AmericanPacific
BORATE & LITHIUM
LIMITED

ASX Announcement

ASX Code: ABR

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17 December 2018

ABR Delivers Exceptional DFS Results for its Flagship Fort Cady Borate Project

Highlights

- **Definitive Feasibility Study completed for Fort Cady Borate Project using US headquartered consultants Barr Engineering for the Study and RESPEC Consulting Inc for the conversion of Mineral Resource Estimates to Ore Reserves**
- **Three phase construction program with low pre production capex and very high margins pre and post by product credits (50% plus pre by product credits)**
- **Unlevered, post tax NPV$_{10}$ of US$1.25bn (A$1.7bn) and IRR of 41%**

Key Financial Metrics	
Targeted production – Phase One	82ktpa boric acid 36ktpa SOP
Targeted production – Phase Two	245ktpa boric acid 73ktpa SOP
Targeted production – Phase Three	408ktpa boric acid 109ktpa SOP
Capex Estimate – Phase One (including 13% contingency)	US$138.2m
Capex Estimate – Phase Two (including 18% contingency)	US$191.4m
Capex Estimate – Phase Three (including 18% contingency)	US$186.5m
Peak Capital (maximum negative cash position during build up)	US$245.2m
Key Selling Price Assumptions (FOB gate in California)	US$800/t boric acid US$725/t SOP
C1 Opex Estimate – boric acid no by product credits	US$367.34/t
C1 Opex Estimate – boric acid with by product credits	US$148.84/t
Targeted EBITDA in first full year of production	US$321m (A$441m)
Unlevered, post tax NPV$_{10}$	US$1.25bn (A$1.7bn)
Unlevered, post tax NPV$_{8}$	US$1.59bn (A$2.2bn)
Unlevered, post tax IRR	41%
Proven and Probable Reserves	41MT @ 6.6% B_2O_3 4.81MT of boric acid
Life of Mine from first production (first fourteen years from Reserves)	21 years

- **Next steps include progressing financing discussions, commencing detailed engineering and ongoing work in decoupling SOP operations from broader project, targeting increased financing options, lower upfront capex, and earlier revenues**
- **Construction of phase one targeted to commence in Q4 CY2019**

American Pacific Borate and Lithium Limited (ASX:ABR) ("ABR" or the "Company") is pleased to announce it has completed the next step for its flagship Fort Cady Borate Project in California, USA, the Definitive Feasibility Study ("DFS").

The DFS was substantially prepared by US headquartered Barr Engineering with the support of mineral processing expert Mr Mike Rockandel. The Reserve calculation and sign off was completed by Mrs Tabetha Stirrett of US headquarterd RESPEC Consulting Inc.

ABR's CEO and Managing Director, Michael Schlumpberger, commented:

> *"We believe the Fort Cady DFS demonstrates an outstanding boric acid and SOP project driven by low upfront capex, high margins and low technical risk. We are targeting a staggering US$321m EBITDA in our first full year of production which makes our Fort Cady Borate Project a substantial mining project in a low risk, supportive jurisdiction.*
>
> *We intend to move quickly into a detailed engineering phase with a current target to commence construction in Q4 CY2019 subject to finance and permitting.*
>
> *The DFS certainly supports our ambition to become a globally significant producer of borates."*

Next Steps

The Company intends to focus on the following over the coming months with a view to being ready to commence construction in Q4 CY2019:

1. Commencement of detailed engineering for phase one.
2. Progressing financing disucssions with a view to financing phase one before Q4 CY2019.
3. Gaining necessary additional permits to enable production activities to commence that are likely to be necessary for the drawdown of construction finance.
4. Working on a strategy to decouple the SOP operation from the broader operation that should provide additional financing options.

A summary of the DFS is attached.

For further information contact:

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Competent Persons Statement

The information in this release that relates to Exploration Targets, Exploration Results and Mineral Resources is based on information prepared by Mr Louis Fourie, P.Geo of Terra Modelling Services. Mr Fourie is a licensed Professional Geoscientist registered with APEGS (Association of Professional Engineers and Geoscientists of Saskatchewan) in the Province of Saskatchewan, Canada and a Professional Natural Scientist (Geological Science) with SACNASP (South African Council for Natural Scientific Professions). APEGS and SACNASP are a Joint Ore Reserves Committee (JORC) Code 'Recognized Professional Organization' (RPO). An RPO is an accredited organization to which the Competent Person (CP) under JORC Code Reporting Standards must belong in order to report Exploration Results, Mineral Resources, or Ore Reserves through the ASX. Mr Fourie has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which they are undertaking to qualify as a CP as defined in the 2012 Edition of the JORC Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Fourie consents to the inclusion in the release of the matters based on their information in the form and context in which it appears.

The information in this release that relates to the conversion of Mineral Resources to Ore Reserves has been prepared by Tabetha A. Stirrett of RESPEC Consulting Inc. Mrs. Tabetha A. Stirrett, P. Geo of RESPEC Consulting Inc. is a member in good standing of the Association of Professional Engineers and Geoscientists of Saskatchewan (Member #10699) and a member of the American Institute of Professional Geologists (CPG) (#11581). APEGS and CPG are a Joint Ore Reserves Committee (JORC) 'Recognised Professional Organization' (RPO). Mrs. Stirrett has sufficient Experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which they are undertaking to qualify as a CP as defined in the 2012 Edition of the JORC Australasian Code for Reporting of Exploration Results, Mineral Resource and Ore Reserves. Mrs. Stirrett consents to the inclusion in the release of the matters based on their information in the form and context in which it appears.

This report contains historical exploration results from exploration activities conducted by Duval Corp ("historical estimates"). The historical estimates and are not reported in accordance with the JORC Code. A competent person has not done sufficient work to classify the historical estimates as mineral resources or ore reserves in accordance with the JORC Code. It is uncertain that following evaluation and/or further exploration work that the historical estimates will be able to be reported as mineral resources or ore reserves in accordance with the JORC Code. The Company confirms it is not in possession of any new information or data relating to the historical estimates that materially impacts on the reliability of the historical estimates or the Company's ability to verify the historical estimates.

About American Pacific Borate and Lithium Limited

American Pacific Borate and Lithium Limited is focused on advancing its 100% owned Fort Cady Borate Project located in Southern California, USA. Fort Cady is a highly rare and large colemanite deposit and is the largest known contained borate occurrence in the world not owned by the two major borate producers Rio Tinto and Eti Maden. The JORC compliant Mineral Resource Estimate and Reserve is presented below. Importantly, it comprises 13.93Mt of contained boric acid. In excess of US$60m has been spent at Fort Cady, including resource drilling, metallurgical test works, well injection tests, permitting activities and substantial small-scale commercial operations and test works.

A Definitive Feasibility Study ("DFS") was completed in December 2018 delivering compelling financial metrics including steady state production target of 410ktpa of boric acid and 110ktpa of SOP, pre production capex including a 13% contingency of US$138m, unlevered post tax NPV$_{10}$ of US$1.25bn (NPV$_8$ of US$1.59bn) and an unlevered post tax IRR of 41%.

In 1994 the Plan of Operations (mining permit) was authorised along with the Mining and Land Reclamation Plan. These permits are in good standing and contain a full Environmental Impact Report and water rights for initial operations of 82ktpa of boric acid. The Company is currently working through a permitting process to gain three additional permits required to commence operations.

JORC compliant Mineral Resource Estimate and Reserve						
Reserves	**MMT**	**B_2O_3 %**	**H_3BO3 %**	**Li ppm**	**B_2O_3 MT**	**H_3BO_3 MT**
Proven	27.21	6.70	11.91	379	1.82	3.24
Probable	13.80	6.40	11.36	343	0.88	1.57
Total Reserves	**41.01**	**6.60**	**11.72**	**367**	**2.71**	**4.81**
Resources						
Measured	38.87	6.70	11.91	379	2.61	4.63
Indicated	19.72	6.40	11.36	343	1.26	2.24
Total M&I	**58.59**	**6.60**	**11.72**	**367**	**3.87**	**6.87**
Inferred	61.85	6.43	11.42	322	3.98	7.07
Total M,I&I	**120.44**	**6.51**	**11.57**	**344**	**7.84**	**13.93**

In addition to the flagship Fort Cady Project the Company also has an earn in agreement to acquire a 100% interest in the Salt Wells North and Salt Wells South Projects in Nevada, USA on the incurrence of US$3m of Project expenditures. The Projects cover an area of 36km^2 and are considered prospective for borates and lithium in the sediments and lithium in the brines within the project area. Surface salt samples from the Salt Wells North project area were assayed in April 2018 and showed elevated levels of both lithium and boron with several results of over 500ppm lithium and over 1% boron.

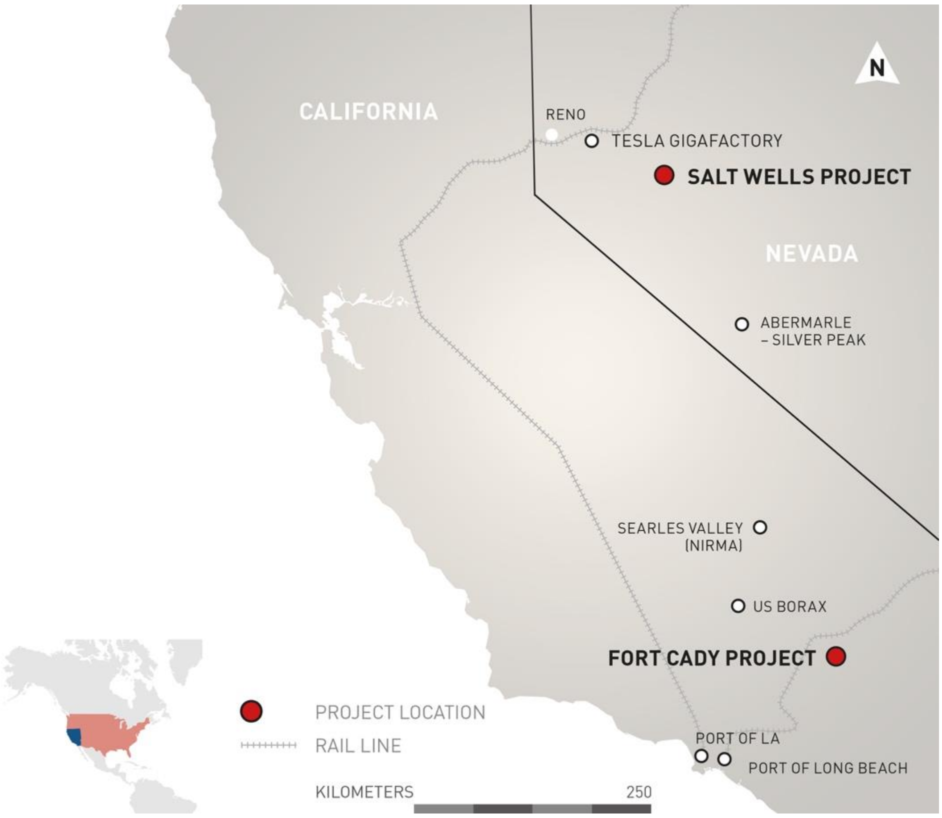

Figure 1 | *Location of the Fort Cady Project, California and the Salt Wells Projects, Nevada USA*

American Pacific Borate & Lithium Ltd

Fort Cady Borate Project
Definitive Feasibility Study Summary

17 December 2018

Forward Looking Statements

Some of the statements contained in this report are forward looking statements. Forward looking statements include but are not limited to, statements concerning estimates of tonnages, expected costs, statements relating to the continued advancement of ABR's projects and other statements which are not historical facts. When used in this report, and on other published information of ABR, the words such as "aim", "could", "estimate", "expect", "intend", "may", "potential", "should" and similar expressions are forward-looking statements. Although ABR believes that its expectations reflected in the forward-looking statements are reasonable, such statements involve risk and uncertainties and no assurance can be given that actual results will be consistent with these forward-looking statements. Various factors could cause actual results to differ from these forward-looking statements include the potential that ABR's projects may experience technical, geological, metallurgical and mechanical problems, changes in product prices and other risks not anticipated by ABR.

ABR is pleased to report this summary of the Study and believe that it has a reasonable basis for making the forward-looking statements in this announcement, including with respect to any mining of mineralised material, modifying factors, production targets and operating cost estimates. This announcement has been compiled by ABR from the information provided by the various contributors to the Study.

Competent Persons Statement

The information in this release that relates to Exploration Targets, Exploration Results and Mineral Resources is based on information prepared by Mr Louis Fourie, P.Geo of Terra Modelling Services. Mr Fourie is a licensed Professional Geoscientist registered with APEGS (Association of Professional Engineers and Geoscientists of Saskatchewan) in the Province of Saskatchewan, Canada and a Professional Natural Scientist (Geological Science) with SACNASP (South African Council for Natural Scientific Professions). APEGS and SACNASP are a Joint Ore Reserves Committee (JORC) Code 'Recognized Professional Organization' (RPO). An RPO is an accredited organization to which the Competent Person (CP) under JORC Code Reporting Standards must belong in order to report Exploration Results, Mineral Resources, or Ore Reserves through the ASX. Mr Fourie has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which they are undertaking to qualify as a CP as defined in the 2012 Edition of the JORC Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Fourie consents to the inclusion in the release of the matters based on their information in the form and context in which it appears.

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1. EXECUTIVE SUMMARY

American Pacific Borate & Lithium Ltd (**ASX: ABR**) (“*ABR*” or “*the Company*”) is developing its 100% owned Fort Cady Borate Project (the “Project”) located in the southeastern desert region of San Bernardino County, California. The Project is located near the town of Newberry Springs, approximately 50 km east of the city of Barstow and 4 km south of Interstate 40 (I-40) (Figure 1). The Project area occurs approximately 200 km from Los Angeles (California) and Las Vegas (Nevada) in the Barstow Trough of the central Mojave. The Project and proposed operation is situated in an area with existing sealed roads, a gas pipeline, rail line and power lines.

1.1 The Project

This report summarises the outcomes of a comprehensive project Definitive Feasibility Study (the “Study”) which evaluates solution mining of the Fort Cady borate deposit to produce a high purity (99.99%) boric acid (H_3BO_3) product along with sulphate of potash / SOP (K_2SO_4). ABR is proposing to produce approximately 408,000 metric tonnes per annum of boric acid in multiple phases:

- Phase One: 81,600 metric tonnes pa of boric acid with 36,000 metric tonnes pa of SOP (90,000 stpa and 40,000 stpa)
- Phase Two: Additional 163,000 metric tonnes pa of boric acid with 36,000 metric tonnes pa of SOP (180,000 stpa and 40,000 stpa)
- Phase Three: Additional 163,000 metric tonnes pa of boric acid with 36,000 metric tonnes pa of SOP (180,000 stpa and 40,000 stpa)
- End of Phase Three total production: 408,000 metric tonnes pa of boric acid with 108,000 metric tonnes pa of SOP (450,000 stpa and 120,000 stpa)

The Project previously attained the key mining permits for Phase One, including the Environmental Impact Statement (“*EIS*”) / Environmental Impact Report (“*EIR*”) for commercial-scale operations, which remain active and in good standing. To capitalise on the large-scale of the borate JORC compliant Ore Reserve and Mineral Resource Estimate (“*MRE*”), the Company also plans on gaining the necessary approvals and permits to expand the processing infrastructure and mine wellfield to accommodate Phase Two and Phase Three productions.

Boric acid and SOP, along with the by-products of gypsum and hydrochloric acid (“HCl”) will be transported in bulk by road and/or railroad to domestic consumers or to the ports in Los Angeles for export.

The SOP production will be achieved with a Mannheim furnace that produces both SOP and by-product HCl. HCl is the key input used in the make-up leaching solution that produces boric acid. Operating both boric acid and SOP facilities enables the Company to expand its sales markets, as boron is used as a micronutrient, and optimise boric acid operations by saving on input HCl requirements. The Company has also identified local market availability and industrial customers for excess production of HCl.

Alternatives for optimising boric acid production, additional boric acid related product stream and future lithium production are planned. Process alternatives have been evaluated for lithium future production, which will be based on utilising waste streams associated with boric acid production. Lithium production is not planned for Phase One, but will be pursued and investigated for the subsequent phases.

The Company has been evaluating different solution mining techniques and various processing alternatives. Previous pilot scale works completed for the Fort Cady ore by Duval and Mountain State Minerals have been evaluated extensively by the Company, as well as new processes and mining methods.

Boric acid will be removed from the ground through in-situ solution mining which, in simplified terms, involves:

1. The pumping of a weak acid solution into the ore body 350m to 450m below the surface (<4% HCl and c.96% recycled process water);
2. A chemical reaction between the acid and the alkaline elements in the colemanite ore body forming boric acid in solution (pregnant leach solution ("PLS"));
3. Extraction of the solution by airlift and surface pumping;
4. Solvent extraction process to remove impurities and enrich the solution;
5. Crystallisation of the boric acid via mechanical cooling;
6. Precipitation of gypsum via acid regeneration using sulphuric acid;
7. By-product HCl produced during gypsum precipitation added to predominantly recycled water and re-injected into the solution mine.

The mining operation will produce gypsum as a by-product, which will be sold to the local cement industry or to producers of drywall or sold as soil conditioner.

1.2 Mining & Processing

Mass balance, capital expenditure ("Capex") and operational expenditure ("Opex") have been prepared for the process design. Under this design, a weak HCl (<4% HCl) solution will be injected underground into the colemanite orebody where it will leach the colemanite ore, generating a PLS by converting the colemanite to boric acid.

The PLS from the production wells will be pumped to the surface where the boric acid will be separated from impurities by solvent extraction (SX), concentrated and crystallised. The crystallised boric acid is then dried, sized, and bagged as final product.

Within the boric acid plant, some HCl would be regenerated by sulphuric acid (H_2SO_4) acidification of the process waste stream causing gypsum crystallisation. The weak HCl solution would be combined with recycled water and SOP generated HCl to produce the make-up solution for re-injection into the formation. Net water usage is minimal for the wellfield ore extraction.

Separately from the boric acid plant, the sulphate of potash (SOP, potassium sulphate) plant processes muriate of potash (MOP, potassium chloride) with Mannheim furnaces to produce high quality SOP. The production of SOP yields HCl as a by-product to be used for the solution mine ore extraction. All HCl demands by the wellfield is covered by the HCl by-product from the SOP plant.

1.3 Financial Highlights

The project NPV is post-tax and calculated on a 100% equity basis, discounted at 10%, and has been estimated via cash flow modelling. A sensitivity analysis of the base case NPV estimates have been calculated on a range of ±30%. These estimates accommodate fundamental uncertainties at the DFS level of study and will be refined through detailed engineering. The sensitivity analysis was undertaken on all of the key inputs to arrive at a range of project NPV's for any given sensitivity (boric acid price, boric acid Opex and boric acid initial Capex). The sensitivity analysis is covered in detail in the Financial Metrics section of this report.

Considering the level of accuracy, the sensitivities and the reasonable estimate of potential cost variations, the base case (Phase One) post-tax NPV_{10} is approximately US$460M. Full production (Phase Three) post-tax NPV_{10} is approximately US$1,247M.

The existing synergies between the products are taken into account as follows:

- The SOP plant claims hydrochloric acid (HCl) by-product credit revenue with sales assumed to the Boric Acid plant

- The Boric acid plant claims gypsum by-product revenue with purchase assumed from the SOP plant
- The combined plant claims revenue for boric acid, SOP, as well as HCl, and gypsum by-product credits.

Table 1: Key Financial Metrics

Key Financial Metrics	
Targeted production – Phase One	82ktpa boric acid 36ktpa SOP
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Unlevered, post tax NPV_8	US$1.59bn (A$2.2bn)
Unlevered, post tax IRR	41%
Proven and Probable Reserves	41MT @ 6.6% B_2O_3 4.81MT of boric acid
Life of Mine from first production (first fourteen years from Reserves)	21 years

1.4 Next Steps

The Company intends to focus on the following over the coming months with a view to being ready to commence construction in Q4 CY2019:

- Commencement of detailed engineering for phase one.
- Progressing financing discussions with a view to financing phase one before Q4 CY2019.
- Gaining necessary additional permits to enable production activities to commence that are likely to be necessary for the drawdown of construction finance.
- Working on a strategy to decouple the SOP operation from the broader operation that should provide additional financing options.

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UNITS, CONDITIONS AND ABBREVIATIONS

The units used throughout the project shall be in the metric SI system of measurement. Standard conditions for gas volumes shall be 32°F and 14.696 psia.

Abbreviation	Meaning
°C	degree Celsius
°F	degree Fahrenheit
o	degree of arc
a	annum (year)
A	ampere
BA	Boric acid
bgs	below ground surface
btu	British Thermal Unit
cp	centipoise (viscosity)
d	day
D80	Size which 80% of the material passes a square mesh screen of the same opening
dB	decibel
ft	feet
F80	Feed size of which 80% passes a square mesh screen of the same opening
g/t	grams per tonne = parts per million (weight)
g/L	grams per liter (solution concentration)
gpm	US gallons per minute
HCl	hydrochloric acid
H_2SO_4	sulphuric acid
H_3BO_3	boric acid
h	hour
Hz	hertz = 1s-1
hp	horsepower
kW	kilowatt
lb	pound (avoirdupois)
L	liter
m	meter
m	million
m3/h	volumetric flow cubic meters per hour
masl	meters above sea level
mg/L	milligrams per liter (solution or gas concentration)
mmbtu	million btu
mm Hg	millimeters of mercury
min	minute
mo	month
mol	mole
Mt	million tonnes
MW	Megawatt
N/A	not applicable
o/f, u/f	overflow, underflow
P80	product size of which 80% passes a square mesh screen of the same opening
psi	pressure pound per square in (sub g = gauge, sub a = absolute)
rad	radian
rpm	revolutions per minute
s	second
SOP	sulphate of potash
st	short ton (2,000 lb)
STP	Normal / Standard Conditions (20°C/101.325 kPa, 68°F/14.696 psi)
stpa	short tons per annum
t	tonnes
tpa	tonnes per annum
t/y	tons per year
t/h	tons per hour
TBA, TBD, TBC	to be announced, determined, confirmed
V	volt
VSD/VFD	Variable speed drive/variable frequency drive
W	watt
Ω (Omega)	ohm
μm	micron (micrometer)
y	year

2. PROJECT SUMMARY

2.1 Overview and Scope

The proposed mining operation includes the construction and operation of a boric acid production solution mine and processing plant with the anticipated capability of initially 81,600 metric tonnes pa (90,000 stpa) of boric acid ("*Phase One*") under the existing Land Use Permits. The Company then will look to gain the necessary approvals to scale-up to 244,800 metric tonnes pa of boric acid (270,000 stpa) ("*Phase Two*"); and 408,000 metric tonnes pa (450,000 stpa) ("*Phase Three*") of boric acid for a projected production life of 20 years. The Company is also proposing to permit and commission a 36,000 metric tonnes pa (40,000 stpa) of Sulphate of Potash ("*SOP*") fertiliser project for every phase, for a total post Phase Three production of 108,000 metric tonnes pa (120,000 stpa). Synergies exist between the two projects including the production of a boron-rich fertiliser and capitalise on the generation of by-product hydrochloric acid ("*HCl*") during SOP manufacturing. HCl is the key input and reagent used for leaching in the proposed boric acid solution mine.

Development work is currently in train on lithium production from waste streams associated with boric acid production. The Company is evaluating lithium by-product production from the boric acid plant streams. A purge stream from the gypsum production circuit is identified as the potential lithium production source. Filtration is being evaluated as a potential process step for lithium extraction. Currently, lithium extraction is still under evaluation and is not included in the process flowsheets and financials for this report.

The proposed mining operation uses in-situ solution mining technology. The recovery of boron from the colemanite ($2CaO \cdot 3B_2O_3 \cdot 5H_2O$) mineral will be performed by injecting a heated (50°C) weak acid solution (containing ~4% HCl in a water solution) through wells drilled into the ore body. The injected acid would remain in the formation to allow reaction with the alkaline ore body. Boric acid and calcium chloride will be withdrawn from the wells as products of the chemical reaction.

The extracted solution will be pumped to the processing plant where boric acid crystals will be precipitated from the solution and to a regeneration facility which will regenerate hydrochloric acid. Gypsum is a by-product of this operation, which will be stored in the gypsum storage facility. Gypsum will be sold to the local cement industry and agricultural end users.

The project area consists of 6,500 acres of land including 343 acres of disturbed lands defined as the project boundary for Phase One. The proposed 343-acre project site includes a 273-acre ore body well field, a 10-acre process facility, 16-acre gypsum deposition area, and 43.5 acres of ancillary services. Ancillary services include a process water supply network, a railroad spur, a natural gas pipeline, access roads and electric lines and facilities. The key land use, mining and environmental permits for Phase One boric acid production are active and in good standing. The Air and Water Quality Permits for Phase One were rescinded in 2009 at the request of the company and are in the process of being acquired. A third permit, the Under Injection Control (UIC) permit is also in the process of being obtained. Phase Two and Phase Three of the Project and SOP production will be advanced as addendum(s) to the existing permits.

2.2 Project Location

The Fort Cady Project is located in the eastern part of the Mojave Desert region in San Bernardino County, California. The Project lies approximately 200 km northeast of Los Angeles near the town of Newberry Springs and is approximately 50 km east of the city of Barstow (Figure 1 and Figure 2) Fort Cady resides in a highly prospective area for borate and lithium mineralisation. The deposit is situated in the Hector evaporite basin and is in close proximity to the Elementis Specialties PLC ("*Elementis*") Hectorite lithium clay mine. The Project has a similar geological setting as Rio Tinto Borates Boron operations and Nirma Limited's Searles Lake (Trona) operations, situated approximately 120 km west-northwest and 140 km northwest of the Project, respectively.

The Fort Cady borate ore body is located in Sections 25, 26 and 27 of T8N, R5E, in San Bernardino County, California. The Project site encompasses ~1.39 sq km (343 acres), including a 1.10 sq km (273 acres) ore body well field, with wells to be located on 76 metre (~250 feet) centres. The ore body contains an estimated 13.93 Mt of H_3BO_3 in-place, with an estimated 6.87 Mt H_3BO_3 (Measured and Indicated Category) and 7.07 Mt H_3BO_3 (Inferred Category) (JORC 2012 MRE; ASX Release dated 3 December 2018). The proven and probable JORC compliant Ore Reserves defined by this Study contain 4.81 Mt of H_3BO_3.

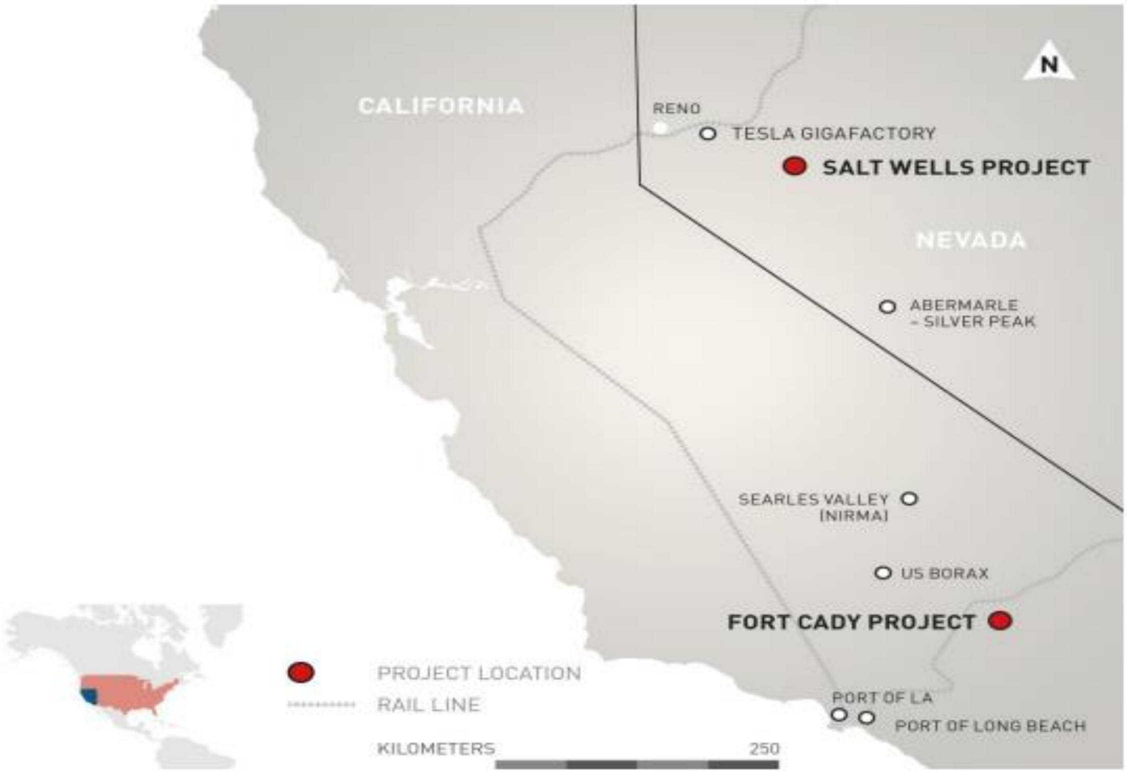


Figure 1. Location of the Fort Cady Borate and Lithium Project, California, USA.

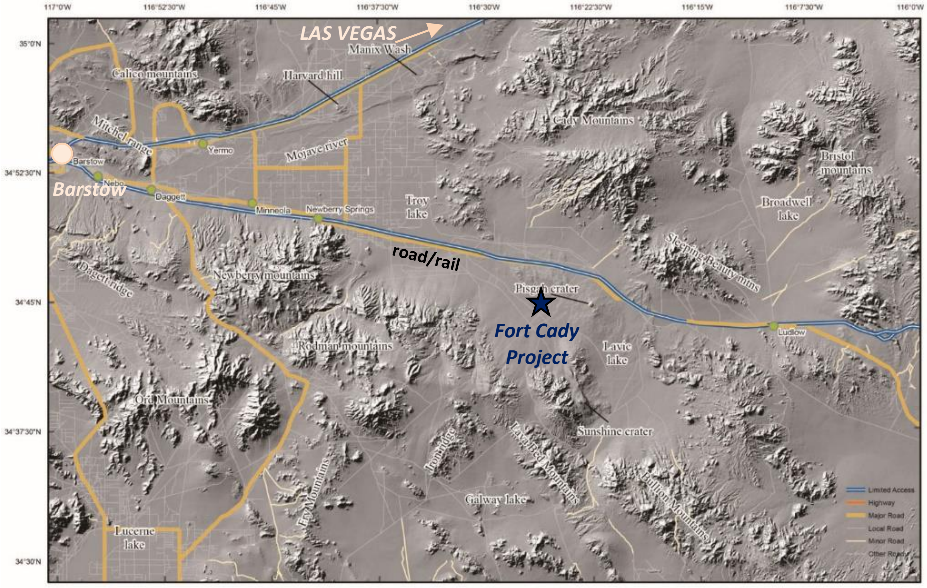


Figure 2. Digital elevation model of the Project area.

2.3 Project History

Several borate-bearing deposits are known in the region including Calico Mountain, Boron, and Searles Lake. Discovery of the Fort Cady borate deposit occurred in 1964 when Congdon and Carey Minerals Exploration Company found several zones of colemanite, a calcium borate mineral, between the depths of 405m to 497m (1,330 ft to 1,570 ft) below ground surface ("bgs") in Section 26, TSN, R5E (Simon Hydro-Search, 1993).

