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BC Geological Survey Assessment Report 37967

Ministry of Energy, Mines & Petroleum Resources
Mining & Minerals Division
BC Geological Survey

Assessment Report Title Page and Summary

TYPE OF REPORT [type of survey(s)]: Geochemical Assessment

TOTAL COST: $8,100.00

AUTHOR(S): J. T. Shearer, M.Sc. P.Geo.

SIGNATURE(S): [signature]

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S):

YEAR OF WORK: 2018

STATEMENT OF WORK - CASH PAYMENTS EVENT NUMBER(S)/DATE(S): 5718036

PROPERTY NAME: Bighorn

CLAIM NAME(S) (on which the work was done): 1057281

COMMODITIES SOUGHT: Phosphate

MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN:

MINING DIVISION: Fort Steele Mining Division

NTS/BCGS: 82G/07W (82G.026)

LATITUDE: 49 ° 1769 ' " **LONGITUDE:** -114 ° 7499 ' " **(at centre of work)**

OWNER(S):

1) J. T. Shearer

2)

MAILING ADDRESS:

Unit 5 - 2330 Tyner Street
Port Coquitlam, BC V3C 2Z1

OPERATOR(S) [who paid for the work]:

1) Same as above

2)

MAILING ADDRESS:

Same as above

PROPERTY GEOLOGY KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and attitude):

The target is a phosphatic horizon in the basal Jurassic Fernie Group

The zone is 1m to 2m thick grading around 33.5% P2O5

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS:

Assessment Reports 6859, 5556, 8989, 6365

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TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (IN METRIC UNITS)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
GEOLOGICAL (scale, area)			
Ground, mapping			
Photo interpretation			
GEOPHYSICAL (line-kilometres)			
Ground			
Magnetic			
Electromagnetic			
Induced Polarization			
Radiometric			
Seismic			
Other			
Airborne			
GEOCHEMICAL (number of samples analysed for...)			
Soil	10	1057281	8100
Silt			
Rock			
Other			
DRILLING (total metres; number of holes, size)			
Core			
Non-core			
RELATED TECHNICAL			
Sampling/assaying			
Petrographic			
Mineralographic			
Metallurgic			
PROSPECTING (scale, area)			
PREPARATORY / PHYSICAL			
Line/grid (kilometres)			
Topographic/Photogrammetric (scale, area)			
Legal surveys (scale, area)			
Road, local access (kilometres)/trail			
Trench (metres)			
Underground dev. (metres)			
Other			
		TOTAL COST:	$8,100.00

GEOCHEMICAL ASSESSMENT REPORT
on the
BIGHORN PROPERTY

49.1769N LATITUDE/-114.7499"W LONGITUDE
NTS: 82G/07W (82G.026)
UTM: 664736E-5448127N

FORT STEELE MINING DIVISION
SOUTHEASTERN BRITISH COLUMBIA
Event # 5718036
Permit # MX-5-814

For

FERTOZ INTERNATIONAL INC.
Unit 5 – 2330 Tyner Street,
Port Coquitlam, BC
V3C 2Z1
Phone: 604-970-6402

J. T. Shearer, M.Sc., P.Geo. (BC & Ontario)
E-mail: jo@HomegoldResourcesLtd.com

October 22, 2018

Fieldwork Completed Between July 1, 2018 and October 22, 2018

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SUMMARY

The Bighorn Property consists of the Bighorn Claims and is located in the Bighorn Creek and Wigwam River area of the Rocky Mountains, Fort Steele Mining Division, southeastern British Columbia, approximately 24 kilometres southeast of Morressey (30km south of Fernie, B.C). The property is accessed via an extensive network of logging and exploration roads.

The Bighorn claims were staked as part of the Fernie Project, whose primary objective was to evaluate the grade and continuity of the basal Fernie phosphate horizon in terms of establishing its potential as a large tonnage P_2O_5 resource. Previously, in 1929-1930 reconnaissance and detailed geologic mapping, hand trenching, sampling, inclined shafts and assaying was completed on phosphorite in the area.

The Bighorn Property is predominantly underlain by a sequence of Late Paleozoic to Mesozoic strata (Permian to Jurassic) that were deposited in the Alberta Trough under marine conditions and Late Jurassic to Cretaceous fluvio-deltaeic sediments that were subsequently deformed during the Late Cretaceous. Phosphatic rocks occur in a number of stratigraphic intervals within this sequence; however, the thickest and most continuous phosphate horizon was developed at the base of the Jurassic Fernie Group and is the focus of this project. The basal Fernie phosphatic strata are generally one to two metres thick.

Previous work on the Bighorn Property suggests average grades of the basal phosphorite horizon on the property are around 23.4% P_2O_5 across 1.2 metres.

Results for previous sampling are encouraging in P2O5 content. Current sampling shows an extensive strike length of the basal Fernie Formation.

Respectfully submitted,

J. T. Shearer, M.Sc., P.Geo. (BC & Ontario)

INTRODUCTION

Pell (1990) makes the following observations: Canada imported 2.39 million tonnes of phosphorite in 1986, approximately 80 per cent of which was used in the fertilizer industry. Other products which require the use of phosphorus include organic and inorganic chemicals, soaps and detergents, pesticides, insecticides, alloys, animal-food supplements, ceramics, beverages, catalysts, motor lubricants, dental and silicate cements (Barry, 1987). Approximately 55 million tonnes per annum are produced in the United States (Stowasser, 1989). Approximately 50 per cent of the phosphate rock imported into western Canada comes from Florida, the remainder being supplied from the Western U.S. (Barry, 1987). The majority of phosphate rock imported into eastern Canada is from Florida: minor amounts have also been imported from Togo, Tunisia and Morocco. Resources in Florida are rapidly being depleted (Stowasser, 1988): some experts feel that the western U.S. sources will not be able to meet the demand when Florida becomes exhausted, which suggests a possible niche for a new producer.

Phosphate rock produced in the U.S. is classified as acid or fertilizer grade, more than 31 per cent P_2O_5; furnace grade, 24 to 31 per cent P_2O_5; and beneficiation grade, 18 to 24 per cent P_2O_5. Acid grade rock is used directly in fertilizer plants, furnace grade rock is charged to electric furnaces and beneficiation grade rock is upgraded to acid or furnace feed (Stowasser, 1985).

Most commercial phosphate rock is used in fertilizer plants: feed for these plants must meet the following specifications:

P_2O_5 content: 27 to 42%
CaO/P_20_5 ratio:1.32 to 1.6
R_20_3/P_20_5:<0.1; R_20_3=$A1_20_3$+Fe_20_3+MgO
MgO content<l.O%

The phosphate rock mined in the western United States (Idaho, Montana, Wyoming, Utah) is from the Retort and Meade Peak members of the Permian Phosphoria Formation. The majority of mines are strip mining operations with ore zones ranging from 9 to 18 metres thick, with an average grade of 21.3 per cent P_2O_5. Overburden thickness is commonly 5 to 10 metres (Fantel et. al., 1984). Cominco American operated an underground phosphate mine in Montana. The phosphate horizon is 1 to 1.2 metres thick and has an average grade of >31 per cent P_2O_5. Most western U.S. phosphate ore is beneficiated by crushing, washing, classifying and drying (Stowasser, 1985). Phosphates mined in Florida and South Carolina are from the Miocene Hawthorne Formation and the younger, reworked deposits of the Bone Valley Formation. Ore thickness range from 3 to 8 metres, with overburden of 3 to 10 metres. Average grade is 7 per cent P_2O_5. Flotation processes are used to beneficiate the ores.

Phosphates mined in Tennessee have a minimum cut-off grade of 16 to 17.2 per cent P_2O_5 and a minimum thickness of 0.6 to 1.2 metres (Fantel et. al., 1984). Currently, there is no by-product recovery of yttrium from any of the U. S. operations. Phosphoria formation phosphorites from the western phosphate field contain an average of 300 ppm Y; phosphorites from North Carolina and Florida contain an average of 235-300 ppm Y; and, phosphorites from Tennessee contain an average of 63 ppm Y (Altschuler, 1980). The worldwide average yttrium value in phosphorites is 260 ppm (Altschuler, 1980).

The phosphorite beds in the Jurassic Fernie Group are thin (usually 1 to 2 metres, Butrenchuk, 1987a) relative to most phosphorites mined in the United States. As with most of the phosphate ores mined in the United States, Fernie phosphorites would require beneficiation to produce an acid grade product. The Fernie phosphorites have anomalous yttrium concentrations with respect to most other sedimentary phosphate deposits. If it proves feasible to recover yttrium during the production of phosphoric acid, as has been suggested by some researchers (Altschuler, et. al:, 1967), the economics of exploiting the Fernie Group basal phosphorite horizon will become significantly more attractive.

However, the strategy employed by Fertoz in the present program is to investigate the direct application phosphate to organic market. Contacts have been made to farmers already engaged with organic products.

Figure 1 Location Map

LOCATION and ACCESS

The Bighorn Claims are located 24km east-southeast of Morrissey, British Columbia along the Wigwam River Road, immediately northeast of Bighorn Creek and south of the Lodgepole South Fork Forest Development Road.

The Bighorn Claims consist of cells staked over Jurassic, Triassic and Permian sediments in an area where rich phosphate rock boulders were found. One outcrop of the phosphate bed was found beneath black Jurassic Fernie shales and immediately above, siltstones and fine grained sandstones of the Triassic Spray River Formation. It was not possible to determine the true thickness of the phosphate unit at this location. No Permian phosphate beds were found. The claims are largely covered by overburden.

