

Our Ref: 2731 AD

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Dear Gerry,

**Uranium, Thorium and Metal Analytical Review for the Mackay Sulfate of Potash (SOP) Project.**

## 1. Background and Legislative Context

Agrimin Limited (Agrimin) plans to develop a Sulfate of Potash (SOP) project at Lake Mackay located in the Great Sandy Desert on the Western Australia (WA) and Northern Territory (NT) border, in the portion of the lake lying within WA.

The SOP Project comprises 12 tenements covering most of Lake Mackay for a combined area of approximately 347,722 ha. The nearest major town is Alice Springs which is approximately 540 km south-east of the lake and the nearest community is Kiwirrkurra lying approximately 65 km south-west of the lake (Figure 1 in Attachment 1).

The Department of Environment and Energy (DEE) has advised that uranium, thorium and major & trace metals should be considered in potash projects based on Sections 21 and 22 of the Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act). Based on this advice, Agrimin Limited (Agrimin) engaged 360 Environmental to undertake a uranium, thorium and metals analytical review for the Mackay SOP Project.

Based on Section 22 of the EPBC Act, a nuclear action means any of the following:

- a. establishing or significantly modifying a nuclear installation;
- b. transporting spent nuclear fuel or radioactive waste products arising from the reprocessing;
- c. establishing or significantly modifying a facility for storing radioactive waste products arising from reprocessing;
- d. mining or milling uranium ore;

- e. establishing or significantly modifying large-scale disposal facility for radioactive waste;
- f. decommissioning or rehabilitating any facility or area in which an activity described in paragraph a, b, c, d and e has been undertaken, and
- g. any other action prescribed by the regulations.

Radioactive waste means radioactive material for which no further use is foreseen.

Reprocessing means a process or operation to extract radioactive isotopes from spent nuclear fuel or further use.

In accordance with Section 21 of the EPBC Act, the requirement for approval of nuclear actions includes:

- A constitutional corporation, the Commonwealth or Commonwealth agency must not take a nuclear action that has, will have or is likely to have a significant impact on the environment;
- A person must not for the purposes of trade or commerce take a nuclear action that has, will have or is likely to have a significant impact on the environment, and
- A person must not take in a Territory a nuclear action that has, will have or is likely to have a significant impact on the environment.

## 2. Proposed Activities

### 2.1. Off-lake

The process plant, associated offices and accommodation are proposed to be constructed just west of the lake. At this stage, it is expected that only minimal disturbance of surface soils will occur during the construction of the plant. The process plant components are planned to be prefabricated, pre-assembled, standard types of mechanical and electrical equipment, either mobile or fixed (Lycopodium, 2016). Off-lake infrastructure that is typical to a mining operation will include a dedicated processing plant, administration offices, workshop, accommodation units (camp), access roads, haul roads, water pipelines gas pipelines and an airstrip. The Project does not include any excavations of off-lake pits and no significant disturbance (including processing) of off-lake soils or sediments is expected. The site layout is presented in Figure 2 (Attachment 1).

### 2.2. On-lake

Brine (approximately 66.5 GL per year) will be collected via an excavated shallow trench infiltration network approximately 550 km long and up to 5 m in depth (Figure 2). Agrimin

is not planning to drill any deep bores on the lake to drain brine. Groundwater is planned to be abstracted and piped to site to supply water for the Project's construction and operations only. The Proposal does not involve brine extraction through bores.

Lake sediment will be excavated to construct the trench network and placed alongside the trenches. Some excavated sediment will be used as road base to promote vehicle access to the trenches. The trench network will connect with pond feed channels that drain to the evaporation ponds. Lake sediments will also be used to construct the pond feed channels, with excavated sediment placed alongside these channels in a similar manner to the trenches.

Brine will be solar evaporated within a series of evaporation ponds to facilitate the crystallisation of targeted potassium salts. These ponds will be constructed on the south-western side of Lake Mackay. The pond system is estimated to cover an area of 34 ha upon commencement of operations and expand to 60 ha over the proposed 20-year mine life. The evaporation ponds will be constructed using *in-situ* lakebed sediments. The pond design also includes a cut-off trench that requires excavation and removal of lake sediments.

Stockpiled potassium salts from the ponds will be transferred off-lake via a pipeline to the process plant where the material will be coarsely crushed, screened and fed into a flotation process to separate the bulk of the potassium salts from halite and other minor materials (Lycopodium, 2016). Concentrated potassium salts will then be sent to the SOP crystallisers where process water is added to dissolve excess magnesium sulfate to produce SOP (Lycopodium, 2016). The SOP crystals will be dried, compacted and glazed to meet desired product specifications (Lycopodium, 2016). More information on the process is provided in Section 2.3.

Some surface sediment disturbance may also be required for the construction of associated site infrastructure including an on-lake halite tailings stack and a causeway connecting the process plant to the evaporation ponds.

## 2.3. Process of Producing SOP

The Project's evaporation ponds collect the brine feed from across the lake and precipitate intermediate potash salts. The intermediate potash salts are then harvested and processed through the process plant to generate SOP (WorleyParsons Group, 2018).

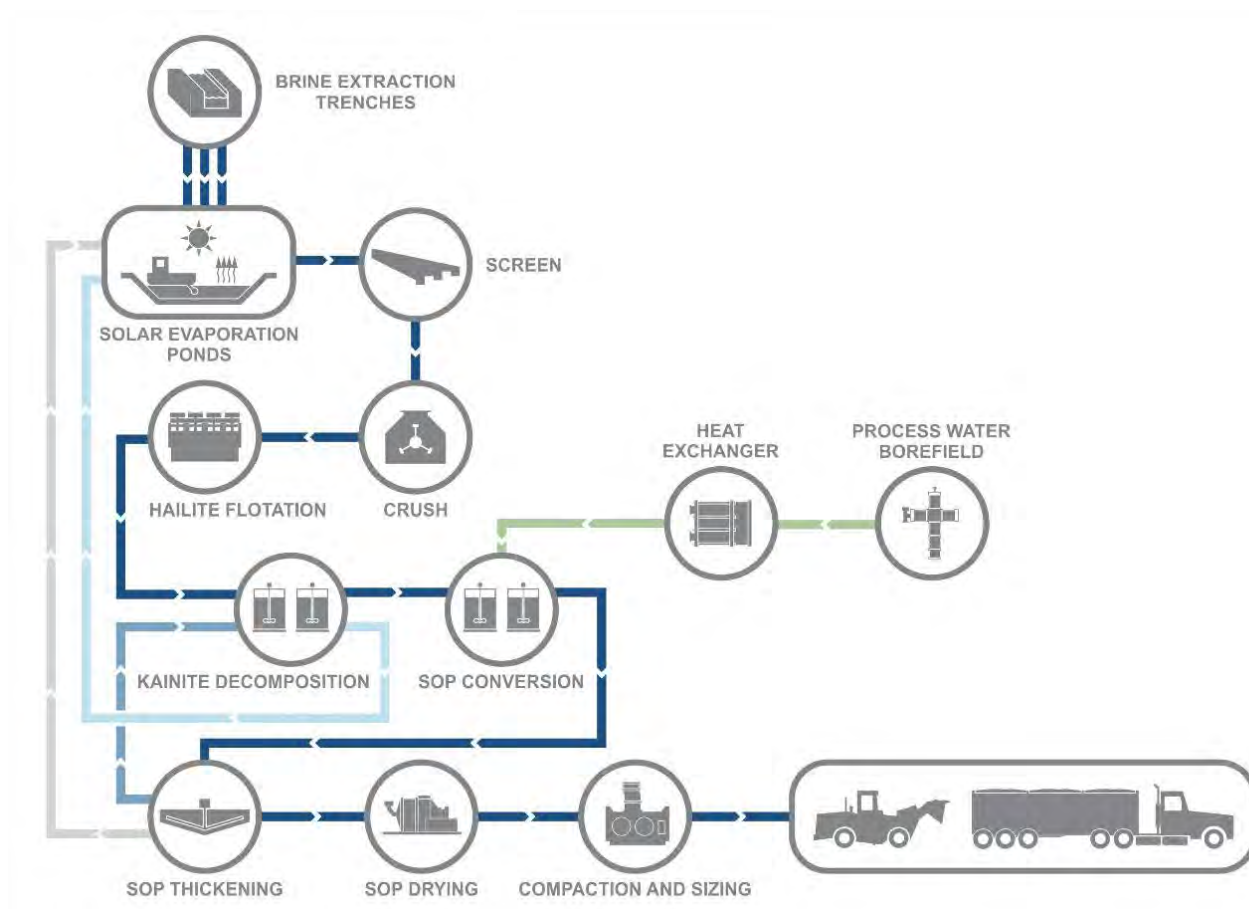
The starting brine chemistry at Lake Mackay is not fully saturated in salts, so the evaporation pond system initially pre-concentrates the brine to the point where salt precipitation will commence (WorleyParsons Group, 2018). The fully saturated brine is then transferred through a sequence of ponds where the precipitation of various salts is targeted (WorleyParsons Group, 2018). The final pond is designed to precipitate a

targeted Potassium-bearing salt which is then collected via a wet harvester and fed to the processing plant (WorleyParsons Group, 2018). The harvested Potassium salts are suitable for the production of SOP using a conventional process plant configuration (ie flotation, decomposition and SOP conversion) (WorleyParsons Group, 2018).

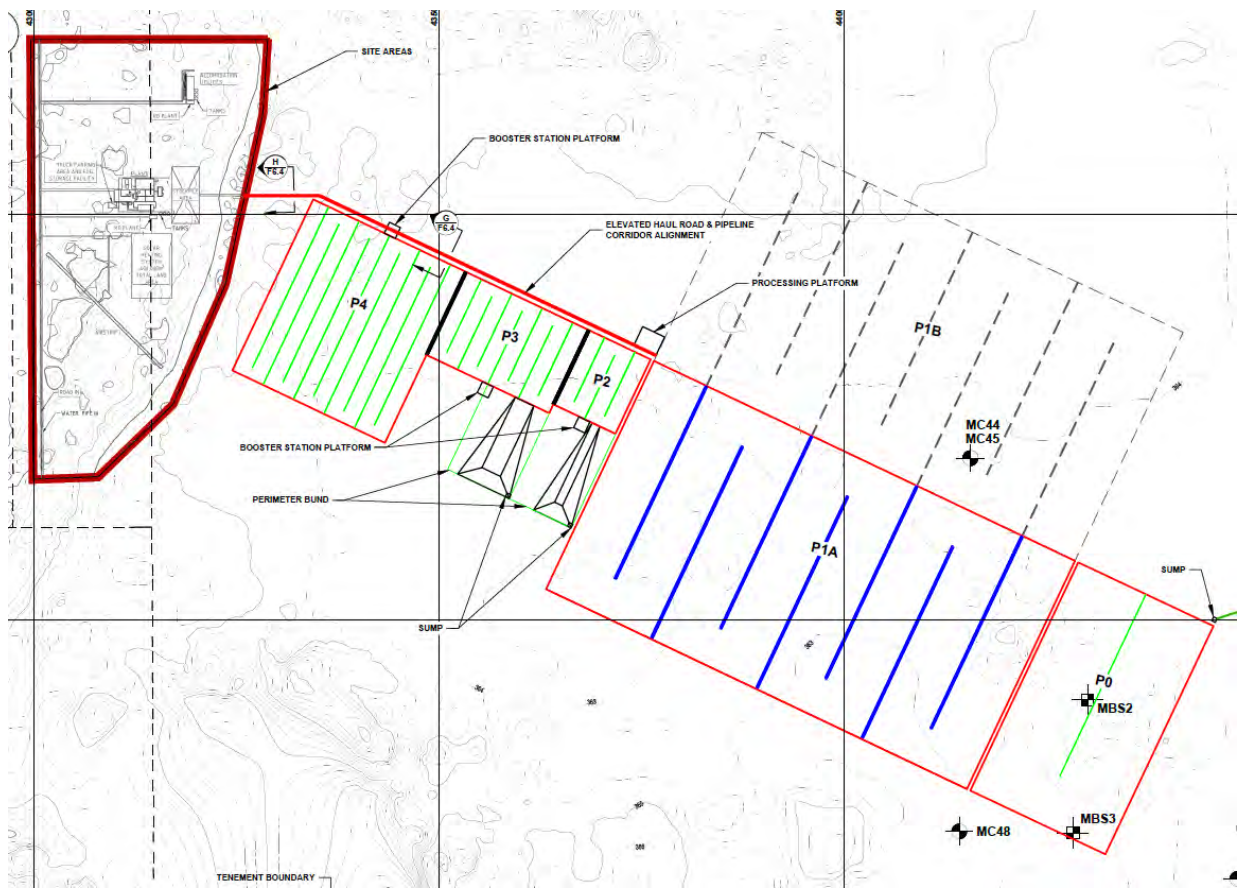
The plant design starts by crushing the harvested Potassium salts from the evaporation ponds and then feeding them into a flotation circuit (WorleyParsons Group, 2018). Following flotation, the concentrated Potassium salts are decomposed and then converted to SOP using heated water. The SOP crystals are then dried, compacted, screened, sized and prepared for transport (WorleyParsons Group, 2018).

The process design incorporates all outflows from the process plant being recirculated back to the evaporation ponds. The main recovery loss is associated with the entrainment of Potassium brine within solid waste salts retained in the ponds (WorleyParsons Group, 2018). The diagram below (Plate A) shows a simplified version of the process flows.

The pond evaporation and salt precipitation system consist of 5 ponds and 2 waste salt stacks (one Halite stack and one Epsomite stack) (WorleyParsons Group, 2018). The Halite (P2) salt stack will contain primarily Halite while the Epsomite (P3) salt stack will contain a mixture of mainly Epsomite and Halite. The Ponds are as follows – P0 (Pre-saturation Pond, P1 (Main Halite Pond), P2 (Secondary Halite Pond, from which waste Halite is pumped to stack), P3 (Epsomite Pond from which waste Epsomite and Halite are pumped to stack), P4 (Kainite Pond, with Kainite pumped to process plant) (WorleyParsons Group, 2018). The layout of the evaporation ponds is presented in Plate B.



**Plate A.A simplified version of the process flow chart for SOP production (WorleyParsons Group, 2018).**



**Plate B. The layout of the pond evaporation and salt precipitation system (WorleyParsons Group, 2018).**

## 3. Environmental Setting

### 3.1. Geology

Regionally, the surface geology of the Project site is described as Lacustrine deposits, including lake, playas and fringing dunes (Regolith of Western Australia, 500 m grid, Geoview online map). Lacustrine deposits typically comprise mud, silt, evaporate, limestone and minor sand (Quaternary in age). Based on the 1:250,000 Geological Series Sheet (1976) Sheet SF 52-10, other geological units that occur in association with Lake Mackay include:

- Halite, gypsum, sand, silt, clay - evaporitic and lacustrine, and
- Sand, halite, gypsum, calcrete - aeolian and minor evaporitic.

In the area adjacent to Lake Mackay, aeolian deposits comprising sand and clayey sand are present as longitudinal dunes. Sand plain deposits (Quaternary in age) also occur within the extent of Lake Mackay (Lycopodium, 2016). Extensive tracts of calcrete



comprising massive, nodular and cavernous sandy limestone of tertiary age occur adjacent to Lake Mackay where they formed as paleodrainage valley infill deposits. Quaternary aeolian deposits often overlie the calcrete deposits (Lycopodium, 2016).

The stratigraphy of Lake Mackay sediments comprises a coarse-grained, upper gypsum sand unit predominately present in the eastern areas of the Lake to depths of up to 1 m below ground surface. This unit has interbedded silt layers and grades downwards into sandy clay. Beneath this unit, red clay extends to underlying bedrock. The lake depth is approximately 16 m in the west of the lake, deepening to over 30 m on the northern territory border (Lycopodium, 2016).

### 3.2. Topography and Hydrology

The site is located within the Mackay basin, specifically within Lake Mackay. Lake Mackay is an ephemeral hypersaline lake. The Lake Mackay lakebed covers an area of approximately 3,325 km<sup>2</sup> and measures approximately 100 km east to west and 100 km north to south. Lake McKay is the low point of the enormous groundwater and surface water catchment area that is approximately 87,000 km<sup>2</sup>. The elevation of Lake Mackay ranges between 355 m and 370 m Australian Height Datum (AHD).

The catchment area extends mainly to the east of the lake through the valley between McDonnell Range and the range to the south (Lycopodium, 2016). This is the contributing catchment for the groundwater paleochannel system and for surface water runoff in times of abnormally heavy flows that generate significant surface flow. The catchment area excluding such abnormal rainfall periods is probably closer to approximately half this size (Lycopodium, 2016).

There is also an extensive system of paleovalleys and paleochannels. These originate in the Northern Territory and extend west to the valley between the ranges to Lake Mackay, which is the discharge point for water in the paleochannels (Lycopodium, 2016).

Lake Mackay undergoes some inundation during the wet season (December to March), with water entering the lake along a series of channels (Lycopodium, 2016).

### 3.3. Hydrogeology

A search of the DWER Water Information Reporting database in September 2017 identified 3 groundwater bores within the site consisting of three groundwater bores drilled by Agrimin. The status and use of the bores were not specified.

There were no groundwater bores within a 1 km radius, surrounding the site. Based on this review, no current use of groundwater within a 1 km radius of the site can be identified.

The site is within the lakebed of Lake Mackay. Lake Mackay is the low point of the enormous groundwater and surface water catchment area. The water table underlying the lakebed is typically encountered at around 0.4 meters below ground surface (mbgs) at most points around the lake. However, Lake Mackay undergoes some inundation during the wet season (December to March) (Lycopodium, 2016).

Regional groundwater flows predominantly from an easterly direction towards Lake McKay. Groundwater flows through the extensive system of palaeovalleys and palaeochannels originating in the Northern Territory and intersecting the lake in the east and along the southern boundary. Lake Mackay is the discharge point for groundwater and surface water in the paleochannels (Lycopodium, 2016). There is also possible upward groundwater migration from the basement beneath the salt lake (Lycopodium, 2016).

An investigation was undertaken by Geosciences Australia of the Wilkinkarra palaeovalley system, which is located east of Lake Mackay (Lycopodium, 2016). They concluded that the palaeovalley system ends in Lake Mackay. The investigation identified that the palaeovalley comprised an upper layer of calcrete and underlying units of sandy sediments with internal clay units all overlying weathered basement of the Arunta Region and Ngalia Basin. The groundwater flow within the channel is towards Lake Mackay (Lycopodium, 2016).

The groundwater underlying the site is considered to be hypersaline. Based on an acid sulfate soil investigation currently being undertaken by 360 Environmental in 2018, total dissolved solids (TDS) in the groundwater underlying the lakebed (evaporation) ranged from 198 g/kg (Trench 22) to 266 g/kg (Trench 5) and were indicative of a hypersaline lake.

### 3.4. Surrounding Land uses

The site is very remote. The closest town is Kiwirrkurra community located approximately 65 km south west of the Project.

### 3.5. Environmentally Sensitive Receptors

The nearest sensitive receptor is Lake Mackay and adjacent swamps and pans. The site is within the lakebed of Lake Mackay. Lake Mackay is an ephemeral hypersaline lake that can support significant populations of water birds and other salt lake fauna such as crustaceans during periods of inundation.

360 Environmental conducted a waterbird survey across the lake and local environs (flooded claypans and freshwater lakes) in April 2017 and a single phase Level 2 fauna survey (largely off-lake as well as targeting selected on-lake islands) in May 2017 for the Lake Mackay SOP Project for Agrimin. A total of 21 conservation significant species



(including Priority species), and 56 conservation significant species were identified during the desktop review of database searches.

360 Environmental also conducted a Detailed Flora and Vegetation Assessment for the Lake Mackay SOP Project for Agrimin in April 2017. No Threatened flora species pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or gazetted as Threatened pursuant to the *Wildlife Conservation Act 1950* were recorded during the recent flora and vegetation survey (360 Environmental (c), 2017).

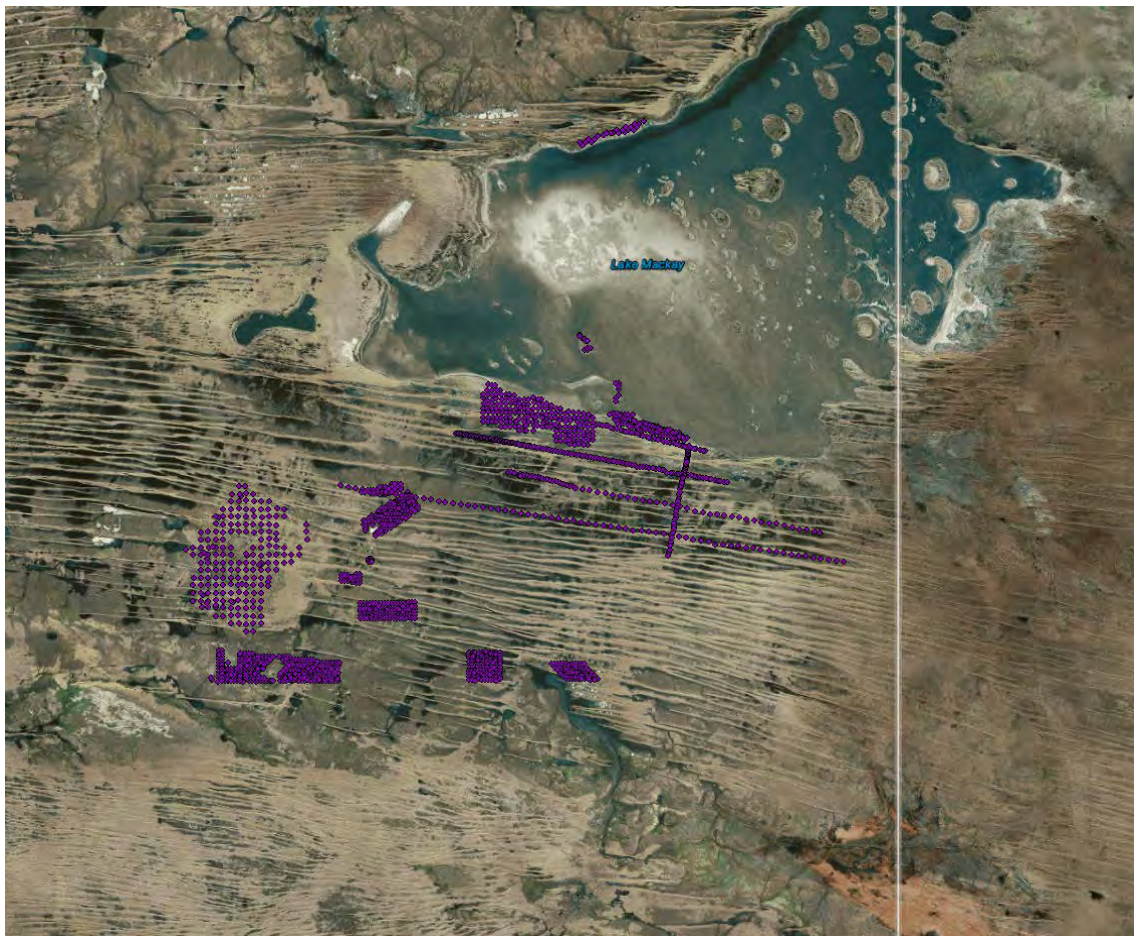
A review of the Department of Biodiversity Conservation and Attractions (DBCA), formerly Department of Parks and Wildlife (DPaW), threatened flora database and EPBC Protected Matters Search Tool (PMST) did not identify any Threatened/EPBC listed species, however, ten taxa listed as Priority flora were identified as potentially occurring in the survey area (360 Environmental, 2017). Three Priority listed flora were recorded during the April 2017 survey.

## 4. Source of Data Reviewed

Twenty eight sediment/soil samples from the lake bed were collected by Agrimin's Hydrogeologist. Sediment/soil samples were opportunistically collected as part of the lake trenching programme (2017) and the pilot pond programme (2018) for acid sulfate soil investigations. The sediment samples were collected from trial trench locations and from undisturbed sediment located next to the pilot pond. The trench and pilot pond sediment sample locations are presented on Figure 3. These samples were analysed at Eurofins Management Laboratory for total metals (uranium, thorium, aluminium, iron, arsenic, total chromium, cadmium, manganese, nickel, selenium, zinc, barium, beryllium, cobalt, copper, lead, molybdenum, strontium and mercury). The results are presented in Attachment 2, Table 1.

Uranium (U) and thorium (Th) analyses were previously undertaken by Genalysis Laboratory Services on 54 on-lake samples under the direction of Toro Energy / Rum Jungle Resources Limited while exploring for Uranium at Lake MacKay. The results are presented in detail in Attachment 2 (Table 5).

Thorium and uranium were also analysed by Genalysis Laboratory Services for Toro Energy for numerous off-lake samples. The results of these analyses are provided in Table 6 in Attachment 2. These samples were collected intermediately south and west of the lake and up to 52 km south of the Lake. None of the samples were collected in the off-lake areas proposed for infrastructure development. However, these results are considered representative of the broader regional setting. Plate C provides the Toro Energy/Rum Jungle on-lake and off-lake sample locations



**Plate C. Toro Energy/Rum Jungle on-lake and off-lake sample locations.**

For the off-lake samples, three types of analyses were undertaken for uranium:

- Acid digest / Mass Spectrometer (A/MS). This method extracts the majority of the uranium in the sample including soluble and insoluble forms;
- Acid digest / Optical Emissions Spectrometer (A/OES). This acid digest method extracts the majority of the uranium in the sample. However, the OES is not as sensitive for detecting uranium compared to the MS, and
- 10 g Aquaregia / Optical Emissions Spectrometer (B/OES). This method does not detect all the insoluble forms of uranium.

For the off-lake samples, three types of analysis were undertaken for thorium:

- Acid digest / Mass Spectrometer (A/MS). This method extracts the majority of the thorium in the sample including soluble and insoluble forms;
- 10 g Aquaregia / Mass Spectrometer (B/MS). This method does not detect all the insoluble forms of thorium, and

- Terraleach Alkaline Carbonate / Mass Spectrometer (TL8/MS). This method only detects the soluble forms of thorium.

Six groundwater samples were collected from six temporary groundwater monitoring wells (PPASB1, PPASB2, PPASB3, PPASB4, MC36 and MA07). The temporary groundwater monitoring wells were installed within the lake bed under the supervision of Agrimin's Hydrogeologist as part of an associated hydrogeological study. The location of the groundwater bores are presented on Figure 4. These samples were analysed at Bureau Veritas laboratory for dissolved metals (uranium, thorium, aluminium, iron, arsenic, chromium, cadmium, manganese, nickel, selenium, zinc, barium, beryllium, cobalt, lead, molybdenum, strontium and mercury). These samples were also analysed at Eurofins Management Laboratory for total metals (uranium, thorium, aluminium, iron, barium, beryllium, cobalt, lead, molybdenum, strontium and mercury). Additional totals metals (chromium, cadmium, manganese, nickel, selenium, zinc) were undertaken on two of the groundwater samples (MC36 and MA07). The results are presented in Attachment 2, Table 4.