In September 1977, Duval Corporation initiated land acquisition and exploration activities near Hector, California, and by March 1981, completed 33 exploration holes. In 1981, Duval Corp. began considering conventional underground extraction of the ore body. Because of the depth, conventional underground mining was determined to be not economically feasible. Subsequent studies and tests performed by Duval Corporation indicated that in-situ mining technology was feasible (Simon Hydro-Search, 1993).

Duval commenced limited-scale solution mining in June 1981. An additional 17 production wells were completed in the following years which were used for injection testing and pilot-scale operations. In July 1986, an additional series of tests were conducted by Mountain States Mineral Enterprises Inc. ("*MSME*"). In these tests a dilute hydrochloric acid solution was injected through a well into the ore body and a boron-rich solution was withdrawn from the same well. Boric acid average head grade of 3.7% was achieved by MSME when using acid injection. In July 1986, Fort Cady Minerals Corp. ("*FCMC*") was formed with the view of commencing pilot-scale testing. The first phase of pilot plant operations was conducted between 1987 and 1988. Approximately 450 tonnes of boric acid were produced during this time. Given the promising results of the pilot-scale tests the project was viewed to be commercially viable (Dames & Moore, 1993). Concentrated permitting efforts for commercial-scale operations began in early 1990. Final approval for commercial-scale solution mining and processing was attained in 1994.

Extensive feasibility studies, detailed engineering and test works were subsequently undertaken in the late 1990's and early 2000's. This included a second phase of pilot plant operations between 1996 and 2001 during which approximately 1,800 tonnes of a synthetic colemanite product (marketed as CadyCal 100) was produced. CadyCal was produced using sulphuric acid as the leachate which resulted in gypsum precipitation underground and in the surface piping. After the test work was completed the commercial scale operations were not commissioned due to operational issues in conjunction with low commodity prices and other priorities of the controlling entity.

Production data for these projects were recently obtained by ABR. A summary of this data is given in Tables 2-4.

In total, over US$60m has been spent on the Fort Cady Project, including licence acquisition, drilling and resource estimation (non-JORC), well testing, metallurgical testing, feasibility studies and pilot plant testing test work. In addition, the project has previously obtained all operating and environmental permits required for commercial solution mining operations.

ABR executed a Share Purchase Agreement with the project vendors (Atlas Precious Metals Inc.) in May 2017 to purchase 100% of the Project. ABR subsequently listed on the Australian Securities Exchange (ASX) by way of Initial Public Offering (IPO) in July 2017.

Table 2. Duval Testing Results

Test No	Volume Injected	Rate	Pump pressure	Acid	Volume recovered	Rate	HBO_3, average	HBO_3, max
	Gallons	Gallons/ minute	pounds/square inch	%	Gallons	Gallons/ minute	%	%
1	680	1.5	150	16% HCl	700	1--2	0.3	
	1,500	2	275	5% H_2SO_4	1,500	1--2	0.5	1.5
	1,400	1.5-2.0	150	5% H_2SO4	2,000	1--2	1.5	4.6
	1,500	2	275	23% H_2SO_4	1,500	1--2	1	4
2	2,250	2	300	8% H_2SO_4	2,000	1.5-2.0	1.5	4
3	5,358	2-2.5	275	6.9% H_2SO_4	28,927	1-1.5	3	6.9
	6,597	2-2.5	275	17.5% HCl			3	6.9
4	19,311	2-2.5	230-275	6.2% HCL & 2.4% H_2SO_4	67,995	1-1.5	3	6.5
5	20,615	2	290	16% HCl	112,637	1-1.5	2.5	5.2
6	21,569	20	275	1.6% HCl	63,460	1-1.5	1.1	1.7

Table 3a. Mountain State Testing Results: Injection Summary

Injection Summary										
	Date				Gallons		Pounds		Theoretical HBO_3	
Series	From	To	Test No	Wells (SMT)	Series	Cumulative	HCl	CO_2	Series	Cumulative
1	1986-08-04	1986-08-23	1--3	6 & 9	67,972	67,972	23,286		59,540	59,540
2	1986-11-04	1986-11-10	4--7	6	45,489	113,461	15,500		39,431	98,971
3	1986-12-09	1986-12-18	8--11	6	53,023	166,484	15,398		39,173	138,144
4	1987-06-18	1987-06-27	12--15	9	47,640	214,124		4,313	18,184	156,328
					214,124	**214,124**	**54,184**	**4,313**	**156,328**	**452,983**

Table 3b. Mountain State Testing Results: Recovery Summary

Recovery Summary													
	Date				Gallons		Pounds BA		%BA in solution, by surge tank			Theoretical %BA	
Series	From	To	Test No	Wells (SMT)	Series	Cumulative	Series	Cumulative	High	End	Avg	Series	Cumulative
1	1986-08-07	1986-10-17	1--3	6&9	128,438	128,438	32,608	32,608	3.84%	1.56%	2.50%	54.77%	54.77%
2	1986-11-05	1986-11-13	4--7	6	51,636	180,074	21,223	53,831	5.74%	4.05%	4.68%	53.83%	54.39%
3	1986-12-10	1987-01-13	8--11	6	99,889	279,963	33,386	87,217	5.59%	1.93%	4.18%	85.23%	63.14%
4	1987-06-09	1987-07-02	12--15	9	86,595	366,558	18,973	106,190	3.55%	1.81%	2.60%	104.34%	67.93%
					366,558	**366,558**	**106,190**	**279,846**			**3.79%**		**67.93%**

Table 4. Fort Cady Mineral Corporation, Production Summary

				Plant Feed					Total Production		
	Total	Flow to Plant	Flowrate	pH	Free Acid	Boric Acid	Chloride	Sulfate	Boric Acid	B_2O_3	CadyCal 100*
Date	Minutes	Gallons	gallons/ minute		grams / litre	%	grams / litre	grams / litre	tons**	tons**	tons**
Jan-01	7,215	258,556	35.8	5.83		2.33	12.54	3.76	15	9	20
Feb-01	7785	331,886	42.6	2.54	0.35	2.36	12.13	4.94	25	14	33
Mar-01	10,470	422,922	40.4	2.41	0.23	1.9	15.84	3.23	34	19	45
Apr-01	10,290	393,824	38.3	1.86	2.6	5.43	42.11	8.18	41	23	53
May-01	7,560	296,000	39.2	2.02	2.67	5.77	44.77	8.70	31	17	40
Jun-01	3,375	120,928	35.8	0.67	1.35	3.12	27.84	5.30	12	7	16
Jul-01	2,385	77,157	32.4	1.19	0.31	2	12.74	2.60	7	4	9
Aug-01	3,300	142,207	43.1	4.04	0.07	3.84	19.60	3.08	15	8	19
Sep-01	4,875	247,901	50.9	2.77	0.12	3.44	23.21	3.68	21	12	28
Oct-01	10,035	478,723	47.7	2.03	0.35	3	15.54	4.60	37	1	49
Nov-01	9,270	371,171	40.0	1.99	0.16	2.39	14.15	4.02	23	13	30
Dec-01	12,525	353,885	28.3	1.83	0.17	2.42	14.95	2.58	29	16	38
01-Total	89,085	3,495,160	39.2	2.44	0.73	3.19	21.37	4.74	291	164	381
00-Total	87,255	3,142,413	36.0	2.14	0.25	2.70	12.42	2.54	279	157	366
99-Total	92,820	2,475,770	26.7	1.59	0.48	2.82	10.13	6.84	201	113	263
98-Total	111,468	2,715,319	24.4	1.24	0.91	2.85	7.78	10.19	217	122	284
97-Total	109,040	2,692,940	24.7	0.99	1.84	3.10	3.52	13.00	252	142	329
96-Total	101,212	2,711,044	26.8	1.33	1.32	3.01	2.96	5.76	244	137	319
Project Total	**590,880**	**17,232,646**	**29.2**	**1.67**	**0.9**	**2.95**	**10.29**	**6.95**	**1,483**	**835**	**1,942**

**Artificial colemanite product*

***Short tons (2000 lbs)*

2.4 Process History and Evolution

The historical progress of the process design is illustrated in Figure 3. The process initially utilised for Fort Cady by Duval and Mountain State Minerals (MSME) consisted of well extraction followed by evaporation pond and harvesting. MSME averaged a head grade of 3.7% of boric acid, out of the wells, and harvested the PLS out of evaporation ponds after concentrating the solution.

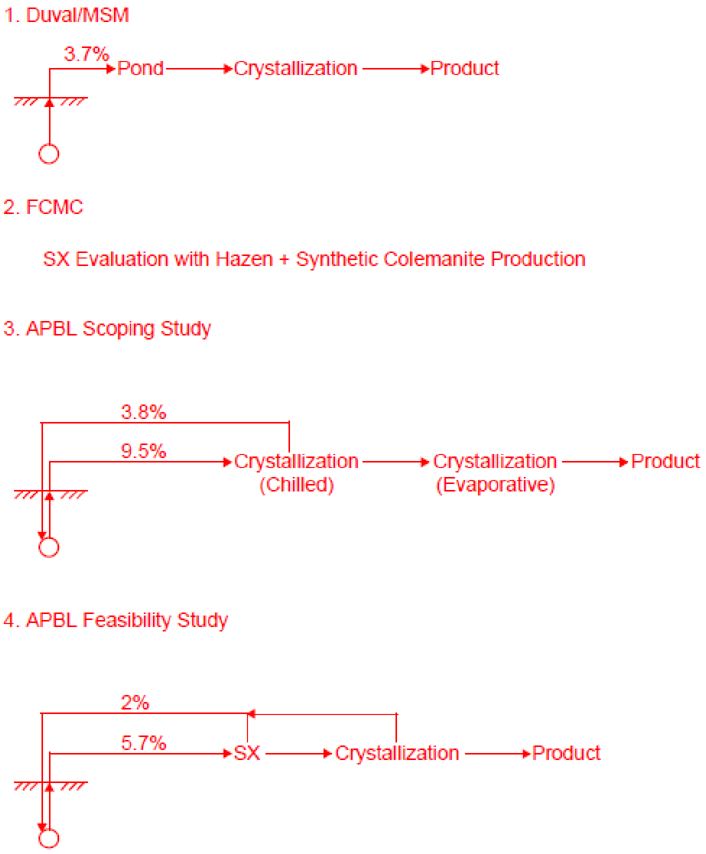


Figure 3. Process Evolution

MSME had lab scale tests and process flowsheet for using crystallisers to process the PLS. FCMC produced synthetic colemanite using evaporation ponds, but considered solvent extraction (SX) for processing the PLS. Hazen produced research on SX for boric acid production, and the FCMC flowsheets for boric acid utilised SX.

The ABR Scoping Study published in December of 2017 had the process flowsheets to utilise dual stage crystallisers based on using heated solutions recirculated back to the wells. This process flowsheet was based on the solubility curve of boric acid with temperature. Please refer to the Solution Mining and Processing sections of this report for details.

The current flowsheet for Phase One for this Feasibility Study is based on utilising SX and crystallisation. This decision is based upon using the historic head grade produced by MSME as the average, rather than using the solubility curve for the head grade average. This decision to use the historic head grade results in the highest level of confidence in the overall process design. This process is thus designed for the lowest head grade scenario.

The decision to use SX instead of dual stage crystallisation was largely based on the flexibility that SX offers in handling variable PLS concentration, and capex and Opex considerations with regard to the cost of premium alloy crystallisers with higher level of energy usage. Solvent extraction is also expected to produce high level consistency in the composition of the processed PLS.

Phase Two and Phase Three flowsheets will be based on the production and performance of the Phase One plant. Since Phase One process is designed for the lowest head grade scenario, there is a high likelihood that the Phase Two and Phase Three processes will be different than Phase One. For example, Phase Two and Phase Three processes could be based on dual stage crystallisation, similar to the Scoping Study design, instead of having SX.

The process design for this Feasibility Study is based on historical head grade, and thus can be considered a baseline process option. If head grade is proven to be higher than this base design assumption, this upside will result in optimised process design with future lower Capex and Opex.

2.5 Land Titles

The Project land titles (tenements) map is shown in Figure 4 and Table 5. The 1994 approved Project area covers roughly 26.3 sq. km (6,500 acres). The Company has the exclusive rights to mine in this area where it coincides with the known spatial extent of the borate deposit. Currently approximately 17.84 sq. km (4,409 acres) are held by Ft. Cady California Corporation (“FCCC”), a subsidiary of the Company, of which approximately 5.6 sq. km (1,386 acres) coincides with the aforementioned approved Project area.

There are several types of land titles within and adjacent to the Project area. These include 0.97 sq. km (240 acres) of fee simple patented or privately held lands; 1.09 sq. km (269 acres) of surface areas owned with mineral rights held by the State of California; 9.63 sq. km (2,380 acres) of unpatented claims held by FCCC; and 6.15 sq. km (1,520 acres) of unpatented claims leased by FCCC from Elementis Specialties, Inc. (“*Elementis*”). Other areas within the project area are mainly unclaimed public lands managed by the U.S. Department of Interior, Bureau of Land Management (BLM).

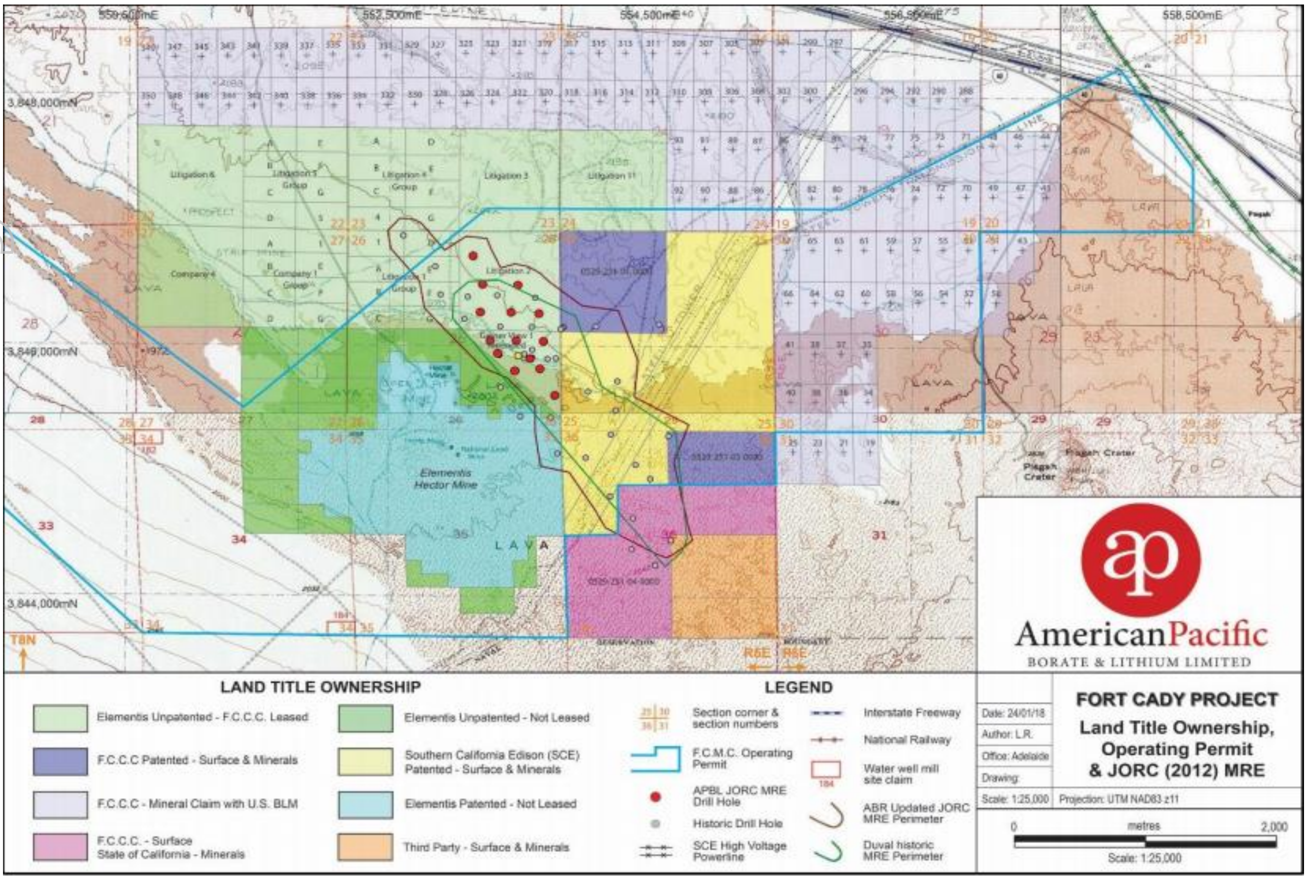


Figure 4. Land Titles (tenements) map highlighting extent of the Fort Cady borate and lithium deposit and Operating Permit area.

Table 5. List of tenements (Land Titles) for the Fort Cady Project.

Tenement Name	Status	Date of Grant	Date of Expiry	Area km²	Ownership		
					Surface Rights	Mineral Rights	Lessee
Parcel 0529-251-01 Parcel 0529-251-03	Granted	8/05/2010	Not applicable	0.65 0.32	Fort Cady California Corp.	Fort Cady California Corp.	Not applicable
Parcel 0529-251-04	Granted	8/05/2010	Not applicable	1.09	Fort Cady California Corp.	State of California	Not applicable
Company 1 Group	Granted	Various	Not applicable	0.65	Elementis Specialties, Inc.	Elementis Specialties, Inc.	Fort Cady California Corp.
Litigation 1 Group		12/09/1991		0.65			
Litigation 4 Group		Various		0.65			
Litigation 5 Group		Various		0.65			
Litigation 2		29/07/1937		0.65			
Litigation 3		29/07/1937		0.65			
Litigation 6		29/07/1937		0.65			
Litigation 11		29/07/1937		0.65			
Geyser View 1		18/11/1934		0.28			
Company 4		15/12/1931		0.65			
HEC #124 - #127, HEC #129, HEC #131, HEC #343, HEC #344, HEC #365, HEC #369, HEC #371, HEC #372, HEC #374 - #376	Granted	Various	Not applicable	1.21	Elementis Specialties, Inc.	Elementis Specialties, Inc.	Fort Cady California Corp.
HEC #19; HEC #21; HEC# 23; HEC#25; HEC #34 - #41; HEC #43 - #67; HEC #70 - #82; HEC #85 - #93; HEC #182; HEC #184; HEC #288; HEC #290; HEC #292; HEC #294; HEC #296 - #297; HEC #299 - #350	Granted	Various	Not applicable	9.63	Fort Cady California Corp.	Fort Cady California Corp.	Not applicable

3 GEOLOGY AND MINERALISATION

3.1 Geology Overview

The Project area is located in the Hector Basin of the Barstow Trough of the central Mojave. The Mojave comprises a structural entity commonly referred to as the Mojave block, and is bounded on the southwest by the San Andreas fault zone and the Transverse Ranges, on the north by the Garlock fault zone, and on the east by the Death Valley and Granite Mountain faults. The central Mojave region is made up of a number of relatively low mountain ranges separated by intervening basins which are floored primarily by alluvium. The central Mojave area is cut by numerous faults of various orientations but which predominantly trend to the northwest (Figure 5).

The Barstow Trough, which is a structural depression extending northwesterly from Barstow toward Randsburg and east-southeasterly toward Bristol. It is characterised by thick successions of Cenozoic sediments, including borate-bearing lacustrine deposits, with abundant volcanism along the trough flanks. The northwest-southeast trending trough initially formed during Oligocene through Miocene times. As the basin was filled with sediments and the adjacent highland areas were reduced by erosion, the areas receiving sediments expanded, and playa lakes, characterized by fine-grained clastic and evaporitic chemical deposition, formed in the low areas at the centre of the basins.

Exposures of fine-grained lacustrine sediments and tuffs, possibly Pliocene in age, are found throughout the Project area. Younger alluvium occurs in washes and overlying the older lacustrine sediments. The Project area is covered by recent olivine basalt flows from Pisgah Crater, which is located approximately 3.2 km east of the site (Figure 5 and 6). Thick fine-grained, predominantly lacustrine mudstones appear to have been uplifted, forming a block of lacustrine sediments interpreted to be floored by an andesitic lava flow.

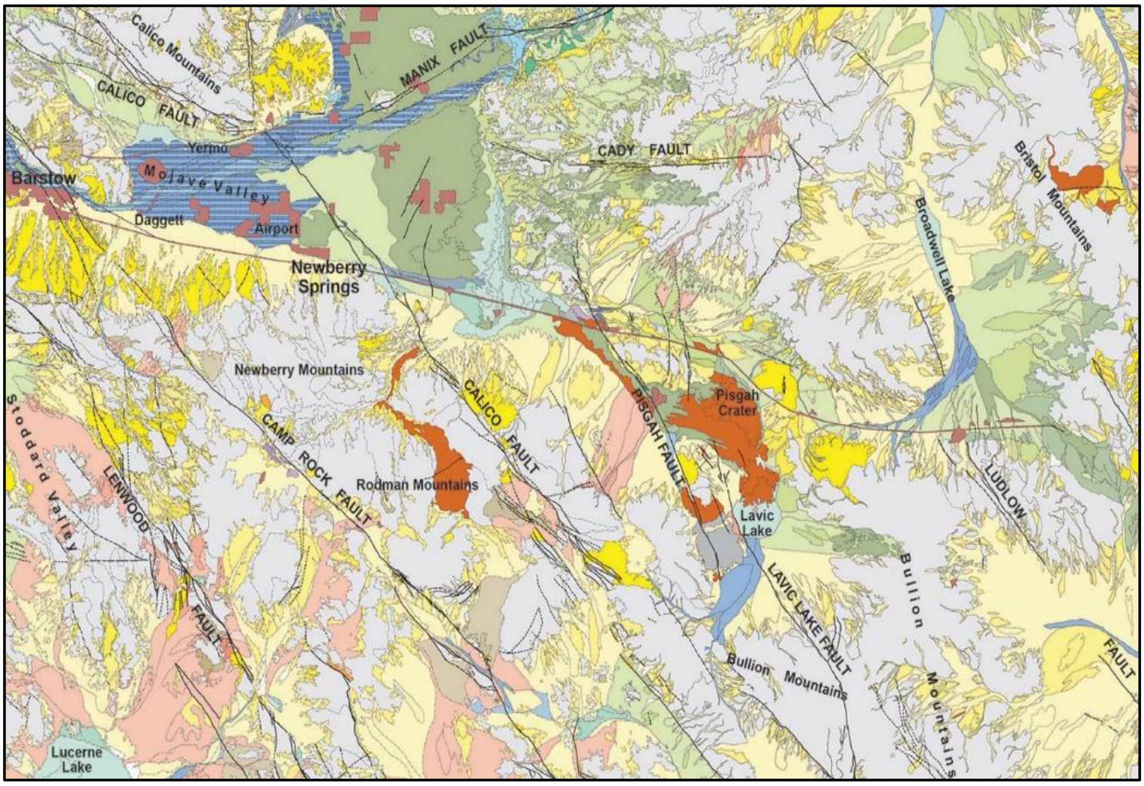


Figure 5. Geology and major structures in the Newberry Springs region.

There are three prominent geologic features in the Project area:

1. Pisgah Fault, which transects the southwest portion of the project area west of the ore body;
2. Pisgah Crater lava flow located 3.2 km east of the site; and
3. Fault B, an unnamed fault, located east of the ore-body.

The Pisgah Fault is a right-lateral slip fault that exhibits at least 200m of vertical separation in the project area. The east side of the fault is up-thrown relative to the west side. Fault B is located east of the ore body and also exhibits at least 200m of vertical separation. The borate ore body is situated within a thick area of fine-grained, predominantly lacustrine (lake bed) mudstones, east of the Pisgah Fault and west of Fault B. The central project area has been uplifted along both faults, forming an uplifted block. Test borings emplaced through the ore body reportedly show the presence of claystone at the base and around the evaporite/mudstone ore body. Exploration drilling in the project area indicate that the ore body lies between approximately 400m and 550m below ground level. The ore body consists of variable amounts of calcium borate (colemanite) within a mudstone matrix (Simon Hydro-Search, 1993).

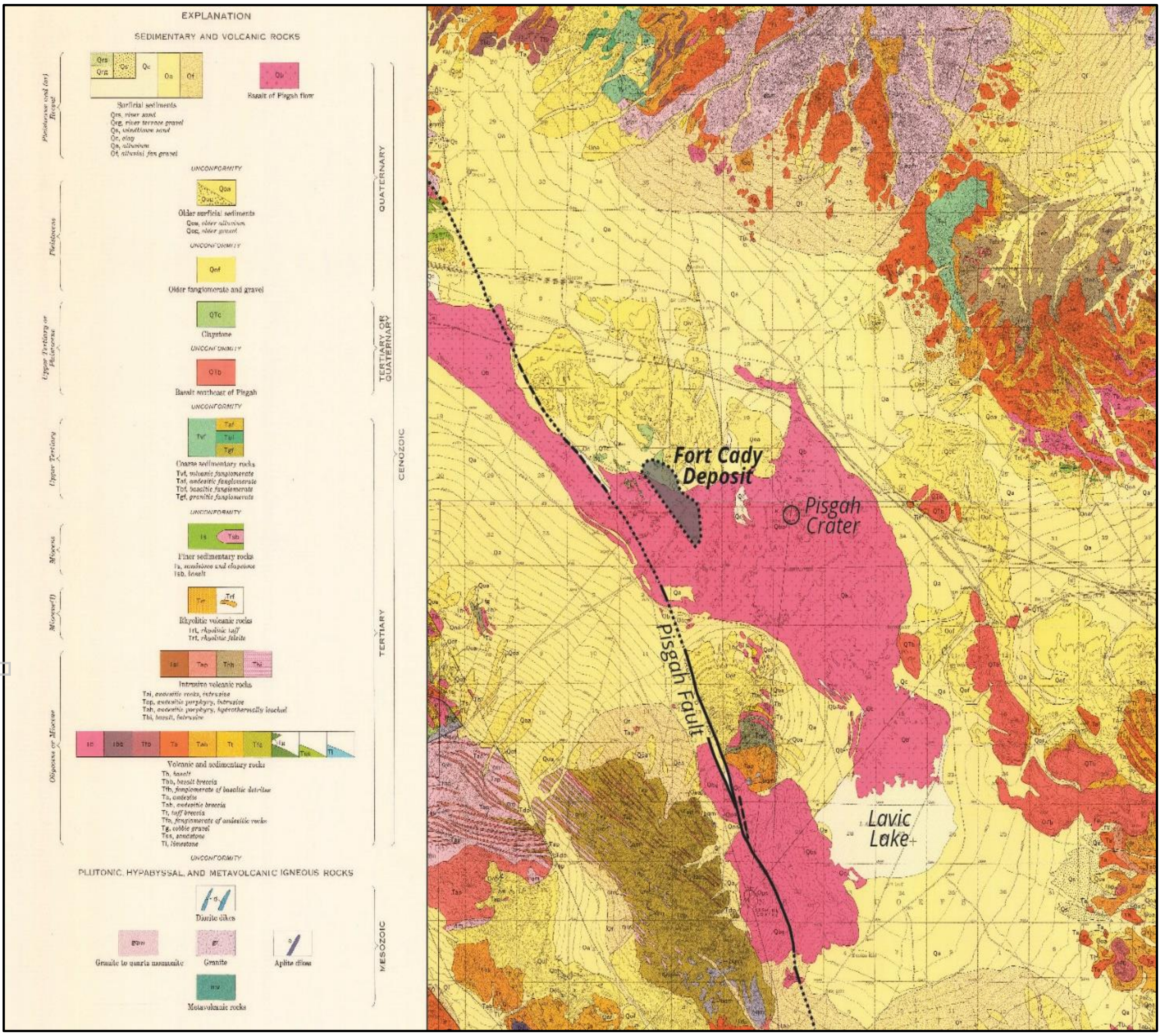


Figure 6: Geology map of project region (modified from Dibblee, 1967).

3.2 Deposit Geometry

The ore body is elongate in shape and trends northwesterly, extending over an area of about 2.46 km^2 (606 acres) at an average depth of approximately 350m to 450m below surface. In plan view, the concentration of boron-rich evaporites is roughly ellipsoidal with the long axis trending N40-50W. Beds within the colemanite deposit strike roughly N45W and dip about 10° or less to the southwest. A zone of >5% B_2O_3 mineralisation, ranging in thickness from 20 m to 80 m (70 ft to 262 ft), is approximately 800 m to 900 m wide at its centre and 3,400 m long (Figure 7) If the entire mineralized zone, irrespective of grade cut-off and minor barren interbeds is considered, the thickness ranges up to 130m.

The eastern margin of the ore body appears to be roughly linear, paralleling the Pisgah Fault which lies approximately 1.6km to the west (Figure 6 and 7). This boundary was considered by Duval geologists to be controlled by a facies change to boron-poor, carbonate-rich lake beds as a result of syn-depositional faulting. The northeast and northwest boundaries of the deposit are controlled by facies changes to more clastic material, reducing both the overall evaporite content and the concentration of boron within the evaporites. The southeast end of the deposit is open-ended and additional drilling is necessary to define the southeastern limits of borate deposition (Wilkinson & Krier, 1985).

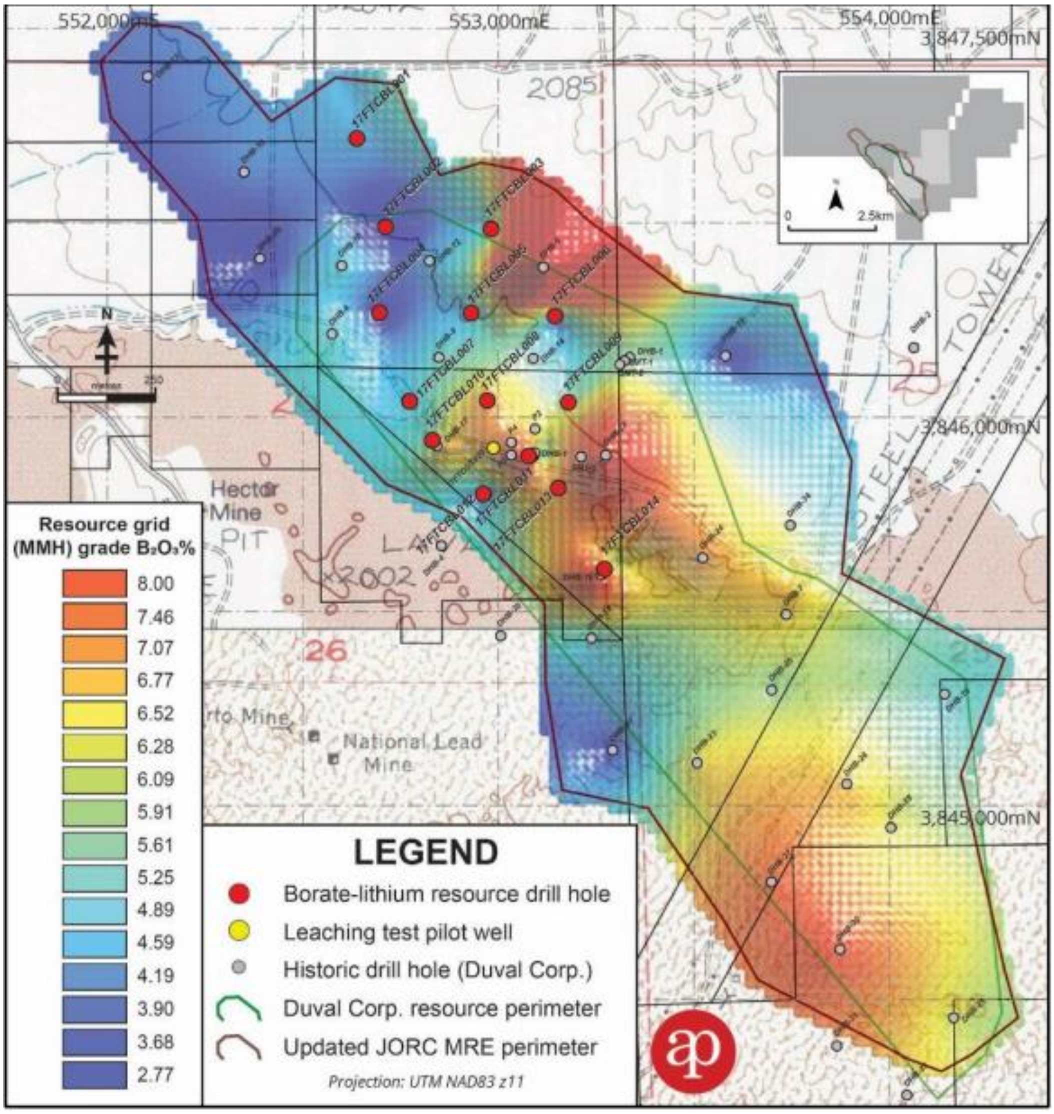


Figure 7. Fort Cady updated JORC (2012) perimeter and Main Mineralized Horizon B2O3 % grade grid

3.3 Deposit Genesis

The boron is believed to have been sourced from thermal waters that flowed from hot springs in the region during times of active volcanism. These hot springs vented into the Hector Basin that contained a large desert lake. Borates were precipitated as the thermal waters entered the lake and cooled or as the lake waters evaporated and became saturated with boron. Colemanite being the least soluble would evaporate on the receding margin of the lake. The evaporite-rich sequence forms a consistent zone in which the borate-rich colemanite zone transgresses higher in the section relative to stratigraphic marker beds.

