Report Summarizing

Landsat MSS Image Processing and Interpretation

Siwash Creek Property
Similkameen Mining Division

British Columbia, Canada

for
International Tower Hill Mines, Ltd.

PART 3 OF 3

23252

by
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SIWASH CREEK LANDSAT SURVEY

1.0 Introduction and Purpose

Wolf Creek Exploration Company is pleased to provide International Tower Hill Mines, Ltd. this survey of Landsat and other data on their Siwash Creek Property in south central British Columbia, Canada.

Landsat Multispectral Scanner (MSS) digital imagery was obtained for the project interest area, designated as centered at North Latitude 49.78 degrees and West Longitude 120.33 degrees. The area is located approximately 90 km northeast of Princeton, British Columbia, Canada. The purpose of the project was to obtain Landsat MSS imagery, perform digital enhancements, generate hard copy film/photo products, and analyze the imagery along with other remote sensing data in a search for mineral deposits. For information on the geology of the area, the reader is referred to reports by Grove (1989) and Reynolds (1992).

The work described in this report includes the following:

1. Analysis of geological information; including information on ore deposits in the region and site area, geological maps, and company reports.

2. Analysis of satellite imagery in order to identify possible hydrothermal altered areas, areas of exclusive vegetative cover, and linear features.

3. Analysis of aeromagnetic maps published by the Geological Survey of Canada.

This work was done at a scale of 1:250,000 and therefore is regional in nature. It attempts to place the site in a regional geological and geophysical framework, and to identify site and regional anomalies which could lead to large, open pittable ore deposits. The survey is the initial step in evaluating the site for further development.

2.0 Landsat Data

2.1 General

Landsat MSS imagery exists from five separate satellite missions, the first launched in 1972. Landsat MSS data possesses four channels or bands of information: visible green, visible red, and two near-infrared (IR). These bands collect specific intervals of electromagnetic energy, reflected from the earth's surface. The MSS bands from the first three Landsat missions are designated Bands 4, 5, 6, and 7 (green, red, and two near IR respectively); MSS bands from Landsats 4 & 5 are named indicated as 1, 2, 3, and 4 (green, red, and two near IR).

The ground resolution of the MSS is governed by the picture element (pixel) size, which in the case of MSS imagery is generally thought of as 79 m. However, each MSS pixel has a "footprint" of 79 m by 57 m. In computer-rectifying the imagery to north, MSS pixels can be digitally resampled to 57-meters square, thereby emulating a 57-meter ground resolution.

When referring to any digital imagery for geologic analysis, it is important to emphasize the difference between spatial and spectral resolutions. Spatial resolution refers to the scanner's pixel size and, therefore, what size of features that can be observed. For geologic interpretation, the spatial resolution directly effects the type and size of structures that can be resolved (i.e., faults, folds, strike/dip, fractures, joint patterns, foliation). Spectral resolutions relates to the type of bands or spectral intervals that the scanner records. For geology, the spectral resolution will directly impact lithologic discrimination, alteration mapping, vegetation & stress condition determination, and other surficial composition observations.

Landsat MSS data are obtained from the Earth Observation Satellite Company (EOSAT), and imagery costs vary according to current fee schedules and acquisition date. MSS (and other airborne and satellite data) are generally archived at the EROS Data Center.

Digital MSS for this project was obtained on 9-track magnetic tape at 6250 bpi. Other attributes are as follows:

Path/Row:	46/26
Date:	10/10/82
Scene Id:	#4008618223
Scene Center:	N48-51, W121-11

The scene was observed to possess a "herringbone" noise pattern in the visible bands 1 and 2. This condition probably relates to humidity and/or haze, which strongly affects the visible bands (but not the IR bands).

2.2 Interactive Processing

In order to allow for maximum geologic use, various digital enhancements need to be interactively evaluated so that optimum techniques can be selected for hard-copy generation.

Once the digital imagery was transferred from 9-track tape to the hard, disk of the computer, the image was rectified to a UTM projection using ground-control points (GCPs) selected from the 1:250,000-scale topographic map for Hope, B.C. For the interactive session, the imagery was in a georectified state, so that North was directly up and UTM coordinates could be obtained in real-time.

