

# Saskatchewan Potash Properties Technical Overview



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# **Technical Overview**

# Contents

# **Table of Contents**

Con	tents		2
1.0	Intro	ction	5
	1.1.	Permit Description	6
		1.1.1 Location Map	6
		1 1 2 Regional Geology	7
		1 1 3 Saskatchewan Potash Permit Regulations	9
	12	Technical Expertise	3
	1.2.	1.2.1 RPS Energy	11
		1.2.2 North Rim	11
			11
2.0	Foan	ake	12
	2.1.	Introduction	12
		2.1.1. Permit description	12
		2.1.2. Foam Lake Local Geology	14
	2.2.	Exploration Activities	15
		2.2.1. Seismic	15
		2.2.2. Drilling	18
	2.3.	Foam Lake Mineral Resource Estimate Results	23
	2.4.	Proposed Foam Lake Mine and Mill	26
		2.4.1 Foam lake Potash Surface Facilities and Renderings	26
	2.5.	Infrastructure	32
		2.5.1. Highways	32
		2.5.2. Rail Line	32
		2.5.3. Power	33
		2.5.4. Natural Gas	35

	2.5.5	. Water
	2.5.6	. Communications
	2.5.7	. Topography/climate
	2.5.8	. Manpower
3.0	Stockholm	
	3.1. Introd	uction
	3.1.1	. Permit description
	3.1.2	. Stockholm Local Geology
	3.2. Explor	ation Activities
4.0	Conclusion	
5.0	References	

# List of Figures

Figure 1: North Atlantic Potash Permit Location Map	6
Figure 2: Stratigraphy of the Prairie Formation in Saskatchewan (modified from Holter, 1969)	8
Figure 3: Regional geological cross-section of the Prairie Evaporite Formation Adopted from North Rim Technical	I
Summary Report, Dec 2012)	9
Figure 4: Project location map from North Rim Technical Summary, Dec 2012	13
Figure 5: 2D seismic location map with collapse features from North Rim Technical Summary, Dec 2012	17
Figure 6: Type section drill hole well 4-18-29-10W2 from North Rim Technical Summary, Dec 2012	20
Figure 7: NAP Foam Lake 4-27-28-11 W2 core photo	21
Figure 8: Conventional Mining Resource Areas – EM1 from North Rim Technical Summary, Dec 2012	24
Figure 9: NAP-Foam Lake Plant layout	28
Figure 10: NAP-Foam Lake Plant south-southwest with potash train	29
Figure 11: NAP-Foam Lake Plant Northwest with rail loadout	30
Figure 12: NAP-Foam Lake Plant Southeast production shaft and conveyance	31
Figure 13: Infrastructure Map from North Rim Technical summary, Dec 2012	34
Figure 14: KP421 Location Map	38
Figure 15: NAP 5-10-19-03W2 gamma geophysical log	42

# List of Tables

Table 1: Foam Lake Property Subsurface Mineral Permit Information	12
Table 2: Resource Summary from North Rim Technical Summary Report, Dec 2012	25
Table 3: Comparison of Greenfield Potash Projects	25
Table 4: Permit description/acres-KP421	38
Table 5: Analysis summary for NAP Stockholm 5-10-19-3	42

# List of Appendices

Appendix A – Biography of David C.E. Waugh	. 45
Appendix B – Biography of Milton Holter M.Sc., P.Eng, P.Geo	.46

# 1.0 Introduction - North Atlantic Potash and Holdings

This summary report will serve to introduce the reader to North Atlantic Potash Inc. (North Atlantic) a Canadian company owned by JSC Acron Group. The information described below is based on two years of potash exploration on North Atlantic properties identified as the Foam Lake and Stockholm Projects in the province of Saskatchewan. This overview report was prepared by North Atlantic's internal technical team. Detailed independent reports by North American leading potash geologic, geophysical and engineering consultants support the seismic and geologic information used for the Technical Overview discussed in this report (Section 1.2). These reports are available to parties interested in additional information. The next stage for the Foam Lake Project is a Scoping and/or Pre-Feasibility Study as well as initiation of an Environmental Impact Assessment Study.

North Atlantic is a growing company focused on developing potash production in Canada. The company initially owned 26 permits covering 850,000 hectares (2.1 million acres) in the Saskatchewan Potash Area, selling 8 permits in September 2011 to Yancoal Canada, a subsidiary of Yanzhou Coal Mining Company Limited of China. Currently North Atlantic possesses 18 potash permits in Saskatchewan (485,000 hectares) within the government Potash Designated Area. This includes 245,000 hectares fully controlled by North Atlantic and 240,000 hectares held within a Joint Venture with Rio Tinto Exploration Canada Inc. (60% NAP, 40% Rio).

An extensive exploration program, directed by Rio Tinto, is underway in the Joint Venture which has potash solution mining capability. North Atlantic's 9 wholly owned permits were evaluated and five were selected as having the highest priority for potash exploration. Four of these permits are contiguous and cover an area of 129,000 hectares in the Foam Lake area of the province. A 2D seismic survey was completed for these permits and an 11 hole drilling program undertaken with the last well completed December 2012. The main potash horizon intersected is the Esterhazy Member which is considered the best potash resource in the world due to mineral quality, very low clay content and excellent structure characteristics equating to low mining and processing costs. Mosaic K1 and K2 and PCS Rocanville mines produce from the Esterhazy Member and are considered to have the lowest operating costs in Canada.

North Rim Exploration Ltd., one of the leading geologic consulting firms in North American potash exploration, was selected to plan, monitor, secure, log, and sample the potash wells and prepare a geologic resource evaluation. A Canadian standard 43-101 Resource Report for the Foam Lake property by North Rim was completed December 2012.

A second exploration target, KP421 bordering the Mosaic Esterhazy Mining Lease and BHP Billiton Permits, was also selected for evaluation. A 2D Seismic Survey re-evaluation was completed by RPS Boyd PetroSearch and a drill hole location selected. A drill rig was moved onto location the week of July 23, 2012 and was completed in early August with very favorable results as detailed in Section 3 - Stockholm.

North Atlantic has four additional potash permits, KP388, KP390, KP400, and KP410 that will be evaluated following completion of the exploration on the Foam Lake and Stockholm Properties.

# 1.1. Permit Description

The Saskatchewan potash permits are located in the world's largest potash reserve in a country with very stable government, world-class financial system, highly skilled workforce, excellent transportation and infrastructure. This is in sharp contrast to other Greenfield properties frequently located in geopolitically unstable regions with poor infrastructure and often very complex potash geology. The Saskatchewan Potash Area is presently 100% permitted including ownership by many of the world's largest mining companies such as BHP Billiton and Rio Tinto and leading potash producers PCS, Mosaic, K+S and Agrium.



#### 1.1.1. Location Map

Figure 1: North Atlantic Potash Permit Location Map

### 1.1.2. Regional Geology

The Potash resources of Saskatchewan are part of extensive shallow marine sequence of the Middle Devonian, Elk-Point Group. The potassium bearing minerals in the Elk Point Group are located in the Prairie Evaporate Formation (see Figure 3).

The potash-bearing Prairie Evaporite Formation of Saskatchewan was laid down within the Saskatchewan Subbasin at the distal end of the Middle Devonian Elk Point Basin Saline waters flooded the Basin from the north through a series of at least four sub-basins. The northernmost of these features has been designated as the Mackenzie Sub-basin and sea water flowing from here into the more southerly Northern Alberta Sub-basin was somewhat restricted by the Pres'Quile Reef complex. The Northern Alberta Sub-basin was, in a similar manner, partially separated from the Central Alberta Sub-basin immediately to the south by the tectonically positive Peace River-Athabasca Arch. The Meadow Lake Escarpment, which is interpreted to have been a tectonically positive feature in Middle Devonian times, restricted normal seawater flow into and out of the Saskatchewan Sub-basin. The increasingly concentrated nature of the Elk Point Sub-basin water toward the southeast resulted in more highly saturated saline seawater and the ultimate deposition of potash minerals within the Saskatchewan region.

