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Empire Mine Soil Survey Report

**Konnex Resources, Inc.
Mackay, Idaho
November 2018**

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Konnex Resources, Inc.
Mackay, Idaho**

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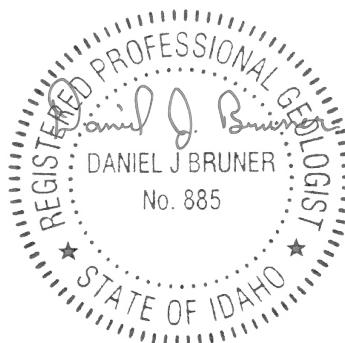
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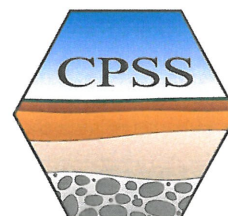
Konnex Resources, Inc., Mackay, Id.

This report, sealed by a Professional Geologist registered in the State of Idaho and a certified Professional Soil Scientist and Certified Crop Advisor, contains information and data developed by a team of professionals including soil scientists, geologists, testing laboratories, and other professionals. This report does not contain design plans and specifications.

Submitted By:



Daniel J. Bruner, Managing Geologist, PG



Certified Professional
Soil Scientist
MICHAEL SOWERS
25019 Exp. 12/21/18

A handwritten signature in black ink, appearing to read "Michael S. Sowers".

Michael S. Sowers, Managing Soil Scientist, CPSS,
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1.0 INTRODUCTION

1.1 Project Objectives

Konnex Resources, Inc (Konnex) requested an Order 2 soil survey for the Empire Mine (Site) to evaluate soil conditions and growth media suitability for reclamation.

Data collected during the survey was used along with the laboratory analytical results to evaluate the characteristics of the soils located within the Site.

1.2 Data Quality Objectives

The overall data quality objective (DQO) for this soil survey was to collect appropriate and valid data to identify soil conditions of the Site.

Specific DQOs identified for the project include:

- Evaluate soil suitability and availability for reclamation;
- Provide a hazard or rating interpretation for each map unit component using NRCS-defined criteria for wind and water erosion;
- Evaluate the concentrations of plant available nutrients in the soil located within the Site;
- Determine hydrologic soil groups that will be utilized by other members of the study team.

2.0 Cascade Earth Sciences (CES) Project Team and Qualifications

Cascade Earth Sciences deployed multiple qualified personnel to lead and perform tasks required to complete this study.

2.1 Project Manager

Mr. Daniel Bruner, PG, was the Project Manager, and served as the primary liaison between Konnex and the CES soil survey team. Mr. Bruner also reviewed this technical report.

2.2 Soils Technical Lead

Mr. Michael Sowers, Certified Professional Soil Scientist (# 25019), served as the technical lead on the project. He performed the fieldwork and related technical soil survey activities. He developed the data for this technical report.

2.3 Laboratory

Kuo Testing Labs, located at 337 S. 1st Avenue, Othello, Washington 99344, provided analytical services for the project.

3.0 Methodology

This section presents the field procedures and methodologies for the Order 2 soil survey completed within the Site. Soil mapping, profile description, sampling, and taxonomic classification were conducted by the standards described in the Soil Survey Manual (Soil Science Division Staff, 2017). The soils at each location were described according to methods and standards set forth in the *Field Book for Describing and Sampling Soils, Version 3.0*, (Schoeneberger, et.al, 2012). The information and data collected in soil morphological descriptions were utilized to classify the soils and to determine soil map units. Map units generally comprised of a single soil series except where soil variability required the establishment of a soil complex (multiple series) as a single map unit. The pedon (soil unit) that most accurately represented each soil series was classified to the family level according to the *Key to Soil Taxonomy, Twelfth Edition*, (Soil Survey Staff, 2014).

Existing available information about the Site was reviewed prior to mobilizing to the field. Sources of information included the Mackay Reservoir 7.5-minute topographic quadrangle map, US Department of Agriculture National Resource Conservation Service (USDA-NRCS) soil maps, and satellite imagery from Google Earth. This information was examined to determine the general types of parent material, bedrock, slope breaks, vegetative patterns, and other features necessary for soil map unit development.

A project-specific Health and Safety Plan (HASP) was prepared for the project. Each field team member reviewed the HASP before commencing with fieldwork activities. The HASP provided information regarding anticipated health and safety matters, and established policies and procedures to protect workers from potential site hazards.

A 2-person team investigated the soil resources of the Site over the course of a week in August 2018. The following tasks were performed:

- Site reconnaissance;
- Soil mapping and development of map units;
- Documentation of map units and soil components;
- Soil sample collection; and
- Laboratory analyses and quality control.

Soil intended for use as reclamation material requires suitable chemical and physical characteristics, which make it appropriate for use as growth medium. Soils within the Site were rated on their suitability for use as reclamation material based on the suitability criteria outlined in Table 1. The criteria in Table 1 were developed from the reclamation suitability rating issued by the NRCS (NRCS, 2018a) and *A Basic Guide for Interpreting Soil Test Values* (Woods End Research Laboratory, 1995-1996).

The soil erosion factor (K factor) was calculated using the Soil Erodibility Nomograph published in the National Soils Handbook (NRCS, 2018b). A copy of the Soil Erodibility Nomograph is

provided in Appendix A. The K factor indicates the susceptibility of the soil to sheet erosion by water with a range in value from 0.0 to 0.7, with higher factors indicating a greater erosion potential.

3.1 Site Reconnaissance

The initial field reconnaissance involved the evaluation hand-excavated soil pits and exposed soils along road cuts in an exploratory manner across the Site. Soil characteristics were observed and recorded, while observing and documenting surface conditions, vegetation, slope gradient, and slope aspect.

3.2 Soil Mapping and Development of Map Units

The soil map units were developed and documented based on mapping scale, soil taxonomic classification, and interpretive characteristics. Interpretive characteristics, including slope, stoniness, or erosion status, were characterized for identifying soil materials suitable for use as salvageable soil resources. Mapping units were delineated on aerial photos at a scale of 1:1,000, and consist of consociations (a single soil), associations (two or more soils), or complexes (tightly intermingled soil and/or land types). Field maps at a scale of 1:500 were also utilized in the field for additional detail. The maps were scanned and digitized in a geographic information system (GIS).

3.3 Documentation of Map Units and Soil Components

Generally, soils were described to a depth of approximately 60 inches or to excavation refusal, whichever was shallower. In many cases, deep soils were not described to 60 inches if, for example, if rocky material unsuitable for reclamation purposes was encountered. Survey documentation included field notes from traverses, visual observations, soil morphological descriptions, and other site characteristics such as rock outcrops, percent slope, slope aspect, vegetation, erosion, drainage, and surface stoniness.

Soil morphological descriptions were completed throughout the Site. The location of each description was surveyed using a hand-held GPS unit. The soil morphological descriptions noted soil texture, consistency, depth, coarse fragment content, secondary carbonate accumulation, and additional characteristics that affect quality and reclamation suitability.

3.4 Soil Sample Collection

Soil samples were collected at each soil layer (horizon) from soil pedons. A soil sample volume of approximately 1/2-quart was collected from a fresh soil face and was placed directly into a clean polyethylene bag. After the mapping units were developed and delineated across the Site, soil samples from the four predominate soil series described were selected for laboratory analysis. A unique ID and depth were recorded by permanent marker on the outside of each plastic sample bag. Each sample was documented on chain of custody forms. The soil samples were placed in an ice-filled cooler and shipped to Kuo Testing Labs for analysis.

3.5 Laboratory Analyses

The soil samples were analyzed for the following laboratory analyses to support proper taxonomic classification and assist with reclamation suitability of the soils:

- Particle size analysis (soil texture),
- Organic matter content,
- pH,
- Cation exchange capacity,
- Base saturation,
- Effervescence,
- Electrical conductivity (salinity),
- Nitrate Nitrogen (NO₃-N),
- Ammonium (NH₄-N),
- Phosphorus (P),
- Potassium (K),
- Sulfate (SO₄-S),
- Boron (B),
- Calcium (Ca),
- Copper (Cu),
- Iron (Fe)
- Magnesium (Mg),
- Manganese (Mn),
- Molybdenum (Mo),
- Sodium (Na),
- Zinc (Zn),

The agronomic parameters were completed according to methods described in the publication, *Soil, Plant and Water Reference Methods for the Western Region* (Gavlak, et.al, 1994). The methods are the industry standard for agronomic soil testing labs in the region.

4.0 Results

Seventeen pedons were examined within the Site as shown in Figure 1. Copies of the soil morphological descriptions (K-1 – K-17) are included in Appendix B.

Seven soil map units comprised of five different soil series were developed for the Site, as listed in Table 2 and exhibited on the map in Figure 2. Map Unit 6 (Mine land disturbance) was established to encompass previously disturbed mining and reclaimed areas.

4.1 Map Unit Descriptions

The map unit descriptions provide data in general terms about the soils and landscapes upon which they occur. The map unit descriptions are contained in Table 3. Salvageable quantities listed for each map unit are for the Site and do not necessarily correspond to areas of proposed disturbance.