One interactive session was completed for the project; it occurred November 14, 1992. Eight hours of interactive time was utilized to evaluate enhancements and plan hard-copy photographic products.

2.3 Imagery Enhancements

Four enhancement techniques were selected for hard-copy photographic products. Since a majority of the area is vegetation covered, band ratios and compositional enhancements did not reveal good rock/soil discrimination results. To further complicate compositional observations for mineral exploration, many clear-cut areas impose a cultural effect. Therefore, imagery enhancements were sought for generalized color reference and for structural observations. The four enhancement techniques selected for the project are:

1. False-color composite using Bands 4, 2, and 1 in the red, green, and blue (RGB). This composite is shown in Plate B.

2. False-color composite using Bands, 4, 3, and 2 (RGB). This is shown as Plate C.

3. Band 3 (Near Infra Red), edge-enhanced and portrayed as a single black and white image. This is shown as Plate D.

4. Principal Component 1 (PC1) with a northeast directional edge-enhancement filter applied. This is shown as Plate E.

These are described in the following section.

3.0 Description of Imagery and Overlays

Plate A - A clear topographic map to be used as an overlay for all hard-copy images. This map was generated from the 1:250,000-scale topographic map for Hope, B.C. Canada. Note that Plate A has been trimmed to fit the edges of the other plates for simple registration; otherwise, use lakes and roads for registration.

3.0 Description of Imagery and Overlays (continued)

Plate B - False-color composite using Bands 4, 2, 1 in the red, green, and blue (RGB). This color composite image simulates a high-altitude color-IR photo where vegetation is in shades of red, rock and soil outcrop is white and shades of blue; water is black. Since both visible bands are included in this image, the "noise" pattern (previously described) is apparent. This image can be useful since most geologists are familiar with these color relationships similar to color-IR photography.

Image texture located in the NE image corner takes on an arcuate pattern. This area may be exhibiting glacial influences, either erosional (bedrock striae, scour, etc.) or depositional (morraines, kames, drumlins, etc.).

Numerous linear features are noted in this image (overlay Plate F), as well as bright red areas of deciduous (?) forest cover (as opposed to maroon to brown conifer forests). A striking contrast is seen in the northwest corner of the site where a circular geomorphic feature contains a bright red core, due to deciduous (aspen) cover or stressed conifer trees. This may indicate an area of rock type change, or altered and mineralized rock. No mapping or sampling has been done in this portion of the property.

Plate C - False-color composite using Bands 4, 3, 2 (RGB). This image helps reduce the "noise" problem since only one visible band is used. Vegetation is in shades of brown, ochre, and yellow. Rock/soil exposures are in white and shades of purple. Water and shadows are black. Textural attributes of this image aid in detecting faults, fracture zones, and strike (or rock fabric). Many structural features can be observed in the project area at image center.

Alteration on this image is noted as pale yellows and blues. An indirect indicator, pale yellow suggests stressed vegetation; whereas blue coloration indicates higher red reflectance or increased iron content in the rocks. Blue is noted along Siwash Creek as it crosses the site; south of Siwash Lake in the Fairfield Discovery area; in the open pit at the Brenda Mine, and numerous additional areas.

Plate D - Band 3 (near IR), edge-enhanced and portrayed as a single-band B&W image. Edge-enhancement is a spatial-filter technique that aids in accentuating linear image elements. While the extremely bright outcrop to the northwest is saturated, good linear contrasts can be observed in the project area.

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Plate E - Principal Component 1 (PC1) with a NE directional edge-enhancement filter applied. PC analysis aids in decorrelating the otherwise highly-correlated MSS bands; PC1 usually "concentrates" image contents that are in common to all MSS bands, such as topography. Since topography closely reflects structural relationships (which here are largely obscured by vegetation), PC1 was selected for detailed filtering. Several directional filters were evaluated; a modified Laplacian filter was designed which aided in accentuating subtle NW- and north-trending linear elements. The filter results in a "harsh" appearance, however subtly-expressed linear and circular details can be best observed.

Most of the linear features shown on the Plate F overlay are drawn from the Plate E image.