Two waste salts (comprising halite/epsomite) and one potash product sample were provided by Agrimin from the evaporation pond and process plant trials. These samples were also analysed at Bureau Veritas laboratory for total metals (uranium, thorium, aluminium, iron, arsenic, total chromium, cadmium, manganese, nickel, selenium, zinc, barium, beryllium, cobalt, lead, molybdenum, strontium and mercury). The results are presented in Attachment 2, Table 1.

Assay data for an intermediate waste salt (kainite) sample POT003B was also provided from SRC Geological Laboratory data. Analysis of the sample was undertaken at different particle sizes and following various processes including decomposition, direct flotation and SOP tests at different water/solid ratios. The various results represent various salts that have precipitated from the Lake Mackay brine, and have been used to produce a final SOP product. The assay data is provided in Attachment 3. The original sample results (POT003B) and the assay sample data (relevant to project) with the highest concentrations of uranium and thorium have also been presented in Attachment 2, Table 1.

## 5. Assessment Criteria

### 5.1. Environmental Value and Assessment Criteria in Soil and Groundwater

Environmental value is a value or use of the environment, which is conducive to public benefit, welfare, safety or health and which requires protection from the effects of pollution, waste discharge and deposits [National Environmental Protection Council

(NEPC), 2013]. Table A provides detail on the nominated environmental values in relation to the current setting and realistic foreseeable future. Rationalisation for these nominated environmental values and appropriate Tier 1 risk assessment criteria are also provided. The assessment criteria for the individual trace metal and metal concentrations in soil and groundwater are provided in Tables 1 and 4 respectively.

In the absence of Australian Marine Water assessment criteria for uranium, the groundwater standards for Discharge to Marine Waters from Canadian Council of Ministers of the Environment (CCME), Canada (Nova Scotia) have been adopted.

There are no Australian or international groundwater assessment criteria available for thorium. Very little data are available that relate to the effects associated with thorium in groundwater. However, because thorium is the daughter product of uranium, a conservative approach commonly used is to adopt the available guidelines for uranium in groundwater.

**Table A: Environmental Value and Assessment Criteria for Trace Metals**

Environmental Value/ Beneficial Use	On-Site	Off-Site	Assessment Criteria	Assessment Criteria
	Rationalisation	Rationalisation		
SOIL				
Industrial (future)	SOP Project. Workers involved in the project.	No viable pathway	HIL D: Health Investigation Level – Commercial/Industrial	NEPM 2013 DOH 2009
Ecosystem protection	Ecology in undisturbed remote location. The closest town is Kiwirrkurra community located approximately 65 km south west of the Project. The soil standards for public open space for the protection of the environment are the most relevant to an undisturbed remote location such as Lake MacKay.		Ecological Investigation Level (EIL) - Urban residential/public open space	NEPM 2013
GROUNDWATER				
Ecosystem protection (Marine Water)	The nearest sensitive receptor is Lake Mackay and adjacent swamps and pans. The site is within the lakebed of Lake Mackay. The lake is a hypersaline lake. Therefore, the marine water investigation levels were considered the most applicable to the ecology of a salt lake	The nearest sensitive receptor is hyper saline Lake MacKay. The marine water investigation levels were considered the most applicable to the ecology of a salt lake.	GIL – MW: Groundwater Investigation Level - Marine Water	ANZECC & ARMCANZ 2000
			For Th and U only Discharge to Marine Waters	CCME, 2014



Environmental Value/ Beneficial Use	On-Site	Off-Site	Assessment Criteria	Assessment Criteria
	Rationalisation	Rationalisation		
Non-potable use	Potential groundwater use for the project. The groundwater underlying the lake will only be used for the extraction of brine for producing SOP and will not be used for general purposes (drinking, washing or other non-potable uses). Water for this purpose will be sourced from a borefield, across the border in the Northern Territory.	There were no groundwater bores within a 1 km radius, surrounding the site. Based on this review, no current use of groundwater within a 1 km radius of the site can be identified.	GIL – NPUG: Groundwater Non Potable Use	ADWG 2011 DoH 2014

In the absence of Australian assessment criteria for uranium, the soil standards for parkland/residential for the protection of Environmental and Human Health from Canadian Council of Ministers of the Environment (CCME), Canada (Nova Scotia) have been adopted. The soil standards for parkland for the protection of the environment are the most relevant to an undisturbed remote location such as Lake MacKay.

In addition, given that the site is proposed to be used as a Sulfate of Potash (SOP) Project, the industrial soil criteria for Environmental and Human Health (CCME) for uranium (300 mg/kg) will also be used.

There are no Australian or international assessment criteria available for thorium. Very little data are available that relate to the terrestrial effects associated with thorium in soil, with no studies available in the US Ecotox database to support criteria derivation. However, because thorium is the daughter product of uranium, a conservative approach commonly used is to adopt the available guidelines for uranium.

Table B summarises the adopted criteria for uranium and thorium.

**Table B. Uranium and Thorium Adopted Criteria**

Analyte	Source	Terrestrial Ecology Protection -Park land (mg/kg)	Human Health Protection – Parklands (mg/kg)	Human Health and Environment Protection – Industrial (mg/kg)
Uranium	CCME (2007)	500	23	300
Thorium	Use of U criteria as a conservative surrogate	500	23	300

## 5.2 Assessment Criteria for Waste Salts and Product

For the waste salts and the SOP product, the National Directory for Radiation Protection (ARPANSA, 2017) guidelines provide guidance in that materials that are below the exemption levels are excluded from regulatory concern. These Exemption Levels are also included in the Australian Radiation Protection and Nuclear Safety Regulations 1999, Schedule 2, Part 2. The Exemption Levels are provided in Table C for the relevant radionuclides. The waste salts and SOP product were also compared to the soil assessment criteria provided in Section 5.1.

**Table C. Exempt activity concentrations and exempt activities of radionuclides**

Nuclide	Activity Concentration (Bq/g)	Source
U-238 and U-234 Series		
U-238	10	National Directory for Radiation Protection (ARPANSA, 2017)
Th-234	1000	
Pa-234m	---	
U-234	10	
Th-230	1	
Ra-226	10	
Rn-222	10	
Po-218	---	
Pb-214	---	
Bi-214	---	
Po-214	---	
Pb-210	10	
Bi-210	1000	
Po-210	10	
U-235 Series		
U-235	10	National Directory for Radiation Protection (ARPANSA, 2017)
Th-231	1000	
Pa-231	1	
Ac-227	0.1	
Th-227	10	
Ra-223	100	
Rn-219	---	
Po-215	---	
Pb-211	---	



Nuclide	Activity Concentration (Bq/g)	Source
Bi-211	---	
Tl-207	---	
Th -232 series		
Th-232	1	National Directory for Radiation Protection (ARPANSA, 2017)
Ra-228	10	
Ac-228	10	
Th-228	1	
Ra-224	10	
Rn-220	10000	
Po-216	---	
Pb-212	10	
Bi-212	10	
Po-212	---	
Tl-208	---	

## 5.3 Calculation of Nuclide Specific Activity Concentrations

In order to utilise the provided exemption levels as a screening tool, the total uranium and thorium concentrations in the waste salt, potash and sediment samples collected by Agrimin were converted to nuclide specific activity concentrations using natural isotopic ratios and secular equilibrium assumptions. The specific activity of natural uranium (e.g. natural abundance) is presented in Table D. The conversions of total uranium to nuclide specific activity concentrations are presented in Table 2.

**Table D. Isotopic Composition of Natural Uranium**

	U-234	U-235	U-238	Total
<b>Atom %</b>	0.0054%	0.72%	99.275%	100%
<b>Weight %</b>	0.0053%	0.711%	99.284%	100%
<b>Activity %</b>	48.9%	2.2%	48.9%	100%
<b>Activity in 1 g U</b>	12,356 Bq	568 Bq	12,356 Bq	25,280 Bq

Thorium also appears in the uranium decay series and, therefore, the natural isotopic ratio varies. However, in this case, because the quantity of uranium in all of the samples is reasonably similar to the quantity of thorium, the abundance of Th-234, Th-230, Th-231 and Th-227 can be considered negligible (due to their relatively small physical abundance compared to Th-232). The majority of the sample by weight will, therefore, be associated with Th-232. The specific activity of Th-232 is 4,070Bq/g. Assuming secular equilibrium, the Th-232 daughters all have the same activity as their parent (except for Tl208 and Po212). The specific activity concentrations for each nuclide in the

Th-232 series are presented in Table 2. A comparison of the converted specific activity concentrations to the Exemption Levels are provided in Table 3.

## 6. Thorium, Uranium and Metals Analytical Review

### 6.1. Metal On-lake Soil and Sediment Results (Agrimin Samples)

Twenty-eight sediment samples from the lake bed were collected as part of the lake trenching programme (2017) and during the construction of the pilot pond (2018) for the purposes of Acid Sulfate Soil Investigations. The soil samples were collected from trial trench locations and from undisturbed sediment located next to the pilot pond.

The sediment sampling analytical reports are provided in Attachment 4. Results of this analysis are presented in Table 1 and summarised in Table E.

**Table E Total Metal Concentrations in On-lake Soil/Sediment (Agrimin Samples) Analysis Summary**

Analyte	Concentration Range (mg/kg)	Average (mg/kg)	Number of samples analysed	% of samples exceeding EIL (Urban Residential /Public Open Space)	% of samples exceeding HIL-D (Industrial /commercial)	% of Samples exceeding CCME Parkland - Human Health Protection (U and Th only -23 mg/kg)	% of Samples exceeding CCME Terrestrial Ecology Protection (U and Th only -500 mg/kg)	% of Samples exceeding CCME Industrial - Human Health and Environmental Protection (U and Th only-300 mg/kg)
Aluminium	760-46,000	14,902	28	0%	0%	NA	NA	NA
Arsenic	<2-5.7	2.01	28	0%	0%	NA	NA	NA
Barium	<10-100	32	5	0%	0%	NA	NA	NA
Beryllium	<2	<2	5	0%	0%	NA	NA	NA
Cadmium	<0.4-0.5	<0.4	28	0%	0%	NA	NA	NA
Total Chromium	<5-66	20.2	28	0%	0%	NA	NA	NA
Cobalt	<5	<5	5	0%	0%	NA	NA	NA
Copper	<5-35	10.4	28	0%	0%	NA	NA	NA
Iron	1,300-52,000	17,736	28	0%	0%	NA	NA	NA
Lead	<5-22	6.35	28	0%	0%	NA	NA	NA
Mercury	<0.1	<0.1	28	0%	0%	NA	NA	NA
Molybdenum	<5	<5	5	0%	0%	NA	NA	NA

Analyte	Concentration Range (mg/kg)	Average (mg/kg)	Number of samples analysed	% of samples exceeding EIL (Urban Residential /Public Open Space)	% of samples exceeding HIL-D (Industrial /commercial)	% of Samples exceeding CCME Parkland - Human Health Protection (U and Th only -23 mg/kg)	% of Samples exceeding CCME Terrestrial Ecology Protection (U and Th only -500 mg/kg)	% of Samples exceeding CCME Industrial - Human Health and Environmental Protection (U and Th only-300 mg/kg)
Nickel	<5 -23	7.51	28	0%	0%	NA	NA	NA
Selenium	<5	<5	5	0%	0%	NA	NA	NA
Strontium	11-580	142	5	NA	NA	NA	NA	NA
Thorium	6-17	10.6	5	NA	NA	0%	0%	0%
Uranium	<10-16	5.5	21	NA	NA	0%	0%	0%
Zinc	<5-67	24.5		0%	0%	NA	NA	NA

Based on the laboratory analyses, the following conclusions were drawn:

- All uranium concentrations in the on-lake soil/sediments were below the relevant assessment criteria (both parkland and industrial for protection of human health and the environment) indicating they pose a low risk to human health and the receiving ecological environment;
- All thorium in the on-lake soil/sediments were below the relevant assessment criteria (both parkland and industrial for protection of human health and the environment) indicating they pose a low risk to human health and the receiving ecological environment;
- All other metal concentrations in the in the on-lake soil/sediments were below the health investigation levels HIL-D (industrial/commercial) and the Ecological Investigation Level (EIL) (Public Open Space) suggesting they pose a negligible risk to human health and the receiving ecological environment;

The uranium and thorium results were also compared to the National Directory for Radiation Protection Activity Concentration Exemption Levels. The nuclide specific activity concentrations are presented in Table 3 for the U-238, U234, U-235 and Th – 232 series and is summarised in Table F.

**Table F. Nuclide Specific Activity Concentrations Analysis Summary**

Nuclide	% Exceeding Exemption Levels	Activity Concentration Range (Bq/g)	% Exceeding Exemption Levels
<b>U-238 and U-234 Series</b>			
U-238	10	<0.123-0.198	0%
Th-234	1000	<0.123-0.198	0%
Pa-234m	---	<0.123-0.198	0%

Nuclide	% Exceeding Exemption Levels	Activity Concentration Range (Bq/g)	% Exceeding Exemption Levels
U-234	10	<0.123-0.198	0%
Th-230	1	<0.123-0.198	0%
Ra-226	10	<0.123-0.198	0%
Rn-222	10	<0.123-0.198	0%
Po-218	---	<0.123-0.198	0%
Pb-214	---	<0.123-0.198	0%
Bi-214	---	<0.123-0.198	0%
Po-214	---	<0.123-0.198	0%
Pb-210	10	<0.123-0.198	0%
Bi-210	1000	<0.123-0.198	0%
Po-210	10	<0.123-0.198	0%
<b>U-235 Series</b>			
U-235	10	<0.0057-0.0091	0%
Th-231	1000	<0.0057-0.0091	0%
Pa-231	1	<0.0057-0.0091	0%
Ac-227	0.1	<0.0057-0.0091	0%
Th-227	10	<0.0057-0.0091	0%
Ra-223	100	<0.0057-0.0091	0%
Rn-219	---	<0.0057-0.0091	0%
Po-215	---	<0.0057-0.0091	0%
Pb-211	---	<0.0057-0.0091	0%
Bi-211	---	<0.0057-0.0091	0%
Tl-207	---	<0.0057-0.0091	0%
<b>Th -232 series</b>			
Th-232	1	0.024-0.069	0%
Ra-228	10	0.024-0.069	0%
Ac-228	10	0.024-0.069	0%
Th-228	1	0.024-0.069	0%
Ra-224	10	0.024-0.069	0%
Rn-220	10000	0.024-0.069	0%
Po-216	---	0.024-0.069	0%
Pb-212	10	0.024-0.069	0%
Bi-212	10	0.024-0.069	0%
Po-212	---	0.016-0.044	0%
Tl-208	---	0.009-0.025	0%

All on-lake soil/sediment results were significantly below the National Directory for Radiation Protection Activity Concentration Exemption Levels, suggesting that on-lake sediment/soil (collected by Agrimin) are not defined as 'radioactive' in a regulatory context and do not require further assessment.

## 6.2. Thorium and Uranium Soil and Sediment Results (Toro Energy/Rum Jungle Resources)

Uranium (U) and thorium (Th) analyses were previously undertaken by Genalysis Laboratory Services on 54 on-lake samples under the direction of Toro Energy / Rum Jungle Resources Limited while exploring for uranium at Lake MacKay, the results of which are also summarised in Table G and presented in detail in Attachment 2 (Table 5).

Thorium and uranium were also analysed by Genalysis Laboratory Services for Toro Energy for numerous off-lake samples. The results of these analyses are summarised in Table J and listed in Table 6 in Attachment 2. These samples were collected intermediately south and west of the lake and up to 52 km south of the Lake. None of the samples were collected in the area proposed for infrastructure development. However, these results are considered representative of the broader regional setting.

**Table G. Uranium and Thorium Analysis Summary (Toro Energy / Rum Jungle Resources Limited Exploration Data)**

Analyte	Source	Concentration Range (mg/kg)	Average (mg/kg)	Number of samples analysed	Percentage of Samples exceeding Parkland - Human Health Protection (23 mg/kg)	Percentage of Samples exceeding Parkland - Terrestrial Ecology Protection (500 mg/kg)	Percentage of Samples exceeding Industrial - Human Health and Environmental Protection (300 mg/kg)
Uranium	On-lake Samples, Toro Energy, 2009	3 – 11.5	6.0	54	0%	0%	0%
Thorium	On-lake Samples, Toro Energy, 2009	12 - 42	22.9	54	44.4%	0%	0%
Uranium A/MS	Off-Lake Samples Toro Energy, 2009	<0.05 - 55	10.3	191	4.7%	0%	0%
Uranium A/OES	Off-Lake Samples	0.2 – 5.3	0.52	1,400	0%	0%	0%

Analyte	Source	Concentration Range (mg/kg)	Average (mg/kg)	Number of samples analysed	Percentage of Samples exceeding Parkland - Human Health Protection (23 mg/kg)	Percentage of Samples exceeding Parkland - Terrestrial Ecology Protection (500 mg/kg)	Percentage of Samples exceeding Industrial - Human Health and Environmental Protection (300 mg/kg)
	Toro Energy, 2009						
Uranium B/OES	Off-Lake Samples Toro Energy, 2009	0.1 – 32	2.02	115	1.74%	0%	0%
Thorium A/MS	Off-Lake Samples Toro Energy, 2009	<0.02 - 349	31.2	304	42.1%	0%	0.66%
Thorium B/MS	Off-Lake Samples Toro Energy, 2009	<0.01 – 2.9	1.85	2	0%	0%	0%
Thorium TL8/MS	Off-Lake Samples Toro Energy, 2009	0.0002 – 0.008	0.00166	1399	0%	0%	0%

Based on the laboratory analyses, the following conclusions were drawn:

### Uranium

- All uranium concentrations for on-lake samples were below the relevant assessment criteria (both parkland and industrial for protection of human health and the environment) indicating they pose a low risk to human health and the receiving ecological environment;
- The uranium concentrations in the on-lake samples collected by Toro Energy (3 mg/kg to 11.5 mg/kg) are within a similar range to the samples collected by Agrimin (<10 mg/kg to 16 mg/kg). Therefore, they are also likely to be significantly below the National Directory for Radiation Protection Activity Concentration Exemption Levels, suggesting that on-lake sediment/soil are not defined as 'radioactive' in a regulatory context and do not require further assessment;
- The majority of the uranium concentrations for off-lake samples were also below the relevant assessment criteria, indicating they pose a low risk to human health and the receiving ecological environment. Only 4.7% of samples exceeded the parkland human health assessment criteria using the A/MS method. No samples exceeded the parkland human health assessment criteria using the A/OES method and only



1.74% exceeded the parkland human health assessment criteria using the B/OES method. The location of the Project area is very remote and very few people are likely to visit this area or stay for a long period of time. As a result, the potential exposure of uranium to human health receptors using the land as “parkland” is considered low. The majority of people using the area would be for the proposed SOP Project, considered an industrial use;

- No concentrations of uranium for off-lake samples exceeded the industrial human health criteria for uranium, indicating they pose a low risk to human health for the Project. No samples exceeded the terrestrial ecology protection for parkland, indicating they pose a low risk to the receiving ecological environment; and
- The uranium concentrations in the off-lake samples collected by Toro Energy range from <0.05 - 55mg/kg. The off-lake soil will not be processed or modified. When the highest concentration 55 mg/kg, is converted to specific activity concentrations for each nuclide in the U-238 and U-234 series (0.680 Bq/g) and in the U-235 series (0.031 Bq/g), the specific activity concentrations are also below the National Directory for Radiation Protection Activity Concentration Exemption Levels. This suggests that off-lake sediment/soil in their natural state are not defined as ‘radioactive’ in a regulatory context and do not require further assessment.

## Thorium

- The concentrations in the on-lake sediment samples of thorium ranged from 12 mg/kg to 42 mg/kg. The majority of the thorium concentrations for on-lake samples were also below the adopted assessment criteria. Only 44.4% exceeded the parkland human health assessment criteria (23 mg/kg) and no samples exceeded the industrial human health criteria (300 mg/kg). All the samples that exceeded the criteria were only marginally above the parkland human health criteria for uranium (between 1 and 2 times the assessment criteria). As previously stated, the location of the Project area is very remote and very few people are likely to visit this area or stay for a long period of time. As a result, the potential exposure of thorium to human health receptors using the land as “parkland” is considered low. The majority of people using the area would be for the proposed SOP Project, for industrial use;
- No concentrations of thorium in the on-lake sediment samples exceeded the industrial human health criteria, indicating a low risk to human health for industrial use;
- No concentrations of thorium in the on-lake sediment samples exceeded the terrestrial ecology protection for parkland, indicating they pose a low risk to the receiving ecological environment. Based on these results, the concentrations of thorium in the on-lake sediments are considered to pose a low risk to human health and the receiving ecological environment;

- The thorium concentrations in the on-lake samples collected by Toro Energy range from 12 mg/kg to 42 mg/kg. When the highest concentration 42 mg/kg, is converted to specific activity concentrations for each nuclide in the Th-232 series, the specific activity concentrations (0.062 Bq/g to 0.17 Bq/g) are also below the National Directory for Radiation Protection Activity Concentration Exemption Levels. This suggests that on-lake sediment/soil are not defined as 'radioactive' in a regulatory context and do not require further assessment;
- The majority of the thorium concentrations for off-lake samples were also below the relevant assessment criteria. For both the B/MS and TL8/MS methods, no samples exceeded the parkland human health assessment criteria and no samples exceeded the industrial criteria. A total of 42.1% exceeded the parkland assessment criteria and 0.66% exceeded the industrial assessment criteria using the A/MS method. The A/MS method extracts the thorium in both insoluble and soluble forms using a highly acidic acid. Only the insoluble forms of thorium extracted under acid digest exceed the assessment criteria. A comparison of the thorium concentrations using the three methods indicates that the majority of the thorium is in an insoluble form and, therefore, poses a lower risk to human health and the receiving ecological environment under natural conditions. The average concentration using the A/MS method was 31.2 mg/kg, compared to concentrations of 1.85 mg/kg and 0.00166 mg/kg using the B/MS and TL8/MS methods, respectively. Thorium has low mobility under all environmental conditions, mainly due to the high stability of the insoluble oxide  $\text{ThO}_2$  and the strongly resistant nature of its carrier minerals such as monazite and zircon. Unlike uranium, thorium cannot be oxidised to a stable cation equivalent to the highly mobile uranyl ion  $\text{UO}_2^{2+}$ . The soluble species  $\text{Th}(\text{SO}_4)^{2+}$  may form below pH 3 and under oxidising conditions (e.g. in acid mine water) (FOREGS, 2017). Based on the proposed activities, no acidic water is expected to impact the off-lake soils and sediments;
- The location of the Project area is very remote and very few people are likely to visit this area or stay for a long period of time. As a result, the potential exposure of thorium to human health receptors using the land as "parkland" is considered low. The majority of people using the area would be for the proposed SOP Project, for industrial use. Only 0.66% of thorium concentrations for off-lake samples exceeded the industrial assessment criteria using the A/MS method and no samples exceeded the criteria using the other methods, indicating that thorium concentrations pose a low risk to human health for industrial use;
- No thorium concentrations for off-lake samples exceeded the terrestrial ecology protection - parkland, also indicating they pose a low risk to the receiving ecological environment;

- The thorium concentrations in the undigested (analytical methods B/MS and TL8/MS) off-lake samples collected by Toro Energy range from 0.0002 mg/kg – 2.9 mg/kg. When the highest concentration 2.9 mg/kg, is converted to specific activity concentrations for each nuclide in the Th-232 series, the specific activity concentrations (0.0043 Bq/g to 0.012 Bq/g) are significantly below the National Directory for Radiation Protection Activity Concentration Exemption Levels; and
- The thorium concentrations in the digested (analytical methods A/MS) off-lake samples were converted to specific activity concentrations for each nuclide in the Th-232 series. Based on the conversions, only 4.9 % of the specific activity concentrations exceeded the National Directory for Radiation Protection Activity Concentration Exemption Levels. These samples were not located near the proposed offsite infrastructure. These samples were actually located at least 20 km to the south east of the proposed processing plant, to the south of the lake. The off-lake soils will not be modified or processed, and these concentrations represent natural background concentrations on a regional scale. Given that the majority of samples on a regional scale were below the Exemption Levels and the soil will not be modified or processed, the thorium concentrations are considered to pose a low risk to human health for industrial use.

### 6.3. Groundwater Results

Groundwater analytical reports are provided in Attachment 4. Results of the baseline sampling are presented in Table 4 and summarised below.

The results of the total metal concentrations in groundwater are summarized in Table H, together with reference to the assessment criteria, and presented in detail in Table 4 (Attachment 2).