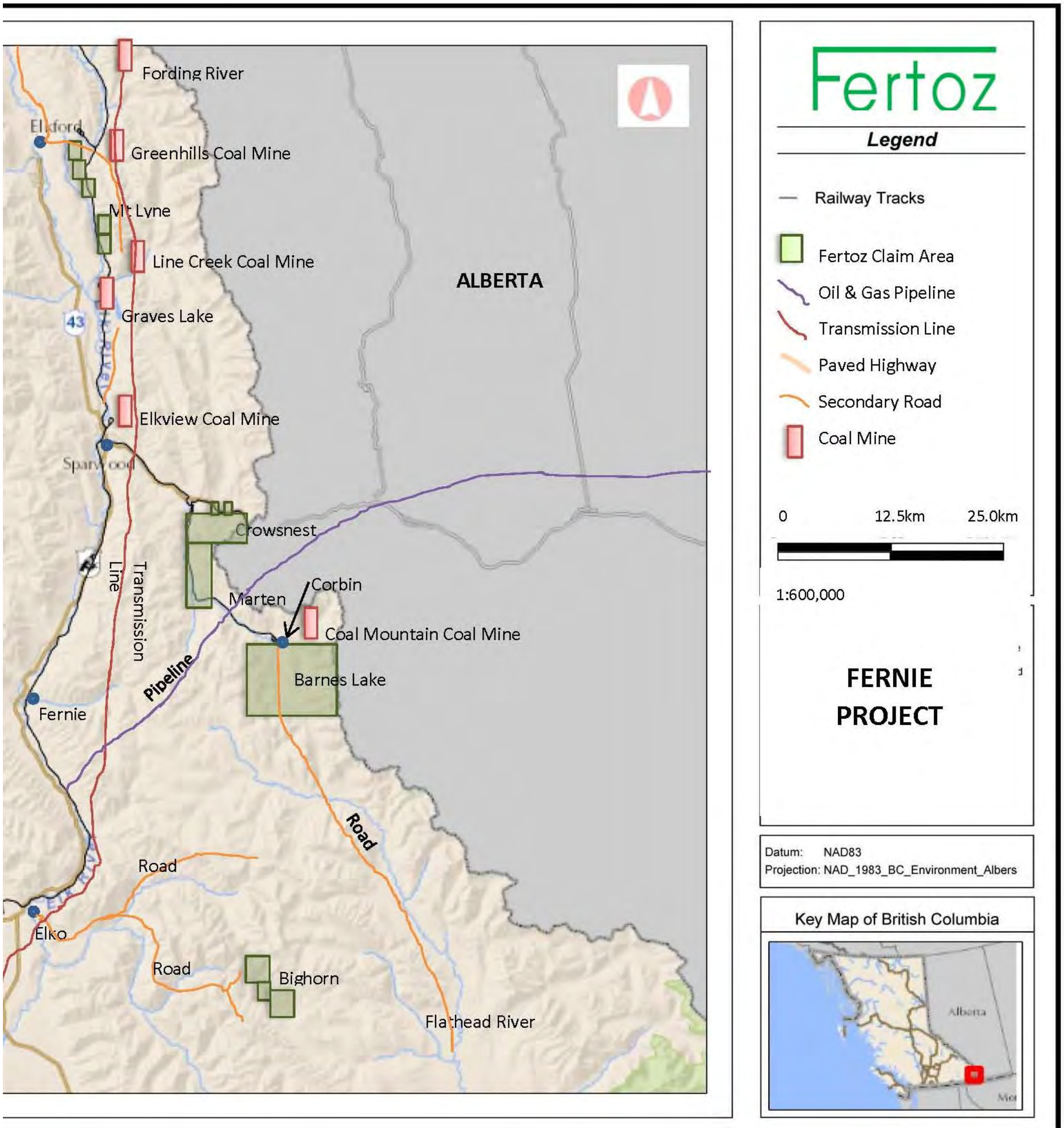


Figure 2 Detail Location and Claim Location

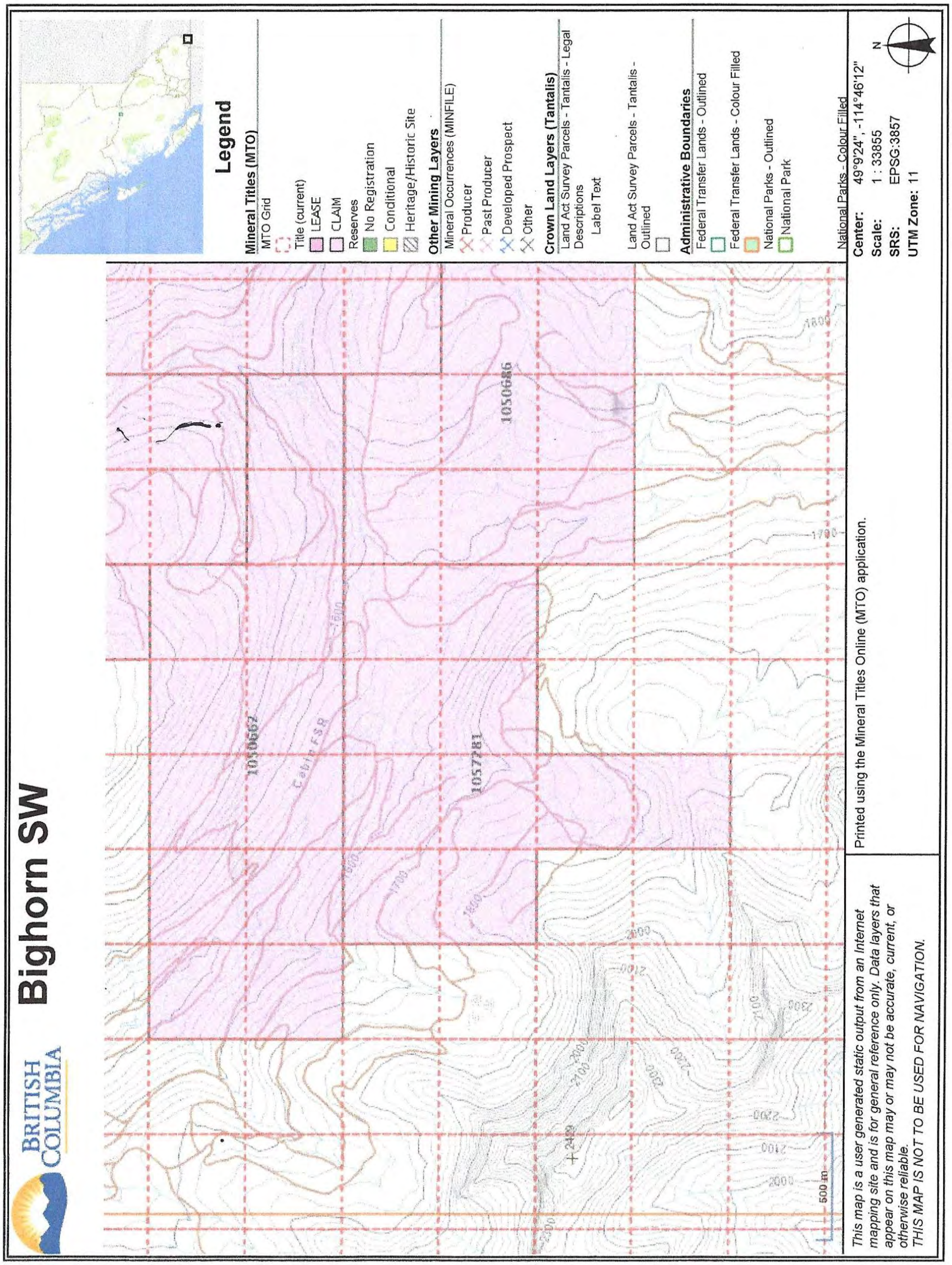


Figure 3 Claim Map

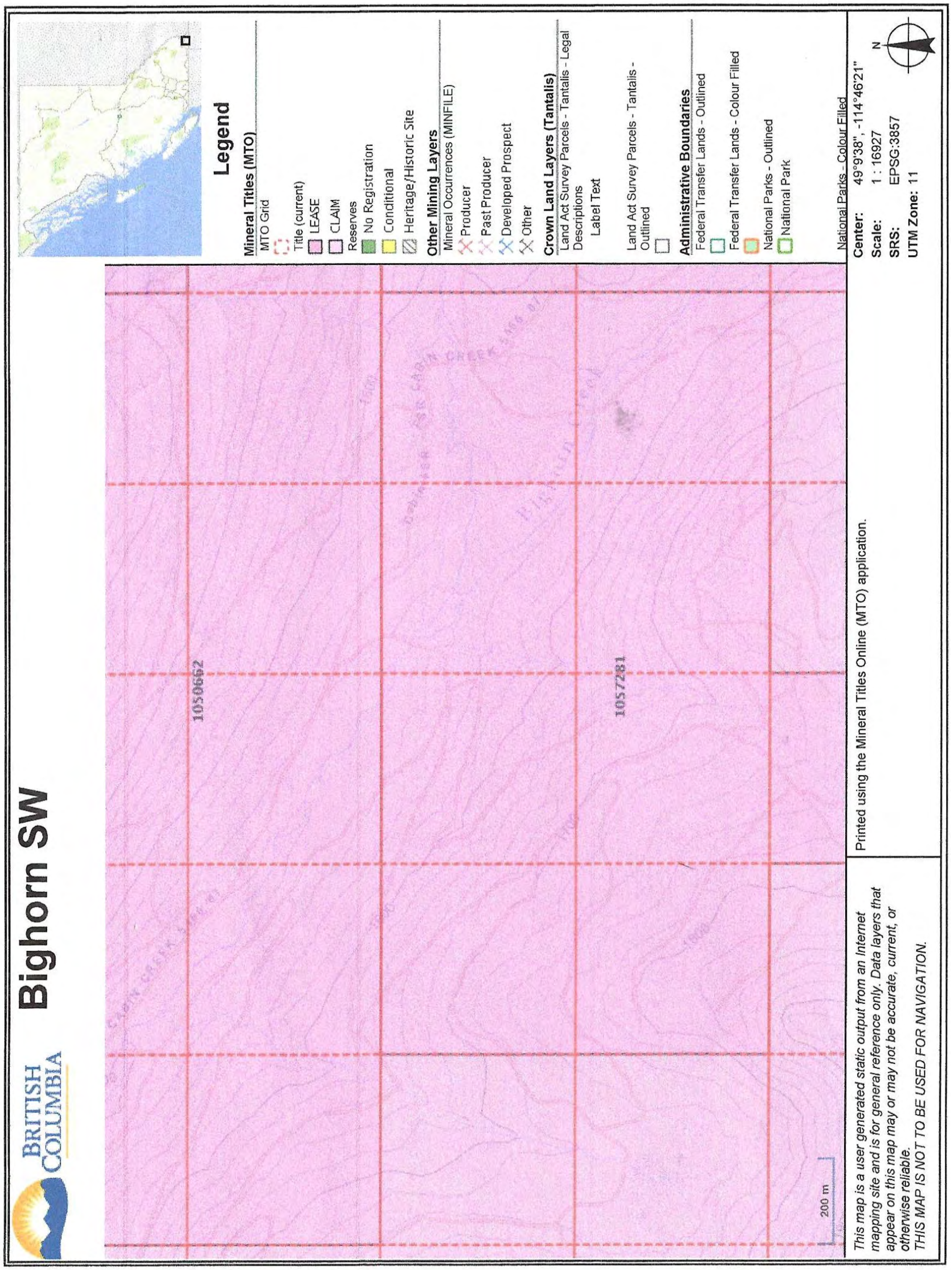


Figure 3a Claim Map Detail

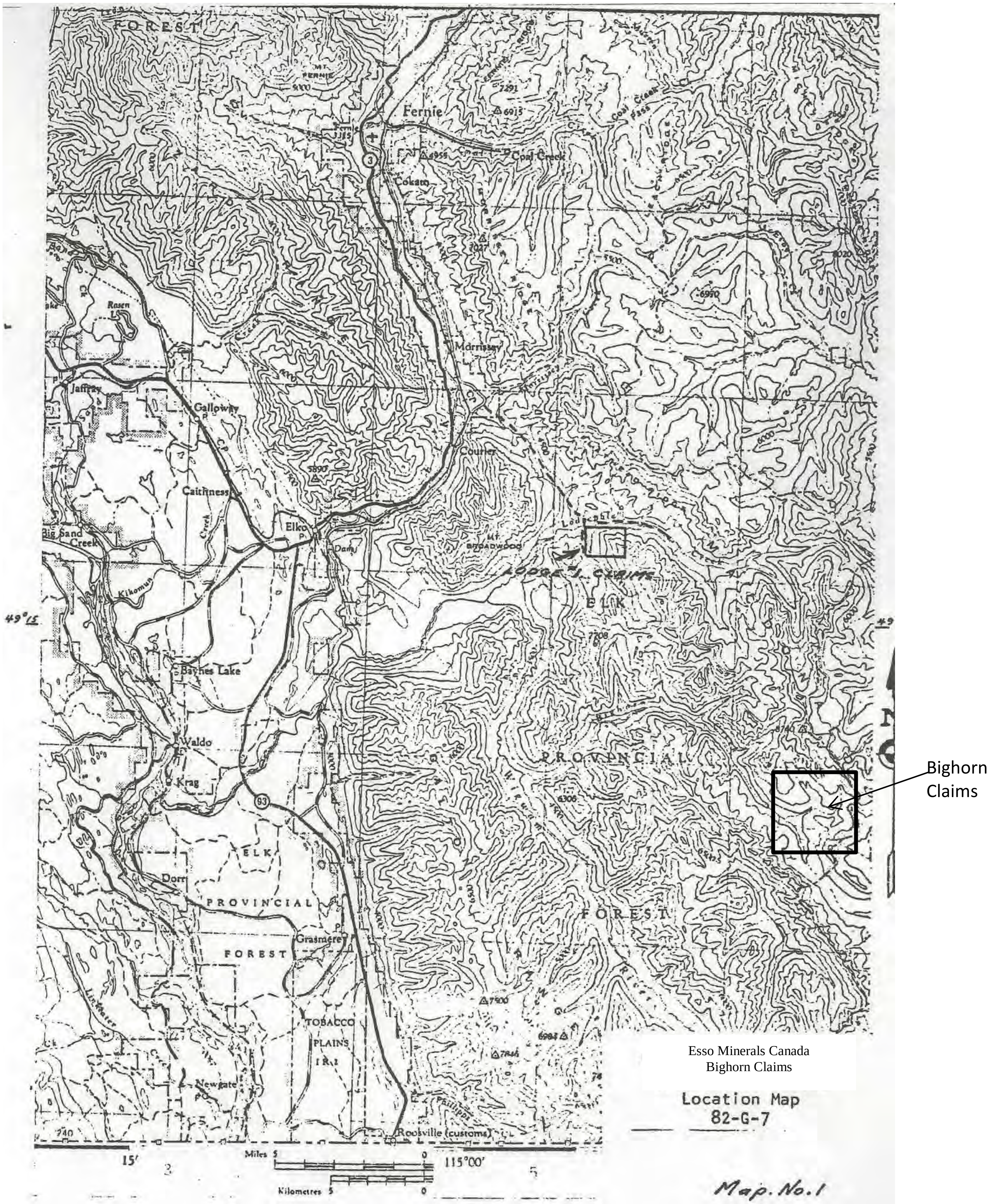


Figure 4 Access Map

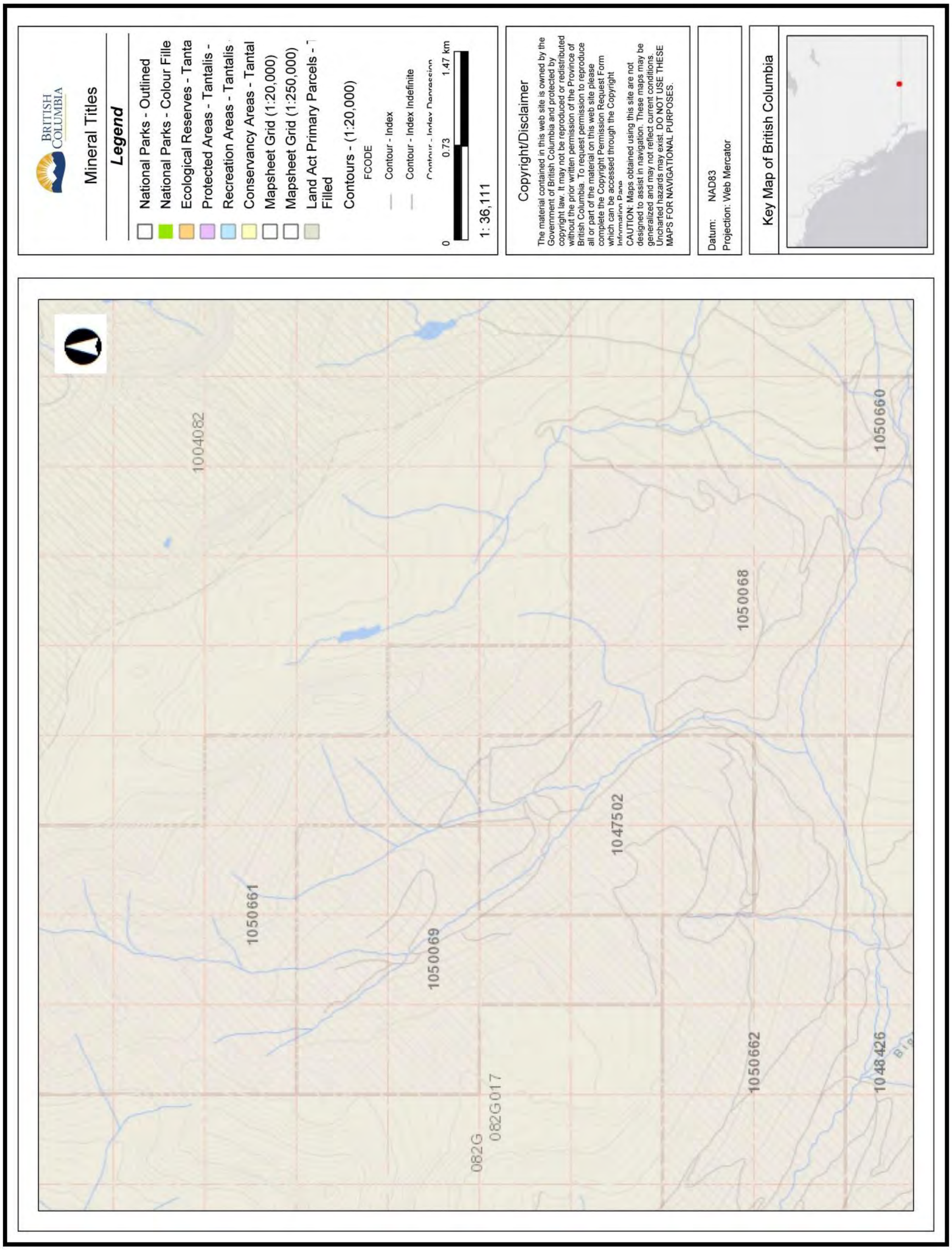


Figure 4a Claim Map

MINERAL TENURE

The Bighorn property, 7 claims encompassing 1,415.11 hectares were staked by J. T. Shearer as shown in Table 1 and Figure 2 and subsequently transferred to Fertoz International Inc.

TABLE I
List of Claims

Name	Tenure #	Area (ha)	Issue Date	Current Expiry Date	Registered Owner
Ram 1	1047502	126.72	October 29, 2016	October 29, 2021	Fertoz International
Ram 2	1050068	253.48	February 16, 2017	March 16, 2021	Fertoz International
Ram 3	1050069	168.93	February 16, 2017	March 16, 2021	Fertoz International
Ram 4	1050660	105.64	March 10, 2017	March 10, 2021	Fertoz International
Ram 5	1050661	295.58	March 10, 2017	March 10, 2021	Fertoz International
Ram 6	1050662	253.48	March 10, 2017	March 10, 2021	Fertoz International
Bighorn 7	1050686	211.28	March 11, 2017	March 10, 2021	Fertoz International
Bighorn Southwest	1057281	211.28	December 29, 2017	October 29,2021	J. T. Shearer

Total 1,626.39 ha

Cash may be paid in lieu if no work is performed. Following revisions to the Mineral Tenures Act on July 1, 2012, claims bear the burden of $5 per hectare for the initial two years, $10 per hectare for year three and four, $15 per hectare for year five and six and $20 per hectare each year thereafter.

HISTORY

Phosphatic horizons at the base of the Jurassic Fernie Group in southeastern British Columbia were discovered in 1925 (Telfer, 1933) and have been the subject of periodic exploration by Cominco (Kenny, 1977) and others since that time. Phosphate strata in the Bighorn area were (in the mid and late 1970's) explored by Western Warner Oils Ltd., Medesto Exploration Ltd. and Esso Minerals (Dorian, 1975; Pelzer, 1977; Dales 1978). The phosphate potential of the area was also addressed in a number of recent academic and government studies (Butrenchuk, 1987a, 1987b; Macdonald, 1985; 1987).

Thirteen holes were drilled in 1977 on the Lodge #1 claim to the north of Bighorn, as a program to test overburden depths, basement topography, and geological structure, and to sample the phosphate bed, if penetrated. The program was designed to provide a rapid bedrock appraisal of the area, with no holes to be drilled deeper than 75 metres unless the phosphate bed was penetrated. All holes were drilled vertically with a truck mounted Sanderson Cyclone Drill equipped with Mission Megadrill downhole hammer, 2 7/8" drillstem, and a 3" diameter VTM core barrel to be used if required. A total of 262.17m of 4" hole was drilled. A chip sample was kept for each hole by Kevin J. Heffernan.

Results for 2014 sampling Bighorn01 at 5460695N+0660329E, elevation1414m, are low in P2O5 content but close to 1977 drill hole 06A which gave (assessment report 6717):

downhole hammer			
77-06	9.8m to 10.4m	0.6m	black phosphate rock, soft crumbly
77-06A	9.1m to 10.2m	1.1m	Interbedded phosphorite and shale
	10.2m to 10.7m	0.5m	Silty shale with scattered oolites, phosphates
	10.7m to 11.6m	0.9m	Phosphorite, abundant calcite on fractures as cement
Assays for hole 77-06A			
	7.62m to 9.14m	1.52m	0.85% P_2O_5
	9.14m to 10.21m	1.07m	12.90% P_2O_5
	10.21m to 11.58m	1.37m (4.459 ft.)	20.80% P_2O_5
	11.58m to 12.3m	0.72m	0.63% P_2O_5

Minfile description of the Bighorn Zones are as follows:

The Bighorn phosphate prospect outcrops on Inverted Ridge on the south side of Bighorn Creek, 45 km southeast of Fernie.

The area in the vicinity of Bighorn Creek near the southwest margin of the Fernie Basin is underlain by fine-grained quartzose sandstones, siltstones and dolomitic siltstones of the Permian Ranger Canyon Formation (Ishbel Group), overlain by siltstones and calcareous or dolomitic siltstones of the Triassic Sulphur Mountain Formation (Spray River Group), followed by shales, siltstones and minor sandstones of the Jurassic Fernie Group. These units are situated on the west limb of an anticline trending northwest along the east side of the MacDonald thrust fault. This stratigraphy is locally warped into a smaller anticline-syncline pair.

Phosphate mineralization is contained in the Fernie Group and the Ranger Canyon Formation. A phosphorite horizon trends northwest along the southwest side of Bighorn Creek at the base of the Fernie Group. The horizon consists of a 0.75 metre thick layer of dense black phosphate with limonite blebs, overlain by 1.5 metres of silty shale and pelletal phosphate, which is in turn overlain by 1.5 metres of chocolate-coloured shale. A sample taken across its 2 metre thickness contained 18.50 per cent P_2O_5 (Open File 1987-16, Figure 33). A composite chip sample averaged over a true thickness of 0.51 metres contained 23.74 per cent P_2O_5 and 0.690 per cent yttrium (Assessment Report 19938, page 16, section IVR89-2).

This occurrence was first explored by First Nuclear Corporation in 1981 and then prospected by Formosa Resources Corporation in 1989.

