequently received and drilled during the 2005 field season. Additional drilling, based on the 2004 IP survey as well as evolving stratigraphic knowledge of the district, lead to other added exploration holes at Grace. During the 2005 field season geotechnical characterization of the foundation for the potential dam in the Galore Creek Valley began and drilling continued to explore the remaining targets in the valley. Again exploration results were disappointing.

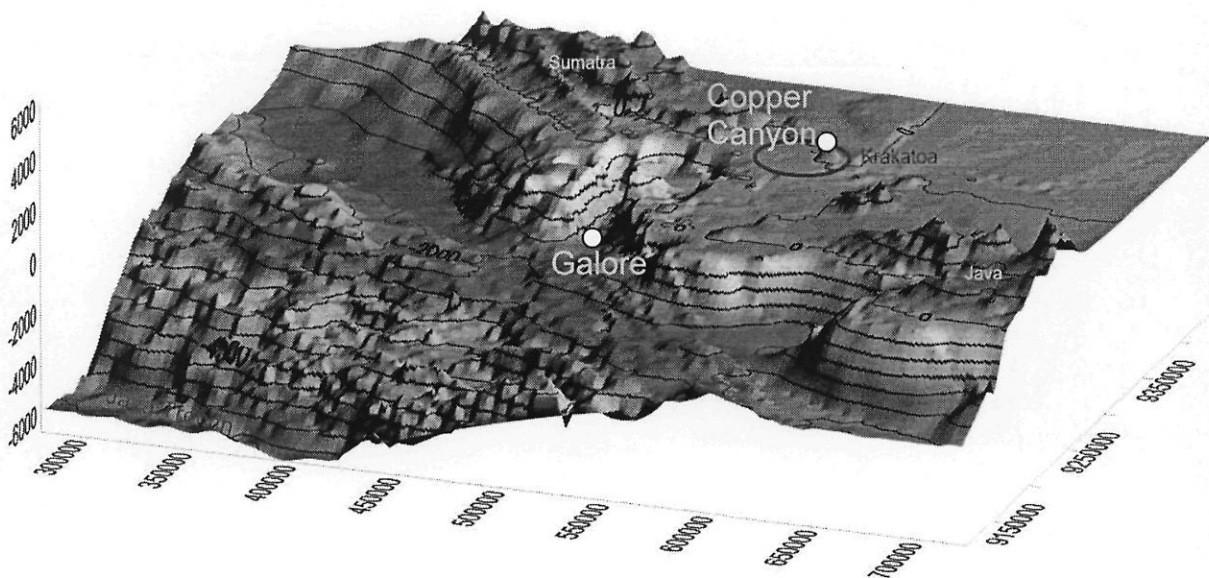
## **The Geology**

The current thoughts on the deposits geology, found here in summarized form, differ slightly from the historic interpretations on the depositional setting of the volcanic rocks and their controls of mineralization on the property. A more detailed geologic analysis with some

background on our current interpretation can be found in many recent reports, including the Environmental Impact Assessment.

NovaGold geologists have had the luxury few previous workers have had - a consolidated property package consisting of the Copper Canyon deposit, the Grace Claims and the Galore Creek property. This has allowed comprehensive analysis of the geology in a larger context. Historically, workers have considered the mineralized Galore Creek intrusive complex in the Galore Creek valley as the center of a 200 million year old volcanic edifice. From recent work by NovaGold geologists it is believed that Copper Canyon was a sub-aerial or shallow water eruptive center during the time of volcanic activity and mineralization (Figure 2).

**Figure 2.**



This view is supported by the mapping and documentation of Plinian tuffs, interbedded lahars and sandstone units. Between Copper Canyon and Galore Creek there is an abrupt change in the depositional environment and the “volcanic” rocks take on characteristics of resedimentation by mass gravity flow of clastic and volcaniclastic material into a deeper water basin flanking the eruptive center. Supporting evidence exists in the form of reworked volcanics as unidirectional

flute casts, moderate sorting and graded bedding in the units. Further supporting this analysis is the recognition of pillow lavas in the Galore Basin sequence.