Table H. Dissolved and Total Metal Concentrations in Groundwater Analysis Summary

Analyte	Total Metals Concentration Range (mg/L)	Average (mg/L)	Sample with Highest concentration	Number of samples analysed	Percentage of Samples exceeding Marine Water (mg/L)	Percentage of Samples exceeding NPUG mg/L	Dissolved Metals Concentration Range (mg/L)	Average (mg/L)	Sample with Highest concentration	Number of samples analysed	Percentage of Samples exceeding Marine Water (mg/L)	Percentage of Samples exceeding NPUG mg/L
Total Metals							Dissolved Metals					
Aluminium	<0.5 - 190	32.1	PPASB1	6	No Criteria	No Criteria	<1 - 1	0.75	PPASB2, PPAB3 and PPAB4	6	No criteria	50%
Arsenic	-	-	-	-	-	-	0.01-0.1	0.052	PPASB1	6	0%	0%
Barium	<0.05– 0.75	0.38	PPASB1	6	No Criteria	No Criteria	0.02-0.03	0.022	PPASB1	6	No criteria	0%
Beryllium	<0.02	<0.02	None	6	No Criteria	No Criteria	<0.001	<0.001	None	6	No criteria	0%
Cadmium	<0.002 – 0.003	0.0027	MC36-11	2	No Criteria	No Criteria	<0.01	<0.01	None	6	0%	0%
Chromium	<0.01	<0.01	None	2	No Criteria	No Criteria	<0.5	<0.5	None	6	0%	0%
Cobalt	<0.01-0.074	0.019	PPASB1	6	No Criteria	No Criteria	<0.01 - <0.5	<0.01	None	6	0%	No criteria
Iron	<0.5-290	48.9	PPASB1	6	50%	50%	<0.5	<0.5	None	6	No criteria	No criteria
Lead	0.033 – 0.46	0.14	PPASB1	6	No Criteria	No Criteria	<0.05-0.25	0.1	PPASB1	6	50%	33%
Manganese	0.18 – 0.36	0.27	MA07	2	No Criteria	No Criteria	<0.5-2.5	0.83	PPASB1	6	No Criteria	0%
Mercury	<0.002	<0.002	None	6	unknown	0%	<0.001-0.007	0.003	PPASB1	4	50%	0%
Molybdenum	<0.1	<0.1	None	6	No Criteria	No Criteria	<0.01-0.06	0.02	None	6	No Criteria	No Criteria
Nickel	<0.01	<0.01	None	2	No Criteria	No Criteria	<0.5	<0.5	None	6	0%	0%
Selenium	<0.01	<0.01	None	2	No Criteria	No Criteria	<0.1-0.2	0.1	PPASB1 and PPASB4	6	No Criteria	33%
Strontium	6.7-9.1	8.18	MC36-11	6	No Criteria	No Criteria	6.04-9.29	8.4	PPASB4	4	No Criteria	No Criteria
Thorium	1-3.2	2.46	PPASB1, PPASB2, PPASB3	6	No Criteria	No Criteria	<0.001-0.002	0.00075	MA07	6	0%	0%
Uranium	<0.05 -0.13	0.055	PPASB1	6	No Criteria	No Criteria	0.001-0.006	0.003	PPASB1	6	0%	0%
Zinc	0.079—0.22	0.1495	MC36-11	2	No Criteria	No Criteria	<0.5-0.5	<0.5	MC36-11	6	16.7%	0%

Based on the laboratory analyses, the following conclusions were drawn:

- The highest concentration of both dissolved and total metals were typically reported in monitoring well PPASB1 located near the pilot pond. The concentrations of metals in all groundwater wells are considered representative of natural background conditions;
- Based on the groundwater metal results, all reported total and dissolved concentrations of dissolved uranium, thorium, iron, arsenic, chromium, cadmium, manganese, nickel, barium, beryllium, cobalt, molybdenum, strontium, aluminium and selenium were below the Marine Water assessment criteria in all groundwater samples, indicating negligible risk to the nearest down gradient ecological receptor (Lake Mackay);
- The only reported exceedances of Marine Water assessment criteria for dissolved metals were lead, mercury, zinc which exceeded the criteria in several bores surrounding the pilot pond (lead and mercury) and the centre of lake Mackay (zinc). Total iron also exceeded the Marine Water assessment criteria in three samples near the pilot pond and the centre of the lake (PPAB1, PPAB2 and MA07). Although, the concentrations have slightly exceeded the Marine Water criteria, the concentrations are representative of natural background conditions;
- Based on the groundwater metal results, all reported (above LOR) concentrations of dissolved uranium, thorium, iron, arsenic, chromium, cadmium, manganese, nickel, zinc, barium, beryllium, cobalt, molybdenum, strontium and mercury, were below the NPUG assessment criteria in all groundwater samples, indicating negligible risk to human health receptors and potential future beneficial users;
- The only exceedances of NPUG were dissolved aluminium, lead and selenium which slightly exceeded (<10 times the NPUG) the assessment criteria in several bores surrounding the pilot ponds. Although the concentrations have slightly exceeded the NPUG criteria, the concentrations are representative of natural background conditions. The groundwater underlying the lake will only be used for the extraction of brine for producing SOP and will not be used for general purposes (drinking, washing or other non-potable uses). Therefore, the slight exceedances of NPUG for dissolved aluminium, lead, selenium are considered a low risk to human health receptors and potential future beneficial users. In addition, the trial waste salts and potash that will be produced from the evaporation and processing of Lake MacKay groundwater/brine have also been analysed for aluminium, lead and selenium. No exceedances of relevant assessment criteria were reported in the trial waste salts and potash metal concentration (refer to Section 6.4); and

- No reported total metal concentrations in any groundwater sample exceeded the NPUG assessment criteria, with the exception of total iron. Total iron exceeded the NPUG assessment criteria in three samples (PPAB1, PPAB2 and MA07). The iron NPUG criterion is only an aesthetic criterion and the concentration of iron in the groundwater represents negligible human health risk to non-potable users of groundwater.

## 6.4. Product and Waste Salt Results

Two waste salts (comprising halite and epsomite) and one potash product sample were provided for analysis by Agrimin from the evaporation pond and process plant trials. The waste salts and potash analytical reports are provided in Attachment 4. Results of this analysis are presented in Table 1 and summarised in Table I.

Assay data for an intermediate waste salt (kainite) sample POT003B and the sample following processing was also reviewed. The various results represent various salts that will precipitate from the Lake Mackay brine, and will be used to produce a final SOP product. The assay data are provided in Attachment 3. The original kainite waste salt sample (POT003B) results and the assay sample data (relevant to the project) with the highest concentrations of uranium and thorium [Ag-D(40)-SOP (1.5)] have also been presented in Table 1 and summarised in Table I.

There was only one sample in the assay data sample with a higher uranium concentration than Ag-D(40)-SOP (1.5)]. This sample was a leonite waste salt, with a total uranium concentration of 52 mg/kg. However, based on the envisaged flow sheet no leonite is expected to precipitate, with all of the potassium to report as kainite. Leonite is expected to comprise of 0% of the waste salts in the overall waste salt. Therefore, this sample was excluded from this review.

**Table I. Total Metal Concentrations in Product and Waste Analysis Summary**

Analyte	Concentration Range (mg/kg)	Average (mg/kg)	Number of samples analysed	% of samples exceeding EIL (Urban Residential /Public Open Space)	% of samples exceeding HIL-D (Industrial /commercial)	% of Samples exceeding CCME Parkland - Human Health Protection (U and Th only -23 mg/kg)	% of Samples exceeding CCME Parkland - Terrestrial Ecology Protection (U and Th only -500 mg/kg)	% of Samples exceeding CCME Industrial - Human Health and Environmental Protection (U and Th only-300 mg/kg)
Aluminium	<0.01	<0.01	3	0%	0%	NA	NA	NA
Arsenic	<0.2	<0.2	3	0%	0%	NA	NA	NA
Barium	<1 - 11	4.1	5	0%	0%	NA	NA	NA



Analyte	Concentration Range (mg/kg)	Average (mg/kg)	Number of samples analysed	% of samples exceeding EIL (Urban Residential /Public Open Space)	% of samples exceeding HIL-D (Industrial /commercial)	% of Samples exceeding CCME Parkland - Human Health Protection (U and Th only -23 mg/kg)	% of Samples exceeding CCME Parkland - Terrestrial Ecology Protection (U and Th only -500 mg/kg)	% of Samples exceeding CCME Industrial - Human Health and Environmental Protection (U and Th only-300 mg/kg)
Beryllium	<0.001-0.001	<0.001	5	0%	0%	NA	NA	NA
Cadmium	<1	<0.05	5	0%	0%	NA	NA	NA
Total Chromium	<5-5	4.1	5	0%	0%	NA	NA	NA
Cobalt	<1-2	1.1	5	0%	0%	NA	NA	NA
Copper	0.5-4	2.25	2	0%	0%	NA	NA	NA
Iron	<1-2	0.87	4	0%	0%	NA	NA	NA
Lead	<1-2	0.9	5	0%	0%	NA	NA	NA
Manganese	0.5-2	0.87	4	0%	0%	NA	NA	NA
Mercury	<0.01	<0.01	3	0%	0%	NA	NA	NA
Molybdenum	<1-<0.1	<0.1	5	0%	0%	NA	NA	NA
Nickel	<1-20	4.9	5	0%	0%	NA	NA	NA
Selenium	<1	<1	3	0%	0%	NA	NA	NA
Strontium	8.3-29	22.34	5	0%	0%	NA	NA	NA
Thorium	<0.02-0.02	0.013	5	NA	NA	0%	0%	0%
Uranium	<0.02-11	2.42	5	NA	NA	0%	0%	0%
Zinc	<1-7	2.9	5	0%	0%	NA	NA	NA

Based on the laboratory analyses, the following conclusions were drawn:

- All uranium concentrations in the potash products, waste salt (halite and epsomite) and intermediate waste salt (kainite) were below the relevant assessment criteria (both parkland and industrial for protection of human health and the environment) indicating they pose a low risk to human health and the receiving ecological environment;
- All thorium concentrations in the potash products, waste salt (halite and epsomite) and intermediate waste salt (kainite) were below the relevant assessment criteria (both parkland and industrial for protection of human health and the environment) indicating they pose a low risk to human health and the receiving ecological environment; and
- All other metal concentrations in the potash products, waste salt (halite and epsomite) and intermediate waste salt (kainite) were below the health investigation levels HIL-D (industrial/commercial) and the Ecological Investigation Level (EIL)

(Public Open Space) suggesting they pose a negligible risk to human health and the receiving ecological environment.

The uranium and thorium results were also compared to the National Directory for Radiation Protection Activity Concentration Exemption Levels. The nuclide specific activity concentrations are presented in Table 3 for the U-238, U-234, U-235 and Th-232 series and is summarised in Table J.

**Table J. Nuclide Specific Activity Concentrations Analysis Summary**

Nuclide	% Exceeding Exemption Levels	Activity Concentration Range (Bq/g)	% Exceeding Exemption Levels
<b>U-238 and U-234 Series</b>			
U-238	10	<0.000247- 0.136	0%
Th-234	1000	<0.000247- 0.136	0%
Pa-234m	---	<0.000247- 0.136	0%
U-234	10	<0.000247- 0.136	0%
Th-230	1	<0.000247- 0.136	0%
Ra-226	10	<0.000247- 0.136	0%
Rn-222	10	<0.000247- 0.136	0%
Po-218	---	<0.000247- 0.136	0%
Pb-214	---	<0.000247- 0.136	0%
Bi-214	---	<0.000247- 0.136	0%
Po-214	---	<0.000247- 0.136	0%
Pb-210	10	<0.000247- 0.136	0%
Bi-210	1000	<0.000247- 0.136	0%
Po-210	10	<0.000247- 0.136	0%
<b>U-235 Series</b>			
U-235	10	<0.000011- 0.0062	0%
Th-231	1000	<0.000011- 0.0062	0%
Pa-231	1	<0.000011- 0.0062	0%
Ac-227	0.1	<0.000011- 0.0062	0%
Th-227	10	<0.000011- 0.0062	0%
Ra-223	100	<0.000011- 0.0062	0%
Rn-219	---	<0.000011- 0.0062	0%
Po-215	---	<0.000011- 0.0062	0%
Pb-211	---	<0.000011- 0.0062	0%
Bi-211	---	<0.000011- 0.0062	0%
Tl-207	---	<0.000011- 0.0062	0%
<b>Th -232 series</b>			
Th-232	1	<0.00008-0.0001	0%

Nuclide	% Exceeding Exemption Levels	Activity Concentration Range (Bq/g)	% Exceeding Exemption Levels
Ra-228	10	<0.00008-0.0001	0%
Ac-228	10	<0.00008-0.0001	0%
Th-228	1	<0.00008-0.0001	0%
Ra-224	10	<0.00008-0.0001	0%
Rn-220	10000	<0.00008-0.0001	0%
Po-216	---	<0.00008-0.0001	0%
Pb-212	10	<0.00008-0.0001	0%
Bi-212	10	<0.00008-0.0001	0%
Po-212	---	<0.00005 – 0.0001	0%
Tl-208	---	<0.00003-0.00003	0%

All potash, waste salt (halite and epsomite) and intermediate waste salt (kainite) results were significantly below the National Directory for Radiation Protection Activity Concentration Exemption Levels, suggesting that product and the waste product are not defined as 'radioactive' in a regulatory context and do not require further assessment.

## 7. Impact Assessment

*Impact assessment – describe the potential impacts that may occur to the environmental factor as a result of implementing the proposal.*

### Off-lake soils

The process plant, associated offices and accommodation are proposed to be constructed to the west of the lake. At this stage, it is expected that only minimal disturbance of surface soils will occur during the construction of the plant and associated infrastructure. Off-lake soil will not be modified or processed and no significant disturbance of off-lake soils is expected.

The majority of the uranium concentrations for off-lake samples were below both the parkland human health and terrestrial ecology criteria, indicating they pose a low risk to human health and the receiving ecological environment. No samples exceeded the industrial criteria.

The majority of the thorium concentrations for off-lake samples were below the relevant assessment criteria. Only the insoluble forms of thorium extracted under acid digest exceeded the assessment criteria. A comparison of the thorium concentrations using the three analytical methods indicates that the majority of the thorium is in an insoluble form and, therefore, poses a lower risk to human health and the receiving ecological environment under natural conditions. Based on the proposed Project related activities,

no acidic water is expected to impact the off-lake soils and sediments. The adopted parkland human health assessment criterion for uranium (23 mg/kg) is considered a very conservative assessment level for thorium.

The location of the Project area is very remote and very few people are likely to visit this area or stay for a long period of time. Consequently, the potential exposure of thorium to human health receptors using the land as “parkland” is considered low. The majority of people using the area would be for the proposed SOP Project, for industrial use. Only 0.66% of thorium concentrations for off-lake samples exceeded the industrial assessment criteria using the A/MS method and no samples exceeded the criteria using the other methods indicating that thorium concentrations pose a low risk to human health for industrial use. No thorium concentrations for off-lake samples exceeded the terrestrial ecology protection - parkland, also indicating they pose a low risk to the receiving ecological environment. Based on these results, and the proposed Project related activities, the concentrations of thorium in the off-lake sediments are considered to pose a low risk to human health and the receiving ecological environment.

The uranium and thorium off lake soil results were also converted to radionuclides and compared to the National Directory for Radiation Protection Activity Concentration Exemption Levels. All of the off-lake soil specific activity concentrations for each nuclide in the U-238 and U-234 series were below the National Directory for Radiation Protection Activity Concentration Exemption Levels. This suggests that off-lake soil in their natural state are not defined as ‘radioactive’ in a regulatory context and do not require further assessment.

All the thorium concentrations (converted to radionuclides) in the undigested (analytical methods B/MS and TL8/MS) off-lake samples were below the National Directory for Radiation Protection Activity Concentration Exemption Levels.

The thorium concentrations in the digested (analytical methods A/MS) off-lake samples were converted to specific activity concentrations for each nuclide in the Th-232 series. Based on the conversions, only 4.9 % of the specific activity concentrations exceeded the National Directory for Radiation Protection Activity Concentration Exemption Levels. These samples were not located near the proposed offsite infrastructure. These samples were actually located at least 20 km to the south east of the proposed processing plant, to the south of the lake. The off-lake soils will not be modified or processed, and these concentrations represent natural background concentrations on a regional scale. Given that the majority of samples on a regional scale were below the Exemption Levels and the soil will not be modified or processed, the thorium concentrations are considered to pose a low risk to human health for industrial use.

Based on the U and Th results, and the minimal disturbance expected to off-lake surface soils for the proposed SOP Project, the potential impacts to human health and the receiving ecological environment associated with U and Th are considered low.

#### On-lake soils/sediments

The proposal is to construct a shallow network of infiltration trenches connected to a series of evaporation ponds and associated infrastructure. The retrieved brine will be solar evaporated to facilitate the production of targeted potassium salts.

No reactive wastes are expected to be generated during Project related activities. The Project will involve moving some shallow sediments to construct infrastructure. Only the brine will be extracted and processed. No sediment or soils will be processed.

On the basis of the U and Th results discussed in Section 6.1 and 6.2, and, given that only shallow sediment disturbance and no processing is expected as part of the proposed Project related activities, the potential impacts to human health and the receiving ecological environment associated with U and Th in the on-lake soil/sediment are considered low.

All other metal concentrations in the in the on-lake soil/sediments were below the health investigation levels HIL-D (industrial/commercial) and the Ecological Investigation Level (EIL) (Public Open Space) suggesting they pose a negligible risk to human health and the receiving ecological environment.

The uranium and thorium results were also converted to radionuclides and compared to the National Directory for Radiation Protection Activity Concentration Exemption Levels. All on-lake soil/sediment results were below the National Directory for Radiation Protection Activity Concentration Exemption Levels, suggesting that on-lake sediment/soil are not defined as 'radioactive' in a regulatory context and do not require further assessment.

#### Groundwater/Brine

Based on the groundwater metals results, all reported concentrations of dissolved uranium, thorium and the majority of dissolved metal concentrations were below the Marine Water assessment criteria in all groundwater samples, indicating negligible risk to the nearest ecological receptor (Lake Mackay).

The only exceedances of Marine Water assessment criteria were dissolved lead, mercury, zinc and total iron which exceeded the criteria in several bores surrounding the pilot pond (total iron and dissolved lead and mercury) and the centre of Lake Mackay (total iron and dissolved zinc). Although, the concentrations have slightly exceeded the Marine Water criteria, the concentrations are representative of natural background conditions.

Based on the groundwater metal results, all reported (above LOR) concentrations of dissolved uranium, thorium, iron, arsenic, chromium, cadmium, manganese, nickel, zinc, barium, beryllium, cobalt, molybdenum, strontium and mercury, were below the NPUG assessment criteria in all groundwater samples, indicating negligible risk to human health receptors and potential future beneficial users.

The only exceedances of NPUG were dissolved aluminium, lead, selenium which slightly exceeded the assessment criteria in several bores surrounding the pilot pond. Although the concentrations have slightly exceeded the NPUG criteria, the concentrations are representative of natural background conditions. The groundwater underlying the lake will only be used for the extraction of brine for producing SOP and will not be used for general purposes (drinking, washing or other non-potable uses). Therefore, the slight exceedances of NPUG for dissolved aluminium, lead, selenium are considered a low risk to human health receptors and potential future beneficial users. In addition, the trial waste salts and potash that will be produced from the evaporation and processing of Lake MacKay groundwater/brine have also been analysed for aluminium, lead and selenium. No exceedances of relevant assessment criteria were reported in the trial waste salts and potash metal concentration.

No reported total metal concentrations in any groundwater sample exceeded the NPUG assessment criteria, with the exception of total iron. Total iron exceeded the NPUG assessment criteria in three samples (PPAB1, PPAB2 and MA07). The iron NPUG criterion is only an aesthetic criterion and the concentration of iron in the groundwater represents negligible human health risk to non-potable users of groundwater.

#### Product and Waste Salt Results

All uranium concentrations in the potash products, the waste salts (halite and epsomite) and intermediate waste salt (kainite) were below the relevant assessment criteria (both parkland and industrial for protection of human health and the environment) indicating they pose a low risk to human health and the receiving ecological environment.

All thorium concentrations in the potash products, the waste salts (halite and epsomite) and intermediate waste salt (kainite) were below the relevant assessment criteria (both parkland and industrial for protection of human health and the environment) indicating they pose a low risk to human health and the receiving ecological environment.

All other metal concentrations in the potash products, the waste salts (halite and epsomite) and intermediate waste salt (kainite) were below the health investigation levels HIL-D (industrial/commercial) and the Ecological Investigation Level (EIL) (Public Open Space) suggesting they pose a negligible risk to human health and the receiving ecological environment.

The uranium and thorium results were also compared to the National Directory for Radiation Protection Activity Concentration Exemption Levels. In order to utilise the



provided Exemption Levels as a screening tool, the total uranium and thorium concentrations in the waste salts and potash and were converted to nuclide specific activity concentrations using natural isotopic ratios and secular equilibrium assumptions.

All potash, waste salts (halite and epsomite) and intermediate waste salt (kainite) results were significantly below the Exemption Levels, suggesting that product and the waste product are not defined as 'radioactive' in a regulatory context and do not require further assessment.

## 8. Mitigation Measures

*Mitigation Measures - what measures are proposed to mitigate the potential environmental impacts?*

Based on a review of the analytical data, no further mitigation measures are proposed.

## 9. Residual Impacts

*Residual impacts – review the residual impacts against the EPA objectives.*

Based on the information available to date, it is considered unlikely that significant residual impacts on the environment or human health will result from the disturbance of shallow on-lake sediments and minimal disturbance of off-lake surface sediments and soils.

Based on the information available to date, it is considered unlikely that significant residual impacts on the environment or human health will result from the evaporation and processing of brine extracted from Lake Mackay.

## 10. EPA Objective

*EPA Objectives- from your perspective and based on your review, which option applies to the proposal in relation to this factor?*

Meets the EPA objective.

## 11. Recommendations

It is recommended that as part of the maintenance program, the scale build up in the pipes of the processing plant are monitored and analysed for radionuclides and trace metals after 5 years of operation to provide baseline concentrations. Following the initial baseline assessment, monitoring is proposed to be undertaken on a 10 yearly basis as part of the maintenance program.

Agrimin also propose to undertake soil sampling and analysis of off-lake soils within the proposed off-lake areas of impact to obtain more site specific data. Analysis will include thorium, uranium and major and trace metals.

We trust this meets your requirements at this time. Should you have any questions or require further action please do not hesitate to contact Sarah Breheny or the undersigned on (08) 9388 8360. We look forward to hearing from you.

**For and on behalf of**

**360 Environmental Pty Ltd**

**Julie Palich – Principal Geoscientist**

Attachment 1 Figure 1, Figure 2, Figure 3 and Figure 4

Attachment 2 – Tables 1 to Table 6

Attachment 3 - Assay Data for Intermediate Waste Salt (kainite)

Attachment 4- Laboratory Reports

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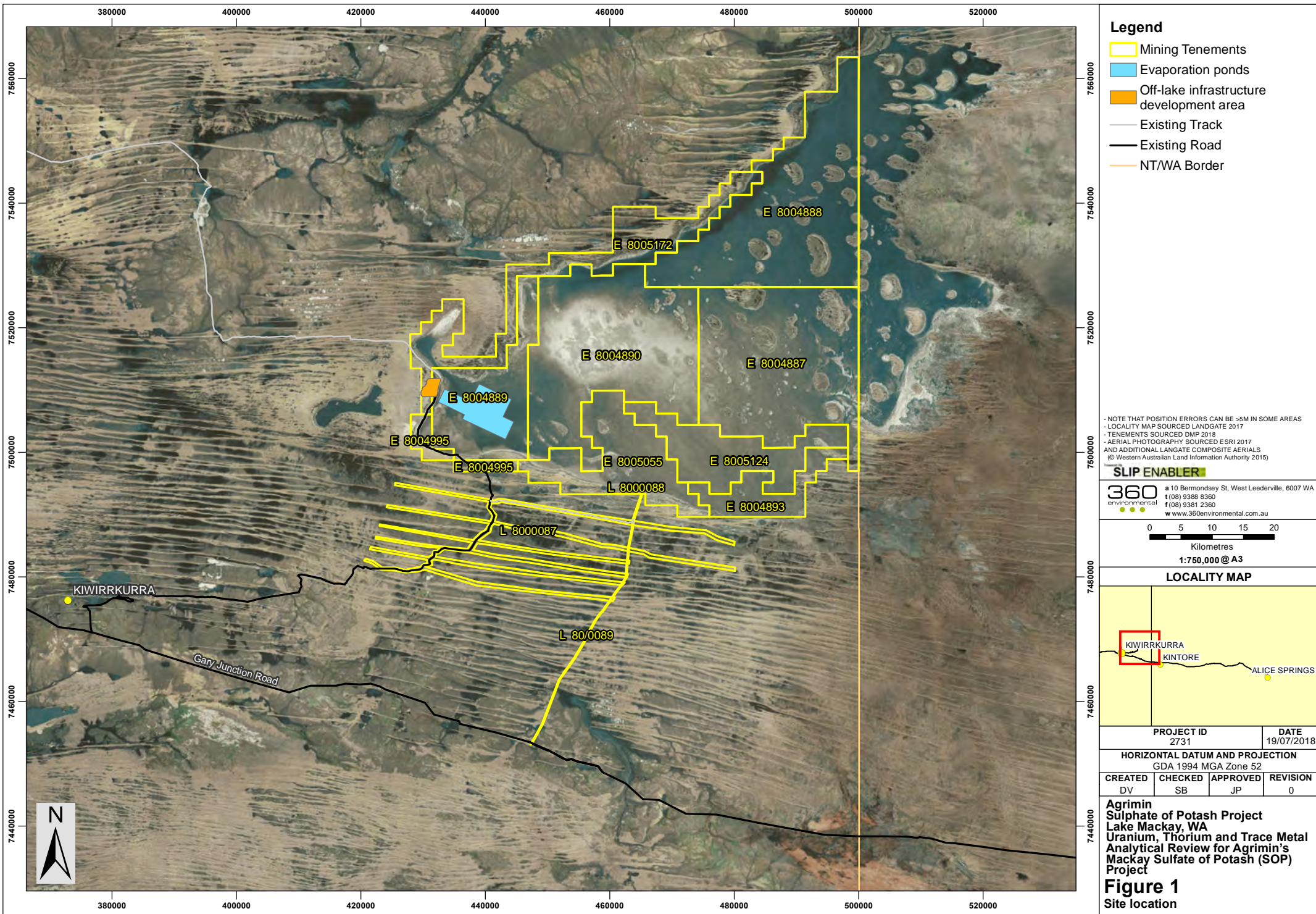
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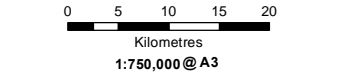


- Legend**
- Mining Tenements
  - Evaporation ponds
  - Off-lake infrastructure development area
  - Existing Track
  - Existing Road
  - NT/WA Border

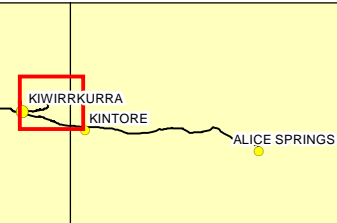
NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS  
LOCALITY MAP SOURCED LANDGATE 2017  
TENEMENTS SOURCED DMP 2018  
AERIAL PHOTOGRAPHY SOURCED ESRI 2017  
AND ADDITIONAL LANGATE COMPOSITE AERIALS  
(© Western Australian Land Information Authority 2015)