Three potash units may be present including (from the base to uppermost) the Esterhazy, Belle Plaine, and Patience Lake Members (Holter, 1969). The Prairie Evaporite is underlain by the Winnipegosis Formation and immediately overlain by the Second Red Beds, the basal strata of the Dawson Bay Formation. Both the Winnipegosis and Dawson Bay mainly include carbonate strata. The potash strata of Saskatchewan have a relatively simple mineralogy, stratigraphy, and structure. Two potash minerals are prevalent: sylvite (KCl) and carnallite (KCl.MgCl<sub>2</sub>.6H<sub>2</sub>O). Prairie Evaporite potash bedding demonstrates widespread lateral consistency and individual higher grade units may normally be traced for more than tens of kilometers.

These mineralized zones are generally flat lying interbeds of sylvite, halite, carnallite and clay, with minor amounts of anhydrite. The Esterhazy and Patience Lake Members are mined in the 7 conventional underground mining sites in Saskatchewan while Mosaic's Belle Plaine solution operation extracts all three members. The Esterhazy Member sylvinite is considered the best potash interval in the world in terms of mineralogy with very low insolubles and favorable rock mechanics which allows wide mining rooms with minimum ground control.



Figure 2: Stratigraphy of the Prairie Formation in Saskatchewan (Holter, 1969)

The uppermost contact between the Prairie Evaporite and the Dawson Bay is termed the Second Red Beds and consists of dolomitic shale. The basal depositional contact is marked by a sharp transition from Prairie Evaporite halite to an assortment of Winnipegosis Formation dolostones, limestones, and anhydrite interbeds. Regionally, the Winnipegosis forms a broad flat basin to platform deposit with local development of limestone/dolomite reef-like systems known as Winnipegosis mounds which are readily apparent on seismic profiles.

Overlying the Elk Point Group is a sequence of rocks commonly referred to as the Manitoba Group which consists of the Dawson Bay Formation and overlying Souris River Formation. Two halite beds are locally found to be incorporated into the Manitoba Group including the Hubbard Salt and Davidson Evaporite.



Figure 3: Regional geological cross-section of the Prairie Evaporite Formation (adopted from North Rim Technical Summary Report, Dec 2012)

The section demonstrates the lateral extent and consistency of the Prairie Evaporite Formation across southern Saskatchewan over hundreds of kilometers through the correlation of clay seams and mineralized beds.

### 1.1.3. Saskatchewan Potash Permit Regulations

In Saskatchewan, mineral tenure is regulated and governed by both the *Subsurface Mineral Regulations* (The Subsurface Mineral Regulations, 1960) and the *Crown Minerals Act* (The Crown Minerals Act, 1984-85-86).:

Crown Mineral Rights are mineral titles that are owned by the Saskatchewan Provincial Government and in some instances the federal government as in the case of National Parks or Reserve land.

Today provincially held mineral rights are administered by the Saskatchewan Government Ministry of Energy and Mines.

Freehold Subsurface Mineral Rights are mineral titles which are owned by companies or by private individuals and can be disposed of under any terms and conditions the owner chooses. Any homestead grants issued after the late 1800's were for surface rights only and the mineral rights remained the property of the Crown. In some cases both the surface and mineral rights could be obtained when Saskatchewan settlers purchased land from private holding companies or railways. Over the years most Freehold titles have passed through several owners and in some instances the mineral rights have been separated from the surface title.

#### ACTS AND REGULATIONS

Subsurface Mineral Permits are described in the Saskatchewan Government Subsurface Minerals Regulation. The following conditions are relevant to potash permits owned by NAP:

- 1. Application for permit, the area not to exceed 100,000 acres and such lands to be one solid block of contiguous lands as approved by the Minister.
- 2. The Application shall be accompanied by:
  - a. A plan and legal description of the area applied for;
  - b. A fee of \$100 CAD;
  - c. Rental for the first year of the term of the permit, the rental being \$0.50 CAD per acre for the first 5 years with \$10,000 CAD for the first extension period, \$20,000 CAD for the second extension, and \$40,000 CAD for the third extension period;
  - d. A deposit of \$2,000 CAD, which is refundable within 30 days after the expiration date of the permit or sooner if terminated earlier than the full term;
  - e. Details of the work to be carried out;
  - f. Names and addresses of the directors and officers if the applicant is a corporation; and
  - g. A statement of financial position of the applicant.
- 3. The permittee shall have the exclusive right to prospect for subsurface minerals in the Project Area.
- 4. The term of the permit shall be 5 years from the date of issue and such term may be extended upon application by the permittee for not more than three extension periods of one year each.
- 5. The permittee shall be required to expend for work upon the permit lands the amounts of \$40,000 CAD during each of the second and third years of the term of the permit and \$80,000 CAD during each of the fourth and fifth years of the term of the permit with proof offered to the Minister in the form of a detailed statement, such statement which may require certification by a chartered accountant or certified public accountant satisfactory to the minister.
- 6. In the event the permittee is deficient in the amount spent during any one period, the deficiency may be satisfied by a cash payment equivalent to the deficiency.
- 7. Consolidation of smaller permits is allowed, provided that the size of the consolidated permits does not exceed 100,000 acres.

The permittee has the right to surrender at any time all lands in the Project Area or any portion thereof, but the surrender shall not entitle the permittee to a refund of any rental for the current year. The permittee may, with the approval of the Minister, add or substitute Crown subsurface mineral lands for lands in the permit.

# **1.2 Technical Expertise**

#### 1.2.1. **RPS Energy**

RPS Energy, formerly Boyd PetroSearch (RPS), has been involved with seismic acquisition and interpretation since 1977. Specifically, RPS has been involved with the potash industry since 1984. RPS has conducted similar potash projects for a number of companies, including BHP Billiton Canada, Potash Corporation of Saskatchewan, International Minerals Corporation, Mosaic Potash, Potash One, Western Potash, Vale Potash, and Agrium Potash. RPS Energy has been the primary seismic consulting firm for all operators in the Canadian potash industry since 1986. As a seismic technology services provider for Potash Corporation of Saskatchewan, Mosaic Potash, Vale Potash Canada, Western Potash, and Agrium Potash, RPS has an unprecedented understanding of the Prairie Evaporite geological section gleaned from thousands of kilometers of 2D and tens of thousands of square kilometers of 3D seismic in the vicinity of Saskatoon, Regina and Esterhazy, Saskatchewan. During this time RPS has undertaken in excess of 70 projects at 13 different mine sites. Mining depths on these projects have ranged from less than 450 meters to over 1200 meters. Geological conditions have included both horizontally layered Western Canadian sites and highly structured sites in Canada's Maritime Provinces. Projects typically involve all facets of seismic exploration: survey design, acquisition, processing, interpretation, reporting, and final presentation.

#### 1.2.2. North Rim

North Rim Exploration Ltd. was contracted to carry out the geologic evaluation of the Foam Lake and Stockholm Projects. This included drill planning, core control and security, logging, sampling and preparation of 43-101 Resource Calculations and Report all as required within NI 43-101 Resource Studies. North Rim has worked on potash and coal projects for Encanto Potash, America West Potash, Athabasca Potash, NuCoal Energy, Westcore Energy and Wescan Goldfields as well as has completed data reviews of historical potash deposits in Australia and Arizona, and has completed a historical resource calculation of a potash deposit in the Holbrook Basin, Arizona. In 2012 North Rim completed reviews of properties in Laos, Brazil, Spain, North America and Australia.