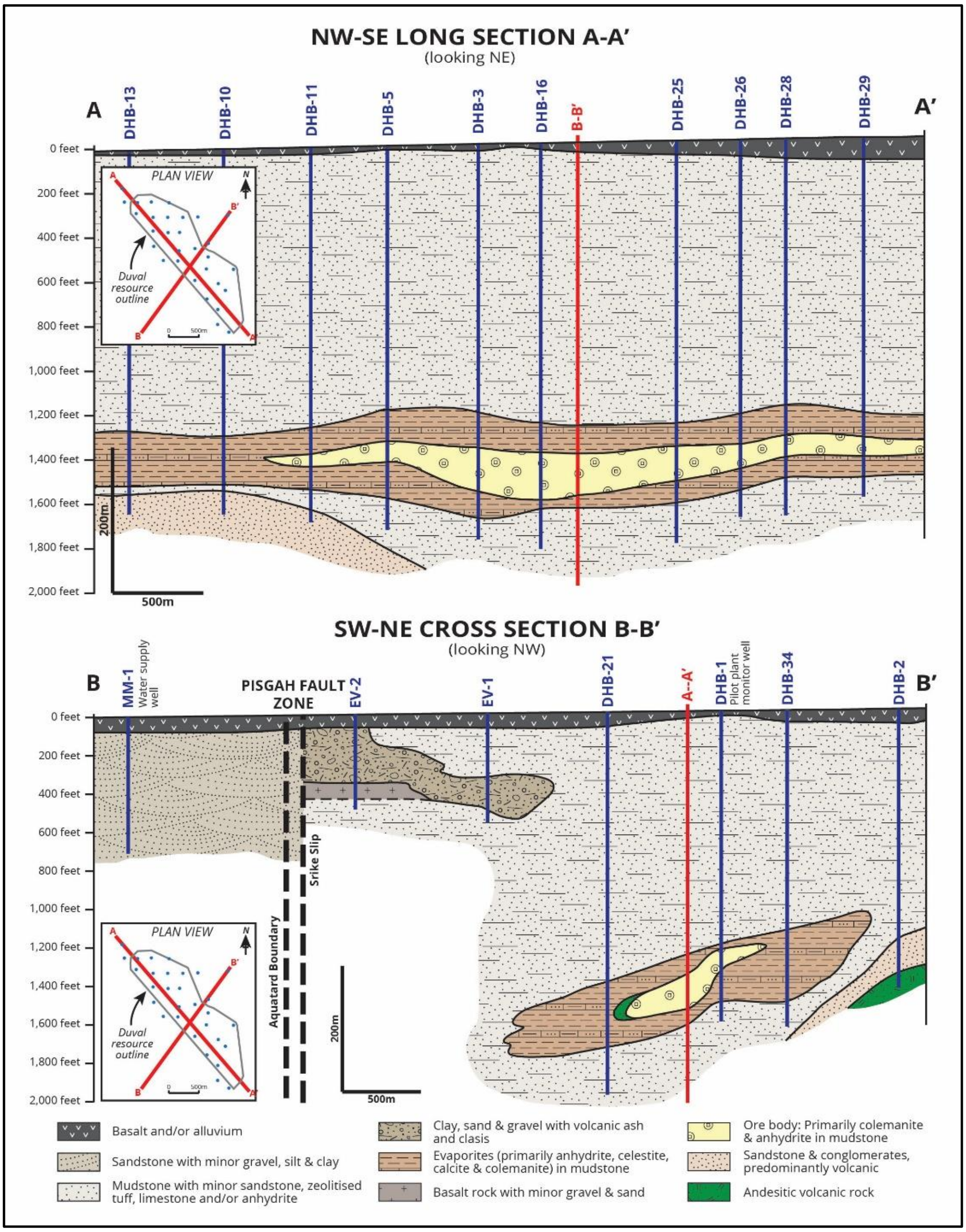


Figure 8. Long-section (top) and cross-section (bottom) through the Fort Cady deposit as defined by Duval (Simon Hydro-Search, 1993).

3.4 Lithological Sequence

Drilling of the deposit by Duval Corp. in the late 1970's and early 1980's has defined the present lithological sequence (Figure 9). Four major units have been identified:

Unit 1: is characterised by a 150 m to 200 m thick sequence of red-brown mudstones with minor sandstone, zeolitized tuff, limestone, and rarely hectorite clay beds. Unit 1 is intersected immediately below the alluvium and surface basaltic lavas.

Unit 2: is a green-grey mudstone that contains minor anhydrite, limestone, and zeolitized tuffs. Unit 2 has a similar thickness (100 m to 150 m) as the overlying Unit 1. Unit 2 is interpreted as lake beds.

Unit 3: is a 75 m to 150 m thick evaporite section which consists of rhythmic laminations of anhydrite, clay, calcite, and gypsum. Thin beds of air fall tuff were also intercepted which provide time continuous markers for interpretation of the sedimentation history. These tuffs have variably been altered to zeolites or clays. Unit 3 contains the colemanite deposit. Anhydrite is the dominant evaporite mineral, and the ore deposit itself is made up mostly of an intergrowth of anhydrite, colemanite, celestite, and calcite with minor amounts of gypsum and howlite.

Unit 4: is characterised by clastic sediments made up of red and grey-green mudstones and siltstones, with locally abundant anhydrite and limestone. The unit is approximately 50 m thick and rests directly on the irregular surface of andesitic lava flows. Where drill holes intersect this boundary it has been noted that an intervening sandstone or conglomerate composed mostly of coarse volcanic debris is usually present. Most drill holes did not extend to this depth.

3.5 Mineralogy

The ore body is hosted by a sequence of mudstone and tuff, consisting of variable amounts of colemanite, a calcium borate ($2CaO \cdot 3B_2O_3 \cdot 5H_2O$). The colemanite is associated with thinly laminated siltstone, clay and gypsum beds containing an average of 9% calcite, 35% anhydrite plus 10% celestite, $SrSO_4$ (Wilkinson & Krier, 1985).

X-ray diffraction (XRD) analysis of the ore body mineralogy indicated the presence of the evaporite minerals anhydrite, colemanite, celestite, and calcite. The mineralogy of the detrital sediments included quartz, illite, feldspars, and the zeolite clinoptilolite. The deposit underlies massive clay beds which appear to encapsulate the evaporite ore body on all sides as well as above and below the deposit (Figure 8 and 9). This enclosed setting makes the deposit an ideal candidate for in-situ mining technology affording excellent containment of the leachate solution.

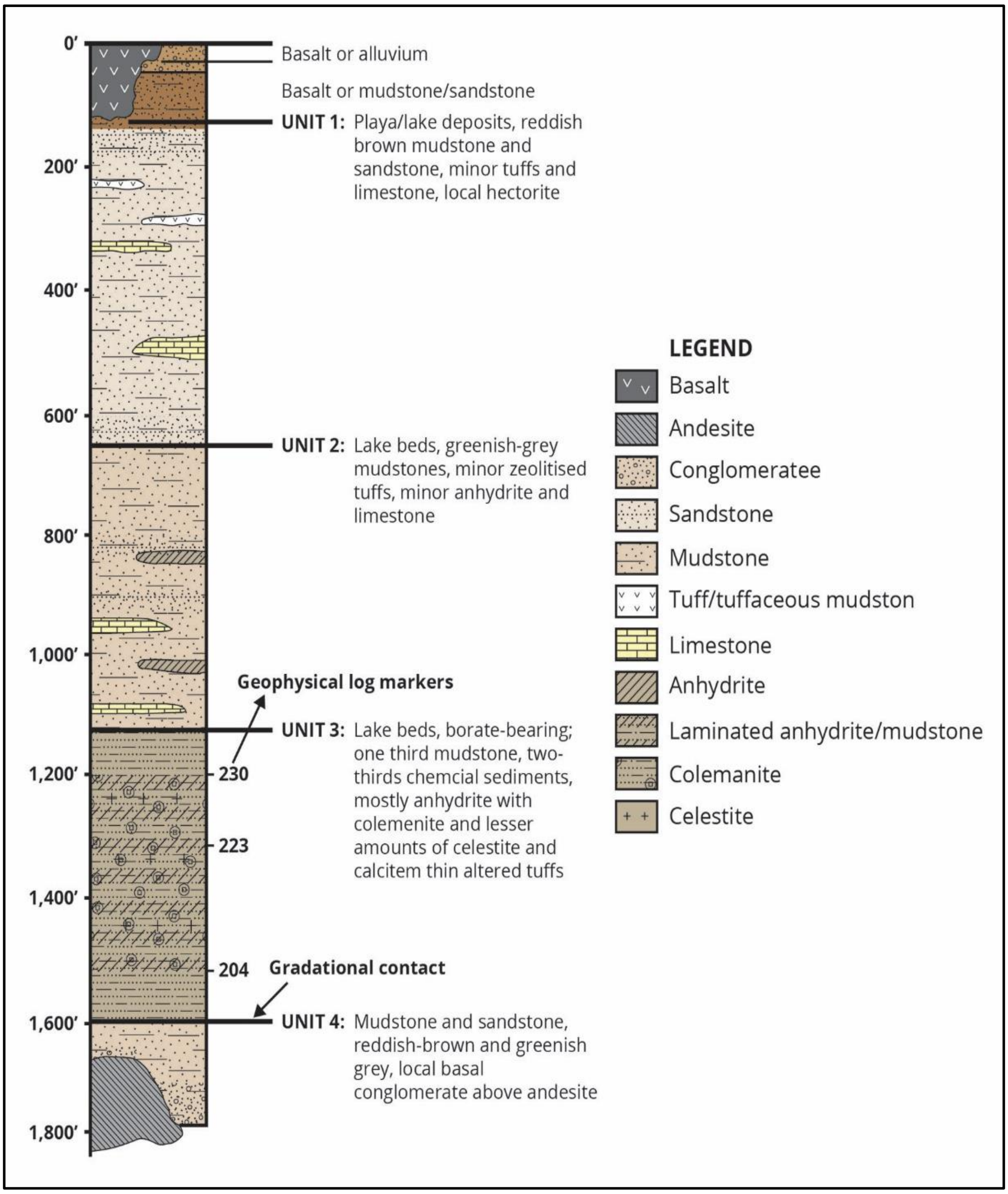


Figure 9. Generalised lithological column for the Fort Cady deposit (Duval Corp.)

4 HYDROGEOLOGY

The ore body lies within the central portion of the project area which consists of a structurally uplifted claystone block bounded on the west and east by active faults. Clay fault gouge has developed along these faults which results in an effective barrier to ground-water movement across the faults. The central project area is located within this fine-grained block and is not considered water bearing due to the low porosity and permeability of the claystone.

The project area west or the Pisgah Fault lies to the southeast of the Newberry Ground Water Basin. The eastern portion or the project area, east of Fault B is underlain by predominantly coarse-grained alluvium. Depth to ground water in the Newberry Basin ranges from approximately 15 meters below ground surface ("bgs") to over 60 meters bgs. Ground-water flow in the Newberry Basin is generally toward the south and southeast (Simon Hydro-Search, 1993).

4.1 Central project area hydrogeology

Depth to ground-water measurements from seven project area test wells in the central project area collected in February 1990, ranged from 44 to 106 meters bgs. These seven wells are with 0.8 km from one another. Because these wells were not completed within the same intervals, the variations observed in the depth to ground water may be an indication of poor hydraulic communication between intervals (Simon Hydro-Search, 1993).

A multiple-well constant-rate injection test was performed in the seven area test wells in 1990 to evaluate the hydraulic properties of the ore body. Results of the tests revealed that the inherent permeability of the ore body is very low, between 3 to 8 millidarcies (mD). These results are consistent with reports that test wells completed in the ore body have been observed to require months to re-equilibrate following injection or pumping (Simon Hydro-Search, 1993).

In 2018, the Company engaged Piteau Associates to produce an updated hydrogeologic model using recent measurements and data in conjunction with the historic data. Piteau is currently completing a "Leapfrog" model suitable for basic mine and injection planning, to be followed by a full model, if required, suitable for detailed planning, to be completed by end of 2018. The Company is drilling additional test holes around Fault B to support the model and further study hydrologic connections to the east of the ore body.

4.2 Proposed water production

The existing water supply well network is located west of Pisgah Fault. The safe yield of the aquifer was calculated to estimate the amount of ground water that could be withdrawn without causing a long-term decline of the water table, or piezometric surface. Variables of safe yield calculated include: recharge area, infiltration rate and precipitation. Based on an estimated recharge area of 60 square kilometres, rainfall of 100 to 180 mm (4 to 7") per year for the low lying and higher elevations respectively, and an infiltration rate of 2% to 5% of the annual precipitation, the safe yield of the aquifer is approximately 200,000 to 500,000 cubic meters per year. There is a high level of uncertainty associated with this estimate because little data exists. Based on 1993 estimates it is anticipated that 161-acre feet of ground water will be pumped from the Newberry Ground Water Basin for FCMC operations (Simon Hydro-Search, 1993).

4.3 Ground water quality

Ground-water quality in the project area is generally poor. Ground-water samples from the project area generally exceed the recommended drinking water standards of 1,000 milligrams per litre (mg/lt) for total dissolved solids (TDS) and 1 mg/lt for boron (Simon Hydro-Search, 1993).

Ground-water analyses from mining zone wells in the central project area indicate that the formation water is highly saline, with TDS concentrations ranging from 23,300 to 29,800 mg/l. One sample collected from well P-2 in July 1987, had a TDS concentration of 25,400 mg/l, and a boron concentration of 530 mg/l (Simon Hydro-Search, 1993).

Water quality data from well MW-1, located west of Pisgah Fault within the Newberry Ground Water Basin had a TDS concentration ranging from 1,640 to 1,974 mg/l in four sampling events in 1982. The well was sampled again in 2018 and had a TDS value of 1,640 mg/l. Water from this well exceeded regulatory drinking water standards for TDS, boron, arsenic and sulphate. Most if not all ground water in the area is unusable for human consumption or agriculture due to high concentration of TDS and boron. Only water obtained from the Newberry ground-water basin, located west of the Pisgah Fault is suitable for industrial use. Ground-water quality data for the eastern project area, east of Fault B does not exist (Simon Hydro-Search, 1993). The Company is currently in the process of gathering more information about the water to the east of Fault B, and have drilled test wells for pump tests and sampling.

Degradation of usable groundwater in water-bearing formations located adjacent to the block of mudstone comprising the central project area, due to infiltration of affected ore zone fluids, is not considered likely, due to:

1. The impermeability of the mudstones surrounding the ore body and the apparent barriers to groundwater movement provided by the faults which bound the mudstone block; and
2. The neutralising effect minerals in the formation would have on any acidic mining fluids which escape extraction.

These two factors are discussed in the following sections (Dames & Moore, 1993).

4.4 Hydrogeologic units

The ore body is located within a body of relatively impermeable mudstone in the central project area, which is separated from the southeastern Newberry Basin by the Pisgah Fault. The Pisgah Fault forms a relatively impermeable barrier to ground-water movement between the two units as supported by the difference in ground-water elevations across the fault (generally over 30 meters) and the differences in ground-water quality across the fault. Water samples collected in the central project area have TDS concentrations ranging from 23,100 to 29,800 mg/l as compared to 1,640 to 1,974 mg/l from MW-1 collected west of Pisgah Fault (Simon Hydro-Search, 1993).

4.5 Leapfrog Model

The intent of the “Leapfrog” model is to examine the orebody, its overall and potential directional permeability, and to provide basis for a detailed hydrogeologic model, if it is deemed necessary. Figure 10 shows views from the Leapfrog model of the ore body.

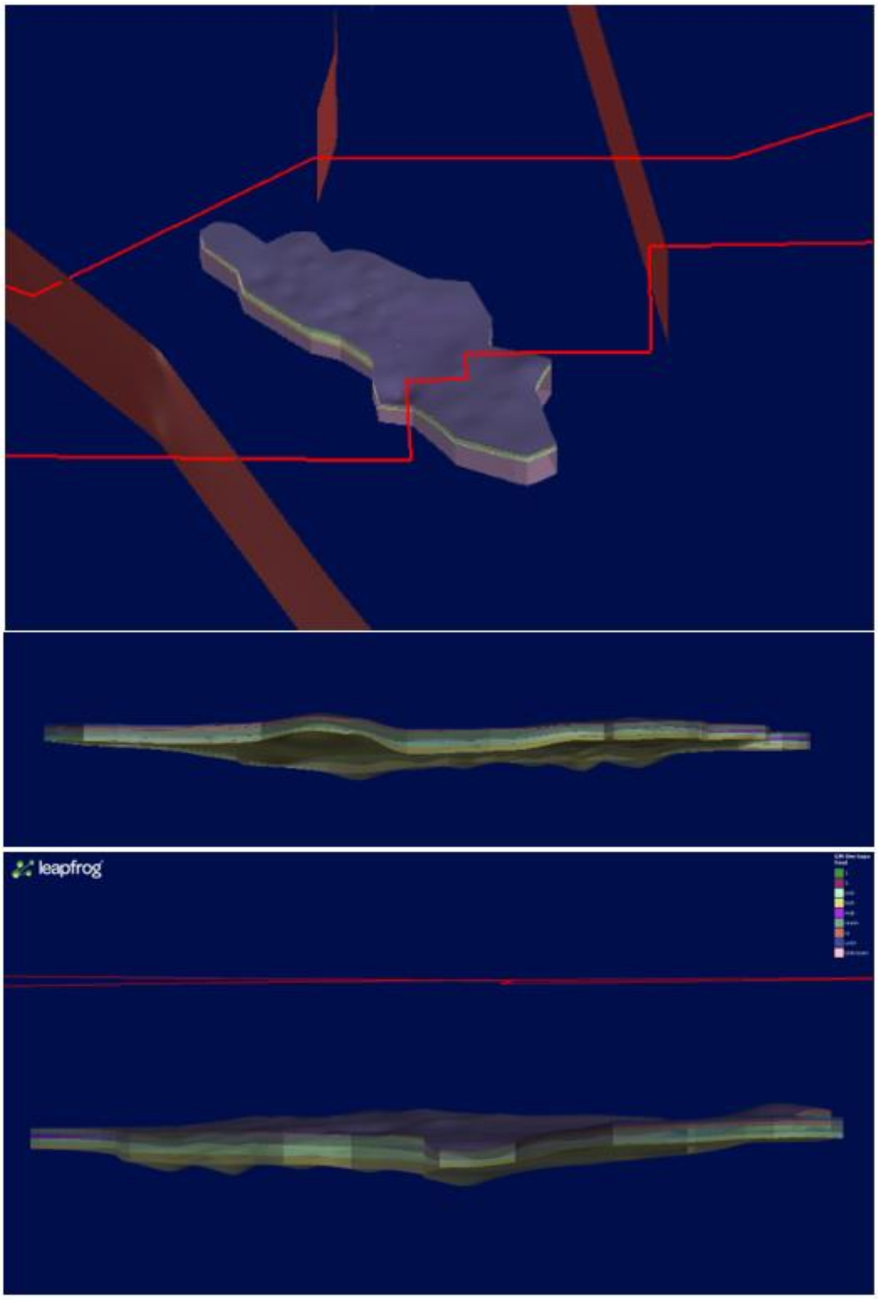


Figure 10. Leapfrog Model Views

The Leapfrog model and studying of the past drilling data suggests that due to the impermeability of the ore body and the existence of confining faults, the likelihood of producing a detailed groundwater model for the ore body is low.

5 MINERAL RESOURCE ESTIMATES, RESERVES, AND PRODUCTION TARGETS

Full details of the Fort Cady borate and lithium JORC (2012) Compliant Mineral Resource Estimate (*"MRE"*) are detailed in the ASX release dated 3rd December, 2018, "*ABR Delivers Upgraded JORC Compliant Mineral Resource Estimate for Fort Cady Borate and Lithium Project*". The estimated mineral resource underpinning production targets in this report have been prepared by a Competent Person in accordance with the requirements of the JORC Code (2012). The following is a summary of the key aspect of the JORC MRE that should be read in conjunction with the aforementioned ASX release.

5.1 Modern Drilling Program

Since acquisition of the project in May 2017, ABR has completed 14 new drill holes in confirming and expanding the Resource at Fort Cady. These are summarised in Table 6.

Assay data from 33 drill holed completed by Duval were also incorporated into the MRE. A cross-section through the deposit is also displayed in Figure 11. Drilling through the overburden sequence is completed using rotary air blast (RAB) drilling technique. This is followed by drilling HQ diamond core through the evaporite sequence. The core was logged and evaluated using industry standard techniques.

Core logging was completed on all drill holes and included lithological, geomechanical and qualitative geochemical (Laser-Induced Breakdown Spectroscopy; "*LIBS*") logging. Downhole geophysical logs, including Gamma Ray, Induction, and standard Caliper were completed on all drill holes from surface to TD with the exception of 17FTCBL009 where adverse hole conditions resulted in only partial geophysical logging. All core is logged and photographed according to industry standard procedures. An example of core photos is shown in Figure 12.

Table 6. Drill holes included in JORC Mineral Resource Estimate.

Hole ID	Rotary (m)	DDH (m)	Hole depth (m)	Samples	Blanks	Duplicates	Boron standards	Lithium standards	Total
17FTCBL001	359.7	118.6	478.2	82	5	6	4	2	**99**
17FTCBL002	347.5	112.5	459.9	107	7	7	5	2	**128**
17FTCBL003	335.3	109.4	444.7	91	6	6	4	2	**109**
17FTCBL004	378.0	151.8	529.7	162	10	9	8	3	**192**
17FTCBL005	352.3	132.0	484.3	150	10	10	7	3	**180**
17FTCBL006	347.5	110.6	458.1	83	5	5	4	2	**99**
17FTCBL007	310.9	230.1	541.0	207	13	14	10	4	**248**
17FTCBL008	323.1	172.2	495.3	153	10	11	7	3	**184**
17FTCBL009	309.4	166.1	475.5	120	7	8	6	2	**143**
17FTCBL010	342.3	159.7	502.0	176	11	12	8	4	**211**
17FTCBL011	304.8	237.1	541.9	160	10	10	8	3	**191**
17FTCBL012	323.1	210.3	533.4	212	14	13	10	4	**253**
17FTCBL013	323.1	216.1	539.2	155	10	10	8	3	**186**
17FTCBL014	335.3	227.1	562.4	260	17	15	12	6	**310**
Total	***4,692.1***	***2,353.7***	***7,045.8***	***2,118***	***135***	***136***	***101***	***43***	***2,533***

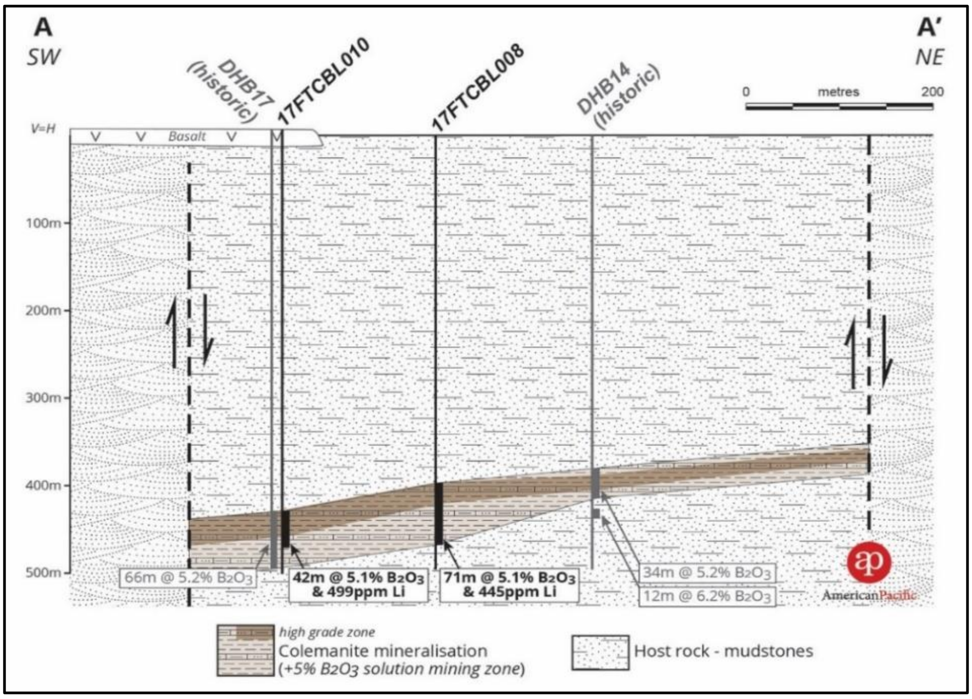


Figure 11. Cross-section through the Fort Cady deposit.

Figure 12. Core photo, 17FTCBL-0014, Note the variability of the core, including finely banded clay, and more competent evaporitic (mostly anhydrite, the lightest coloured material) sections. Depth measurements are in feet.

5.2 Mineral Resource Estimate Reporting

An evaluation of the in-situ resources is shown in Table 7 at 5% B_2O_3 (boric oxide) cut-off grade. The entire mineral resource estimate (MRE) with the exception of "FCCC – Surface; State of CA – Minerals" is contained within the commercial-scale Operating Permit region awarded to FCCC in 1995.

In total, 76.0 Mt out of the total MRE is under 100% ownership or control of FCCC, a fully owned subsidiary of the Company. 86.6 Mt or 72% of the total MRE occurs within the approved Operating Permit region approved for commercial-scale operations which was awarded to FCCC in 1995. 42.2 Mt or 35% of the total MRE that occurs in the Operating Permit region is under full ownership of the Company. 44.4 Mt or 37% of the total MRE is contained within the Southern California Edison ("SCE") Land Title. The SCE Land Title occurs fully within the Operating Permit area which bestows all mining rights of the deposit to FCCC.

The estimation methodology for the historic mineral resources (Duval, 1983; Geosolutions, 1990) was reviewed for comparison with the JORC MRE. It is noted that no geostatistical methods were utilised in the historical MRE. In addition, "waste" holes or below grade data was discarded from the modelling process, which means that grades below cut-off were not allowed to influence the rest of the model. While the 'waste' holes were used to delineate the body, this type of approach can lead to overestimation both in terms of grade and tonnage, once cut-offs are applied.

Table 7a. JORC compliant Measured, Indicated, and Inferred Mineral Resource Estimates

Measured Resource	**Horizon**	**Tonnage MMT**	**B_2O_3 Weight%**	**HBO_3 Weight%**	**Li ppm**	**B_2O_3 Mt**	**HBO_3 Mt**
Elementis Unpatented - FCCC Leased, FCCC Patented - Surface & Minerals	UMH	0.83	6.98	12.40	290	0.06	0.10
	MMH	22.91	7.04	12.51	392	1.61	2.86
	IMH	9.74	5.77	10.25	367	0.56	1.00
	Subtotal	*33.48*	*6.67*	*11.85*	*382*	*2.23*	*3.97*
FCCC - Surface; State of CA - Minerals	UMH	0.24	5.87	10.43	267	0.01	0.02
	MMH	5.16	6.96	12.36	366	0.36	0.64
	Subtotal	*5.39*	*6.91*	*12.28*	*362*	*0.37*	*0.66*
Total Measured Resource	***Total***	***38.87***	***6.70***	***11.91***	***379***	***2.61***	***4.63***
Indicated Resource	**Horizon**	**Tonnage MMT**	**B_2O_3 Weight%**	**HBO_3 Weight%**	**Li ppm**	**B_2O_3 Mt**	**HBO_3 Mt**
Elementis Unpatented - FCCC Leased, FCCC Patented - Surface & Minerals	UMH	0.02	6.24	11.08	320	0.001	0.002
	MMH	2.36	7.35	13.06	374	0.17	0.31
	IMH	3.54	5.25	9.33	350	0.19	0.33
	Subtotal	*5.92*	*6.09*	*10.82*	*359*	*0.36*	*0.64*
FCCC - Surface; State of CA - Minerals	UMH	0.61	5.80	10.30	254	0.04	0.06
	MMH	13.19	6.56	11.65	340	0.87	1.54
	Subtotal	*13.80*	*6.53*	*11.59*	*336*	*0.90*	*1.60*
Total Indicated Resource	***Total***	***19.72***	***6.40***	***11.36***	***343***	***1.26***	***2.24***
Inferred Resource	**Horizon**	**Tonnage MMT**	**B_2O_3 Weight%**	**HBO_3 Weight%**	**Li ppm**	**B_2O_3 Mt**	**HBO_3 Mt**
Elementis Unpatented - FCCC Leased, FCCC Patented - Surface & Minerals	MMH	2.31	5.51	9.78	282	0.13	0.23
	IMH	0.52	5.10	9.05	335	0.03	0.05
	Subtotal	*2.82*	*5.43*	*9.65*	*292*	*0.15*	*0.27*
SCE Patented - Surface& Minerals	MMH	44.42	6.29	11.17	309	2.79	4.96
FCCC - Surface; State of CA - Minerals	MMH	14.61	7.06	12.54	367	1.03	1.83
Total Inferred Resource	***Total***	***61.85***	***6.43***	*11.42*	***322***	***3.98***	***7.07***
Total Measured, Indicated & Inferred Resource	**Horizon**	**Tonnage MMT**	**B_2O_3 Weight%**	**HBO_3 Weight%**	**Li ppm**	**B_2O_3 Mt**	**HBO_3 Mt**
Elementis Unpatented - FCCC Leased, FCCC Patented - Surface & Minerals	UMH	0.84	6.96	12.37	291	0.06	0.10
	MMH	27.58	6.94	12.32	381	1.91	3.40
	IMH	13.80	5.61	9.97	361	0.77	1.38
	Subtotal	*42.22*	*6.51*	*11.55*	*373*	*2.75*	*4.88*
SCE Patented - Surface& Minerals	MMH	44.42	6.29	11.17	309	2.79	4.96
FCCC - Surface; State of CA - Minerals	UMH	0.85	5.82	10.34	258	0.05	0.09
	MMH	32.95	6.84	12.16	356	2.26	4.01
	Subtotal	*33.80*	*6.82*	*12.11*	*354*	*2.30*	*4.09*
TOTAL MEASURED, INDICATED & INFERRED RESOURCES		***120.44***	***6.51***	***11.57***	***344***	***7.84***	***13.93***

[1] Discrepancies in the subtotals and totals are due to rounding; [2] FCCC (Fort Cady California Corp.) is a fully owned subsidiary of ABR; [3] SCE – Southern California Edison; [4] Boric acid (H_3BO_3) equivalent % = 1.78 x B_2O_3%.