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**LOCALITY MAP**

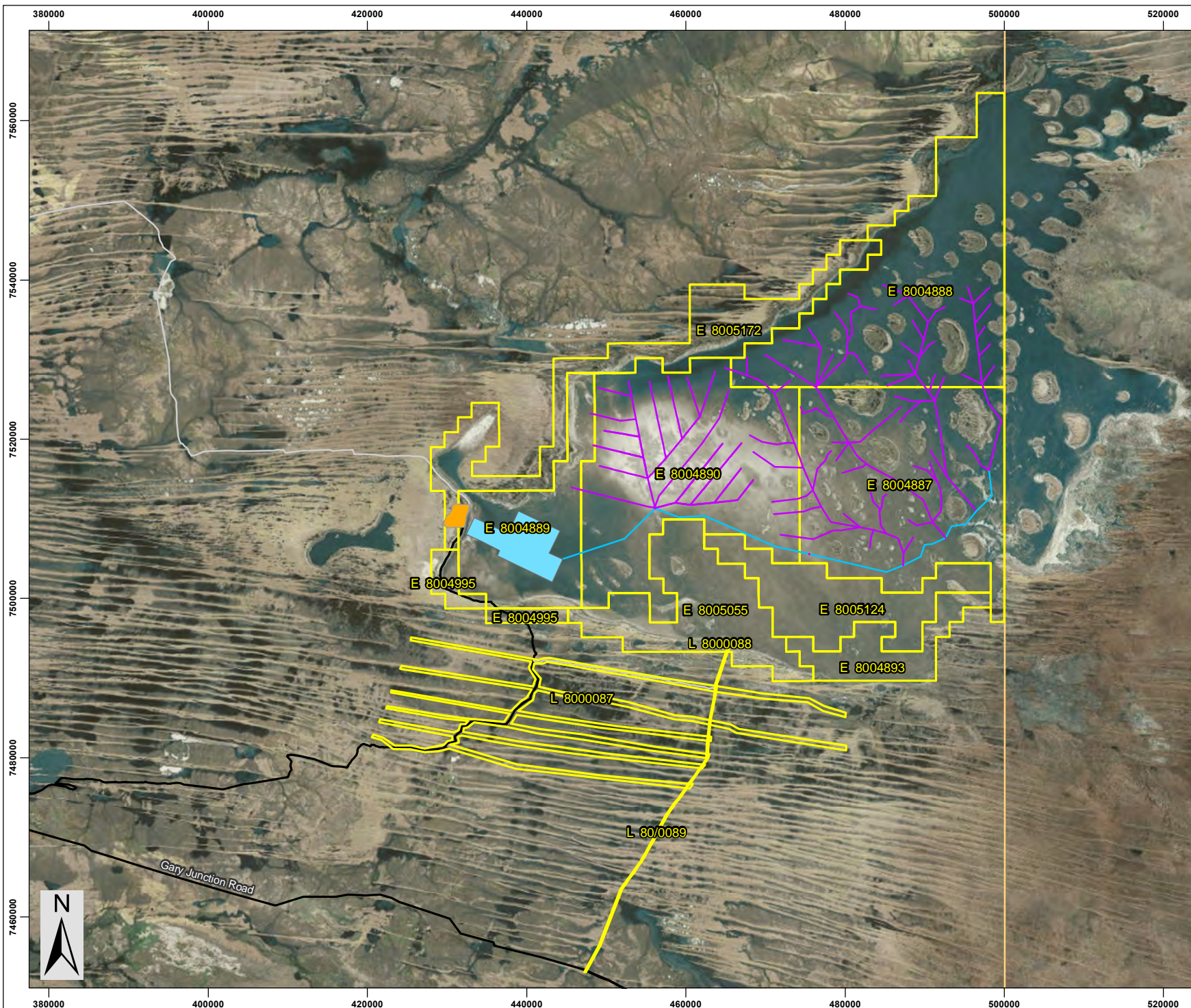


PROJECT ID 2731		DATE 19/07/2018	
HORIZONTAL DATUM AND PROJECTION GDA 1994 MGA Zone 52			
CREATED DV	CHECKED SB	APPROVED JP	REVISION 0

**Agrimin  
Sulphate of Potash Project  
Lake Mackay, WA  
Uranium, Thorium and Trace Metal  
Analytical Review for Agrimin's  
Mackay Sulfate of Potash (SOP)  
Project**

**Figure 1  
Site location**





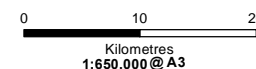
## Legend

- Mining Tenements
- Evaporation ponds
- Off-lake infrastructure development area
- Infiltration Trenches
- Pond Feed Channel
- Existing Track
- Existing Road
- NT/WA Border

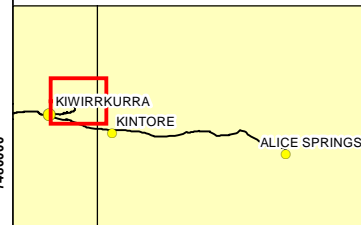
NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS  
 LOCALITY MAP SOURCED LANDGATE 2017  
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## LOCALITY MAP



PROJECT ID 2731	DATE 19/07/2018
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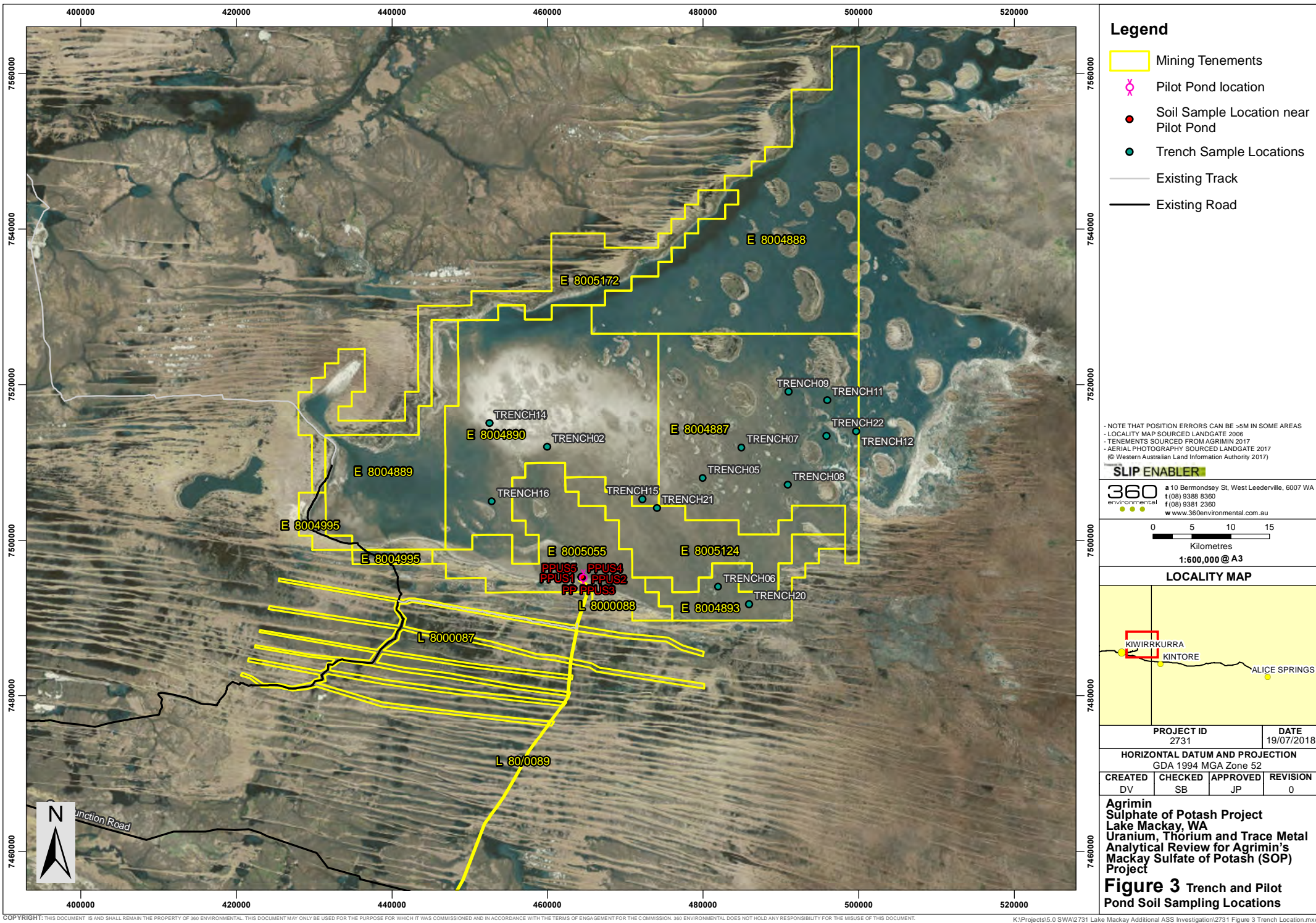
HORIZONTAL DATUM AND PROJECTION  
 GDA 1994 MGA Zone 52

CREATED	CHECKED	APPROVED	REVISION
DV	SB	JP	0

**Agrimin  
 Sulphate of Potash Project  
 Lake Mackay, WA  
 Uranium, Thorium and Trace Metal  
 Analytical Review for Agrimin's  
 Mackay Sulfate of Potash (SOP)  
 Project**

**Figure 2  
 Site Layout**







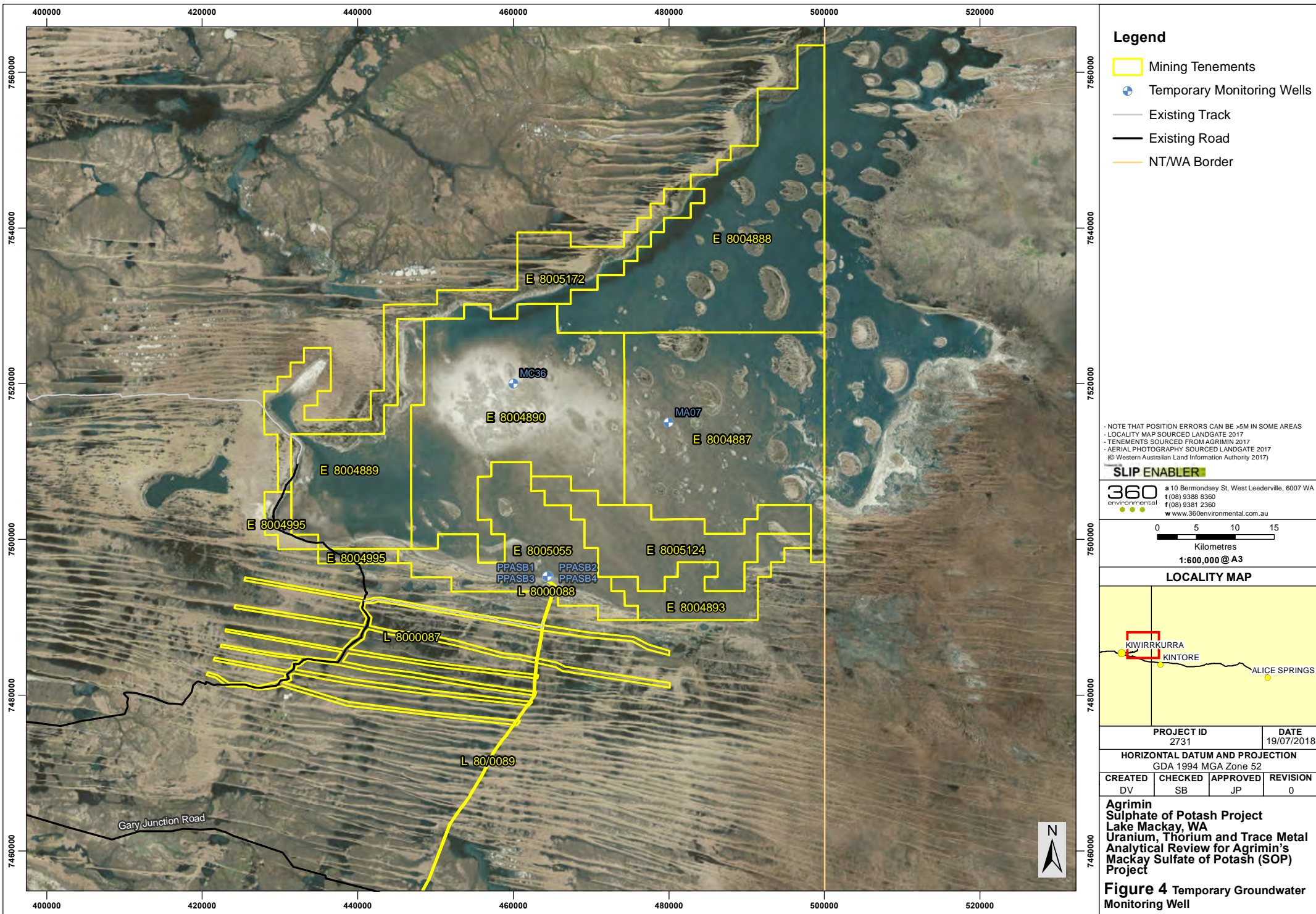



Table 1 :Trace Metal Soil, Sediment, Waste Salts and Potash Results (Agrimin Samples)

Sample ID								T2_0	T6_0.02	T11_1.0	T11_4.5	T12_0.01	T12_0.5	T12_2.5	T14_0.5	T15_0.5
Laboratory ID								P17-Au28569	P17-No25779	P17-No02825	P17-No02823	P17-No02826	P17-No02832	P17-No02829	P17-Au28572	P17-Au28576
Sample Matrix								Black Ooze	Evaporite SAND, grey/black	Evaporite SAND, dark grey/black	Evaporite sandy CLAY, mottled brown	Black Ooze	SAND, brown	Gypsum SAND, cream	SILTY SAND, red/brown	SANDY CLAY red/brown
Laboratory								Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT
Date Sampled								13/08/2017	26/10/2017	27/09/2017	27/09/2017	27/09/2017	27/09/2017	27/09/2017	13/08/2017	15/08/2017
Analyte	LOR	Units	HIL-D	EIL (Urban Residential/Public Open Space)	CCME Nova Scotia (Parkland) for protection of human health	CCME Nova Scotia (Parkland) for terrestrial ecological protection	CCME Nova Scotia (Industrial) for protection of human health and environment									
Metals (NEPM 8) 																
Aluminium	0.01	mg/kg	198000*	---	---	---	---	9600	1100	4300	15000	2700	2600	7500	12000	9300
Arsenic	0.2	mg/kg	3000	100	---	---	---	< 2	< 2	< 2	2.1	< 2	< 2	< 2	2	< 2
Barium	1	mg/kg	140000*	---	---	---	---	---	---	---	---	---	---	---	---	---
Beryllium	0.001	mg/kg	500	---	---	---	---	---	---	---	---	---	---	---	---	---
Cadmium	0.05	mg/kg	900	---	---	---	---	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Total Chromium	5	mg/kg	6700*	190**	---	---	---	18	< 5	7.7	18	< 5	< 5	8.5	20	16
Cobalt	1	mg/kg	4000	---	---	---	---	---	---	---	---	---	---	---	---	---
Copper	5	mg/kg	240000	60**	---	---	---	7.8	< 5	< 5	11	< 5	< 5	8.9	9.6	7.7
Iron	0.01	mg/kg	144000*	---	---	---	---	16000	1500	6400	17000	3500	3300	8900	17000	14000
Lead	1	mg/kg	1500	1100	---	---	---	< 5	< 5	< 5	9.3	6.1	< 5	< 5	< 5	< 5
Manganese	1	mg/kg	60000	---	---	---	---	---	---	---	---	---	---	---	---	---
Mercury	0.01	mg/kg	730	---	---	---	---	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	0.1	mg/kg	1200*	---	---	---	---	---	---	---	---	---	---	---	---	---
Nickel	1	mg/kg	6000	30**	---	---	---	5.7	< 5	< 5	7.8	< 5	< 5	< 5	6.1	5.1
Selenium	1	mg/kg	10000	---	---	---	---	---	---	---	---	---	---	---	---	---
Strontium	0.1	mg/kg	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Thorium	0.02	mg/kg	---	---	23	500	300	---	---	---	---	---	---	---	---	---
Uranium	0.02	mg/kg	---	---	23	500	300	---	<10	<10	<10	<10	<10	<10	---	---
Zinc	1	mg/kg	400000	70**	---	---	---	28	< 5	14	21	10	5.2	10	25	15

**Acronyms:**  
LOR = limits of reporting  
mg/kg = milligrams per kilogram  
"---" = criteria have not been derived for these chemical constituents/compounds.

\*In the absence of Australian values, the soil standards for the protection of Environment and human health from Canada (Nova Scotia) have been adopted [Canadian Council of Ministers of the Environment (CCME)]

\*\*In the absence of site specific soil parameters, the most conservative EILs have been adopted

**Font and Cell :**  
- Coloured cells indicate exceedence of relevant assessment criteria  
- Bolded analytical data indicates detection above LOR



Table 1 :Trace Metal Soil, Sediment, Waste Salts and Potash Results (Agrimin Samples)

Sample ID								T20_1.0	T20_2.5	T21_0	T21_1.0	T21_2.0	T5_0.05	T7_0.05	T8_0.5	T22_0.03
Laboratory ID								P17-No25785	P17-No25788	P17-Au28581	P17-Au28584	P17-Au28586	P17-Se27802	P17-Se27807	P17-Se27813	P17-Se27817
Sample Matrix								CLAY, brown	CLAY, olive	Black Ooze	Clay, brown	SANDY CLAY, red	Black Ooze	CLAY, brown	SANDY CLAY, red/brown	Black Ooze
Laboratory								Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT
Date Sampled								30/10/2017	30/10/2017	15/08/2017	17/08/2017	17/08/2017	14/09/2017	14/09/2017	13/09/2017	13/09/2017
Analyte	LOR	Units	HIL-D	EIL (Urban Residential/Public Open Space)	CCME Nova Scotia (Parkland) for protection of human health	CCME Nova Scotia (Parkland) for terrestrial ecological protection	CCME Nova Scotia (Industrial) for protection of human health and environment									
<b>Metals (NEPM 8)</b> □																
Aluminium	0.01	mg/kg	198000*	---	---	---	---	44000	32000	5600	9500	38000	760	14000	46000	1800
Arsenic	0.2	mg/kg	3000	100	---	---	---	3.9	4.2	< 2	< 2	4	< 2	2.6	5.1	< 2
Barium	1	mg/kg	140000*	---	---	---	---	---	---	---	---	---	---	---	---	---
Beryllium	0.001	mg/kg	500	---	---	---	---	---	---	---	---	---	---	---	---	---
Cadmium	0.05	mg/kg	900	---	---	---	---	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Total Chromium	5	mg/kg	6700*	190**	---	---	---	44	35	12	16	47	< 5	22	54	< 5
Cobalt	1	mg/kg	4000	---	---	---	---	---	---	---	---	---	---	---	---	---
Copper	5	mg/kg	240000	60**	---	---	---	25	35	7.5	11	19	< 5	11	20	< 5
Iron	0.01	mg/kg	144000*	---	---	---	---	52000	43000	7900	12000	39000	1300	18000	47000	2100
Lead	1	mg/kg	1500	1100	---	---	---	22	11	< 5	< 5	12	< 5	5.4	15	< 5
Manganese	1	mg/kg	60000	---	---	---	---	---	---	---	---	---	---	---	---	---
Mercury	0.01	mg/kg	730	---	---	---	---	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	0.1	mg/kg	1200*	---	---	---	---	---	---	---	---	---	---	---	---	---
Nickel	1	mg/kg	6000	30**	---	---	---	19	13	< 5	5.4	17	< 5	6.7	20	< 5
Selenium	1	mg/kg	10000	---	---	---	---	---	---	---	---	---	---	---	---	---
Strontium	0.1	mg/kg	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Thorium	0.02	mg/kg	---	---	23	500	300	---	---	---	---	---	---	---	---	---
Uranium	0.02	mg/kg	---	---	23	500	300	<10	<10	---	---	---	<10	<10	<10	<10
Zinc	1	mg/kg	400000	70**	---	---	---	48	45	17	30	44	< 5	26	54	< 5

**Acronyms:**  
LOR = limits of reporting  
mg/kg = milligrams per kilogram  
"---" = criteria have not been derived for these chemical constituents/compounds.

\*In the absence of Australian values, the soil standards for the protection of Environment and human health from Canada (Nova Scotia) have been adopted [Canadian Council of Ministers of the Environment (CCME)]

\*\*In the absence of site specific soil parameters, the most conservative EILs have been adopted

**Font and Cell :**  
- Coloured cells indicate exceedence of relevant assessment criteria  
- Bolded analytical data indicates detection above LOR

Table 1 :Trace Metal Soil, Sediment, Waste Salts and Potash Results (Agrimin Samples)

Sample ID								T22_2.5	T22_4.0	PP_0.02	PP_0.02B	PP_2.0	PPUS1-0.02	PPUS2-0.02	PPUS3-0.02	PPUS4-0.02
Laboratory ID								P17-Se27820	P17-Se27821	P17-No25775	P17-No25776	P17-No25778	P18-My21721	P18-My21722	P18-My21723	P18-My21724
Sample Matrix								CLAY, red/brown	CLAY, green	evaporatite SAND, grey/black organic material	Black Ooze	CLAY, mottled red/ brown/ tan/olive	Soil	Soil	Soil	Soil
Laboratory								Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins	Eurofins	Eurofins	Eurofins
Date Sampled								13/09/2017	13/09/2017	Not Provided	Not Provided	Not Provided	23/04/2018	23/04/2018	23/04/2018	23/04/2018
Analyte	LOR	Units	HIL-D	EIL (Urban Residential/Public Open Space)	CCME Nova Scotia (Parkland) for protection of human health	CCME Nova Scotia (Parkland) for terrestrial ecological protection	CCME Nova Scotia (Industrial) for protection of human health and environment									
<b>Metals (NEPM 8)</b> ☐																
Aluminium	0.01	mg/kg	198000*	---	---	---	---	38000	43000	7500	6400	38000	11000	2600	3300	6900
Arsenic	0.2	mg/kg	3000	100	---	---	---	4.2	4.6	< 2	< 2	5.7	< 2	< 2	< 2	< 2
Barium	1	mg/kg	140000*	---	---	---	---	---	---	---	---	---	100	< 10	24	15
Beryllium	0.001	mg/kg	500	---	---	---	---	---	---	---	---	---	< 2	< 2	< 2	< 2
Cadmium	0.05	mg/kg	900	---	---	---	---	< 0.4	0.5	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Total Chromium	5	mg/kg	6700*	190**	---	---	---	33	48	15	13	66	18	7.4	9.1	14
Cobalt	1	mg/kg	4000	---	---	---	---	---	---	---	---	---	< 5	< 5	< 5	< 5
Copper	5	mg/kg	240000	60**	---	---	---	23	22	5.9	5.4	24	8.8	< 5	< 5	6.4
Iron	0.01	mg/kg	144000*	---	---	---	---	34000	45000	11000	10000	49000	14000	4000	4100	9300
Lead	1	mg/kg	1500	1100	---	---	---	19	12	< 5	< 5	21	< 5	< 5	< 5	< 5
Manganese	1	mg/kg	60000	---	---	---	---	---	---	---	---	---	---	---	---	---
Mercury	0.01	mg/kg	730	---	---	---	---	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	0.1	mg/kg	1200*	---	---	---	---	---	---	---	---	---	< 5	< 5	< 5	< 5
Nickel	1	mg/kg	6000	30**	---	---	---	23	21	< 5	< 5	19	6.4	< 5	< 5	< 5
Selenium	1	mg/kg	10000	---	---	---	---	---	---	---	---	---	< 2	< 2	< 2	< 2
Strontium	0.1	mg/kg	---	---	---	---	---	---	---	---	---	---	580	84	11	14
Thorium	0.02	mg/kg	---	---	23	500	300	---	---	---	---	---	17	6	7.1	13
Uranium	0.02	mg/kg	---	---	23	500	300	< 10	< 10	< 10	< 10	16	< 10	< 10	< 10	< 10
Zinc	1	mg/kg	400000	70**	---	---	---	54	56	22	19	67	20	6.2	9.1	18

**Acronyms:**  
LOR = limits of reporting  
mg/kg = milligrams per kilogram  
"---" = criteria have not been derived for these chemical constituents/compounds.

\*In the absence of Australian values, the soil standards for the protection of Environment and human health from Canada (Nova Scotia) have been adopted [Canadian Council of Ministers of the Environment (CCME)]

\*\*In the absence of site specific soil parameters, the most conservative EILs have been adopted

**Font and Cell :**  
- Coloured cells indicate exceedence of relevant assessment criteria  
- Bolded analytical data indicates detection above LOR

Table 1 :Trace Metal Soil, Sediment, Waste Salts and Potash Results (Agrimin Samples)

Sample ID								PPUS5-0.02	Potash (Ag-Feed +2.0)	Ag-D(40)-SOP(1.5)	S1 - Waste Salt	S2 - Waste Salt	Potash
Laboratory ID								P18-My21725	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
Sample Matrix								Soil	Intermediate waste salt (Kainite)	Sulfate of Potash(SOP)	Waste salt (halinite /epsomite)	Waste salt (halinite /epsomite)	Potash
Laboratory								Eurofins	SRC Geolaboratories	SRC Geolaboratories	Bureau Veritas	Bureau Veritas	Bureau Veritas
Date Sampled								23/04/2018	11/08/2017	11/08/2017	Not Provided	Not Provided	Not Provided
Analyte	LOR	Units	HIL-D	EIL (Urban Residential/Public Open Space)	CCME Nova Scotia (Parkland) for protection of human health	CCME Nova Scotia (Parkland) for terrestrial ecological protection	CCME Nova Scotia (Industrial) for protection of human health and environment						
Metals (NEPM 8) <input type="checkbox"/>													
Aluminium	0.01	mg/kg	198000*	---	---	---	---	4800	---	---	<0.01	<0.01	<0.01
Arsenic	0.2	mg/kg	3000	100	---	---	---	< 2	---	---	<0.2	<0.2	<0.2
Barium	1	mg/kg	140000*	---	---	---	---	16	11	8	<1	<1	<1
Beryllium	0.001	mg/kg	500	---	---	---	---	< 2	<0.2	<0.2	0.001	<0.001	<0.002
Cadmium	0.05	mg/kg	900	---	---	---	---	< 0.4	<1	<1	<0.05	<0.05	<0.05
Total Chromium	5	mg/kg	6700*	190**	---	---	---	12	5	5	<5	<5	<5
Cobalt	1	mg/kg	4000	---	---	---	---	< 5	1	<1	2	1	1
Copper	5	mg/kg	240000	60**	---	---	---	< 5	<1	4	---	---	---
Iron	0.01	mg/kg	144000*	---	---	---	---	6300	---	---	<0.01	<0.01	<0.01
Lead	1	mg/kg	1500	1100	---	---	---	< 5	1	<1	<1	<1	2
Manganese	1	mg/kg	60000	---	---	---	---	---	---	---	3	2	<1
Mercury	0.01	mg/kg	730	---	---	---	---	< 0.1	---	---	<0.01	<0.01	<0.01
Molybdenum	0.1	mg/kg	1200*	---	---	---	---	< 5	<1	<1	<0.1	<0.1	<0.1
Nickel	1	mg/kg	6000	30**	---	---	---	< 5	2	1	20	1	<1
Selenium	1	mg/kg	10000	---	---	---	---	< 2	---	---	<1	<1	<1
Strontium	0.1	mg/kg	---	---	---	---	---	21	22	24	29	28.4	8.3
Thorium	0.02	mg/kg	---	---	23	500	300	10	<1	<1	<0.02	<0.02	0.02
Uranium	0.02	mg/kg	---	---	23	500	300	< 10	<2	11	<0.02	<0.02	0.12
Zinc	1	mg/kg	400000	70**	---	---	---	15	7	6	<1	<1	<1

**Acronyms:**  
LOR = limits of reporting  
mg/kg = milligrams per kilogram  
"---" = criteria have not been derived for these chemical constituents/compounds.