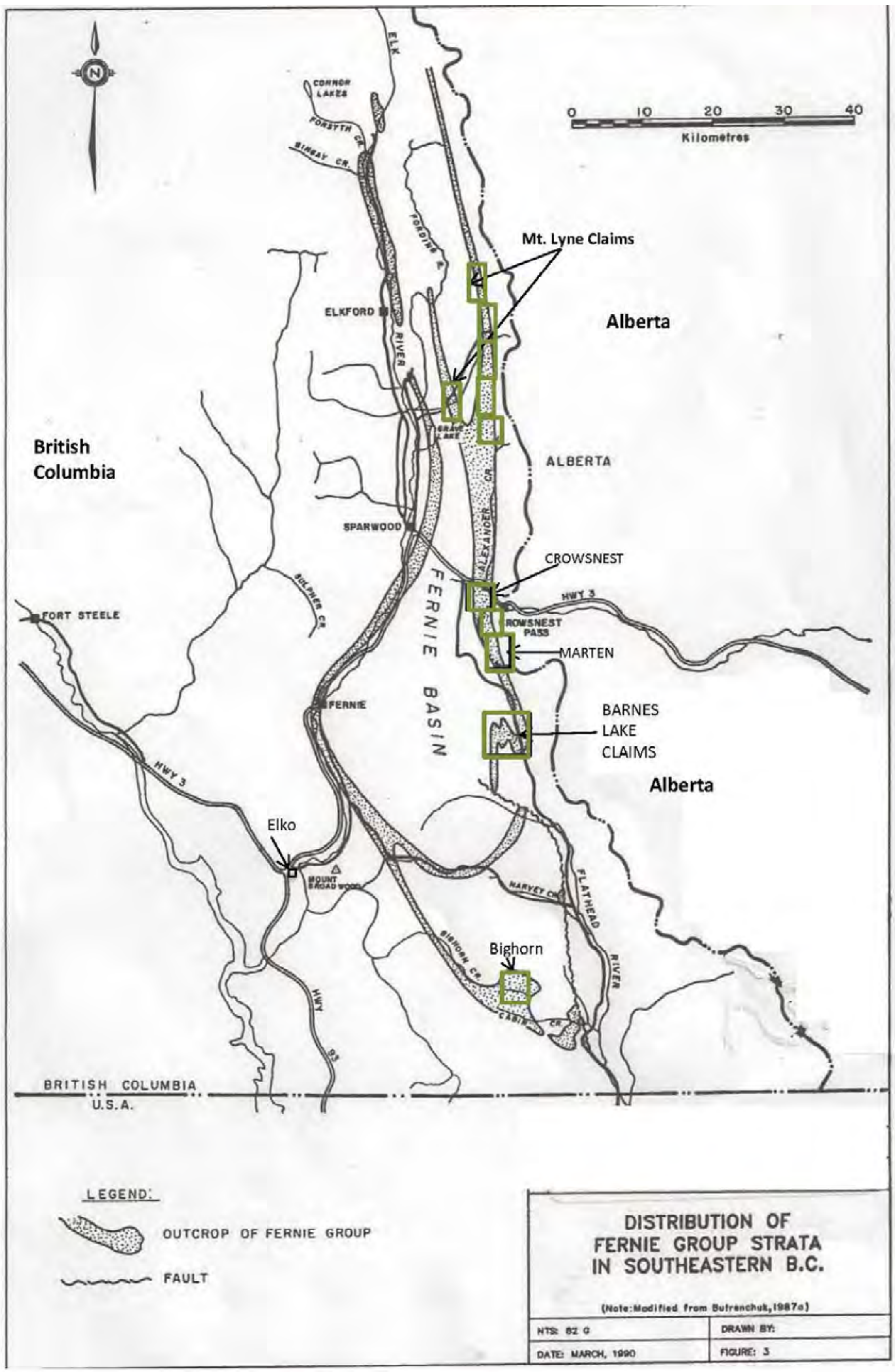


Figure 5 Distribution of Fernie Group Strata in Southern British Columbia

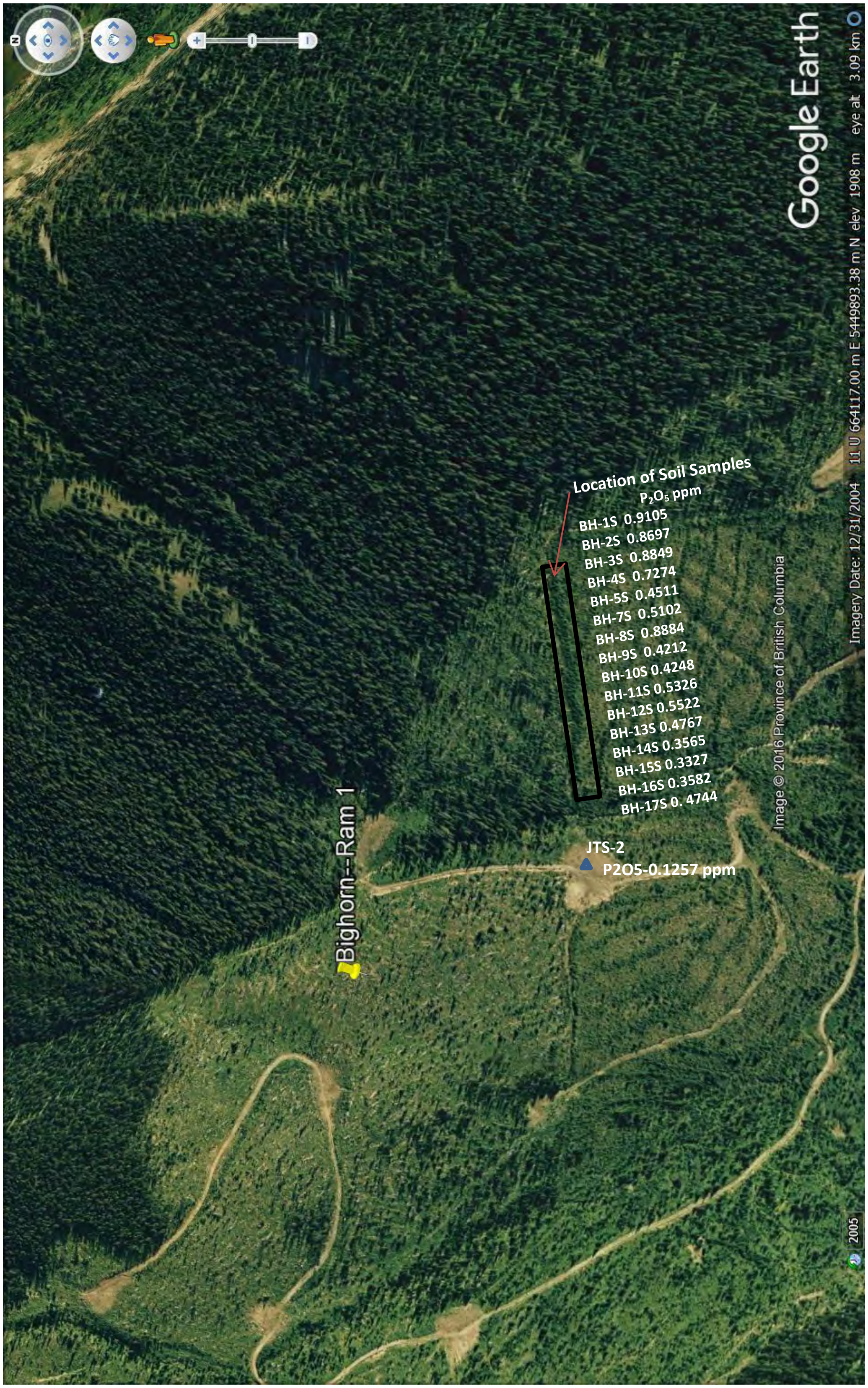


Figure 6 General Google Image of Bighorn Area and 2017 Samples

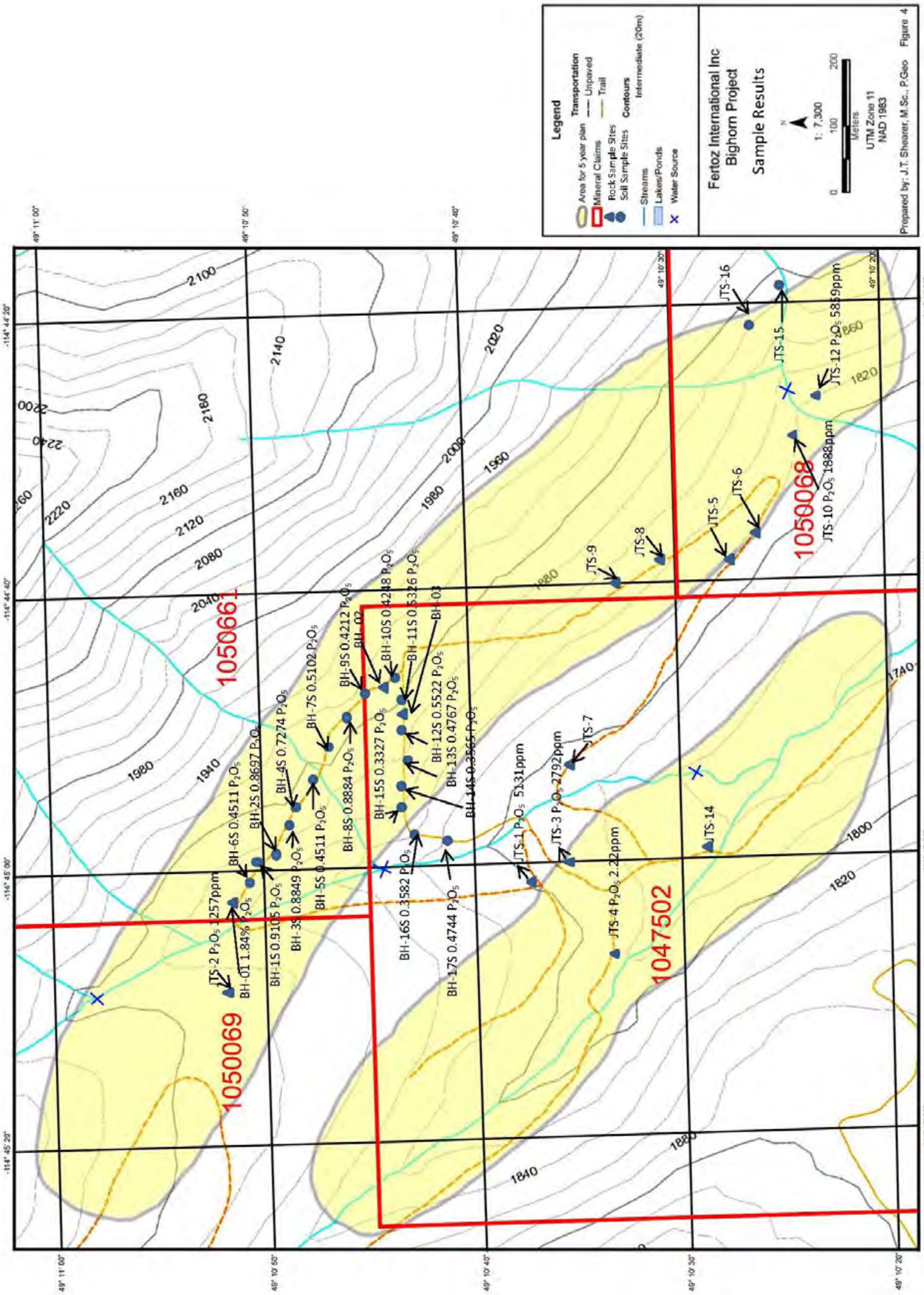


Figure 7 Sample Locations and Results 2017

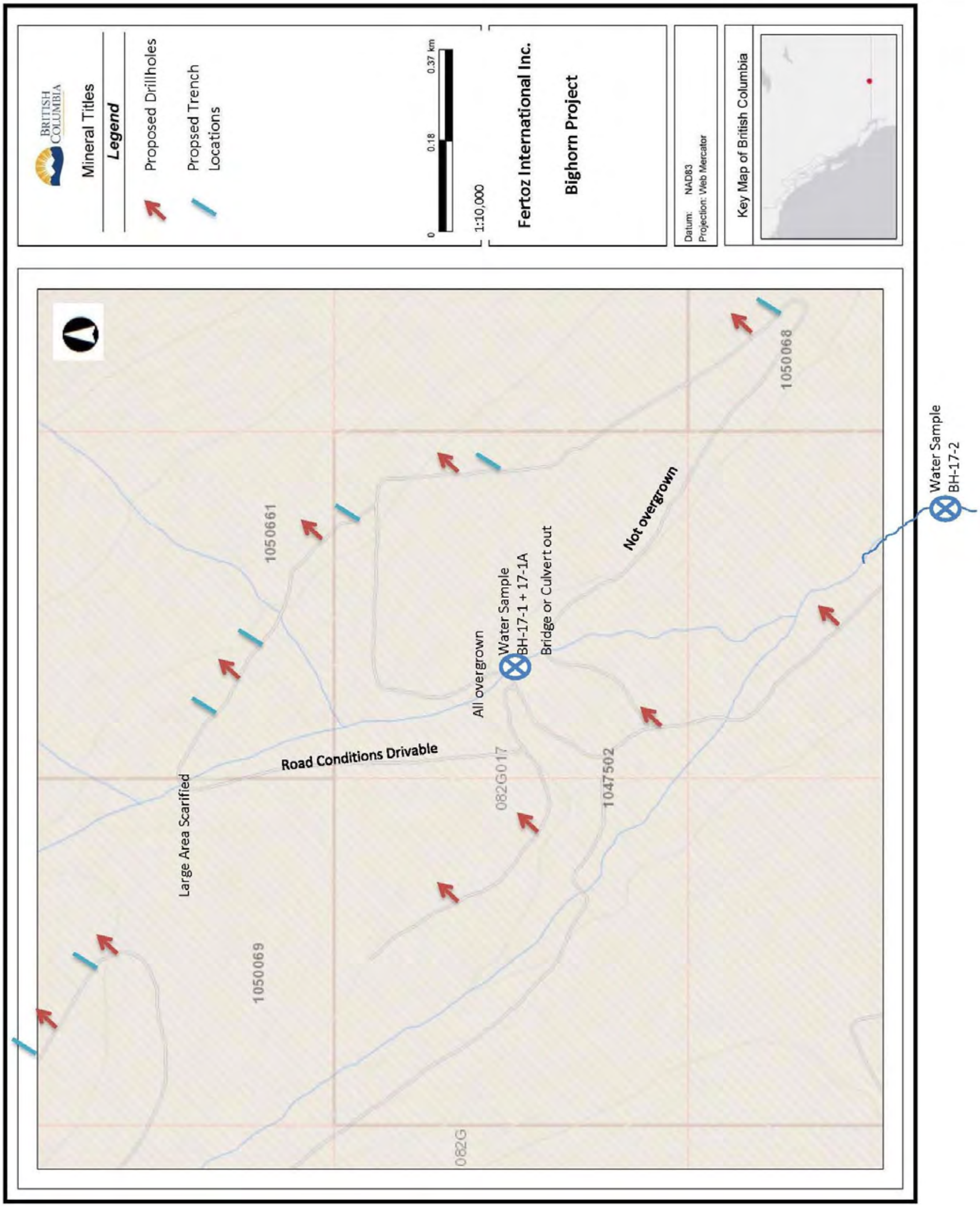


Figure 8 Water Sample Locations 2017

Work Program 2017

The work was conducted between August 17 and August 26, 2017, which included locating historical phosphate workings, re-sampling a number of old trenches, reconnaissance mapping, prospecting and soil sampling.

For mapping and sampling control, maps were downloaded from BC Mineral Title Online and hand held Garmin – GPSmap60CSx was utilized. Most times the accuracy of GPS readings were within ± 3 metres of the mapping (i.e. rock outcrop) or sampling site. Each rock outcrop was briefly noted in field book and plotted on base map and each grab sample collected was briefly described with GPS position recorded, photographs were also taken as part of field documentation.

The Property is along the front ranges of the Rocky Mountains in southeastern British Columbia.

Mapping and sampling surveys conducted along the headwaters of Bighorn Creek identified a phosphate-bearing horizon. This horizon trends northwest appears to extend up northwestern branch of the creek (see figure 8).

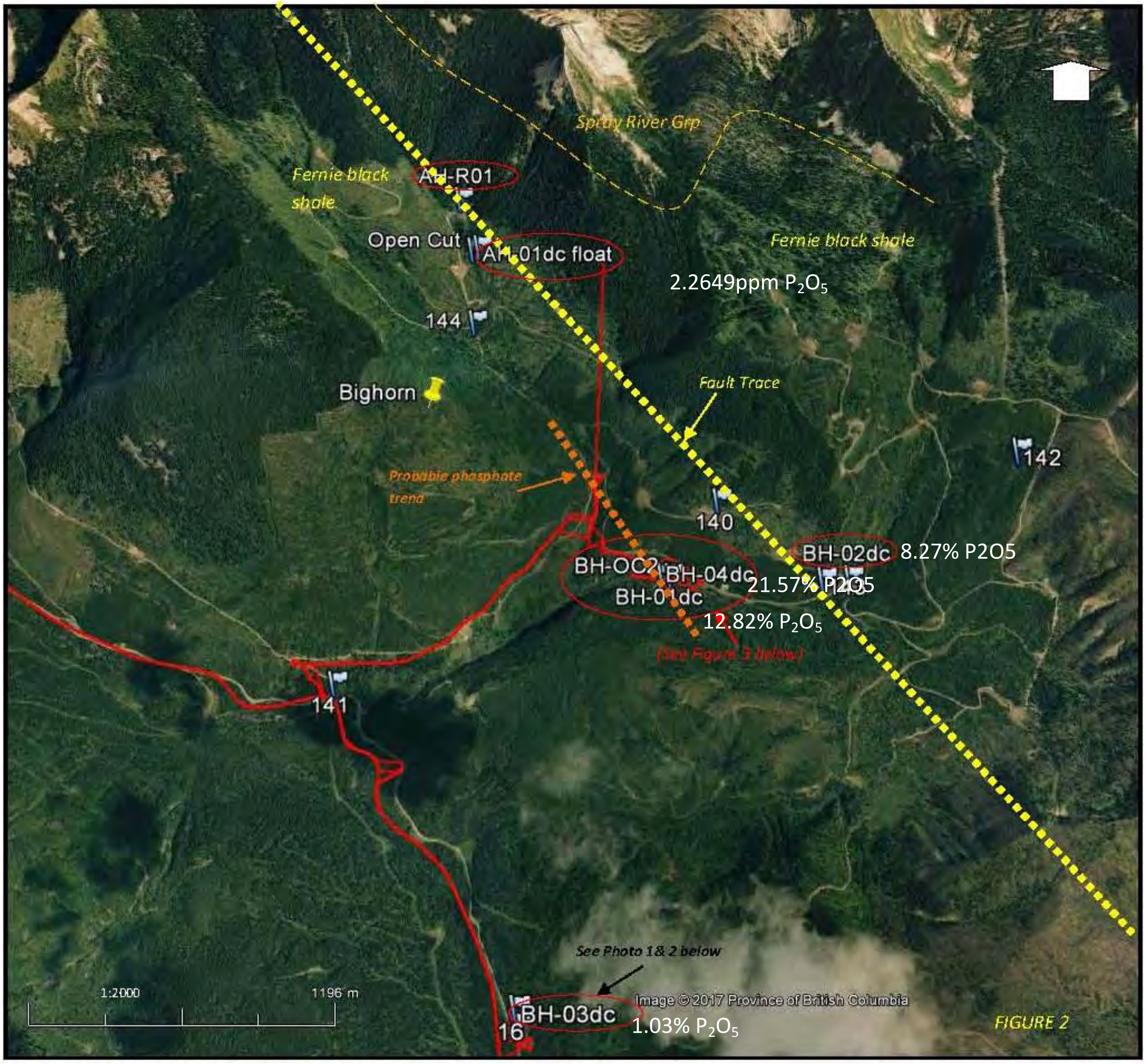
Assays were conducted by using an XRF Unit factory calibrated (Cert No. 0154-0557-1) on October 30, 2013, Instrument #540557 Type Olympus DPO-2000 Delta Premium. The instrument was calibrated using Alloy Certified reference materials by ARM1 and NIS5 standards. Only certified operators were employed and that were experienced in XRF assay procedures. Read times were 120 seconds or greater.

Results of the XRF assays are contained in Appendix III with sample descriptions are contained in Appendix IV.

Soil samples, figure 8, show the subcrop of the phosphate horizon. The soils over the phosphate horizon are relatively thin. Average depth of samples was 10cm to 15cm (refer to Appendix IV)

Rock samples from a large road pit/trench area at DC sample 03 returned higher P2O5 values and needs detail follow-up work.

Three water samples were collected (Appendix V) to establish a geochemical baseline.



GPS reconnaissance traverses: **BH-R01**: dolomitic shale (probable Spray River); **BH01dc:** float material, black shale weakly phosphatic. Reconnaissance surveys within small watershed are masked by overburden. Float material observed is mainly black shale and the recessive nature of this area suggests it is underlain by the Fernie Formation. A northeast trending fault mapped by the GSC also occupies this area as shown above. Outcrop **BH-OC2**: float material black shale with abundant calcite veinlets, phosphatic about 10-15% oolitic texture.

Figure 9 Google Image of Area with Waypoints 2017

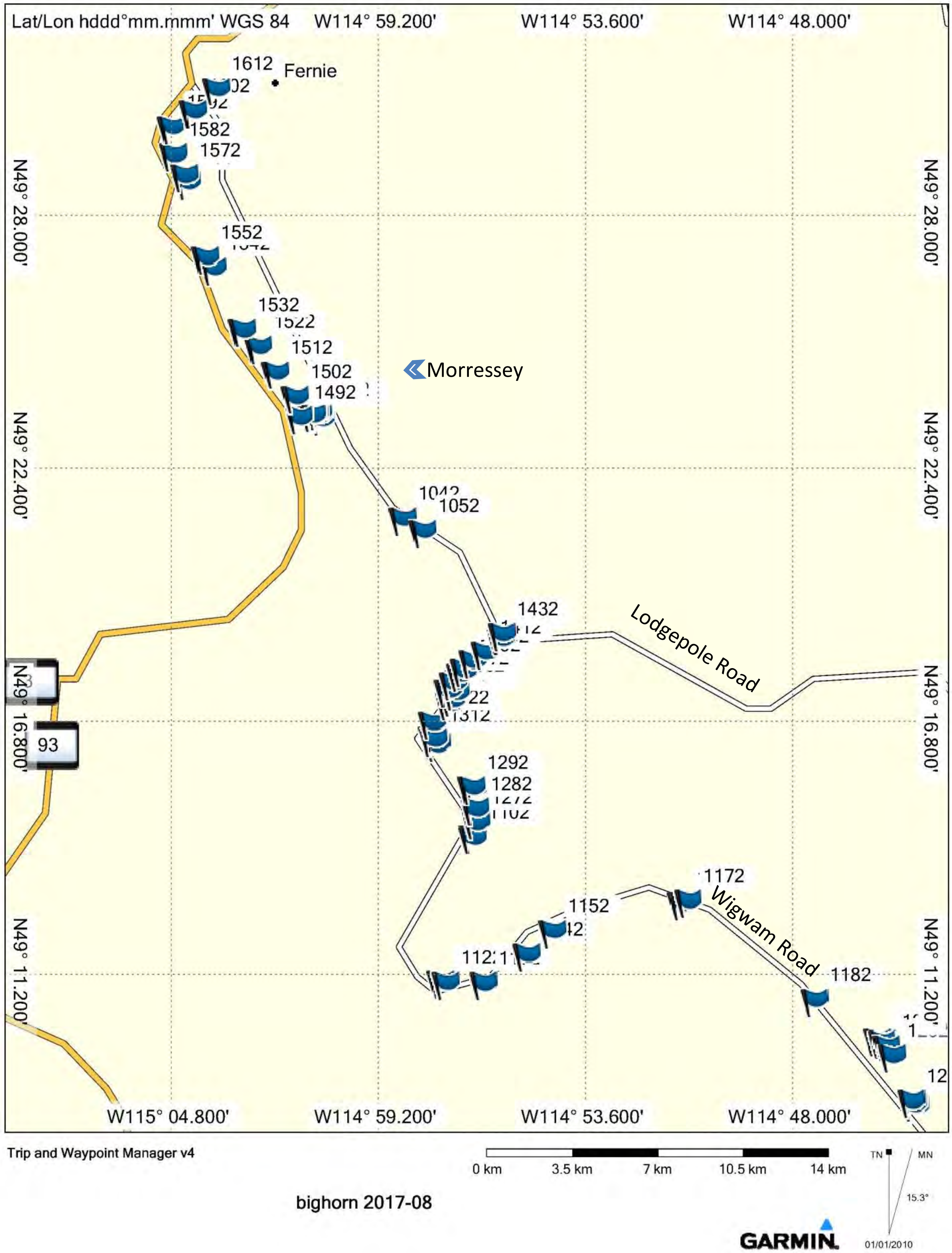


Figure 10 Garmin Map and Access Map 2017

*Grab Sample **BH-03dc**: GPS location: 663981E-5446325N, sub-crop taken adjacent to road side near divide (height of land) leading to Flat Head River valley. Sample is comprised mainly of black shale.*