Mr. Dave Mackintosh, P. Geo, consulting for North Rim, reviewed the contents of North Atlantic Potash's Foam Lake 43-101 compliant Resource Report. Mr. Mackintosh, of ADM Consulting, offers expertise in all aspects of potash and salt mining. With over 41 years of experience in soft rock mechanics and mine

engineering, ADM Consulting specializes in mine design and mine planning as well as carrying out mining feasibility studies, ore reserve evaluations and audits. Dave has completed various feasibility studies and ore reserve estimations on potash properties in Thailand, Argentina, Brazil, and Canada, nitrate and iodine prospects in Chile, and trona properties in Wyoming, U.S.A. He has managed mine inflow and shaft grouting projects in Canada, as well as seismic and deep core drilling exploration programs. He continues to provide geological, rock mechanics and mine planning services to a potash mine producing 2.0 million tonnes of product per year.

# 2.0 Foam Lake

# 2.1. Introduction

The Property is located approximately 250 km SE of Saskatoon near the community of Foam Lake. The Project Area is comprised of four individual, contiguous subsurface mineral claims; KP 382, KP 383, KP 508, and KP 509. The permits encompass 318,027 acres of Crown Minerals Lands (Table 1). The permits span a region north-south from Township 26 to 30 and east-west from Range 8 to 13, all west of the Second Meridian. The Property is bound to the north by Canada Potash Corp., to the south by Yancoal Canada, to the east by Athabasca Resource Partnership (BHP Billiton) and Canada Potash Corp. permits, and to the west by Athabasca Resource Partnership (BHP).

#### 2.1.1. Permit description

Permit	Townships	Ranges(W2)	Acres	
KP 382 29, 30		11, 12, 13	93,138.5	
KP 383	29, 30	8, 9, 10, 11	76,103.3	
KP 508	27, 28	11, 12	68,271	
KP 509	26, 27, 28	9, 10, 11	80,514	

Table 1: Foam Lake Property Subsurface Mineral Permit Information



#### 2.1.2. Foam Lake Local Geology

The Patience Lake, Belle Plaine and Esterhazy Members of the Prairie Evaporite Formation are present within the Foam Lake Project Area. The stratigraphic nomenclature is based on that presented by Holter (1969) and Fuzesy (1982). The following is a summary of the key potash-bearing members intersected in the 11 well drilling program:

- Patience Lake Member: The Patience Lake is the uppermost member of the Prairie Evaporite Formation. Sylvite-rich beds within this unit are extracted using conventional underground mining techniques in the Saskatoon and Lanigan areas of Saskatchewan, and by solution-mining techniques at Mosaic's Belle Plaine Potash Mine. Within the Project Area, the Patience Lake Member has an average geologic thickness of 5.19 m over nine of the wells which intersected the member. The saltback, salt layer between potash and overlying Dawson Bay ranged from 0.38 to 3.25 m which was considered very thin for conventional underground mining. The top of this Member ranges from 996.88 to 1068.93 m below surface and the lower boundary ranges from 1004.02 to 1074.44 m. Based on the thin salt back and presence of carnallite the Patience Lake Member was excluded from the resource evaluation.
- **Belle Plaine Member:** The Belle Plaine Member is stratigraphically lower than the Patience Lake Member; barren halite horizons separate these two members. The Belle Plaine is extracted using solution-mining techniques at Mosaic's Belle Plaine Potash Mine.

The Belle Plaine Member has an average geologic thickness of 12.63 m throughout the Project Area over nine wells which intersected it; the top of the member ranges from 973.64 to 1082.41 m and the base extends 987.13 to 1095.84 m below the surface. The Belle Plaine in this area is characterized by thick successions of massive carnallite with minor sylvite and insolubles. Based on the high presence of carnallite the Belle Plaine Member was excluded from the resource evaluation.

• Esterhazy Member: The Esterhazy Member underlies the Belle Plaine Member and is separated from it by a barren halite zone with minor clay marker horizons. The Esterhazy Member is the most prospective of the potash-bearing Members in the Project Area. In Saskatchewan, sylvite is extracted from this Member by conventional underground techniques at the Esterhazy and Rocanville Potash Mines and by solution-mining techniques at Mosaic's Belle Plaine Potash Mine.

The Esterhazy Member was selected as the prospective potash Member of interest as it has the following characteristics:

- the most continuous geology and grade;
- lower carnallite;
- thicker salt back than the Patience Lake Member; and
- lower clay content than that of the Patience Lake or Belle Plaine Members.

For the purpose of this report, the Esterhazy Member has been divided into the Upper and Lower Esterhazy Sub-Members. The Upper Esterhazy Sub-Member is the target zone due to higher grades relative to the Lower Esterhazy. The target zone has three distinct K<sub>2</sub>O peaks, termed Esterhazy 1, 2 and 3 (EM1, EM2 and EM3) from top to bottom. The calculation for Mineral Resource uses Esterhazy 1 (EM1) and Esterhazy 3 (EM3) as they are the most laterally continuous and have the highest overall grades.

Of the potash-bearing Members in the Project Area, the Esterhazy Member contains the least amount of clays, averaging 0.88% insolubles, and is characteristically coarse grained which are positive processing characteristics. It has an average geologic thickness of 16.78m and an average total K<sub>2</sub>O grade of 8.85% over this thickness. The mineralogy was found to be cloudy, iron oxide-rimmed, reddish pink to dark grey sylvite crystals averaging 0.2 to 2.2 cm in diameter. The Esterhazy also contains interstitial reddish orange carnallite in all of the wells drilled to date averaging 8.91% over the geologic thickness.

# 2.2. Exploration Activities

#### 2.2.1. Seismic

North Atlantic completed two separate seismic surveys in the Foam Lake Project Area between March 2011 and July 2012. As part of a geophysical subsurface investigation North Atlantic Potash Inc. contracted RPS Boyd PetroSearch the primary potash geophysical consultant. RPS Boyd PetroSearch under leadership of Roger Edgecombe manages the field surveys and carries out the interpretation for most of the 2D and 3D Seismic Surveys for the potash producers and developers in Saskatchewan. The initial NAP contract was to acquire 293.7 km of two dimensional (2D) seismic data and purchased an additional 36.3 km of trade data over in the Foam Lake Project Area for a cost of \$2.5 million.

The trade data purchased and the newly acquired data was interpreted by RPS Boyd PetroSearch between March 2011 and March 2012. Several features are identified within the 2D dataset, including the presence of Winnipegosis mounds, and evidence of survey small collapse features. However, as identified in the RPS Boyd PetroSearch seismic report there are no features which would indicate large scale salt dissolution, removal or channeling. Minor features are present or indicated which will be delineated further with the acquisition of additional 3D seismic data to assist in future underground mine planning.

The following discussion is taken from RPS Boyd PetroSearch' s report entitled, "2011 Foam Lake 2D Seismic Interpretation" and "2011 Winthorpe 2D Seismic Interpretation". Based on the integrated work completed to date, the following conclusions are derived:

• In general, quality of the historic 2D data is good and consistent with recent modern day data for the area. The data has usable frequencies from approximately 130 to 140 Hz, and provided sufficient resolution to meet the objectives of the project;

- The stratigraphy in the Foam Lake area, dips regionally from northeast to southwest. Several features are identified within the Winthorpe 2D dataset such as minor seismic character changes, Second Red Bed amplitude anomalies, the presence of Winnipegosis mounds, and evidence of on-line and off-line collapse features;
- Based on the seismic response, the potential to encounter carnallite is delineated within the Foam Lake area;
- Numerous Winnipegosis mounds have been identified. Structural lows or sags are often observed in the interpreted horizons overlying Winnipegosis mounds;
- Total Salt Isopach in the Winthorpe 2D area varies from 20 m to 195 m in thickness. Salt thinning is observed over the Winnipegosis mounds; and
- It should be noted that seismic data does not directly indicate the presence of potash, hence the maps created can be used as guidance for the thickness and structure associated with the potash bearing zone.