\*In the absence of Australian values, the soil standards for the protection of Environment and human health from Canada (Nova Scotia) have been adopted [Canadian Council of Ministers of the Environment (CCME)]

\*\*In the absence of site specific soil parameters, the most conservative EILs have been adopted

**Font and Cell :**  
- Coloured cells indicate exceedence of relevant assessment criteria  
- Bolded analytical data indicates detection above LOR

Table 2: Conversion of Uranium and Thorium to Specific Activity

Sample ID			T6_0.02	T11_1.0	T11_4.5	T12_0.01	T12_0.5	T12_2.5	T14_0.5	T15_0.5	T20_1.0	T20_2.5	T21_0	T21_1.0	T21_2.0	T5_0.05	T7_0.05	T8_0.5	T22_0.03	T22_2.5	T22_4.0	PP_0.02			
Laboratory ID			P17-No25779	P17-No2825	P17-No2823	P17-No2826	P17-No2832	P17-No2829	P17-Au28572	P17-Au28576	P17-No25785	P17-No25788	P17-Au28581	P17-Au28584	P17-Au28586	P17-Se27802	P17-Se27807	P17-Se27813	P17-Se27817	P17-Se27820	P17-Se27821	P17-No25775			
Sample Matrix			Evaporite SAND, grey/black	Evaporite SAND, dark grey/black	Evaporite sandy CLAY, mottled brown	Black Ooze	SAND, brown	Gypsum SAND, cream	SILTY SAND, red/brown	SANDY CLAY red/brown	CLAY, brown	CLAY, olive	Black Ooze	Clay, brown	SANDY CLAY, red	Black Ooze	CLAY, brown	SANDY CLAY, red/brown	Black Ooze	CLAY, red/brown	CLAY, green	evaporitic SAND, grey/black organic material			
Laboratory			Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT			
Date Sampled			26/10/2017	27/09/2017	27/09/2017	27/09/2017	27/09/2017	27/09/2017	13/08/2017	15/08/2017	30/10/2017	30/10/2017	15/08/2017	17/08/2017	17/08/2017	14/09/2017	14/09/2017	13/09/2017	13/09/2017	13/09/2017	13/09/2017	Not Provided			
Analyte	Specific Activity Concentration of each nuclide for 1 mg/kg of U or Th (Bq/kg) (assuming secular equilibrium)	Units																							
Metals (NEPM 8)																									
Thorium		mg/kg																							
Uranium		mg/kg	<10	<10	<10	<10	<10	<10			<10	<10				<10	<10	<10	<10	<10	<10	<10			
U-238 and U-234 Series																									
U-238	12.356	Bq/kg	<123	<123	<123	<123	<123	<123			<123	<123				<123	<123	<123	<123	<123	<123	<123			
Th-234	12.356	Bq/kg	<123	<123	<123	<123	<123	<123			<123	<123				<123	<123	<123	<123	<123	<123	<123			
Pa-234m	12.356	Bq/kg	<123	<123	<123	<123	<123	<123			<123	<123				<123	<123	<123	<123	<123	<123	<123			
U-234	12.356	Bq/kg	<123	<123	<123	<123	<123	<123			<123	<123				<123	<123	<123	<123	<123	<123	<123			
Th-230	12.356	Bq/kg	<123	<123	<123	<123	<123	<123			<123	<123				<123	<123	<123	<123	<123	<123	<123			
Ra-226	12.356	Bq/kg	<123	<123	<123	<123	<123	<123			<123	<123				<123	<123	<123	<123	<123	<123	<123			
Rn-222	12.356	Bq/kg	<123	<123	<123	<123	<123	<123			<123	<123				<123	<123	<123	<123	<123	<123	<123			
Po-218	12.356	Bq/kg	<123	<123	<123	<123	<123	<123			<123	<123				<123	<123	<123	<123	<123	<123	<123			
Pb-214	12.356	Bq/kg	<123	<123	<123	<123	<123	<123			<123	<123				<123	<123	<123	<123	<123	<123	<123			
Bi-214	12.356	Bq/kg	<123	<123	<123	<123	<123	<123			<123	<123				<123	<123	<123	<123	<123	<123	<123			
Po-214	12.356	Bq/kg	<123	<123	<123	<123	<123	<123			<123	<123				<123	<123	<123	<123	<123	<123	<123			
Pb-210	12.356	Bq/kg	<123	<123	<123	<123	<123	<123			<123	<123				<123	<123	<123	<123	<123	<123	<123			
Bi-210	12.356	Bq/kg	<123	<123	<123	<123	<123	<123			<123	<123				<123	<123	<123	<123	<123	<123	<123			
Po-210	12.356	Bq/kg	<123	<123	<123	<123	<123	<123			<123	<123				<123	<123	<123	<123	<123	<123	<123			
U-235 Series																									
U-235	0.568	Bq/kg	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			<5.68	<5.68				<5.68	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			
Th-231	0.568	Bq/kg	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			<5.68	<5.68				<5.68	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			
Pa-231	0.568	Bq/kg	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			<5.68	<5.68				<5.68	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			
Ac-227	0.568	Bq/kg	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			<5.68	<5.68				<5.68	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			
Th-227	0.568	Bq/kg	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			<5.68	<5.68				<5.68	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			
Ra-223	0.568	Bq/kg	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			<5.68	<5.68				<5.68	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			
Rn-219	0.568	Bq/kg	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			<5.68	<5.68				<5.68	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			
Po-215	0.568	Bq/kg	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			<5.68	<5.68				<5.68	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			
Pb-211	0.568	Bq/kg	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			<5.68	<5.68				<5.68	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			
Bi-211	0.568	Bq/kg	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			<5.68	<5.68				<5.68	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			
Tl-207	0.568	Bq/kg	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			<5.68	<5.68				<5.68	<5.68	<5.68	<5.68	<5.68	<5.68	<5.68			
Th-232 series																									
Th-232	4.07	Bq/kg																							
Ra-228	4.07	Bq/kg																							
Ac-228	4.07	Bq/kg																							
Th-228	4.07	Bq/kg																							
Ra-224	4.07	Bq/kg																							
Rn-220	4.07	Bq/kg																							
Po-216	4.07	Bq/kg																							
Pb-212	4.07	Bq/kg																							
Bi-212	4.07	Bq/kg																							
Po-212	2.6	Bq/kg																							
Tl-208	1.47	Bq/kg																							

**Acronyms:**

LOR = limits of reporting

mg/kg = milligrams per kilogram

"..." = criteria have not been derived for these chemical constituents/compounds.

Bq/g = becquerels / gram

**Font and Cell :**

- Coloured cells indicate exceedance of National Directory for Radiation Protection Activity Concentration Exemption Levels (ARPANSA, 2017)

- Bolded analytical data indicates detection above LOR

- Total U and Th concentrations have been converted to nuclide specific activity concentrations using natural isotopic ratios and secular equilibrium assumptions.



Table 2: Conversion of Uranium and Thorium to Specific Activity

Sample ID	PP_0.02B	PP_2.0	S1 - Waste Salt	S2 - Waste Salt	Potash	PPUS1-0.02	PPUS2-0.02	PPUS3-0.02	PPUS4-0.02	PPUS5-0.02	Potash (Ag-Feed +2.0)	Ag-D(40)-SOP(1.5)
Laboratory ID	P17-No25776	P17-No25778	Not Provided	Not Provided	Not Provided	P18-MY21721	P18-MY21722	P18-MY21723	P18-MY21724	P18-MY21725	Not Provided	Not Provided
Sample Matrix	Black Oxide	CLAY, mottled red/ brown/ tan/olive	Waste salt (halinite / epsomite)	Waste salt (halinite / epsomite)	Potash	Soil	Soil	Soil	Soil	Soil	Intermediate waste salt (Kainite)	Sulfate of Potash(SOP)
Laboratory	Eurofins MGT	Eurofins MGT	Bureau Veritas	Bureau Veritas	Bureau Veritas	Eurofins	Eurofins	Eurofins	Eurofins	Eurofins	SRC Geolaboratories	SRC Geolaboratories
Date Sampled	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018	11/08/2017	11/08/2017
Analyte	Specific Activity Concentration of each nuclide for 1 mg/kg of U or Th (Bq/kg) (assuming secular equilibrium)	Units										
<b>Metals (NEM 8)</b>												
Thorium	mg/kg	---	---	<0.02	<0.02	0.02	17	6	7.1	13	10	---
Uranium	mg/kg	<10	16	<0.02	<0.02	0.12	<10	<10	<10	<10	<10	---
<b>U-238 and U-234 Series</b>												
U-238	12.356	Bq/kg	<123	197.7	<0.247	<0.247	1.483	<123	<123	<123	<123	<24.7
Th-234	12.356	Bq/kg	<123	197.7	<0.247	<0.247	1.483	<123	<123	<123	<123	<24.7
Pa-234m	12.356	Bq/kg	<123	197.7	<0.247	<0.247	1.483	<123	<123	<123	<123	<24.7
U-234	12.356	Bq/kg	<123	197.7	<0.247	<0.247	1.483	<123	<123	<123	<123	<24.7
Th-230	12.356	Bq/kg	<123	197.7	<0.247	<0.247	1.483	<123	<123	<123	<123	<24.7
Ra-226	12.356	Bq/kg	<123	197.7	<0.247	<0.247	1.483	<123	<123	<123	<123	<24.7
Rn-222	12.356	Bq/kg	<123	197.7	<0.247	<0.247	1.483	<123	<123	<123	<123	<24.7
Po-218	12.356	Bq/kg	<123	197.7	<0.247	<0.247	1.483	<123	<123	<123	<123	<24.7
Pb-214	12.356	Bq/kg	<123	197.7	<0.247	<0.247	1.483	<123	<123	<123	<123	<24.7
Bi-214	12.356	Bq/kg	<123	197.7	<0.247	<0.247	1.483	<123	<123	<123	<123	<24.7
Po-214	12.356	Bq/kg	<123	197.7	<0.247	<0.247	1.483	<123	<123	<123	<123	<24.7
Pb-210	12.356	Bq/kg	<123	197.7	<0.247	<0.247	1.483	<123	<123	<123	<123	<24.7
Bi-210	12.356	Bq/kg	<123	197.7	<0.247	<0.247	1.483	<123	<123	<123	<123	<24.7
Po-210	12.356	Bq/kg	<123	197.7	<0.247	<0.247	1.483	<123	<123	<123	<123	<24.7
<b>U-235 Series</b>												
U-235	0.568	Bq/kg	<5.68	9.1	<0.011	<0.011	0.068	<5.68	<5.68	<5.68	<5.68	<1.13
Th-231	0.568	Bq/kg	<5.68	9.1	<0.011	<0.011	0.068	<5.68	<5.68	<5.68	<5.68	<1.13
Pa-231	0.568	Bq/kg	<5.68	9.1	<0.011	<0.011	0.068	<5.68	<5.68	<5.68	<5.68	<1.13
Ac-227	0.568	Bq/kg	<5.68	9.1	<0.011	<0.011	0.068	<5.68	<5.68	<5.68	<5.68	<1.13
Th-227	0.568	Bq/kg	<5.68	9.1	<0.011	<0.011	0.068	<5.68	<5.68	<5.68	<5.68	<1.13
Ra-223	0.568	Bq/kg	<5.68	9.1	<0.011	<0.011	0.068	<5.68	<5.68	<5.68	<5.68	<1.13
Rn-219	0.568	Bq/kg	<5.68	9.1	<0.011	<0.011	0.068	<5.68	<5.68	<5.68	<5.68	<1.13
Po-215	0.568	Bq/kg	<5.68	9.1	<0.011	<0.011	0.068	<5.68	<5.68	<5.68	<5.68	<1.13
Pb-211	0.568	Bq/kg	<5.68	9.1	<0.011	<0.011	0.068	<5.68	<5.68	<5.68	<5.68	<1.13
Bi-211	0.568	Bq/kg	<5.68	9.1	<0.011	<0.011	0.068	<5.68	<5.68	<5.68	<5.68	<1.13
Tl-207	0.568	Bq/kg	<5.68	9.1	<0.011	<0.011	0.068	<5.68	<5.68	<5.68	<5.68	<1.13
<b>Th-232 series</b>												
Th-232	4.07	Bq/kg	---	---	<0.06	<0.06	0.081	69.2	24.4	28.9	52.91	40.7
Ra-228	4.07	Bq/kg	---	---	<0.06	<0.06	0.081	69.2	24.4	28.9	52.91	40.7
Ac-228	4.07	Bq/kg	---	---	<0.06	<0.06	0.081	69.2	24.4	28.9	52.91	40.7
Th-228	4.07	Bq/kg	---	---	<0.06	<0.06	0.081	69.2	24.4	28.9	52.91	40.7
Ra-224	4.07	Bq/kg	---	---	<0.06	<0.06	0.081	69.2	24.4	28.9	52.91	40.7
Rn-220	4.07	Bq/kg	---	---	<0.06	<0.06	0.081	69.2	24.4	28.9	52.91	40.7
Po-216	4.07	Bq/kg	---	---	<0.06	<0.06	0.081	69.2	24.4	28.9	52.91	40.7
Pb-212	4.07	Bq/kg	---	---	<0.06	<0.06	0.081	69.2	24.4	28.9	52.91	40.7
Bi-212	4.07	Bq/kg	---	---	<0.06	<0.06	0.081	69.2	24.4	28.9	52.91	40.7
Po-212	2.4	Bq/kg	---	---	<0.06	<0.06	0.052	44.2	15.6	18.5	33.9	26.0
Tl-208	1.47	Bq/kg	---	---	<0.03	<0.03	0.029	25.0	8.8	10.4	19.1	14.7

**Acronyms:**

LOR = limits of reporting

mg/kg = milligrams per kilogram

"---" = criteria have not been derived for these chemical constituents/compounds.

Bq/g = becquerels / gram

**Font and Cell :**

- Coloured cells indicate exceedance of National Directory for Radiation Protection Activity Concentration Exemption Levels (ARPANSA, 2017)

- Bolded analytical data indicates detection above LOR

- Total U and Th concentrations have been converted to nuclide specific activity concentrations using natural isotopic ratios and secular equilibrium assumptions.

Table 3: Comparison of Specific Activity Concentration to Uranium and Thorium Exemption Levels

Sample ID			T6_0.02	T11_1.0	T11_4.5	T12_0.01	T12_0.5	T12_2.5	T14_0.5	T15_0.5	T20_1.0	T20_2.5	T21_0
Laboratory ID			P17-No25779	P17-No02825	P17-No02823	P17-No02826	P17-No02832	P17-No02829	P17-Au28572	P17-Au28576	P17-No25785	P17-No25788	P17-Au28581
Sample Matrix			Evaporite SAND, grey/black	Evaporite SAND, dark grey/black	Evaporite sandy CLAY, mottled brown	Black Ooze	SAND, brown	Gypsum SAND, cream	SILTY SAND, red/brown	SANDY CLAY red/brown	CLAY, brown	CLAY, olive	Black Ooze
Laboratory			Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT
Date Sampled			26/10/2017	27/09/2017	27/09/2017	27/09/2017	27/09/2017	27/09/2017	13/08/2017	15/08/2017	30/10/2017	30/10/2017	15/08/2017
Analyte	National Directory for Radiation Protection Activity Concentration Exemption Levels	Units											
Metals <input type="checkbox"/>													
Thorium		mg/kg	---	---	---	---	---	---	---	---	---	---	---
Uranium		mg/kg	<10	<10	<10	<10	<10	<10	---	---	<10	<10	---
U-238 and U-234 Series													
U-238	10	Bq/g	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	---	---	<0.123	<0.123	---
Th-234	1000	Bq/g	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	---	---	<0.123	<0.123	---
Pa-234m	---	Bq/g	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	---	---	<0.123	<0.123	---
U-234	10	Bq/g	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	---	---	<0.123	<0.123	---
Th-230	1	Bq/g	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	---	---	<0.123	<0.123	---
Ra-226	10	Bq/g	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	---	---	<0.123	<0.123	---
Rn-222	10	Bq/g	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	---	---	<0.123	<0.123	---
Po-218	---	Bq/g	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	---	---	<0.123	<0.123	---
Pb-214	---	Bq/g	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	---	---	<0.123	<0.123	---
Bi-214	---	Bq/g	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	---	---	<0.123	<0.123	---
Po-214	---	Bq/g	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	---	---	<0.123	<0.123	---
Pb-210	10	Bq/g	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	---	---	<0.123	<0.123	---
Bi-210	1000	Bq/g	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	---	---	<0.123	<0.123	---
Po-210	10	Bq/g	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	---	---	<0.123	<0.123	---
U-235 Series													
U-235	10	Bq/g	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	---	---	<0.0057	<0.0057	---
Th-231	1000	Bq/g	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	---	---	<0.0057	<0.0057	---
Pa-231	1	Bq/g	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	---	---	<0.0057	<0.0057	---
Ac-227	0.1	Bq/g	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	---	---	<0.0057	<0.0057	---
Th-227	10	Bq/g	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	---	---	<0.0057	<0.0057	---
Ra-223	100	Bq/g	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	---	---	<0.0057	<0.0057	---
Rn-219	---	Bq/g	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	---	---	<0.0057	<0.0057	---
Po-215	---	Bq/g	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	---	---	<0.0057	<0.0057	---
Pb-211	---	Bq/g	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	---	---	<0.0057	<0.0057	---
Bi-211	---	Bq/g	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	---	---	<0.0057	<0.0057	---
Tl-207	---	Bq/g	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	---	---	<0.0057	<0.0057	---
Th-232 series													
Th-232	1	Bq/g	---	---	---	---	---	---	---	---	---	---	---
Ra-228	10	Bq/g	---	---	---	---	---	---	---	---	---	---	---
Ac-228	10	Bq/g	---	---	---	---	---	---	---	---	---	---	---
Th-228	1	Bq/g	---	---	---	---	---	---	---	---	---	---	---
Ra-224	10	Bq/g	---	---	---	---	---	---	---	---	---	---	---
Rn-220	10000	Bq/g	---	---	---	---	---	---	---	---	---	---	---
Po-216	---	Bq/g	---	---	---	---	---	---	---	---	---	---	---
Pb-212	10	Bq/g	---	---	---	---	---	---	---	---	---	---	---
Bi-212	10	Bq/g	---	---	---	---	---	---	---	---	---	---	---
Po-212	---	Bq/g	---	---	---	---	---	---	---	---	---	---	---
Tl-208	---	Bq/g	---	---	---	---	---	---	---	---	---	---	---

**Acronyms:**

LOR = limits of reporting

mg/kg = milligrams per kilogram

"---" = criteria have not been derived for these chemical constituents/compounds.

Bq/g = becquerels / gram

**Font and Cell :**

- Coloured cells indicate exceedence of National Directory for Radiation Protection Activity Concentration Exemption Levels (ARPANSA, 2017)

- Bolded analytical data indicates detection above LOR

- Total U and Th concentrations have been converted to nuclide specific activity concentrations using natural isotopic ratios and secular equilibrium assumptions.

Table 3: Comparison of Specific Activity Concentration to Uranium and Thorium Exemption Levels

Sample ID		T21_1.0	T21_2.0	T5_0.05	T7_0.05	T8_0.5	T22_0.03	T22_2.5	T22_4.0	PP_0.02	PP_0.02B
Laboratory ID		P17-Au28584	P17-Au28586	P17-Se27802	P17-Se27807	P17-Se27813	P17-Se27817	P17-Se27820	P17-Se27821	P17-No25775	P17-No25776
Sample Matrix		Clay, brown	SANDY CLAY, red	Black Ooze	CLAY, brown	SANDY CLAY, red/brown	Black Ooze	CLAY, red/brown	CLAY, green	evaporable SAND, grey/black organic material	Black Ooze
Laboratory		Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT
Date Sampled		17/08/2017	17/08/2017	14/09/2017	14/09/2017	13/09/2017	13/09/2017	13/09/2017	13/09/2017	Not Provided	Not Provided
Analyte	National Directory for Radiation Protection Activity Concentration Exemption Levels	Units									
Metals											
Thorium		mg/kg	---	---	---	---	---	---	---	---	---
Uranium		mg/kg	---	---	<10	<10	<10	<10	<10	<10	<10
U-238 and U-234 Series											
U-238	10	Bq/g	---	---	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123
Th-234	1000	Bq/g	---	---	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123
Pa-234m	---	Bq/g	---	---	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123
U-234	10	Bq/g	---	---	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123
Th-230	1	Bq/g	---	---	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123
Ra-226	10	Bq/g	---	---	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123
Rn-222	10	Bq/g	---	---	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123
Po-218	---	Bq/g	---	---	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123
Pb-214	---	Bq/g	---	---	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123
Bi-214	---	Bq/g	---	---	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123
Po-214	---	Bq/g	---	---	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123
Pb-210	10	Bq/g	---	---	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123
Bi-210	1000	Bq/g	---	---	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123
Po-210	10	Bq/g	---	---	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123	<0.123
U-235 Series											
U-235	10	Bq/g	---	---	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057
Th-231	1000	Bq/g	---	---	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057
Pa-231	1	Bq/g	---	---	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057
Ac-227	0.1	Bq/g	---	---	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057
Th-227	10	Bq/g	---	---	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057
Ra-223	100	Bq/g	---	---	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057
Rn-219	---	Bq/g	---	---	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057
Po-215	---	Bq/g	---	---	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057
Pb-211	---	Bq/g	---	---	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057
Bi-211	---	Bq/g	---	---	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057
Tl-207	---	Bq/g	---	---	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057
Th-232 series											
Th-232	1	Bq/g	---	---	---	---	---	---	---	---	---
Ra-228	10	Bq/g	---	---	---	---	---	---	---	---	---
Ac-228	10	Bq/g	---	---	---	---	---	---	---	---	---
Th-228	1	Bq/g	---	---	---	---	---	---	---	---	---
Ra-224	10	Bq/g	---	---	---	---	---	---	---	---	---
Rn-220	10000	Bq/g	---	---	---	---	---	---	---	---	---
Po-216	---	Bq/g	---	---	---	---	---	---	---	---	---
Pb-212	10	Bq/g	---	---	---	---	---	---	---	---	---
Bi-212	10	Bq/g	---	---	---	---	---	---	---	---	---
Po-212	---	Bq/g	---	---	---	---	---	---	---	---	---
Tl-208	---	Bq/g	---	---	---	---	---	---	---	---	---

**Acronyms:**

LOR = limits of reporting  
 mg/kg = milligrams per kilogram  
 "—" = criteria have not been derived  
 Bq/g = becquerels / gram

**Font and Cell :**

- Coloured cells indicate exceedence
- Bolded analytical data indicates det
- Total U and Th concentrations have

Table 3: Comparison of Specific Activity Concentration to Uranium and Thorium Exemption Levels