Plate F - Linear Features Overlay - This map proposes faults, fractures, linear and curvilinear glacial features, and circular geomorphic features. It is intended as an observation map only, based upon purely Landsat interpretations, and should be integrated with other surface, subsurface, and potential-field data, (Plates G and H) before attempting any field investigations.

The overlay shows two major linears on the image, northeast (A) and northwest (B) trending linear features which intersect at Simem creek, southeast of the project area. Both of these are expressed as magnetic linears (Plate G) and are believed to be large fault zones.

Linear A the Trout Creek Linear, is coincident with Trout Creek at its northeast end, and other drainages to the southwest. It displays truncation or right lateral offset to most faults and fractures. Linear B the Siwash Creek Linear, trends along Siwash Creek, through the project area, and on to the northwest.

Linear C is located immediately south of Siwash Lake and trends east-northeastward across the Trepanege Plateau into the Brenda Mine. The Fairfield discovery, high grade gold - silver mineralization in quartz veins in clay altered pyritic granite, southwest of Siwash Lake appears to be on the same east-northeast trending structure. A similar trend is apparent on the north side of the property, with ENE linears intersecting linear B in and just south of Siwash Creek in the northwest corner of the property. The circular structure noted on Plate B occurs in this area.

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Plate G - Known Faults and Linear Magnetic Features Overlay - Few faults are known in this region. Those that have been mapped (Canada Department of Mines and Resources, 1947A) are shown on this overlay as solid lines. Linear Magnetic features have been described by McEldowney and Pascucci (1979) and are shown on this overlay, based on data presented by the Geological Survey of Canada (1973) for the Hope Quadrangle.

An enlargement of the basic aeromagnetic data in the site area is shown as Figure 1. The site is located on a west northwest trending magnetic low, which coincides with linear B on the satellite imagery (Plate F). The low is most likely caused by a late stage quartz-eye porphyry (Otter Intrusion), which has intruded NW trending faults in the Pennask Lake Pluton, a large granite to granodiorite body described by Rice (1960). The magnetic low in the center of the property (Figure 1) appears to correlate with Unit 6, a megacryst granite, and Unit 7, the quartz eye feldspar porphyry shown on Figure 4 of Reynolds (1992).

In the northwest corner of the property, a northeast trending bulge or reentrant high into the magnetic low, corresponds to the location of the circular geomorphic feature and vegetative anomaly previously described, and reinforces the idea of a rock-type change.