The deep water or sub-wave base environment was the result of the development of a third-order riedel basin in the present day Galore Creek Valley that formed under N-S directed compression at 200Ma. A series of parallel faults structures up the east side of the Galore Creek valley and underneath the glacier in the valley east of S110 Creek, mark the trace of the controlling structure and the basin transition. As the basin was developing volcanic material was being shed into from the Copper Canyon eruptive center and the focused extension which formed the basin allowed for the rapid emplacement the Galore Creek intrusive complex and the circulation of mineralized fluids.

The Galore Creek intrusive complex, consisting of four major and possibly twelve different pulses of intrusive activity, is limited in extent to the 3<sup>rd</sup> order basin developed under N-S compression. Each intrusive pulse has some documented relation to the mineralizing fluids, but the general account is that the earlier intrusions were responsible for the higher concentrations of mineralization and associated alteration. The mineralized fluids associated with these early intrusives took advantage of specific parts of the stratigraphy which, in the Galore Creek Valley consists largely, as mentioned above, of reworked volcanic rocks being shed from the Copper Canyon eruptive center. Three main groups of stratigraphy are found in the central part of the Galore Valley they are: V1 (mafic volcanic lavas and their reworked equivalents), V2 (pseudolucite bearing volcanics, possibly a hypabyssal dome) and V3 (orthoclase-bearing volcanics and their reworked equivalents). Each of these units can host mineralization but the bulk of higher grades and increased alteration are found typically in the V2 near the V1 contact.

The V2 unit was a highly unstable and fluid receptive unit which has undergone a great deal of potassic alteration. Associated with mineralization in the core of the deposit is an intense potassic alteration with increased biotite. The presence of these elements would be a primary indicator of proximity to a potential mineralized body. Alteration is zoned outward from a potassic core to an un-mineralized distal propylitic halo consisting of elevated pyrite, chlorite and epidote typically

seen on the Grace Claims in the northern part of the Galore Valley. Possibly later phases of mineralization occurred in late breccia bodies around the margins of the intrusive complex.

So a simple Galore-style exploration model has been established based on the formational setting of the deposit. Required elements for a Galore Creek porphyry-style, disseminated mineralized body (excluding Copper Canyon) are:

- 1) Proximity of the early stage Mid-Jurassic intrusions,
- 2) Existence of these intrusions in the structural confines of the Galore sub-aqueous basin,
- 3) Receptive lithologies (dominantly V2 near the V1 contact),
- 4) Intense K-spar-Biotite alteration. Uncharacteristic of many alkaline deposits the Galore Creek system has a very large K-spar alteration footprint which easily identifies one as “within the system”.

When these conditions are met anomalous values of copper and gold in core sampling will almost always be present. Other obvious factors affecting exploration vectors include fluid temperature based on mineralogy, the geophysical response of the rocks, and post-mineral structure.

Other mineralized systems can be identified with differing exploration models such as the intrusive proximal mineralized breccias and later vein systems that crosscut the Jurassic Galore Creek system.

### **Geophysical Interpretation**

Due to the lack of exposure, or outward expressions of mineralization in the lower Galore Valley, geophysics has been utilized as the best exploration tool available to target potential mineralized bodies. An extensive amount of geophysical data has been collected in the area of the tailings impoundment during the last three years to build on surveys conducted historically. In 2004, 500 linear kilometers of helicopter-borne geophysical surveys, measuring radiometric and



electromagnetic responses, and over 35km of ground-based, induced polarization (IP) surveys were conducted. In 2005, a reconnaissance IP survey was conducted to broaden the IP coverage in the areas of rough terrain where traditional linear surveys could not be carried out. Since 2004 NovaGold has employed an experienced in-house Geophysicist to complete expert oversight and interpretation of the geophysical work completed on the property.