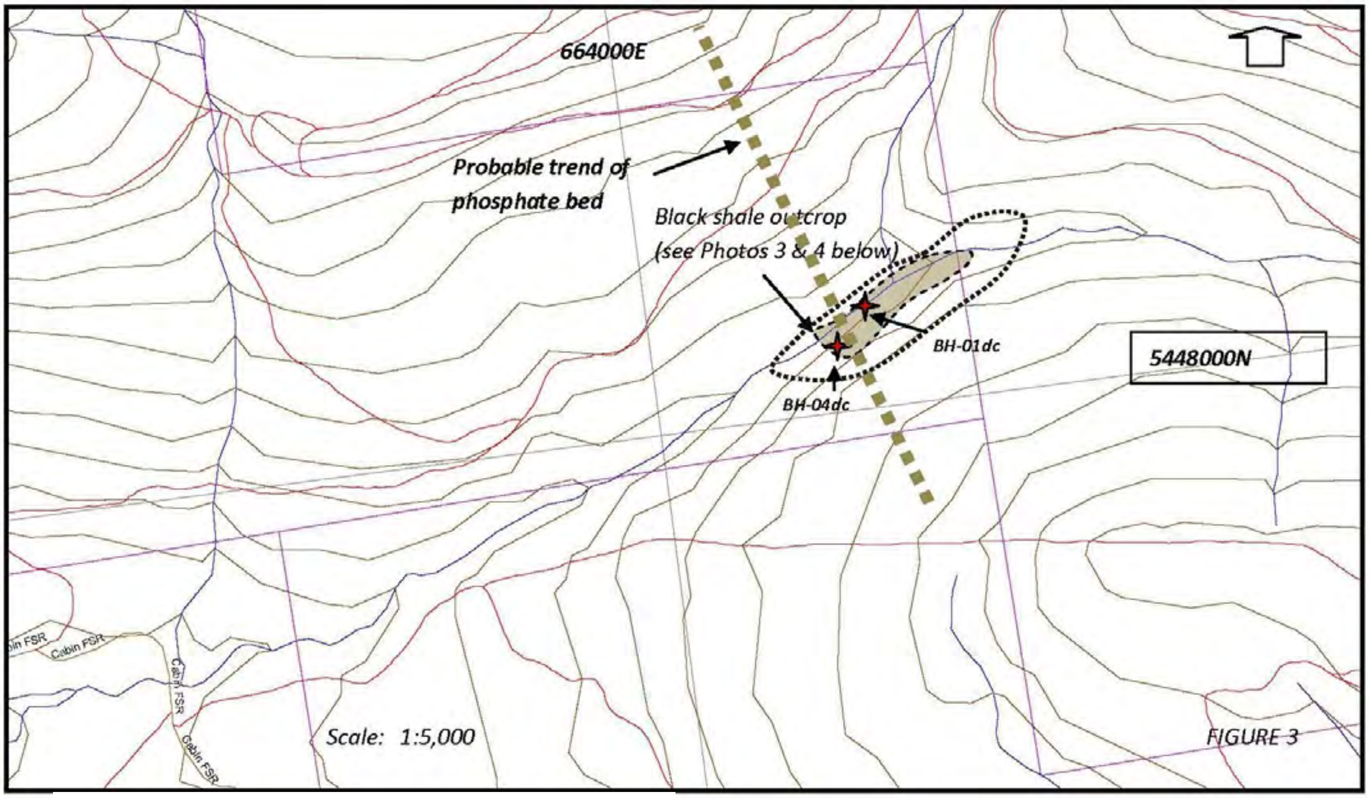
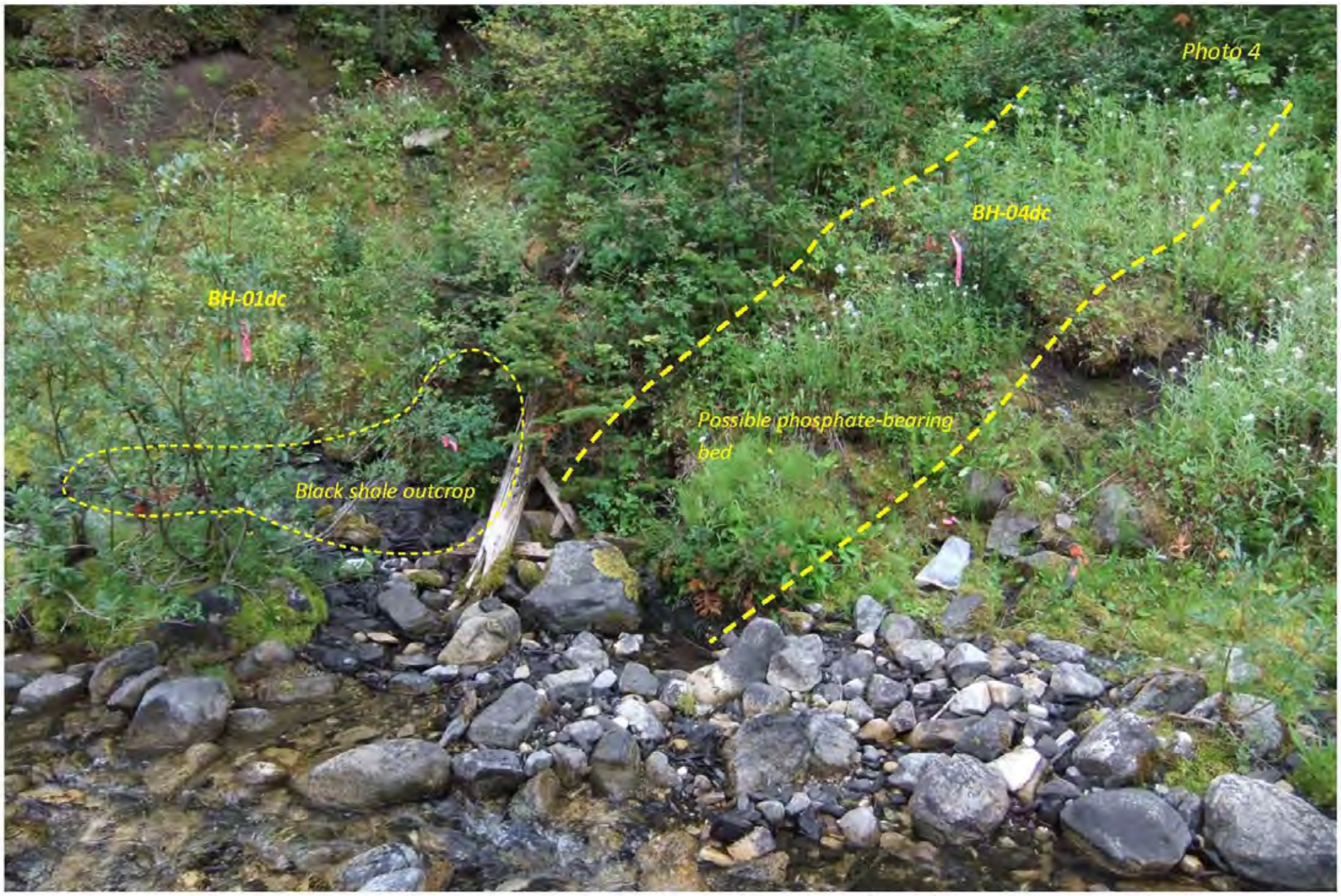


Figure 11 Phosphate Zone Bighorn Claims

Fernie black shale outcrop along small stream



Fernie black shale phosphatic outcrop. Two grab samples were collected from this exposed bank see descriptions below.

Sample No.	UTM GPS Location	Brief Description
BH-01dc	664736E-5448127N	Thin bedded black shale with oolitic texture – phosphate
BH-04dc	664730E-544125N	Black shale appears to be part of phosphate horizon.

Fernie black shale is well exposed along the stream. Western section of this outcrop contains increase phosphate and may host phosphate-bearing horizon trending northwesterly (Figure 3). Further mapping would have to be conducted along this creek bed in order to determine the extent of phosphate mineralization. Black shale beds strike northwest and dominantly dip 20-25°northeast.

REGIONAL GEOLOGY

The Bighorn area is underlain by a series of predominantly marine strata which range in age from Devonian to Jurassic and non-marine fluvio-deltaic sediments of late Jurassic to Cretaceous age. Reconnaissance geological mapping in the region (Newmarch, 1953; Price,1965; 1964; 1962; 1961) has shown that these strata are now exposed in a broad, doubly plunging syncinorium, commonly referred to as the Fernie Basin. This synclinorium is broadly delineated by the distribution of the Jurassic Fernie Group in southeastern British Columbia (Figure 3): the structure is complicated by second order folds and later faults, both easterly directed thrusts and west-side down normal faults.

Phosphatic horizons (Figure 4) are known to occur at a number of intervals within the Paleozoic and Mesozoic stratigraphic section (Butrenchuk, 1987a; Kenny, 1977; Macdonald, 1987; Telfer, 1933). Phosphatic strata at the base of the Fernie Group are considered to have the best potential (Butrenchuk, 1987a; Macdonald, 1987).

REGIONAL STRATIGRAPHY

Upper Devonian strata exposed in the vicinity of the Fernie Basin consist of massive, grey, fine grained, cliff forming limestones of the Palliser Formation. These limestones are commonly mottled and locally interbedded with brown dolostones. They are overlain by the Devono-Mississippian Exshaw Formation, which predominantly consists of black, fissile shale, cherty shale, siltstone and minor limestone (Kenny, 1977). The Exshaw Formation is generally 6 to 30 metres in thickness (Figure 4). Four phosphatic horizons exist within the Exshaw Formation: the lowest is less than 50 cm thick and has grades of less than 9 per cent P_2O_5; the middle two horizons are both around one metre thick, have grades of up to 10 per cent P_2O_5 and are separated by approximately two metres of shale: and the uppermost phosphatic zone, which has very limited extent, contains grades which always exceed 15 per cent P_2O_5 and is always less than 15 cm thick (Macdonald, 1987).

The Mississippian Banff Formation has a gradational contact with the underlying Exshaw Formation. It is 280 to 430 metres thick and consists of dark grey, fissile shale and bands of argillaceous limestone that grade upwards into dark grey, massive, finely crystalline limestone and dolostone. The Rundle Group, which is also Mississippian in age, conformably overlies the Banff Formation and attains a thickness of approximately 700 metres. It consists of a series of resistant, thick-bedded crinoidal limestones, grey and black, finely crystalline limestones, dark, argillaceous limestones, dolostones and minor black and green shale (Butrenchuk, 1987a: Kenny, 1977).

Conformably overlying the Mississippian carbonates are Pennsylvanian strata of the Spray Lakes Group which consist of a lower unit, the Tunnel Mountain Formation and an upper unit, the Kananaskis Formation. The Tunnel Mountain Formation comprises a uniform, monotonous sequence of reddish-brown weathering dolomitic sandstone and siltstone that attains a maximum thickness of 500 metres at its western margin, near the Elk River. The Tunnel Mountain Formation is disconformably overlain by the Kananaskis Formation which consists of light grey, silty dolostones and dolomitic siltstones and is generally around 55 metres thick. Chert nodules and intraformational chert breccias are found in the upper part of the section. Slightly phosphatic horizons, containing up to 9 per cent P_2O_5, are reported as rare occurrences within the Kananaskis Formation (Macdonald, 1987).

The Kananaskis Formation of the Spray Lakes Group is unconformably overlain by Permian strata of the Ishbel Group. Together, the Spray Lake Group and the Ishbel Group comprise the Rocky Mountain

Supergroup (Figure 4). The Ishbel Group, which has been correlated with the Phosphoria Formation in the western United States, consists of the Johnston Canyon, Telford, Ross Creek and Ranger Canyon formations, from oldest to youngest, respectively.

The Johnston Canyon Formation comprises a series of recessive weathering, thin to medium-bedded siltstones, silty carbonate rocks and sandstones, with minor shale and chert. It varies from 1 to 60 metres in thickness and commonly contains phosphatic rocks. Thin, intraformational, phosphate-pebble conglomerate beds are common throughout the formation and, locally, mark its base. Phosphate is present as black nodules in distinct horizons within the siltstones, locally cements siltstone beds and, locally occurs in pelletal siltstone or pelletal silty phosphorite beds which are slightly greater than 1 metre in thickness (Butrenchuk, 1987a; Macdonald, 1987). The pelletal phosphorites can contain up to 21 per cent P_2O_5, but are of limited distribution: the basal conglomerate is less than 50 centimetres thick and generally contains 3-4 per cent P_2O_5, only; the nodular and phosphate pebble-conglomerate beds can have cumulate thicknesses of up to 22 metres, but grades rarely exceed 10 per cent P_20_5 over a few 10s of centimetres.
The Telford and Ross Creek Formations, which attain thicknesses of 210-225 and 90-150 metres respectively, are of limited distribution, exposed only in the Telford Thrust, west of the Elk Valley in the Sparwood region. The Telford Formation consists of resistant-weathering, thick-bedded, sandy, oolitic and fossiliferous rocks. Rarely, slightly phosphatic horizons are present, with grades commonly around 11 per cent P_2O_5 across 30 centimetres. The Ross Creek Formation is composed of recessive, thin-bedded siltstone, argillaceous siltstone, minor carbonate and chert. Nodular phosphate horizons are present throughout this unit and are best developed in the upper portions. Locally, phosphatic coquinoid beds are also present. Reported phosphate grades are only 1.7 to 6 per cent P_2O_5 (Butrenchuk, 1987a; Macdonald, 1987).

The Ranger Canyon Formation, which can be up to 60 metres thick, paraconformably to disconformably overlies the Ross Creek Formation. It predominantly consists of resistant, cliff-forming, thick-bedded, blue-grey cherts, cherty sandstones, siltstones, fine sandstones and conglomerates. Minor gypsum and dolomite are also present. The base of the formation is marked by thin, phosphate-cemented, chert-pebble conglomerates that locally contain massive, phosphatic intraclasts. Phosphate also occurs as nodules in brownish weathering sandstone beds in the upper part of the formation. With the exception of phosphatic strata near the Fernie ski hill, most of the horizons are reportedly low grade: the highest values reported are 13.3 per cent P_2O_5 across 0.5 metres (Butrenchuk, 1987a; Macdonald, 1987).

Permian strata are unconformably overlain by the Triassic Sulphur Mountain Formation of the Spray River Group. The Sulphur Mountain Formation is between 100 and 496 metres thick and typically consists of rusty brown weathering, medium-bedded siltstones, calcareous and dolomitic siltstones, silty dolostones and limestones and minor shale. Locally, the Sulphur Mountain Formation is overlain by pale weathering, variegated dolostones, limestones, sandstones and intraformational breccias of the Whitehorse Formation. The Whitehorse Formation, which can be from 6 to 418 metres in thickness, is middle to upper Triassic in age and is the upper member of the Spray River Group. It is not present in most areas (Butrenchuk, 1987a).

The Jurassic Fernie Group unconformably overlies the Triassic strata. It consists of a lower zone of dark grey to black shales, dark brown shales, phosphates and minor limestones, siltstones and sandstones (the basal phosphate zone and equivalent Nordegg Member, Poker Chip Shales and the Rock Creek Member), a middle unit of light grey shale, calcareous sandstone and sandy limestone (the Grey Beds) and an upper unit of yellowish-grey to pale brown or dark grey weathering glauconitic sandstone and shale grading upwards into interbedded fine grained sandstone, siltstone and black shales (the Green and Passage beds). In southeastern British Columbia, the Fernie Group is 70 to 376 metres in thickness and generally thickens to the west (Freebold, 1957; Kenny, 1977; Macdonald, 1987; Price, 1965).

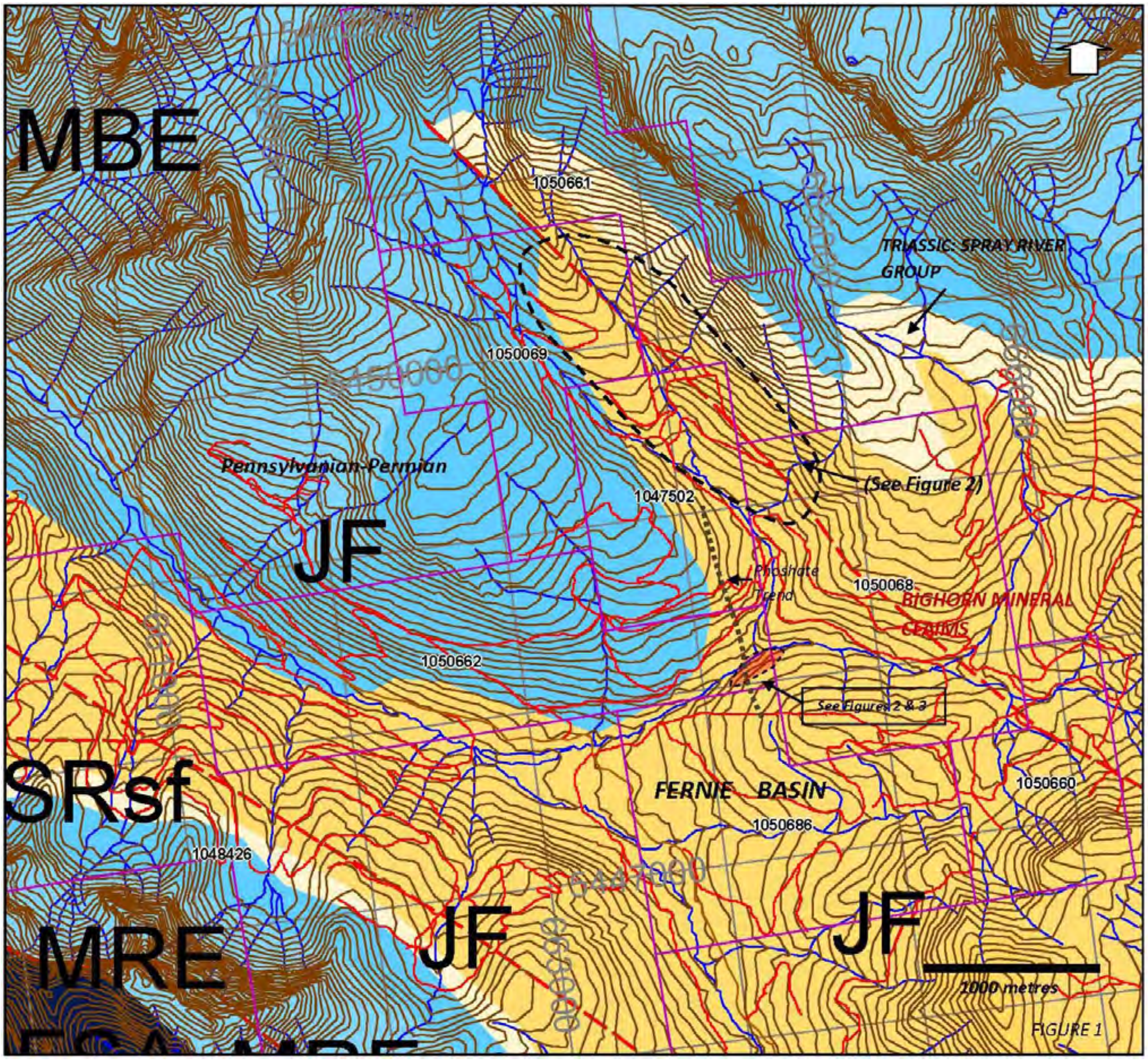
The base of the Fernie Group is marked by a persistent pelletal phosphorite horizon that is 1 to 2 metres in thickness and generally contains greater than 15 per cent P_2O_5; grades up to 30 per cent P_2O_5 have been found. It commonly consists of two pelletal phosphorite beds separated by a thin, chocolate brown to black phosphatic shale bed. The basal phosphorite rests either directly on Triassic strata or is separated from the underlying rocks by a thin phosphatic conglomerate. Phosphatic shales of variable thickness, generally less than 3 metres, overlie the phosphorites. The top of this sequence is locally marked by a yellow-orange bentonite bed. This part of the formation is Sinemurian in age and generally considered to be a lateral facies of the Nordegg Member and Nordegg equivalent beds. A second phosphatic horizon is present in the Bajocian Rock Creek Member, approximately 60 metres above the base of the Fernie Group. This zone is extremely low grade, generally containing less than one per cent P_2O_5 and is often associated with belemnite-bearing calcareous sandstone beds (Butrenchuk, 1987a; Freebold, 1957; Macdonald, 1987).

The Kootenay Formation, of upper Jurassic to Cretaceous age, overlies rocks of the Fernie Group. It consists of dark grey carbonaceous sandstone, gritty to conglomeratic sandstone, siltstone, shale and coal and can be from 150 to 520 metres thick (Price, 1965).

Age	Group/Formation (Thickness, metres)	Lithology	Phosphatic Horizons	Thickness (metres)	Grade (% P_2O_5)
Cretaceous	Kootenay Fm.	-grey to black carbonaceous siltstone and sandstone; nonmarine; coal			
Jurassic	Fernie Gp. (+244)	-black shale, siltstone, limestone; marine to nonmarine at top -glauconitic shale in upper section -belemnites; common fossil	-approximately 60 metres above base low-grade phosphate bearing calcareous sandstone horizon or phosphatic shale -Bajocian -basal phosphate in Sinemurian strata; generally pelletal/oolitic; rarely nodular; 1-2 metres thick; locally two phosphate horizons; top of phosphate may be marked by a yellowish-orange weathering marker bed.	1-2	11-30
regional uncomformity					
Triassic	SPRAY RIVER GP. Whitehorse Fm.	-dolomite, limestone, siltstone			
	SPRAY RIVER GP. Sulphur Mntn. Fm. (100-496)	-grey to rusty brown weathering sequence of siltstone, calcareous siltstone and sandstone, shale, silty dolomite and limestone	-nonphosphatic in southeastern British Columbia		
regional unconformity					
Permian	ROCKY MOUNTAIN SUPERGROUP Ranger Canyon Fm. (1-60)	-sequence of chert, sandstone and siltstone; minor dolomite and gypsum; conglomerate at base -shallow marine deposition	-upper portion-brown, nodular phosphatic sandstone; also rare pelletal phosphatic sandstone (few centimetres to +4 metres) -basal conglomerate-chert with phosphate pebbles present (≤1 metre)	0.6 0.5-1.0	9.5 13-18
unconformity					
	ROCKY MOUNTAIN SUPERGROUP / ISHBEL GROUP Ross Creek Fm. (90-150)	-sequence of siltstone, shale chert, carbonate and phosphatic horizons areally restricted to Telford thrust sheet -west of Elk River, shallow marine deposition	-phosphate in a number of horizons as nodules and finely disseminated granules within the matrix -phosphatic coquinoid horizons present	0.4-1.0	1.7-6.0
	ROCKY MOUNTAIN SUPERGROUP / ISHBEL GROUP Telford Fm. (210-225)	-sequence of sandy carbonate containing abundant brachiopod fauna; minor sandstone -shallow marine deposition	-rare, very thin beds or laminae of phosphate; rare phosphatized coquinoid horizon	0.3	11.4
	ROCKY MOUNTAIN SUPERGROUP Johnson Canyon Fm. (1-60)	-thinly bedded, rhythmic sequence of siltstone, chert, shale, sandstone and minor carbonate; basal conglomerate -shallow marine deposition	-locally present as a black phosphatic siltstone or pelletal phosphate -phosphate generally present as black ovoid nodules in light coloured siltstone; phosphatic interval ranges in thickness from 1-22 metres -basal conglomerate (maximum 30 cm thick) contains chert and phosphate pebbles	0.2-0.3 1-22 1-2	3.0-4.0 0.1-11.0 14.2-21.2
regional unconformity					
Pennsylvanian	SPRAY LAKES GP. Kananaskis Fm. (±55)	-dolomite, silty, commonly contains chert nodules or beds	-locally, minor phosphatic siltstone in uppermost part of section		
	SPRAY LAKES GP. Tunnel Mntn Fm (±500)	-dolomitic sandstone and siltstone			
Mississippian	Rundle Gp. (±700)	-limestone, dolomite, minor shale, sandstone and cherty limestone			
	Banff Fm. (280-430)	-shale, dolomite, limestone			
Devonian-Mississippian	Exshaw Fm. (6-30)	-black shale, limestone -areally restricted in south-eastern British Columbia	-an upper nodular horizon -phosphatic shale and pelletal phosphate 2-3 metres above base -basal phosphate <1 metre thick		
Devonian	Palliser Fm.	-limestone			

FIGURE 4: STRATIGRAPHIC SUMMARY INCLUDING PHOSPHATE-BEARING HORIZONS IN SOUTHEASTERN BRITISH COLUMBIA (modified from Butrenchuk, 1987a). Thickness not to scale.