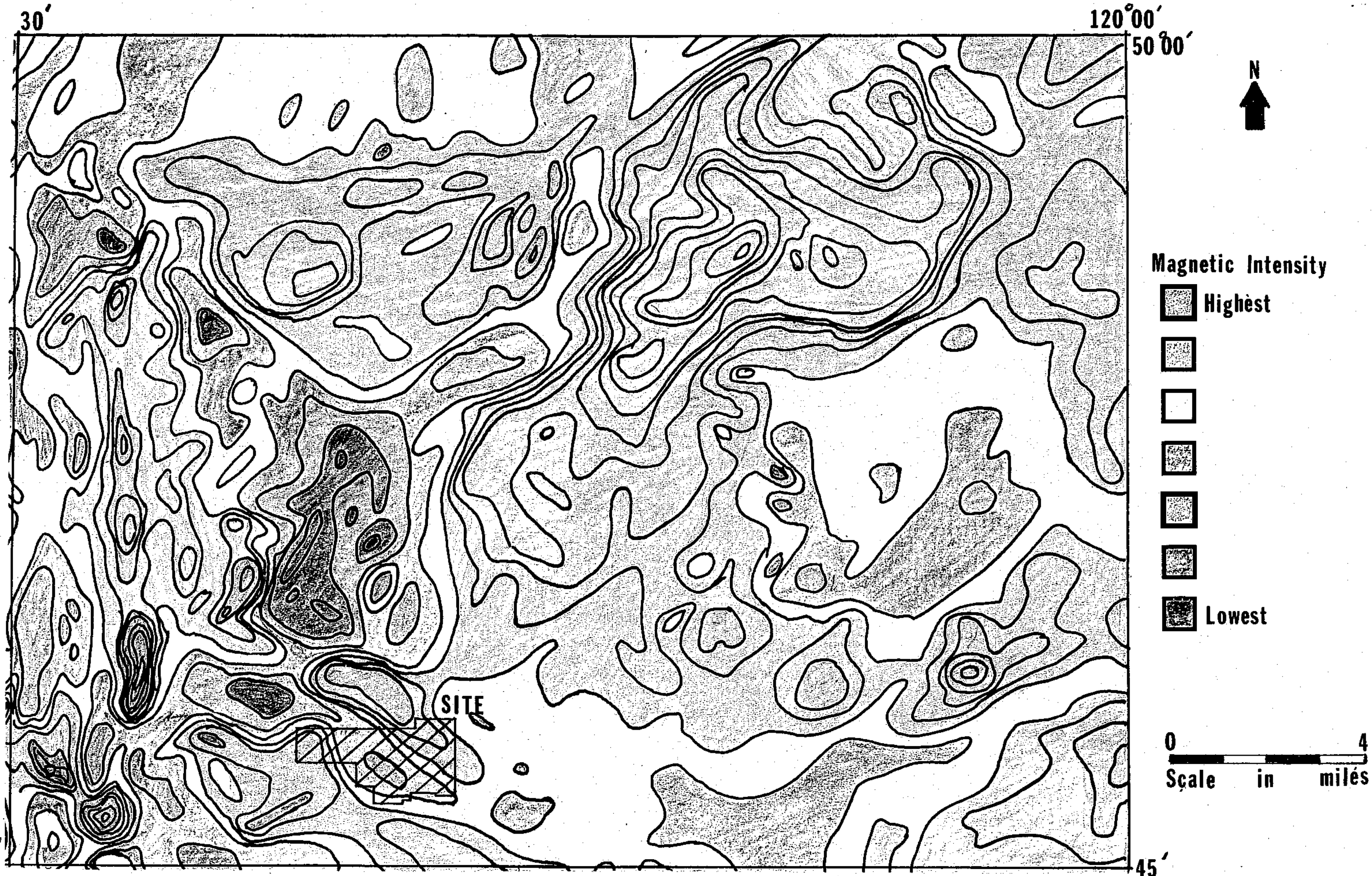
Plate H - Alteration and Mineralization Overlay - Mineral occurrences were transferred from published maps (Canada DMR, Geol. Survey, 1947A; and Geol. Survey of Canada, 1966) onto the overlay. Interpreted alteration haloes include scarlet red coloration on Plate B, and pale yellow coloration on Plate C, indicative of changes in mineral or water (clay) content in the soil.

Altered areas occur in the following zones which parallel or coincide with linear features:

1. NE from the vicinity of Leonard Creek, NW of the site, to the vicinity of Elkhart Creek;

2. NE from south of Pennask Mountain; including copper-moly occurrences;

3. SE from the Osprey Lake region to Lost China Creek. These areas coincide with Linear B (Plate F) which runs through the site.



AEROMAGNETIC MAP OF THE SITE AREA **FIGURE 1**

SIWASH CREEK PROPERTY BRITISH COLUMBIA CANADA

Altered areas coincident with aeromagnetic lows (Plate H) occur in the following areas:

1. Along the road between Pothole Creek and Shrimpton Creek. Adjacent to a NS linear magnetic anomally in the vicinity of strong NS fracture systems.

2. Along Siwash Creek NW of the site. In the zone of linear B at the intersection of a strong NE linear.

3. Along Pennask Creek NW of Brenda Lake. Adjacent to a NE trending linear magnetic anomally and proposed fault.

4. ESE of Bankeir along a tributary of Trout Creek. Along the extension of linear B, at an intersection with a NS fracture set.

Mineralization at the site and at the Fairfield discovery, occurs on the flanks of magnetic lows.

4.0 Conclusions

The project area is located within a structurally complex region dominated primarily by NW- and NE-trending fault zones. A N-S trending zone of outcrop along the western third of the image is characterized by a N-S trending structural and magnetic fabric. Bounded by NW- and NE-trending fault zones, the Siwash Creek site was strongly effected by lateral offsets and extensional features, which controlled implacement of intrusive bodies.