For the purposes of the Study the relevant MRE was reduced to exclude the right of way area for Southern California Edison (SCE) land corridor. This had the effect of reducing the MRE from 120.4Mt to 94.64Mt.

Importantly, the Ore Reserve was not reduced as no part of the Reserve is contained within the land corridor. The Table below shows the final JORC compliant MRE that was assumed could be mined for production targets in the Study.

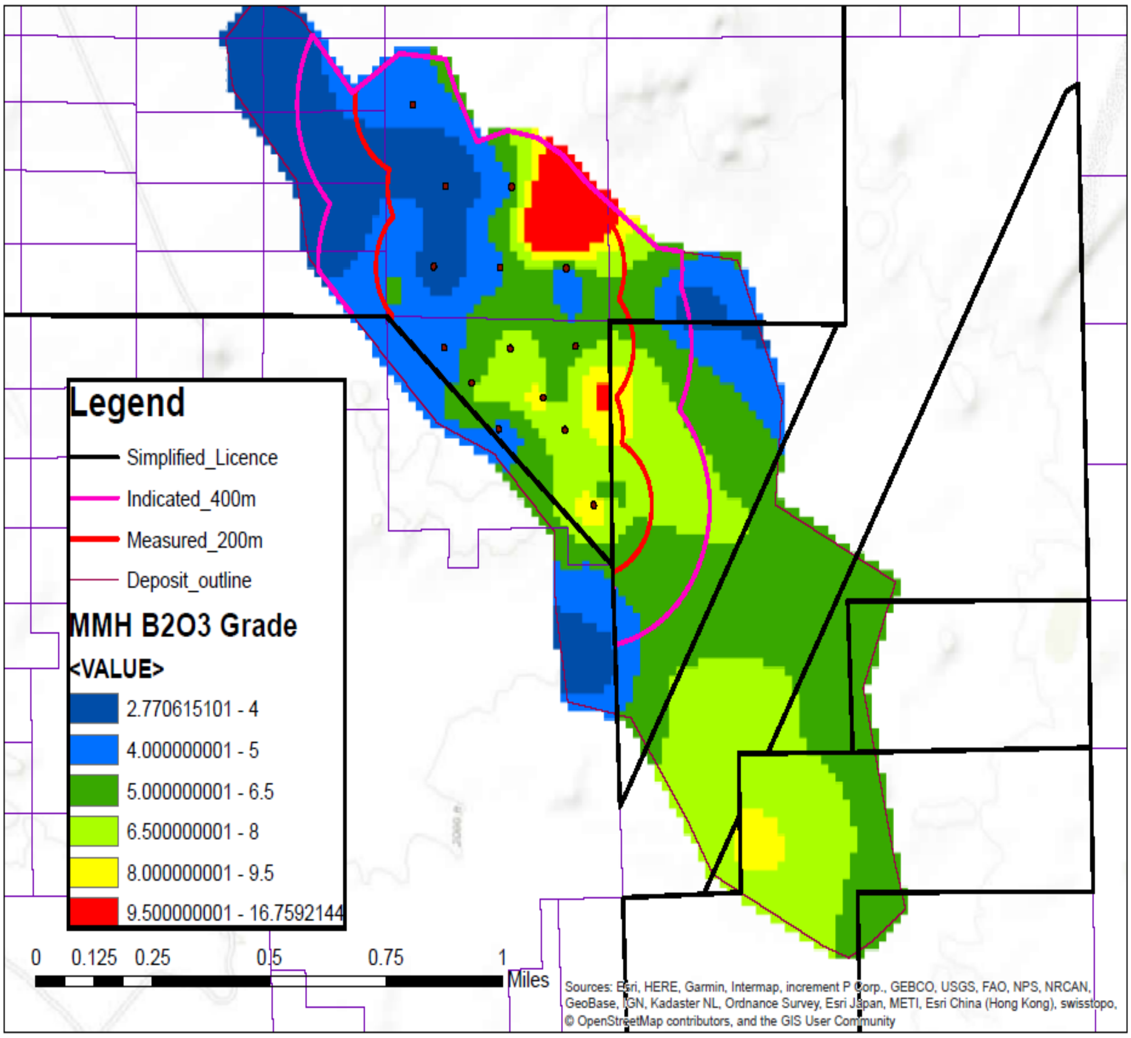
The Company believes there may be an opportunity in the future to relocate power lines associated with the SCE right of way land corridor. This would have the effect of adding an additional five years to the proposed mine life discussed below.

Table 7b. Revised JORC Mineral Resource Estimate excluding SCE right of way area

Measured Resource					
	Horizon	**B_2O_3**	**H_3BO_3**	**Li**	**Tonnage**
		Weight%	**Weight%**	**ppm**	**MMT**
Elementis Unpatented	UMH	6.98	12.40	290	0.83
	MMH	7.04	12.51	392	22.91
	IMH	5.77	10.25	367	9.74
	Subtotal	**6.67**	**11.85**	**382**	**33.48**
SCE Patented - Surface& Minerals	UMH	5.87	10.43	267	0.24
	MMH	6.96	12.36	366	5.16
	Subtotal	**6.91**	12.28	**362**	**5.39**
ALL	**Total**	**6.70**	**11.91**	**379.36**	**38.87**
Indicated Resource					
	Horizon	**B_2O_3**	**H_3BO_3**	**Li**	**Tonnage**
		Weight%	**Weight%**	**ppm**	**MMT**
Elementis Unpatented	UMH	6.24	11.08	320	0.02
	MMH	7.35	13.06	374	2.36
	IMH	5.25	9.33	350	3.54
	Subtotal	**6.09**	**10.82**	**359**	**5.92**
SCE Patented - Surface& Minerals	UMH	5.80	10.30	254	0.61
	MMH	6.56	11.65	340	13.19
	Subtotal	**6.53**	11.59	**336**	**13.80**
ALL	**Total**	**6.40**	**11.36**	**343.18**	**19.72**
Inferred Resource					
	Horizon	**B_2O_3**	**H_3BO_3**	**Li**	**Tonnage**
		Weight%	**Weight%**	**ppm**	**MMT**
Elementis Unpatented	MMH	5.51	9.78	282	2.31
	IMH	5.10	9.05	335	0.52
	Subtotal	**5.43**	**9.65**	**292**	**2.82**
SCE Patented - Surface& Minerals	MMH	6.02	10.69	309	18.62
FCCC - surface State of CA	MMH	7.06	12.54	367	14.61
ALL	**Total**	**6.40**	**11.36**	**331**	**36.05**
Measured + Indicated + Inferred		**6.52**	**11.58**	**353**	**94.64**

[1] Discrepancies in the subtotals and totals are due to rounding; [2] FCCC (Fort Cady California Corp.) is a fully owned subsidiary of ABR; [3] SCE – Southern California Edison; [4] Boric acid (H_3BO_3) equivalent % = 1.78 x B_2O_3%.

The measured and indicated resource limits are graphically represented in Figure 13. The mine planning progression starts in the currently measured resource area. The next section discusses the mine planning progression in detail.



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Figure 13. Measured and Indicated Resource Limits

5.3 Ore Reserves

All Measured and Indicated Resources were converted to JORC compliant Proven and Probable Ore Reserves respectively, by Competent Person. A modifying factor was applied for an extraction ratio of 70% of Resources. See Table 8.

Table 8: Reserves Table

Proven Reserve	Horizon	Tonnage	B_2O_3	H_3BO_3 [2]	Li	B_2O_3 [3]	H_3BO_3 [3]
		MMt[1]	Weight%	Weight%	ppm	MMt[1]	MMt[1]
Elementis Unpatented - FCCC Leased, FCCC Patented - Surface & Minerals	UMH	0.58	6.98	12.40	290	0.04	0.07
	MMH	16.04	7.04	12.51	392	1.13	2.01
	IMH	6.82	5.77	10.25	367	0.39	0.70
	Subtotal	*23.43*	*6.67*	*11.85*	*382*	*1.56*	*2.78*
FCCC - Surface; State of CA - Minerals	UMH	0.17	5.87	10.43	267	0.01	0.02
	MMH	3.61	6.96	12.36	366	0.25	0.45
	Subtotal	*3.77*	*6.91*	*12.28*	*362*	*0.26*	*0.46*
Total Proven Reserve	***Total***	***27.21***	***6.70***	***11.91***	***379***	***1.82***	***3.24***
Probable Reserves	**Horizon**		**B_2O_3**	**H_3BO_3 [2]**	**Li**	**B_2O_3 [3]**	**H_3BO_3 [3]**
			Weight%	**Weight%**	**ppm**	**MMt[1]**	**MMt[1]**
Elementis Unpatented - FCCC Leased, FCCC Patented - Surface & Minerals	UMH	0.01	6.24	11.08	320	0.001	0.001
	MMH	1.65	7.35	13.06	374	0.12	0.22
	IMH	2.48	5.25	9.33	350	0.13	0.23
	Subtotal	*4.14*	*6.09*	*10.82*	*359*	*0.25*	*0.45*
FCCC - Surface; State of CA - Minerals	UMH	0.43	5.80	10.30	254	0.02	0.04
	MMH	9.23	6.56	11.65	340	0.61	1.08
	Subtotal	*9.66*	*6.53*	*11.59*	*336*	*0.63*	*1.12*
Total Probable Reserve	***Total***	***13.80***	***6.40***	***11.36***	***343***	***0.88***	***1.57***
Total Reserves	**Horizon**		**B_2O_3**	**H_3BO_3 [2]**	**Li**	**B_2O_3 [3]**	**H_3BO_3 [3]**
			Weight%	**Weight%**	**ppm**	**MMt[1]**	**MMt[1]**
Elementis Unpatented - FCCC Leased, FCCC Patented - Surface & Minerals	UMH	0.59	6.96	12.37	291	0.04	0.07
	MMH	17.69	7.07	12.56	390	1.03	1.84
	IMH	9.30	5.63	10.00	362	0.32	0.57
	Subtotal	*27.58*	*6.58*	*11.69*	*379*	*1.40*	*2.48*
FCCC - Surface; State of CA - Minerals	UMH	0.59	5.82	10.34	258	0.03	0.06
	MMH	12.84	6.67	11.85	347	0.86	1.52
	Subtotal	*13.43*	*6.63*	*11.79*	*343*	*0.89*	*1.58*
TOTAL PROVEN AND PROBABLE RESERVES		***41.01***	***6.60***	***11.72***	***367***	***2.71***	***4.81***

B_2O_3 Grade cut-off of 5%

[1] MMT = Million Metric Tonnes

[2] B_2O_3 to HBO_3 conversion ratio of 1.7764

[3] Extraction ration of 70% assumed

5.4 Production Targets

The estimated resource underpinning production targets in this report have been prepared by a Competent Person in accordance with the requirements of the JORC Code (2012) as announced to the ASX on 1st February, 2018, with upgraded figures as of 3rd December, 2018 by the Competent Persons referenced in the report.

Boric acid production is built up as follows:

Phase One – 82ktpa, Phase Two – 245ktpa, and Phase Three – 408ktpa

The Ore Reserve and Inferred category Mineral Resource Estimate support a 21 year mine life from first production. Production targets as well as the corresponding gypsum and SOP targets are shown in Table 9 for the entirety of the mine life. 7.48 Mt of ore is recovered via a 70% extraction ratio, with 99% metallurgical recovery rate, and 1.6% solution loss.

The Ore Reserve supports the first fourteen years of production. Inferred category MRE supports an additional seven years of production.

There is a lower level of geological confidence associated with Inferred Mineral Resources and there is no certainty that further exploration work will result in the determination of Measured or Indicated Mineral Resources or that the Production Target or preliminary economic assessment will be realised.

Table 9. Full production schedule by year

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Production Per Year (tonnes per annum)																
Boric Acid Production Capacity (nameplate)	0	81,647	81,647	244,940	244,940	408,233	408,233	408,233	408,233	408,233	408,233	408,233	408,233	408,233	408,233	408,233
Gypsum Production Capacity (nameplate)	0	62,051	62,051	186,154	186,154	310,257	310,257	310,257	310,257	310,257	310,257	310,257	310,257	310,257	310,257	310,257
Sulphate-Of-Potash Production Capacity (nameplate)	0	36,287	36,287	72,575	72,575	108,862	108,862	108,862	108,862	108,862	108,862	108,862	108,862	108,862	108,862	108,862
Boric Acid Production (actual with ramp-up)	0	65,317	81,647	212,281	244,940	375,575	408,233	408,233	408,233	408,233	408,233	408,233	408,233	408,233	408,233	408,233
Gypsum Production (actual with ramp-up)	0	49,641	62,051	161,334	186,154	285,437	310,257	310,257	310,257	310,257	310,257	310,257	310,257	310,257	310,257	310,257
Sulphate-Of-Potash Production (actual with ramp-up)	0	29,030	36,287	65,317	72,575	101,605	108,862	108,862	108,862	108,862	108,862	108,862	108,862	108,862	108,862	108,862
Boric Acid Mined Cumulative	0	65,317	146,964	359,245	604,185	979,760	1,387,993	1,796,226	2,204,460	2,612,693	3,020,926	3,429,159	3,837,393	4,245,626	4,653,859	5,062,092
Reserves (M&I) Mined Cumulative	0	65,317	146,964	359,245	604,185	979,760	1,387,993	1,796,226	2,204,460	2,612,693	3,020,926	3,429,159	3,837,393	4,245,626	4,653,859	4,683,421
Inferred Mined Cumulative	0	-	0	0	0	0	0	0	0	0	0	0	0	0	-	378,671

	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
	2036	2037	2038	2039	2040	2041
Production Per Year (tonnes per annum)						
Boric Acid Production Capacity (nameplate)	408,233	408,233	408,233	408,233	408,233	408,233
Gypsum Production Capacity (nameplate)	310,257	310,257	310,257	310,257	310,257	310,257
Sulphate-Of-Potash Production Capacity (nameplate)	108,862	108,862	108,862	108,862	108,862	108,862
Boric Acid Production (actual with ramp-up)	408,233	408,233	408,233	408,233	408,233	408,233
Gypsum Production (actual with ramp-up)	310,257	310,257	310,257	310,257	310,257	310,257
Sulphate-Of-Potash Production (actual with ramp-up)	108,862	108,862	108,862	108,862	108,862	108,862
Boric Acid Mined Cumulative	5,470,326	5,878,559	6,286,792	6,695,025	7,103,259	7,511,492
Reserves (M&I) Mined Cumulative						
Inferred Mined Cumulative	786,904	1,195,137	1,603,371	2,011,604	2,419,837	2,828,070

	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6			
	2021				2022				2023				2024				2025				2026			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
BA PH1 production ramp up	12,247	12,247	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412
BA PH2 production ramp up									24,494	24,494	40,823	40,823	40,823	40,823	40,823	40,823	40,823	40,823	40,823	40,823	40,823	40,823	40,823	40,823
BA PH3 production ramp up																	24,494	24,494	40,823	40,823	40,823	40,823	40,823	40,823
BA total	***12,247***	***12,247***	***20,412***	***20,412***	***20,412***	***20,412***	***20,412***	***20,412***	***44,906***	***44,906***	***61,235***	***61,235***	***61,235***	***61,235***	***61,235***	***61,235***	***85,729***	***85,729***	***102,058***	***102,058***	***102,058***	***102,058***	***102,058***	***102,058***
SOP PH1 production ramp up	5,443	5,443	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072
SOP PH2 production ramp up									5,443	5,443	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072
SOP PH3 production ramp up																	5,443	5,443	9,072	9,072	9,072	9,072	9,072	9,072
SOP total	***5,443***	***5,443***	***9,072***	***9,072***	***9,072***	***9,072***	***9,072***	***9,072***	***14,515***	***14,515***	***18,144***	***18,144***	***18,144***	***18,144***	***18,144***	***18,144***	***23,587***	***23,587***	***27,216***	***27,216***	***27,216***	***27,216***	***27,216***	***27,216***

6 SOLUTION MINING

6.1 Overview for In-Situ Solution Mining

The Fort Cady ore body is highly favourable for in-situ solution mining for several reasons:

- The ore body is located deep, and below water tables
- The ore body is confined vertically by impermeable layers
- The ore body and its confining layers are weak in structural strengths and rubblize easily
- The faults in the area further confine the ore zone for in-situ leaching

The Fort Cady ore zone is at approximately 400m (>1300 ft) depth ranging in thickness from 20 – 80m (65 ft – 262 ft). For Phase One production of 81,600 tpa (90,000 stpa) boric acid, approximately 1.03 Mt of ore will require dissolution (at 70% extraction ratio). For Phase Two production 245,000 tpa (270,000 stpa) boric acid, approximately 3.1 Mt or ore will be required for dissolution; and for Phase Three production of 408,000 tpa (450,000 stpa) of boric acid production, approximately 5.2 Mt of ore will require dissolution. The Life of Mine (“*LOM*”) is set at 21 years for financial modelling purposes. However, the JORC Mineral Resource estimate is substantial enough to support mining operations in excess of the 21 years.

In-situ solution mining (flooded leaching) effectiveness depends on the following hydrologic characteristics: Void space and porosity, permeability, ore zone thickness, transmissivity, storage coefficient, water table or piezometric surface, and hydraulic gradient (Bartlett, Solution Mining, 1992 & 1998).

The Company is currently developing a hydrologic model for the ore body based on the past data, recent measurements and tests. Piteau Associates is consulting the Company, and developing a detailed hydrologic/hydrogeologic model, which will be utilized for detailed plans for mining.

There are various ways of developing the wellfield for in-situ leaching, including “push-pull” where a well functions both as injection and recovery wells; line drive; and multiple spot patterns (Figure 14).

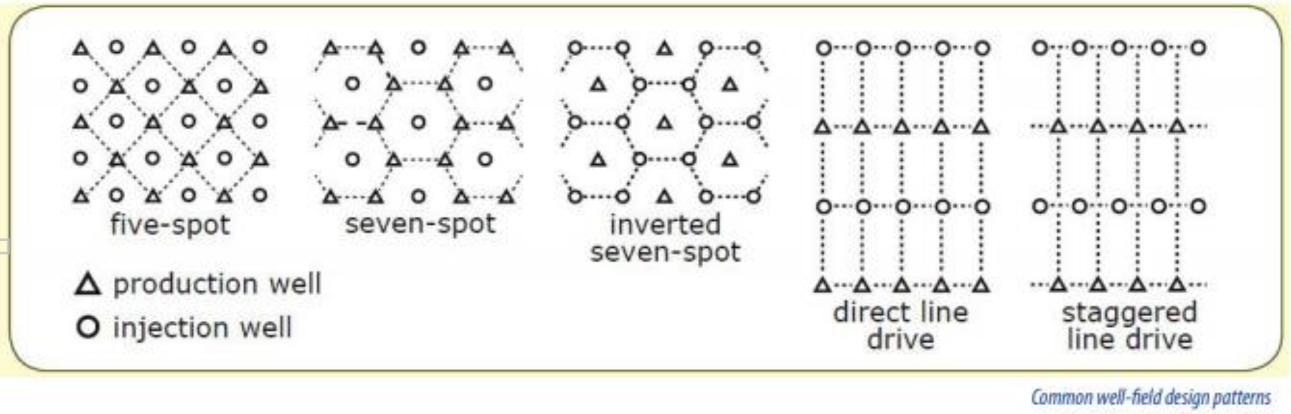


Figure 14. Typical vertical wellfield configurations for flooded leaching (In-Situ Inc., in-situ.com)

In addition to the vertical pattern options, horizontal drilling for well development is also an option for the Fort Cady ore body. The mine wellfield development and the pattern will ultimately depend on the hydrogeologic model, and cost benefit analysis of various patterns and options.

The Fort Cady well field is planned to be operated initially in a "push and pull" mode, until wells naturally connect, where separate injection and recovery wells can be utilised. At this point a mining wellfield pattern will be installed, converting the push-pull wells into separate production and recovery wells as required, to optimize the operation.

Recent bulk sampling by the Company, and data and documentation from previous testing clearly show that the wells within the ore body can be connected rather quickly. With optimised spacing and planning based on the hydrogeologic models being developed, the Company is expecting sweeping efficiency of the flooded leaching to be optimized to support full scale production.

6.2 Leaching Kinetics

The leaching of the colemanite in the ore body is characterized by the following equation:

$$[2CaO \cdot 3B_2O_3 \cdot 5H_2O] + 4HCl + 2H_2O \rightarrow 6H_3BO_3 + 2CaCl_2$$

colemanite + hydrochloric acid + water → boric acid + calcium chloride

The reaction of colemanite with hydrochloric acid produces boric acid and calcium chloride. Hydrochloric acid (HCl) was chosen to be the leaching agent after considering alternatives, processing, project synergy, and economics. The process design consists of supplying heat to the injection solution in order to improve the reaction kinetics of the leaching process. Figure 15 shows the boric acid solubility curve versus temperature.

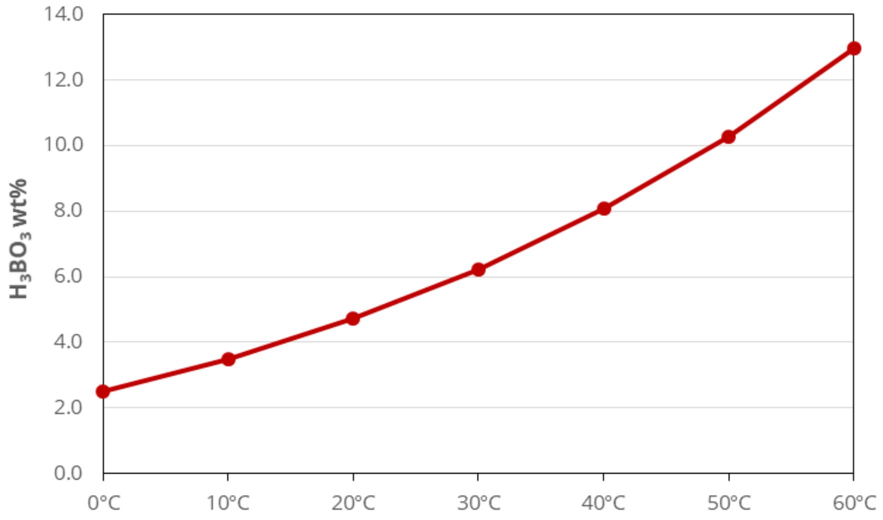


Figure 15. Boric acid solubility curve versus temperature.

During the bulk sampling process in 2018, the Company successfully proved that heating the injection solution can be done effectively with processing arrangements consisting of plate heat exchangers in loop with a heat source and the injection line.

Average head grade of 3.7% by weight boric acid (H_3BO_3) is expected to be recovered from the mine with the current design. Historically, these grades were achieved during pilot plant operations by Mountain State Minerals without the use of heat.

Average throughput of 145 tonnes/hour (160 st/hour) is expected from the mine during full Phase One operation. The injection solution would first be injected into the well and then allowed to remain in the formation for a period of four to 12 hours to facilitate its reaction with the ore body (Dames & Moore, 1993; FCMC, 1996).

The amount of hydrochloric acid injected determines the reaction, and thus is one of the key control variables for the mining process. Amount of HCl in the injection solution must be optimized to make adequate reactions with colemanite, while not being excessive in concentration as not to react with anhydrites, which is primarily $CaSO_4$, and other minerals within the ore zone.

The return pregnant leach solution (PLS) from the mine is where sampling and measurements will be conducted to test the effectiveness of the reaction. Acid concentration measurements via titration for boric acid and HCl, and pH measurements are good initial indicators for effectiveness of reaction.

The pH of a sample of solution withdrawn from the well would be tested, and if it is found to be low (i.e., the solution is still too acidic), the injection solution would be left in the well for a longer period. Once the chemical reaction is thought to have reached equilibrium, the boron-rich solution would be recovered by use of airlifts and surface pumps and pumped to the processing plant. With this mode of operation, approximately $^1/_3$ of the wells would be in the injection mode, $^1/_3$ in the reaction mode, and the remaining $^1/_3$ in the recovery mode (Dames & Moore, 1993; Simon Hydro-Search, 1996). The mode of each well will be inter-changeable. Over time, as resources are exhausted in specific localities, new wells will be drilled to replace those which are depleted.

Due to the time necessary for start-up and shut-down of the integrated process, operations would be continued 24 hours a day, 350 days per year at 90% availability (7,560 hours of operation per year). This continuous operation is anticipated for both the well field and the process plant.

6.2 Well field and Mining Sequence

The ore-body well field will encompass approximately 1.1 km^2 (273 acres) of disturbed lands which is capable of supporting in excess of 200 wells. The Table below provides a summary of production and well field parameters for the different production phases targeted in the Study.

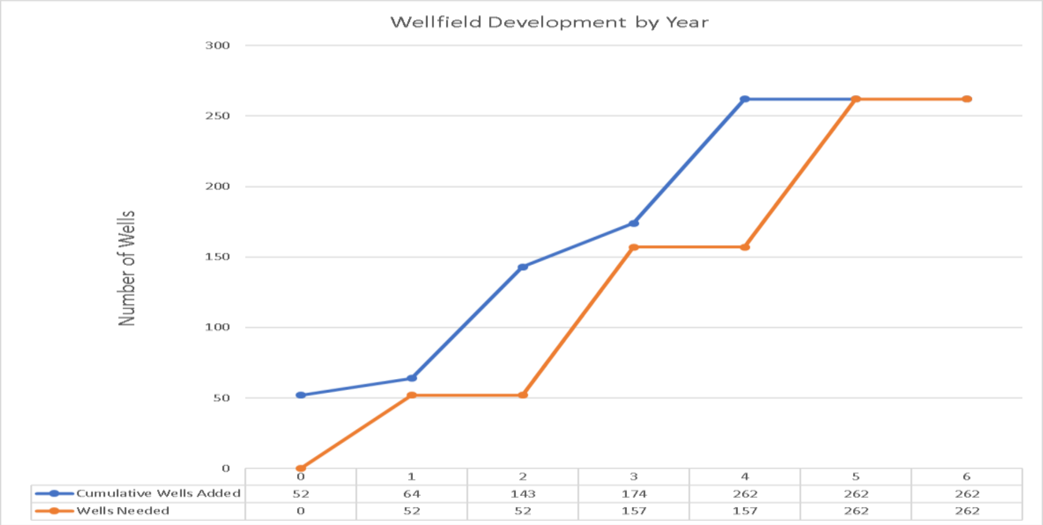
Well flow rates are estimated to be 75 gpm during the PLS recovery phase. To accommodate well field planning and mine scheduling, it is estimated that net recovery flow rates are 25 gpm to reflect that each well is only in recovery mode for $^1/_3$ of the time. Based on well recovery flow rates and PLS boric acid head grade (3.0-5.0% H_3BO_3), of which <0.5% H_3BO_3 is re-injected, each well will produce approximately 1,700 tons of B.A. per year with each well estimated to have a life of 8 years. Total of 52 wells will be in operation during full production of Phase One, 157 during Phase Two, and 262 during Phase Three.

The wellfield will be developed initially with 49 wells under the Phase One capital expenditure, and then further developed with sustaining capex, with additional wells also captured under Phase Two and Phase Three capex expenditures also. Wellfield pipeline and infrastructure will be developed in sequence with wellfield, and will consist of main trunk lines and branch lines. Details are discussed in the following sections.

Table 10. Wellfield development schedule (short tons)

Year	Quarter	Phase 1	Phase 2	Phase 3	Total Production	Total BA Mined (70% Recovery)	PLS produced from wellfield, gpm	Number of producing wells - at 25 gpm well capacity	Wells added under initial capex	Wells added as sustaining capex	Cumulative Wells Added
2019	4	construction							49		
2020	1	construction									
	2	construction									
	3	construction									
	4	13,500			13,500	19,286	785.40	31		3	52
2021	1	13,500			13,500	19,286	785.40	31			
	2	22,500			22,500	32,143	1,309.00	52		6	58
	3	22,500			22,500	32,143	1,309.00	52			
	4	22,500			22,500	32,143	1,309.00	52		6	64
2022	1	22,500			22,500	32,143	1,309.00	52			
	2	22,500	construction		22,500	32,143	1,309.00	52	67	6	137
	3	22,500	construction		22,500	32,143	1,309.00	52			
	4	22,500	construction		22,500	32,143	1,309.00	52		6	143
2023	1	22,500	construction		22,500	32,143	1,309.00	52			
	2	22,500	27,000		49,500	70,714	2,879.80	115		13	156
	3	22,500	27,000		49,500	70,714	2,879.80	115			
	4	22,500	45,000		67,500	96,429	3,927.00	157		18	174
2024	1	22,500	45,000		67,500	96,429	3,927.00	157			
	2	22,500	45,000	construction	67,500	96,429	3,927.00	157	52	18	244
	3	22,500	45,000	construction	67,500	96,429	3,927.00	157			
	4	22,500	45,000	construction	67,500	96,429	3,927.00	157		18	262
2025	1	22,500	45,000	construction	67,500	96,429	3,927.00	157			
	2	22,500	45,000	27,000	94,500	135,000	6,545.00	262			262
	3	22,500	45,000	27,000	94,500	135,000	6,545.00	262			
	4	22,500	45,000	45,000	112,500	160,714	6,545.00	262			262
2026	1	22,500	45,000	45,000	112,500	160,714	6,545.00	262			
	2	22,500	45,000	45,000	112,500	160,714	6,545.00	262			262
	3	22,500	45,000	45,000	112,500	160,714	6,545.00	262			
	4	22,500	45,000	45,000	112,500	160,714	6,545.00	262			262

The wellfield development requirements compared to wells developed is shown in Figure 16.



	0	1	2	3	4	5	6
Cumulative Wells Added	52	64	143	174	262	262	262
Wells Needed	0	52	52	157	157	262	262

Figure 16: Wellfield development in early years

The mine plan progression is displayed in Figure 17. As indicated by the areas (A1, A2, etc), the mine is expected to be developed from the north initially, then progressing gradually south. Note that there is a SEC Right-of-Way within the ore body limits, which is excluded from the wellfield development.