Figure 12 Stratigraphic Summary



Local Geology map – Bighorn Mineral Claims
The property is dominantly underlain by the Jurassic, Fernie Basin black shale, which overlies the Triassic Spray River Group comprised of indurated shale, mudstone and siltstone. These rock formations are regionally underlain by Pennsylvanian-Permian Rocky Mountain Group consisting mainly of dolomitic carbonate rock units.

Figure 13 Local Geology

PROPERTY GEOLOGY

The Bighorn area is underlain by a sequence of sedimentary rocks which range from Permian to Lower Cretaceous in age (Figure 6). Geological mapping at a scale of 1:5,000, concentrated on locating the basal Fernie Group phosphorite horizon, which marks the Triassic/Jurassic boundary in this region.

The Bighorn claims are underlain by strata correlative with the Ranger Canyon Formation of the Permian Ishbel Group, the Sulphur Mountain Formation of the Triassic Spray River Group and the Jurassic Fernie Group (Figures 5). Ishbel Group strata older than the Ranger Canyon Formation may also be present on the property, but little attention was paid to this part of the stratigraphy. Late Jurassic to early Cretaceous sandstones, siltstones and coal beds of the Kootenay Formation are exposed on a ridge crests on the northwestern corner of the claims.

Rocks assigned to the Ranger Canyon Formation are predominantly medium to thick bedded, cream to buff to light grey weathering, fine grained sandstones, siltstones and dolomitic siltstones with white to light grey fresh surfaces. Locally, thin cherty and chert nodule rich layers are present within the siltstones. Thin grey limey beds may also be present, interlayered with the siltstones and are particularly common at the top of the section, immediately underlying Triassic siltstones. These limey beds are locally fossiliferous, containing rugosan corals and possible crinoid fragments. At one location, along the main access road, dark grey siltstones containing black phosphate nodules were present near the top of the Permian section and were overlain by grey calcareous beds.

Rocks correlative with the Triassic Sulphur Mountain Formation in the Bighorn area are predominantly buff, yellowish-brown and chocolate brown weathering, thin to medium bedded siltstones and shaley siltstone with a grey to buff fresh surface. Horizons consisting of dark brown shale with thin siltstone interlayers are common within this formation and, throughout much of the property, occur at the top of the formation.

Fernie Group rocks are recessive weathering and for the most part not well exposed. Where the base of the Fernie is exposed and the section complete, it is marked by a phosphorite horizon that is commonly 1.1 to 2.1 metres thick. In many areas the top of the section has been eroded and therefore thicknesses impossible to estimate; locally, backthrusting has placed Triassic and basal Jurassic strata over Jurassic Fernie shales, disrupting the sequence. The basal phosphorite horizon generally consists of poorly to well consolidated, gritty, pelletal phosphorite and shaley phosphorite capped by phosphatic shale. Trenches and hand pits at the southern part of the property revealed beds containing phosphate nodules within a pelletal phosphorite matrix. Brown and black shales commonly overlie the phosphorites; locally, extremely hard, dark grey nodular siltstone layers occur within the shales immediately overlying the phosphatic sequence.

The monotonous, fissile black shales which overlie the basal Fernie phosphorites give way, upsection to black, brown and dark grey shales with interbedded boudinaged buff to orange weathering dolostones, buff fossiliferous fine-grained sandstones and light grey limestone beds. Further upsection light grey to yellowish grey calcareous shales occur within the Fernie Group.

On the northwestern corner of the property, gritty grey sandstones, siltstones and thin coal beds of the late Jurassic to Cretaceous Kootenay Formation crop out, but were not examined in detail.

WORK PROGRAM 2018

A GPS traverse survey was carried out along an old log haul road for about 2.5 kilometres to approximately the location of the minfile showing. The first kilometre of the road encounters sections of the Spray River Formation. At the switchback numerous Fernie black shale loose rock was noted probable subcrop material. A sample was collected 'BH-1'. The traverse continued southeastward. Approximately 500m from the switchback an outcrop of black shale-siltstone was noted (GPS BSh). For about the next kilometre occasional limestone is exposed. The traverse ended along small dry creek, the minfile showing is plotted approximately this area. However the area is covered by abundant young alders and spruce. Further traverses should be extended along the dry creek bed especially northward or downslope toward the Spray River Formation. The claim has generally being reclaimed by vegetation with the old logging roads now covered by re-growth.

Assays were conducted by using an XRF Unit factory calibrated (Cert No. 0154-0557-1) on October 30, 2013, Instrument #540557 Type Olympus DPO-2000 Delta Premium. The instrument was calibrated using Alloy Certified reference materials by ARM1 and NIS5 standards. Only certified operators were employed and that were experienced in XRF assay procedures. Read times were 120 seconds or greater.

Results and descriptions of the rock geochemistry are shown in Appendix III and IV. Assays are plotted on Figure 15. The lower phosphate horizon was indicated by samples JTS-2+3 at 3.83% P_2O_5.

Further follow-up is recommended for 2019.

Figure 14 Bighorn Claims: Local Geology (Southside) 2018

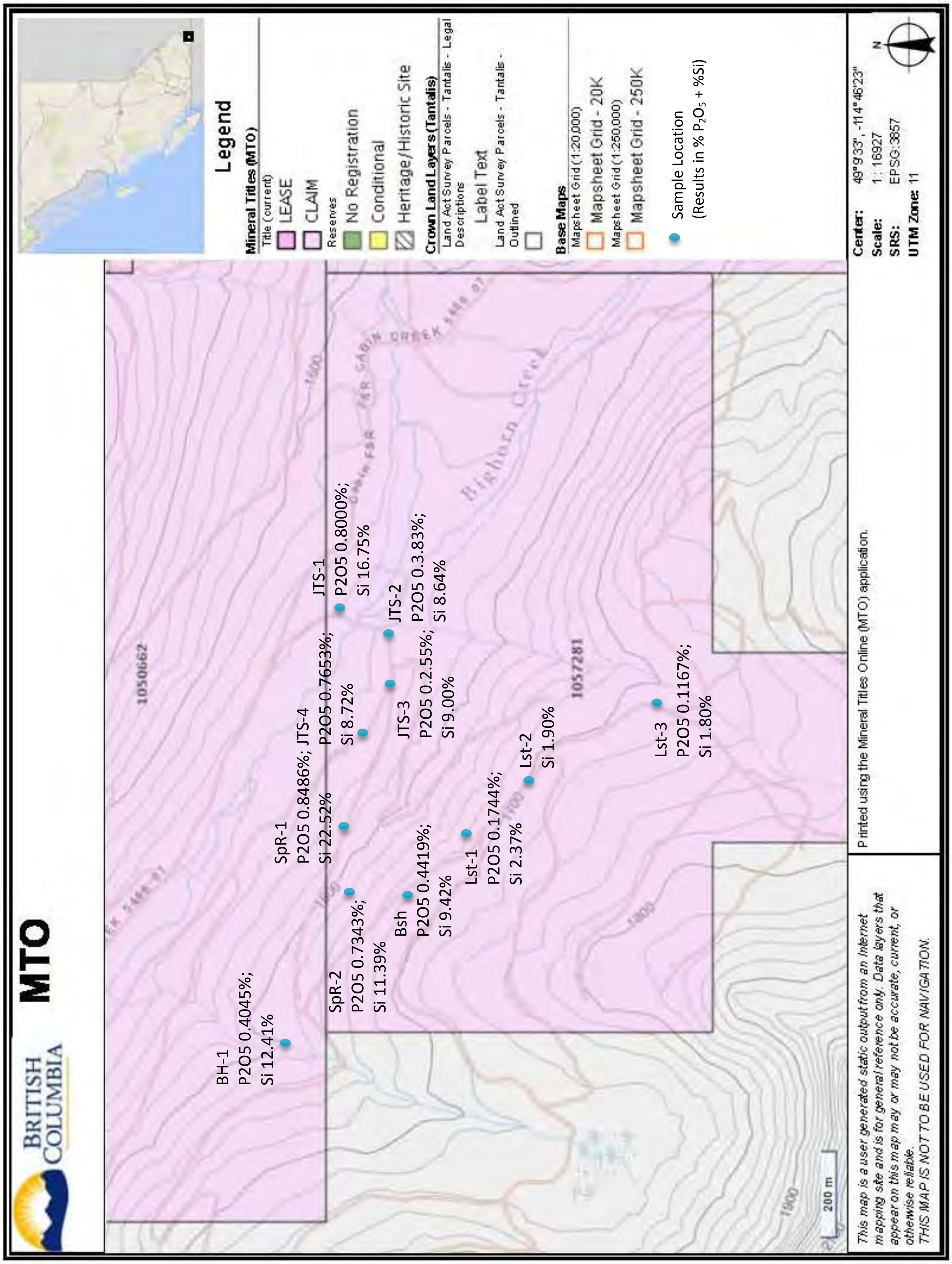


Figure 15 Bighorn Sample Locations and Results 2018

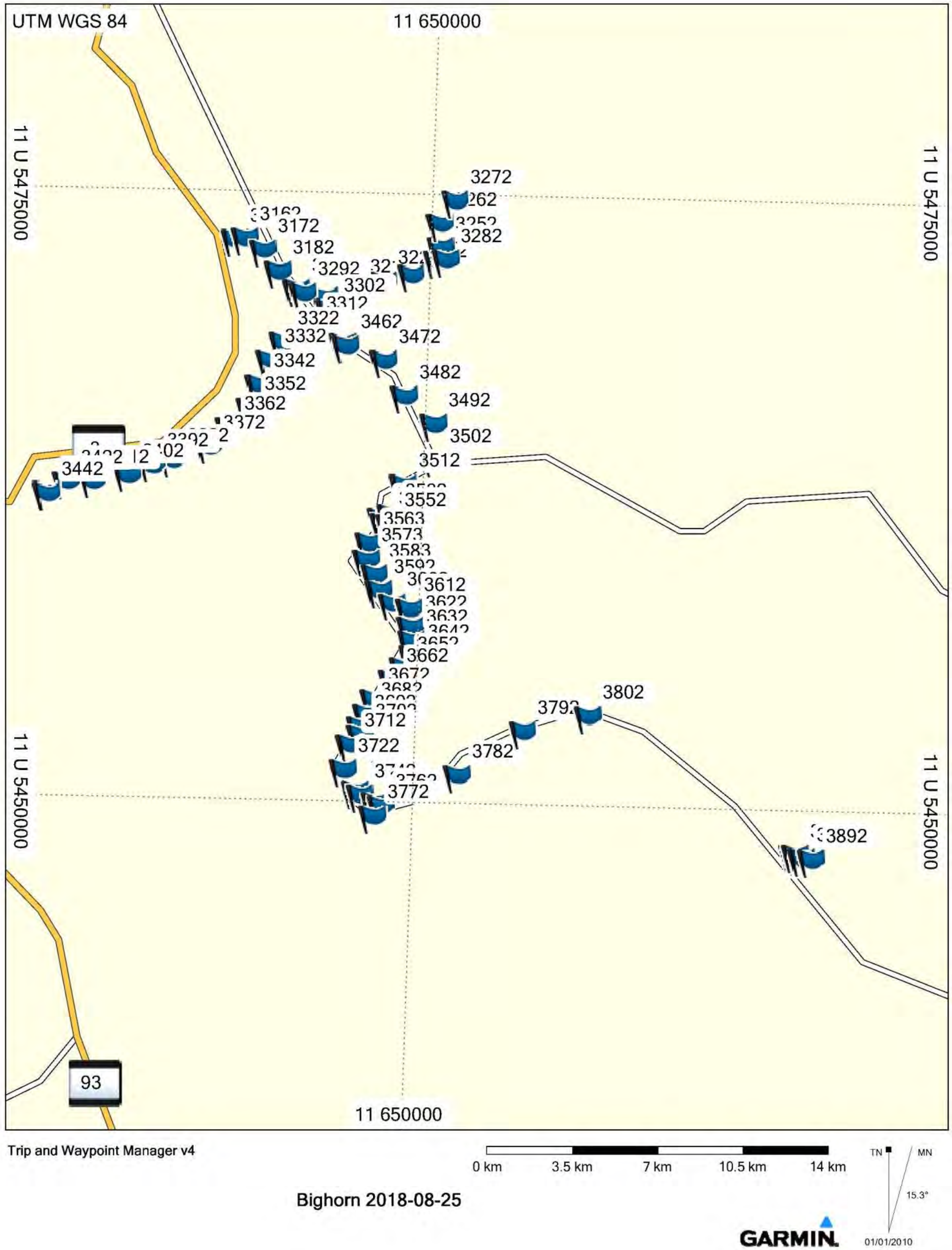


Figure 16 Location Map GPS Traverse

CONCLUSIONS and RECOMMENDATIONS

The Bighorn claim, which can be reached by road from Fernie, B.C., is underlain by a series of Upper Paleozoic and Mesozoic strata that were deposited off the western margin of North America between the Permian and late Jurassic. Considerable phosphatic strata occur at the base of the Jurassic Fernie Group.

On the Bighorn claim, complete sections of the phosphatic strata are 1.11 to 2.1 metres in thickness and average 22.5 per cent P_2O_5. One incomplete section, where the upper beds were eroded away, was 0.98 metres in thickness and contained 32.62 per cent P_2O_5.

North of Bighorn, on the western limb of the easternmost anticline, an area was located where the phosphate horizon dips in a downslope direction at an angle approximately parallel to or slightly steeper than the slope: this scenario is favourable for exploiting the resource with minimal removal of overburden.

The work done to date has been preliminary and has not addressed questions such as the effects of surface weathering and the potential of changes in grade with depth from surface.

In 2017 the program consisted of reconnaissance geochemistry, rock sampling, soil sampling and establishing access.

Results for previous sampling and 2017 assays are encouraging in P2O5 content. Current sampling shows an extensive strike length of the basal Fernie Formation extending to the southwest on to claim 1057281. Follow-up work is recommended for 2019.

Respectfully Submitted,

J. T. Shearer, M.Sc., P.Geo. (BC & Ontario)

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APPENDIX I

STATEMENT of QUALIFICATIONS

October 22, 2018

STATEMENT of QUALIFICATIONS

I, Johan T. Shearer of Unit 5 – 2330 Tyner Street, in the City of Port Coquitlam, in the Province of British Columbia, do hereby certify:

1. I graduated in Honours Geology (B.Sc., 1973) from the University of British Columbia and the University of London, Imperial College, (M.Sc. 1977).

2. I have practiced my profession as an Exploration Geologist continuously since graduation and have been employed by such mining companies as McIntyre Mines Ltd., J.C. Stephen Explorations Ltd., Carolin Mines Ltd. and TRM Engineering Ltd. I am presently employed by Homegold Resources Ltd.

3. I am a fellow of the Geological Association of Canada (Fellow No. F439). I am also a member of the Canadian Institute of Mining and Metallurgy, the Geological Society of London and the Mineralogical Association of Canada. I am a member in good standing of the Association of Professional Engineers and Geoscientists of British Columbia (P.Geo., Member Number 19,279).

4. I am an independent consulting geologist employed since December 1986 by Homegold Resources Ltd. At Unit #5 2330 Tyner Street, Port Coquitlam, British Columbia.

5. I am the author of the report entitled "Geochemical Assessment Report on the Bighorn Property" dated October 22, 2018.

6. I have visited the property on August 15-19, 2017 and again on August 10-12, 2018. I have carried out mapping and sample collection and am familiar with the regional geology and geology of nearby properties. I have become familiar with the previous work conducted on the Bighorn Project by examining in detail the available reports and maps and have discussed previous work with persons knowledgeable of the area.

Dated at Port Coquitlam, British Columbia, 22nd day of October, 2018.

J.T. Shearer, M.Sc., P. Geo. (BC & Ontario)

APPENDIX II

STATEMENT of COSTS

October 22, 2018

Appendix II

Bighorn Property
Statement of Costs
2018

Wages	Total
J. T. Shearer, M.Sc., P.Geo, Geologist 3 days @ $700/day, August 10-12, 2018	$2,100.00
Dan Cardinal, B.Sc., P.Geo., Geologist 3 days @ $700/day, August 10-12, 2018	2,100.00
Subtotal Wages	$4,200.00
Transportation	
Truck 1 – 3 days @ $120/day	360.00
Truck 2 – 3 days @ $100/day	360.00
Fuel	650.00
Hotel	600.00
Meals & Food	350.00
Heath Smith, Field Assistant, 3 days @ $200/day, August 10-12, 2018	600.00
GPS & Field Supplies	120.00
Satellite Phone	100.00
SRF Assays	250.00
Data Compilation	350.00
Report Writing	750.00
Word Processing and Reproduction	350.00
Subtotal Expenses	$4,840.00
Total	**$9,040.00**

Event #	5718036
Date Filed	October 22, 2018
Amount	$ 8,100.00
PAC	$ 420.01
Total Filed	$ 8,520.01

APPENDIX III

SAMPLE DESCRIPTIONS

October 22, 2018

Sample Descriptions
GPS UTM Zone 11

Sample	Northing	Easting	Description
BH-1	5447993	661661	Dark brown, soft, finely clastic, shale
SpR-1	5447862	662179	Brownish weathering, silty appearance, well indurated siltstone
SpR-2	5447916	662002	Brownish-yellow weathering, traces of pyrite, finely clastic, significant carbonate content
Bsh	5447695	662033	Dark grey to black
Lst-1	5447555	662150	Mottled dark grey, finely crystalline, sugary texture, white blotches & veinlets - limestone
Lst-2	5447407	662320	Limestone, Rundle Group - mottled dark grey, finely crystalline, sugary texture, white blotches & veinlets - limestone
Lst-3	5447143	662488	Mottled dark grey, finely crystalline, sugary texture, white blotches & veinlets - limestone
JTS-1	5447898	662679	Fernie shale float, low P_2O_5, fine grained, black shale
JTS-2	5447772	662638	Fernie shale float, moderate P_2O_5 near basal contact, fine grained
JTS-3	5447765	662513	Fernie shale float, P_2O_5 content black fine grained, nodular
JTS-4	5447833	662383	Spray River Group, siltstone, orangey weathering