Two pervasive fault zones dominate the image area: one NE-trending zone that exhibits right-lateral displacement; and a NW-trending zone that appears somewhat discontinuous and trends diagonally through the site and across the image area. This relationship suggests that the NE and ENE-trending fault zones are younger than the NW-trending ones, and are the most important trends for mineralization. This is borne out by the fact that the two most important ore bodies in the image area, Brenda Mine and the Fairfield discovery, are on ENE trending structures. Undoubtedly, proposed fault intersections, magnetic lows, and altered areas will (from the remote sensing perspective only) constitute areas for detailed work.

Imagery and image observations should be integrated with all possible geologic, geophysical, and geochemical information for the region. Landsat structural observations will offer surficial information which together with potential-field data may aid in further characterizing displacement and recurrent movements. The imagery will also benefit logistics for field work, stream-sediment planning, and current land-use operations.

5.0 Recommendations

We recommend that the following areas be examined in detail, including reconnaissance BLEG (Bulk Leach Extractible Gold) sampling of streams and wide-spaced minus 80 mesh soil sampling:

1. In the northwestern portion of the site area, the circular geomorphic feature;

2. The four altered areas which are coincident with aeromagnetic lows;

3. All altered areas on NE trending (intersecting) linear features, especially linear C; and

4. All outcrops (including stream gravel) exhibiting blue coloration on Plate B.

6.0 References

1. Canada Department of Mines and Resources, Geological Survey, 1947A Geological Map of the Princeton Quadrangle, British Columbia; Scale 1:253,440; Map 888A, Sheet 92H (East Half).

2. Canada Department of Mines and Resources, Geological Survey, 1947B Geological Map of the Nicola Quadrangle, British Columbia; Scale 1:253,440; Map 886A, Sheet 92I (East Half).

3. Fairfield Minerals, Ltd., 1986-1992, Selected News Releases issued by the company.

4. Fairfield Minerals, Ltd., 1990 Annual Report.

5. Geological Survey of Canada, 1966, Maps of the Thompson-Shuswap, Okanagan Areas, British Columbia; Open File Report 637, Map C; Scale 1:250,000.

6. Geological Survey of Canada, 1973, Aeromagnetic Map of the Hope Quadrangle, British Columbia; Scale 1:250,000; Map 7687G, Sheet 92H.

7. Geological Survey of Canada, 1989, Geology of the Penticton Quad, British Columbia, Scale 1:250,000, Map 1736A, Sheet 82E.

8. Grove, E.W. 1989, Exploration and Development Proposal on the Siwash Creek Silver Property, Similkameen M.D., British Columbia; Private company report, 18p.

9. McEldowney, R.C. and Pascucci, R.F., 1979, Application of remote-sensing data to nuclear power plant site investigations; in Hatheway A.W. and McClure, C.R., Jr., eds, Geology in the Siting of Nuclear Power Plants, Geol. Soc. America Reviews in Engineering Geol., Vol. IV, pg. 121-139.

10. Reynolds, P., 1992, Geological Report on the Siwash Creek Property, Similkameen Mining Division, British Columbia; Private Company report, 13p., plus 2 Appendices, 4 maps.

11. Rice, H.M.A., 1960, Geology and Mineral Deposits of the Princeton Map-Area, British Columbia; Geological Survey of Canada, Memoir 243.

7.0 Certificate

I, Roland C. McEldowney, resident of Evergreen, Colorado, do hereby certify that:

1. I am a certified geologist in the State of Maine;
2. I am a graduate of Franklin and Marshall College, Lancaster, Pennsylvania, with a B.A. degree in geology;
3. I am a graduate of San Diego State University, San Diego, California, with an M.S. degree in geology;
4. I have been an exploration geologist since 1963;
5. I am President of the Wolf Creek Exploration Company.
6. I am Vice President of American Gold Resources Corporation.
7. I wrote this report with the help of Subcontractors;
8. I have no interest, directly or indirectly, in the Siwash Property or in the securities of International Tower Hill Mines, Ltd.; and
9. Permission is hereby granted to International Tower Hill Mines, Ltd. to use this report in support of any filing to be submitted to the Vancouver Stock Exchange and the British Columbia Securities Commission.

Dated this 25th day of November, 1992.

Roland C. McEldowney