IP methods have undoubtedly been the best ground-based geophysical technique for identifying buried metalliferous zones. Whether measured as PFE, Chargeability, or Phase, induced polarization is a measure of the frequency dependence of the electrical resistivity of the ground at low frequency. In mineralized rocks the frequency dependence is largely a result of electrons transferring from ions moving in pore fluids under the influence of an applied current to metallic grains along pore paths. The primary source of the IP response is the presence of metallic minerals namely pyrite in the lower Galore Valley and Grace claims. Anomalous responses that are sometimes associated with certain clays, limestones, ilmenite, titaniferous magnetite, graphite and serpentinite, are not known associates at Galore due to their lack of adequate volume or existence.

Many of the Induced polarization anomalies outside of known mineralization, which were mapped during the 2004 and 2005 IP/resistivity surveys, were tested by drilling in 2005. In general, the resistivity model was an accurate predictor of the depth to competent rock and IP was a good predictor of the presence of sulfide minerals, but not a good predictor of the quantity or type of mineralization. After the completion of many surveys and analysis, Geophysical techniques at Galore have in general been poor indicators of mineralization as mineralization at Galore Creek occurs over a large area in a variety geophysical settings and has a broad range of geophysical responses. The geophysical responses are being influenced by the combined effects of geology, structures, alteration, and mineralization. Regional scale airborne surveys and ground geophysical surveys have been used to follow-up on targets generated from prospecting and geochemistry, with almost all of the accessible ground in this rugged and challenging terrain

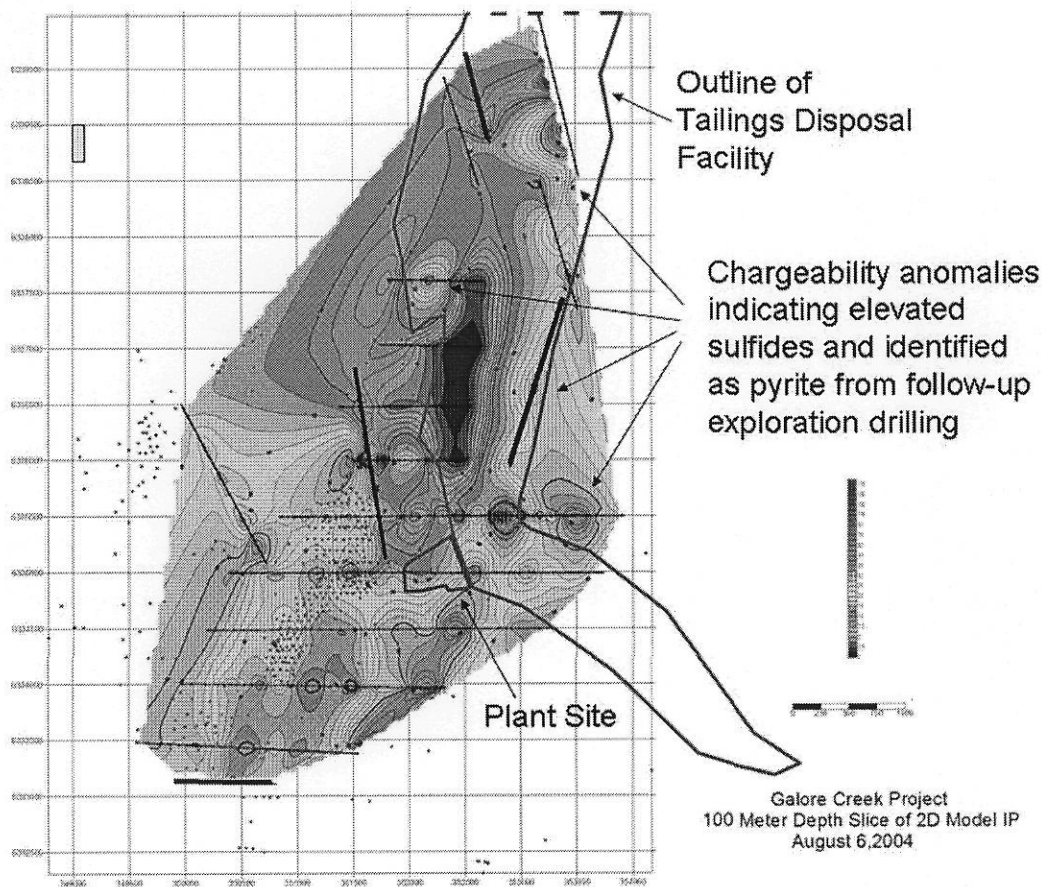
seeing at least some work. Some of the geophysical characteristics of known mineralization at Galore Creek are:

- ☞ Associated with the boundary of long wavelength aeromagnetic magnetic lows: the Central Zone, the Bountiful Zone, the West Fork Zone, the Southwest Zone, and the Copper Canyon Property.
- ☞ Associated with the axis of long wavelength aeromagnetic highs: North Rim, Junction, Butte, and Saddle.
- ☞ Associated with small high amplitude ground magnetic anomalies: the Opulent Vein.
- ☞ Associated with or near Potassium Radiometric anomalies: all zones.
- ☞ Associated with resistivity lows or the boundary of resistivity lows: all zones except North Rim, and Saddle. We have no current information on Copper Canyon.
- ☞ Associated with weak to moderate IP anomalies: all zones tested.

In the area of the tailings impoundment facility, drill results indicate disseminated and fracture filled pyrite (0.1-15%) as the primary cause of increased chargeability values observed within anomalous zones for all of the 2005 drill targets. Recommendations for drilling from Pioneer Metal's Vice President of Exploration, Pat McGowan, a geophysicist, following a detailed review of the existing data on a combination of the above mentioned factors turned up similar disappointing results. Based entirely on the drill results from geophysical IP targets alone, the area could be considered of low exploration potential or thus condemned.

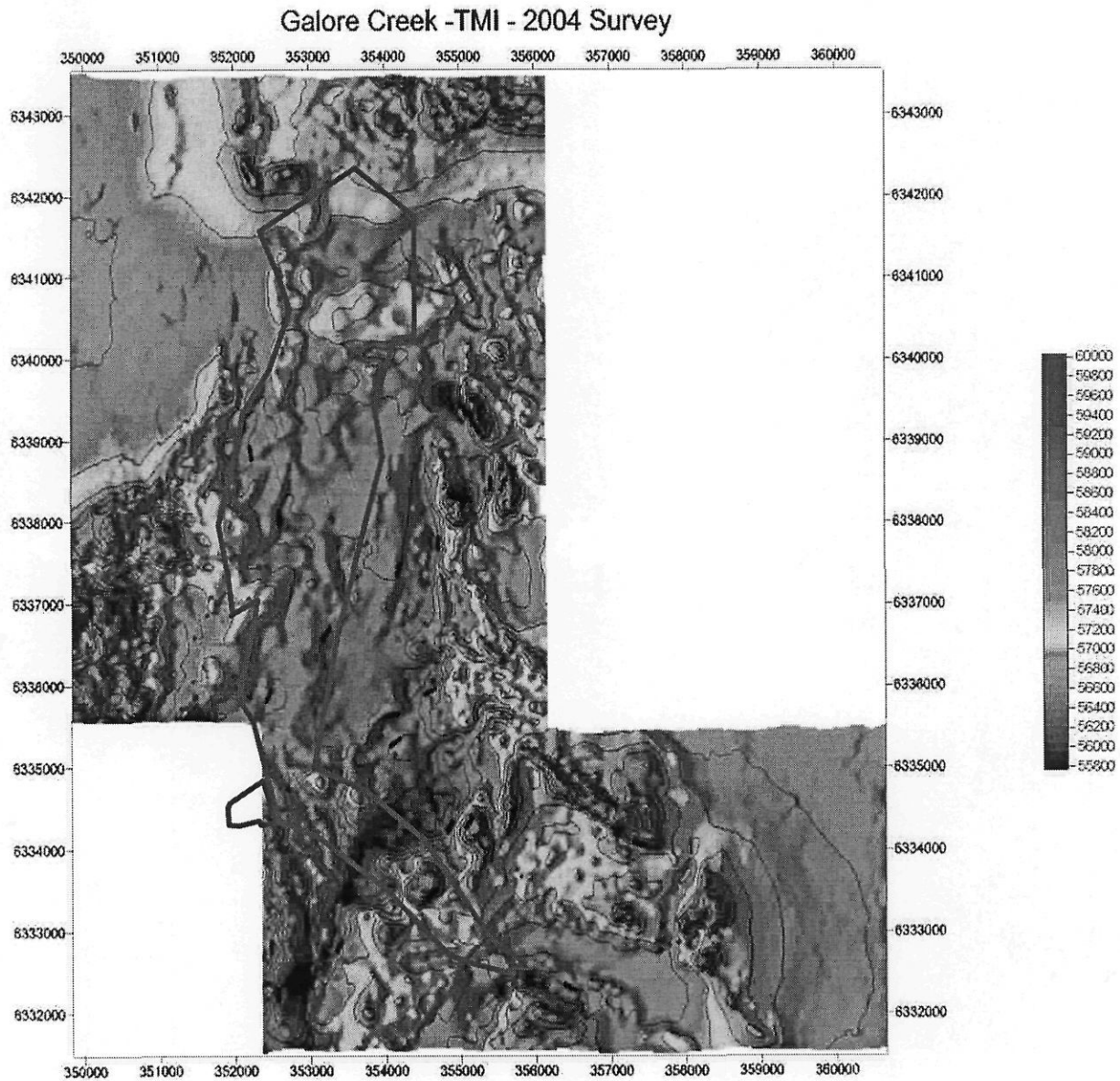
The figure below (Figure 3) shows a plan slice of the IP data collected in 2004 and the outline of the tailings disposal facility.

Figure 3.