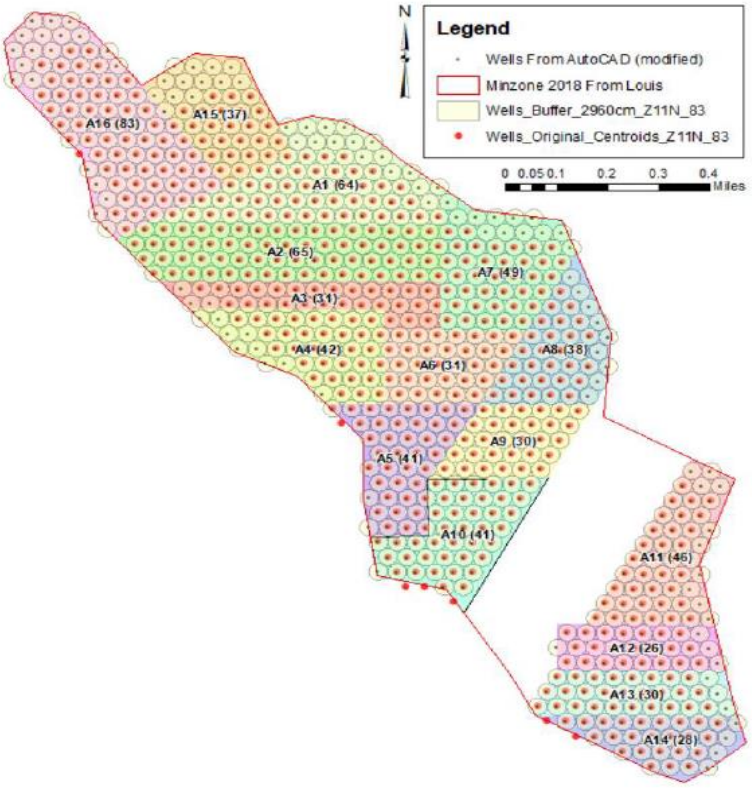


Figure 17. Mine wellfield development sequence

Figure 18 shows a typical wellfield array and estimated progression of development of a single well with time.

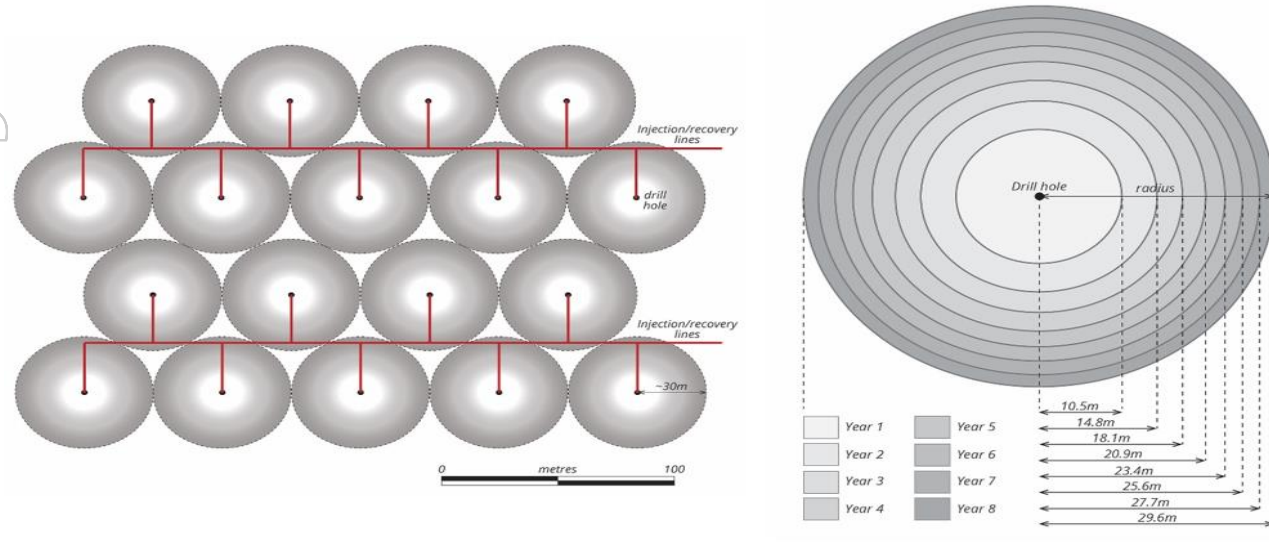


Figure 18. Schematic of initial well field array (left), and estimated production well development by year (right).

6.3 Well design, drilling and completion

Wells will be located on a spacing of 60 metre (~200 feet), will average 457 metres (1,500 feet) in depth and will be drilled with conventional rotary technology. Field tested materials of construction will be used throughout the well field. The well field surface fluid distribution layout will have a capacity of 1,309 gpm. There will be separate lines for injection and recovery operations. A proposed site layout map is shown in Figure 19.

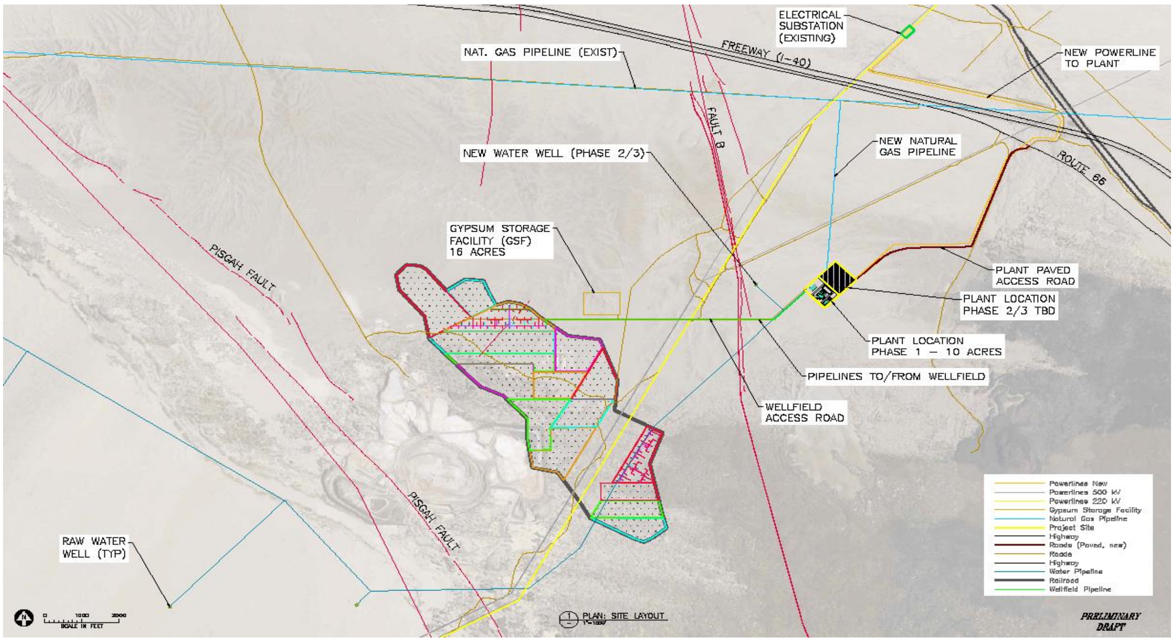


Figure 19. Site Plan of Fort Cady Project.

The basic well design that will be used for commercial well installation has been proven to be successful in the Ft Cady ore body for both injection and recovery wells (FCMC, 1996) (Figure 20) or a design similar in concept. This method utilises a 12¼ inch hole, using conventional rotary technology, drilled completely through the ore body. A large diameter hole is necessary to accommodate 7 inch fibreglass (FRP) casing.

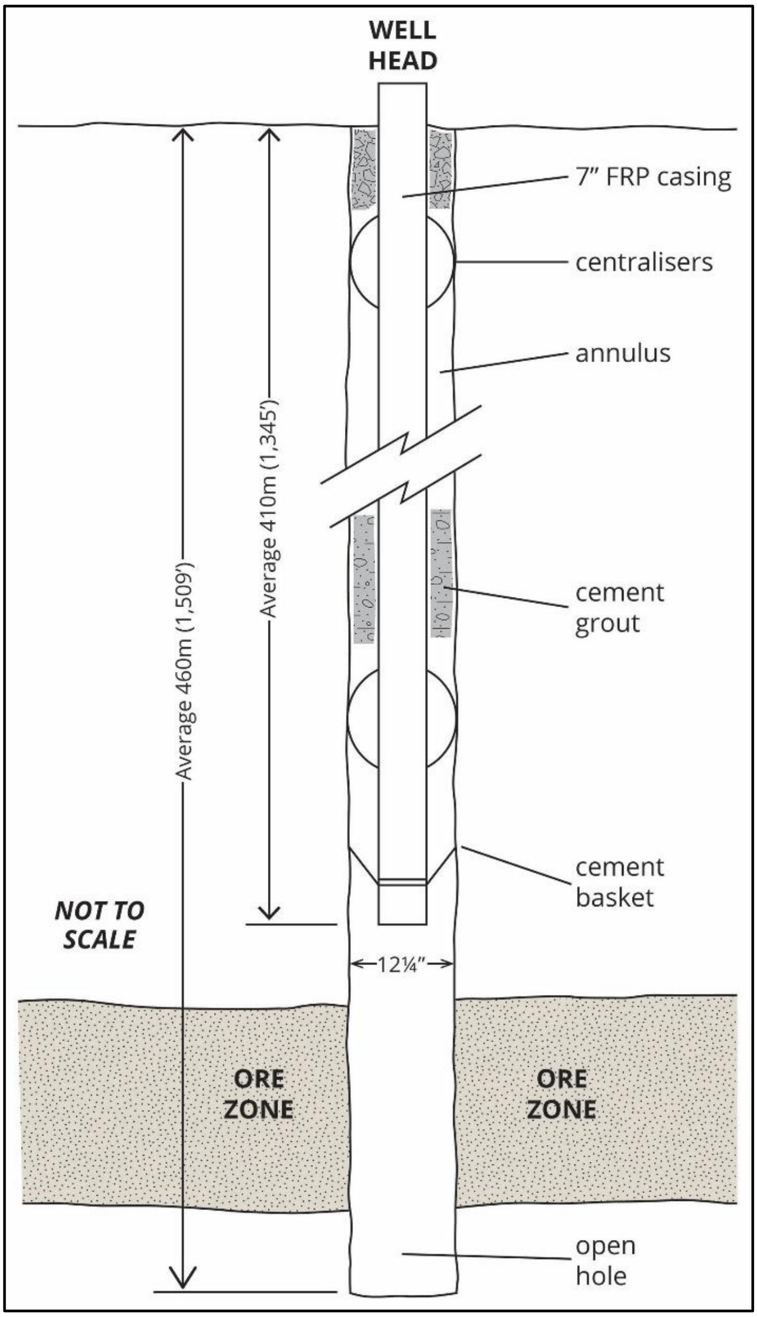


Figure 20. Schematic of injection/recovery well design.

Hydrochloric acid is highly corrosive, and thus submersible pumps will not be used. Instead, airlift will be the main means of recovery from the well, where injection of compressed air within the recovery line provides up flow of the PLS to the surface, where surface pumps with internally robust parts then take the PLS to the processing plant. This method of recovery has been proven successfully during the Company's bulk sample testing in 2018.

The well casing thus must be adequately sized to fit pipe lines for recovery (~4” diameter), and air (~2”). The casing is then run to a pre-selected depth above the ore body, or down to a specified depth within the ore body with perforations in the casing, with double cement baskets on the bottom joint of casing and five centralisers located at intervals along the length of the casing. The casing is then cemented to the surface. After the cement has set, the well is re-entered and a string of drill pipe is run to the bottom. A combination of air and foam is used to clean the casing and open hole interval after development.

Perforated well casing at critical sections, with the use of “stoppers” at predetermined depths will control the leaching zone within the ore body to optimize recovery. The Company will also evaluate horizontal and directional drilling for future developments. The Phase One design is based on vertical wells.

6.4 Well field and piping distribution systems

The schematic of the proposed well field with well locations and piping layout are presented in Figure 17 and 21. High Density Polyethylene (HDPE) plastic has been selected as the material of construction for the surface piping. Project experience has shown that HDPE is resistant to the harsh desert climate for periods of time greater than 10 years. HDPE is also very acid resistant and can withstand higher temperatures than equivalent PVC without loss of working life (FCMC, 1996). The primary injection and recovery trunklines will be identical 8” HDPE pipe and the secondary distribution piping will be 2” HDPE pipe. HDPE is very flexible thus eliminating a large number of 90 degree and 45 degree elbows.

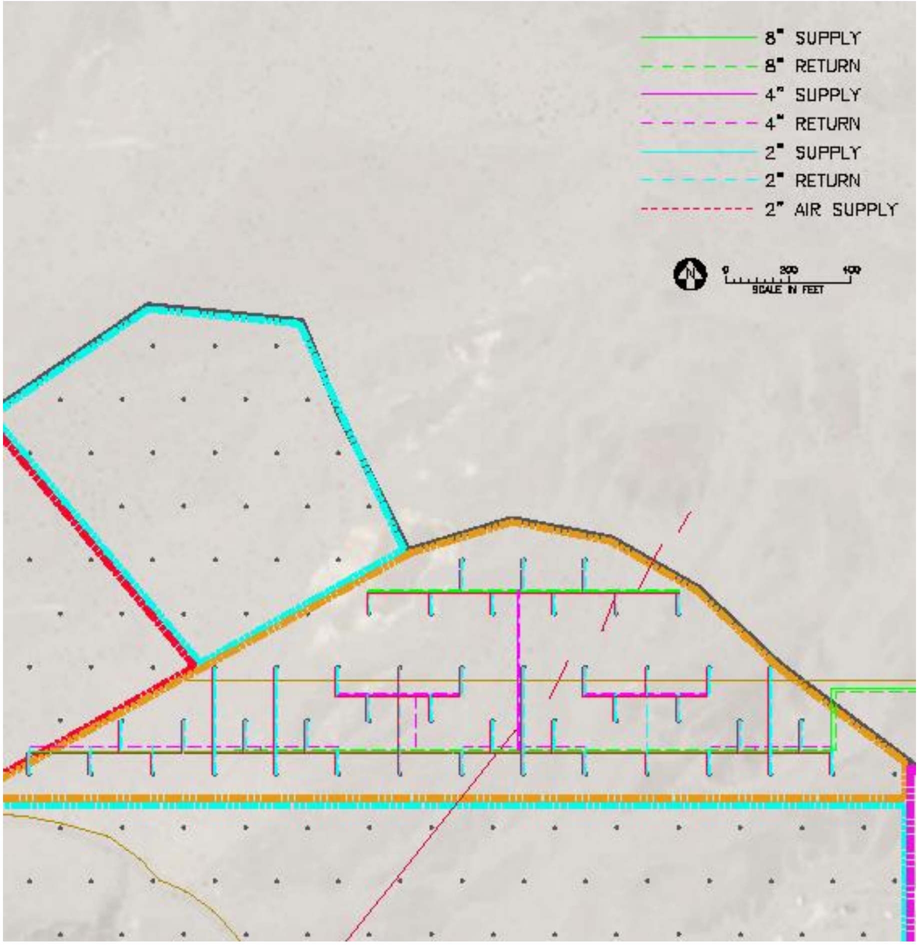


Figure 21. Typical wellfield surface piping

6.5 Well heads and airlifts

Well heads will be constructed of fiberglass (FRP) for its corrosion resistance and structural strength. For the most part, exterior well head parts will be identical for both injection and recovery wells. Airlifts with air de-aerating tanks (foam knock-out tanks) will be used to recover the pregnant borate solutions from the ore body. The airlift piping depth will be set at varying depths. Airlifting allows for solution mining without exposing pump internal parts to the acidic solution from the ore body.

Airlifting works with air injection into the well casing, forcing the PLS up to be recovered at surface level. See Figure 22. The PLS out of the well exits into a foam knockout tank, and then pumped to the plant.

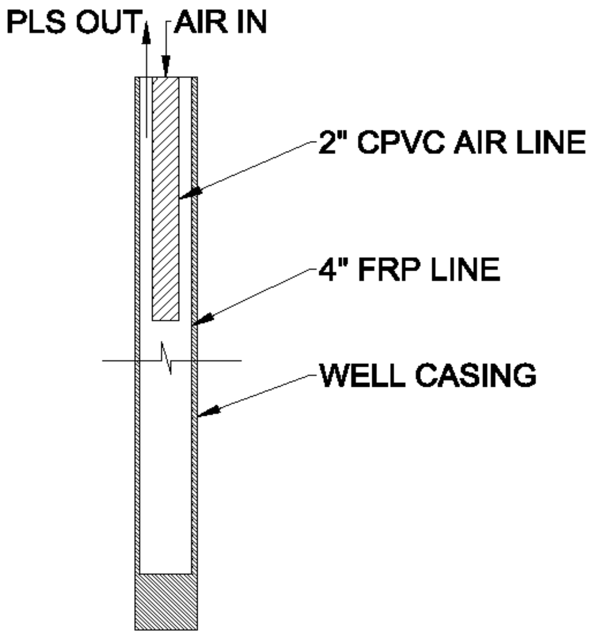


Figure 22: Airlifting from a well

6.6 Electrical distribution system

The three-phase power will be transferred to the well field through overhead lines at 13.8KV. Ground mounted transformers will step-down the power to 480 volts. Distribution panel centres will be utilised to send power to individual wells in groups. In addition to the electrical distribution wire, signal wire will be used to send data from the well head flow meter to the well control centre at the plant.

6.7 Miscellaneous

In order to provide access to well locations during the construction phase and for maintenance during commercial operations, some roadways will be built in the lava area, utilizing gypsum from the process as roadbase.

Labour costs for all services and equipment installations are included in the Opex estimate. A surface construction crew will assemble the well heads, operate the pipe fusion machine, and set submersible pumps into the wells.

7 PROCESSING

7.1 Boric Acid Production

Barr Engineering Co. ("Barr") was engaged by the Company to work on its mineral processing program. The processing program built on a lab-scale test work, pilot-scale field sampling tests and feasibility study level studies completed by previous owners on the Project. The process for the exploitation of the Fort Cady ore body by in-situ solution mining and production of technical-grade boric acid (BA) is based on, well-established chemical and physical reactions. The flowsheet utilises standard industrial chemical processing equipment.

In-line with the existing Operating Permit and EIS/EIR, the process design evaluated boric acid production of 81.6ktpa (Phase One). Following is a summary of the process design and plant layout required for Phase One. Following commissioning of Phase One, the Company intends on attaining the requisite permits to up-scale boric acid production to 408ktpa after Phase Three. The plant configuration is designed such that Phase Two and Three expansion will involve the modular addition for a further capacity of boric acid production.

As part of the processing work program, Barr reviewed historical information and identified several potential mineral process flowsheets for the production of boric acid. Mass and energy balances were modelled in METSIM^{TM} for each option and operating costs were projected. Solvent extraction in combination with mechanical cooling was finally chosen as the favoured processing route for crystallisation of boric acid given its solubility relationship with temperature (Figure 23). Solvent extraction allows for high grade recovery of the PLS, while mechanical cooling has advantages in several key parameters, including water consumption, energy requirements, plant footprint and operating efficiency.

The reaction between the leach solution and the colemanite which produces boric acid can be summarised by the following:

$$[2CaO \bullet 3B_2O_3 \bullet 5H_2O] + 4HCl + 2H_2O \rightarrow 6H_3BO_3 + 2CaCl_2$$

colemanite + hydrochloric acid + water → boric acid + calcium chloride

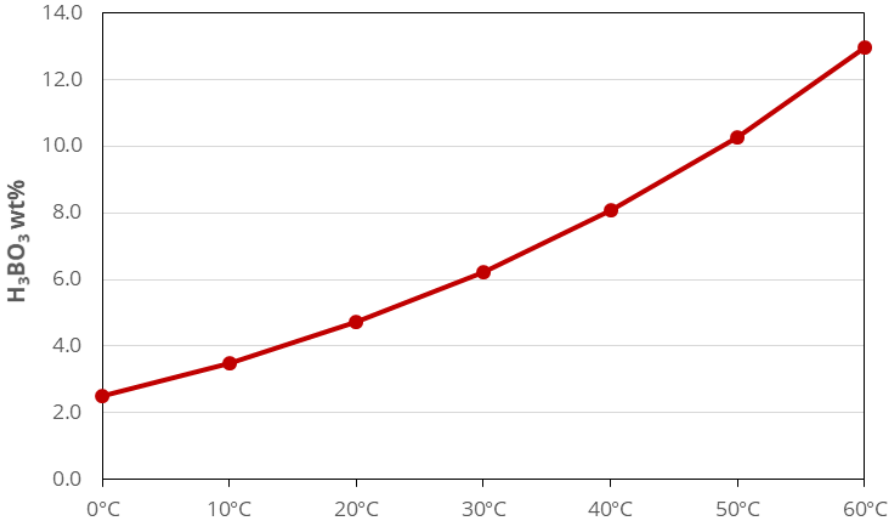


Figure 23. Boric acid solubility curve versus temperature.

Colemanite is an acid-soluble oxide mineral ($3CaO \bullet 3B_2O_3 \bullet 5H_2O$), and the preferred lixiviant is hydrochloric acid (HCl). The pregnant leach solution (PLS) from the mine will contain primarily BA and calcium chloride along with minor quantities of chlorides such as strontium, lithium, potassium, sodium, aluminium, and magnesium. Various processing options are available for the initial separation of a borate value, depending on the concentration of BA in the PLS. These include evaporative pond cooling, cooling in a refrigeration assisted crystalliser (chiller), re-precipitation of high quality colemanite, or solvent extraction (SX). In order to provide plant flexibility to handle variable PLS concentration, the decision was made to conduct the preliminary design and cost estimate based on solvent extraction (SX).

A. Boric acid process description

Following solution mining, the separation of boric acid from impurities will be performed by solvent extraction and cooling crystallisation. The Company proposes to produce a high purity (99.99%) boric acid (H_3BO_3) product. It is envisaged the boric acid process design will consist of the following:

- Acid in-situ solution mining to produce a PLS concentrated in BA
- Clarification of the PLS
- Solvent extraction to purify BA and increase BA concentration
- Evaporative crystallisation of pure BA at 100°C through an MVR-type crystalliser
- Crystal dewatering and drying
- Regeneration of the crude BA mother liquor by sulfuric acid acidification to precipitate calcium and strontium while simultaneously producing hydrochloric acid
- Dewatering and storage of the gypsum by-product for resale
- Volume makeup of the regeneration liquor by adding process water, addition of concentrated makeup hydrochloric acid and liquor heating prior to reinjection.
- Zero liquid discharge (ZLD) circuit for solid waste removal without tailings

The BA production facility is complemented by a Mannheim furnace-based production plant yielding 36,000 tpa (Phase One) of potassium sulphate (SOP) through the high-temperature reaction of potassium chloride (KCl, muriate of potash, MOP) with sulfuric acid (SA). Off-gas from the high-temperature process is rich in hydrochloric acid (HCl) gas, which is scrubbed with process water to produce a by-product stream of aqueous HCl which can be used within the BA process plant or sold. The SOP plant process is discussed in detail in a separate section.

It is proposed to perform the solution mining at a mildly elevated temperature (c. 50°C), achieved exclusively or primarily through heat of reaction within the process, with little or no reliance on steam heating. The expected BA concentration from the production wells is assumed to be 3.7 wt.%. The injection liquor to the mine will contain 2-4% HCl along with 20% or higher calcium chloride. The elevated $CaCl_2$ level is a recent process enhancement that has been incorporated to increase the extraction distribution coefficient of BA in the SX process. Simply it allows a higher BA in organic concentration at a lower raffinate BA concentration. This is a significant change from the previous SX investigations for this project. The concentration of BA in the PLS is a key process assumption and defines wellfield size and the front end of the processing plant. The solution mine solubilises borates, strontium, calcium, lithium, and minor quantities of gangue minerals.

The following sections contain more detailed description of the process design. The processing basic flowsheet is shown in Figure 25.

B. PLS Recovery and Solvent Extraction

Solvent extraction (SX) provides an opportunity to upgrade the PLS from 3.7% BA to roughly 9% (between 8% and 10%) BA while rejecting impurities, including chloride which could have significant impact on downstream materials of construction. In an acidic solution, BA is readily and preferentially extracted by a long-chain alcohol such as 2-ethyl-hexanol or iso-octanol. The SX design was initially based on test work performed at Hazen Research in 1992-1993[1] at lower temperatures than are expected in the current process embodiment. Test work is again underway at Hazen with a goal to produce a rich (stripped) liquor containing 8-10% BA. This will require operation at elevated temperature.

The production of 81.6ktpa of Boric Acid (BA) will require the dissolution of 1.3 million tpa of ore at an estimated 70% extraction of borate values. Boron will be extracted by solution mining. The leaching agent will be hydrochloric acid. The goal is to produce a PLS containing 3.7% or more by weight of BA.

Regenerated liquor containing 2% hydrochloric acid and 0.3% BA will be injected at a temperature of 105°F and a flow of 1,300 gpm. Heating of the mine water will not be required as sufficient heat is recovered and generated from downstream processes.

The separation of BA from calcium chloride and other impurities will be performed by SX. PLS received from the mine will be first clarified and then filtered through a multimedia filter bed to remove insoluble impurities. The SX system will utilise an alcohol (such as iso-octanol, ethyl hexanol, etc.) as the extractant. The reagent is extremely specific for BA and is unable to extract anionic or cationic metal impurities.

The SX chemistry is as follows:

Extraction: $B(OH)_3 + 3\ C_{18}H_{17}OH \rightarrow (C_{18}H_{17})3BO_3 + 3H_2O$

Stripping: $(C_{18}H_{17})3BO_3 + 3H_2O \rightarrow 3\ C_{18}H_{17}OH + B(OH)_3$

Based upon past work performed at Hazen Research, it has been assumed that 92% of the BA will be extracted and stripping will be 90% effective. A scrubbing step has been included which utilises crystalliser purge liquor to remove aqueous entrainment while slightly increasing the organic loading of boric acid. The SX circuit must operate at elevated temperature to produce a strip liquor containing 8% to 10% BA. Test work is required to confirm SX parameters including the cross solubility of the reagents and process liquor. The stripped liquor is filtered through a multi-media filter to remove entrained organic.

In the SX circuit, the PLS enters the solvent extraction heating tank, which feeds extraction circuit, followed by the washing circuit, which follows the stripping circuit. The final stripped liquor is filtered and directed to the crystallisation circuit. The raffinate from the solvent extraction circuit is directed to the gypsum and regeneration circuit. The SX circuit utilises organic extractant (octanol and kerosene), as well as stripping water. The barren organics from stripping is recollected.

The SX circuit consists of a number of mixer-settlers to complete the extraction process. Total of five mixer-settlers are included in the design, and this is to be confirmed by testing soon to be completed by Hazen, who will also size the equipment in the circuit as part of the detailed engineering program.

In 1992-1993 Hazen Research performed an extensive solvent extraction test campaign for the Project. Boric Acid is an unusual non-ionic, specie, largely present as undissociated $B(OH)_3$. The test work indicated that BA could be effectively extracted using a long chain alcohol extractant such as iso-octanol or 2-ethyl-1-hexanol. Over the intervening years no improved extractants have been identified. The alcohol is

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[1] Process Development for Solvent Extracting and Recovering Boric Acid from Fort Cady Brine, Hazen Research Inc. June 17, 1992.

extremely selective for BA but the distribution coefficient was poor with the concentration of BA in the rich liquor being equal to or lower than that in the PLS.

Hazen recommended increasing the calcium chloride concentration in the PLS. The significant impact of elevated calcium chloride on distribution is illustrated in Figure 24. It can been that at 400 g/L $CaCl_2$, 20 g/L BA in the organic can be achieved along with 13 g/L BA in the PLS, compared to 28 g/L in the expected PLS.

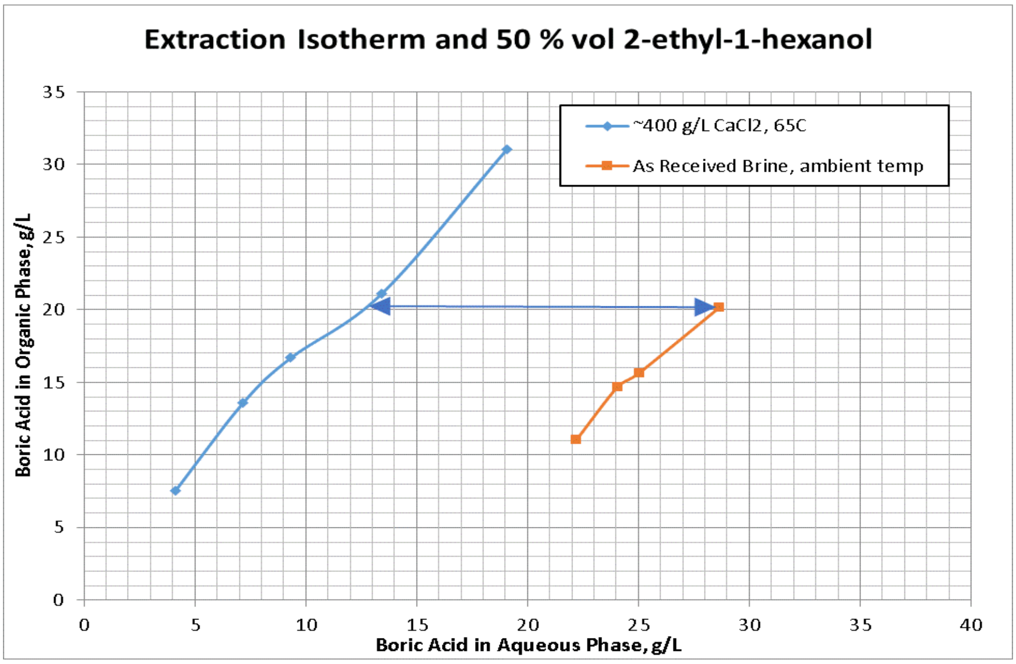

Figure 24. Effect of BA distribution between aqueous and organic phases as a result of elevated CaCl2 concentration

Raising the $CaCl_2$ level is not difficult, requiring only a slight reduction in the percentage of calcium chloride precipitated as gypsum.

There are several benefits in operating at $CaCl_2$ level including:

- Reduced dissolution of magnesium and sodium in the well,
- Reduced stages and equipment sizing in SX with the organic to aqueous ratio falling from 4:1 (previous Hazen) to 1:1, and extraction and stripping stages reduced from 7 to 5,
- Comparable extraction (92%) and stripping (90%),
- Higher concentration BA in rich liquor which will reduce the energy requirements in downstream crystallisation,
- Simplification and reduction of the gypsum circuit. At 250 g/L $CaCl_2$ compared to 4 g/L previously it will only be necessary to process 10% of the SX raffinate through gypsum precipitation. The slurry density in gypsum precipitation will increase from 4-5% to greater than 20%, therefore eliminating the previously considered 60-foot diameter corrosion resistant thickener and the seeding loop,
- Water consumption falls by 25% due to reduction of gypsum production

As a trade-off the hydrochloric acid demand is increased and water removal through the waste evaporator (ZLD) is increased.

The solvent extraction circuit is expected to produce 1150 gpm of raffinate containing 0.3% BA and 630 gpm of rich liquor (stripped) containing 8% to 10% BA. The raffinate from the SX circuit will be split three ways, with 4 % (48 gpm) reporting to the ZLD circuit as purge (see below), 10.6 % (122 gpm) reporting to regeneration (see below), and the remaining 85 % (980 gpm) returning directly to the wellfield.