Sample ID	PP_2.0		S1 - Waste Salt	S2 - Waste Salt	Potash	PPUS1-0.02	PPUS2-0.02	PPUS3-0.02	PPUS4-0.02	PPUS5-0.02	Potash (Ag-Feed +2.0)	Ag D(40)-SOP(1.5)
Laboratory ID	P17-No25778		Not Provided	Not Provided	Not Provided	P18-My21721	P18-My21722	P18-My21723	P18-My21724	P18-My21725	Not Provided	Not Provided
Sample Matrix	CLAY, mottled red/ brown/ tan/olive		Waste salt (halinite /epsomite)	Waste salt (halinite /epsomite)	Potash	Soil	Soil	Soil	Soil	Soil	Intermediate waste salt (Kainite)	SOP
Laboratory	Eurofins MGT		Bureau Veritas	Bureau Veritas	Bureau Veritas	Eurofins	Eurofins	Eurofins	Eurofins	Eurofins	SRC Geolaboratories	SRC Geolaboratories
Date Sampled	Not Provided		Not Provided	Not Provided	Not Provided	23/04/2018	23/04/2018	23/04/2018	23/04/2018	23/04/2018	11/08/2017	11/08/2017
Analyte	National Directory for Radiation Protection Activity Concentration Exemption Levels	Units										
Metals												
Thorium		mg/kg		<0.02	<0.02	0.02	17	6	7.1	13	10	<1
Uranium		mg/kg	16	<0.02	<0.02	0.12	<10	<10	<10	<10	<10	<2
U-238 and U-234 Series												
U-238	10	Bq/g	0.198	<0.000247	<0.000247	0.0015	<0.123	<0.123	<0.123	<0.123	<0.123	<0.025
Th-234	1000	Bq/g	0.198	<0.000247	<0.000247	0.0015	<0.123	<0.123	<0.123	<0.123	<0.123	<0.025
Pa-234m		Bq/g	0.198	<0.000247	<0.000247	0.0015	<0.123	<0.123	<0.123	<0.123	<0.123	<0.025
U-234	10	Bq/g	0.198	<0.000247	<0.000247	0.0015	<0.123	<0.123	<0.123	<0.123	<0.123	<0.025
Th-230	1	Bq/g	0.198	<0.000247	<0.000247	0.0015	<0.123	<0.123	<0.123	<0.123	<0.123	<0.025
Ra-226	10	Bq/g	0.198	<0.000247	<0.000247	0.0015	<0.123	<0.123	<0.123	<0.123	<0.123	<0.025
Rn-222	10	Bq/g	0.198	<0.000247	<0.000247	0.0015	<0.123	<0.123	<0.123	<0.123	<0.123	<0.025
Po-218		Bq/g	0.198	<0.000247	<0.000247	0.0015	<0.123	<0.123	<0.123	<0.123	<0.123	<0.025
Pb-214		Bq/g	0.198	<0.000247	<0.000247	0.0015	<0.123	<0.123	<0.123	<0.123	<0.123	<0.025
Bi-214		Bq/g	0.198	<0.000247	<0.000247	0.0015	<0.123	<0.123	<0.123	<0.123	<0.123	<0.025
Po-214		Bq/g	0.198	<0.000247	<0.000247	0.0015	<0.123	<0.123	<0.123	<0.123	<0.123	<0.025
Pb-210	10	Bq/g	0.198	<0.000247	<0.000247	0.0015	<0.123	<0.123	<0.123	<0.123	<0.123	<0.025
Bi-210	1000	Bq/g	0.198	<0.000247	<0.000247	0.0015	<0.123	<0.123	<0.123	<0.123	<0.123	<0.025
Po-210	10	Bq/g	0.198	<0.000247	<0.000247	0.0015	<0.123	<0.123	<0.123	<0.123	<0.123	<0.025
U-235 Series												
U-235	10	Bq/g	0.0091	<0.000011	<0.000011	0.0001	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.00113
Th-231	1000	Bq/g	0.0091	<0.000011	<0.000011	0.0001	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.00113
Pa-231	1	Bq/g	0.0091	<0.000011	<0.000011	0.0001	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.00113
Ac-227	0.1	Bq/g	0.0091	<0.000011	<0.000011	0.0001	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.00113
Th-227	10	Bq/g	0.0091	<0.000011	<0.000011	0.0001	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.00113
Ra-223	100	Bq/g	0.0091	<0.000011	<0.000011	0.0001	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.00113
Rn-219		Bq/g	0.0091	<0.000011	<0.000011	0.0001	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.00113
Po-215		Bq/g	0.0091	<0.000011	<0.000011	0.0001	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.00113
Pb-211		Bq/g	0.0091	<0.000011	<0.000011	0.0001	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.00113
Bi-211		Bq/g	0.0091	<0.000011	<0.000011	0.0001	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.00113
Tl-207		Bq/g	0.0091	<0.000011	<0.000011	0.0001	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.00113
Th-232 series												
Th-232	1	Bq/g		<0.00008	<0.00008	0.0001	0.069	0.024	0.029	0.053	0.041	<0.0041
Ra-228	10	Bq/g		<0.00008	<0.00008	0.0001	0.069	0.024	0.029	0.053	0.041	<0.0041
Ac-228	10	Bq/g		<0.00008	<0.00008	0.0001	0.069	0.024	0.029	0.053	0.041	<0.0041
Th-228	1	Bq/g		<0.00008	<0.00008	0.0001	0.069	0.024	0.029	0.053	0.041	<0.0041
Ra-224	10	Bq/g		<0.00008	<0.00008	0.0001	0.069	0.024	0.029	0.053	0.041	<0.0041
Rn-220	10000	Bq/g		<0.00008	<0.00008	0.0001	0.069	0.024	0.029	0.053	0.041	<0.0041
Po-216		Bq/g		<0.00008	<0.00008	0.0001	0.069	0.024	0.029	0.053	0.041	<0.0041
Pb-212	10	Bq/g		<0.00008	<0.00008	0.0001	0.069	0.024	0.029	0.053	0.041	<0.0041
Bi-212	10	Bq/g		<0.00008	<0.00008	0.0001	0.069	0.024	0.029	0.053	0.041	<0.0041
Po-212		Bq/g		<0.00008	<0.00008	0.0001	0.044	0.016	0.018	0.034	0.026	<0.0026
Tl-208		Bq/g		<0.00003	<0.00003	0.0000	0.025	0.009	0.010	0.019	0.015	<0.00147

**Acronyms:**

LOR = limits of reporting  
 mg/kg = milligrams per kilogram  
 "----" = criteria have not been derived  
 Bq/g = becquerels / gram

**Font and Cell :**

- Coloured cells indicate exceedence
- Bolded analytical data indicates det
- Total U and Th concentrations have



Table 4 -  
Groundwater Results

Sample ID					PPASB1 26/4 Small	PPASB2 26/4 Small	PPASB3 26/4 Small	PPASB4 26/4 Small	MC36-11	MA07
Sample Matrix					Water	Water	Water	Water	Water	Water
Laboratory					Bureau Veritas Eurofins	Bureau Veritas Eurofins	Bureau Veritas Eurofins	Bureau Veritas Eurofins	Bureau Veritas Eurofins	Bureau Veritas Eurofins
Date Sampled					26/04/2018	26/04/2018	26/04/2018	26/04/2018	Not provided	Not provided
Analyte	LOR	Units	ANZECC & ARMCANZ (2000) Marine Water	DoH (2014) NPUG						
<i>Dissolved Metals (Bureau Veritas)</i>										
Aluminium	1	mg/L	---	0.2	<1	1	1	1	<1	<1
Arsenic		mg/L	13 (as As(v))	0.1	0.07	0.06	0.05	0.1	0.02	0.01
Barium		mg/L	---	20	0.03	0.02	0.02	0.02	0.02	0.02
Beryllium	1	mg/L	---	0.6	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	0.01	mg/L	0.0007	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	0.5	mg/L	0.0044	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	0.01	mg/L	1	---	<0.01	<0.01	<0.01	<0.01	<0.5	<0.5
Iron	0.5	mg/L	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Lead	50	mg/L	0.0044	0.1	0.25	0.15	<0.05	0.1	<0.05	<0.05
Manganese	0.5	mg/L	---	5	2.5	1.5	<0.5	<0.5	<0.5	<0.5
Mercury	0.001	mg/L	0.0001	0.01	0.007	0.003	<0.001	<0.001	---	---
Molybdenum	0.01	mg/L	---	---	0.06	0.03	<0.01	0.02	<0.01	<0.01
Nickel	0.5	mg/L	0.007	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Selenium	0.1	mg/L	---	0.1	0.2	<0.1	<0.1	0.2	<0.1	<0.1
Strontium	---	mg/L	---	---	6.04	9.08	9.19	9.29	---	---
Thorium	1	mg/L	0.1*	0.17	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
Uranium	---	mg/L	0.1*	0.17	0.006	0.003	0.004	0.002	0.001	0.002
Zinc	0.5	mg/L	0.015	3	<0.5	<0.5	<0.5	<0.5	0.5	<0.5
<i>Total Metals (Eurofins)</i>										
Aluminium	1	mg/L	---	---	190	< 1	< 1	< 1	< 0.5	0.85
Barium	0.1	mg/L	---	---	0.75	< 0.1	< 0.1	< 0.1	< 0.05	< 0.05
Beryllium	0.02	mg/L	---	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.01
Cadmium	0.002	mg/L	---	---	---	---	---	---	0.0030	< 0.002
Chromium	0.01	mg/L	---	---	---	---	---	---	< 0.01	< 0.01
Cobalt	0.02	mg/L	---	---	0.074	< 0.02	< 0.02	< 0.02	< 0.01	< 0.01
Iron	1	mg/L	1	0.3	290	1.1	<1	<1	<0.5	1.3
Lead	---	mg/L	---	---	0.46	0.16	0.067	0.11	0.036	0.033
Manganese	0.01	mg/L	---	---	---	---	---	---	0.18	0.36
Mercury	0.002	mg/L	0.0001	0.01	< 0.002	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001
Molybdenum	0.1	mg/L	---	---	< 0.1	< 0.1	< 0.1	< 0.1	< 0.05	< 0.05
Nickel	0.01	mg/L	---	---	---	---	---	---	< 0.01	< 0.01
Selenium	0.01	mg/L	---	---	---	---	---	---	< 0.01	< 0.01
Strontium	---	mg/L	---	---	6.1	8.2	8.5	8.4	9.1	8.8
Thorium	---	mg/L	---	---	3.2	3.2	3.2	3	1.2	1
Uranium	0.1	mg/L	---	---	0.13	< 0.1	< 0.1	< 0.1	< 0.05	< 0.05
Zinc	0.1	mg/L	---	---	---	---	---	---	0.22	0.079

Notes  
ANZECC & ARMCANZ 2000 values tabulated are based on slightly to moderately degraded ecosystems - 95% Protection Level  
mbgl indicates metres below ground level  
LOR = limits of reporting  
mg/L = milligrams per litre  
µg/L= micrograms per litre

\*In the absence of Australian values, the groundwater standards for Discharge to Marine Waters from Canadian Council of Ministers of the Environment (CCME), Canada (Nova Scotia)

"---" = criteria have not been derived for these chemical constituents/compounds.

Font and Cell :  
- Coloured cells indicate exceedence of relevant assessment criteria  
- Bolded analytical data indicates detection above LOR

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 5: Thorium and Uranium Genalysis Soil and Sediment Sampling Results (onlake)

	Sediment	
Laboratory	Genalysis	
Date Sampled	20/05/2009-20/07/2009	
Analyte	Uranium	Thorium
LOR	0.5	0.5
CCME Nova Scotia (Parkland) for protection of human health	23*	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300**
Units	mg/kg	mg/kg
LM001	7.5	20
LM002	7	20.5
LM003	5.5	21.5
LM004	5	22
LM005	5.5	25
LM006	8	26
LM007	5	30
LM008	4.5	38
LM009	4	42
LM010	8	20.5
LM011	6.5	20.5
LM012	5.5	22
LM013	4	20
LM014	5.5	23.5
LM015	4.5	29.5
LM016	5.5	24
LM017	5.5	23.5
LM018	6.5	22.5
LM019	5.5	23.5
LM020	5.5	23.5
LM021	5.5	28.5
LM022	4	28
LM023	8.5	24
LM024	8	23
LM025	6	20
LM026	5	22.5
LM027	6	25
LM028	11.5	25
LM029	5.5	20
LM030	6	20.5
LM031	6	19
LM032	5	19.5
LM033	3	12
LM034	3	12.5
LM034-A	4	20
LM035	5.5	22.5
LM036	6	23.5
LM037	7	23.5
LM039	6	23.5
LM040	5.5	20
LM041	6	22
LM042	6	25
LM043	8.5	22.5
LM044	7.5	21.5
LM045	6	23.5
LM046	5.5	24
LM047	8.5	21.5
LM048	8	22.5
LM049	6	21
LM050	6	23
LM062	6.5	20



	Sediment	
Laboratory	Genalysis	
Date Sampled	20/05/2009-20/07/2009	
Analyte	Uranium	Thorium
LOR	0.5	0.5
CCME Nova Scotia (Parkland) for protection of human health	23*	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300**
Units	mg/kg	mg/kg
LM063	5	17.5
LM064	6	20.5
LM065	6	22
T6_0.02		
T11_1.0		
T11_4.5		
T12_0.01		
T12_0.5		
T12_2.5		
T20_1.0		
T20_2.5		
T5_0.05		
T7_0.05		
T8_0.5		
T22_0.03		
T22_2.5		
T22_4.0		
PP_0.02		
PP_0.02B		
PP_2.0		

**Acronyms:**

LOR = limits of reporting  
mg/kg = milligrams per kilogram  
'---' = criteria have not been derived for these chemical constituents/compounds.

\*In the absence of Australian values, the soil standards for the protection of Environment and human health from Canada (Nova Scotia) have been adopted [Canadian Council of Ministers of the Environment (CCME)]

**Font and Cell :**

- Coloured cells indicate exceedence of relevant assessment criteria

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
117130		2.1				0.0007
117481		0.9				<0.0001
117482		1.1				<0.0001
117483		0.6				0.0004
117484		1.2				<0.0001
117485		0.4				0.0006
117486		0.4				0.0004
117487		0.5				0.0008
117488		0.5				0.0004
117489		0.7				0.0006
117490		0.9				0.0006
117491		0.5				0.0008
117492		0.8				0.0003
117493		0.5				0.0006
117494		0.3				<0.0001
117495		0.5				0.0022
117496		0.7				0.0003
117497		0.3				0.0003
117498		0.3				0.0009
117499		<1				0.001
117500		0.3				0.0013
117501		<1				0.0005
117502		0.2				0.0004
117503		<1				0.0003
117504		<1				0.0008
117505		<1				0.001
117506		0.2				0.0009
117507		<1				0.0004
117508		0.3				0.001
117509		0.8				<0.0001
117510		<1				0.0003
117511		0.3				0.0004

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
117512		<1				0.0006
117513		0.2				0.0014
117514		<1				0.0017
117515		0.5				<0.0001
117516		0.5				0.0005
117517		1.4				0.0002
117518		<1				0.0006
117520		<1				0.0004
117521		0.5				0.0004
117522		1.2				0.0005
117523		0.4				0.0027
117524		0.3				0.0004
117525		<1				0.0012
117526		<1				0.0006
117527		<1				0.0003
117528		<1				<0.0001
117529		0.8				0.0005
117530		<1				0.0007
117531		0.6				0.0007
117532		0.3				0.001
117533		0.7				0.0003
117534		0.4				0.0007
117535		0.4				0.0011
117536		0.2				0.0004
117537		<1				0.0014
117538		0.2				0.0021
117539		0.6				0.0021
117540		0.2				0.0019
117541		0.4				0.0055
117542		0.3				0.0016
117543		0.3				0.0018
117544		<1				0.0012

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
117545		<1				0.002
117546		0.4				0.0027
117547		0.3				0.0013
117548		0.5				0.0021
117549		0.3				0.0014
117550		<1				0.0007
117551		0.2				0.001
117552		0.3				0.0017
117553		0.3				0.0011
117554		0.4				0.0008
117555		0.7				0.0037
117556		0.5				0.0011
117557		0.7				0.0003
117558		1.8				0.0004
117559		0.5				0.0005
117560		0.6				0.0004
117561		0.6				0.0005
117562		0.5				0.0007
117563		2.6				0.0003
117564		0.3				0.0004
117565		0.6				0.0003
117566		0.4				<0.0001
117567		0.6				0.004
117568		0.2				0.0008
117569		0.6				0.0017
117570		1				0.0003
117571		0.6				0.0004
117572		1.6				<0.0001
117573		2.1				0.0003
117574		0.9				<0.0001
117575		0.5				0.0024
117576		1.8				0.0004

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
117577		1.8				0.0009
117578		1.5				0.0002
117579		2.5				0.0005
117580		2.3				0.0004
117581		4				0.0003
117582		0.5				0.0004
117583		0.4				0.0019
117584		0.4				0.0015
117585		0.4				0.0011
117586		3.1				0.0004
117587		1.3				<0.0001
117588		1.4				0.0003
117589		0.5				0.0023
117600		0.4				0.0003
117601		0.5				0.0018
117602		0.9				0.001
117603		0.4				0.0041
117604		0.4				0.003
117605		0.3				0.0016
117606		0.5				0.0027
117607		0.6				0.0008
117608		0.8				<0.0001
117609		0.9				0.0009
117610		0.8				0.0002
117611		0.7				0.0016
117612		0.8				0.0006
117613		0.4				0.0019
117614		0.3				0.0017
117615		0.2				0.0021
117616		0.3				0.0029
117617		0.3				0.0017
117618		0.3				0.002

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
117619		0.3				0.0014
117620		0.4				0.0022
117621		0.3				0.0022
117622		0.4				0.0027
117623		0.3				0.0027
117624		0.4				0.0021
117625		0.3				0.0018
117626		0.3				0.0014
117627		0.4				0.0025
117628		0.4				0.0019
117629		0.4				0.0023
117630		0.3				0.0013
117631		0.4				0.0026
117632		0.4				0.0028
117633		0.5				0.0025
117634		0.3				0.0019
117635		0.3				0.002
117636		0.3				0.0018
117637		0.4				0.0022
117638		0.5				0.0024
117639		0.3				0.0019
117640		0.6				0.0025
117642		0.4				0.0022
117643		0.3				0.0022
117644		0.4				0.0021
117645		0.5				0.0028
117646		0.3				0.002
117647		0.3				0.0028
117648		0.5				0.0028
117649		0.4				0.0017
117650		0.3				0.0012
117651		0.3				0.0017

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
117652		0.3				0.0018
117653		0.3				0.0019
117654		0.4				0.0019
117655		0.4				0.0016
117656		0.4				0.0025
117657		0.3				0.0023
117658		0.4				0.0032
117659		0.4				0.003
117660		0.4				0.0023
117661		0.4				0.0031
117662		0.3				0.0022
117663		0.3				0.0019
117664		0.3				0.0022
117665		0.3				0.0029
117666		0.4				0.0042
117667		0.3				0.0017
117668		0.2				0.0021
117669		0.4				0.002
117670		0.4				0.0026
117671		0.3				0.0022
117672		0.3				0.0021
117673		0.3				0.0028
117674		0.3				0.0024
117675		0.3				0.0019
117676		0.3				0.0027
117677		0.3				0.0024
117678		0.2				0.0015
117679		0.2				0.0023
117680		0.5				0.0007
117681		0.5				0.0037
117682		0.3				0.0019
117683		0.3				0.0023



Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
117684		0.3				0.0023
117685		0.3				0.0016
117686		0.4				0.0031
117687		0.3				0.0024
117688		0.3				0.0021
117689		0.3				0.0019
117690		0.3				0.0021
117691		0.5				0.0018
117692		0.4				0.0028
117693		0.3				0.003
117694		0.3				0.002
117695		0.4				0.0022
117696		0.4				0.0019
117697		0.3				0.0017
117698		0.3				0.0014
117699		0.3				0.0016
117700		0.3				0.0018
117701		0.2				0.0016
117702		0.3				0.0013
117703		0.6				0.0012
117704		0.6				0.0011
117705		0.4				0.0012
117706		0.5				0.002
117707		0.4				0.0022
117708		0.5				0.0031
117709		0.4				0.0018
117710		0.6				0.0024
117711		0.3				0.0013
117712		1.3				0.0005
119000		0.5				0.0044
119001		0.2				0.0011
119002		0.3				0.0023

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
119003		<1				0.001
119004		0.3				0.0018
119005		0.2				0.0021
119006		0.3				0.0034
119007		0.3				0.0024
119008		0.4				0.0019
119009		0.4				0.0025
119010		0.3				0.0021
119011		0.2				0.0014
119012		0.3				0.0032
119013		0.5				0.0016
119014		0.4				0.0022
119015		0.5				0.0037
119016		0.2				0.0018
119017		0.3				0.0017
119018		0.2				0.0012
119019		0.8				0.0022
119020		0.4				0.002
119021		0.3				0.0022
119022		<1				0.001
119023		0.3				0.002
119024		0.4				0.0036
119025		0.3				0.0026
119026		0.5				0.0047
119027		0.3				0.0021
119028		0.3				0.0029
119029		0.3				0.0029
119030		0.8				0.0006
119031		0.3				0.0019
119032		0.2				0.0018
119033		<1				0.0017
119034		0.3				0.0025

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
119035		0.3				0.0022
119036		0.3				0.0026
119037		0.3				0.0017
119038		0.4				0.0025
119039		0.3				0.0016
119040		0.3				0.0026
119041		0.3				0.0021
119042		0.2				0.0022
119043		0.2				0.0018
119044		<1				0.0017
119045		0.4				0.0035
119046		<1				0.001
119047		0.2				0.0018
119049		0.4				0.0028
119050		0.4				0.0023
119051		0.6				0.004
119052		0.4				0.0038
119053		0.4				0.0017
119054		0.3				0.0022
119056		0.3				0.0019
119057		0.2				0.0017
119058		0.3				0.0015
119059		0.4				0.0017
119060		0.4				0.0035
119061		0.4				0.003
119062		0.4				0.0026
119063		0.4				0.0013
119064		0.7				0.0014
119065		<1				<0.0001
119066		0.4				<0.0001
119067		<1				0.0005
119068		0.3				0.0004

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
119069		0.4				0.0007
119070		0.3				0.0015
119071		0.3				0.0021
119072		0.5				0.0015
119073		0.3				<0.0001
119074		0.5				0.0005
119075		0.3				0.0013
119076		0.5				0.0016
119077		0.3				0.0017
119078		0.3				0.0018
119079		0.3				0.0003
119080		0.3				0.0005
119081		<1				0.0002
119082		<1				<0.0001
119083		0.3				0.0004
119084		<1				0.0007
119085		0.2				0.0009
119086		1.1				<0.0001
119087		0.4				0.0018
119088		<1				<0.0001
119089		<1				<0.0001
119090		<1				0.0004
119091		0.7				0.0009
119092		1.5				0.0004
119093		0.4				<0.0001
119094		0.2				0.0013
119095		0.4				0.0007
119096		0.3				0.002
119097		0.2				0.0007
119098		0.2				0.0006
119099		<1				<0.0001
119101		<1				0.0003

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
119102		0.3				0.0003
119103		<1				0.0008
119104		<1				0.0004
119105		<1				<0.0001
119106		<1				0.0003
119107		<1				0.0002
119108		<1				<0.0001
119109		<1				0.0002
119110		<1				0.0004
119111		0.3				0.0012
119112		0.3				0.0015
119113		0.3				0.0019
119114		0.3				0.0015
119115		0.4				0.0017
119116		0.4				0.0025
119117		0.4				0.0032
119118		0.4				0.0019
119119		0.5				0.0021
119120		0.8				0.0031
119121		0.5				0.0008
119122		0.6				0.0022
119123		0.6				0.0014
119124		0.4				0.0022
119125		0.5				0.0032
119126		0.6				0.0029
119127		0.5				0.0005
119128		0.8				0.0006
119129		0.4				0.0022
119130		0.3				0.0019
119131		0.3				0.0022
119132		0.3				0.0019
119133		0.6				0.0003

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
119134		1				0.0006
119135		1				0.0002
119136		0.6				0.0004
119137		0.8				0.0029
119138		0.7				0.0011
119139		0.7				0.0026
119140		0.3				0.0005
119141		0.6				0.0028
119142		0.6				0.003
119143		0.6				0.0015
119144		0.7				0.0018
119145		0.9				0.0034
119146		0.5				0.0012
119148		0.4				0.0006
119149		0.5				0.0017
119150		0.3				0.0008
119151		0.4				0.0012
119152		0.3				0.0009
119153		0.5				0.0004
119154		0.7				<0.0001
119155		0.8				0.0002
119156		0.9				0.0003
119157		0.5				<0.0001
119158		1				0.0003
119159		0.6				0.0002
119160		0.5				0.0004
119161		0.3				0.0013
119162		0.3				0.0008
119163		0.3				0.0011
119164		0.5				0.0006
119165		0.3				0.0007
119166		0.9				0.001

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
119167		2				0.0003
119168		0.4				0.0015
119169		0.4				0.0008
119170		0.8				0.0003
119171		1				0.0009
119172		0.6				0.0015
119173		0.5				0.0014
119174		1				0.0016
119175		0.7				0.0018
119176		0.7				0.0008
119177		0.8				0.0009
119178		0.6				0.0006
119179		0.4				0.0018
119180		0.3				0.0015
119181		0.5				0.0005
119182		0.5				0.0027
119183		0.5				0.0035
119184		0.5				0.0016
119185		0.6				0.0024
119186		0.5				0.0028
119187		0.5				0.0018
119188		0.6				0.0039
119189		0.7				0.0025
119190		0.6				0.0026
119191		0.7				0.0007
119192		0.8				0.0014
119193		0.7				0.0003
119194		0.5				0.0009
119195		0.5				0.0013
119196		0.4				0.0021
119197		1.2				0.0004
119198		0.5				0.0014

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
119199		0.5				0.0015
119200		0.5				0.0008
119201		0.5				0.0006
119202		0.5				0.0008
119203		0.9				0.0002
119204		0.5				0.0016
119205		0.5				0.0011
119206		0.8				0.0013
119207		0.7				0.001
119208		0.6				0.0011
119209		1				0.0005
119210		0.4				0.0024
119211		0.9				0.0005
119212		0.7				0.0013
119213		1				0.0005
119214		1.6				0.0004
119215		0.9				0.0005
119216		0.3				0.0007
119217		0.9				<0.0001
119218		<1				<0.0001
119219		<1				<0.0001
119220		1.2				0.0005
119221		<1				0.0014
119222		<1				0.0013
119223		<1				0.0017
119224		0.3				0.0011
119225		0.4				0.0009
119226		0.4				0.0023
119227		0.3				0.0014
119228		0.3				0.0013
119229		0.6				0.0042
119230		0.7				0.0005



Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
119231		0.8				0.0007
119232		0.3				0.001
119233		0.6				0.0006
119234		0.5				0.0038
119235		0.4				0.0031
119236		0.6				0.0037
119237		<1				0.0006
119238		0.5				0.001
119239		0.6				0.001
119240		0.4				0.0017
119241		1				0.0073
119242		0.6				0.002
119243		0.6				0.0034
123000		0.4				0.0005
123001		1.4				0.0004
123002		0.7				0.0012
123003		0.4				0.0033
123004		0.9				0.0005
123005		0.3				0.0008
123006		0.6				0.0013
123007		1				0.0003
123008		1.2				0.0006
123009		0.7				0.001
123010		1				0.0059
123011		0.3				0.0021
123012		0.4				0.0035
123013		1.8				<0.0001
123014		0.4				0.0016
123015		0.5				0.0022
123016		0.8				0.0008
123017		1.1				0.0005
123018		0.4				0.002

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
123019		0.7				0.0047
123020		0.4				0.002
123021		0.3				0.0014
123022		0.3				0.0009
123023		0.9				0.0039
123024		0.9				0.0018
123025		0.4				0.0018
123026		0.3				0.0013
123027		0.3				0.001
123028		0.4				0.0015
123029		0.4				0.0013
123030		0.5				0.0009
123031		0.7				0.0003
123032		0.4				0.0011
123033		0.4				0.0004
123034		0.4				0.0008
123035		0.4				0.0005
123036		1.2				<0.0001
123037		1				<0.0001
123038		1.6				<0.0001
123039		0.3				0.001
123040		1.1				0.0003
123041		0.3				0.0015
123042		0.7				0.0026
123043		0.3				0.0012
123044		0.3				0.0015
123045		0.3				0.0013
123046		<1				0.0014
123047		0.3				0.0014
123048		<1				0.0008
123049		0.3				0.0009
123050		0.3				0.002

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
123051		0.3				0.0022
123052		0.5				0.0042
123053		0.3				0.0019
123054		0.3				0.0023
123055		0.4				0.003
123056		0.3				0.002
123057		0.3				0.0015
123058		0.3				0.0023
123059		0.3				0.0022
123060		0.3				0.0017
123061		0.4				0.0022
123062		0.3				0.0012
123063		0.3				0.0014
123064		0.3				0.0013
123065		0.3				0.0016
123066		0.3				0.0018
123067		0.4				0.0021
123068		0.4				0.0014
123069		<1				0.0014
123070		0.7				0.0048
123071		0.3				0.0019
123072		0.3				0.0025
123073		0.4				0.0002
123074		0.5				0.0004
123075		0.3				0.0002
123076		1.1				<0.0001
123077		0.4				0.0017
123078		0.4				0.0014
123079		0.3				0.0005
123080		<1				0.0005
123081		<1				0.0003
123082		<1				0.0007