Figure 5: 2D seismic location map with collapse features from North Rim Technical Summary, Dec 2012

### 2.2.2. Drilling

Eleven exploration wells were drilled on the Foam Lake property from November 2011 to December 2012. The drilling program was designed by North Atlantic Potash with drilling operations contracted to Champion Drilling of Brooks, Alberta and CanElson Drilling of Calgary Alberta. Both companies utilize oil-field drilling equipment capable of drilling to depths beyond that of the Prairie Evaporite Formation.



All exploration wells were vertical and cored through the potash mineralized members of the Prairie Evaporite Formation. The objective of the drilling program was to define the most suitable area within the Project Area for the development of a potential potash mine. Drill-hole locations were selected based on the following parameters:

- Presence of laterally continuous potash-bearing beds (avoiding solutioning/mound effects)
- Desirable surface location (cooperative landowner/topographically suitable)
- Potential for intersecting potash-bearing beds, specifically the Esterhazy Member at the shallowest subsurface location within the Project Area
- Acquiring drill-hole data suitable to support documentation of a NI 43-101 complaint potash mineral resource

The following drilling procedures were followed for all drill holes completed in 2011-2012:

- a) Drilled with a 349.0 millimeter(mm) surface bit and gel chemical drilling fluid to an approximate depth of 175.0 mKB, where surface casing was set;
- b) Cemented 244.5 mm surface casing;
- c) Drilled a 222.0 mm diameter borehole with brine drilling mud from surface casing to core point, which was located approximately 10.0 m above the top of the Prairie Evaporite Formation;
- d) 199.0 mm core barrels were made up and cored down into the Dawson Bay Formation Second Red Bed Member;
- e) Switched drilling fluid over from brine to mineral oil. Made up core barrels and continued to core to the base of the Esterhazy Member, or until no visible sylvite was present at the base of the cored interval;
- f) Drilled ahead with a 222.0 mm destructive bit to total depth, which was approximately 30.0 m past the base of the Esterhazy Member; and
- g) Weatherford logged the open hole section using the wireline program provided by North Rim Exploration.



Figure 6: Type section drill hole well 4-18-29-10 W2 from North Rim Technical Summary, Dec 2012

Coring and core retrievals were completed by Blackies Coring Services of Estevan, Saskatchewan for ten of the wells while Rocking Horse Energy Services of Strathmore Alberta conducted wireline core retrieval on the eleventh well. Conventional recovery produces approximately 18m of core while wireline recovery produces 6m of core per run. This is due to the length of the core barrel utilized in each procedure.



Figure 7: NAP Foam lake 4-27-28-11 W2 core photo

The following is the core handling protocol and procedures as developed by North Rim:

- 1. A safety meeting was held prior to the recovery of each core. During the meeting all safety issues were discussed along with proper core handling procedures;
- The core supervisor was present at the drill site while the core was being recovered from the barrel. The North Rim Core Supervisor oversaw the core retrieval on the rig floor and ensured that the rig crew understood the importance of the process and what each person's responsibility was;
- 3. A core brake was bolted to the core barrel, which allowed precise control of the core was it was let out of the barrel. The drill rig tool push was in charge of the core brake at all times. The tool push would let the core out of the barrel in pieces (~0.5m sections) and the derrick hand would break the piece gently in order to fit it in the core boxes. Due to the natural breaks common in the cored intervals, often the core would not require breaking. The core pieces were passed to the North Rim Core Supervisor after the bottoms were marked with a grease crayon to eliminate confusion when boxing;
- 4. With a clearly marked core bottom, the core was wiped clean and placed into the box by the North Rim Core Supervisor. This process was repeated until all core was recovered from the barrel;
- 5. At the end of each core, a core chaser was run through the barrel to ensure that no core was remained inside. The core boxes were then laid out in stratigraphic order and examined by the North Rim Core Supervisor for potash or any sign of pitting or loss of core integrity. The core was measured to determine the recovery factor of the interval;
- 6. The core boxes were clearly labeled with the location, well name, and the interval cut; and
- 7. After the core was boxed, it was carried to the vehicle for transportation to the core laboratory. All core was kept sheltered from the elements to avoid pitting.

Upon retrieving the core each drill hole was logged from TD to surface casing with geophysical wireline tools. These geophysical analyses were completed to provide North Atlantic Potash with detailed downhole information that can be used to cross-reference lithology, mineralogy, and geochemical assay data. Weatherford International of Calgary, Alberta was contracted to complete the logging of each hole. The wireline program, which was run from Total Depth (TD) to Surface Casing, included Gamma Ray, Induction, Neutron, Density, Sonic and Caliper logs for each hole.

The gamma ray log provides a depth-recorded dataset of the natural formation radioactivity and is displayed in American Petroleum Institute (API) units. As isotopic potassium undergoes radioactive decay which is read by the gamma tool, the natural gamma log is then proportional to the sylvite concentration through the potash interval; therefore the natural gamma log can be used to provide an estimate of the potash grade and is excellent for depth correcting intervals. The density, sonic, neutron and resistivity logs

are useful tools for assessing the mineralogy of formation and the presence of impurities such as clay, carnallite and anhydrite. The caliper log indicates the size of the borehole and is a useful tool when looking for areas of washout or buildup on the borehole walls.

A single drill stem test (DST) was conducted on NAP 16-05-28-11W2 on July 6, 2012 over the Dawson Bay interval 1010.22-1057.00 mKB. The test recovered only 13m of drilling fluid with a 25kPa increase during the main flow period. This indicated the interval was of low permeability and dry. Comments indicated that there was a "very weak air blow decreasing to dead in 4 minutes. No gas to surface". Data was consistent between the two gauges and the comparison of beginning and end hydrostatic pressure indicated a good test.

# 2.3. Foam Lake Mineral Resource Estimate Results

North Rim Exploration Ltd. prepared the Resource Report for the Foam lake Property. This report is available for interested parties by contacting NAP corporate office in Saskatoon.

Within the Foam Lake property the Esterhazy Member Upper Sequence EM 1 and EM 3 were found to be the most consistent beds. For purpose of the resource calculation limits were established based on mining and processing constrains. The cutoffs for selecting the sylvite beds were set at

- Minimum 10% K<sub>2</sub>O sylvite
- Maximum 12% K<sub>2</sub>O carnallite
- Minimum mining height of 2m (for mining panels while main travel ways would be 2.4m)

For the EM1 target, cut-off grades of 10% K<sub>2</sub>O and 12% carnallite and a mining height of 2.00m have been applied to both the Inferred and Indicated Mineral Resource calculation. Using these parameters and a 4000m ROI, wells 1-14, 4-36, 4-27, 16-2, 16-5 and 4-9 have been included in the Inferred Mineral Resource assessment for the Resource Area. The Inferred Mineral Resource of EM1 is 402.0 MMT with an average grade of 18.93% K<sub>2</sub>O. An ROI of 2000m gives an Indicated Mineral Resource of 218 MMT with an average grade of 18.97% K<sub>2</sub>O.