Map Unit 1 – Ike-Jimbee gravelly loam Complex, 20 to 35 percent slope

This map unit occurs on in rolling to very steep mountain sideslopes and ridges. The soils formed in residuum, alluvium and colluvium from limestone. The elevation range is 4,500 to 9,200 feet. The areas at the lower elevations have northerly slopes. The average annual precipitation is between 11 to 13 inches. The average annual air temperature is 36° to 40°F. The average freeze-free period is about 10 to 80 days. The vegetation community is mainly mixed sagebrush and grasses.

This unit is 65 percent Ike and similar soils and 30 percent Jimbee soils on mountain sideslopes and ridges. Inclusions of rock outcrops make up about 5 percent of the total area. The major difference between these series is the thickness of the surface epipedon (topsoil), which is a determining factor for classification. The Ike series has a slightly thinner topsoil thickness than the Jimbee series.

The Ike series consists of shallow, well-drained soils over limestone bedrock. They are found on ridgetops and sideslopes of mountains and foothills and formed in colluvium, slope alluvium, and residuum from limestone. Typically, the surface layer is dark brown stony loam 3 inches thick. The upper subsoil is brown gravelly loam about 9 inches thick, and is underlain by dark yellowish brown very gravelly sandy loam 5 inches thick.

The Jimbee series consists of shallow, well-drained soils formed in slope alluvium and colluvium from limestone on ridges, foothills and mountains. Typically, the surface layer is dark brown gravelly loam, 6 inches thick. The upper subsoil is dark brown very gravelly loam about 3 inches thick, and is underlain by yellowish brown very gravelly loam 7 inches thick.

Map Unit 2 – Ike-Jimbee gravelly loam Complex, 8 to 20 percent slope

This map unit consists of the same soils as Map Unit 1, however slopes range between 8 and 20 percent.

Map Unit 3 – Gany gravelly loam, 30 to 50 percent slope

This map unit occurs on mountains. The soils formed in slope alluvium and colluvium from limestone. The elevation range is 5,200 to 9,800 feet. The climate is cold and moist in the winter and spring, and cool and dry in the summer. The average annual precipitation is between 18 to 28 inches. The average annual air temperature is 34° to 39°F. The average freeze-free period is about 10 to 40 days.

The Gany series consists of very deep, well drained soils formed in slope alluvium and colluvium from limestone on mountains. Typically, the surface layer is dark brown gravelly loam, 6 inches thick. The upper subsoil is brown very gravelly loam about 15 inches thick, and is underlain by

yellowish brown extremely gravelly sandy loam 40 inches thick. Inclusions of Ike and Jimbee soils are approximately 5 and 10 percent, respectively.

Map Unit 4 – Gany gravelly loam, 15 to 30 percent slope

This map unit consists of the same soils as Map Unit 3, however slopes range between 15 and 30 percent.

Map Unit 5 – Rock Outcrop, 0 to 35 percent slope

This map unit consists of surface exposed bedrock or soils with surface coarse fragment content of 90% or more.

Map Unit 6 – Mine land disturbance, 15 to 35 percent slope

This map unit consists of disturbed mine land, roads and exploration sites. The soils are on flat to very steep slopes and have been graded by machinery. The natural properties of these soils have been altered due to disturbance.

Map Unit 7 – Soil A (Typic Agricryolls) gravelly loam, 25 to 35 percent slope

This map unit consists of a soil that did not match a published NRCS local soil series. Soil A formed in colluvium and residuum from metamorphosed limestone on mountains. The elevation ranged from 8,000 to 8,900 feet. The climate is cold and moist in the winter and spring, cool and dry in the summer.

Soil A consists of very deep, well-drained soil formed in colluvium and residuum from metamorphosed limestone (skarn). The surface layer was described to be a very dark brown gravelly sandy loam, between 6 and 10 inches thick. The upper subsoil is brown gravelly sandy loam about 22 inches thick, and is underlain by a brown very gravelly loamy sand approximately 35 inches thick. Inclusions of Gany soils are approximately 15 percent.

4.2 Classification of Soils

The taxonomic classification of soils found within the Site is presented in Table 4. The detailed soil profile descriptions of the soil characteristics are presented in Appendix B.

4.3 Laboratory Data

Soil samples were collected from 13 of the 17 soil pedons. Soil samples were analyzed from K-1, K-4, K-9, and K-12, which best represented the Ike, Jimbee, Soil A, and Gany series, respectively.

The results of the laboratory analyses and analysis methods used are summarized in Table 4. The laboratory report is provided in Appendix C. The physical and chemical characteristics are typical for the region. The soils in the CES study area exhibited low clay content and high coarse fragment content.

- Soil textures were dominated by sand throughout the profile. Sand percentages ranged from 52% to 72%. Clay content ranged from 2.8% to 8.8%.
- Coarse fragment content ranged from approximately 35% to 85%.

- Organic matter content ranged from less than 1% to 8.61% and cation exchange capacity ranged from 14.96 to 28.7 milliequivalents per 100 grams (meq/100g).
- The soil pH was slightly acidic to moderately basic, with values ranging from 6.3 to 8.5.
- Soil salinity levels were low (less than 0.38 millimhos per centimeter, mmhos/cm).

5.0 RECLAMATION SUITABILITY

Soil suitability ratings are provided in Table 3 for each named soil component in the map units. The NRCS Reclamation Suitability Report for the soils described at the Site is provided in Appendix D. The recommended salvage depth for each soil was determined based on the ratings. These estimates were based on soil profile descriptions and the laboratory data associated with the soils of each map unit.

The major factors limiting soil salvage at the Site are rock fragment content, depth to bedrock, and slope. The assessment of rock fragment content is based on the soil descriptions provided in Appendix B. All map units exhibited fair-poor or poor reclamation suitability due to high rock fragment content (NRCS, 2018). The rock fragment content generally increased with depth in the subsoil or substrata. The recommended salvage depth is from 0.4 to 0.7 feet (5 to 8 inches). In some cases, rock fragments may be sorted out of the soil profile with a “grizzly” type screener, thus making the remaining soil material suitable for reclamation purposes. If screening is used, it would likely be more practical for the deep soils in Map Units 3, 4 and 7. Slope further limits reclamation suitability. Steep slopes at the Site may increase the difficulty of soil stripping and stockpiling.

6.0 SOIL ERODIBILITY

Soil erodibility is an important consideration for scheduling reclamation seeding to minimize soil loss. Soil erodibility is largely a function of texture. The clay content of soil binds particles together to resist erosion. For non-clay particles, erodibility increases as particle size decreases with silt having the highest potential for erosion.

The Wind Erodibility Group (WEG) is an arbitrary grouping of soils based on texture, structure, and carbonate content. Values range from 1 to 8 with lower values indicating increased potential to wind erosion. WEG values for each series was obtained from a published Web Soil Survey from the NRCS (NRCS, 2018a). The WEG value for Soil A was estimated by comparing soils of similar properties. WEG values for Site soils range from 5 to 8.

Hydrologic soil groups (HSG) are arrangements of soils having similar runoff potential under similar storm and cover conditions. Slope and the influence of ground cover are treated independently and are not considered in placing soils into HSGs. The groups may be used in equations that estimate runoff from rainfall and snowmelt. Soils in Group A have low runoff potential while soils in Group D have high runoff potential. As with wind erodibility groups,

HSG ratings apply only to the surface layer of an undisturbed soil. The Gany series and Soil A are in HSG B while Jimbee and Ike are in HSG D (Table 6).

The calculated soil erodibility factors (K factors) for each soil series are provided in Table 6. Soils with K-factors of 0.05 to 0.15 have low erosivity. Soils with K-factors greater than 0.4 have high erosivity. Site soils have moderate to high erosion potentials due to low clay contents.

7.0 SUMMARY

Soil resources within the Empire Mine Site have fair to unsuitable characteristics for reclamation and moderate to high erosion potential. Surface soil textures range from sandy loam to loamy sand. Chemical characteristics of soils, relating to reclamation and site revegetation, are generally within suitability criteria. Limitations related to soil salvage for reclamation at the Site include rock fragments, shallow soils, and slope. One of the primary limitations, excessive coarse fragments, could be reduced by sorting the rock fragments from the soil as it is salvaged. This practice would greatly increase the amount of available growth media for salvage and eventual site reclamation.