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
123083		0.3				0.0009
123084		0.5				<0.0001
123085		0.3				0.0002
123086		0.5				<0.0001
123087		0.3				0.0002
123088		0.4				0.0003
123090		2.1				<0.0001
123091		<1				0.0003
123092		<1				0.0003
123093		<1				0.0004
123094		<1				0.0003
123095		<1				0.001
123096		<1				0.0009
123097		<1				0.0008
123098		0.3				0.0003
123099		<1				0.0003
123100		0.3				0.0021
123101		<1				0.0014
123102		0.4				0.0026
123104		0.3				0.0014
123105		0.5				0.0017
123106		0.3				0.0014
123107		0.4				0.002
123108		0.4				0.001
123109		0.4				0.0015
123110		0.4				0.002
123111		1.4				0.0004
123112		0.4				0.0013
123113		0.4				0.0023
123114		0.4				0.0009
123115		0.4				0.0016
123116		1.2				0.0005

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
123117		0.9				0.0006
123118		0.3				0.0015
123119		0.3				0.002
123120		0.4				0.0019
123121		0.3				0.0017
123122		0.4				0.0019
123123		0.6				0.0016
123124		0.7				0.0004
123125		0.7				0.0008
123126		0.6				0.001
123127		1.3				0.0004
123128		1.7				0.0004
123129		1.4				0.0004
123131		0.4				0.0008
123132		0.9				0.0003
123133		0.8				0.0019
123134		0.5				0.0021
123135		0.4				0.0023
123136		3.5				0.0004
123137		2				0.0012
123138		0.4				0.0013
123139		0.3				0.0024
123140		0.4				0.0022
123141		0.8				<0.0001
123142		1				0.0003
123143		<1				0.0006
123144		0.3				0.0028
123145		0.4				0.0024
123146		0.5				0.0015
123147		0.7				0.0007
123148		0.6				0.0006
123149		0.5				0.0005

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
123150		0.9				0.0005
123151		0.6				0.0015
123152		0.6				0.0016
123153		0.6				0.0033
123154		0.9				0.0011
123155		1.2				0.0007
123156		0.5				0.0012
123157		0.7				0.0009
123158		<1				0.0004
123159		0.3				0.0004
123160		1.1				0.0007
123161		0.4				0.0027
123162		1.5				<0.0001
123163		0.4				0.0008
123164		0.3				0.0006
123166		0.5				0.0004
123167		1.2				0.0006
123168		0.9				0.0003
123169		0.5				0.0005
123170		0.6				0.0004
123171		0.5				0.0003
123172		0.5				0.0005
123173		0.7				0.0006
123174		0.5				0.0006
123175		0.3				0.0022
123176		0.3				0.0013
123177		0.7				0.0004
123178		0.5				0.0004
123179		0.7				0.0002
123180		0.5				0.0005
123181		0.7				0.0003
123182		1.1				0.0003

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
123183		1.4				0.0002
123184		0.4				0.0005
123185		0.3				0.0011
123186		0.3				0.0007
123187		0.4				0.0004
123188		0.4				0.0008
123189		0.4				0.0006
123190		0.6				0.0008
123191		0.3				0.0011
123192		0.5				0.0008
123193		1.1				<0.0001
123194		0.3				0.0005
123195		0.8				0.0004
123196		0.3				0.002
123197		0.5				0.0005
123198		0.6				0.0007
123199		0.3				0.0009
123200		0.5				0.0012
123201		<1				0.0007
123203		0.3				0.001
123204		0.3				0.0002
123205		<1				0.0005
123206		0.4				0.0023
123207		<1				0.0009
123208		0.5				0.0005
123209		<1				0.0007
123210		<1				0.001
123211		0.3				0.0011
123212		1				0.0006
123213		0.3				0.0012
123214		0.4				0.0011
123215		1				0.0019

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
123216		<1				0.0008
123217		1.1				0.0003
123218		0.5				0.0004
123219		2.8				0.0002
123220		1				<0.0001
123221		<1				0.0006
123222		<1				0.0004
123223		<1				0.0007
123224		0.9				0.0002
123225		0.9				0.0003
123226		<1				0.0003
123227		0.4				<0.0001
123228		0.4				0.0002
123229		1.2				0.0009
123230		0.2				0.0008
123231		0.4				0.0004
123232		0.3				<0.0001
123233		0.6				0.0004
123234		0.2				0.0008
123235		0.3				0.0006
123236		0.7				0.0015
123237		0.2				0.0011
123238		0.8				0.0011
123239		0.4				0.0005
123240		0.3				0.0005
123241		<1				0.001
123242		<1				<0.0001
123244		0.5				0.0024
123245		0.3				0.001
123246		0.2				0.0016
123247		0.5				0.0014
123248A		0.3				0.001



Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
123248B		0.4				0.001
123249		0.3				0.0017
123250		0.5				0.0009
123251		0.6				0.001
123252		0.5				0.0015
123253		0.5				0.0013
123254		0.9				0.0009
123255		0.6				0.0006
123256		0.5				0.0008
123257		0.6				0.001
123258		0.9				0.0007
123259		0.6				0.0007
123260		0.4				0.0006
123261		0.6				0.0012
123262		0.4				0.001
123263		0.6				0.0015
123264		0.6				0.0026
123265		<1				0.0009
123266		0.5				0.0013
123267		0.7				0.0024
123268		0.3				0.0011
123269		0.4				0.0017
123270		0.7				0.0009
123271		0.5				0.0026
123272		0.4				0.0021
123273		0.4				0.0023
123274		0.4				0.0016
123275		0.8				0.0022
123276		0.6				0.0027
123277		1.2				0.0007
123280		0.5				0.0008
123281		0.4				0.001

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Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
123282		0.3				0.0011
123283		0.9				0.0028
123284		0.6				0.0007
123285		0.6				0.0015
123286		0.5				0.0008
123287		1				0.002
123288A		0.7				0.0009
123288B		0.5				0.0009
123289		0.6				0.0018
123290		0.7				0.0005
123291		0.4				0.0004
123292		0.3				0.0008
123293		0.3				0.0008
123294		0.4				0.0014
123295		0.4				0.0003
123296		0.6				0.0008
123297		0.3				0.0007
123298		0.3				0.0005
123299		0.3				0.0008
123301		0.3				0.0004
123302		0.4				0.0005
123303		0.5				0.0008
123304		0.6				0.0005
123305		0.6				<0.0001
123306		0.4				0.0006
123307		0.2				0.0007
123308		0.3				0.0011
123309		0.4				0.0007
123310		0.6				0.0003
123311		0.5				0.0013
123312		0.8				0.0005
123313		<1				0.0007

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Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
123314		0.3				0.0027
123315		0.8				0.001
123316		0.4				0.0005
123317		0.5				0.0006
123318		0.3				0.001
123319		0.6				0.0012
123320		0.3				0.0004
123321		0.4				0.0008
123322		0.3				0.0007
123323		0.3				0.0015
123324		0.4				0.0013
123325		0.5				0.0011
123326		0.3				0.0013
123327		0.8				0.0062
123328		0.6				0.0006
123329		0.4				0.0004
123330		0.3				0.0009
123331		0.3				0.0018
123332		0.4				0.0027
123333		0.4				0.0022
123334		0.4				0.0023
123335		0.9				0.0011
123336		0.8				0.0008
123337		0.5				0.0032
123338		0.6				0.0031
123339		0.8				0.0015
123340		1.2				0.0005
123341		0.7				0.0009
123342		1.2				0.0004
123343		0.4				0.0012
123344		0.6				0.0006
123345		1.1				0.0006

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Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
123346		0.5				0.001
123348		0.4				0.0014
123349		1.2				0.0008
123350		0.8				0.0079
123351		0.4				0.0021
123352		0.5				0.0008
123353		1.3				0.0008
123354		0.7				0.0006
123355		0.4				0.0014
123356		1				0.0013
123357		1.2				0.0002
123358		0.4				0.0008
123359		0.4				0.0009
123360A		0.6				0.005
123360B		0.5				0.0043
123361		2.3				0.0007
123362		1.2				0.0021
123363		1.1				0.0006
123364		1.7				0.0006
123365		0.9				0.0005
123366		0.6				0.0069
123367		0.3				0.0019
123368		0.5				0.0019
123369		0.3				0.002
123370		<1				0.0005
123371		0.2				0.0016
123372		<1				0.002
123373		0.4				0.0031
123374		0.3				0.0024
123375		0.3				0.0026
123376		0.3				0.0017
123377		0.5				0.0023

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Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
123378		0.5				0.0029
123379		0.4				0.0028
123380		0.3				0.002
123381		0.4				0.0027
123382		0.3				0.0018
123383		0.3				0.0016
123384		0.4				0.0021
123385		0.4				0.0024
123386		0.4				0.0023
123387		0.3				0.0018
123388		0.3				0.0018
123389		0.5				0.0032
123390		0.5				0.0027
123391		0.4				0.0021
123392		0.5				0.0022
123393		0.3				0.0016
123394		0.3				0.0021
123395		0.4				0.0022
123396		0.3				0.0021
123397		0.3				0.0017
123398		0.2				0.0014
123399		0.4				0.001
123400		0.8				0.0046
123401		0.5				0.0019
123402		0.7				0.0033
123403		0.4				0.0024
123404		0.5				0.0023
123405		0.4				0.0017
123406		0.3				0.0023
123407		0.4				0.002
123408		0.3				0.0029
123409		0.2				0.0021

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Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
123410		0.4				0.0033
123411		0.4				0.0022
123412		0.3				0.0022
123413		0.3				0.0018
123414		0.2				0.0019
125001		0.3				0.002
125002		<1				0.0019
125003		0.2				0.0019
125004		<1				0.0016
125005		0.3				0.001
125007		<1				0.0005
125008		1				<0.0001
125009		1.1				0.0009
125010		0.7				0.0012
125011		0.7				0.0015
125012		0.2				0.0021
125013		0.2				0.0019
125014		2.1				<0.0001
125015		0.6				0.0025
125016		1.2				0.0008
125017		0.9				0.0011
125018		0.3				0.0021
125019		0.3				0.0022
125020		0.3				0.0018
125022		0.5				0.0023
125023		0.2				0.001
125024		0.8				<0.0001
125025		0.6				0.0017
125026		0.4				0.0012
125027		0.4				0.0017
125028		1				0.0007
125029		0.5				0.0012



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Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125030		1				<0.0001
125031		1				<0.0001
125032		0.3				0.0008
125033		0.3				0.0008
125034		0.6				0.0003
125035		0.5				0.0019
125036		2.6				0.0004
125037		3.4				<0.0001
125038		0.3				0.0006
125039		0.4				0.0027
125040		0.4				0.0021
125041		0.6				0.0022
125042		0.4				0.0008
125043		<1				<0.0001
125044		0.4				0.0021
125045		0.4				0.0018
125046		0.4				0.0003
125047		0.6				0.0002
125048		0.4				<0.0001
125049		0.5				<0.0001
125050		2.1				<0.0001
125051		0.4				0.0023
125052		0.4				0.0023
125054		0.4				0.0013
125055		0.6				0.0028
125056		0.7				<0.0001
125057		0.4				0.0007
125058		0.4				<0.0001
125059		2.4				0.0002
125060		<1				<0.0001
125061		0.4				0.0012
125062		0.3				0.0019

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125063		1.8				0.0004
125064		0.4				0.0007
125065		0.5				<0.0001
125066		<1				0.0008
125067		0.3				0.0014
125068		0.4				0.0035
125069		0.9				0.0002
125070		0.4				0.0005
125071		<1				0.0003
125072		0.7				0.0008
125073		0.3				0.0021
125074		1.2				0.0008
125075		5.3				0.0005
125076		0.2				0.0011
125077		1.6				0.0006
125078		<1				0.0039
125079		0.5				0.0004
125080		1.5				0.0003
125081		<1				0.0005
125082		0.7				0.0002
125083		0.9				0.0008
125084		0.6				0.0002
125085		0.4				0.0029
125086		<1				0.0002
125087		1.2				0.0005
125088		1.6				0.0003
125089		1.1				<0.0001
125090		<1				0.0004
125091A		1.6				0.0004
125091B		1.9				0.0003
125092		0.3				0.0008
125093		0.4				0.0005

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125094		0.3				0.001
125095		0.2				0.001
125096		0.4				0.0029
125097		<1				0.0012
125098		0.3				0.001
125099		2.8				0.0004
125100		1.5				0.0006
125101		1				<0.0001
125102		0.3				0.0018
125103		0.6				<0.0001
125104		0.3				0.001
125105		<1				0.0007
125106		0.4				0.0004
125107		1.2				<0.0001
125108		0.5				0.0003
125109		0.6				0.0004
125110		1.6				0.0035
125111		0.3				<0.0001
125112		0.3				<0.0001
125113		<1				0.0004
125114		0.3				0.0009
125115		0.4				0.002
125116		0.3				0.0025
125117		<1				0.0008
125118		0.3				0.001
125119		<1				0.0008
125120		0.3				0.0027
125121		0.3				0.0019
125122		0.3				0.002
125123		0.3				0.0024
125124		0.3				0.0034
125125		<1				0.0017

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125126		0.4				0.0029
125127		0.5				<0.0001
125128		0.3				0.003
125129		0.2				0.0019
125130		<1				0.0017
125131		<1				0.0013
125132		0.2				0.0002
125133		0.2				0.0013
125134		1.2				0.0007
125135		0.7				<0.0001
125136		<1				0.0004
125137		0.3				0.0005
125138		0.3				0.0003
125139		0.3				0.0016
125140		0.2				0.0013
125141		0.3				0.0018
125142		0.2				0.0024
125143		0.3				0.0019
125145		0.2				0.002
125146		0.3				0.0024
125147		0.3				0.0024
125148		0.3				0.0034
125149		<1				0.0002
125150		0.3				0.0009
125151		<1				0.0005
125152		0.9				<0.0001
125153		0.7				0.0002
125154		0.9				0.0003
125155		0.9				0.0005
125156		<1				0.0011
125157		0.4				0.0032
125158		0.4				0.0013

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125159		0.4				0.0022
125160		<1				0.0018
125161		0.3				0.0016
125162		0.4				0.0037
125163		0.4				0.0045
125164		0.5				0.0047
125165		0.4				0.0026
125166		0.5				0.0044
125167		0.4				0.0024
125168		0.5				0.0007
125169		0.5				0.0061
125170		0.3				0.0013
125171		0.3				0.0019
125172		0.4				0.0017
125173		<1				0.0019
125174		0.3				0.0013
125175		0.4				0.0021
125176		0.4				0.0024
125177		0.3				0.0019
125178		<1				0.0016
125179		0.3				0.0026
125180		0.5				0.004
125181		0.4				0.0019
125182		0.3				0.0021
125183		0.5				0.0029
125184		0.5				0.0041
125185		0.5				0.0033
125186		0.3				0.0012
125187		0.3				0.0012
125188		0.7				0.0016
125189		0.5				0.0044
125190		0.7				0.0006

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125191		0.4				0.0036
125192		0.5				0.0038
125193		0.7				0.002
125194		0.4				0.0027
125195		0.4				0.0022
125196		0.6				0.0008
125197		0.4				0.0074
125198		0.3				0.0023
125199		0.4				0.0022
125200		0.5				0.0039
125201		0.6				0.0002
125202		0.3				0.0012
125203		0.6				0.0002
125204		0.9				<0.0001
125205		0.2				0.0015
125206		0.5				0.0016
125207		0.3				0.0027
125208		0.9				0.0056
125209		0.4				0.0037
125210		0.5				0.0043
125211		0.7				0.0065
125212		0.7				0.0006
125213		0.7				0.0013
125214		0.4				0.0025
125215		0.3				0.002
125216		0.3				0.0014
125217		0.7				0.0048
125218		0.7				0.0054
125219		0.8				0.0058
125220		0.4				0.0026
125221		0.4				0.0033
125222		0.3				0.0023



Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125223		0.5				0.0039
125224		0.7				0.006
125225		0.5				0.0037
125226		0.2				0.0028
125227		0.4				0.003
125228		<1				0.0017
125229		0.8				0.0039
125230		0.5				0.0038
125231		0.4				0.0033
125232		0.3				0.0019
125233		0.2				0.0016
125234		0.3				0.0015
125235		0.4				0.0043
125236		<1				0.0014
125237		0.3				0.0019
125238		0.3				0.0029
125239		0.7				0.0061
125240		0.8				0.0008
125241		<1				0.0013
125242		0.3				0.0015
125243		0.3				0.0015
125244		<1				0.0014
125245		0.3				0.0015
125246		0.3				0.003
125247		0.5				0.0031
125248		0.5				0.0015
125249		0.4				0.0027
125250		0.3				0.001
125251		0.5				0.0027
125252		0.5				0.0025
125253		0.5				0.0026
125254		0.4				0.0023

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Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125255		0.4				0.0021
125256		0.5				0.0032
125257		0.4				0.0023
125258		0.3				0.002
125259		0.4				0.0029
125260		0.5				0.0025
125261		0.2				0.0012
125263		0.4				0.0028
125264		0.3				0.0023
125265		0.4				0.0017
125266		0.3				0.0018
125267		0.3				0.0019
125268		0.3				0.0016
125269		0.3				0.0022
125270		0.8				0.0057
125271		0.4				0.0033
125272		0.4				0.0019
125273		0.7				0.0029
125274		0.4				0.003
125275		0.4				0.0025
125276		0.5				0.0017
125277		0.3				0.0018
125278		0.4				0.0029
125279		1.1				0.0056
125280		0.4				0.002
125281		0.4				0.0016
125282		0.3				0.0032
125283		0.4			2	0.0014
125284		0.4			1.6	0.0019
125285		0.3			1.5	0.0025
125286		0.3			1.9	0.0016
125287		0.6			1.8	0.0044

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125288		0.4			1.9	0.0026
125289		0.4			2.5	0.0032
125290		0.3			1.7	0.0032
125291		0.3			1.4	0.0017
125292		0.7			1.7	0.0047
125293		0.3			2.5	0.0016
125294		0.4			2.1	0.0017
125295		0.4			2.5	0.0018
125296		0.4			2.9	0.0017
125297		0.4			0.6	0.0022
125298		0.3			2.3	0.0022
125299		<1			1.8	0.0016
125300		0.3			2	0.0021
125301		0.3			2.1	0.0025
125303		0.3			2.3	0.0018
125304		0.2			2	0.0002
125305		0.4			1.7	0.0027
125306		0.5			2.1	0.0045
125307		0.4			2.5	0.0036
125308		0.6			1.2	0.003
125309		0.5			1.1	0.0033
125310		0.5			1.6	0.0027
125311		0.3			<0.01	0.0027
125312		0.3			2	0.003
125313		0.3			1.4	0.0032
125314		0.4			1.6	0.0029
125315		0.6			1.2	0.0028
125316		<1		111		0.0025
125317		0.3		22		0.0033
125318		0.7		18		0.008
125319		0.4		25		0.0023
125320		0.2		<0.02		0.0016

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125321		0.5		<0.02		0.0028
125323		0.6		<0.02		0.0028
125324		1		<0.02		0.0065
125325		0.3		<0.02		0.0023
125326		0.5		<0.02		0.003
125327		0.4		<0.02		0.0021
125328		0.6		<0.02		0.0045
125329		0.6		<0.02		0.0031
125330		0.2		<0.02		0.0018
125331		0.4		<0.02		0.0026
125332		0.4		<0.02		0.0027
125333		0.4		7		0.0027
125334		0.2		<0.02		0.0025
125335		0.4		9		0.0026
125336		0.5		<0.02		0.003
125337		0.4		15		0.0027
125338		0.4		17		0.0022
125339		0.7		14		0.006
125340		0.4		12		0.0033
125341		0.3		9		0.0028
125342		0.6		12		0.0032
125343		0.3		24		0.0015
125344		0.6		17		0.0005
125345		0.4		10		0.0018
125346		0.7		14		0.0009
125347		0.6		17		0.0009
125348		0.4		14		0.0016
125349		0.5		19		0.0024
125350		0.4		47		0.0023
125351		0.4		38		0.001
125352		0.5		29		0.0028
125353		0.3		11		0.0012

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125354		0.2		17		0.001
125355		0.3		47		0.0014
125356		0.3		36		0.0018
125357		0.4		40		0.0011
125358		0.4		10		0.0012
125359		0.4		20		0.0019
125360		0.4		23		0.0015
125361		0.4		49		0.0019
125362		0.4		65		0.0022
125363		0.5		7		0.0026
125364		0.4		9		0.0025
125365		0.7		6		0.0011
125366		0.5		16		0.0037
125367		0.4		<0.02		0.0017
125368		0.4		<0.02		0.0029
125369		0.4		33		0.0022
125370		0.4		25		0.0018
125371		0.3		9		0.0015
125372		0.4		50		0.0026
125373		0.5		49		0.0032
125374		0.3		42		0.0018
125375		0.3		65		0.002
125376		0.3		81		0.0022
125377		0.3		68		0.0019
125378		0.3		18		0.0009
125379		0.3		173		0.0023
125380		0.3		349		0.0018
125381		0.4		129		0.0021
125382		0.3		32		0.0017
125383		0.4		29		0.002
125384		0.3		32		0.0019
125385		0.3		26		0.0016

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125386		0.3		19		0.0013
125387		0.7		33		0.0034
125388		0.5		41		0.0017
125389		0.4		28		0.0021
125390		<1		31		0.0008
125391		0.4		20		0.002
125392		0.3		17		0.0018
125393		0.4		25		0.0022
125394		0.5		<0.02		0.003
125395		0.5		<0.02		0.0032
125397		0.4		20		0.0025
125398		0.4		18		0.0023
125399		0.4		10		0.0022
125400		0.3		20		0.0024
125401		0.8		<0.02		0.0008
125402		0.4		19		0.0024
125403		0.3		8		0.0021
125404		0.4		12		0.0033
125405		0.4		54		0.0025
125406		0.3		69		0.0022
125407		0.5		<0.02		0.0017
125408		0.4		<0.02		0.0029
125409		0.4		<0.02		0.0022
125410		0.5		32		0.0027
125411		0.3		46		0.0023
125412		0.7		41		0.0009
125413		0.2		21		0.0012
125414		0.4		10		0.0026
125415		0.4		6		0.002
125416		0.2		9		0.0013
125417		0.5		14		0.001
125418		0.3		23		0.0016

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125419		0.3		25		0.0016
125420		0.3		14		0.0009
125421		0.2		10		0.0014
125422		0.2		11		0.0016
125423		0.3		22		0.0018
125424		0.3		32		0.0009
125425		0.4		33		0.0018
125426		0.3		34		0.0018
125427		0.3		27		0.001
125428		0.3		29		0.0014
125429		0.3		108		0.0011
125430		0.2		17		0.0009
125431		0.3		<0.02		0.0011
125432		0.3		16		0.0016
125433		0.5		<0.02		0.0018
125434		0.3		82		0.001
125435		0.4		85		0.0015
125436		0.5		31		0.0021
125437		0.5		8		0.0013
125439		0.4		23		0.0016
125440		0.4		36		0.0018
125441		0.4		21		0.0018
125442		0.2		19		0.0009
125443		0.3		12		0.0028
125444		0.4		29		0.0026
125445		0.2		23		0.0015
125446		0.2		13		0.0004
125447		0.3		11		0.002
125448		0.3		19		0.0018
125449		0.2		<0.02		0.0014
125450		<1		12		0.0014
125451		0.2		17		0.0015



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Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125452		0.2		<0.02		0.0013
125453		0.2		<0.02		0.0009
125454		0.3		<0.02		0.0014
125455		0.2		11		0.0009
125456		0.7		8		0.0015
125457		0.3		16		0.0018
125458		0.4		12		0.0024
125459		0.2		24		0.0014
125460		0.2		22		0.0016
125461		0.3		35		0.0011
125462		0.5		31		0.0038
125463		0.4		18		0.0026
125464		0.3		15		0.002
125465		0.2		22		0.001
125466		0.5		21		0.002
125467		0.4		36		0.0015
125468		0.4		16		0.0007
125469		0.5		16		0.0028
125470		0.3		16		0.0014
125471		0.4		18		0.0011
125472		0.3		66		0.0028
125473		0.3		25		0.0017
125474		0.3		25		0.0014
125475		0.3		14		0.0014
125476		0.4		25		0.0017
125477		<1		<0.02		0.0015
125478		0.3		52		0.0011
125479		0.2		11		0.0016
125480		0.3		33		0.0017
125481		0.3		52		0.0013
125482		<1		19		0.0015
125483		0.2		14		0.0011

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Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125484		0.3		23		0.0012
125485		0.3		18		0.0028
125486		0.3		20		0.0024
125487		0.4		20		0.0017
125488		<1		23		0.0011
125489		0.2		35		0.0008
125490		0.3		17		0.0017
125491		0.4		57		0.0013
125492		0.2		20		0.0015
125493		0.2		11		0.0022
125494		0.4		32		0.0023
125495		0.3		71		0.002
125496		0.3		48		0.0019
125498		0.4		19		0.0019
125499		<1		18		0.0018
125500		0.2		36		0.0024
125501		0.3		42		0.0024
125502		0.2		40		0.0019
125503		0.2		52		0.0019
125504		0.2		18		0.0019
125505		0.3		16		0.0025
125506		0.2		28		0.0019
125507		0.4		27		0.0023
125508		0.5		60		0.0018
125509		0.5		84		0.0016
125510		0.6		26		0.0017
125511		0.7		6		0.0012
125512		0.4		6		0.0022
125513		0.4				0.0014
125514		0.5		349		0.0017
125515		0.5				0.0018
125516		0.4				0.0015

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Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
125517		0.4				0.0013
125518		0.4				0.0021
125519		0.4				0.0026
125520		0.4				0.0023
125521		0.7				0.0035
125522		0.5				0.0004
125523		0.4				0.0021
125524		0.4				0.0017
125525		0.5				0.0015
125526		0.5				0.0021
125527		0.5				0.0024
125529		0.5				0.0015
125530		0.4				0.0017
125531		0.4				0.002
125532		0.6				0.0021
125533		0.3				0.0011
125534		0.2				0.0011
125535		0.4				0.0011
125536		<1				0.0003
125537		0.4				0.002
125538		0.5				0.0013
125539		0.4				0.0015
125540		0.7				0.0006
LC0001	52					
LC0002	6					
LC0003	5	5.3				
LC0004	5					
LC0005	<0.05					
LC0006	<0.05					
LC0007	<0.05					
LC0008	<0.05					
LC0009	<0.05					