For the EM3 target, cut-off grades of 10%  $K_2O$  and 12% carnallite and a mining height of 2.00m have been applied to the Inferred Mineral Resource calculation. Using these parameters, wells 4-18, 13-30, 4-36 and 4-27 have been included in the Inferred Mineral Resource assessment for the Resource Area. An ROI of 3000 m around the drill provides an Inferred Mineral Resource estimate for EM3 of 322.0 MMT and an average grade of 19.00%  $K_2O$ . (Table 2)

The total resource for the two horizons is 942 million tonnes in place at just under 19%  $K_2O$ . This includes at conservative 25% reduction for possible geologic structural features which 2D seismic to date has not identified. The property is open within the permits to the south/southeast and is limited only by consideration of conventional mining depths should not exceed 1200m.

The sylvite grades delineated within Foam Lake property are lower than the grades reported from current Saskatchewan operations of 21.5 to 24.7 % K<sub>2</sub>O however it compares very favorably to other Greenfield resources in North America, Europe, Africa and Asia. (Table 3)





Figure 8: Conventional Mining Resource Areas - EM1 from North Rim Technical Summary, Dec 2012

North Atlantic Potash Resource Summary - Effective December 19, 2012											
	Indicated Resource Summary										
Member	Area with Exclusions (m <sup>2</sup> )	Weighted Average Thickness (m)	Weighted Average K <sub>2</sub> O Grade (%)	Weighted Average KCI Grade (%)	Volume (m <sup>3</sup> )	In-Place Sylvinite Tonnage (MMT)	Gross K₂O Tonnage (MMT)	Gross KCI Tonnage (MMT)	Net K₂O Tonnage (MMT)	Net KCl Tonnage (MMT)	
EM1	69,876,980	2.00	18.97	30.03	104,815,469	218.0	41.4	65.5	13.0	20.6	
			Inf	erred Resourd	e Summary						
Member Area with Exclusions (m <sup>2</sup> ) (m) (m) (m) (m) (m) (m) (m) (m) (m) (m		Weighted Average K <sub>2</sub> O Grade (%)	Weighted Average KCI Grade (%)	Volume (m³)	In-Place Sylvinite Tonnage (MMT)	Gross K <sub>2</sub> O Tonnage (MMT)	Gross KCI Tonnage (MMT)	Net K₂O Tonnage (MMT)	Net KCI Tonnage (MMT)		
EM1	96,633,389	2.00	18.93	29.96	193,266,778	402.0	76.1	120.5	24.0	37.9	
EM3	77,393,818	2.00	19.00	30.08	154,787,635	322.0	61.2	96.8	19.3	30.5	
Note: Deductions for unknown anomalies:											
1. MMT = Million Metric Tonnes Outside 3D: Measured = N/A   2. Density of Sylvinite = 2.08 T/m <sup>3</sup> Indicated = 25%   3. In-Place Sylvinite is calculated based on Area x Thickness x Density (2080kg/m <sup>3</sup> ) Indicated = 25%   3. Gross Tonnage refers to Tonnage In-Place times Average Grade Inferred = 25%   4. Net Resource based on 35% extraction ratio and 10% plant loss Inferred = 25%   5. KCl Resource = 1.583*K <sub>2</sub> 0 Resource 6. Weighted average thickness and K <sub>2</sub> 0 are weighted to In-Place Tonnage											

Table 2: Resource Summary from North Rim Technical Summary Report, Dec 2012.

Company	Project Site	Country	% K20
North Atlantic	Foam Lake, SK	Canada	19.0
Acron	Verkhnekamskaya Russia		19.0
Encanto	Muskowekwan, SK (Patience Lake)	Canada	18.1 – 19.4
Western Potash	Milestone, SK	Canada	10.3 – 16.2
Karnalyte Resources	Wynyard, SK	Canada	9.1
Allana	Danakil Depression	Ethiopia	11.1 – 12.5
Elemental Minerals	Sintoukola	Republic of Congo	14.8 – 15.4
Furochem	Gremyachinskoe	Russia	24 9 - 18 9
	Verknekamskoe		24.0 10.0
MagMinerals	Mego, Pointe-Noire	Republic of Congo	17.3
South Boulder Mines	Danakil Depression	Eritria	11.3

Table 3: Comparison of Greenfield Potash Projects

# 2.4. Proposed Foam Lake Mine and Mill

The potential future site of the Foam Lake Operations would be near the center of the delineated resource with final selection depended on numerous factors (environmental, topographic, soil profile, infrastructure, free hold title etc.) which include drilling shaft holes for geotechnical design data. The site would be located on or near HWY 310 approximately 25 km south of the community of Foam Lake. The area is generally flat lying cultivated agricultural land. The exact location would fall within 5 km radius of this general area and be better defined in the Pre-Feasibility Study.

With the understanding of the general characteristics of the potash horizon and surrounding rock the next stages will focus on the design of the mine layout and methods as well as the processing facility to optimize recovery of the resource.

Laboratory testing of the rock characteristics and computer modeling will assist in the design of mining room width, pillar size, room layout and extraction ratio. The optimization of the mine design based on computer model will enable selection of equipment that will maximize the safe, productive extraction of the potash. The Esterhazy Member has one of the best geotechnical characteristics of any potash interval in the world based on it coarse crystal structure, very low clay content and lack of partings in or immediately above the mining horizon. The overlying salt horizons are very stable enabling excavation of wide rooms using large four rotor mining machines. The percentage of carnallite will impact the room width and stress-relieve layout of the production panels and the mains. The mining plan and equipment selection will be designed with the flexibility to accommodate these variations. The height of the room opening is directly related to pillar strength with the 2m proposed mining height a positive factor in pillar stability compared to higher rooms.

The long term openings such as shaft area bins and loading pockets, main travelways and conveyors will be designed based on 30 year life. The design of the room configuration or stratigraphic location will accommodate the longevity of these opening. Potentially these strategic opening could be located in stable salt strata above or below the potash horizon a common practice in potash mining.

The short and long term mining plan will be built around consistency of the feed grade to the mill in terms of potash and impurities. This is a very common practice in ore bodies around the world including potash. It requires the placement of production panels in areas of varying grades of mineralization and excavating tonnage from the various areas to meet mill feed grade targets through blending the raw ore streams.

#### 2.4.1. Foam Lake Potash Surface Facilities

The mill facility will be designed to produce 2.0 Mtpa of potash (muriate) from the processing of the Esterhazy Ore. The process will be designed around the most recent efficient potash technology acquired during the just completed Brownfield Saskatchewan expansions at PCS, Mosaic and Agrium. The preliminary plan for

Foam Lake is to have the capability to produce 80% granular and 20% standard muriate largely for the global agricultural market such as China, India, Brazil and Japan.

The mill will be designed from the beginning to optimize the anticipated variations in the mine feed in terms of sylvite, insolubles and carnallite percentages. At this time no economic potential of the magnesium minerals in Esterhazy EM 1 and EM3 has been taken into consideration however this will be revaluated in the pending studies. Should an efficient process be defined for extracting the magnesium and the market supports the investment this will be incorporated in the mill design.

The mill will be designed for 21,000 ore tonnes per day at 19% K<sub>2</sub>O with the capacity to produce 5880 tonnes of product. The run rate to produce 2.0 million Mtpa will be based on potash industry standard of 340 operating days per year and 92% availability. The process facility will have 90% recovery rate to produce final muriate at market standard grade of 60.5% K<sub>2</sub>O.

Several renderings of the Foam Lake Plant were prepared by Hatch Engineering Saskatoon Office based on underground mine design, plant size and potential site location. The renderings are attached below. The site will have a production shaft and service shaft as access to the underground mine operation. Ore will be hoisted using the production shaft and conveyed to raw ore storage building as buffer between the mine and mill. Depending on feed rates to the mill ore will be conveyed from raw ore storage to the frontend of the mill.