C. Purification and crystallisation

An evaporative crystalliser has been selected to produce BA from the stripped liquor. This energy-efficient crystalliser provides heat by mechanical vapour recompression (MVR) of the overhead steam vapour. The compressor simultaneously compresses and heats the vapour before delivering it to the circulating heat exchanger. The crystalliser will operate at ambient pressure and about 212°F. Boric acid concentration will be 28%. The crystalliser will produce a 30% by weight slurry. An estimated 234,000 lb/h of water will be evaporated and compressed from 14.7 to 23 psia (1.6 compression ratio). Compression will be achieved by two-stage centrifugal fans (2,000 hp each). Crystalliser feed will be pre-heated from about 90°F to 180°F by counter-current exchange with hot crystalliser condensate. A small amount of liquor will be bled from the crystalliser to control impurity levels. A 2% purge has been assumed. The crystalliser purge is redirected back to the SX wash circuit. The crystalliser product slurry, containing 28% liquid boric acid by weight, is directed to the dewatering circuit containing cyclone, centrifuge, and drying equipment.

Hazen tests have produced samples to be sent to the manufacturers of crystallisers to size and determine the specifics of them as part of the detailed engineering program. The concentrated and purified rich liquor containing Boric Acid will be filtered to remove any entrained organic and will then be concentrated and crystallised by evaporation. It is proposed to perform the crystallisation in a single vessel, however one vendor has suggested a combination of evaporation and cooling crystallisation. The final decision will be made as part of the detailed engineering program.

D. Gypsum production and acid regeneration

The solvent extraction raffinate will be directed to re-generation. The raffinate liquor will be reacted with sulphuric acid to precipitate calcium as gypsum and strontium as strontium sulphate while regenerating hydrochloric acid for return to the wellfield. The precipitation chemistry is as follows:

$$2CaCl_2 + 2H_2SO_4 + 4H_2O \rightarrow 2CaSO_4 \cdot 2H_2O + 4HCl$$

calcium chloride + sulphuric acid + water → gypsum + water + hydrochloric acid

$$SrCl_2 + H_2SO_4 \rightarrow SrSO_4 + 2\ HCl$$

strontium chloride + sulphuric acid → strontium sulphate + hydrochloric acid

This precipitates calcium and strontium as sulphates while generating hydrochloric acid.

The filtering characteristics of gypsum are highly dependent upon the size and nature of the precipitate. Experience has shown that optimal design includes a high-density sludge step. The precipitated gypsum will be thickened, and a portion of the underflow will be recirculated to the precipitation step.

Typically, the ratio of recycle to fresh solids is 2:1. Following thickening, filtration through a pressure filter will be performed to produce a 75-80% solids cake suitable for dry stacking. A small amount of lime is to be added to this filter cake to neutralise any remaining aqueous acid in the cake. Sufficient gypsum is precipitated to provide a calcium chloride process balance.

The quantity of wet cake to be produced is estimated at 14 t/h (15.5 st/h) with total gypsum production estimated at dry 66,000 t/h (73,000 st/h). The gypsum storage facility (GSF) will have the capability to stack gypsum, and to recover water. The stacked gypsum piles will be loaded out as damp or dried, in bulk, depending upon the customer.

E. Boric Acid product loading and shipping

The crystalliser slurry will be concentrated to 60% solids by a hydro-cyclone prior to dewatering by a pusher centrifuge. The cyclone and centrifuge centrate streams will be returned to the crystallizer feed tank. The BA cake, at 92% solids, advances to drying. The crystal will be dried by gas-fired rotary tray dryer then conveyed to a load-out silo for truck transport or to a packaging area for bulk or paper bagging. Typically, the filled bags are palletised within the process plant and can be loaded onto trucks or railroad cars using fork lifts. Alternately, the product can be routed to bulk loading, depending on the customer.

In the product loading and shipping facility, the boric acid crystals would be sent first to the centrifuge, where the majority of the water would be removed. From the centrifuge, they would be conveyed to the natural gas-fired dryer, which would remove the remaining moisture. The product dryer maximum heat input is 2.7 MMBTU/hr. The product is expected to be high purity boric acid (99%). When the product is dry, it would be sorted by size through the use of sizing screens. The dried and screened boric acid crystals would then be delivered to a bagging system which would produce different sized bags of product. Typically, the filled bags are placed on pallets within the process plant and can be loaded onto trucks or railroad cars using fork lifts. Alternately, the product can be routed to bulk loading, depending on the customer.

F. Process utilities, and general design parameters

The overall process design simplified flow sheet is shown in Figure 25. Utilisation rate of 86% (7,560 operating hours per year) is used for this Study. The process (Phase One) will require about 75 gpm of well water, and 86,650 lb/h of 585 psig steam. The total natural gas requirement is 2,243 SCFM. Power will be generated within the boundaries with a power generation (Cogen) plant producing 8MW of power, which covers the power requirements for the production. Details of the Cogen plant is described in the Infrastructure and Utilities section.

The HCl requirement by the wellfield for Phase One is ~4 tons/hour, which is supplied internally by the SOP plant by-product. The excess HCl is sold to the market. Sulfuric acid is purchased and supplied for the production of SOP and gypsum, totalling 8 tons/hour. The reagent requirements are listed in Table 11.

The processing plant will have a zero-liquid-discharge (ZLD) circuit to control the process impurity levels. The crystallizer will be an MVR type with a 450 hp rotary lobe blower. The ZLD effluent will be a filter cake nearly saturated with chlorides. Calcium chloride for example will be at 60% by weight. The ZLD system will produce an estimated 0.8 t/h of wet cake at 70% solids. The ZLD circuit will produce a filtered cake and will have no liquid discharge.

Table 11. Process flow design parameters estimated for Phase One, 82ktpa BA production scenario.

SUMMARY TABLE			
	Units	Value	Units/t BA
Operating Time	h/y	7,560	
PLS Flow	gpm	1,126	5,672
PLS Boric Acid	wt%	3.7	
Boric Acid Production	st/y	90,014	
Gypsum	Dry st/y	73,102	0.81
K2SO4	st/y	40,000	
Utilities			
Water	gpm	88	442
Steam	lb/h	86,651	7,279
Steam Pressure	psig	585	
Natural Gas	SCFM	2,243	11,301.8
Power Generated	kW	8,070	682
Reagents			
HCl To Mine (31.5%)	st/h	4.37	0.367
H2SO4 (93%) Total	st/h	8.80	0.739
H2SO4 to Gypsum	st/h	5.54	0.465
H2SO4 to K2SO4	st/h	3.26	0.274
Mannheim HCl Produced	st/h	6.98	0.587
CaO	st/h	0.71	0.059
Makeup Organic	st/h	0.018	0.0015

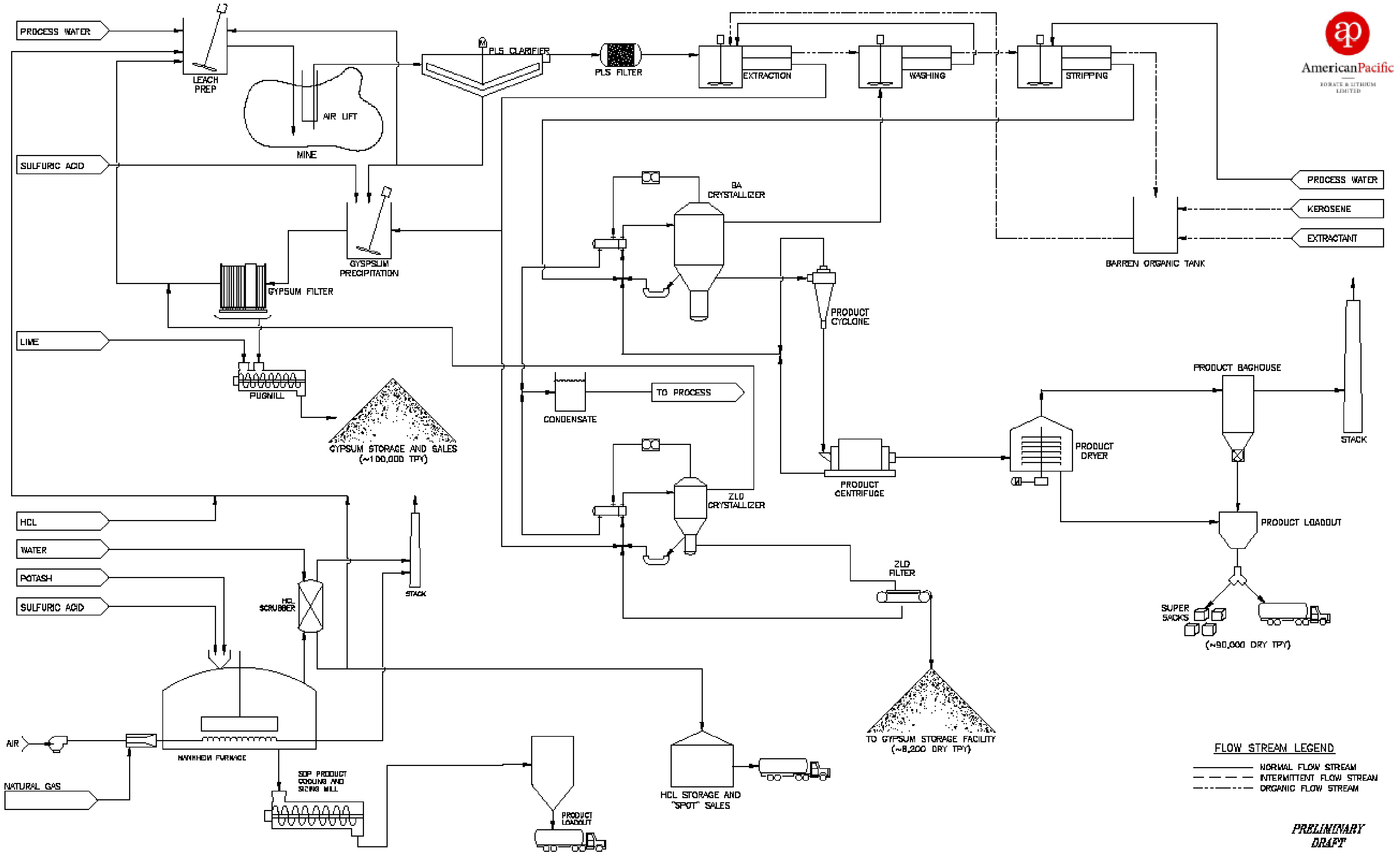

Figure 25. Summary process flow design.

7.2 Sulphate of Potash Production

The sulphate of potash (SOP) is to be produced by the Mannheim process. The process consists of feed sources of muriate of potash (MOP) and sulphuric acid, heated and reacted in the Mannheim furnace, producing sulphate of potash, with the by-product of hydrochloric acid. The SOP is a higher value product than MOP. The generated hydrochloric acid is to be used for the solution mining.

The following equation results in the Mannheim process:

$$2KCl + H_2SO_4 \rightarrow K_2SO_4 + 2HCl$$

MOP (0.86t) + sulphuric acid (0.56t) → SOP (1t) + hydrochloric acid (0.42t)

The Company proposes to produce 36,000 tpa of SOP for Phase One, 72,000 tpa of SOP for Phase Two, and 108,000 tpa for Phase Three. One typical Mannheim furnace produces approximately 10,000 tpa, and thus the plant is laid out with the required number of furnaces in a "modular" way. The gas fired furnace is typically 6m in diameter, and has a slow moving internal mixer. The total power requirement for the SOP plant is 400kW for Phase One.

The process consists of raw feed circuit for MOP and sulphuric acid; the furnace and reactor circuit; the hydrochloric acid absorption system consisting of coolers and absorption towers; the SOP product bagging circuit; as well as an HCl tank farm, a leak protection system from furnaces, and a circulating water system. This proven process is accountable for 50% of global SOP production.

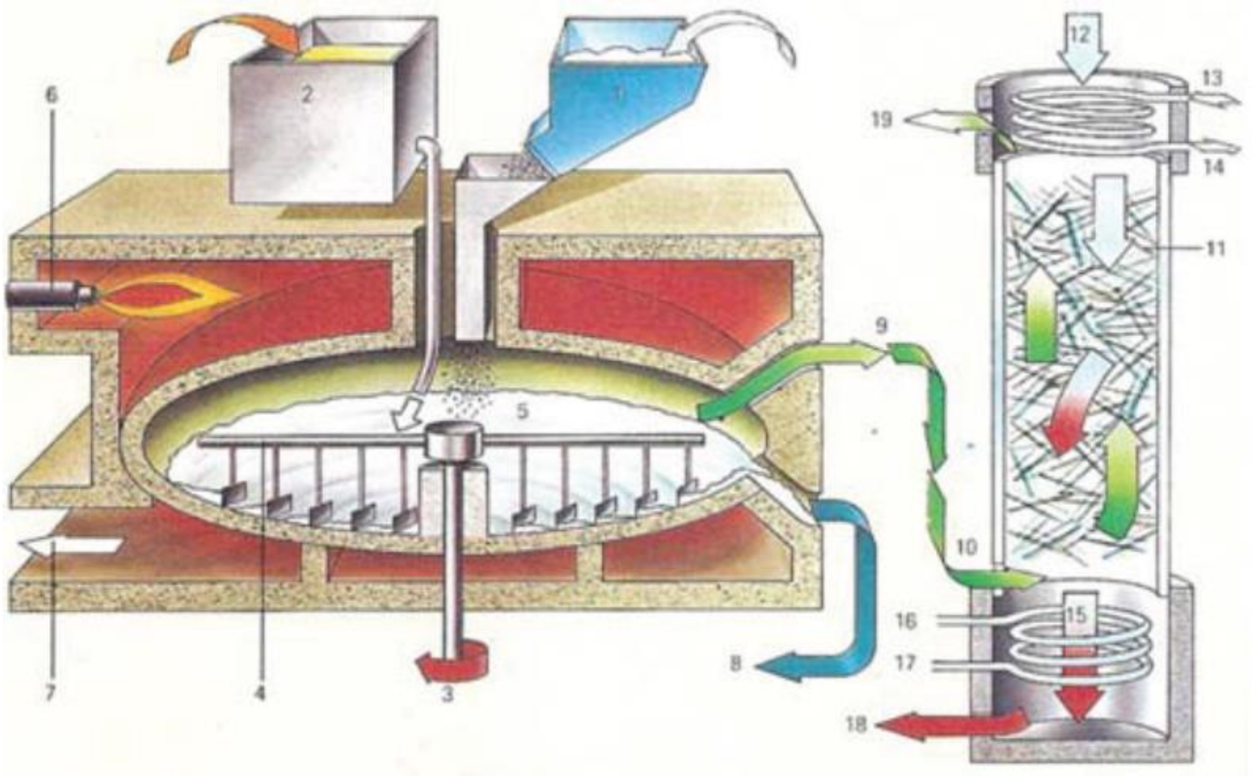

Figure 26. Graphical representation of the Mannheim Furnace operation

Key to Figure 26:

1) Potassium Chloride (MOP) is added to the furnace.
2) Sulphuric acid inlet by way of lead-lined tank.
3) Rotating shaft.
4) Rotating stirrers mix reactants.
5) Reaction chamber. The salt and sulphuric acid react to form sodium sulphate and hydrochloric acid, which comes off as a gas hydrogen chloride because of the high temperature.
6) Oil burner heats reaction chamber.
7) Combustion gases outlet.
8) Salt cake (sodium sulphate) outlet.
9) Hydrogen chloride gas led off.
10) Hydrogen chloride gas piped into the absorption column below the packed section.
11) The absorption chamber is packed with Raschig rings made of glass. On the surface of these rings the hydrogen chloride combines with water, emitted at the top of the tower (12), to form hydrochloric acid. This reaction releases heat.
12) Water inlet. The water passes down the packed column and dissolves the hydrogen chloride gas.
13) Cooling water inlet.
14) Cooling water outlet.
15) Hot concentrated hydrochloric acid passes into the cooler at the bottom of the column.
16) Cooling water inlet.
17) Cooling water outlet.
18) Cool hydrochloric acid led out to storage tanks.
19) Spent gas vent.

SOP production process equipment and Mannheim furnace manufacturing are primarily manufactured in China. The Company is currently evaluating manufacturers of SOP plants, and have obtained quotes and proposals for the engineering of the SOP plant from manufacturers that have built SOP plants from 10,000 tpa to 100,000 tpa globally.

The Phase One SOP facility will require 4.0 t/h of KCl and 2.95 t/h of 93% sulphuric acid. Figure 27 below shows a typical SOP plant view rendered, showing the absorption circuit with the Mannheim furnace behind. The Phase One Mannheim system is planned to consist of a packaged system that includes reactant feeders, two high-temperature furnaces with natural gas burners, and product cooling, sizing, and conveying equipment. Additional equipment beyond the vendor package will be included for product packaging and loadout. The Mannheim product coolers will require ~620 gpm of cooling water supplied from a cooling tower assumed to be operating at ~25°C.

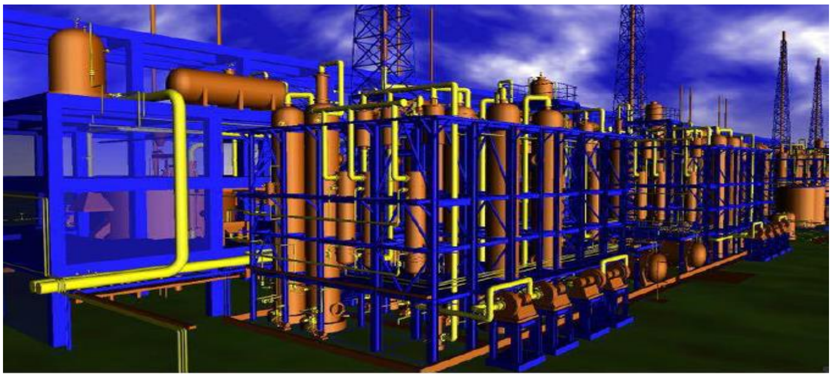

Figure 27. Typical SOP plant. Rendered view. (Kindly Tech Trading Co.)

8 PLANT LAYOUT

8.1 Plant General Arrangement

The Company produced preliminary design for the plant, and the preliminary design is to be the basis for producing the final approved detailed design drawings for construction. The preliminary design included general arrangement (GA) drawings of the plant produced by Barr, which includes basic plan and elevation views.

The plant general design is to be modular in nature, such that the production expansions can occur by simple additions of equipment with basic arrangement. The vast majority of the plant process equipment is outside, which is typical design of plants in the region, due to the dry and hot climate of the Mojave Desert.

The plant structural design will consist of supporting nearly all pieces of equipment from the ground directly, while the building structural members will function to only support roofing for the most part. Due to the nature of the process design, very little amount of equipment is required to be elevated.

Phase Two and Phase Three are to be near duplicates of the initial Phase One design, with some improvements and optimisations gained through the Project implementation. The general arrangement layout showing the Phase One plant, along with future expansions of Phase Two and Phase Three are shown in Figure 28.

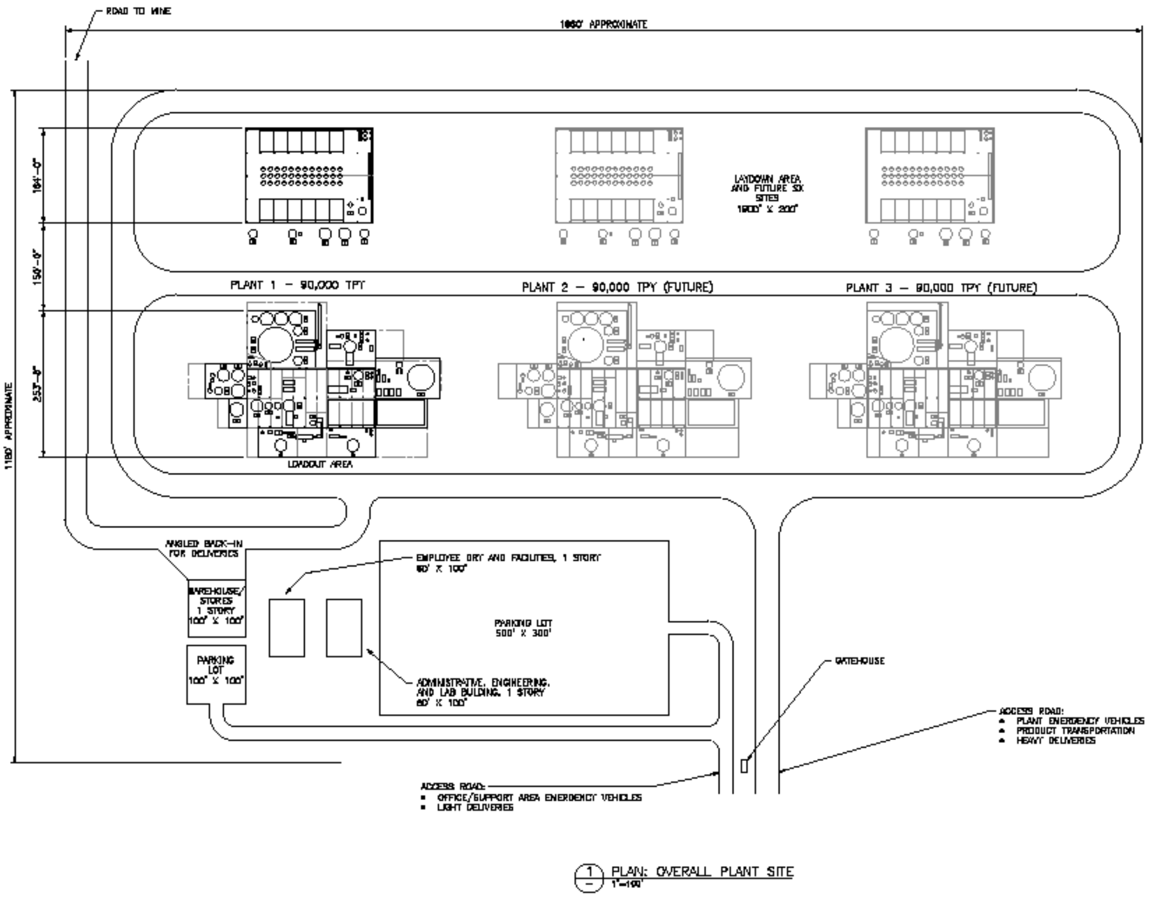

Figure 28. Plant Site with Future Expansions

The plant arrangement consists of several process area, and the majority of the process areas inside the plant is connected via pipelines. The SX process requires its own building, located at ~45 meters (~150 ft) distance from the main plant area, where the other processes are situated together. Figure 29 shows a rendered 3D view of the overall plant arrangement.

The main plant area is largely an open plant, with the exception of the crystalliser and some of the chemical storage areas. Figure 30 shows the main plant area.

Figure 29. 3D rendered view of the plant arrangement (From left to right: SOP plants, main plant, SX building and Cogen)

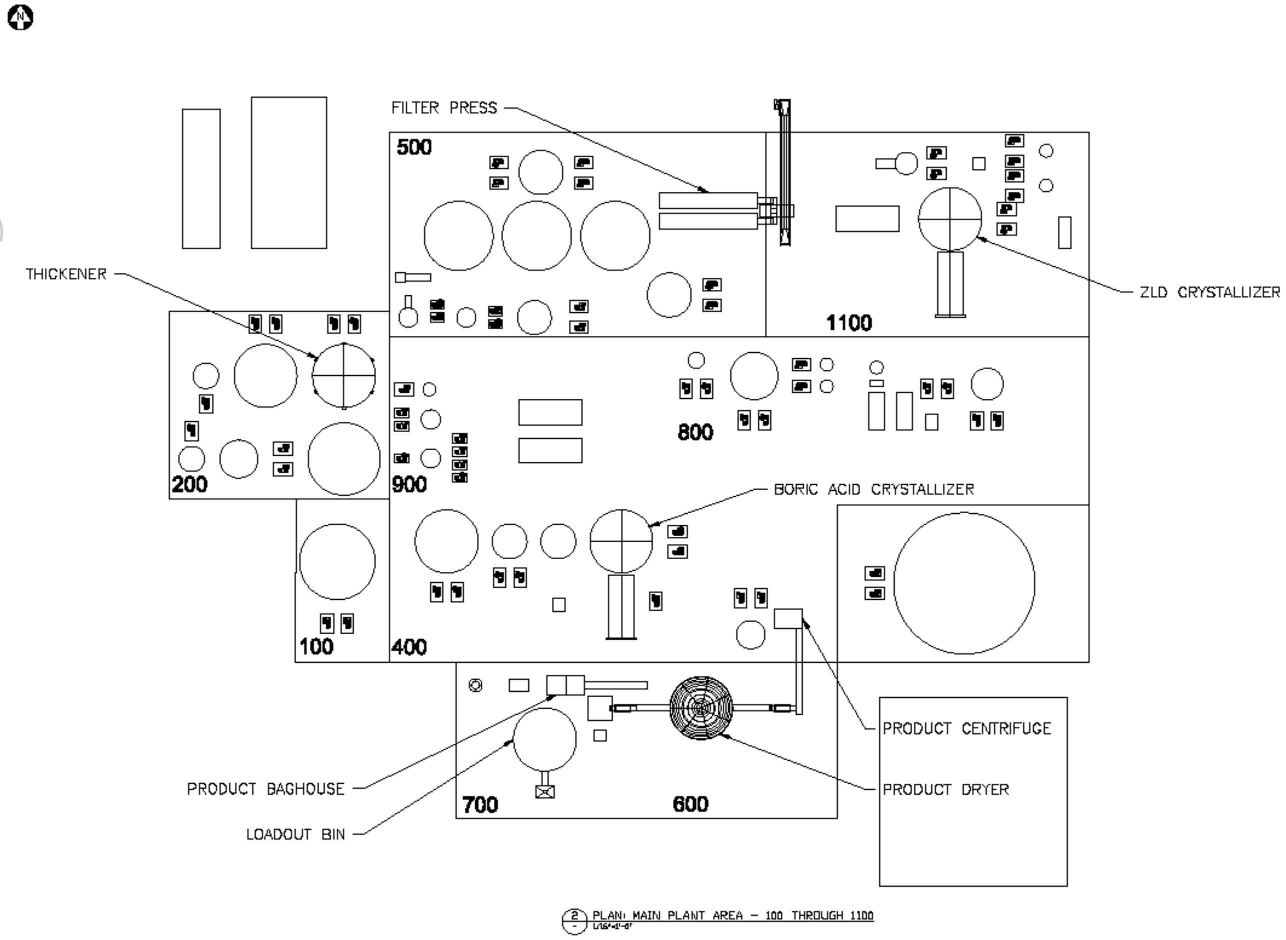

Figure 30. Main plant area, plan view

The SX process consists largely of rectangular, fiberglass mixer-settler tanks, with the middle of the building occupied with the chemical supply tanks as shown in Figure 31.

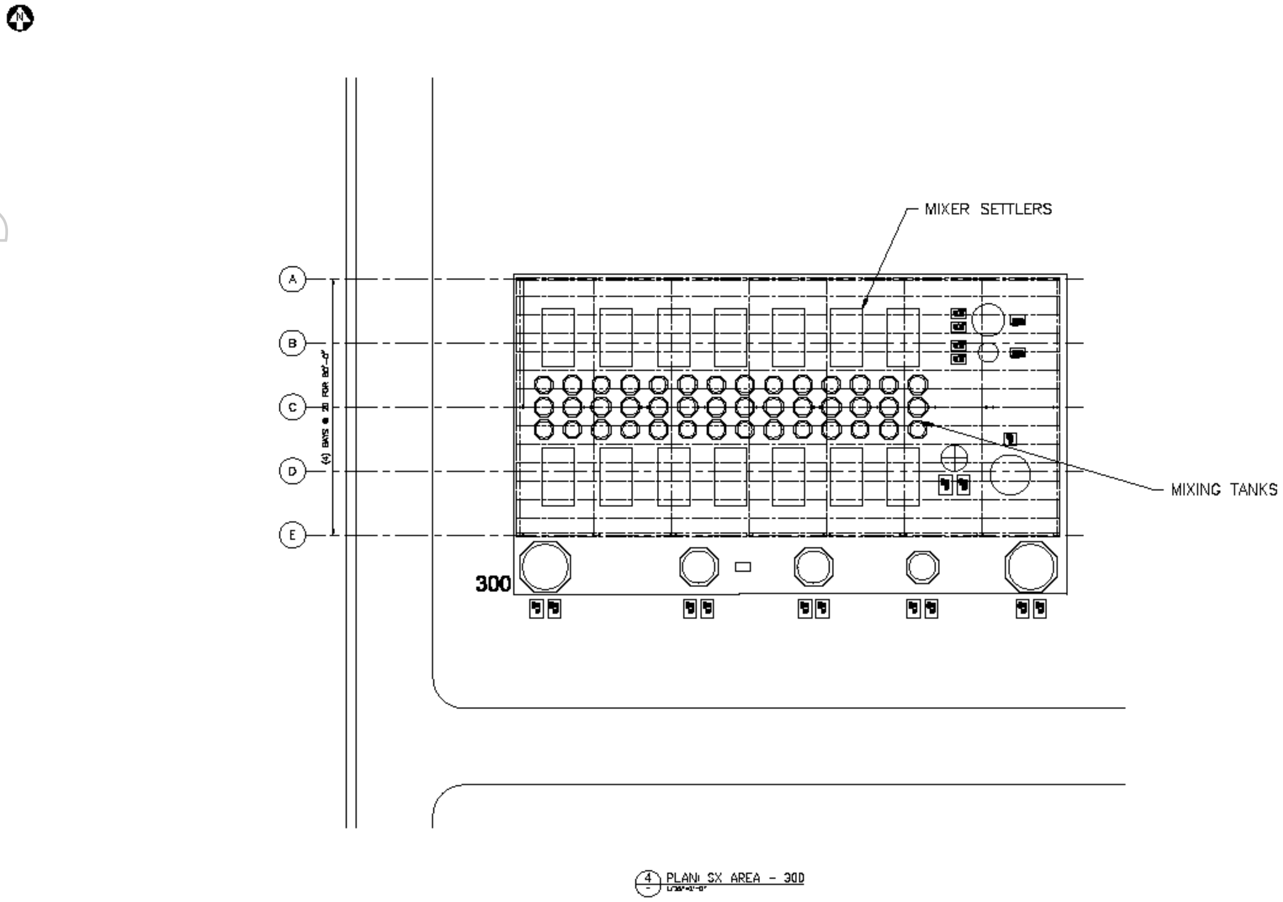

Figure 31. SX Building process equipment arrangement

Shown in Figure 32 is the Mannheim Furnace and SOP production area, also showing the warehouse bulk storage loading for the plant finished products. Note that there are two Mannheim furnaces to support the production of 36,000 tonnes of SOP per annum.