8.0 REFERENCES

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TABLES

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Table 5.	Soil Laboratory Analyses
Table 6.	Erosion Factors of Surface Soils

Table 1. Soil Suitability Ratings¹

Parameter	Testing Method	Good Suitability	Fair Suitability	Poor Suitability
pH	S2.10	6.0 - 8.4	5.5 - 6.0, 8.4 - 8.8	< 5.5, > 8.8
EC (dS/m)	S-2.10	< 4.0	4.0 - 12.0	> 12.0
Texture	S -14.10 ASTM D6913	Loamy sand, sandy loam, loam silt; soil w/ < 35% clay	sand, loamy coarse sand; soil w/ < 45% clay	soils w/ > 45% clay
Saturation %	S-10.20	25 - 80	25 - 80	< 25 and /or > 80
CaCO ₃ %	Fizz	0 - 15	15 - 30	> 30
Rock fragments %	Field Estimated	< 35	35 - 60	> 60
Erosion factor K	Calculated	< 0.37	> 0.37	
Organic Matter %	S-9.10	2.5 - 6.0	0.5 - 2.5, > 6	< 0.5

NOTE:

¹ Sources: NRCS Web Soil Survey, Accessed September 10, 2018, Woods End Research Laboratory, 1995-1996, A Basic Guide for Interpreting Soil Test Values

Table 2. Soil Survey Map Legend

Map Unit ¹	Name - Description
1	Ike-Jimbee gravelly loam, 20 to 35 percent slope
2	Ike-Jimbee gravelly loam, 8 to 20 percent slope
3	Gany gravelly loam, 30 to 50 percent slope
4	Gany gravelly loam, 15 to 30 percent slope
5	Rock outcrop 0 to 35 percent slope
6	Mine land disturbance 15 to 35 percent slope
7	Soil A gravelly loam 25 to 35 percent slope

Table 3. Soil Survey Map Unit Characteristics

Map Unit	Components	Composition (%)	Slope	Typical Surface Texture	Surficial Rock Fragments (%)	Typical Subsurface Texture	Rock Fragments (%)	Reclamation Suitability Rating ¹	Limitation	Recommended Salvage Depth (feet)
1	Ike	65	20-35	SL	15	SL	45	Poor	Rock Content, Slope	0.4
	Jimbee	30		SL	15	SL	40	Poor	Rock Content, Slope	0.7
	Rock Outcrop	5		--	--	--	--	Unsuitable	Rock	--
2	Ike	50	8-20	SL	15	SL	45	Poor	Rock Content, Slope	0.4
	Jimbee	45		SL	15	SL	40	Poor	Rock Content, Slope	0.7
	Rock Outcrop	5		--	--	--	--	Unsuitable	Rock	--
3	Gany	85	30-50	SL	20	SL	65	Fair-Poor	Rock Content, Slope	0.7
	Ike	5		SL	15	SL	45	Poor	Rock Content, Slope	0.4
	Jimbee	10		SL	15	SL	40	Poor	Rock Content, Slope	0.7
4	Gany	85	15-30	SL	30	SL	65	Fair-Poor	Rock Content, Slope	0.7
	Ike	5		SL	15	SL	45	Poor	Rock Content, Slope	0.4
	Jimbee	10		SL	15	SL	40	Poor	Rock Content, Slope	0.7
5	Rock Outcrop	90	0-35	--	--	--	--	Unsuitable	Rock	--
	Ike	5		SL	15	SL	45	Poor	Rock Content, Slope	0.4
	Jimbee	5		SL	15	SL	40	Poor	Rock Content, Slope	0.7
6	Mine land disturbance	80	15-35	Variable	Variable	Variable	Variable	Unsuitable	Disturbance, Slope	--
	Gany	10		SL	20	SL	65	Fair-Poor	Rock Content, Slope	0.7
	Soil A	10		SL	20	SL, LS	45	Fair-Poor	Rock Content, Slope	0.5
7	Soil A	85	25-35	SL	20	SL, LS	45	Fair-Poor	Rock Content, Slope	0.5
	Gany	15		SL	20	SL	65	Fair-Poor	Rock Content, Slope	0.7

NOTES:

Abbreviations- LS = loamy sand, SL = sandy loam

¹ Reclamation suitability rating determined based upon depth to bedrock, rock fragment content and slope.

Table 4. Soil Series Taxonomic Classification

Series	Family
Gany ¹	Loamy-skeletal, mixed, superactive Typic Calcicryolls
Ike ¹	Loamy-skeletal, carbonatic, frigid Lithic Xeric Haplocalcids
Jimbee ¹	Loamy-skeletal, carbonatic, Lithic Calcicryolls
Soil A	Loamy-skeletal, mixed, Typic Argicryolls
Mine land disturbance	Typic Cryorthents

NOTE:

¹ Soil Series data obtained from USDA Official Soil Series Descriptions

Table 5. Soil Laboratory Analyses

Laboratory Analysis	Method	Unit	Sample Point														
			K-1			K-4		K-9					K-12				
			0-5	5-15	15-21	0-8	8-17	0-6	6-12	12-26	26-44	44-60	0-8	8-17	17-27	27-47	47-60
Nitrate- Nitrogen	S - 3.10	mg/kg	2.975	2.475	3.975	0.975	1.525	0.575	0.25	0.275	0.275	0.2	0.175	0.25	0.3	0.375	0.45
Ammonium	S - 3.50	mg/kg	22.95	5.575	8	7.525	4.7	6.575	2.45	2.375	2.6	2.6	1.75	1.425	2	3.175	5.2
Phosphorus	S - 4.10	mg/kg	14	9	6	21	9	30	13	12	6	5	21	9	6	4	4
Potassium	S - 5.11	mg/kg	498	471	462	582	428	454	170	163	107	118	646	222	113	71	61
Sulfate	S - 6.12	mg/kg	10	4	4	5	4	5	3	2	1	1	3	3	3	2	9
Boron	S - 6.12	mg/kg	1.3	1.6	1.48	0.63	0.58	0.56	0.23	0.23	0.16	0.16	1.28	1.17	1.34	0.72	0.53
Organic Matter	S - 9.00	%	5.01	4.97	4.91	6.25	2.57	8.61	2.18	1.82	0.95	0.98	4.16	3.52	5.35	3.31	2.48
pH	S - 2.20	pH Units	8.2	8.3	8.5	6.6	6.9	6.4	6.3	6.3	6.5	6.8	8.1	8.3	8.4	8.5	8.4
Salinity	S - 2.40	mmhos/cm	0.38	0.26	0.26	0.19	0.17	0.26	0.12	0.12	0.08	0.09	0.65	0.28	0.37	0.27	0.49
Zinc	S - 6.12	mg/kg	9.3	3.1	1.4	21.2	6.9	29.3	7.8	11.7	18	13.8	3.5	0.8	0.5	0.4	0.6
Manganese	S - 6.12	mg/kg	245	17	6	21	12	42	6	7	5	7	9	2	4	2	5
Copper	S - 6.12	mg/kg	7.3	1.4	1.1	2.6	2.5	11.5	15.6	35.7	118	91.3	1.6	2.2	3	3.4	1.8
Iron	S - 6.12	mg/kg	9	10	8	41	24	162	92	84	54	43	52	34	17	9	6
Calcium	S - 5.11	meq/100g	22	27	28.5	16.2	19.5	22.8	11.9	15.8	14.6	19.4	29.4	25.4	29.5	22.2	22.1
Magnesium	S - 5.11	meq/100g	0.7	0.7	0.8	2.6	1.8	1.9	1.4	2.4	2.4	3	1.4	0.8	0.6	0.3	0.5
Sodium	S - 5.11	meq/100g	0.07	0.06	0.07	0.04	0.05	0.07	0.09	0.1	0.1	0.1	0.08	0.03	0.04	0.05	0.36
CEC	S - 10.10	meq/100g	26.03	28.76	26.5	25.62	26.74	32.56	19.87	26.27	24.86	28.49	28.67	24.51	25.95	17.89	14.96
Texture	S -14.10	unitless	SL	SL	SL	SL	SL	SL	SL	SL	SL	LS	SL	SL	SL	SL	SL
Effervescence	Visual	unitless	None	Medium	Heavy	None	None	None	None	None	None	None	Medium	Heavy	Heavy	Heavy	Heavy
Total Bases	Calculated	meq/100g	24.04	28.96	30.55	20.33	22.44	25.93	13.82	18.72	17.37	22.80	32.53	26.80	30.43	22.73	23.12
Base Sat. Ca	Calculated	%	91.50	93.22	93.28	79.69	86.88	87.93	86.08	84.42	84.04	85.08	90.37	94.78	96.95	97.66	95.60
Base Sat. Mg	Calculated	%	2.91	2.42	2.62	12.79	8.02	7.33	10.13	12.82	13.81	13.16	4.30	2.99	1.97	1.32	2.16
Base Sat. K	Calculated	%	5.30	4.16	3.87	7.32	4.88	4.48	3.14	2.23	1.58	1.32	5.08	2.12	0.95	0.80	0.67
Base Sat. Na	Calculated	%	0.29	0.21	0.23	0.20	0.22	0.27	0.65	0.53	0.58	0.44	0.25	0.11	0.13	0.22	1.56

NOTE:

Abbreviations- % = percent, Base Sat. = base saturation, Ca = calcium, CEC = cation exchange capacity, K = potassium, LS = loamy sand, meq/100g = milliequivalents per 100 grams, Mg = magnesium

mg/kg = milligrams per kilogram, mmhos/cm = millimhos per centimeter, Na = sodium, SL = sandy loam

Table 6. Erosion Susceptibility and Hydrologic Characteristics of Surface Soils

Soil Series	WEG (Wind Erosion Group)	Internal Drainage	Permeability	Available Water Capacity	HSG (Hydrologic Soil Group)	K-Factor (Soil Erodibility Factor)
Gany	8	Well	Moderately High - High	Low	B	0.2
Ike	5	Well	Moderately High - High	Very Low	D	0.5
Jimbee	5	Well	Moderately High - High	Very Low	D	0.4
Mine land disturbance	Varied	Well	Varied	Varied	Not Rated	Varied
Soil A	8	Well	Moderately High - High	Low	B	0.2

NOTE:

Information was obtained from USDA NRCS soil series descriptions and interpolations for Site soils.