As a general overview of the process the mill will handle ore at 955 tonnes per hour from raw ore storage into the crushing circuit from where it is fed to a slurry box and pumped to de-slime and flotation/heavy media circuit. The wet product from flotation/heavy media will be dried using centrifuges and the fluid-bed driers then conveyed to the Compaction Circuit. The dried product feed will be compacted and screened with the potash meeting specification conveyed to the potash warehouse while undersize material is recycled through Compaction.

The waste stream of salt and insolubles (clays, anhydrite) will be pumped to the Tails Management Area (TMA) where solids are settled out and brine is retained in the lined Brine Ponds to settle the very fine suspended insolubles. The cleaned brine is recycled through the mill process.

The fine dust from the crushing plant, driers, crushing and screening will be collected and discharged through the air Scrubbers to remove the salt and potash particles. The cleaned air is then released to the atmosphere.

The product will be shipped by rail through the site loadout facility which will be designed to move 2.0 Mtpa based on five days per week load cycle. The product warehouse will hold 300,000 tonnes or approximately 50 days of production. Product will be transported via Canadian National (CN) or Canadian Pacific (CP) Railways to a west coast terminal or south to the central United States market. From the Pacific Terminal the product will be distributed around the world through Acron's Sales Group.



Figure 9: NAP-Foam Lake 2.0 million tonne Plant layout Permit 508 looking southeast from SK-HWY 310, showing raw ore storage, production and service shafts, mill, product warehouse and administration building.





Figure 10: NAP-Foam Lake Plant looking south-southwest showing rail loadout and potash train with the service and production shafts and mill in background.





Figure 11: NAP-Foam Lake Plant looking northwest showing rail loadout, product warehouse, mill and service shaft.





Figure 12: NAP-Foam Lake Plant looking southeast showing production shaft, conveyance to raw ore storage building and conveyor gallery to mill. The service shaft for manpower and supplies is located on the right.



# 2.5. Infrastructure

#### 2.5.1. Highways

The Foam Lake Property (25 x 30 km) is situated south of the community of Foam Lake and is bound to the north by the major provincial Highway 16, also called the Yellowhead Highway which stretches from Winnipeg through Saskatoon to Edmonton.

Saskatoon, nearest major center and the largest city in the province, is located 230km west with a population of 236,000. It has air access to numerous Canadian and United States airport hubs with international connection. Saskatoon is the home of the province's major educational center, The University of Saskatchewan. Access from Regina, the provincial capital, is by HWY 1 to Fort Qu'Appelle and north on HWY 35 to Elfros, SK.

The property is crossed by numerous government grid roads of varying standards at 1 mile spacing. The secondary all weather HWY 310 from Foam Lake approximately dissects the 4 permits and will be the main access road to the future mine site.

#### 2.5.2. Rail line

Two of Canada's main rail lines run adjacent to the property. CP Wynyard is a main line for Canadian Pacific and is located nearby along the north Permit boundary approximately 23km from proposed plant site. This line also services the potash operations of PCS Lanigan, PCS Allan and Mosaic Colonsay.

The main repair yard for Canpotex fleet of cars is located 120km east on the CP line at community of Lanigan.

The CN Watrous rail line is adjacent to the southern boundaries of KP 508 and 509 of the Foam Lake Property. This is a main line for Canadian National and serves the Mosaic Esterhazy and PCS Rocanville mine sites. It is located approximately 30km form the proposed plant site.

Rail transportation will move 100% of the Foam Lake potash products and has sufficient capacity on either CP or CN lines. Railcar fleet will be a combination of leased cars and owned CP or CN cars. The market destination for Foam Lake products will vary year over year; however, it is anticipated that 80% of the tonnage will be shipped to a western terminal on Pacific with the remaining transported to the central US markets.

The Pacific coast terminal location has not been delineated however it is anticipated it will be outside the Canpotex system. For this stage of the project it is expected that the terminal will be leased from third party based on tonnage and located either in Canada or United States.

#### 2.5.3. **Power**

The provincial crown corporation SaskPower controls all power production and distribution within Saskatchewan. A major 138 kV line traverses the Foam Lake property very close to potential plant site. Recent preliminary discussions with SaskPower indicated they will be able to provide an annual capacity of 32MW for the mine and plant which will meet the needs of the 2.0 million tonne operation. The subsequent Scoping/Pre-Feasibility study will address power requires in more detail.



Figure 13: Infrastructure Map

#### 2.5.4. Natural Gas

The provincial Crown Corporation SaskEnergy and its subsidiary TransGas Ltd. controls most of the gas distribution system within the province. A twin NPS-6 standard natural gas pipeline is located at Yorkton with smaller gas lines adjacent to the Foam Lake Property. Preliminary estimates for a conventional mine and plant will require 6TJ/day (0.9 GJ/tonne or 1.8 million GJ annually to the mine site). A NPS-6 gas line will be built by TransGas from Yorkton area to the Foam Lake site over distance of 95 km.

#### 2.5.5. Water

The SaskWater and Saskatchewan Water Authority are responsible for water in the province. The Foam Lake plant is estimated to require 340 m<sup>3</sup>/hr. or 2.5 million m<sup>3</sup> annually at a rate of 2.0 tonnes potash. This is based on historic water usage at Saskatchewan potash operations without regard to newer water conservation efficiencies.

SaskWater has identified potential water sources which include:

- Quill Lake 70km brackish
- Last Mountain Lake 118km large reliable source
- Lake of the Prairies (MB) 134km neighboring province with restriction
- Ground water from Foam Lake site 0km untested brackish

The subsequent Scoping/Pre-Feasibility study will address water requirements and sources. The final source may include multiple locations including brackish plant brine and potable fresh water.

#### 2.5.6. Communications

The provincial Crown Corporation SaskTel historically controlled most of the communication systems within Saskatchewan; however, this has changed over the last decade. Within rural Saskatchewan however SaskTel continues to control a high percentage of the wire based system. The main highway corridor from Saskatoon through Yorkton is a fiber-optic trunk line which passes through the Foam Lake area. A 25km extension of communication cables and fiber-optic lines to the plant site will be required. Wireless service is currently very strong in the area.

#### 2.5.7. Topography/Climate

The area topography is general flat with minor rolling hills and numerous small drainage bodies of water locally called sloughs. Most of the area is cultivated farmland with only minor localized forested plots frequently associated with poor drainage thus unsuitable agricultural land. The rural area is within the Foam Lake Rural Management District and is sparsely populated.

The climate in the area is typically very cold in the winters and warm through the short summers. Between November and March the temperatures range from just above freezing to -30°C with minimum average of - 22°C. The summer months from June through August are generally warm ranging from 20 to 35°C with maximum average of 18°C. The average annual precipitation for the Saskatoon area is 350 mm.

#### 2.5.8. Manpower

The area within 50 km of the property is sparsely populated with the only major communities of Foam Lake with population of 1450 and Wynyard with 1750. The city of Yorkton which has a population of 15,669 is located approximately 90km east of Foam Lake.

It is projected that the expected workforce of 500 employees would locate as follows: 70% - Yorkton and Area 20% - 50km radius in rural areas and small villages 10% - Foam Lake

It is not anticipated that temporary company accommodation will be required either during construction or permanent operation. It is felt with sufficient advance planning with the local communities and regional governments that private facilities will be built to accommodate the increased population.

The 2 million tonne annual capacity plant will require approximately 500 employees with an estimated 30% professionals/technical/clerical, 30% trades and the remaining labors. It is forecast that 60% of the manpower will be hired within 150km of the operations while the remaining will be hired remotely and relocate to the area. The operation will draw experienced junior professionals and tradesmen looking for promotion

opportunities from the 3 surrounding existing potash operations within 150km of the project. The remaining will be recruited outside the Foam Lake Region.