Magnetic and radiometric data have not been ignored. Data from the 2004 aeromagnetic and radiometric survey completed by Fugro Airborne Surveys and the 1991 airborne survey (Figure 4) suggests intrusive units have higher magnetic responses, compared to volcanic units with relatively low magnetic responses. Prospecting the boundaries between these two units was considered a high priority due to the same condition occurring in the Central Zone. Several of the IP targets were located near regional scale magnetic high/low boundaries. Magnetic responses at Galore are typically due to the complex response of a combination of primary lithologic, stratigraphic and alteration/mineralization sources that are difficult to characterize and are not necessarily vectors to mineralization. These targets were drilled in 2004-05 without success.

Figure 4.



Several holes were drilled in the East Fork of Galore Creek in order to define the cause of regional magnetic highs within the area. Two holes were completed in order to test a N-S trending magnetic high below Saddle ridge. Both holes contained late to post-mineral intrusive units and weak magnetic values associated with disseminated magnetite as an accessory mineral.

In summary, all the geophysical parameters that could be interpreted to be an indication of potential mineralization in the Galore Creek tailings disposal area have been drill tested and do not contain copper-bearing sulfides. IP responses are generally dictated by increased pyrite in the large distal propylitic halo of the Galore Creek deposit and magnetic anomalies can be attributed to primary characteristics of different lithologies with occasional minor accessory magnetite. Very shallow looking radiometric survey results only show a potassium anomaly down the middle of the Galore Creek drainage and are interpreted to represent stream deposits from eroded K-spar altered areas of the Galore Creek deposit.