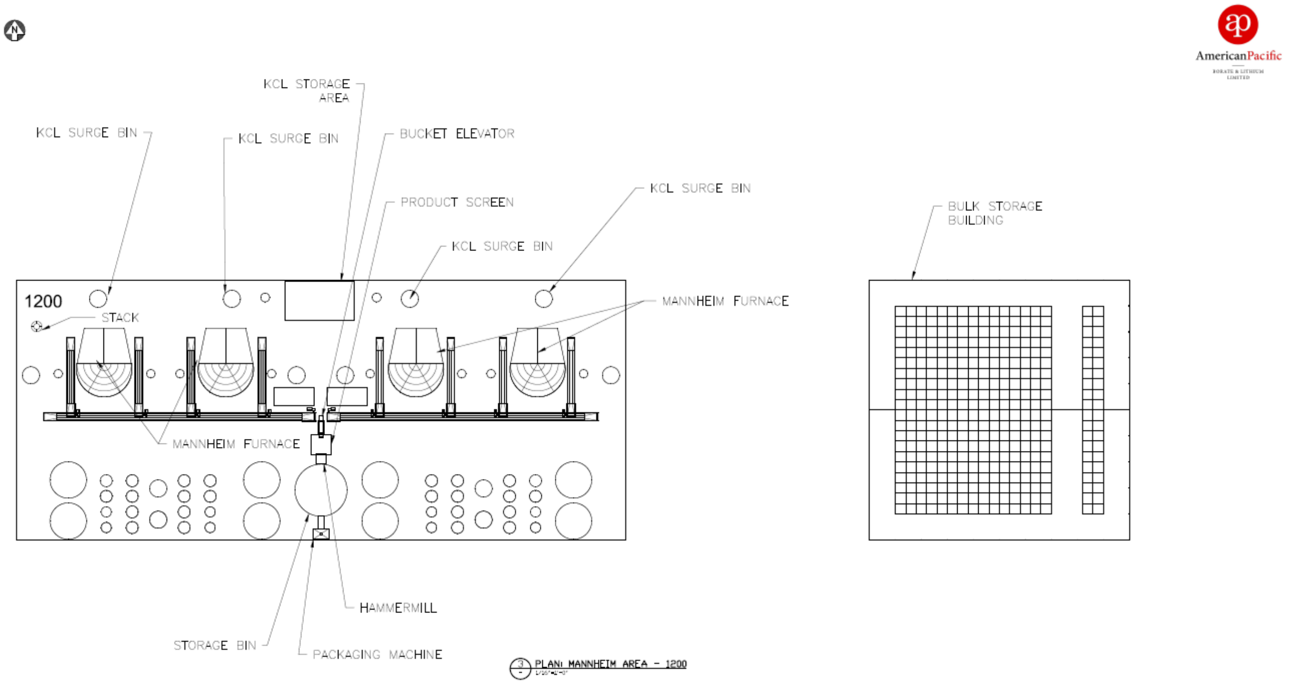

Figure 32. Mannheim Furnace Area

8.2 Ancillary Buildings and Areas

The plant will be supported by office building, operator control rooms, lab and quality control building, electrical motor control centres, maintenance shop, and other areas for employees. The loadout for delivery and shipment, as well as the parking lot is expected to be paved completely, while the other areas are to be graded gravel topped. The plant civil design is to incorporate stormwater design and efficient drainage for occasional precipitation and flash floods.

The buildings are to be efficient and minimalistic in nature, while providing comfortable working environment for the workforce. The motor control centres and storage buildings are to be cost effective modular buildings.

9 TAILINGS & WASTE DISPOSAL

9.1 General Tailings Disposal

Due to the nature of the overall process, the amount of tailings expected are to be low. The gypsum stream of 73,000 tons will be sold and is discussed in detail below and in other sections. The zero-liquid-discharge process will output 3,000 dry stpa of tailings. The SX process produces crud streams and a large portion of the crud is recycled. The remaining solid crud is extracted out and to be sent to landfill disposal off site. See Figure 33.

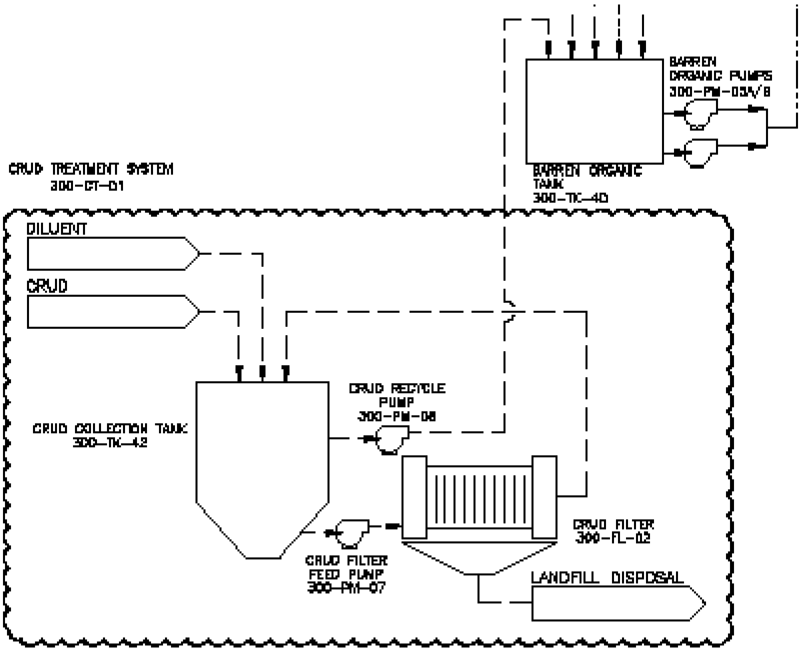

Figure 33. SX Crud Stream

9.2 Gypsum

A by-product of the proposed boric mining operation is gypsum. Gypsum cakes will be delivered to the Gypsum Storage Facility ("*GSF*"). Gypsum, a calcium sulphate compound, is virtually insoluble in water (L. Ordway, 1992) and a quantitative analysis of the leachate solution completed by WCAS found no metals approaching legal Resource Conservation and Recovery Act (RCRA) limits. Sample results of the gypsum produced during the pilot study showed that the gypsum produced as a product of the borate mining operation is non-hazardous (Simon Hydro-Search, 1993).

The gypsum deposition area will encompass approximately 16 acres of land and will include one dam approximately 11.2m (37 feet) high. A double plastic liner will be utilised on the side of the dam that will be in contact with the gypsum cakes. A liner is not proposed for the base of tile gypsum deposition area. FCMC has applied for a waiver for waste discharge requirements from the State of California Regional Waler Quality Control Board – Lahontan Region (RWQCB) for the gypsum deposition area. The rational for the waiver request is that the gypsum to be stored in this area is a saleable product and not a waste (Simon Hydro-Search, 1993).

The GSF facility will stack the gypsum, and extract the drained fluids from the piles back into the process.

9.3 Zero-Liquid-Discharge (ZLD)

The ZLD circuit is designed for extracting the solids out of the tailings streams, while recycling back all the fluids recovered, as discussed previously. Figure 34 shows a section of the circuit where the crystallizer and the filter belt processes the streams to extract out the solids.

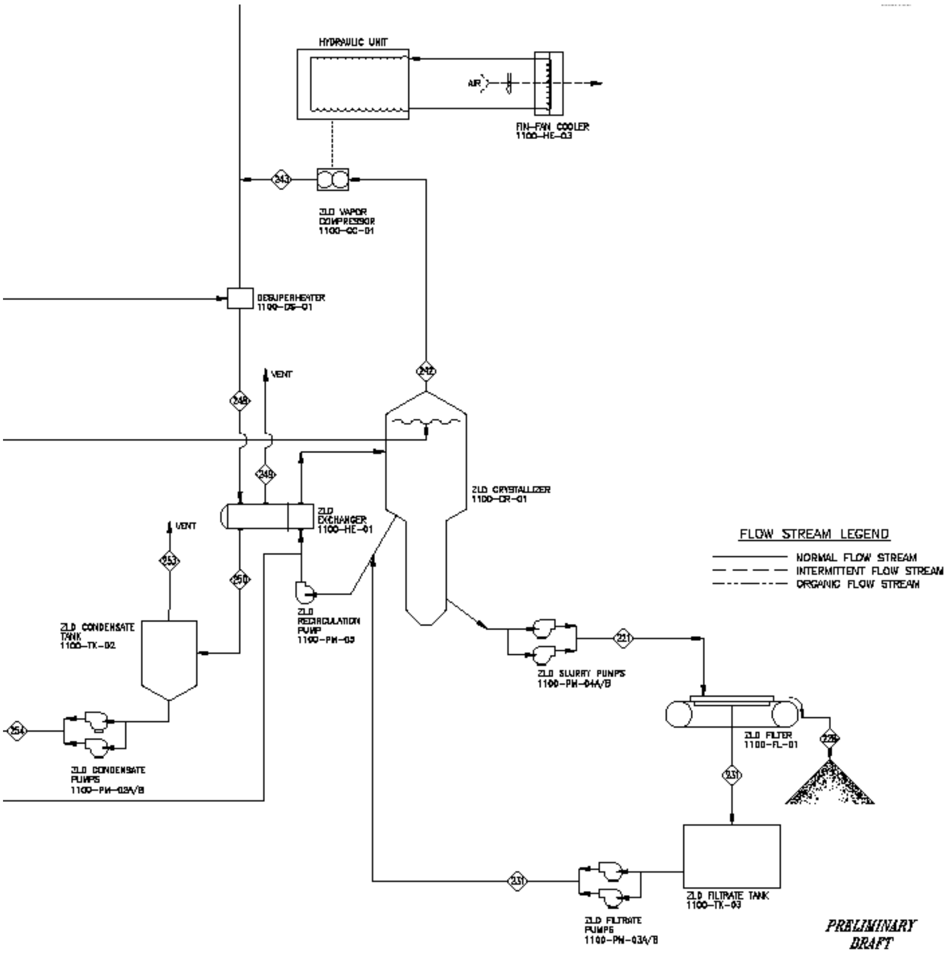

Figure 34. ZLD Process

10 INFRASTRUCTURE, SERVICES & LOGISTICS

10.1 Water supply

The proposed solution mining project is expected to require nominally 100 gallons per minute (gpm) of process water. Water will be required to solvent extraction, provide make-up to processes, supply the steam plant, wash the gypsum, and for process cooling, fire protection and various sanitary uses. The proposed water wells will be located on the west side of Pisgah Fault (Figure 37). Currently two water wells exist in this area and four (4) new water wells are proposed. The distance to the most distant proposed water well is 12.9km (8 miles) west of the processing plant (Simon Hydro-Search, 1993).

The above-ground main water delivery line would have a diameter of 3", and the above-ground delivery lines from the individual wells to this main delivery line would be 3" or less in diameter, depending upon the yield of the individual wells. Water lines would be constructed of HDPE pipe. The distance from the farthest well to the process plant would be approximately 7 miles.

Each well would be equipped with a pump and water delivery pipe joining the main water delivery line which leads to the process water surge tank located in the process plant. Pipelines would be constructed of non or low reflective materials.

10.2 Power supply

Internal power generation (Cogen) will be utilized for the project, allowing for both a reduction in operating costs as well as reducing project risk associated with the timing associated with the tie in of power from the local utility company.

8.0 megawatts of power will be produced utilizing steam from a natural gas fired boiler and powering a single extracting steam turbine type generator set. The boiler will will produce 43.5 tonnes (47.8 tons) per hour of 42 Kg/cm^2 (600 psi) steam. The steam will be used for both process and for power generation. The turbine will be horizontal split case with forged rotor. The steam will be let down to an air-cooled condenser and the condensate will be recovered and returned to the boiler.

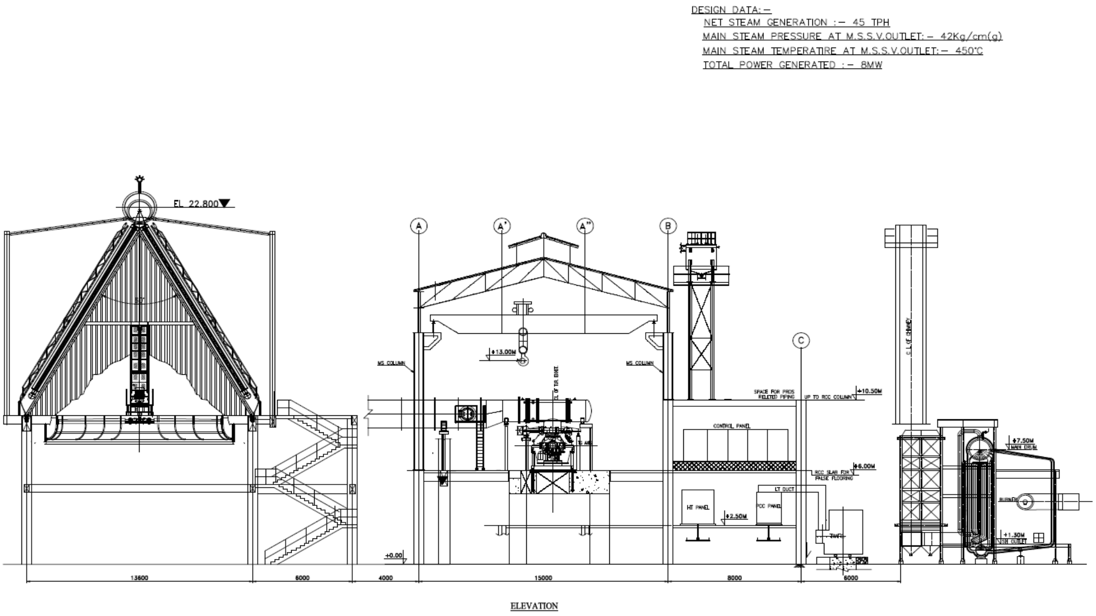

Figure 35: Boiler and Steam Turbine Elevation for Power Generation (Cogen).

10.3 Diesel supply

Diesel requirements would be considerably less than conventional mining operations given the solution mining method being employed. Diesel requirements for vehicles and ancillary equipment could be adequately supplied using standard fuel storage facilities.

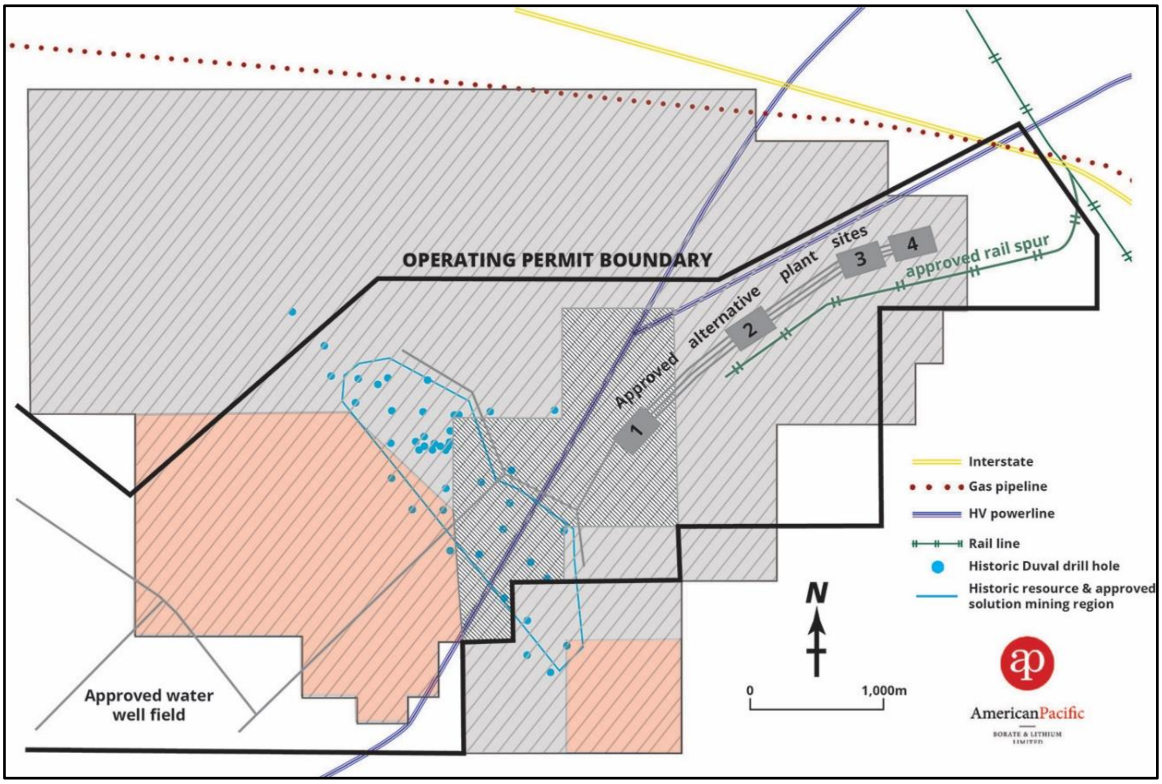

Figure 36. Key infrastructure approved under Land Use Permits & EIS/EIR for Phase One boric acid production.

10.4 Communications

The site is serviced by mobile communications and internet service. The necessary service companies are available in Barstow if any additional communication installations are required.

10.5 Road & transport routes

The Project is access from I-40 Hector turn-off and then from Route 66. The main access road to be constructed would be one of the first of the facilities to be completed. It would be constructed of base materials and gravel and access the proposed plant site via the Pisgah Crater road.

The Project was approved for a rail spur under the Land Use Permits and EIS/EIR. However, rail shipment is currently not planned for Phase One.

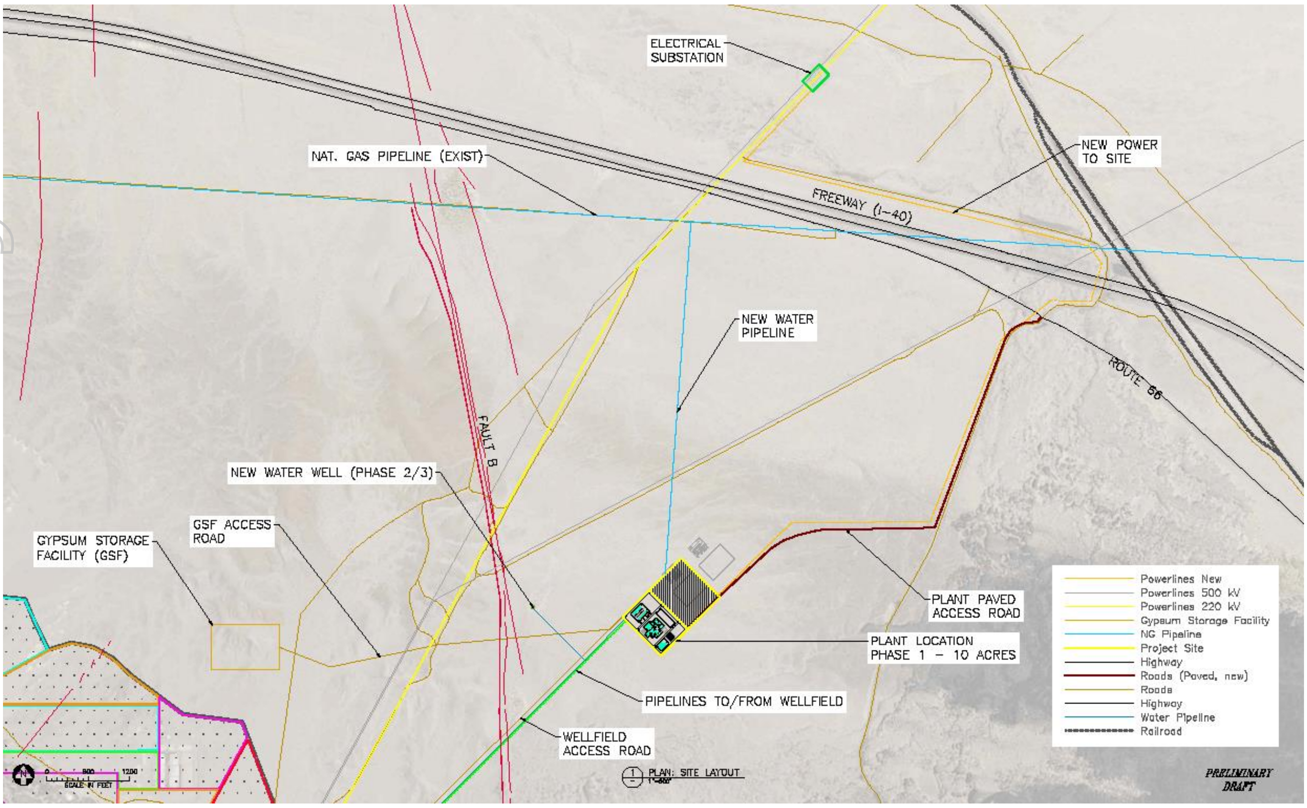

Figure 37. Infrastructure Layout

10.6 Gas pipeline

The natural gas pipeline would be approximately 1.8km in length. The pipeline would be constructed between the process plant and the existing Pacific Gas and Electric Company (PG&E) main line. The tie-in would occur at the underpass of Pisgah Crater Road and I-40. 1.8km of 4" pipeline and 15 ft of 8" line would be buried approximately 1m underground where possible. The gas pipe would parallel Pisgah Crater Road on the west side and follow the plant access road to the project site. The natural gas pipeline would be constructed by Southern California Gas. Total natural gas usage is estimated at 199 SCFM for Phase One.

10.7 Port

Two ports are available in Los Angeles – the Port of Los Angeles and the Port of Long Beach, located approximately 265 km from the Project. See Figure 38. For this study, it is assumed products are sold mine-gate.

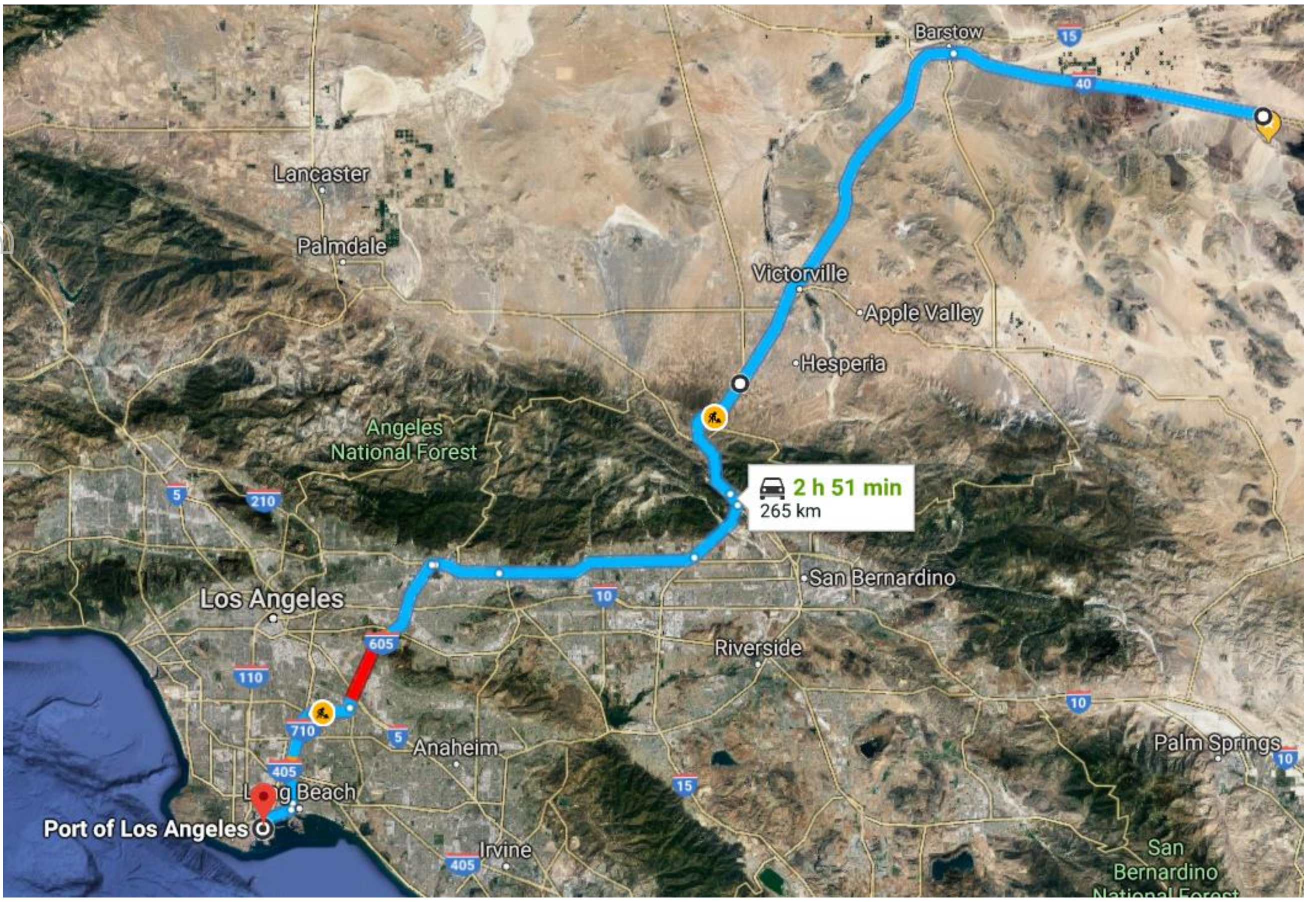

Figure 38. Mine Gate to Port Proximity

10.8 Labour

The project will employ 74 planned full-time employees, who would work in alternating shifts 24 hours per day. The Base Case being considered in this study (all three phases) is assumed to be in operation for approximately 20 years. 350 days per year at 90% availability, resulting 7,560 hours per year, is the basis for the production estimates. See Table 12 for manpower schedule for Phase One. Phase Two and Phase Three manpower demands are expected to be 117 and 131, respectively, with additional positions as demanded by increased production.

Construction for each phase would take 12 months to complete. Construction would be scheduled for normal business hours, therefore without premium pay, as much as possible. However, due to the extreme afternoon temperatures during the summer months in this area, early morning hours may be substituted.

Table 12. Manpower Summary for Phase One

Operations	**per shift**	**shifts**	**total**
Shift Supervisor	1	4	4
Control Room Operator	1	4	4
BA Production Operator	2	4	8
SOP Production Operator	2	4	8
Dayshift Crew (eg Bagging/ Reagent/Loadou	2	2	4
Shift Maintenance (Mech, Elect.)	2	4	8
TSF Operations (dozer, gypsum sales loadou	1	2	2
Mobile Equipment Ops; Tailings Haulage	1	2	2
Wellfield Drilling	2	2	4
Wellfield Operations	1	4	4
	15		48
Maintenance			
Supervisor	1	1	1
Mech/Welder/PF	3	1	3
Electrical/Instrument	4	1	4
	8		8
Quality Control			
Supervisor	1	1	1
QC Tech	4	1	4
	5		5
O/H			
Plant Manager	1	1	1
Maint/Engineering Manager	1	1	1
Chief Process Eng	1	1	1
Electrical/Controls Engineer	1	1	1
Purchasing	2	1	2
Accountant/Payroll	1	1	1
Public & Gov't Affairs	0	1	0
SHE Manager	1	1	1
Safety Supervisor	1	1	1
Human Resources	1	1	1
Admin	2	1	2
Sales	1	1	1
	13		13
Total Workforce			**74**

11 ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT & PERMITTING

11.1 Solution Mining on Federal Lands

A. Bureau of Land Management

3809 Mining

The Federal Land Policy Management Act, 43 U.S.C. §§ 1701 *et seq*. (FLPMA) governs the way in which public lands administered by the U.S. Bureau of Land Management (BLM) are managed. Congress directed that BLM "shall manage the public lands under principles of multiple use and sustained yield". 43 U.S.C. § 1732. The General Mining Law of 1872 (30 U.S.C, §§ 22-42) and FLPMA authorize US citizens to locate mining claims on federal lands open to mineral entry. 43 CFR Part 3832. Borate is a locatable mineral. *See* 30 U.S.C. § 22; 43 C.F.R. §§ 3830.11 and .12. Locatable mineral deposits within mining claims may be developed, extracted and processed under a Plan of Operations (POO). 43 C.F.R. § 3809.11.

The National Environmental Policy Act, 42 U.S.C. §§ 4321-4347 (NEPA), requires a review of all projects proposed to occur on public lands. A NEPA action is initiated with the submittal of a POO to the Federal Land Manager, which at Ft Cady is the Barstow office of the BLM. The POO details how the ore will be mined and processed. The BLM can make one of three determinations: 1) the project does not have the potential for environmental impacts and can proceed with no further BLM action; 2) the project has the potential to have limited environmental impacts, which are studied as part of an Environmental Assessment (EA); 3) the project has the potential to have environmental impacts, which are studied as part of an Environmental Impact Statement (EIS). Both an EA and EIS include public participation as part of the process and include a variety of studies to assess potential impacts including, but not limited to: plants, animals, cultural and paleontological resources, groundwater, geology, noise, visual, and light.

Both the EA and EIS studies consider several operating scenarios and include a no action alternative. At the completion of the process, BLM issues a Record of Decision (ROD) identifying the preferred alternative.

At Ft Cady, the POO was submitted to the Barstow BLM in 1990. BLM elected to prepare the more detailed environmental evaluation required by an EIS, which was ultimately finalised in 1993. In December of 1994, BLM approved the POO with stipulations to address findings in the Final EIS. The current POO addresses those stipulations and includes processing 90,000 short tons per year (stpy) of boric acid and related by-products.

The EIS, CACA 33044, does not have an expiration date and remains in good standing.

Any modifications to the POO must be submitted to BLM for its review. Should the modifications be significant, additional studies may be required.

2800 Realty

A right-of-way (ROW) is required for access to the project site and development of any portion of the project that was not considered within the EIS Project Boundary or is not in the same ownership as the project proponent. ROWs are in place for the electrical and gas pipelines necessary for the project. The ROWs are current and in good standing.

No additional ROWs are required for the project.

11.2 Environmental Protection Agency

The Environmental Protection Agency (EPA) Underground Injection Control regulations identify five classes of injection wells; Ft Cady falls within Class III – Injection Wells for Solution Mining. While California has primacy over some classes of UIC wells, EPA retains primacy for Class III wells. The UIC permitting process requires a demonstration that injection wells will not negatively impact drinking water aquifers. Ft Cady is applying for Class III Area permit, which will allow simultaneous operation of multiple wells within the project boundary at any point in time. Once a Class III Area permit is issued, it is good for the life of the project, subject to five-year review. 40 CFR § 144.36(a).

Ft Cady is in the process of submitting a UIC Class III Area Permit Application to EPA's Region 9 Office. It is anticipated that the permit will be received before the end of 2019.

11.3 Solution Mining in California

A. California Environmental Quality Act

California's Environmental Quality Act (CEQA) is similar to NEPA, requiring solution mining projects to assess and mitigate potential environmental impacts. Through a Memorandum of Understanding between the BLM and the State of California, the CEQA Environmental Impact Review (EIR) is conducted simultaneously with the BLM's EIS. In San Bernardino County, the Land Planning Department is the lead agency, overseeing preparation of the EIR in coordination with the BLM. The County requires submittal and approval of a Mining Conditional Use Permit and Reclamation Plan (Mining/Reclamation Plan), which is approved by the County Planning Commission. The Mining/Reclamation Plan, 94M-04, was approved by the County Planning Commission in July 1994. The plan is good for 25 years, with an additional 5 years for Reclamation.

Mining/Reclamation Plan 94M-04, which allows for 90,000 short tons per year of boric acid production and related by-products, is active and in good standing.

B. Surface Mining and Reclamation Act

California's Surface Mining and Reclamation Act (SMARA) regulates surface mining reclamation on both public and privately held lands to ensure that environmental impacts are minimised and that mined lands are reclaimed to a usable condition. San Bernardino County Land Planning Department is the SMARA lead agency for mining projects in San Bernardino County. The County conducts annual inspections, which are included in the annual report and updated Financial Assurance Cost Estimate (FACE). The County reviews and approves the FACE and holds the financial assurance bond on behalf of BLM, SMARA and the County.

The Annual Reports and FACE are current and in good standing.

C. Lahontan Regional Water Quality Control Board

The Lahontan Regional Water Quality Control Board (LRWQCB) issues Waste Discharge Permits for all wastes associated with any mining process. The LRWQCB issues a Waste Discharge Permit that includes construction and maintenance standards and requires quarterly monitoring and reporting requirements.