# 3.0 Stockholm

# 3.1. Introduction

KP 421 is located near the town of Stockholm, Saskatchewan east of the provinces capital city Regina with access via Highway 1 east to Whitewood then north by Highway 9 through the property. A grid road system of north-south and east-west gravel roads transects the area. The closest rail line is the main Canadian National line which services the nearby Mosaic K1 and K2 mines (25 km).

The average annual daily temperature of the area is 2°C with an average summer maximum of 18°C and a winter average minimum of -22°C. Winds from the west predominate to the north (Saskatoon area) with maximum sustained speeds of 17 km/hr. The average annual precipitation is about 350mm of which 278mm is recorded as direct rainfall. The average annual snowfall is 87.5cm.

The local terrain is gently to moderately rolling farmland with scattered deciduous forested areas and minor wetlands. Local drainage is partially towards the north with the exception of drainage along the southern edge of the permit into Qu'Appelle River system. Surface elevations range from about 520m in the south west of the permit to 560m the northeast. The principal resource base of the area is based on agriculture.

NAP drilled a single exploration well on the property during July 2012. Two high-grade potash members were intersected, the Belle Plaine Member yielded 42% KCL over 2.5 metres and the Esterhazy Member yielded 36% KCL over 2.3 metres. This property has very high potential for both the Esterhazy Member's as well as Belle Plaine Member.

# 3.1.1. Permit description

The Property is comprised of one crown exploration permit, KP-421. This permit encompasses 55,987.35 acres of Crown land.

Permit	Townships	Ranges (West of 2)	Acres
KP 421	17, 18, 19	1,2,3,4,5	55,987.35

Table 4: Permit description/acres-KP421



Figure 14: KP421 Location Map

#### 3.1.2. Stockholm Local Geology

Within the North Atlantic property boundaries the Prairie Evaporite has a regional dip of approximately 6m/km towards the southwest. The depth to the top of the Formation varies between about 1050m in the north to over 1200m to the south. The Formation is mainly comprised of halite beds with some anhydrite strata commonly encountered at the base and near the middle of the unit. The entire Formation is approximately 170m in maximum thickness, of which the uppermost 35 to 50m includes mainly sylvinitic potash beds.

The Formation can be further subdivided into a "Lower Prairie Sequence" and an "Upper Salt" unit. The Upper Salt contains four potash-bearing Members and several regional marker beds. In ascending stratigraphic order they are: the Esterhazy Member, the White Bear Marker Beds, the Belle Plaine Member, and the Patience Lake Member. These mineralized zones are generally flat-lying interbeds of sylvite, halite, carnallite, clay, with minor amounts of anhydrite.

The Belle Plaine and Esterhazy Members of the Prairie Evaporite Formation are present within the Project Area. Salt horizons barren of sylvite as well as discreet clay and anhydrite seams as well as insolubles-rich zones occur between the potash-bearing members (Holter, 1969).

The Esterhazy Member is present in all eleven of the wells drilled to date in the study area with an average thickness of about 12 m. The most recent hole, drilled by North Atlantic Potash in 2012 showed the higher grade upper beds of the Esterhazy Member to have an average total K2O grade of 17.09% with an insoluble content averaging 2.27% and interstitial carnallite at 0.31% over a 1.99m thickness. Stratigraphically lower beds of higher grade within the Esterhazy analysed 22.69% K2O, 0.18% carnallite, and 0.86% insolubles over a 2.29m thickness.

The Belle Plaine Member occurs stratigraphically above the Esterhazy Member and is present in ten of the reference wells. The Belle Plaine Member on the property averages approximately 7m in thickness and has very thin salt back. Analyses of this Member were run on the NAP Stockholm 5-10-19-3 core to indicate 20.09% K2O, 0.49% carnallite, and 4.95% insoluble over the uppermost 5.04m. The lowermost 6.82m of the Member were of considerably lesser grade. The salt back on the Belle Plaine is typically thin at 2.6m.

No massive salt solutioning has been documented within the area as indicated by regional geophysical mapping (Sawatsky, 1968) and recently reinterpreted 2D seismic surveys (Edgecombe, 2011).

# 3.2. Exploration Activities

A total of 3 deeper holes penetrating the Prairie Evaporite Formation have been drilled within the Permit boundaries. The most recent well was drilled by North Atlantic Potash during the summer of 2012. Eight other wells have been drilled within a radius of up to 20 km's (12 miles) of the property. Potash exploration was particularly active in Saskatchewan during the late 1950's and 1960's but no significant activity was concentrated in the Stockholm area during that period of time.

The spacing of historic test holes (all of which are currently of non-confidential status) varies considerably from8 km (5 mile) to as much as 24 km (15 miles).Quality and coverage of geophysical log suites also vary depending on the vintage of the drilling. Earlier test holes may only have some form of electric log whereas later more complete logging suites were run typically including caliper, resistivity, gamma ray, sonic, and neutron logs.

A one-hole exploration drilling program was completed within the permit south of Stockholm in 2012. The drill hole location were designed by North Atlantic with drilling operations being carried out by CanElson Drilling utilizing oil-field drilling equipment capable of drilling to depths beyond that of the Prairie Evaporite Formation.

The hole was drilled vertical, penetrating the potash-mineralized Members of the Prairie Evaporite Formation with the strategic coring of the potash-bearing zones. The objective of the drilling program was to provide a preliminary indication of the potential of the Permit for further exploration. The drill hole location was selected based on the following parameters:

- Presence of laterally continuous potash-bearing beds (avoiding anomalous ground);
- Potential for intersecting potash-bearing beds, specifically the Esterhazy Member; and
- Acquiring drill-hole data suitable to support eventual documentation of a NI 43-101-compliant potash mineral resource.

As part of a subsurface investigation of Potash Permit KP-421, North Atlantic Potash Inc. contracted RPS Boyd PetroSearch to acquire 117.5 linear km (70.5 miles) of two dimensional (2D) market seismic data in the area of. The primary objective of this effort was to reinterpret previously-generated geophysical information with the intent of more accurately delineating the Prairie Evaporite structure and continuity (Edgecombe, 2011). One historic well penetrating the Prairie Evaporite provided a calibration point at the zone of interest (Pheas Bach Broadview 4-27-19-3; Lsd. 4-27-19-3w2). Horizon identifications were made based on the sonic logs from this single well within the area as well as through previous experience gained in the region by RPS Boyd PetroSearch.

The Belle Plaine and Esterhazy Members of the Prairie Evaporite Formation are present within the Project Area. Salt horizons barren of potash occur between the potash-bearing beds as well as discreet clay seams and clay-rich zones. The stratigraphic nomenclature is based on that presented by Holter (1969). The following is a summary of the key potash-bearing members:

- Belle Plaine Member: The Belle Plaine Member is currently being exploited using solution-mining techniques at Mosaic's Belle Plaine Potash Mine. The Belle Plaine Member has an average thickness of about 7m throughout the Project Area over 10 wells which intersected it; the top of the Member ranges from about 1000 to 1200 m. The Member is absent in the historic Riddle Tidewater Clayridge Cr. 16-14 well (Lsd. 16-14-17-1W2).
- Esterhazy Member: The Esterhazy Member underlies the Belle Plaine Member and is separated from it by a barren halite zone with minor clay marker horizons. It has an average thickness of about 12m and ranges in depth between approximately 1100 and 1200m. The Esterhazy Member is the most prospective of the potash-bearing Members in the Project Area. In Saskatchewan, sylvite is extracted from this Member by conventional underground techniques at the Esterhazy and Rocanville Potash Mines and by solution-mining techniques at Mosaic's Belle Plaine Potash Mine.