Bighorn Waypoints 2018-08-25

315	23-AUG-18 10:25:12AM	N49 23.459 W115 01.296	948 m
316	23-AUG-18 10:28:51AM	N49 23.499 W115 01.033	950 m
317	23-AUG-18 10:32:20AM	N49 23.231 W115 00.544	962 m
318	23-AUG-18 10:35:06AM	N49 22.756 W115 00.141	978 m
319	23-AUG-18 10:36:22AM	N49 22.347 W114 59.624	993 m
320	23-AUG-18 10:38:06AM	N49 22.184 W114 58.868	1007 m
321	23-AUG-18 10:39:24AM	N49 22.328 W114 58.049	1028 m
322	23-AUG-18 10:41:13AM	N49 22.529 W114 57.287	1052 m
323	23-AUG-18 10:44:00AM	N49 22.672 W114 56.534	1105 m
324	23-AUG-18 10:46:17AM	N49 22.986 W114 55.822	1178 m
325	23-AUG-18 10:49:04AM	N49 23.275 W114 55.736	1223 m
326	23-AUG-18 10:51:22AM	N49 23.808 W114 55.744	1332 m
327	23-AUG-18 10:55:06AM	N49 24.313 W114 55.338	1407 m
328	23-AUG-18 11:07:48AM	N49 23.003 W114 55.600	1215 m
329	23-AUG-18 11:19:28AM	N49 22.274 W114 59.456	1000 m
330	23-AUG-18 11:21:26AM	N49 21.910 W114 58.757	990 m
331	23-AUG-18 11:23:33AM	N49 21.503 W114 59.231	991 m
332	23-AUG-18 11:25:02AM	N49 21.181 W115 00.008	954 m
333	23-AUG-18 11:26:09AM	N49 20.792 W115 00.357	956 m
334	23-AUG-18 11:27:36AM	N49 20.239 W115 00.649	1001 m
335	23-AUG-18 11:29:02AM	N49 19.730 W115 00.903	993 m
336	23-AUG-18 11:30:32AM	N49 19.290 W115 01.450	968 m
337	23-AUG-18 11:31:52AM	N49 18.866 W115 02.013	967 m
338	23-AUG-18 11:33:37AM	N49 18.583 W115 02.996	950 m
339	23-AUG-18 11:34:44AM	N49 18.474 W115 03.544	934 m

340	23-AUG-18 11:36:30AM	N49 18.243 W115 04.210	932 m
341	23-AUG-18 11:38:11AM	N49 18.112 W115 05.154	931 m
342	23-AUG-18 11:39:29AM	N49 18.104 W115 05.865	938 m
343	23-AUG-18 11:40:41AM	N49 17.890 W115 06.390	940 m
344	23-AUG-18 11:41:02AM	N49 17.837 W115 06.392	930 m
345	23-AUG-18 12:03:18PM	N49 21.154 W114 58.385	1086 m
346	23-AUG-18 12:03:28PM	N49 21.103 W114 58.303	1095 m
347	23-AUG-18 12:05:13PM	N49 20.770 W114 57.267	1182 m
348	23-AUG-18 12:07:06PM	N49 19.983 W114 56.713	1199 m
349	23-AUG-18 12:08:52PM	N49 19.361 W114 55.920	1172 m
350	23-AUG-18 12:11:07PM	N49 18.570 W114 55.886	1144 m
351	23-AUG-18 12:13:14PM	N49 18.026 W114 56.737	1136 m
352	23-AUG-18 12:15:42PM	N49 17.280 W114 57.355	1061 m
353	23-AUG-18 12:16:39PM	N49 17.351 W114 57.092	1040 m
354	23-AUG-18 12:17:21PM	N49 17.182 W114 57.272	1021 m
355	23-AUG-18 12:28:39PM	N49 17.146 W114 57.112	1024 m
356	23-AUG-18 12:30:29PM	N49 16.732 W114 57.686	1028 m
357	23-AUG-18 12:32:17PM	N49 16.367 W114 57.744	1017 m
358	23-AUG-18 12:33:12PM	N49 16.023 W114 57.528	1019 m
359	23-AUG-18 12:34:08PM	N49 15.673 W114 57.402	1051 m
360	23-AUG-18 12:35:13PM	N49 15.390 W114 57.050	1114 m
361	23-AUG-18 12:36:15PM	N49 15.269 W114 56.587	1148 m
362	23-AUG-18 12:37:55PM	N49 14.871 W114 56.548	1129 m
363	23-AUG-18 12:39:04PM	N49 14.555 W114 56.525	1133 m
364	23-AUG-18 12:40:10PM	N49 14.225 W114 56.480	1131 m
365	23-AUG-18 12:41:54PM	N49 13.955 W114 56.766	1140 m
366	23-AUG-18 12:43:14PM	N49 13.701 W114 57.055	1149 m
367	23-AUG-18 12:45:40PM	N49 13.270 W114 57.557	1157 m
368	23-AUG-18 12:47:05PM	N49 12.943 W114 57.751	1159 m
369	23-AUG-18 12:48:12PM	N49 12.668 W114 57.922	1196 m
370	23-AUG-18 12:49:15PM	N49 12.474 W114 57.902	1235 m
371	23-AUG-18 12:50:46PM	N49 12.260 W114 58.199	1217 m
372	23-AUG-18 12:53:38PM	N49 11.702 W114 58.377	1164 m
373	23-AUG-18 12:55:24PM	N49 11.215 W114 58.043	1145 m
374	23-AUG-18 12:55:46PM	N49 11.139 W114 57.923	1139 m
375	23-AUG-18 12:59:21PM	N49 10.969 W114 57.518	1124 m
376	23-AUG-18 1:01:21PM	N49 10.909 W114 57.359	1119 m
377	23-AUG-18 1:04:33PM	N49 10.676 W114 57.577	1127 m
378	23-AUG-18 1:19:04PM	N49 11.574 W114 55.289	1165 m
379	23-AUG-18 1:26:28PM	N49 12.546 W114 53.514	1212 m
380	23-AUG-18 1:30:58PM	N49 12.881 W114 51.754	1262 m
381	23-AUG-18 1:53:07PM	N49 09.817 W114 46.206	1536 m
382	23-AUG-18 1:56:59PM	N49 09.762 W114 46.126	1533 m
383	23-AUG-18 1:58:34PM	N49 09.716 W114 46.121	1531 m
384	23-AUG-18 2:08:36PM	N49 09.722 W114 46.121	1534 m
385	23-AUG-18 2:09:53PM	N49 09.746 W114 46.096	1536 m
386	23-AUG-18 2:18:37PM	N49 09.815 W114 46.202	1541 m
387	23-AUG-18 2:19:28PM	N49 09.804 W114 46.145	1548 m
388	23-AUG-18 2:20:14PM	N49 09.716 W114 45.961	1559 m
389	23-AUG-18 2:21:01PM	N49 09.692 W114 45.718	1570 m

APPENDIX IV

ASSAY RESULTS

October 22, 2018

Assay Results 2018

Sample #	Reading	P_2O_5%	Al%	Si%	Ca%
BH-1	#2	0.4045	2.88	12.41	1.4648
SpR-1	#3	0.8486	3.62	22.52	0.557
SpR-2	#4	0.7343	2.59	11.39	16.79
Bsh	#5	0.4419	2.67	9.42	11.46
Lst-1	#6	0.1744	0.86	2.3721	52.31
Lst-2	#7	ND	0.612	1.8974	54.13
Lst-3	#8	0.1167	0.7467	1.796	56.89
JTS-1	#9	0.8002	2.75	16.75	13.46
JTS-2	#10	3.8336	3.11	8.64	12.81
JTS-3	#11	2.5514	3.66	9	7.01
JTS-4	#12	0.7653	1.69	8.72	34.52

XRF Bighorn 2018

Reading	Mg	Mg +/-	Al	Al +/-	Si	Si +/-	P	P +/-	S	S +/-	Cl	Cl +/-	K	K +/-	Ca	Ca +/-	Ti
BH-1	ND		2.88	0.07	12.41	0.11	0.4045	0.0221	0.1207	0.0038	ND		1.4606	0.0131	1.4648	0.0135	0.2802
SpR-1	ND		3.62	0.07	22.52	0.14	0.8486	0.0253	0.1411	0.0038	ND		1.6563	0.0118	0.557	0.0066	0.3277
SpR-2	ND		2.59	0.06	11.39	0.08	0.7343	0.0257	0.1067	0.003	ND		1.3727	0.0105	16.79	0.12	0.2084
Bsh	ND		2.67	0.06	9.42	0.08	0.4419	0.0234	0.0834	0.003	ND		1.1311	0.0095	11.46	0.09	0.2569
Lst-1	ND		0.86	0.06	2.3721	0.0306	0.1744	0.0319	0.2381	0.0043	ND		0.059	0.0031	52.31	0.45	ND
Lst-2	ND		0.612	0.0477	1.8974	0.0223	ND		0.0666	0.0026	ND		0.0122	0.0023	54.13	0.37	ND
Lst-3	ND		0.7467	0.047	1.796	0.0208	0.1167	0.0259	0.1493	0.0029	ND		ND		56.89	0.37	ND
JTS-1	ND		2.75	0.06	16.75	0.12	0.8002	0.0294	0.3725	0.0051	ND		1.0037	0.0086	13.46	0.1	0.2473
JTS-2	ND		3.11	0.06	8.64	0.07	3.8336	0.0459	0.086	0.003	ND		0.6444	0.0061	12.81	0.1	0.6398
JTS-3	ND		3.66	0.07	9	0.08	2.5514	0.0396	0.1093	0.0036	ND		1.4652	0.0129	7.01	0.06	0.5093
JTS-4	ND		1.69	0.06	8.72	0.07	0.7653	0.0309	0.0788	0.0032	ND		0.9785	0.0084	34.52	0.25	0.1521

Ti +/-	V	V +/-	Cr	Cr +/-	Mn	Mn +/-	Fe	Fe +/-	Co	Co +/-	Ni	Ni +/-	Cu	Cu +/-	Zn	Zn +/-	As
0.0198	0.0331	0.0082	ND		0.5694	0.012	3.3368	0.0352	ND		ND		0.0069	0.001	0.0071	0.0007	ND
0.021	0.0282	0.0084	ND		0.0173	0.0031	1.1761	0.0152	ND		ND		0.0047	0.0008	0.0088	0.0006	ND
0.0195	ND		ND		0.3427	0.0095	2.0252	0.0233	ND		ND		0.0062	0.0009	0.0018	0.0005	ND
0.0203	0.0346	0.0087	ND		0.06	0.0045	2.245	0.0254	ND		ND		0.0064	0.0009	0.007	0.0006	0.001
	ND		ND		ND		0.4118	0.0137	ND		ND		0.0112	0.0015	ND		ND
	ND		ND		0.0309	0.0046	0.3621	0.0105	ND		ND		0.0092	0.0012	0.0018	0.0006	ND
	ND		ND		0.0168	0.004	0.3752	0.0104	ND		ND		0.0085	0.0011	ND		ND
0.0224	ND		ND		0.0324	0.0041	1.5394	0.0206	ND		0.0031	0.001	0.0066	0.001	0.0034	0.0006	ND
0.0269	0.031	0.0094	0.0255	0.0045	0.0492	0.0044	3.1642	0.0324	ND		0.0078	0.0011	0.0062	0.0009	0.0052	0.0006	0.0017
0.0256	ND		0.0213	0.0045	0.0322	0.004	2.9377	0.0324	ND		0.0089	0.0012	0.0059	0.0009	0.0044	0.0006	0.0016
0.0228	ND		ND		0.0568	0.0056	1.4609	0.0221	ND		ND		0.0121	0.0013	0.0077	0.0008	0.0016

As +/-	Se	Se +/-	Rb	Rb +/-	Sr	Sr +/-	Y	Y +/-	Zr	Zr +/-	Mo	Mo +/-	Ag	Ag +/-	Cd	Cd +/-	Sn	Sn +/-	Sb
	ND		0.0041	0.0002	0.0063	0.0002	0.0033	0.0002	0.05	0.0007	0.0011	0.0002	ND		ND		ND		ND
	ND		0.0056	0.0002	0.0099	0.0002	0.0024	0.0002	0.0293	0.0004	ND		ND		ND		ND		ND
	ND		0.0031	0.0002	0.0074	0.0002	0.0022	0.0002	0.0074	0.0003	ND		ND		ND		ND		ND
0.0003	ND		0.0036	0.0002	0.0185	0.0004	0.0038	0.0002	0.0077	0.0003	ND		ND		ND		ND		ND
	ND		ND		0.0795	0.0012	ND		0.0014	0.0005	0.0017	0.0003	ND		ND		ND		ND
	ND		ND		0.059	0.0008	ND		0.0011	0.0003	ND		ND		ND		ND		ND
	ND		ND		0.0881	0.001	ND		ND		0.0008	0.0002	ND		ND		ND		ND
	ND		0.0038	0.0002	0.0205	0.0004	0.0028	0.0002	0.0198	0.0004	ND		ND		ND		ND		ND
0.0003	ND		0.0023	0.0002	0.0235	0.0004	0.0076	0.0003	0.0164	0.0004	0.0011	0.0002	ND		ND		ND		ND
0.0003	ND		0.0037	0.0002	0.0247	0.0005	0.0097	0.0003	0.0166	0.0004	0.0014	0.0002	ND		ND		ND		ND
0.0004	ND		0.0028	0.0002	0.0767	0.001	0.0024	0.0002	0.0053	0.0004	0.0011	0.0002	ND		ND		ND		ND

Sb +/-	W	W +/-	Hg	Hg +/-	Pb	Pb +/-	Bi	Bi +/-	Th	Th +/-	U	U +/-	LE	LE +/-
	0.0033	0.0011	ND		0.0022	0.0004	ND		0.0024	0.0007	ND		76.95	0.19
	ND		ND		0.0027	0.0003	ND		ND		ND		69.04	0.19
	ND		ND		0.0016	0.0003	ND		ND		ND		64.42	0.21
	ND		ND		0.0017	0.0003	ND		ND		ND		72.15	0.19
	ND		ND		0.0026	0.0006	ND		ND		ND		43.48	0.35
	ND		ND		0.0016	0.0004	ND		ND		ND		42.81	0.29
	ND		ND		0.0015	0.0004	ND		ND		ND		39.81	0.28
	ND		ND		0.0023	0.0004	ND		ND		ND		62.99	0.23
	ND		ND		0.002	0.0004	ND		0.0023	0.0007	ND		66.89	0.21
	ND		ND		0.003	0.0004	ND		0.0037	0.0008	ND		72.62	0.2
	ND		ND		0.0019	0.0004	ND		ND		ND		51.47	0.28

APPENDIX V

BIGHORN CREEK PHOSPHORITE MINE ROCKY MOUNTAIN TAILED FROG MANAGEMENT PLAN

by

NOVA PACIFIC ENVIRONMENTAL

October 22, 2018

BIGHORN CREEK PHOSPHORITE MINE ROCKY MOUNTAIN TAILED FROG MANAGEMENT PLAN

June 2018

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Table of Contents

1. INTRODUCTION

1.1 Project Overview

Fertoz International Inc. proposed a Bighorn phosphorite project Notice of Work (NOW) in March 2017. The Bighorn claims are located in the Bighorn Creek area, Flathead region, Fort Steele Mining Division, approximately 27 kilometers by road east of the town of Elko and 45 kilometers due southeast of Fernie. (Figure 1). The proposed activities to be undertaken are exploration surface drilling and mechanical trenching/test pits.

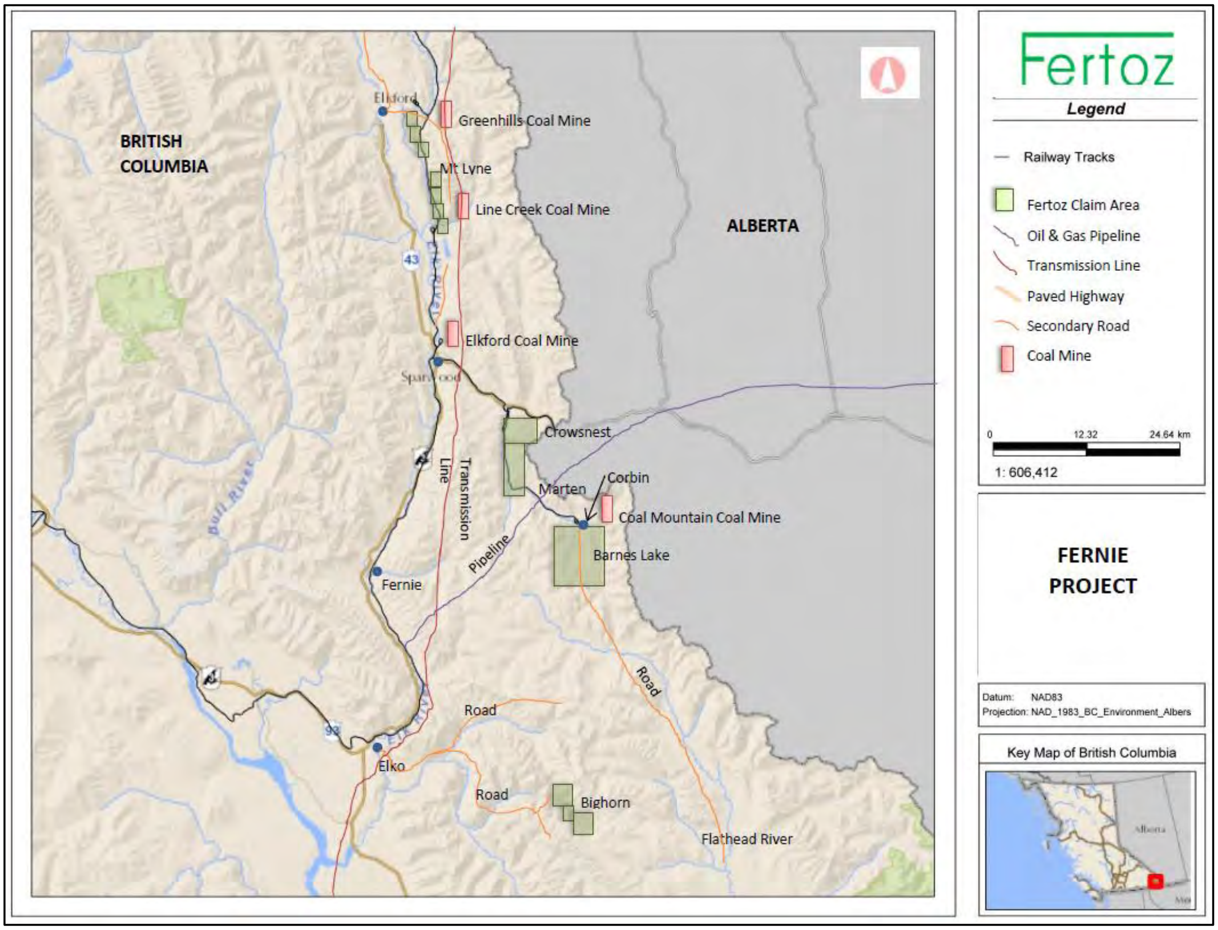

Figure 1: Fertoz claim areas in the East Kootenay region.

For years 1 to 5 in the mine life, 80 drill holes have been proposed over a length of 2,000 meters and area of 1.8 hectares as well as 80 trenches over an area of 1.2 hectares, for a total disturbance of 3.0 hectares in five years. During this time, water used for drilling will be accessed from local creeks (see Figure 2), then directed to a small sump within the footprint of the drill site which will infiltrate to ground. Phosphate material removed from the trenches will be shipped out of the site and the rest of the material will be immediately backfilled.