### **The Potential for Mineralization in the Lower Galore Valley area of the Tailings Impoundment**

While the upper reaches of the Galore Creek have good exposure to outcrops, exposure in the lower section is limited to the immediate creek canyon walls, much of which is difficult to access. Geologic understanding of the area is gained from previous drilling and interpretive efforts to extrapolate information from mapped exposures higher on the valley ridges and historic drilling. It is apparent from surface mapping that the bulk of the tailings impoundment is within the Galore sub-aqueous basin. The likely basin forming growth fault structure has been traced along the eastern wall of the Galore valley. This old structural zone which, is defined by the transition to deep water sediments from surficial deposits of pyroclastic material, crosses the eastern fork of the Galore Creek and the southeastern most end of the impoundment facilities and implies potential for continuation of the key receptive lithologies within the basin extending from the south.

Several 2005 drill targets within the area were generated to locate receptive lithologies (V1-V2) as well as mineralization and alteration assemblages favorable to increased copper and gold values similar to the Galore Creek deposit.

As mentioned in a previous section, the Galore Creek deposit contains increased copper and gold mineralization within the stratigraphic section near the contact of the augite bearing volcanics (V1) and pseudoleucite bearing volcanics (V2). Significant potassic alteration characterized by an assemblage of biotite, magnetite and K-feldspar is integral to economic mineralization. Though previous drilling and mapping have not shown the (V2) unit within vicinity of the tailings disposal area, the section had never been specifically tested until 2005.

Holes drilled east and west of Galore Creek within its lower reaches show extensive propylitic alteration that dominates augite bearing (V1) and aphyric mafic volcanics (V4) and overlying sediment packages of conglomerate (S1), greywacke (S3), epiclastic volcanics (S6), and diamictite (S7). Locally, these units are crosscut by orthoclase syenite (i9), aphyric mafic (D2), and lamprophyre (D1) dykes that range from less than a meter to five meters in width. Units in drill core somewhat correlate with the package of epiclastic sediments derived from mafic volcanic units mapped on the surface by NovaGold field geologists as well as work completed by Gigi Resources Ltd. (Caulfield, Archambault, 1990), (Dunn 1992 and 1993), (Hill and Visser in 1997). As drilling progressed to the North, mafic volcanic strata give way to orthoclase bearing volcanic strata (V3). No indication of the V2 unit, even as clasts within the sediment packages was observed in drill core or field reconnaissance within the area.

To date, drilling within the Grace area exhibits ~~no significant~~ potassic alteration or copper and gold mineralization similar to the Galore Creek deposit. Instead, all drill holes show an extensive development of chlorite and epidote; alteration minerals generally associated with the propylitic halo of the Galore Creek deposit.

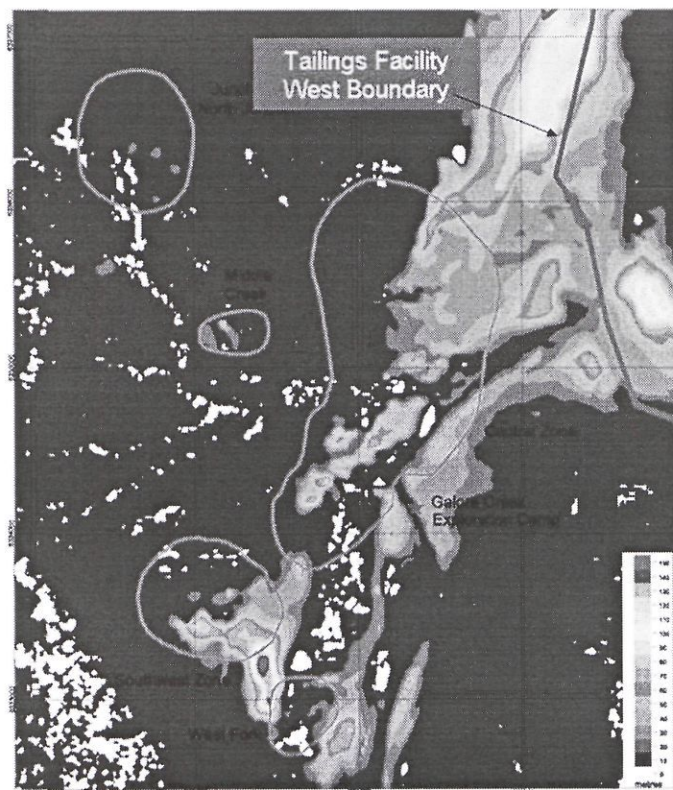
Anomalous copper and gold values have been encountered in several drill holes particularly on the east side of Galore Creek within the Grace 5 (404922) claim block to the east and not directly, under the tailings facility. These values are associated with veins and stringers of pyrite within and proximal to fault structures. Trace chalcopyrite and minor elevated levels of magnetite, epidote and quartz are also observed in these zones. Follow-up of these intercepts are not a