FIGURES

- Figure 1. Soil Profile Description Location**
Figure 2. Soil Description Locations

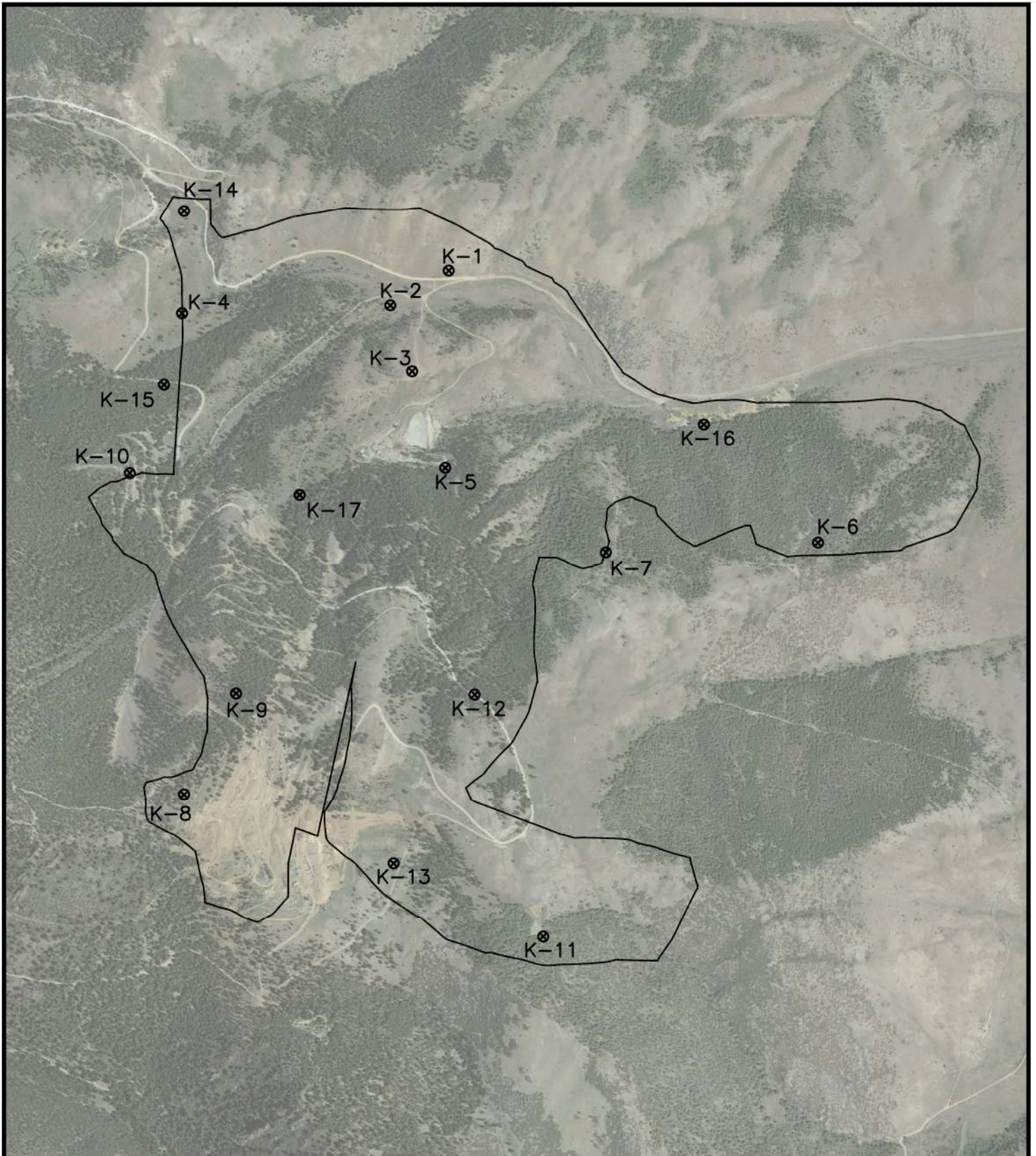
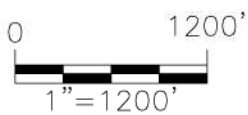



Figure 1. Soil Description Locations



(SOURCE: Google Earth Pro Image, 7-21-2017)

PROJECT NUMBER: 2017220015	Empire Mine Project Soil Types within the Soils Study
DATE: 10/2/2018	
DWG NO: 2017220015 SOILS.DWG	Konnex Resources, Inc. Mackay, Idaho
DWG BY: PROJECT MANAGER: 6DJR 5DJB	
REVISED:	
 CASCADE EARTH SCIENCES	

Map Unit Description

- 1. Ike-Jimbee gravelly loam, 20 to 35 percent slopes
- 2. Ike-Jimbee gravelly loam, 8 to 20 percent slopes
- 3. Gany stony loam, 20 to 35 percent slopes
- 4. Gany stony loam, 8 to 20 percent slopes
- 5. Rock outcrop, 0 to 35 percent slopes
- 6. Mine land disturbance, 15 to 35 percent slopes
- 7. Soil A gravelly loam, 15 to 35 percent slopes

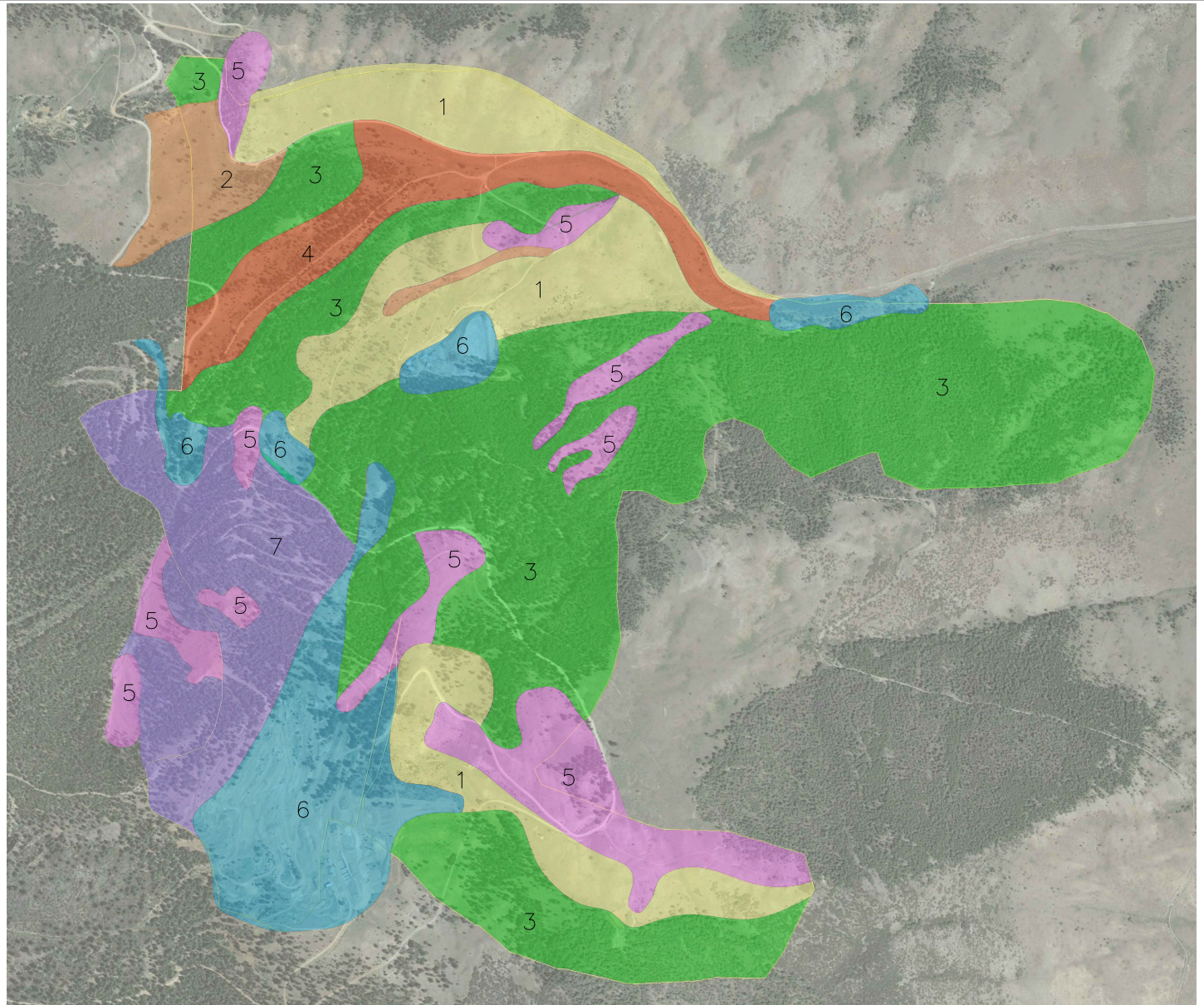
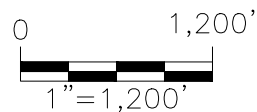