The Esterhazy Member was selected as the most prospective potash Member of interest as it has the following characteristics:

- the most continuous stratigraphic continuity;
- the most favorable grades over a mineable thickness; and
- considerably thicker and more consistent salt back than the Belle Plaine Member



Figure 15: NAP 5-10-19-03W2 gamma geophysical log

Member	Selected Section (m)	Av. %Sylvite	Av. %Carnallite	Av. %Insolubles	Av. Total %K2O
Belle Plaine					
(Selected Section)	5.04	31.14	0.49	4.95	20.09
Upper Esterhazy					
Beds	1.99	26.55	0.36	2.27	17.09
Lower					
Esterhazy Beds	2.29	35.68	0.18	0.86	22.69

Table 5: Analysis Summary for NAP Stockholm 5-10-19-3

# 4.0 Conclusion

North Atlantic North Atlantic Potash Inc. is a growing company focused on developing potash production in Canada. The company initially owned 26 permits in the Saskatchewan Potash Area, selling 8 permits in September 2011 to Yancoal Canada, a subsidiary of Yanzhou Coal Mining Company Limited of China. Currently North Atlantic possesses 18 potash permits in Saskatchewan covering over 485,000 hectares within the government Potash Designated Area. This includes 245,000 hectares fully controlled by North Atlantic and 240,000 held within a Joint Venture with Rio Tinto Exploration Canada Inc. (60% NAP, 40% Rio).

North Atlantic Potash has accomplished a lot over the last year with the exploration programs at Foam Lake and Stockholm. The 11 hole drilling program at Foam Lake delineated 940 million tonnes in-place with a grade of 19% K<sub>2</sub>O. North Rim completed a NI 43-101 standard Resource Report detailed the results of this exploration program. North Atlantic Potash is currently investigating acquiring a partner for this project as it progresses to the next stage of development. It is anticipated that a Scoping/Pre-Feasibility Study will be initialed in early 2013 followed by bankable Feasibility Study in late 2013 early 2014.

The Stockholm Project which consisted of seismic reinterpretation and the drilling of one well, served to confirm the historic drill results and continuity with neighboring potash operations of Mosaic and PCS. Two high-grade potash members were intersected, the Belle Plaine Member yielded 42% KCL over 2.5 metres and the Esterhazy Member yielded 36% KCL over 2.3 metres. This property has very high potential for both the Esterhazy Member s as well as Belle Plaine Member.

# 5.0 References

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North Rim Technical Summary Report, December 2012

Sawatsky (1968). Figure 24A. Composite Seismic Map, Southern Saskatchewan.

# Appendices

# Appendix A

### David C.E. Waugh

Mr. David Waugh has over 40 years of progressive leadership experience in the potash sector in the areas of exploration, development, mine construction, and mine operations.

Appointed CEO of North Atlantic Potash Inc. (NAP) in September 2011, Mr. Waugh is currently tasked with evaluating and developing potash assets in Saskatchewan.

Prior to his appointment with NAP, Mr. Waugh was general mine manager and vice president of operations for the Mosaic Colonsay Company from 2006 to 2011. In this position he was responsible for managing all aspects of a 1.6 million ton underground potash mine in Saskatchewan. During this period Mr. Waugh lead two large expansions of the Colonsay operation including a 30% - \$650 million project beginning in 2009.

From 1997 to 2006, Mr. Waugh was mine manager for the Mosaic Potash Carlsbad mine in New Mexico (formally IMC Potash Company) and was responsible for managing a 25,000 ore tons per day underground operation in a geologically complex potash deposit.

During Mr. Waugh's tenure at the Mosaic Carlsbad operations he led the transition from drill & blast mining method to continuous miners for both the sylvite and langbeinite mining levels. Process improvements were achieved which enabled a 35% productivity gain, while increasing overall production by 20% as well as a corresponding 60% reduction in accident frequency.

As President of Mineral Services Ltd. from 1991 to 1997, Mr. Waugh managed a consulting practice that supplied technical and management services to the exploration and mining industry. During this period, Mr. Waugh's team completed technical and economic evaluations for IMC Global of potash properties in North America as well as international properties including locations in South America, Asia and Africa. Mr. Waugh also carried out long term mine planning, ore reserve calculations, mining project evaluations, and ground control investigations.

While with Mineral Services, Mr. Waugh appeared as a mining technical expert for the Carlsbad Mining Association in New Mexico, USA, in a 6-month court case with the petroleum industry and the US Federal Department of the Interior.

Mr. Waugh worked with Potacan Mining Company at their eastern Canada potash mine from 1979 through 1991. Potacan was owned by K + S of Germany and MDPA of France. During this period he was involved with

all aspects of exploration, feasibility, financing, and mine design through construction of the New Brunswick potash operation. During the production stage he managed the technical services group – comprised of mine planning, rock mechanics, ventilation planning and control, geology, mine projects, industrial engineering and surveying. He maintained daily, intermediate and long range planning, design and layout for the annual production of over 3,000,000 tonnes of ore and the hydraulic placement of 2,000,000 tonnes of tailings in a geologically complex deposit.

From 1972 to 1979, Mr. Waugh held a number of progressively senior roles in grassroots exploration and mining production with a number of leading organizations in the United States and Canada. This included being part of the team that discovered the potash deposits in New Brunswick, Canada which later became two producing mines.

Active in the community, Mr. Waugh has chaired the Saskatoon United Way Campaign, he was a director of the Saskatchewan Mining Association, President of the New Mexico Mining Association and has volunteered on a number of mining innovation, safety, and university engineering advisory boards in the United States and Canada.

During his career, Mr. Waugh has contributed to the knowledge and understanding of the geological nature of potash and potash mining in a number of national and international publications.

# Appendix B

#### Milton Holter M.Sc., P. Eng, P. Geo

Mr. Holter has 50 years of experience as an industrial minerals geologist. He has been associated with North Atlantic Potash and Acron since the company's acquisition of potash permits in Saskatchewan in 2007 and has been directly involved in the completion of individual property evaluations, establishing recommendations for active exploration, and providing technical presentations for permits released for sale to other mining interests.

Prior to his support to NAP, Mr. Holter was most actively engaged in private consulting to a number of companies, mainly on potash and coal projects.

Mr. Holter was first employed by Saskatchewan Energy and Resources where he completed a comprehensive study of the Saskatchewan potash deposits and stratigraphic studies of lignite coals in the southeast of the province. He then was employed by the Alberta Research Council and was responsible for studies on quarriable minerals and the supervision of a province-wide deep coal drilling program.

Mr. Holter went on to serve as Senior Supervising geologist with Monenco Consultants. His responsibilities were to access both undeveloped thermal coal deposits and determine extended reserves and verify coal quality specifications of existing operations.

He entered into private consulting practice in 1980 and continued to emphasize coal assessment work along with providing support to resolution of potash mining issues in Saskatchewan.

During the 1990's Mr. Holter became more involved in environmental support work including the supervision of watershed restoration projects and completion of forest cutblock reviews in British Columbia while employed by the Forest Service. Similar work was carried out subsequently while retained by Coast Forest Management and Silvatech Consulting. Following this, he was employed by the Lummi Indian Nation in Bellingham, WA as Resource Protection Manager as well as Timber, Fish and Wildlife Coordinator.

At the present time, Mr. Holter is registered as a professional engineer and geoscientist in Saskatchewan, Alberta, and British Columbia. He is also registered as a geologist and engineering geologist in the State of Washington.