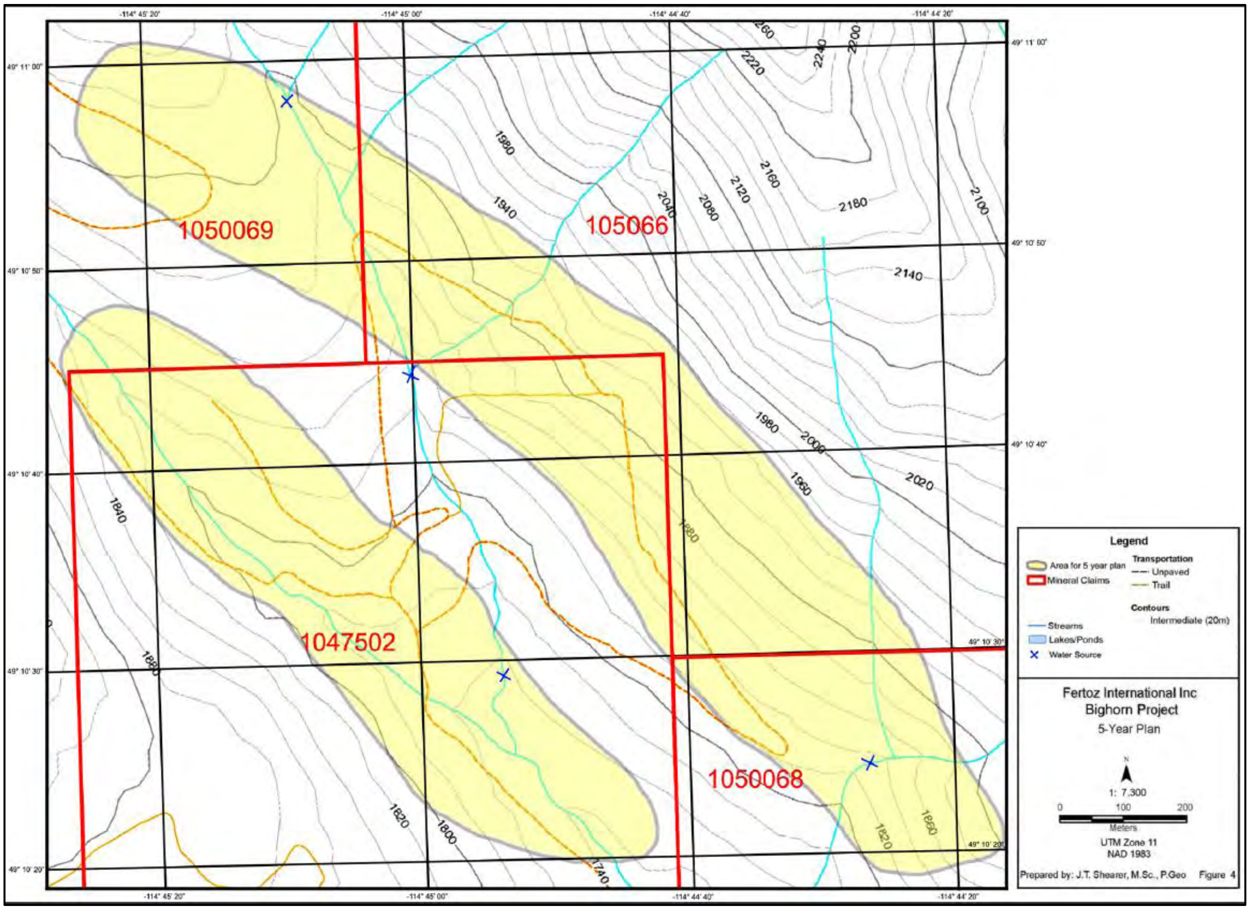

Figure 2: Overview of Bighorn Creek Phosphorite Mine location.

Potential site disturbances will include clearing of vegetation for road access and mining activities. Mining activities at the site will consist of extracting phosphate rock by excavator trenching. Reclamation of the area will include re-establishment of natural contours and hand re-seeding of the disturbed area assisted by an excavator. There is expected to be minimal overall disturbance with no disturbance of watercourses.

Nova Pacific Environmental (NPE) has been requested by Fertoz International Inc. to look at potential impacts to reptiles and amphibians related to a proposed development of a phosphorite mine near Bighorn Creek. A single at-risk amphibian has been identified near the project area, the Rocky Mountain tailed frog (*Ascaphus montanus*). This document describes the Rocky Mountain tailed frog and the proposed project, outlines how this project could potentially affect the species, and provides mitigation measures and management practices to protect tailed frogs and their habitat during work at the Bighorn Creek mine site.

1.2 Purpose of the Plan

This Rocky Mountain Tailed Frog Management Plan (FMP) has been developed to meet the requirements of the BC Government Approval – Mines Act and Environmental Management Act Permits.

This FMP identifies proposed mitigation measures that will be applied to population of the BC red-listed

Rocky Mountain tailed frog and a program for monitoring the effectiveness of these measures to ensure the long-term viability of this species within the area associated with the project.

2. ROCKY MOUNTAIN TAILED FROG

Rocky Mountain tailed frogs (*Ascaphus montanus*) are classified as Endangered species by the Species at Risk Act (SARA), Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and the species is Red-listed in British Columbia. As of 2004, the global status rank of the frog is G4 (apparently secure) according to NatureServe (COSEWIC, 2013). The global population of Rocky Mountain tailed frogs is unknown but could range from several thousand to over 10,000 (IUCN, 2015). At the national level, as of 2011, the US status was N4 (apparently secure) and its Canadian and British Columbia status is N2 (imperiled). The entire Canadian population is estimated to be 3000 individuals (COSEWIC, 2013).

2.1 Description

Adult Rocky Mountain tailed frogs are small species, 2 to 5cm in length, that have bumpy skin that varies in color from tan or brown to olive green or red. Their eyes are with a distinct dark-edged copper bar between the eyes often visible (SARA, 2017). The adults are with a large head, a vertical pupil, broad and flattened outer hind toes, and no ear drum (COSEWIC, 2013). The age of maturity is 7 to 8 years post-hatching with longevity up to 14 years, making the species one of the longest-lived of all North American frogs. Male Rocky Mountain tailed frogs have a short, conical extension of the cloaca, which is used during copulation and is the source of the name “tailed frog” (COSEWIC, 2013).

Tadpoles are mottled black and tan with a black-bordered white spot at the tip of the tail. They have a modified oral disc which acts as a sucker for clinging to rocks in swift currents (COSEWIC, 2013) and also enables feeding on periphyton (Environment Canada, 2015). Larva feed almost exclusively on diatoms or pollen while adults prey on mainly terrestrial invertebrates, foraging at night in forest areas near streams (Franz and Lee 1970).

Breeding season occurs early fall, with eggs fertilized internally and held until the following summer, when the female deposits them in under rocks after spring runoff (Dupuis, 2004). These eggs are deposited in double strands of colorless, pea-sized ova and develop over a three- to six-week period before emergence from the rocks, depending on climate (Dupuis, 2004). Larvae emerge in late August to early September, where they reside in the stream for 1 to 5 years. Based on this information, mid-July through early September is a critical window for the reproduction of this species.

2.2 Distribution and Habitat

In general, Rocky Mountain tailed frogs are found in and along small, swift, cold mountain streams typically with slabby-flat bottomed rocks and little aquatic vegetation (Franz and Lee 1970). Rocky Mountain tailed frogs are endemic to the Pacific Northwest (Dupuis, 2004). The species occurs from extreme southeastern British Columbia south through western Montana and Idaho, northeastern Oregon, and extreme southeastern Washington (Figure 3).

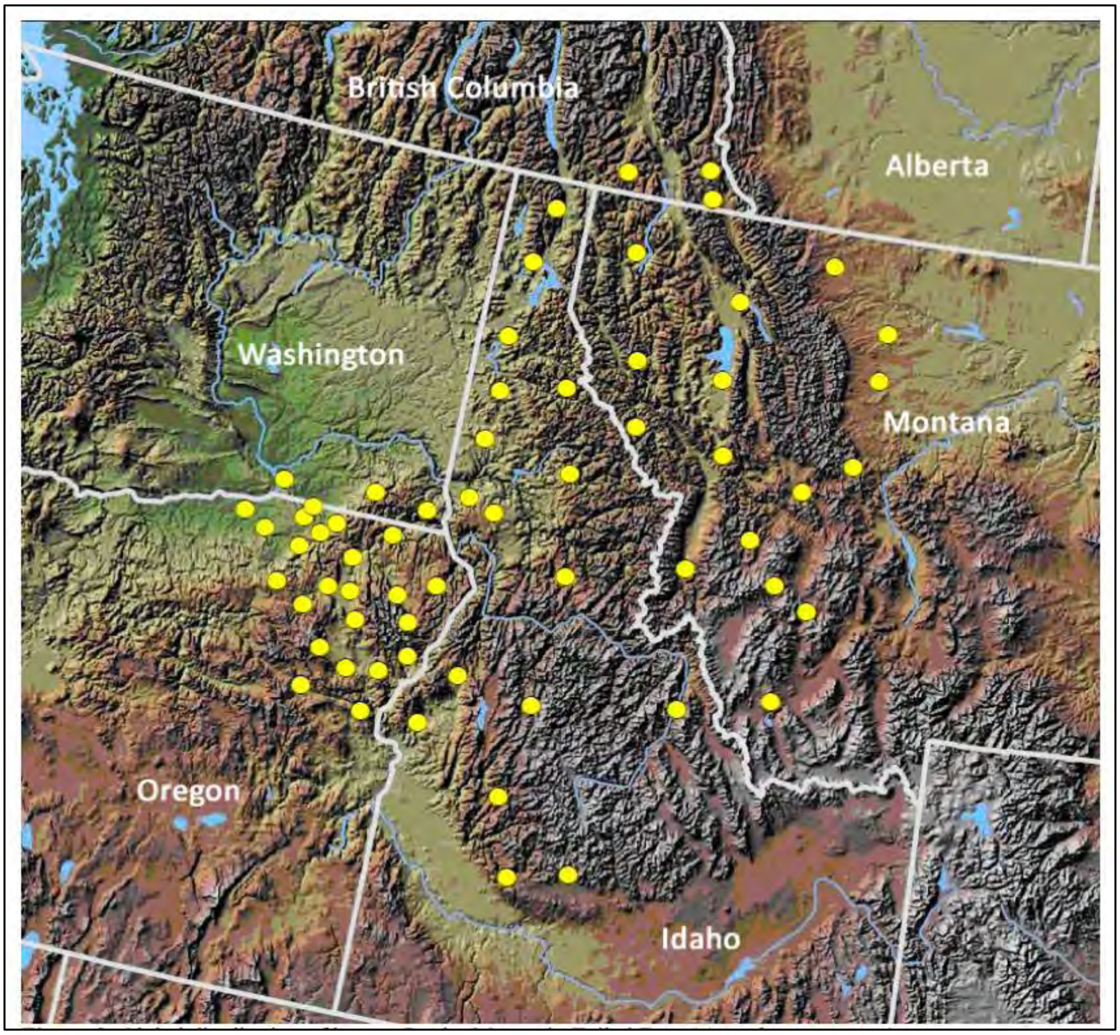

Figure 3: Global distribution of known Rocky Mountain tailed frog occurrences (Environment Canada, 2015).

In Canada, Rocky Mountain tailed frogs are restricted to only two mountainous localities in British Columbia, the Flathead River watershed and the Yahk River watershed, which are separated by the Rocky Mountain Trench (SARA, 2017) (Figure 4).

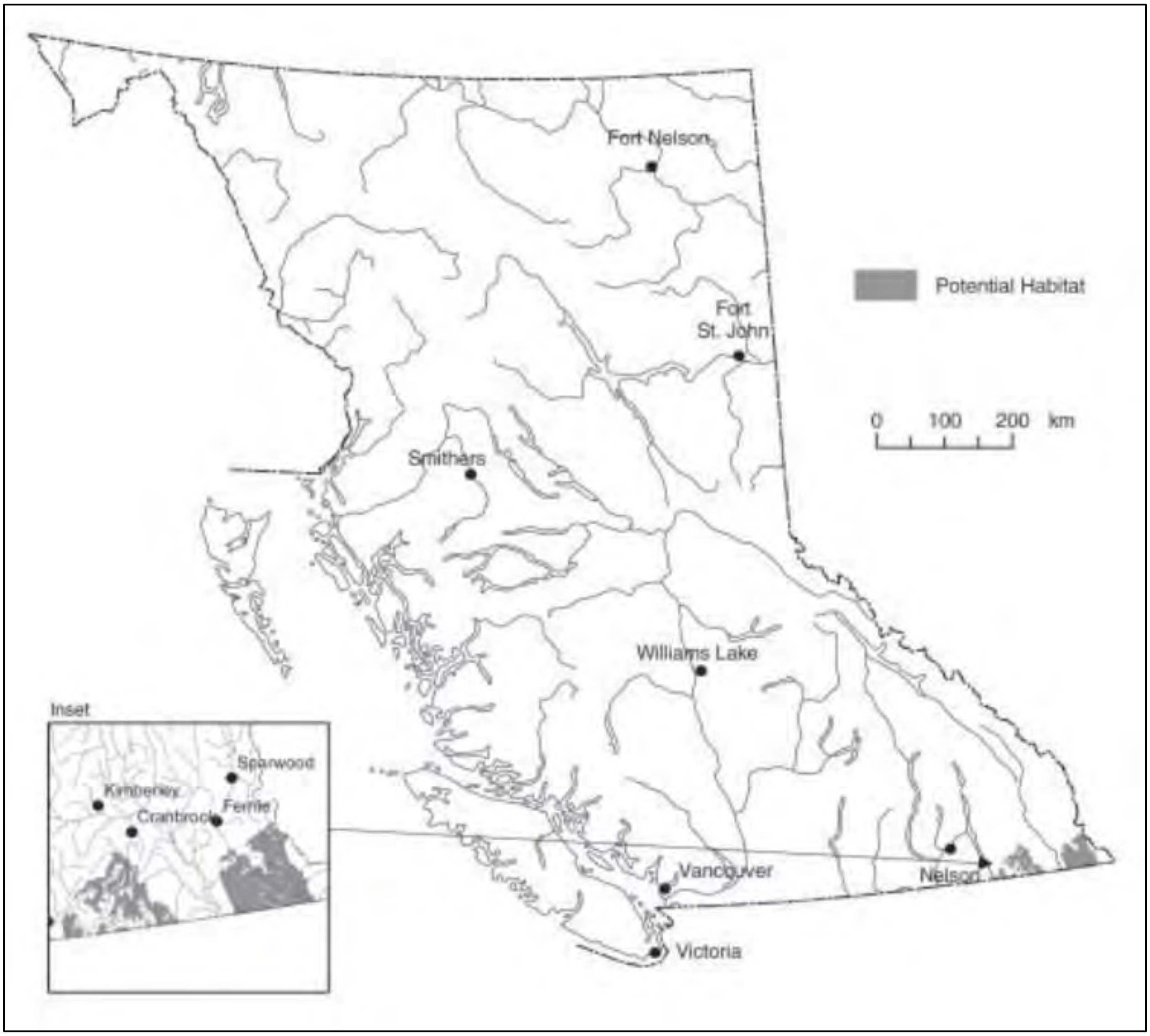

Figure 4: Overview of Rocky Mountain tailed frog distribution within British Columbia (Dupuis, 2014).

The Flathead population is thought to be limited to a 303km^2 area, primarily within two large watersheds, Cabin and Couldrey Creeks, that flow eastward into the Flathead River. This population extends 21km north from the Canada-US border and is a continuation of the distribution of tailed frogs from the Whitefish Ranges, Montana. Small satellite populations also exist in the Flathead region, within Leslie Creek, a tributary to the Flathead River, and Bighorn Creek, a tributary to Wigwam Creek (Environment Canada, 2015). The Flathead population is restricted to specific reaches of American Couldrey, Canadian Couldrey, Burnham, Cabin, Storm, Leslie, and Bighorn Creeks, where cold creeks associated with steep relief or groundwater springs are relatively common (Environment Canada, 2015). The total length of breeding habitat in the Flathead watershed is roughly 50km.

Critical habitat for the frog is identified for all habitable stream reaches and the associated riparian habitat within the species' known range in Canada (Environment Canada, 2015). Critical habitat for the Rocky

Mountain tailed frog in the Flathead River watershed is presented on Figure 5. The critical habitat is represented by the yellow shaded polygons and the 1km x 1km URM grid overlay indicates the geographic area within which critical habitat is found in Canada (Environment Canada, 2015).

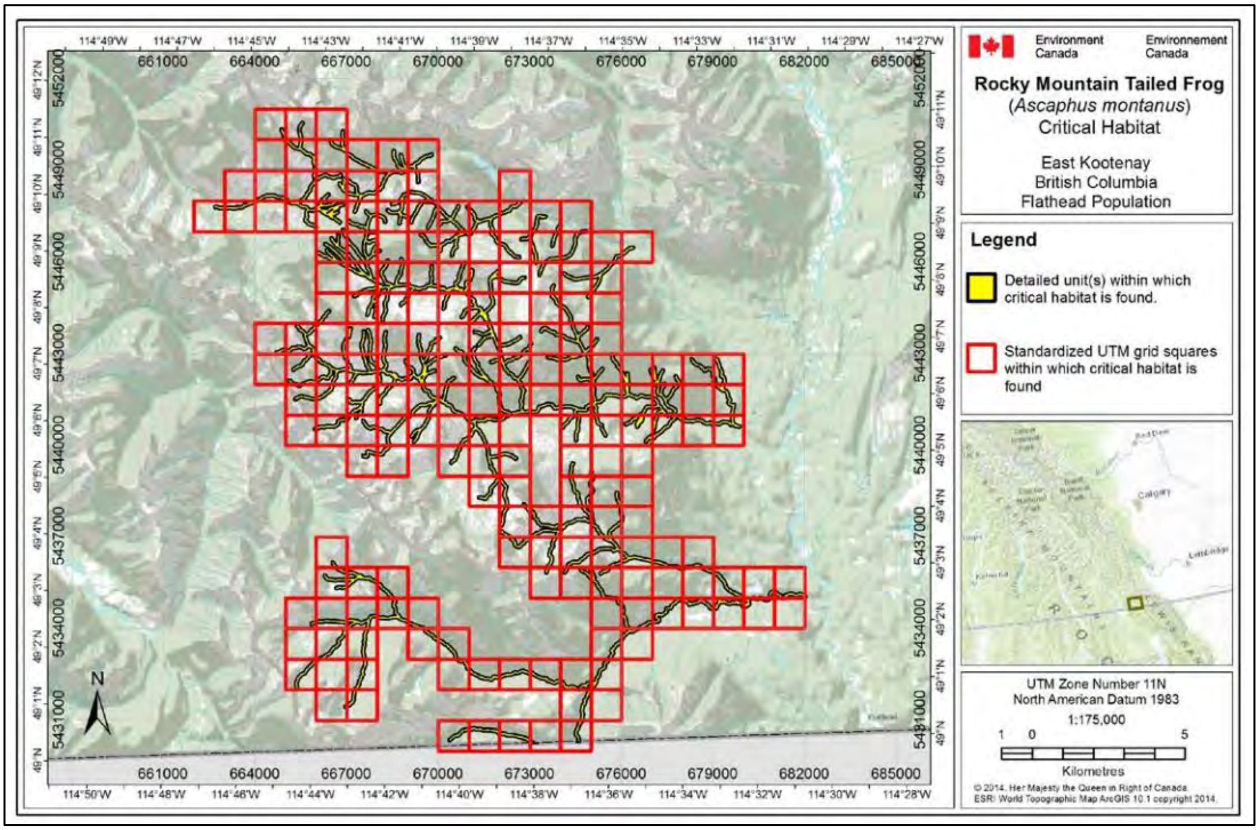

Figure 5: Critical habitat for the Rocky Mountain tailed frog in the Flathead River watershed (Environment Canada, 2015).

The basins occupied by the frog are characterized by minimal sedimentation, good perennial flows, channel gradients of 10-30% with cascade and step-pool morphologies, modulated summer freshet, and presence of appropriate upland habitats (Environment Canada, 2015). The streambeds of the creeks are composed largely of smooth rocks, cobbles, and boulders, as opposed to silt, sand, or pebbles (COSEWIC, 2013). Upland habitat is needed to help maintain present and future riparian microhabitat conditions and increase availability of terrestrial foraging and dispersal habitats for juveniles and adults (Environment Canada, 2015).

The Flathead population of the Rocky Mountain tailed frogs is occupying streams in the Montane Spruce dry, cool subzone (MSdk1) and Engelmann Spruce – Subalpine Fir dry, cool subzone (ESSFdk1) (Environment Canada, 2015). The species is uniquely adapted for life and breed in cold, fast-flowing mountain streams (Dupuis, 2014). Adults can withstand temperatures only as high as 21°C (SARA, 2017), with eggs requiring temperatures between 5 and 18.5°C for survival, and tadpoles between 9 and 16°C (Environment Canada, 2015).

2.3 Threats to the Population

Major threats to Rocky Mountain tailed frogs in Canada include increases in stream sedimentation, alteration of hydrological regimes, loss of riparian forest habitat and headwater linkages, stochastic environmental and demographic fluctuations due to low population size, and climate change resulting in stream habitat contraction (SARA, 2017). These threats can be exacerbated by human activities associated with logging, mining, and road building.

Logging, mining, and road building can increase the frequency and magnitude of sediment input into channel beds (Dupuis, 2004), resulting in increased stream sedimentation. Stream crossings, in particular, can result in sediment runoff into streams as well as remove riparian habitat and alter the hydrological regime (Environment Canada, 2015). Removal of riparian habitat to facilitate logging and mining can also increase stream temperature due to reduction in stream cover (Environment Canada, 2015). Introduction of woody debris to streams from timber clearing and harvest increases the potential for formation of logjams, which can trap fine sediments and alter a gully's substrate composition (Dupuis, 2004). Despite the negative effects of logging, however, sensitivity to logging and timber harvest may depend on surface geology and harvest practices, as tailed frogs frequently occur in many young forests that have been harvested one or more times (IUCN, 2015).