Figure 2. Soil Map



(SOURCE: Google Earth Pro Image, 7-21-2017)



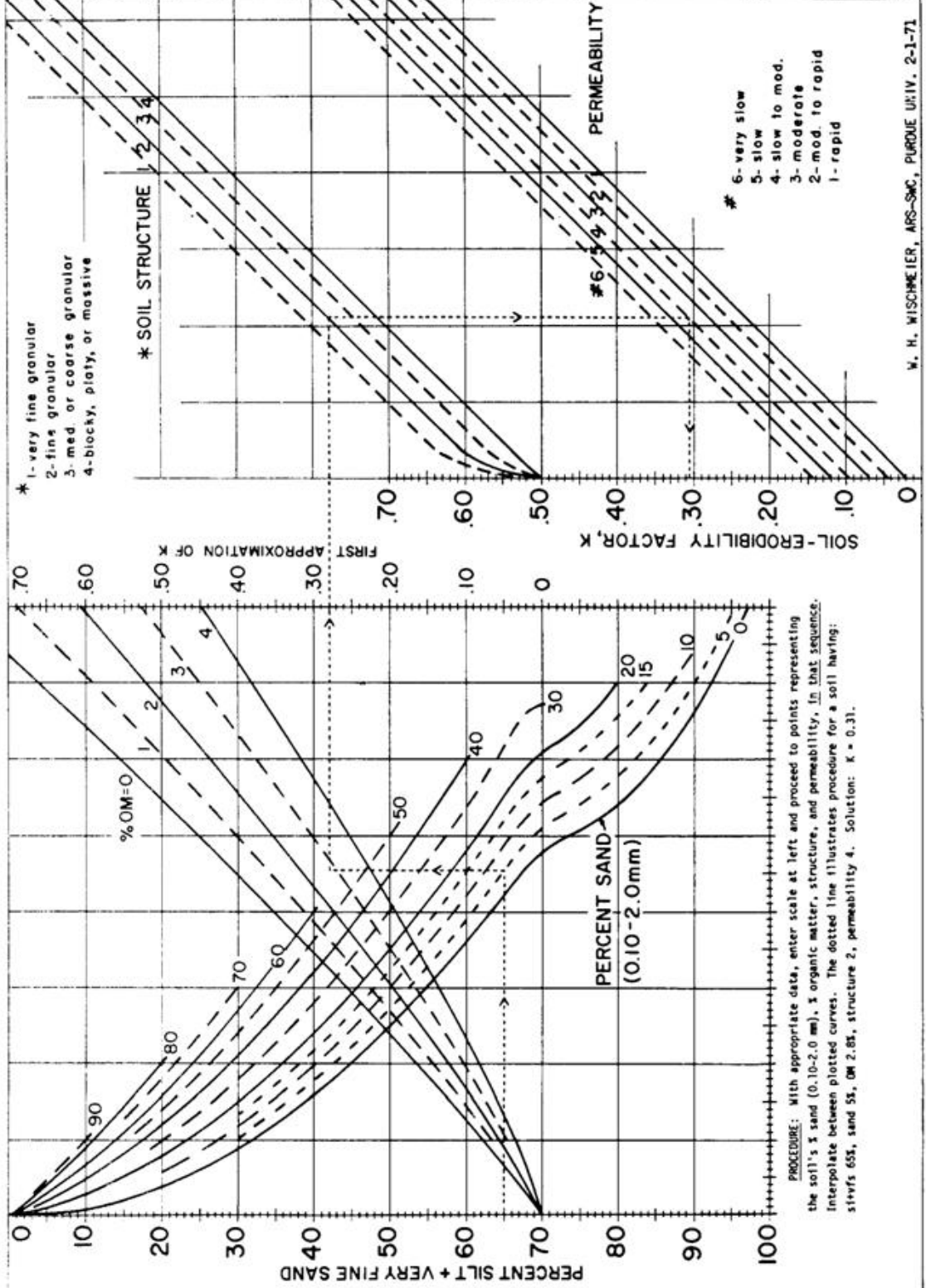
PROJECT NUMBER: 2017220015	Empire Mine Project Soil Types Within the Soils Study Area
DATE: 10/26/2018	
DWG NO: 2017220015 SOILS.DWG	Konnex Resources, Inc. Mackay, Idaho
DWG BY: 6DJR PROJECT MANAGER: 5DJB	
REVISED:	CASCADE EARTH SCIENCES

APPENDICES

Appendix A.	Nomograph for Determining Soil Erodibility Factor
Appendix B.	Soil Descriptions
Appendix C.	Laboratory Results
Appendix D.	Reclamation Suitability Report

Appendix A.

Nomograph for Determining Soil Erodibility Factor



- * 1-very fine granular
 2-fine granular
 3-med. or coarse granular
 4-blocky, platy, or massive

- # 6-very slow
 5-slow
 4-slow to mod.
 3-moderate
 2-mod. to rapid
 1-rapid

PROCEDURE: With appropriate data, enter scale at left and proceed to points representing the soil's % sand (0.10-2.0 mm), % organic matter, structure, and permeability, in that sequence. Interpolate between plotted curves. The dotted line illustrates procedure for a soil having: silt+fs 65%, sand 5%, OM 2.85, structure 2, permeability 4. Solution: $K = 0.31$.

Appendix B.
Soil Descriptions

Date: August 9, 2018
Report No: S54793
Grower: CES - Pocatello
Project: Konnex
Project No: 2018230005
Field: All
Crop: All Crops



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SOIL ANALYSIS REPORT

Lab #	Depth Inches	Field ID	NO3-N		NH4-N		P Olsen ppm	K Acet. ppm	SO4 -S ppm	B DTPA ppm	OM Walkley-Black %	pH 1:2	SS 1:1 mmho/cm	Zn ppm	Mn ppm	Cu DTPA ppm	Fe ppm	Ca meq/100g	Mg Acet. meq/100g	Na meq/100g	CEC meq/100g	Efferve- -science Test	Total Bases Meq/100g	Base Saturation			
			lbs/ac	ppm	lbs/ac	ppm																		% Ca	% Mg	% K	% Na
5431	12	K1 0-5	12	3.0	92	23.0	14	498	10	1.30	5.01	8.2	0.38	9.3	245	7.3	9	22.0	0.7	0.07	26.0	None	24.0	91.5	2.9	5.3	0.3
5432	12	K1 5-15	10	2.5	22	5.6	9	471	4	1.60	4.97	8.3	0.26	3.1	17	1.4	10	27.0	0.7	0.06	28.8	Medium	29.0	93.2	2.4	4.2	0.2
5433	12	K1 15-21	16	4.0	32	8.0	6	462	4	1.48	4.91	8.5	0.26	1.4	6	1.1	8	28.5	0.8	0.07	26.5	Heavy	30.6	93.3	2.6	3.9	0.2
5434	12	K4 0-8	4	1.0	30	7.5	21	582	5	0.63	6.25	6.6	0.19	21.2	21	2.6	41	16.2	2.6	0.04	25.6	None	20.3	79.7	12.8	7.3	0.2
5435	12	K4 8-17	6	1.5	19	4.7	9	428	4	0.58	2.57	6.9	0.17	6.9	12	2.5	24	19.5	1.8	0.05	26.7	None	22.4	86.9	8.0	4.9	0.2
5436	12	K9 0-6	2	0.6	26	6.6	30	454	5	0.56	8.61	6.4	0.26	29.3	42	11.5	162	22.8	1.9	0.07	32.6	None	25.9	87.9	7.3	4.5	0.3
5437	12	K9 6-12	1	0.3	10	2.5	13	170	3	0.23	2.18	6.3	0.12	7.8	6	15.6	92	11.9	1.4	0.09	19.9	None	13.8	86.1	10.1	3.1	0.7
5438	12	K9 12-26	1	0.3	10	2.4	12	163	2	0.23	1.82	6.3	0.12	11.7	7	35.7	84	15.8	2.4	0.10	26.3	None	18.7	84.4	12.8	2.2	0.5
5439	12	K9 26-44	1	0.3	10	2.6	6	107	1	0.16	0.95	6.5	0.08	18.0	5	118.0	54	14.6	2.4	0.10	24.9	None	17.4	84.0	13.8	1.6	0.6
5440	12	K9 44-60	1	0.2	10	2.6	5	118	1	0.16	0.98	6.8	0.09	13.8	7	91.3	43	19.4	3.0	0.10	28.5	None	22.8	85.1	13.2	1.3	0.4
5441	12	K12 0-8	1	0.2	7	1.8	21	646	3	1.28	4.16	8.1	0.65	3.5	9	1.6	52	29.4	1.4	0.08	28.7	Medium	32.5	90.4	4.3	5.1	0.2
5442	12	K12 8-17	1	0.3	6	1.4	9	222	3	1.17	3.52	8.3	0.28	0.8	2	2.2	34	25.4	0.8	0.03	24.5	Heavy	26.8	94.8	3.0	2.1	0.1
5443	12	K12 17-27	1	0.3	8	2.0	6	113	3	1.34	5.35	8.4	0.37	0.5	4	3.0	17	29.5	0.6	0.04	26.0	Heavy	30.4	96.9	2.0	0.9	0.1
5444	12	K12 27-47	2	0.4	13	3.2	4	71	2	0.72	3.31	8.5	0.27	0.4	2	3.4	9	22.2	0.3	0.05	17.9	Heavy	22.7	97.7	1.3	0.8	0.2
5445	12	K12 47-60	2	0.5	21	5.2	4	61	9	0.53	2.48	8.4	0.49	0.6	5	1.8	6	22.1	0.5	0.36	15.0	Heavy	23.1	95.6	2.2	0.7	1.6