priority since the low grade gold values without copper do not meet economic thresholds for a copper concentrate producing facility.

The targeted IP anomalies are easily attributable to the high quantity of pyrite. The holes commonly contain 1-2%, with rare examples exhibiting up to 12 %, disseminated pyrite in select zones. These isolated occurrences of veinlet-restricted higher-level alteration and associated spurious gold values reflect typical occurrences in marginal, propylitically altered areas of porphyry deposits.

Adding to the challenge of development in the lower Galore Valley is the deepening overburden which increases pre-strip requirements. A map showing the overburden thickness can be found in Figure 5.

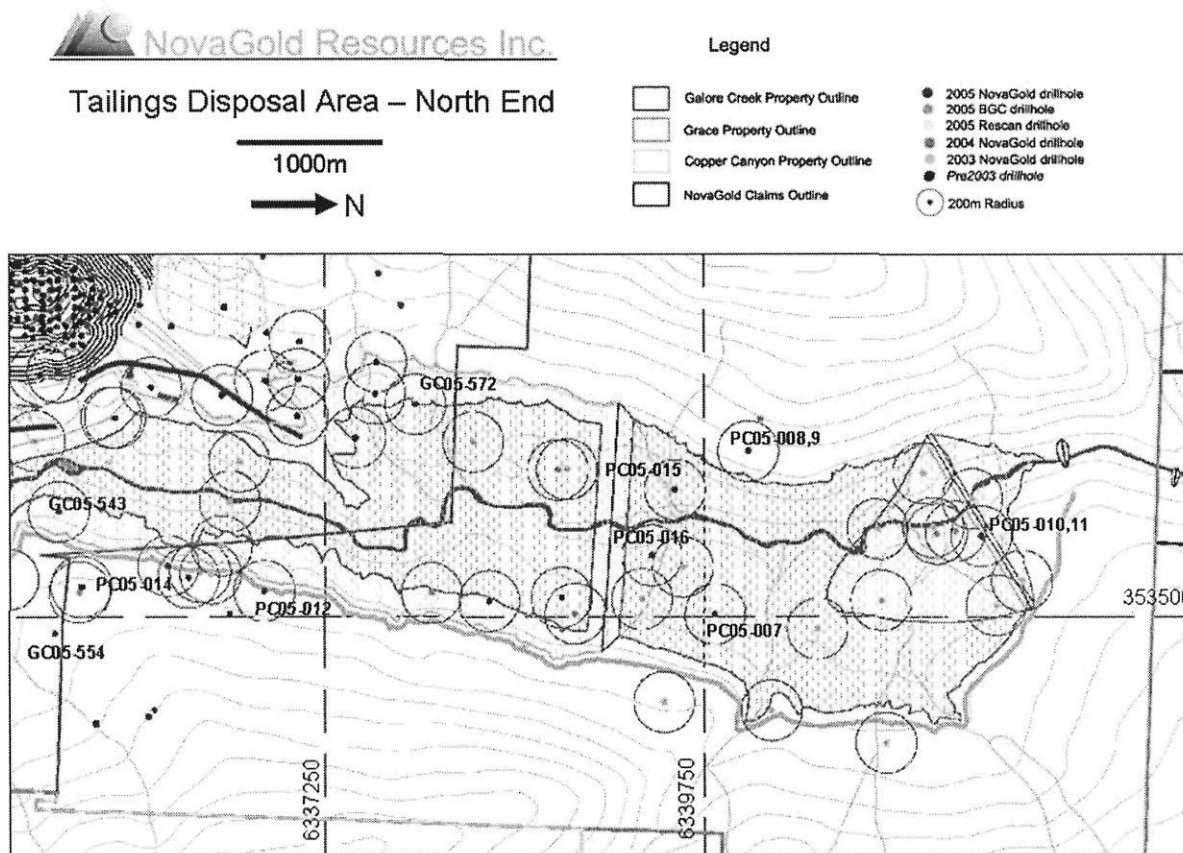
**Figure 5.**



Galore Creek Project  
Isopach Map of the Overburden

The 2005 exploration holes drilled in the area are described below. The location of these holes can be seen in Figure 6.

**Figure 6.**



**PC05-0007:**

DDH PC05-0007 was designed by Pioneer Metals Inc. to test a magnetic low observed in the 2004 aeromagnetic and radiometric survey. Lithologies consisted of interbedded, strongly propylitic altered, polyolithic Diamictite (S7) and Augite Bearing Volcanics (V1). Mineralization within the units was restricted to trace amounts of disseminated pyrite. Low magnetic values were recorded in drill core and correlate to the 2004 aeromagnetic survey data. No significant results were returned.



**PC05-0008:**

DDH PC05-0008 was designed by Pioneer Metals Inc. to test a magnetic high east of the collar location. Lithologies consisted of propylitic altered Augite Bearing Volcanics (V1), crosscut by an Orthoclase Bearing Syenite Mega-porphyry (i9). Mineralization within the hole consisted of trace disseminations and blebs of pyrite with a local interval of increased pyrite mineralization (10%) associated with and proximal to gougy fault structures. Increased magnetic values were recorded within and proximal to the i9 intrusive unit. No significant results were returned.