Additional threats to the population include fire and fire suppression, recreational ATV traffic, and drought, stream warming, and habitat alteration associated with climate change.

2.4 Current Protection

There are currently no legally protected areas such as national/provincial parks, ecological reserves, or Indian reserves in the Flathead and Yahk areas, however 19 Wildlife Habitat Areas (WHAs) have been established in the smaller streams, for a total area of 1,239ha (BC Conservation Data Centre, 2016). These WHAs were established under the Identified Wildlife Management Strategy under the Forest Practices Code of the British Columbia Act to protect all known breeding and adjacent foraging stream habitats.

3. SITE CONDITIONS

The site is located in the Kootenay Region (7B), within the biogeoclimatic zone ESSFdk1. The ESSF zone is characterized by relatively cold, moist, and snowy continental climate with mean annual temperatures between -2 to +2°C (Coupe et al, n.d.). Subalpine fir and Engelmann spruce are the dominant climax tree species in the ESSF, with grouseberry and sparse herb cover characteristic of the dry, cool subzone (dk1). This biogeoclimatic zone provides habitat for very few amphibian species, including the western toad, spotted frog, cascades frog, tailed frog, and long-toed salamander (Coupe et al., n.d.).

The site is located in a valley bottom and along the base of a mountain within the Flathead River watershed. The nearest critical habitat for the Rocky Mountain tailed frog is located 800m northeast (as the crow flies) of the site and the southern border of the western mine is approximately 1km upstream from the mapped critical habitat for the Rocky Mountain tailed frog (Figure 6). There are multiple streams that run through the site, all of which have a downstream connection to the mapped critical habitat.

The identified critical habitat on the northeastern side of the mine site is unlikely to be affected by mine works as a mountain ridge separates the mine from the stream habitat. Upland habitat will also likely be unaffected, provided all activity occurs on the southeast side of the ridge. As all streams located throughout the mine area flow into critical habitat, however, there is potential for activities to affect downstream habitats, particularly due to sedimentation.

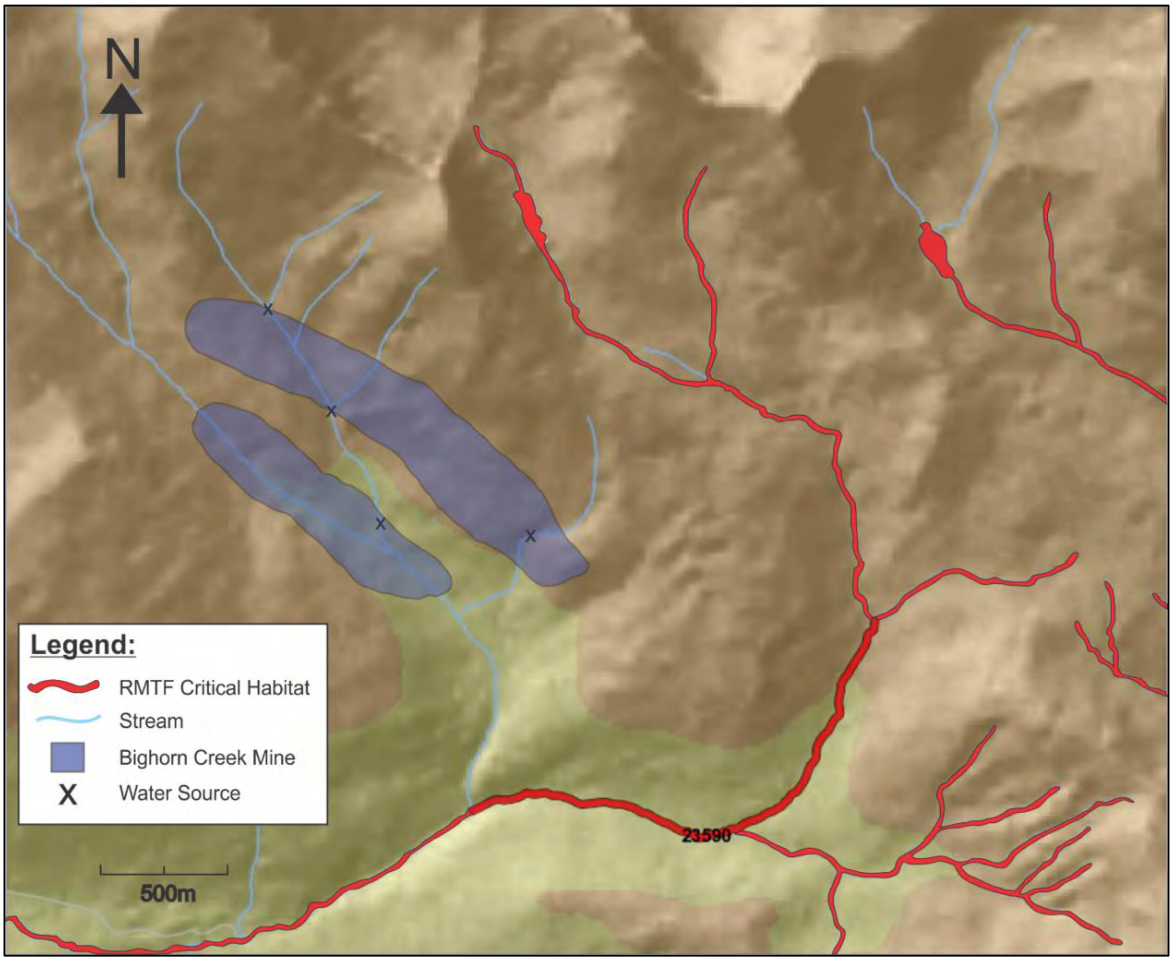

Figure 6: Critical habitat for the Rocky Mountain tailed frog in the area adjacent to the Bighorn Creek Mine Site.

4. POTENTIAL IMPACT ASSOCIATED WITH THE PROJECT

Rocky Mountain tailed frog have the potential to be impacted by project activities due to:

- Sediment runoff during construction into known and potential habitat,
- Altered water quality associated with polluted water from runoff,
- Removal or disturbance of riparian vegetation adjacent to key stream habitat,
- Disturbance to upland habitat resulting in change to critical tailed frog habitat,
- Alterations to behavioral patterns due to increased noise or human presence, and
- Direct mortality of tailed frogs.

5. MITIGATION AND MONITORING APPROACH

Amphibians are sensitive to environmental pollutants because of their permeable skin, their position in the food web as mid-level consumers, and their potential for prolonged exposure to contaminants in both aquatic and terrestrial habitats (Ovaska et al., 2004). Siltation of streams and ponds particularly affects the Rocky Mountain tailed frog as it interferes with foraging by tadpoles and can indirectly affect aquatic invertebrates that the tailed frogs feed on. It is important to address the potential impacts during the lifetime of the Bighorn Creek mine. A number of measures to mitigate and monitor the impact of the project on Rocky Mountain tailed frogs during construction and operation phases of the project were identified and, in general, related to:

- Provision of temporary fencing to exclude frogs from construction and mining activities and prevent them from accessing the roads during the operation of the roads,
- Using of erosion and sediment control measures,
- Water quality controls,
- Compensatory habitat where habitat has been removed by construction activities and is considered locally important as recognized by a frog expert, and
- Development of a monitoring program to monitor impacts on the population of Rocky Mountain tailed frogs and incorporate adaptive management actions where impacts are recorded.

Impacts would be expected to be minimal due to implementation of measures such as the establishment of a 500-meter buffer around all critical habitat, controlling runoff from disturbed areas, and the implementation of routine water quality monitoring.

5.1 Potential Risks of Clearing Vegetation for Road Access

Potential risks associated with clearing activities for site access include disturbing Rocky Mountain tailed frog and their associated habitat, soil erosion from water and wind resulting in sedimentation of critical stream habitat, dust, fuel leaks/spills, and invasive species colonization.

Mitigation strategies related to clearing activities include the following:

- A minimum 500m buffer will be left between the works and all critical Rocky Mountain tailed frog habitat;
- Construct narrow roads to minimize site disturbance and reduce groundwater interception in the cutslope;
- Ensure all erosion and sediment control measures are in place prior to clearing;
- Maximize connectivity of riparian habitats, particularly between adjacent stream reaches;
- Minimize site disturbance during clearing, especially in areas with high sediment transfer potential to natal streams for amphibians;
- Re-fueling to be conducted at least 30m from water bodies to avoid contamination;
- Clean machinery thoroughly prior to work to avoid introducing invasive species;
- Survey of any moderate to high value habitats prior to road clearing and activity will be undertaken to determine presence of Rocky Mountain tailed frog activity to ensure that frogs are more than 500m from activity areas;
- If Rocky Mountain tailed frogs are encountered during operations, activity will be suspended, and machinery shut down until appropriate protection measures have been implemented;
- Identify duration of sensory disturbance (e.g. only during construction or throughout project timeline) and sources of sensory disturbance;
- Workers will not touch, feed, collect, kill, harm or harass Rocky Mountain tailed frogs encountered at the site;
- Access trails will be deactivated at the end of the project to prevent future access; and
- The site supervisor and the environmental monitor will have the authority to advise the re-location of equipment and workers if there is an imminent threat to the welfare of Rocky Mountain tailed frogs within the work area.

5.2 Potential Risks of Exploration, Trenching and Mining

Potential risks associated with drilling and excavator mining to extract phosphate rock include disturbing Rocky Mountain tailed frog habitat due to sedimentation of critical stream habitat, altered water quality associated with polluted water from runoff, introduction of invasive species, and creation of migratory barriers or traps. To minimize these risks, progressive reclamation of exposed trenches will take place once phosphate rock has been extracted by using the previously segregated overburden to backfill the trench.

Mitigation strategies related to exploration, trenching and mining activities include the following:

- A minimum 500m buffer from any known creeks or water sources from all exploration and mining activities will be put in place from mid-July through early September to avoid impacts from potential sediment runoff during this critical period for breeding of this species will be left between the works and all critical Rocky Mountain tailed frog habitat;
- Ensure appropriate erosion and sediment control measures are in place prior to trenching and mining;
- Minimize site disturbance during trenching and excavation, especially in areas with high sediment transfer potential to natal streams;
- Re-fueling should be conducted at least 30m from water bodies to avoid contamination and spill kits should be on hand at all times;
- Clean machinery thoroughly prior to work to avoid introducing invasive species;
- Manage access to the Project area through signage and speed limits;
- Use site radio frequency to relay an advisory message to all personnel if Rocky Mountain tailed frogs are encountered;
- If Rocky Mountain tailed frogs are encountered during operations, activity will be suspended, and machinery shut down until appropriate protection measures have been implemented as discussed in the Active Monitoring section of this document;
- Survey of any moderate to high value habitats prior to exploration activity will be undertaken to determine presence of Rocky Mountain tailed frog to ensure that animals are more than 500m from activity areas;
- Identify duration of sensory disturbance (e.g. only during construction or throughout project timeline) and sources of sensory disturbance (e.g. truck traffic, loading, mining activity); and
- The site supervisor and the environmental monitor will have the authority to advise the re-location of equipment and workers if there is an imminent threat to the welfare of Rocky Mountain tailed frogs within the work area.

5.3 Summary of Activities, Impacts, and Mitigation Strategies

Table 1 below provides a summary of activities expected to occur during the life of this mine, how these activities could impact Rocky Mountain tailed frog and specific actions that could be implemented to mitigate these impacts. General mitigation strategies for Rocky Mountain tailed frog related to general mining activities include the following:

Table 1: Summary of Activities, Impacts, and Mitigation Strategies

Activity	Impact	Mitigation
General	Fuel leaks/spills.	Spill kits will be available on site at all times.
		All refueling will be conducted at least 30m from waterbodies to avoid contamination.

	Introduction of invasive species.	All equipment will be thoroughly cleaned prior to work commencement on site and again before leaving site.
	Potential alteration of critical Rocky Mountain tailed frog habitat.	A minimum 500m buffer will be maintained between the works and identified critical Rocky Mountain tailed frog habitat.
		The site supervisor and the environmental monitor will have the authority to advise the re-location of equipment and workers if there is an imminent threat to the welfare of Rocky Mountain tailed frogs within the work area.
	Anthropogenic impacts from human presence.	Workers will not touch, feed, collect, kill, harm or harass Rocky Mountain tailed frogs encountered at the site.
Construction of Access Roads	Removal of vegetation.	Replanting of disturbed area following mine decommission.
		Minimize site disturbance during clearing, especially in areas with high sediment transfer potential to natal streams for amphibians.
		Maximize connectivity of riparian habitats, particularly between adjacent stream reaches
	Temporary sedimentation of nearby streams.	Ensure all erosion and sediment control measures are in place prior to clearing.
	Increased potential for erosion due to removal of vegetation and increased exposed soil.	Utilization of erosion and sediment control measures.
	Disturbance to upland habitat resulting in changes to critical tailed frog habitat.	Roads will be constructed as narrow as possible to minimize site disturbance and reduce groundwater interception in the cutslope.

	Regular travel on access routes resulting in increased sediment erosion and disturbance.	Access roads will be decommissioned, barricaded, or gated when not in use.
Stream Crossing (no stream crossing is anticipated; this information is provided as a contingency)	Clearing of riparian vegetation for approaches to stream.	Replanting of disturbed area following mine decommission.
		Maximize connectivity of riparian habitats, particularly between adjacent stream reaches
	Alteration of stream bed for placement of culvert.	If disturbance to stream bed is required, the area of disturbance will be kept to a minimum.
	Placement of culvert within stream.	A survey for Rocky Mountain tailed frog in the crossing area will be completed prior to culvert installation.
		The culvert will be placed in an area away from suitable Rocky Mountain tailed frog habitat.
		The culvert will be designed to minimally impact instream habitat.
	Temporary sedimentation of streams.	Ensure all erosion and sediment control measures are in place prior to installation of culvert.
Drilling and Trenching	Removal of vegetation.	Reclamation and replanting of the area will be completed following mine decommission.
	Increased potential for sediment introduction in streams.	Ensure all erosion and sediment control measures are in place prior to drilling and trenching.
		Minimize site disturbance during works, especially in areas with high sediment transfer potential to natal streams for amphibians
	A total land disturbance of 3.0 hectares over five years.	Progressive rehabilitation of exposed trenches will be completed throughout the project life, trenches will be backfilled, and the area replanted.
	Disturbance to upland habitat resulting in changes to critical tailed frog habitat.	Reclamation of the area will be completed following mine decommission.

Water Sourcing	Removal of water from streams.	A survey for Rocky Mountain tailed frogs in the area will be completed prior to pump installation.
	Running of pumps within stream/riparian area.	Pumps will be located in an area away from suitable Rocky Mountain tailed frog habitat.

6. KEY ENVIRONMENTAL PERFORMANCE INDICATORS

Key environmental performance indicators are provided in Table 2 below and are to be reviewed by a Qualified Environmental Professional (QEP) during each day that monitoring activities occur in accordance with the monitoring effort deemed applicable to mitigate risks to Rocky Mountain tailed frogs.

Table 2: Key environmental performance indicators for Rocky Mountain tailed Frog protection.

Key Environmental Indicators – Wildlife Protection
Implementation of an encounter protocol to manage potential encounter(s) with Rocky Mountain Tailed Frogs and sensitive habitat(s).
Identification all critical habitats within and adjacent to the development area.
Developments and roads are located away from key habitats for amphibians, such as wetlands and streams.
Maintenance of buffers of undisturbed native vegetation around and adjacent to key amphibian habitats and discourage human access to these areas.
Provision of suitable landscape linkages to allow movements of animals between important seasonal habitats; riparian management areas, parks, and greenways can connect habitats.
Control of the spread of nonnative animals and plants, as introduced Bullfrogs and fish compete with and prey on native amphibians and weedy exotic plants can overtake native vegetation and choke wetlands.
Maintenance of moist forested habitat with abundant coarse woody debris along streams (at least 30m wide on both banks; the wider, the better).
Erosion and sediment control measures are implemented to avoid siltation of stream habitats.
Altering stream-flow patterns is avoided, and small pools within streams (pocket or step pools) and abundant in-stream cover are maintained.
Decommissioning of trails after drilling and trenching is completed in the area.
Implementation of progressive habitat restoration including activities that reduce sediment accumulation and contamination of stream habitats, restore natural water flows, and allow streamside vegetation to recover.

7. MONITORING

7.1 Pre-Mining Survey

Prior to commencement of mining and associated activities, a Rocky Mountain tailed frog survey will be completed on all streams to be impacted within the mine area. The survey will be completed by a qualified environmental professional and include amount and condition of potential habitat, trapping to determine species presence within the area, and determination of the extent of disturbed habitat. The high value habitat areas identified during this survey will be flagged and no work is to be completed within the identified boundaries. If impact is unavoidable, frog salvage and relocation will be completed prior to disturbance. The results of this survey will be used to determine the location of temporary frog fencing if appropriate.

7.2 Active Monitoring

Monitoring of all works according to the Key Performance Indicators will be completed in accordance with the effort deemed necessary. The site personnel shall be responsible for ensuring that established buffers are adhered to during clearing, and for inspecting the site for wildlife attractants and any other issues related to Rocky Mountain tailed frogs. If Rocky Mountain tailed frogs are encountered at or near the work site, the following protocol will be implemented.

1. Equipment working in the area will be immediately shut down.
2. The encounter will be recorded and photo-documented in the Rocky Mountain tailed frog Encounter Form attached in Appendix 1. Include date, GPS coordinates, location description, and any additional comments about the individual.
3. The individual will be relocated to a suitable location away from the work area utilizing handling BMPs outlined in the BC Amphibian Management Plan.
4. A brief survey of the area will be completed to determine additional presence of RMTF near the work site.
5. If additional individuals are found, relocation of the impact may be required.
6. Once the site has been deemed clear or relocated per environmental monitor's instructions, work may resume as usual.

8. RESULTS AND EXPECTED RESIDUAL IMPACTS

With informed employees and contractors, there will be effective monitoring and reporting of Rocky Mountain tailed frogs. Disruption to Rocky Mountain tailed frog during the proposed mining program is expected to be limited or nonexistent due to the measures implemented to minimize potential impacts during the program, including the pre-mining survey.

Habitat loss will be negligible due to minimizing cleared vegetation width and immediate revegetation, which will occur progressively as areas are completed. The high-value Rocky Mountain tailed frog habitat identified in the pre-mining survey will be flagged and no work will be completed within the flagged boundaries to ensure adequate protection of the species and their habitat.

The magnitude of effects is considered local, due to widening of existing roads and limited new road access. Duration of the impacts are considered long-term for habitat and short-term for disturbance to Rocky Mountain tailed frogs due to construction. The frequency of disturbance is limited (habitat loss and disturbance occur once during construction and is of low frequency for truck traffic on road). Impacts can be considered temporary as the mine and road RoW will be reclaimed upon completion of the mining activities. Impact to individuals would be unlikely during construction and through the life of the project by utilizing the measures found in Table 1 of this document.

The footprint of mining activities will be reduced through the use of road RoW, wherever possible. The area of impact due to mining and associated activities is estimated at a maximum of 3.0 hectares over 5 years. These activities will avoid all areas of high quality or identified critical habitat for Rocky Mountain tailed frogs as determined in initial surveys of the site.

9. CONCLUSION

Many of the potential impacts and risks to Rocky Mountain tailed frogs identified above will be avoided, minimized or mitigated by implementation of the mitigation strategies listed in Table 1 of this document. The key aspects of this will be the establishment of a 500-meter buffer around all critical habitat and conducting surveys for tailed frogs before commencing any vegetation clearing or ground disturbance work. Use of appropriate BMPs will further reduce the impact to this species and aquatic animals as a whole. We expect that disruption to Rocky Mountain tailed frogs during the proposed mining program will be limited due to the expected low potential occurrence of the species in the proposed project areas and inaccessibility of the known suitable habitat in this region. The measures implemented to minimize potential impacts during the mining program should reduce impact to this species down to a negligible level in relative terms to the stability of the populations in British Columbia.

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APPENDIX 1

Rocky Mountain Tailed Frog Encounter Sheet

If a Rocky Mountain tailed frog (RMTF) is encountered during work activities, record the following information about the individual and location: date observation/encounter occurred, GPS coordinates of the encounter, description of the physical characteristics of the site, and any comments about the individual(s) (number observed, size, colour, health, sex, etc.). Please also include a photo of the individual(s) when possible.

Date	GPS Coordinates	Location Description	Comments