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Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LC0010	<0.05					
LC0011	<0.05					
LC0012	<0.05					
LC0013	<0.05					
LC0014	<0.05					
LC0015	<0.05					
LC0016a	<0.05					
LC0016b	<0.05					
LC0017	<0.05					
LC0018	<0.05					
LC0019	<0.05					
LC0020	<0.05					
LC0021	<0.05					
LC0022	<0.05					
LC0023	<0.05					
LC0024	<0.05					
LC0025	<0.05					
LC0026	3					
LC0027	<0.05					
LC0028	<0.05					
LC0029	3					
LC0030	11					
LC0031	8					
LC0032	10					
LC0033	10					
LC0034	11					
LC0035	8					
LC0036	8					
LC0037	10					
LC0038	9					
LC0039	13					
LC0040	11					

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Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LC0041	6					
LC0042	18					
LC0043	15					
Lc0044	15					
Lc0045	6					
Lc0046	<0.05					
Lc0047	<0.05					
Lc0048	<0.05					
Lc0049	4					
Lc0050	<0.05					
Lc0051	<0.05					
Lc0052	5					
Lc0053	6					
Lc0054	4					
Lc0056	6					
Lc0057	8					
Lc0058	8					
Lc0059	15					
Lc0060	16					
Lc0061	17					
Lc0062	5					
Lc0063	15					
Lc0064	50					
Lc0065	12					
Lc0066	6					
Lc0067	5					
Lc0068	24					
Lc0069	9					
LC0070	17					
Lc0071	55					
LC0072	26					
Lc0073	13					

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Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Lc0074	10					
Lc0075	7					
Lc0076	5					
Lc0077	7					
Lc0078	5					
Lc0079	5					
Lc0080	10					
Lc0081	3					
Lc0082	4					
Lc0083	5					
LC1000	<0.05					
LC1001	3					
LC1002	4			19		
LC1003	3			8		
LC1004	17			12		
LC1005	17			54		
LC1006	<0.05			69		
LC1007	<0.05			<0.02		
LC1008	<0.05			<0.02		
LC1009	7			<0.02		
LC1010	12			32		
LC1011	12			46		
LC1012	3			41		
LC1013	<0.05			21		
LC1014	2			10		
LC1015	<0.05			6		
LC1016	10			9		
LC1017	9			14		
LC1018	11			23		
LC1019	17			25		
LC1020	3			14		
LC1021	13			10		

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Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LC1022	8			11		
LC1023	7			22		
LC1024	9			32		
LC1025	16			33		
LC1026	5			34		
LC1027	9			27		
LC1028	27			29		
LC1029	3			108		
LC1030	<0.05			17		
LC1031	3			<0.02		
LC1032	<0.05			16		
LC1033	24			<0.02		
LC1034	21			82		
LC1035	6			85		
LC1036	2			31		
LC1037	5			8		
LC1038	6			23		
LC1039	6			36		
LC1040	11			21		
LC1041	15			19		
LC1042	14			12		
LC1043	15			29		
LC1044	10			23		
LC1101	2			13		
LC1102	3			11		
LC1103	<0.05			19		
LC1104	3			<0.02		
LC1105	3			12		
LC2000	<0.05			17		
LC2001	<0.05			<0.02		
LC2002	<0.05			<0.02		
LC2003	<0.05			<0.02		



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Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LC2004	<0.05			11		
LC2005	2			8		
LC2006	<0.05			16		
LC2007	6			12		
LC2008	5			24		
LC2009	7			22		
LC2010	8			35		
LC2011	4			31		
LC2012	4			18		
LC2013	6			15		
LC2014	6			22		
LC2015	7			21		
LC2016	12			36		
LC2017	14			16		
LC2018	5			16		
LC2019	53			16		
LC2020	30			18		
LC2021	17			66		
LC2022	6			25		
LC2023	10			25		
LC2024	10			14		
LC2025	<0.05			25		
LC3001	16			<0.02		
LC3002	6			52		
LC3003	8			11		
LC3004	6			33		
LC3005	11			52		
LC3006	18			19		
LC3007	7			14		
LC3008	7			23		
LC3009	7			18		
LC3010	5			20		

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Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LC3011	7			20		
LC3012	21			23		
LC3013	11			35		
LC3014	11			17		
LC3015	3			57		
LC3016a	3			20		
LC3016b	10			11		
LC3017	15			32		
LC3018	14			71		
LC3019	2			48		
LC3020	3			19		
LC3021	7			18		
LC3022	10			36		
LC3023	7			42		
LC3024	14			40		
LC3025	3			52		
LC3026	4			18		
LC3027	4			16		
LC3029	17			28		
LC3030	7			27		
LC3031	8			60		
LC3032	<0.05			84		
LM0001			0.4	26		
Lm0002			0.6	6		
Lm0003			2.1	6		
Lm0004			2.6			
Lm0005			0.5	108		
Lm0006			3.3			
Lm0007			0.6			
Lm0008			1.4			
Lm0009			1.3			
LM0010			0.4			

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Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LM0012			0.8			
LM0013			0.9			
Lm0014			1			
Lm0015			2			
Lm0016			0.6			
Lm0017			1.5			
Lm0018			1.4			
Lm0019			2			
Lm0020			3			
Lm0021			1.1			
Lm0022			1.4			
Lm0023			0.6			
Lm0024			1.1			
Lm0025			0.6			
Lm0026			0.3			
Lm0027			4.6			
Lm0028			3.1			
LM0029			2.9			
LM0030			4.8			
LM0031			0.9			
Lm0032			0.9			
Lm0033			1.3			
LM0034			0.6			
Lm0035			0.2			
Lm0036			1.5			
LM0037			0.6			
LM0038			5.6			
Lm0039			32.2			
Lm0040			3			
Lm0041			0.5			
Lm0042			2.3			
Lm0043			2.3			

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Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Lm0044			0.3			
Lm0045			4			
Lm0054			1.1			
Lm0055			0.2			
Lm0056			0.9			
Lm0057			0.2			
Lm0058			0.5			
Lm0060			1.6			
Lm0061			0.2			
Lm0062			<1			
Lm0063			0.6			
Lm0064			0.1			
Lm0065			0.2			
Lm0066			0.2			
Lm0067			0.2			
Lm0068			0.3			
Lm0069			0.1			
Lm0070			<1			
Lm0071			<1			
Lm0072			0.1			
Lm0073			2.1			
Lm0074			4.7			
Lm0075			2.4			
Lm0076			2.2			
Lm0077			6.7			
LM0100			0.4			
LM1000			5.2			
LM1010			0.5			
LM1011			0.7			
LM1012			5.6			
LM1013			15			
LM1014			31.8			

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LM1015			0.9			
LM1016			0.5			
LM1017			0.4			
LM1018			0.8			
LM3001			1.6			
LM3002			1.6			
LM3003			0.8			
LM3004			3			
LM3005			0.4			
LM3006			1.6			
LM3007			0.5			
LM3008			0.9			
LM3009			0.7			
LM3010			1.1			
LM3011			1			
LM3012			1.1			
LM3013			0.2			

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LM3014			0.1			
LM3015			0.4			
LM3016			0.9			
LM3017			0.8			
LM3018			4			
LM3019			0.3			
LM3020			0.5			
LM3021			1.1			
LM3022			0.4			
LM3023			0.6			
LM3024			0.5			
LM3025			0.5			
LM3026			0.7			
LM3027			0.7			
LM3028			0.4			
LM3029			0.7			
LM3030			2.6			
LM3031			0.6			
LM3032			1.6			
LM3033			0.7			
LM3034			0.7			
LM3035			1.6			
LM3036			0.2			
LM3037			1.8			

**Acronyms:**

LOR = limits of reporting

mg/kg = milligrams per kilogram

'---' = criteria have not been derived for these chemical constituents/compounds.

\*In the absence of Australian values, the soil standards for the protection of Environment and human health from Canada (Nova Scotia) have been adopted [Canadian Council of Ministers of the Environment (CCME)]

Job Number: 2731

Client: Agrimin

Site: Lake Mackay

Table 6: Thorium and Uranium Genalysis Soil Sampling Results (offlake)

Sample Matrix	Sediment					
Laboratory	Genalysis					
Date Sampled	20/05/2009-20/07/2009					
Analyte	Uranium	Uranium	Uranium	Thorium	Thorium	Thorium
Run/Instrument	A/MS	A/OES	B/OES	A/MS	B/MS	TL8/MS
LOR	0.05	1	1	0.02	0.01	0.0001
CCME Nova Scotia (Parkland) for protection of human health	23*	23*	23*	23**	23**	23**
CCME Nova Scotia (Parkland) for terrestrial ecological protection	500*	500*	500*	500*	500*	500*
CCME Nova Scotia (Industrial) for protection of human health and environment	300*	300*	300*	300**	300**	300**
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg

**Font and Cell :**

- Coloured cells indicate exceedence of relevant assessment criteria



## Appendix-1 Size by size analysis of Kainite-1 Sample

Mining and Minerals  
Attention: Jack Zhang  
PO #/Project: 14081  
Samples: 9

**SRC Geoanalytical Laboratories**  
125 - 15 Innovation Blvd., Saskatoon, Saskatchewan, S7N 2X8  
Tel: (306) 933-8118 Fax: (306) 933-5656 Email: geolab@src.sk.ca

Report No: G-2017-1489  
Date of Report: Aug 11, 2017

## Potash ICPI Total Digestion

Sample Number	Ag ppm	Al2O3 wt %	Ba ppm	Be ppm	CaO wt %	Cd ppm	Ce ppm	Co ppm	Cr ppm	Cu ppm	Dy ppm	Er ppm	Eu ppm	Fe2O3 wt %	Ga ppm	Gd ppm	Hf ppm
POT003B	<0.2	0.39	11	<0.2	0.97	<1	<1	1	5	<1	<0.2	<0.2	<0.2	0.22	1	<1	<1
Ag-Feed +2.0	<0.2	<0.01	<1	<0.2	<0.01	<1	<1	1	<1	<1	<0.2	<0.2	<0.2	<0.01	<1	<1	<1
Ag-Feed +1.4	<0.2	<0.01	<1	<0.2	<0.01	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.01	<1	<1	<1
Ag-Feed +0.85	<0.2	<0.01	<1	<0.2	<0.01	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.01	<1	<1	<1
Ag-Feed +0.425	<0.2	<0.01	1	<0.2	<0.01	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.01	<1	<1	<1
Ag-Feed +0.212	<0.2	<0.01	<1	<0.2	<0.01	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.01	<1	<1	<1
Ag-Feed +0.106	<0.2	<0.01	<1	<0.2	<0.01	<1	<1	1	<1	<1	<0.2	<0.2	<0.2	<0.01	<1	<1	<1
Ag-Feed -0.106	<0.2	<0.01	<1	<0.2	0.01	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.01	<1	<1	<1
Ag-Feed -0.106 R	<0.2	<0.01	<1	<0.2	0.01	<1	<1	1	<1	<1	<0.2	<0.2	<0.2	<0.01	<1	<1	<1

Mining and Minerals  
Attention: Jack Zhang  
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Report No: G-2017-1489  
Date of Report: Aug 11, 2017

## Potash ICPI Total Digestion

Sample Number	Ho ppm	K2O wt %	La ppm	Li ppm	MgO wt %	MnO wt %	Mo ppm	Na2O wt %	Nb ppm	Nd ppm	Ni ppm	P2O5 wt %	Pb ppm	Pr ppm	S ppm	Sc ppm	Sm ppm
POT003B	<1	19.1	<1	3	2.34	<0.01	<1	30.3	<1	<1	2	<0.01	1	<1	1870	<1	<1
Ag-Feed +2.0	<1	0.76	<1	<1	19.7	<0.01	<1	8.64	<1	<1	<1	<0.01	1	<1	145000	<1	<1
Ag-Feed +1.4	<1	1.76	<1	<1	18.1	<0.01	<1	10.1	<1	<1	<1	<0.01	1	<1	132000	<1	<1
Ag-Feed +0.85	<1	2.28	<1	<1	18.3	<0.01	<1	11.8	<1	<1	<1	<0.01	2	<1	133000	<1	<1
Ag-Feed +0.425	<1	3.66	<1	<1	15.1	<0.01	<1	16.0	<1	<1	<1	<0.01	<1	<1	112000	<1	<1
Ag-Feed +0.212	<1	3.35	<1	<1	13.3	<0.01	<1	21.1	<1	<1	<1	<0.01	<1	<1	98600	<1	<1
Ag-Feed +0.106	<1	2.58	<1	<1	12.1	<0.01	<1	22.6	<1	<1	<1	<0.01	1	<1	87300	<1	<1
Ag-Feed -0.106	<1	11.1	<1	<1	12.7	<0.01	<1	16.4	<1	<1	<1	<0.01	2	<1	86600	<1	<1
Ag-Feed -0.106 R	<1	11.0	<1	<1	12.0	<0.01	<1	16.5	<1	<1	<1	<0.01	1	<1	86100	<1	<1

December 2017

Salt Processing

Mining and Minerals  
Attention: Jack Zhang  
PO #/Project: 14081  
Samples: 9

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Report No: G-2017-1489  
Date of Report: Aug 11, 2017

**Potash ICPI Total Digestion**

Sample Number	Sn ppm	Sr ppm	Ta ppm	Tb ppm	Th ppm	TiO2 wt %	U, ICP ppm	V ppm	W ppm	Y ppm	Yb ppm	Zn ppm	Zr ppm
POT003B	<1	22	1	<1	<1	0.02	<2	3	1	<1	0.1	7	3
Ag-Feed +2.0	<1	<1	1	<1	<1	<0.01	<2	<1	<1	<1	<0.1	<1	1
Ag-Feed +1.4	<1	<1	<1	<1	<1	<0.01	<2	<1	<1	<1	<0.1	<1	1
Ag-Feed +0.85	<1	<1	1	<1	<1	<0.01	<2	<1	<1	<1	<0.1	<1	2
Ag-Feed +0.425	<1	1	2	<1	<1	<0.01	<2	<1	<1	<1	<0.1	<1	1
Ag-Feed +0.212	<1	<1	1	<1	<1	<0.01	<2	<1	<1	<1	<0.1	<1	1
Ag-Feed +0.106	<1	<1	<1	<1	<1	<0.01	<2	<1	<1	<1	<0.1	<1	<1
Ag-Feed -0.106	3	2	1	<1	<1	<0.01	<2	<1	<1	<1	<0.1	<1	8
Ag-Feed -0.106 R	3	2	<1	<1	<1	<0.01	<2	<1	<1	<1	<0.1	<1	8

Potash Total Digestion: A 0.125 g pulp is gently heated in a mixture of HF/HNO<sub>3</sub>/HClO<sub>4</sub> until dry and the residue is dissolved in dilute HNO<sub>3</sub>. The standard is POT003B.

December 2017

Salt Processing

## Appendix-2 Size by size analysis of Decomposed Kainite-1 Sample

Mining and Minerals  
Attention: Jack Zhang  
PO #/Project: 14081  
Samples: 9

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Report No: G-2017-1390  
Date of Report: Jul 27, 2017

### Potash ICPI Total Digestion

Sample Number	Ag ppm	Al2O3 wt %	Ba ppm	Be ppm	CaO wt %	Cd ppm	Ce ppm	Co ppm	Cr ppm	Cu ppm	Dy ppm	Er ppm	Eu ppm	Fe2O3 wt %	Ga ppm	Gd ppm	Hf ppm
POT003B	<0.2	0.38	11	0.2	0.90	<1	<1	<1	4	<1	<0.2	<0.2	<0.2	0.20	1	<1	<1
Ag-DC +1.4	<0.2	<0.01	1	<0.2	<0.01	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.01	<1	<1	<1
Ag-DC +0.85	<0.2	<0.01	<1	<0.2	<0.01	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.01	<1	<1	<1
Ag-DC +0.42	<0.2	<0.01	1	<0.2	<0.01	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.01	<1	<1	<1
Ag-DC +0.212	<0.2	<0.01	<1	<0.2	<0.01	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.01	<1	<1	<1
Ag-DC +0.106	<0.2	0.02	1	<0.2	<0.01	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.01	<1	<1	<1
Ag-DC -1 +0.053	<0.2	<0.01	<1	<0.2	<0.01	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.01	<1	<1	<1
Ag-DC -0.053	<0.2	<0.01	<1	<0.2	0.02	<1	<1	<1	<1	1	0.4	<0.2	<0.2	<0.01	<1	<1	<1
Ag-DC -0.053 R	<0.2	<0.01	<1	<0.2	0.02	<1	<1	<1	1	1	0.4	<0.2	<0.2	<0.01	<1	<1	<1

Mining and Minerals  
Attention: Jack Zhang  
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Samples: 9

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Report No: G-2017-1390  
Date of Report: Jul 27, 2017

### Potash ICPI Total Digestion

Sample Number	Ho ppm	K2O wt %	La ppm	Li ppm	MgO wt %	MnO wt %	Mo ppm	Na2O wt %	Nb ppm	Nd ppm	Ni ppm	P2O5 wt %	Pb ppm	Pr ppm	S ppm	Sc ppm	Sm ppm
POT003B	<1	19.3	<1	3	2.29	<0.01	<1	30.3	<1	<1	2	<0.01	<1	<1	1850	<1	<1
Ag-DC +1.4	<1	0.71	<1	<1	21.4	<0.01	<1	8.38	<1	<1	<1	<0.01	<1	<1	164000	<1	<1
Ag-DC +0.85	<1	0.92	<1	<1	19.1	<0.01	<1	13.6	<1	<1	<1	<0.01	<1	<1	146000	<1	<1
Ag-DC +0.42	<1	5.78	<1	<1	13.9	<0.01	<1	16.5	<1	<1	<1	<0.01	<1	<1	122000	<1	<1
Ag-DC +0.212	<1	7.72	<1	<1	10.0	<0.01	<1	23.0	<1	<1	<1	<0.01	<1	<1	100000	<1	<1
Ag-DC +0.106	<1	6.00	<1	<1	10.1	<0.01	<1	26.4	<1	<1	1	<0.01	1	<1	94200	<1	<1
Ag-DC -1 +0.053	<1	17.0	<1	<1	10.8	<0.01	<1	12.5	<1	<1	<1	<0.01	<1	<1	131000	<1	<1
Ag-DC -0.053	<1	21.2	<1	<1	12.0	<0.01	<1	5.68	<1	<1	1	<0.01	<1	<1	152000	<1	<1
Ag-DC -0.053 R	<1	20.9	<1	<1	12.0	<0.01	<1	5.62	<1	<1	1	<0.01	1	<1	152000	<1	<1



December 2017

Salt Processing

Mining and Minerals  
Attention: Jack Zhang  
PO #/Project: 14081  
Samples: 9

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Report No: G-2017-1390  
Date of Report: Jul 27, 2017

**Potash ICPI Total Digestion**

Sample Number	Sn ppm	Sr ppm	Ta ppm	Tb ppm	Th ppm	TiO2 wt %	U, ICP ppm	V ppm	W ppm	Y ppm	Yb ppm	Zn ppm	Zr ppm
POT003B	<1	21	1	<1	<1	0.02	<2	3	2	<1	0.1	6	3
Ag-DC +1.4	<1	<1	1	<1	<1	<0.01	<2	<1	<1	<1	<0.1	<1	1
Ag-DC +0.85	<1	<1	1	<1	<1	<0.01	<2	<1	<1	<1	<0.1	<1	1
Ag-DC +0.42	<1	<1	1	<1	<1	<0.01	<2	<1	<1	<1	<0.1	<1	<1
Ag-DC +0.212	<1	1	<1	<1	<1	<0.01	<2	<1	<1	<1	<0.1	<1	1
Ag-DC +0.106	<1	1	1	<1	<1	<0.01	<2	<1	<1	<1	<0.1	2	2
Ag-DC -1 +0.053	<1	1	1	<1	<1	<0.01	<2	<1	<1	<1	<0.1	<1	1
Ag-DC -0.053	17	6	<1	<1	<1	<0.01	2	<1	<1	<1	<0.1	2	14
Ag-DC -0.053 R	16	6	<1	<1	<1	<0.01	<2	<1	<1	<1	<0.1	2	14

Potash Total Digestion: A 0.125 g pulp is gently heated in a mixture of HF/HNO<sub>3</sub>/HClO<sub>4</sub> until dry and the residue is dissolved in dilute HNO<sub>3</sub>. The standard is POT003B.

## Appendix-3 Kainite Flotation Brine Composition

Diluted to 50% before analysis

Replicate Data: Ag CF B1						
Repl#	Analyte	Net Intensity	Corrected Intensity	Conc. Units	Calib. Conc. Units	Sample Conc. Units
1	Lu	132785.8	132785.8	9.54083 ppm		
1	Al2O3†	-12.3	-8.3	-0.0710616 ppm	-0.0000621 wt%	12:11:13 PM
1	Fe2O3†	27.0	13.6	0.0423828 ppm	0.0000370 wt%	12:11:33 PM
1	CaO†	592.7	597.5	2.04328 ppm	0.0017851 wt%	12:11:33 PM
1	MgO†	1583605.4	1659815.0	5845.84 ppm	5.10732 wt%	12:11:11 PM
1	K2O†	1287.1	1347.5	1126.13 ppm	0.983865 wt%	12:11:54 PM
1	Na2O†	8087.4	8456.5	760.783 ppm	0.664672 wt%	12:11:13 PM
1	Pb†	15.8	3.4	0.0073051 ppm	0.0638223 ppm	12:12:20 PM
1	Li†	441.2	572.0	0.0097426 ppm	0.0851176 ppm	12:11:33 PM
1	U†	-46.1	-9.9	-0.0011251 ppm	-0.0098299 ppm	12:12:00 PM
1	Mn†	8.9	1.9	0.0021508 ppm	0.0187908 ppm	12:12:20 PM
1	P2O5†	-47.4	9.3	0.158013 ppm	0.0001381 wt%	12:12:20 PM
1	Cd†	19.7	-1.4	-0.0005296 ppm	-0.0046269 ppm	12:12:20 PM
1	MnO†	34.1	39.5	0.0091444 ppm	0.0000080 wt%	12:11:33 PM
1	Cr†	-33.1	-37.3	-0.110168 ppm	-0.962499 ppm	12:11:33 PM
1	V†	-5.0	-8.3	-0.0055846 ppm	-0.0487905 ppm	12:11:33 PM
1	Be†	60.6	-8.7	-0.0005116 ppm	-0.0044699 ppm	12:11:33 PM
1	TiO2†	53.4	3.5	0.0005167 ppm	0.0000005 wt%	12:11:33 PM
1	Zr†	25.5	23.4	0.0092671 ppm	0.0460168 ppm	12:11:33 PM
1	Y†	-34.4	-30.1	0.0164926 ppm	0.144090 ppm	12:11:33 PM
1	La†	44.9	73.6	-0.0884964 ppm	-0.773164 ppm	12:11:33 PM
1	Th†	9.9	-31.1	-0.0007797 ppm	-0.0068118 ppm	12:12:00 PM
1	Sr†	206.8	200.4	0.0672076 ppm	0.587171 ppm	12:11:33 PM
1	Ba†	5.0	5.6	0.0073522 ppm	0.0642335 ppm	12:11:33 PM
1	W†	11.3	6.9	-0.0513385 ppm	-0.448528 ppm	12:12:20 PM
1	Sn†	-3.4	-3.6	-0.153027 ppm	-1.33695 ppm	12:12:20 PM
1	Sc†	-0.9	4.2	0.0001598 ppm	0.0013959 ppm	12:11:33 PM
1	Nb†	-1729.8	-1397.6	-0.0238112 ppm	-0.208031 ppm	12:11:58 PM
1	Ga†	124.8	187.4	-0.113131 ppm	-0.988387 ppm	12:12:00 PM
1	Ta†	24.3	5.4	0.0171490 ppm	0.149825 ppm	12:12:20 PM
1	Prt	38.5	57.8	0.0031382 ppm	0.0274175 ppm	12:12:20 PM
1	Nd†	-48.7	-9.6	-0.0005152 ppm	-0.0045013 ppm	12:12:00 PM
1	Sm†	-144.6	-207.3	-0.0184316 ppm	-0.161031 ppm	12:12:00 PM
1	Eu†	-2.2	0.4	0.0000038 ppm	0.0000330 ppm	12:12:20 PM
1	Gd†	47.8	7.4	0.0002489 ppm	0.0021745 ppm	12:12:20 PM
1	Tb†	21.8	19.6	0.0017076 ppm	0.0149192 ppm	12:12:00 PM
1	Dy†	-7.8	5.9	0.0000959 ppm	0.0008379 ppm	12:12:20 PM
1	Ho†	87.8	-16.5	-0.0008814 ppm	-0.0077001 ppm	12:12:20 PM
1	Er†	-29.8	2.8	-0.0115930 ppm	-0.101284 ppm	12:12:20 PM
1	Hf†	9.4	8.5	-0.168072 ppm	-1.46839 ppm	12:12:20 PM
1	Yb†	59.8	15.6	0.0000363 ppm	0.0003168 ppm	12:12:20 PM
1	Ce†	37.3	-33.8	-0.0020849 ppm	-0.0182150 ppm	12:12:00 PM
1	Int	35.8	37.5	0.713731 ppm	6.23563 ppm	12:12:20 PM
1	Cu†	-1.4	-0.7	-0.0002367 ppm	-0.0020682 ppm	12:11:33 PM
1	Zn†	0.9	2.0	-0.0557320 ppm	-0.486912 ppm	12:11:33 PM
1	Co†	1.2	1.3	0.0050531 ppm	0.0441472 ppm	12:11:33 PM
1	Ni†	-1.6	0.6	0.0024063 ppm	0.0210230 ppm	12:11:33 PM
1	Ag†	-14.6	-3.7	-0.0015063 ppm	-0.0131599 ppm	12:11:33 PM
1	As†	-0.9	0.5	0.0045768 ppm	0.0399863 ppm	12:12:20 PM
1	Bi†	13.9	1.8	0.0017347 ppm	0.0151558 ppm	12:12:20 PM
1	Ge†	-106.3	-50.9	-0.0243734 ppm	-0.212943 ppm	12:12:20 PM
1	Sb†	-9.9	-3.2	-0.0070802 ppm	-0.0618574 ppm	12:12:20 PM
1	Se†	-16.2	-2.4	-0.0056085 ppm	-0.0489995 ppm	12:12:20 PM
1	Te†	-74.2	2.8	-0.148293 ppm	-1.29559 ppm	12:12:20 PM
1	Hg†	-25.5	-4.7	-0.0026364 ppm	-0.0230335 ppm	12:12:20 PM
1	Tl†	-7.2	-4.2	-0.0224446 ppm	-0.196091 ppm	12:12:20 PM
1	St	41746.2	43754.9	1125.55 ppm	9833.60 ppm	12:11:13 PM