**PC05-0009:**

DDH PC05-0009 was designed by Pioneer Metals Inc. to test a chargeability high and magnetic low to the west. The entire hole consisted of a propylitic altered Augite Bearing flow top breccia (V1c). Mineralization was restricted to pyrite and occurred as a 100m wide zone of quartz-pyrite-calcite veins and stringers observed at 40° to 60° to core axis. One interval contained 20% pyrite; however anomalous gold values assayed within this interval were extremely low. This may be a fluid brecciation zone related to a nearby structure. The amount of pyrite within this zone is the primary cause for the high chargeability values observed in this area. Low magnetic values recorded in drill core correlate to the 2004 airborne magnetic survey data. No significant results were returned.

**PC05-0010:**

DDH PC05-0010 was designed by Pioneer Metals Inc. as to test a magnetic low to the west. Location of the primary collar was positioned within a steep SW facing cut bank; therefore collar was moved 200m east. The entire hole consisted of a strong, propylitic altered Orthoclase Bearing Volcanic (V3). Dissemination and blebby pyrite mineralization was observed throughout the hole with local increases proximal to fault structures. Low magnetic values recorded in drill core correlate to the 2004 airborne magnetic survey data. No significant results were returned. No significant results were returned.

**PC05-0011:**

DDH PC05-0011 was designed by Pioneer Metals Inc. to test a magnetic high to the east. As with the above hole, location of the primary collar was positioned within a steep SW facing cut bank; therefore collar was moved 200m east. Lithology within this hole also consisted of a strong, propylitic altered Orthoclase Bearing Volcanic (V3). Mineralization encountered was similar to PC05-0010 with a decrease in pyrite. Moderate magnetic values were recorded in drill core correlate to the magnetic high in the 2004 airborne magnetic survey. No significant results were returned.