Appendix C.
Laboratory Results

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 7/30/2018		No. K - 1	
Location: N 43.89647 W -113.66855					
Soil Type/Classification: Ike			Vegetation: Sagebrush and grasses		
Landform: Upland		Parent Material: Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 7,291 ft		Slope: 30%	Aspect: South
Moisture: Dry		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer: NE
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described	Estimated Permeability: N/A		Estimated Infiltration Rate: N/A
Soils Samples Collected: Yes, 3 samples			Depths: 0"-5", 5"-15", and 15"-24"		
Soil Samples Analyzed: Yes, 3 Samples			Depths: 0"-5", 5"-15", and 15"-24"		
Miscellaneous Notes: 5% rock outcrop					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			Ch	Cb	St					
A	0 - 5	7.5YR 3/2	vchSL	--	lgr	lo	vfr	ss	3vf	--	35%	0	0	--	--	--	C/W	6
Bw1	5 - 15	7.5YR 2.5/2	vchSL	--	lsbk	lo	vfr	ss	2f	--	35%	0	0	--	--	E	C/W	4
Bw2	15 - 24	7.5YR 2.5/2	vchSL	--	lsbk	lo	vfr	ss	2f	--	45%	0	0	--	--	VE	C/S	4
AR	24+																	

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho					Date: 7/30/2018					No. K - 2				
Location: N 43.89561 W -113.67056														
Soil Type/Classification:										Vegetation: Sagebrush and grass				
Landform: Upland					Parent Material: Slope Alluvium/Colluvium					Climate: Moist Winter/Dry Summer				
Relief:					Elevation: 7,364 ft					Slope: 8-10%			Aspect: North	
Moisture: Dry					Groundwater: Not Encountered					Drainage: Well Drained			Depth to Restrictive Layer: Not Encountered	
Depth to Seasonally High Water Table: Not Encountered					Root Distribution: Not Described					Estimated Permeability: N/A			Estimated Infiltration Rate: N/A	
Soils Samples Collected: No					Depths:									
Soil Samples Analyzed:					Depths:									
Miscellaneous Notes:														

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			Ch	Cb	St					
A	0-3	7.5 YR 2.5/1	vch SL	--	2Gr	lo	vfr	so	2vf	--	35	0	10	--	--	--	C/S	4
AB	3-7	7.5 YR 2.5/2	vch SL	--	1sbk	so	fr	ss	2f	--	40	0	0	--	--	--	--	3
AR	7+																	

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 7/31/2018		No. K - 3	
Location: N 43.89397 W -113.66981					
Soil Type/Classification: Jimbee			Vegetation: Sagebrush and Grasses		
Landform: Upland		Parent Material: Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 7,389		Slope: 8-10%	Aspect: East
Moisture: Dry		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer: Not Encountered
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described		Estimated Permeability: N/A	Estimated Infiltration Rate: N/A
Soils Samples Collected: Yes			Depths: 0-4, 4-12		
Soil Samples Analyzed: None			Depths:		
Miscellaneous Notes: 15% Surficial Stones & 5% rock outcrop					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
						A	0 - 4	7.5YR 3.5/2			vgrSL	--	2gr					
AB	4 - 12	7.5YR 3/3	vgrSL	--	2sbk	so	fr	ss	2f	--	40	0	0	--	--	--	--	5
refusal	12+																	

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 7/31/2018		No. K - 4	
Location: N 43.89541 W -113.6773					
Soil Type/Classification: Jimbee			Vegetation: Sagebrush and grasses		
Landform: Upland		Parent Material: Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 7,642 ft		Slope: 15-25%	Aspect: East
Moisture: Dry		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer: Not Encountered
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described		Estimated Permeability: N/A	Estimated Infiltration Rate: N/A
Soils Samples Collected: Yes, 2 Samples			Depths: 0"-8" and 8"-17"		
Soil Samples Analyzed: Yes, 2 Samples			Depths: 0"-8" and 8"-17"		
Miscellaneous Notes:					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
						A	0 - 8	7.5YR 2.5/2			vgrSL	--	2gr					
Bw	8 - 17	10YR 4/4	vgrSL	--	1sbk	so	fr	ss	2vf	--	40	5	5	--	--	s	--	8
Refusal	17+																	

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 7/31/2018		No. K - 5	
Location: N 43.89156 W -113.66867					
Soil Type/Classification: Upland			Vegetation: Forested		
Landform: Upland		Parent Material: Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 7,420		Slope: 30%	Aspect: North
Moisture: Dry		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer:
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described		Estimated Permeability: N/A	Estimated Infiltration Rate: N/A
Soils Samples Collected: Yes, 3 Samples		Depths: 0"-3", 3"-9", and 9"-15"			
Soil Samples Analyzed: None		Depths			
Miscellaneous Notes:					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
						A	0 - 3	10YR 2/1			vgrSL	--	lgr					
AB	3 - 9	7.5YR 4/3	vgrSL	--	lsbk	sh	fr	ss	3vf	--	40	5	0	--	--	--	C/S	8
BK	9 - 15	10YR 5/4	vgrSL	--	lsbk	sh	fr	ss	2m	--	40	10	5	--	--	EV	C/S	5
CK	15 - 35	10YR 5/4	grSL	--	OM	lo	vfr	so	lco	--	90	1	5	--	--	EV	--	5

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 7/31/2018		No. K - 6	
Location: N 43.88971 W -113.65584					
Soil Type/Classification: Gany			Vegetation: Forested		
Landform: Upland		Parent Material: Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 7,406 ft		Slope: 25-30%	Aspect: Northeast
Moisture: Dry		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer: Not Encountered
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described		Estimated Permeability: N/A	Estimated Infiltration Rate: N/A
Soils Samples Collected: Yes, 3 Samples			Depths: 0"-5", 5"-8", and 8"-17"		
Soil Samples Analyzed: None			Depths		
Miscellaneous Notes:					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
						A2	0 - 5	7.5YR 2.5/1			vgrSL	--	lgr					
AB	5-8	7.5YR 2.5/3	vgrSL	--	lsbk	so	fr	ss	3f	--	40	10	1	--	--	--	C/W	6
Bk	8 - 17	10YR 4/6	vgrSL	--	lsbk	so	fr	s	2m	--	55	10	5	--	--	EV	--	8

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 7/31/2018		No. K - 7	
Location: N 43.88947 W -113.66314					
Soil Type/Classification: Gany			Vegetation: Forested		
Landform: Upland		Parent Material: Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 7,567 ft		Slope: 30%	Aspect: North
Moisture: Dry		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer:
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described		Estimated Permeability: N/A	Estimated Infiltration Rate: N/A
Soils Samples Collected: Yes, 2 Samples			Depths: 0"-5" and 5"-12"		
Soil Samples Analyzed: None			Depths:		
Miscellaneous Notes: Could not collect sample from Bk2					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
						A	0-5	10yr3/2			vgrSL	--	2gr					
Bk1	5-12	10yr4/6	vgrSL	--	1sbk	so	fr	ss	3f	--	55	5	0	--	--	EV	C/S	6
Bk2	12-24	10yr4/4	xcbSL	--	1sbk	so	fr	ss	2m	--	20	60	0	--	--	EV	--	6
AR	24+																	

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 8/1/2018		No. K - 8	
Location: N 43.88344 W -113.67766					
Soil Type/Classification: Soil A			Vegetation: Forested		
Landform: Upland		Parent Material: Metamorphosed Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 8,835 ft		Slope: 15-20%	Aspect: East
Moisture: Moist		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer:
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described		Estimated Permeability: N/A	Estimated Infiltration Rate: N/A
Soils Samples Collected: Yes, 5 Samples		Depths: 0"-5", 5"-10", 10"-18", 18"-42", and 42"-60"			
Soil Samples Analyzed: None		Depths:			
Miscellaneous Notes: O horizon 5 inches, visible pine needles and pine cones all throughout.					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
A1	0 - 5	7.5YR 2.5/2	grSL	--	2gr	so	fr	ss	3vf	--	18	0	0	--	--	--	C/S	5
A2	5 - 10	7.5YR 2.5/2	grSL	--	1sbk	so	fr	ss	3f	--	15	0	0	--	--	--	C/S	5
Bt1	10-18	10YR 4/6	grSL	--	2sbk	so	fr	s	2m	--	15	0	0	pf	--	--	C/W	8
Bt2	18-42	10YR 4/6	vgrSL	--	2sbk	sh	fr	s	2m	--	40	5	0	pf	--	--	C/W	8
C	42-60	10YR 4/4	vgrSL	--	OM	sh	fr	ss	1m	--	30	5	0	--	--	--	--	4

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 8/1/2018		No. K - 9	
Location: N 43.88594 W -113.67587					
Soil Type/Classification: Soil A			Vegetation: Forested		
Landform: Upland		Parent Material: Metamorphosed Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 8,577 ft		Slope: 30%	Aspect: East
Moisture: Moist		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer: Not Encountered
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described		Estimated Permeability: N/A	Estimated Infiltration Rate: N/A
Soils Samples Collected: Yes, 5 Samples		Depths: 0"-6", 6"-12", 12"-26", 26"-44", and 44"-60"			
Soil Samples Analyzed: Yes, 5 Samples		Depths: 0"-6", 6"-12", 12"-26", 26"-44", and 44"-60"			
Miscellaneous Notes:					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
A	0 - 6	7.5YR 5/2	vgrSL	--	2gr	so	vfr	so	3vf	--	30	3	0	--	--	--	C/S	4
BE	6-12	7.5YR 5/3	vgrSL	--	1sbk	so	vfr	ss	3f	--	35	10	0	--	--	--	C/W	7
Bt1	12-26	7.5YR 4/3	vgrSL	--	2sbk	h	fi	s	2m	--	35	10	0	Pf	--	--	C/W	8
Bt2	26-44	7.5YR 4/4	vcbSL	--	2sbk	h	fr	s	2m	--	15	20	0	Pf	--	--	C/W	8
C	44-60	10YR 4/4	vcbLS	--	OM	so	fr	ss	1m	--	10	30	0	--	--	--	--	2

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 8/1/2018		No. K - 10	
Location: N 43.89143 W -113.67953					
Soil Type/Classification: Soil A			Vegetation: Forested		
Landform: Upland		Parent Material: Metamorphosed Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 8,026 ft		Slope: 30%	Aspect: East
Moisture: Moist		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer:
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described	Estimated Permeability: N/A		Estimated Infiltration Rate: N/A
Soils Samples Collected: Yes, 2 Samples			Depths: 0"-7" and 7"-18"		
Soil Samples Analyzed: None			Depths		
Miscellaneous Notes:					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
						A	0 - 7	10YR 2/1			vgrSL	--	2gr					
Bt	7-18	7.5 YR 4/4	xgrSL	--	2sbk	sh	fr	s	2m	--	60	10	2	Pf	--	--	C/W	8
Cr	18-60	Fractured Rocks																

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 8/1/2018		No. K - 11	
Location: N 43.87989 W -113.66530					
Soil Type/Classification: Gany			Vegetation: Forested		
Landform: Upland		Parent Material: Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 8,077 ft		Slope: 20-25%	Aspect: North
Moisture: Dry		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer: Not Encountered
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described		Estimated Permeability: N/A	Estimated Infiltration Rate: N/A
Soils Samples Collected: Yes		Depths: 0"-5", 5"-18", and 18"-22"			
Soil Samples Analyzed: None		Depths			
Miscellaneous Notes:					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
A	0 - 5	7.5YR 3/2	SL	--	2gr	so	vfr	ss	3vf	--	10	5	0	--	--	--	C/S	4
Bw	5 - 18	7.5YR 3/3	SL	--	1sbk	so	fr	ss	2f	--	10	0	0	--	--	--	C/S	8
Bk	18-22	10YR 4/4	vgrSL	--	1sbk	so	fr	ss	2m	--	35	10	0	--	--	EV	--	7

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 8/2/2018		No. K - 12	
Location: N 43.88591 W -113.66766					
Soil Type/Classification: Gany			Vegetation: Forested		
Landform: Upland		Parent Material: Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 8,121 ft		Slope: 30%	Aspect: Northeast
Moisture: Dry		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer: Not Encountered
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described		Estimated Permeability: N/A	Estimated Infiltration Rate: N/A
Soils Samples Collected: Yes, 5 Samples		Depths: 0"-8", 8"-17", 17"-27", 27"-42", and 42"-60"			
Soil Samples Analyzed: Yes, 5 Samples		Depths: 0"-8", 8"-17", 17"-27", 27"-42", and 42"-60"			
Miscellaneous Notes: O horizon 4"					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
A	0 - 8	10YR 2/2	grSL	--	2gr	so	vfr	ss	3vf	--	15	5	0	--	--	s	C/S	5
Bk1	8-17	10YR 4/3	vgrSL	--	1sbk	so	vfr	ss	2f	--	30	5	0	--	--	es	C/W	3
Bk2	17-27	7.5YR 4/3	vgrSL	--	1sbk	so	fr	ss	2m	--	30	10	0	--	--	ev	C/S	4
Bk3	27-42	10YR 4/3	vcbSL	--	1sbk	sh	fr	ss	1m	--	10	30	0	--	--	ev	C/S	6
Bk4	42-60	10YR 4/3	vcbSL	--	1sbk	so	fr	ss	1c	--	10	40	0	--	--	ev	--	6

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 8/2/2018		No. K - 13	
Location: N 43.88172 W -113.67045					
Soil Type/Classification: Gany			Vegetation: Mixed forested, localized disturbance		
Landform: Upland		Parent Material: Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 8,276 ft		Slope: 25-35%	Aspect: East
Moisture: Dry		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer: Not Encountered
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described		Estimated Permeability: N/A	Estimated Infiltration Rate: N/A
Soils Samples Collected: No			Depths:		
Miscellaneous Notes:					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
A	0 - 7	7.5YR 2.5/2	grSL	--	2gr	so	vfr	ss	--	--	20	2	0	--	--	--	C/S	5
Bk1	7 - 14	10YR 4/4	vgrSL	--	1sbk	so	fr	s	--	--	40	5	0	--	--	S	C/S	7
Bk2	14-21	10YR 4/4	vgrSL	--	1sbk	so	fr	s	--	--	45	5	0	--	--	S	C/S	7
Bk3	21-30	10YR 4/4	cbSL	--	1sbk	so	fr	ss	--	--	20	20	0	--	--	ES	--	6

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 8/2/2018		No. K-14	
Location: N 43.89796 W -113.67766					
Soil Type/Classification: Gany			Vegetation: Sagebrush and grasses		
Landform: Upland		Parent Material: Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 7,665 ft		Slope: 15-25%	Aspect: East
Moisture: Dry		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer: Not Encountered
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described		Estimated Permeability: N/A	Estimated Infiltration Rate: N/A
Soils Samples Collected: No			Depths:		
Miscellaneous Notes: 20% Surficial Stones					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
A	0 - 8	10YR 2/1	SL	--	lgr	so	vfr	ss	3vf	--	10	0	--	--	--	--	C/S	3
Bw	8 - 17	10YR 3/3	grSL	--	lsbk	so	fr	s	2f	--	20	10	--	--	--	--	C/S	4
Bk	17 - 27	10YR 3/3	vcbSL	--	lsbk	sh	fr	ss	1m	--	10	40	--	--	--	s	--	4

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 8/2/2018		No. K - 15	
Location: N 43.89364 W -113.67835					
Soil Type/Classification: Gany			Vegetation: Forested		
Landform: Upland		Parent Material: Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 7,815 ft		Slope: 30%	Aspect: Northeast
Moisture: Dry		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer: Not Encountered
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described		Estimated Permeability: N/A	Estimated Infiltration Rate: N/A
Soils Samples Collected: Yes, 4 Samples			Depths: 0"-7", 7"-19", 19"-32", and 32"-41"		
Soil Samples Analyzed: None			Depths:		
Miscellaneous Notes:					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
						A	0 - 7	10YR 3/2			grSL	--	2gr					
Bk1	7 - 19	10YR 4/3	vgrSL	--	1sbk	sh	fr	s	2f	--	30	10	0	--	--	ES	C/S	8
Bk2	19 - 32	10YR 4/4	vgrSL	--	1sbk	so	vfr	s	1m	--	25	10	0	--	--	ES	C/S	8
Bk3	32 - 41	10YR 4/4	vcbSL	--	1sbk	so	vfr	ss	1m	--	15	40	0	--	--	ES	--	7

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 8/2/2018		No. K - 16	
Location: N 43.89265 W -113.65977					
Soil Type/Classification: Gany			Vegetation: Forested		
Landform: Upland		Parent Material: Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 7,034 ft		Slope: 30%	Aspect: North
Moisture: Dry		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer: Not Encountered
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described		Estimated Permeability: N/A	Estimated Infiltration Rate: N/A
Soils Samples Collected: No			Depths:		
Miscellaneous Notes:					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
A	0-7	7.5YR 2.5/2	grSL	--	2gr	so	vfr	ss	3vf	--	20	2	--	--	--	--	C/S	3
AB	7-15	7.5YR 3/3	grSL	--	1sbk	so	fr	ss	2vf	--	15	2	--	--	--	--	C/S	4
Bk1	15-29	10YR 4/4	vgrSL	--	1sbk	so	vfr	s	1m	--	40	2	--	--	--	Es	C/S	5
Bk2	29-44	10YR 4/4	vcbsL	--	1sbk	sh	fr	s	1c	--	30	25	--	--	--	Ev	--	6

SOIL DESCRIPTION

Client Konnex Resources Project No. 2017220015 Project Empire Mine Baseline Study Soil Scientist Michael Sowers

Area /State: Mackay, Idaho		Date: 8/2/2018		No. K - 17	
Location: N 43.89089 W -113.67368					
Soil Type/Classification: Gany			Vegetation: Forested		
Landform: Upland		Parent Material: Limestone Colluvium		Climate: Moist Winter/Dry Summer	
Relief:		Elevation: 7,738 ft		Slope: 25%	Aspect: East
Moisture: Dry		Groundwater: Not Encountered		Drainage: Well Drained	Depth to Restrictive Layer: Not Encountered
Depth to Seasonally High Water Table: Not Encountered		Root Distribution: Not Described		Estimated Permeability: N/A	Estimated Infiltration Rate: N/A
Soils Samples Collected: Yes, 4 Samples			Depths: 0"-7", 7"-17", 17"-26", and 26"-40"		
Soil Samples Analyzed: None			Depths:		
Miscellaneous Notes:					

Horizon	Depth (in.)	Color (dry or moist)	USDA Texture	Mottles	Structure	Consistence			Roots	Pores	% Coarse Fragment			Clay Films	pH	Carbonates	Boundary	% Clay
						Dry	Moist	Wet			GRV	Cb	St					
A	0 - 7	10YR 2/1	vgrSL	--	2gr	so	vfr	ss	3vf	--	40	0	0	--	--	--	C/S	3
Bk1	7 - 17	10YR 4/2	vgrSL	--	1sbk	so	vfr	ss	2m	--	45	0	0	--	--	ES	C/S	4
Bk2	17 - 26	10YR 4/3	vgrSL	--	1sbk	sh	fr	s	2m	--	45	0	0	--	--	ES	C/S	7
Bk3	26 - 40	10YR 4/3	vgrLS	--	1sbk	so	fr	s	1c	--	50	10	0	--	--	EV	--	8

Appendix D.
Reclamation Suitability Report

Source of Reclamation Material, Roadfill, and Topsoil (ID)

This table gives information about the soils as potential sources of reclamation material, roadfill, and topsoil. Normal compaction, minor processing, and other standard construction practices are assumed.

The soils are rated *good*, *fair*, or *poor* as potential sources of reclamation material, roadfill, and topsoil. The features that limit the soils as sources of these materials are specified in the table. Numerical ratings between 0.00 and 0.99 are given after the specified features. These numbers indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments. The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Information in this table is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this table. Local ordinances and regulations should be considered in planning, in site selection, and in design.

The criteria for the ratings in this table were developed for conditions in Idaho, Oregon, and Washington.

Report—Source of Reclamation Material, Roadfill, and Topsoil (ID)

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation]

Source of Reclamation Material, Roadfill, and Topsoil (ID)—Custer-Lemhi Area, Idaho, Parts of Blaine, Custer, and Lemhi Counties							
Map symbol and soil name	Pct. of map unit	Potential as a source of reclamation material		Potential as a source of roadfill		Potential as a source of topsoil (ID)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
79—Gany gravelly loam, 30 to 60 percent slopes							
Gany	80	Fair		Poor		Poor	
		Low content of organic matter	0.13	Slope	0.00	Hard to reclaim (rock fragments)	0.00
		Carbonate content	0.16	Stones	0.99	Rock fragments	0.00
		Too acid	0.50	Cobble content	0.99	Slope	0.00
		Droughty	0.94			No limitation	0.00
		Stone content	0.95			Carbonate content	0.73

Source of Reclamation Material, Roadfill, and Topsoil (ID)---Custer-Lemhi Area, Idaho, Parts of Blaine, Custer, and Lemhi Counties							
Map symbol and soil name	Pct. of map unit	Potential as a source of reclamation material		Potential as a source of roadfill		Potential as a source of topsoil (ID)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
93—Howcan-Hagenbarth-Hutchley complex, 5 to 60 percent slopes							
Howcan	35	Fair		Poor		Poor	
		Low content of organic matter	0.88	Slope	0.00	Rock fragments	0.00
		Droughty	0.98	Dusty	0.98	Slope	0.00
				Cobble content	0.98	No limitation	0.00
						Hard to reclaim (rock fragments)	0.00
Hagenbarth	30	Fair		Poor		Poor	
		Low content of organic matter	0.88	Slope	0.00	Rock fragments	0.00
		Water erosion	0.99	Shrink-swell	0.89	Slope	0.00
				Dusty	0.93	No limitation	0.00
						Hard to reclaim (rock fragments)	0.32
Hutchley	20	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.00	Cobble content	0.73	No limitation	0.00
				Shrink-swell	0.87	Depth to bedrock	0.00
				Dusty	0.92	Slope	0.16
						Too clayey	0.81

Source of Reclamation Material, Roadfill, and Topsoil (ID)---Custer-Lemhi Area, Idaho, Parts of Blaine, Custer, and Lemhi Counties							
Map symbol and soil name	Pct. of map unit	Potential as a source of reclamation material		Potential as a source of roadfill		Potential as a source of topsoil (ID)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
95—Ike-Rock outcrop-Jimbee complex, 15 to 60 percent slopes							
Ike, very stony surface	45	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Carbonate content	0.00	Slope	0.00	Slope	0.00
		Depth to bedrock	0.00	Stones	0.56	No limitation	0.00
		Low content of organic matter	0.50	Dusty	0.97	Depth to bedrock	0.00
		Stone content	0.56			Carbonate content	0.00
Rock outcrop	20	Not rated		Not rated		Not rated	
Jimbee	15	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Carbonate content	0.00	Slope	0.00	Slope	0.00
		Depth to bedrock	0.00	Stones	0.79	No limitation	0.00
		Stone content	0.79			Depth to bedrock	0.00
						Carbonate content	0.00
96—Inferno-Grouseville association, 15 to 50 percent slopes							
Inferno	45	Poor		Poor		Poor	
		Too clayey	0.00	Slope	0.00	Too clayey	0.00
		Low content of organic matter	0.13	Shrink-swell	0.18	Slope	0.00
				Low strength	0.22	No limitation	0.00
				Dusty	0.86	Rock fragments	0.00
						Hard to reclaim (rock fragments)	0.68
Grouseville	35	Fair		Poor		Poor	
		Too clayey	0.59	Low strength	0.00	Slope	0.00
		Water erosion	0.99	Slope	0.00	No limitation	0.00
				Shrink-swell	0.22	Too clayey	0.00
				Dusty	0.89	Rock fragments	0.72

Source of Reclamation Material, Roadfill, and Topsoil (ID)---Custer-Lemhi Area, Idaho, Parts of Blaine, Custer, and Lemhi Counties							
Map symbol and soil name	Pct. of map unit	Potential as a source of reclamation material		Potential as a source of roadfill		Potential as a source of topsoil (ID)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
97—Jimbee-Rock outcrop-lke association, 30 to 75 percent slopes							
Jimbee	45	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Carbonate content	0.00	Slope	0.00	Slope	0.00
		Depth to bedrock	0.00	Stones	0.79	No limitation	0.00
		Stone content	0.79			Depth to bedrock	0.00
						Carbonate content	0.00
Rock outcrop	20	Not rated		Not rated		Not rated	
lke, very stony surface	15	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Carbonate content	0.00	Slope	0.00	Slope	0.00
		Depth to bedrock	0.00	Stones	0.56	No limitation	0.00
		Low content of organic matter	0.50	Dusty	0.97	Depth to bedrock	0.00
		Stone content	0.56			Carbonate content	0.00
190—Simeroi gravelly loam, 6 to 15 percent slopes							
Simeroi	95	Poor		Good		Poor	
		Carbonate content	0.00			Hard to reclaim (rock fragments)	0.00
		Droughty	0.07			Rock fragments	0.00
		Low content of organic matter	0.88			No limitation	0.00
						Carbonate content	0.00
						Slope	0.84

Source of Reclamation Material, Roadfill, and Topsoil (ID)---Custer-Lemhi Area, Idaho, Parts of Blaine, Custer, and Lemhi Counties							
Map symbol and soil name	Pct. of map unit	Potential as a source of reclamation material		Potential as a source of roadfill		Potential as a source of topsoil (ID)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
244---Zeale-Meegero complex, 20 to 40 percent slopes							
Zeale	55	Poor		Poor		Poor	
		Carbonate content	0.00	Slope	0.00	Hard to reclaim (rock fragments)	0.00
		Cobble content	0.96	Cobble content	0.40	Rock fragments	0.00
		Droughty	0.99			Slope	0.00
						No limitation	0.00
						Carbonate content	0.00
Meegero	30	Poor		Poor		Poor	
		Carbonate content	0.00	Slope	0.00	Hard to reclaim (rock fragments)	0.00
		Low content of organic matter	0.13	Cobble content	0.82	Rock fragments	0.00
		Cobble content	0.82			Slope	0.00
		Droughty	0.95			No limitation	0.00
						Carbonate content	0.30

Data Source Information

Soil Survey Area: Challis National Forest, Eastern Part, Idaho
 Survey Area Data: Version 2, Dec 9, 2013

Soil Survey Area: Custer-Lemhi Area, Idaho, Parts of Blaine, Custer, and Lemhi Counties
 Survey Area Data: Version 23, Apr 26, 2018