D. Waste Discharge

In 1988, Ft Cady received Waste Discharge Permit WDID 6B3680200086 for the Small-Scale Pilot Plant. While the plant is not currently operational, the permit remains active. Quarterly monitoring and reporting have continued since issuance of the permit.

Upon completion of detailed engineering of any waste components, a Waste Discharge Permit Modification Application will be submitted for review and approval by the LRWQCB.

E. Stormwater

The LRWQCB has primacy over EPA's stormwater permitting programs. There are two parts to stormwater permitting: (1) construction; and (2) operations. Upon completion of facility designs, a Construction Stormwater Pollution Prevention Plan (SWPPP) and associated Notice of Intent (NOI) to participate in the general stormwater permit will be prepared and submitted to LRWQCB for their review. The permit is active immediately upon filing of the application.

Upon completion of the construction phase of the project and prior to commencing site operations, Ft Cady will prepare an operational SWPPP and submit an NOI for coverage under the General Permit for Storm Water Discharges Associated with Industrial Activities (IGP).

F. Water Rights

Ft Cady is in a portion of the Mojave Basin with unadjudicated water rights. Therefore, water rights are not required, nor is there a mechanism for filing for and obtaining water rights. The use of groundwater is included in the San Bernardino Mine and Reclamation Plan, approved by the county.

G. Mojave Desert Air Quality Management District

Mojave Desert Air Quality Management District (MDAQMD) has local primacy over EPA's air permitting programs. Ft Cady submitted the required Dust Control Plan (DCP) in August 2018 and has received MDAQMD approval. It is required that a DCP be in place prior to any ground disturbance. The DCP remains in good standing.

As the initial project design nears completion, air permit applications for all identified sources of regulated air pollutants have been prepared and submitted to MDAQMD for review and approval. The proposed facility is a non-major source of criteria air pollutants. Authority to construct permits is anticipated be received in early 2019.

H. Other Non-Discretionary Permits

Additional permits are required prior to start of construction and/or operations. These permits include:

- California's Unified Programs Act/Agencies (CUPA). California has primacy over EPA's Tier 2 of the Emergency Planning and Community Right to Know Act. San Bernardino County Fire Department is the CUPA lead agency in San Bernardino County. This program notifies responders of the quantities and locations of hazardous chemicals and petroleum products at the project site and will include a Spill Prevention Control and Countermeasure Plan (SPCC) as well as emergency planning and training.
- San Bernardino County Department of Environmental Health Services (DEHS) permits domestic and industrial water systems, on-site wastewater disposal, and water well drilling and closure.
- San Bernardino County Department of Building & Safety reviews and issues permits for grading and building plans.

12 PROJECT IMPLEMENTATION

12.1 Overall Project Schedule

The Company produced a detailed project schedule and Gantt chart. Figure 39 below shows the simplified overview chart of the overall project schedule with key permitting and milestone events.

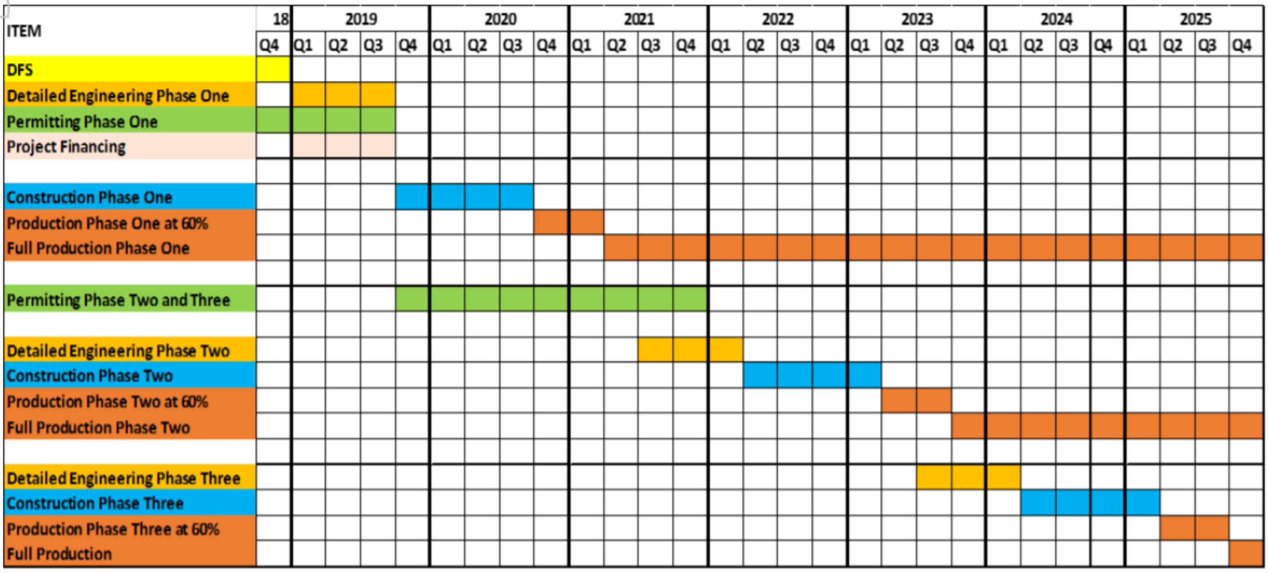

Figure 39. Simplified Project Schedule

The overall project schedule is driven by the main critical paths of permitting completion, testing and sizing of equipment, detailed design completions, procurement, construction, and commissioning. Permitting is discussed in detail the previous sections.

12.2 Project Execution Plan (PEP)

A Project Execution Plan has been developed for the Project. This plan discusses the project and execution strategies for the successful execution of the Fort Cady project.

12.3 Equipment Sizing, Procurement, and Detailed Design

Testing and sizing of equipment is ongoing currently, with Hazen testing with material collected during the 2018 bulk sampling process. Hazen's finalised testing will provide sizing of critical equipment in the SX process, and will lead to further testing with crystalliser manufacturers to final size the crystallisers. Other critical pieces of equipment include those in the SOP circuit. Manufacturers of the SOP Mannheim furnace have been contacted and given the Company lead times with manufacturing and delivery schedule. This is all planned in the detailed engineering program.

Detailed design will commence once the basic design and equipment sizing is completed along with partial fundraising to cover the detailed design and drawing productions. Engineering firms with expertise in the processes of this project are to be sought out and to produce detailed design.

12.4 Construction and Commissioning

Construction and commissioning will take place after the permits are in place, and the detailed designs are completed with finalised and engineering stamped with California professional engineers. The construction will take place after multiple bidders are evaluated and will lead to commissioning. Commissioning is to take place once all the circuits are constructed for civil, mechanical, electrical, controls. The SOP plant will be constructed and commissioned in conjunction with the boric acid plant.

13 CAPITAL COST ESTIMATE

13.1 Overview of Cost Estimates

With the exception of Capex estimates, the costs and financials are presented as follows:

- Combined Boric Acid and SOP Plants (Combined Co.)
- Boric Acid Plant only (Boric Acid Co.)
- SOP Plant only (SOP Co.)

This breakdown is completed for simplification and, also in accordance with strategy of the company to decouple SOP operations for additional financing options.

13.2 Capital Cost Estimates

The pre-production capital estimate (Capex) for the project for initial boric acid production of 82,000 tpa boric acid and 36,000 tpa sulphate of potash (SOP) production (Phase One) is US$138M. The estimate is considered a Class 3 estimate (+/- 10 to 15% accuracy) and considered suitable for authorization of funds and to proceed with detailed design, with further project, optimisation, and de-risking (Table 13).

The Phase One Capex is an equipment list based estimate categorised by plant areas, with each plant area having factors for installation, equipment price contingency, estimation factors for electrical systems, instrumentation and controls, and process piping. All details of the capex and opex estimate are included in the appendices.

Phase Two and Phase Three scale up costs will not require major infrastructure or development costs, as Phase One spending for infrastructure will be adequate for the production scale up. For Phase Two, with tripled plant production at 246,000 tpa boric acid and 36,000 tpa SOP, capex cost is estimated to be ~US$191M, at approximately 139% of the Phase One capex cost, with savings coming from infrastructure already developed, and from more knowledge developed for the process and the project at that time. Phase Three, with quintupled production at 408,000 tpa of boric acid and 54,000 tpa of SOP, the cost is expected to be similar to the Phase Two capex.

Table 13. Summary of capital expenditure for Phase One (BA and SOP, combined operation).

BASE PURCHASED EQUIPMENT COST -- PLANT PLUS WELLFIELD (REF)			*$26,115,461*
AREA	**DESCRIPTION**		**AREA SUBTOTAL**
WF	WELLFIELD		$3,391,200
100	INJECTION		$525,400
200	PLS RECOVERY AND CLARIFICATION		$2,176,640
300	SOLVENT EXTRACTION (SX)		$8,272,378
400	CRYSTALLIZATION		$7,071,195
500	GYPSUM		$2,958,017
600	DRYING		$8,366,400
700	LOADOUT		$1,531,200
800	UTILITIES		$2,402,100
900	REAGENTS		$1,464,620
1000	GYPSUM STORAGE FACILITY (EQUIPMENT ONLY)		$89,700
1100	ZERO LIQUID DISCHARGE (ZLD)		$3,806,080
1200	MANNHEIM		$14,487,989
1300	COGEN		$10,022,040
ESTIMATE OF EQUIPMENT PLUS PIPING, ELECTRICAL, INSTRUMENTAION/CONTROL, STRUCTURES, LAG&PAINT, AND EQUIPMENT CONTINGENCIES BASED ON PLANT PROCESS AREAS			**$66,564,959**
Additional Direct Cost Line Items			
Line Item	**Factor**	**Basis**	**Line Cost**
Freight	3%	Equipment Purchase Price	$783,464
Structures and Buildings (Process Plant Only)		Concrete Pads; Structural Steel	$8,318,634
Ancillary Buildings (Operations Bldg., Employee Dry, Product Storage)		Vendor Quotes	$861,000
Mobile Equipment (Grader, Water Truck, Forklift, Loader, Trucks)		LEASED, SEE OPEX	$0
Drill Rig		Vendor Quote	$700,000
Fencing (Security, Tortoise)		Estimate by lin. ft.; RS Means	$235,200
Plant Access Road (paved road from Rte 66 to Plant)		6,800 linear feet, paved	$1,949,000
Wellfield Access Road		8,000 linear feet, unpaved	$249,000
Wellfield Piping, Above Ground (initial phase)		CPVC Liquid & CS Air Lines; 35 Wells	$6,403,969
Production Wells (35 initial wells)		49 Wells, 14" Diam.	$14,266,350
Production Well Airlift Assemblies		49 Wells, 4" Lift Line, 2" Air Line	$1,716,960
Plant Site Roadways and Parking Lot		Paved parking lot, unpaved roadways	$1,995,750
Sanitary Sewer		Lump sum	$200,000
Raw Water Supply		3 raw water wells based on drilling quote	$552,040
Raw Water Lines to Plant		2" HDPE, 40,000 L.F., fused	$92,800
Potable Water System		Lump sum	$300,000
Fire Protection System		Lump sum	$1,200,000
Natural Gas Service to Site		6,000 ft 4-inch line; 50 ft, 8-inch line	$1,830,000
Electric Power Service to Site		16,000 ft 5KV #6, above ground	$1,391,232
Gypsum Storage Facility		710,000 sq.ft., 2-year capacity	$2,299,803
TOTAL DIRECT COSTS (ISBL + OSBL)			***$111,910,161***
Basic Engineering	2.5%	Total Direct Costs	$2,797,754
EPCM	6.1%	Total Direct Costs	$6,826,520
Spares	2.0%	Purchased Equipment Cost	$522,309
Construction Facilities	L.S.	Engineering Judgment	
Construction Equipment	L.S.	Engineering Judgment	
Vendor Startup Assistance	1.0%	Purchased Equipment Cost	$261,155
TOTAL INDIRECT COSTS			***$10,407,738***
Contingency (Non-Equipment Line Items)	13%	Line Item Costs	$15,901,327
ESTIMATED TOTAL CAPITAL COST			**$138,219,225**

[1] HCl requirements offset by re-acidification during gypsum crystallisation; By-product HCl generated by Mannheim SOP plant; [2] Assumes product sold mine-gate; [3] Differences in totals due to rounding; [4] Processing and plant related costs estimated by Barr Engineering. Consumable costs estimated by APBL.

Table 13 Continued

Summary Of Capex: Fort Cady Project

	Phase 1	Phase 2	Phase 3	Total
	($'000)	($'000)	($'000)	($'000)
Direct Capital Expenditure - Equipment				
Wellfield	3,391.2	6,782.4	6,782.4	16,956.0
Injection	525.4	796.4	796.4	2,118.1
PLS Recovery and Clarification	2,176.6	3,299.2	3,299.2	8,775.0
Solvent Extraction	8,272.4	12,538.6	12,538.6	33,349.5
Crystallisation	7,071.2	11,487.2	11,487.2	30,045.6
Gypsum	2,958.0	4,483.5	4,483.5	11,925.0
Drying	8,366.4	12,681.1	12,681.1	33,728.6
Loadout	1,531.2	2,320.9	2,320.9	6,172.9
Utilities	2,402.1	3,640.9	3,640.9	9,683.9
Reagents	1,464.6	2,219.9	2,219.9	5,904.5
Gypsum Storage Facility	89.7	-	-	89.7
Zero Liquid Discharge	3,806.1	6,183.0	6,183.0	16,172.1
Mannheim Facility	14,488.0	14,488.0	14,488.0	43,464.0
Cogeneration Facility	10,022.0	15,190.6	15,190.6	40,403.2
Total Equipment Costs	**66,565.0**	**96,111.6**	**96,111.6**	**258,788.1**
Other Direct Costs				
Freight (3%)	783.5	1,187.5	1,187.5	3,158.5
Process Plant Buildings	8,318.6	15,523.1	15,523.1	39,364.9
Ancillary Buildings	861.0	938.4	938.4	2,737.8
Drill Rig	700.0	-	-	700.0
Fencing	235.2	129.6	129.6	494.4
Plant Access Road	1,949.0	-	-	1,949.0
Wellfield Access Road	249.0	-	-	249.0
Wellfield Piping, Above Ground	6,404.0	11,150.0	11,150.0	28,703.9
Production Wells	14,266.4	19,507.1	15,139.8	48,913.2
Production Well Airlift Assemblies	1,717.0	2,347.7	1,822.1	5,886.7
Plant Site Roadways and Parking Lot	1,995.8	1,648.9	1,648.9	5,293.6
Sanitary Sewer	200.0	200.0	200.0	600.0
Raw Water Supply	552.0	1,104.1	1,104.1	2,760.2
Raw Water Lines to Plant	92.8	185.6	185.6	464.0
Potable Water System	300.0	-	-	300.0
Fire Protection System	1,200.0	480.0	480.0	2,160.0
Natural Gas Service to Site	1,830.0	-	-	1,830.0
Electric Power Service to Site	1,391.2	695.6	695.6	2,782.5
Gypsum Storage Facility	2,299.8	-	-	2,299.8
Total Other Direct Costs	**45,345.2**	**55,097.5**	**50,204.7**	**150,647.4**
Total Direct Costs	**111,910.2**	**151,209.1**	**146,316.2**	**409,435.5**
Indirect Costs				
Basic Engineering	2,797.8	3,024.2	3,024.2	8,846.1
EPCM	6,826.5	6,826.5	6,826.5	20,479.6
Spares	522.3	783.5	783.5	2,089.2
Vendor Startup Assistance	261.2	395.8	395.8	1,052.8
Total Indirect Costs	**10,407.7**	**11,030.0**	**11,030.0**	**32,467.7**
Contingency	15,901.3	29,203.0	29,203.0	74,307.4
Total Capex	**138,219.2**	**191,442.1**	**186,549.3**	**516,210.6**

Over the period of construction for all three phases of the Fort Cady Project, the Project is forecast to reach a minimum cash balance of approximately $245m. The evolution of the Project cash balance over the construction period can be seen in the chart below.

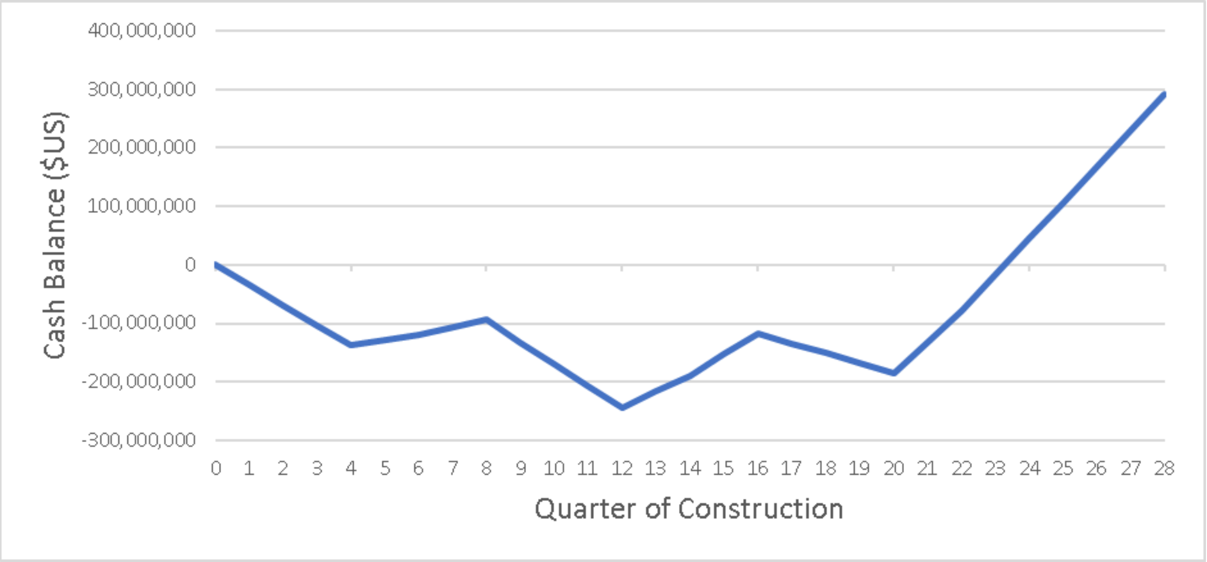

Figure 40: Project Cash Balance over Construction Period

14 OPERATING COST ESTIMATE

14.1 Combined Operating Expenditure (Opex)

Operating expenditures (Opex) for the entire plant (BA and SOP) are inclusive of solution mining, processing, infrastructure, waste storage, administration and product transport Free on Truck (“*FOT*”) at mine gate. Tables 14-17 summarise the key operating cost parameters for boric acid and SOP production. The main cost component is projected to be the reagent consumption. SOP production largely offsets HCl purchase requirements for Phase One. From Phase Two forward, all HCl costs will be offset by the byproduct HCl generation from the SOP production. The additional purchase costs of H_2SO_4 for SOP and gypsum production is more than offset by the credits SOP sales provide to the proposed Base Case operation.

Table 14: Operating Expenditure for all Phases

Fort Cady			
	Phase 1	**Phase 2**	**Phase 3**
	$ per metric tonne of BA		
C1 Costs			
Utilities	43.61	42.31	42.04
Consumables	271.53	215.37	204.14
Labour	102.48	53.77	35.90
Equipment Lease	1.47	1.42	1.41
Maintenance	57.57	54.07	53.37
Sustaining Capex	16.53	15.43	15.21
Wellfield Development	27.56	27.56	11.02
HCl purchased	0.00	0.00	4.23
(SoP by-product credit)	-322.36	-214.91	-193.42
(HCl by-product credit)	-60.39	-6.54	0.00
(Gypsum by-product credit)	-25.08	-25.08	-25.08
Total C1 Costs	**112.92**	**163.40**	**148.84**
C2 Costs			
Licensing and Royalties	6.90	6.90	6.90
Depreciation	84.64	67.29	63.22
Total C2 Costs	**91.55**	**74.19**	**70.13**
C3 Costs			
G&A	12.79	11.97	11.81
Total C3 Costs	**12.79**	**11.97**	**11.81**
Total Opex	**217.26**	**249.57**	**230.77**

Table 15. Summary of operating expenditure for Phase One (BA and SOP, combined operation). US$ per short ton.

Item Num.	Description of OPEX Category	Unit of Measure	Quantity	Unit Rate, USD/Unit	USD/Ton of BA Product	Total (USD)
1	**VARIABLE COSTS**				**$ 285.89**	**$ 25,730,129**
1.1	UTILITIES				**$ 39.56**	**$ 3,560,669**
1.1.1	Natural Gas	thousand scf	1,017,334	$ 3.50	$ 39.56	$ 3,560,669
1.1.2	Electricity	MWh	-	$ 120.00	$ -	$ -
1.1.3	Water (from wells)	gpy	39,916,800	$ -	$ -	$ -
1.2	CONSUMABLES				**$ 246.33**	**22,169,460**
1.2.1	Hydrochloric Acid (31.45%) purchased	tons	-	$ 250.00	$ -	$ -
1.2.2	Hydrochloric Acid (31.45%) captive/excess	tons	19,732	$ -	$ -	$ -
1.2.3	Sulfuric Acid (93%)	tons	66,548	$ 165.00	$ 122.00	$ 10,980,363
1.2.4	Potash (KCl)	tons	34,224	$ 270.00	$ 102.67	$ 9,240,512
1.2.5	Quick Lime (CaO)	tons	5,345	$ 175.00	$ 10.39	$ 935,361
1.2.6	Caustic (50%)	tons	1,048	$ 450.00	$ 5.24	$ 471,517
1.2.7	Organic Diluent	gallons	21,773	$ 10.00	$ 2.42	$ 217,728
1.2.8	Organic Extractant	gallons	21,773	$ 10.00	$ 2.42	$ 217,728
1.2.9	Fuel Consumption (haul trucks, dozer, loader, pickups)	gallons	25,000	$ 4.25	$ 1.18	$ 106,250
1.3	BYPRODUCT STREAMS				**$ -**	**$ -**
1.3.1	Gypsum (included in operations, 76% solids)	tons	68,400	$ -	$ -	$ -
1.3.2	Salt Cake (included in ZLD operations, 70% solids)	wet tons	8,505	$ -	$ -	$ -
2	**FIXED COSTS**				**$ 204.39**	**$ 18,395,123**
2.1	MANPOWER	See Manpower Estimate Detail			$ 92.97	$ 8,367,000
2.2	Mobile Equipment Lease	$/mo	12	$ 10,000	$ 1.33	$ 120,000
2.3	Maintenance Materials (1.5% per month)	% of Equip.Cap	18.0	$ 26,115,461	$ 52.23	$ 4,700,783
2.4	Leased Buildings	$/mo	12	$ 3,670	$ 0.49	$ 44,040
2.5	Licensing and Royalties				$ 6.26	$ 563,400
2.6	Plant Sustaining Capex				$ 15.00	$ 1,350,000
2.7	Wellfield Development				$ 25.00	$ 2,250,000
2.8	General and Administration				$ 11.11	$ 999,900
TOTAL OPERATING COSTS					**$ 490.28**	**$ 44,125,252**

14.2 Boric Acid Plant Opex

Table 16. Summary of operating expenditure for Phase One for Boric Acid Plant only (US$/short ton BA)

Item Num.	Description of OPEX Category	Unit of Measure	Quantity	Unit Rate, USD/Unit	USD/Ton of BA Product	Total (USD)
1	**VARIABLE COSTS**				**$ 129.49**	**$ 11,654,502**
1.1	UTILITIES				**$ 36.00**	**$ 3,239,974**
1.1.1	Natural Gas	thousand scf	925,707	$ 3.50	$ 36.00	$ 3,239,974
1.1.2	Electricity	MWh	-	$ 120.00	$ -	$ -
1.1.3	Water (from wells)	gpy	29,030,400	$ -	$ -	$ -
1.2	CONSUMABLES				**$ 93.49**	**8,414,528**
1.2.1	Hydrochloric Acid (31.45%) purchased	tons	33,037		$ -	$ -
1.2.2	Hydrochloric Acid (31.45%) captive/excess	tons	-	$ 250.00	$ -	$ -
1.2.3	Sulfuric Acid (93%)	tons	41,887	$ 165.00	$ 76.79	$ 6,911,344
1.2.4	Potash (KCl)	tons	-	$ 270.00	$ -	$ -
1.2.5	Quick Lime (CaO)	tons	5,345	$ 175.00	$ 10.39	$ 935,361
1.2.6	Caustic (50%)	tons	82	$ 450.00	$ 0.41	$ 36,742
1.2.7	Organic Diluent	gallons	21,773	$ 10.00	$ 2.42	$ 217,728
1.2.8	Organic Extractant	gallons	21,773	$ 10.00	$ 2.42	$ 217,728
1.2.9	Fuel Consumption (haul trucks, dozer, loader, pickups)	gallons	22,500	$ 4.25	$ 1.06	$ 95,625
1.3	BYPRODUCT STREAMS				**$ -**	**$ -**
1.3.1	Gypsum (included in operations, 76% solids)	tons	68,400	$ -	$ -	$ -
1.3.2	Salt Cake (included in ZLD operations, 70% solids)	wet tons	8,505	$ -	$ -	$ -
2	**FIXED COSTS**				**$ 169.87**	**$ 15,288,301**
2.1	MANPOWER	See Manpower Estimate Detail			$ 73.33	$ 6,600,000
2.2	Mobile Equipment Lease	$/mo	12	$ 9,000	$ 1.20	$ 108,000
2.3	Maintenance Materials (1.5% per month)	% of Equip.Cap.	18.0	$ 21,349,675	$ 42.70	$ 3,842,941
2.4	Leased Buildings	$/mo	12	$ 3,670	$ 0.49	$ 44,040
2.5	Licensing and Royalties				$ 6.26	$ 563,400
2.6	Plant Sustaining Capex				$ 12.00	$ 1,080,000
2.7	Wellfield Development				$ 25.00	$ 2,250,000
2.8	General and Administration				$ 8.89	$ 799,920
TOTAL OPERATING COSTS					**$ 299.36**	**$ 26,942,804**

Table 16 continued: C1,C2, C3 Costs

Boric Acid Operation Only			
	Phase 1	**Phase 2**	**Phase 3**
	$ per metric tonne of BA		
C1 Costs			
Utilities	39.68	39.68	39.68
Consumables	103.06	103.06	103.06
Labour	80.83	42.26	27.65
Equipment Lease	1.32	1.32	1.32
Maintenance	47.07	47.07	47.07
Sustaining Capex	13.23	13.23	13.23
Wellfield Development	27.56	27.56	11.02
HCl purchased	101.16	101.16	101.16
(Gypsum by-product credit)	-25.08	-25.08	-25.08
Total C1 Costs	**388.83**	**350.26**	**319.11**
C2 Costs			
Licensing and Royalties	6.90	6.90	6.90
Depreciation	74.50	60.53	57.14
Total C2 Costs	**81.40**	**67.43**	**64.04**
C3 Costs			
G&A	10.34	10.34	10.34
Total C3 Costs	**10.34**	**10.34**	**10.34**
Total Opex	**480.57**	**428.03**	**393.49**

14.3 SOP Plant Opex

Table 17. Summary of operating expenditure for Phase One for SOP Plant only (US$/short ton SOP)

Item Num.	Description of OPEX Category	Unit of Measure	Quantity	Unit Rate, USD/Unit	USD/Ton of BA Product	Total (USD)
1	**VARIABLE COSTS**				**$ 351.89**	**$ 14,075,627**
1.1	UTILITIES				**$ 8.02**	**$ 320,695**
1.1.1	Natural Gas	thousand scf	91,627	$ 3.50	$ 8.02	$ 320,695
1.1.2	Electricity	MWh	-	$ 120.00	$ -	$ -
1.1.3	Water (from wells)	gpy	10,886,400	$ -	$ -	$ -
1.2	CONSUMABLES				**$ 343.87**	**13,754,932**
1.2.1	Hydrochloric Acid (31.45%) purchased	tons	-	$ 250.00	$ -	$ -
1.2.2	Hydrochloric Acid (31.45%) captive/excess	tons	52,769		$ -	$ -
1.2.3	Sulfuric Acid (93%)	tons	24,661	$ 165.00	$ 101.73	$ 4,069,019
1.2.4	Potash (KCl)	tons	34,224	$ 270.00	$ 231.01	$ 9,240,512
1.2.5	Quick Lime (CaO)	tons	-	$ 175.00	$ -	$ -
1.2.6	Caustic (50%)	tons	966	$ 450.00	$ 10.87	$ 434,776
1.2.7	Organic Diluent	gallons	-	$ 10.00	$ -	$ -
1.2.8	Organic Extractant	gallons	-	$ 10.00	$ -	$ -
1.2.8	Fuel Consumption (haul trucks, dozer, loader, pickups)	gallons	2,500	$ 4.25	$ 0.27	$ 10,625
1.3	BYPRODUCT STREAMS				**$ -**	**$ -**
1.3.1	Gypsum (included in operations, 76% solids)	tons		$ -	$ -	$ -
1.3.2	Salt Cake (included in ZLD operations, 70% solids)	wet tons	-	$ -	$ -	$ -
2	**FIXED COSTS**				**$ 77.67**	**$ 3,106,821**
2.1	MANPOWER	See Manpower Estimate Detail			$ 44.18	$ 1,767,000
2.2	Mobile Equipment Lease	$/mo	12	$ 1,000	$ 0.30	$ 12,000
2.3	Maintenance Materials (1.5% per month)	% of Equip.Cap.	18.0	$ 4,765,786	$ 21.45	$ 857,841
2.4	Leased Buildings	$/mo	12	$ -	$ -	$ -
2.5	Licensing and Royalties					$ -
2.6	Plant Sustaining Capex				$ 6.75	$ 270,000
2.7	Wellfield Development					$ -
2.8	General and Administration				$ 5.00	$ 199,980
TOTAL OPERATING COSTS					**$ 429.56**	**$ 17,182,448**

Table 17 Continued: C1, C2, C3 Costs

SoP Operation Only			
	Phase 1	**Phase 2**	**Phase 3**
	$ per metric tonne of SoP		
C1 Costs			
Utilities	8.84	8.84	8.84
Consumables	379.05	379.05	379.05
Labour	48.70	38.86	30.95
Equipment Lease	0.33	0.33	0.33
Maintenance	23.64	23.64	23.64
Sustaining Capex	7.44	7.44	7.44
(HCl by-product credit)	-363.49	-363.49	-363.49
Total C1 Costs	**104.52**	**94.68**	**86.77**
C2 Costs			
Licensing and Royalties	0.00	0.00	0.00
Depreciation	22.83	22.83	22.83
Total C2 Costs	**22.83**	**22.83**	**22.83**
C3 Costs			
G&A	5.51	5.51	5.51
Total C3 Costs	**5.51**	**5.51**	**5.51**
Total Opex	**132.86**	**123.02**	**115.12**

The Phase Two and Phase Three maintenance, G&A and Sustaining Capex costs are increase for the SOP Co Opex due to the allocation of these costs between BA Co and SOP Co at an 80%-20% split. The SOP Co production increases to double and triple for Phases two and three, while the 80/20 split remains, causing the SOP Co to carry more for the subsequent phases, as the production increases are smaller in relation to the BA Co production increases of tripling and quintupling production.

14.4 Future Cost Reduction Trends

Process optimisation and the head grade upside will allow to reduce future Opex further. For this Study, the head grade of 3.7% is assumed. This is a proven base case scenario supported by historical recovery grade. Any upside to this head grade through the use of process optimisation, such as heated injection, is expected to reduce Opex by $6.0/ton per percent of grade. See Figure 41.

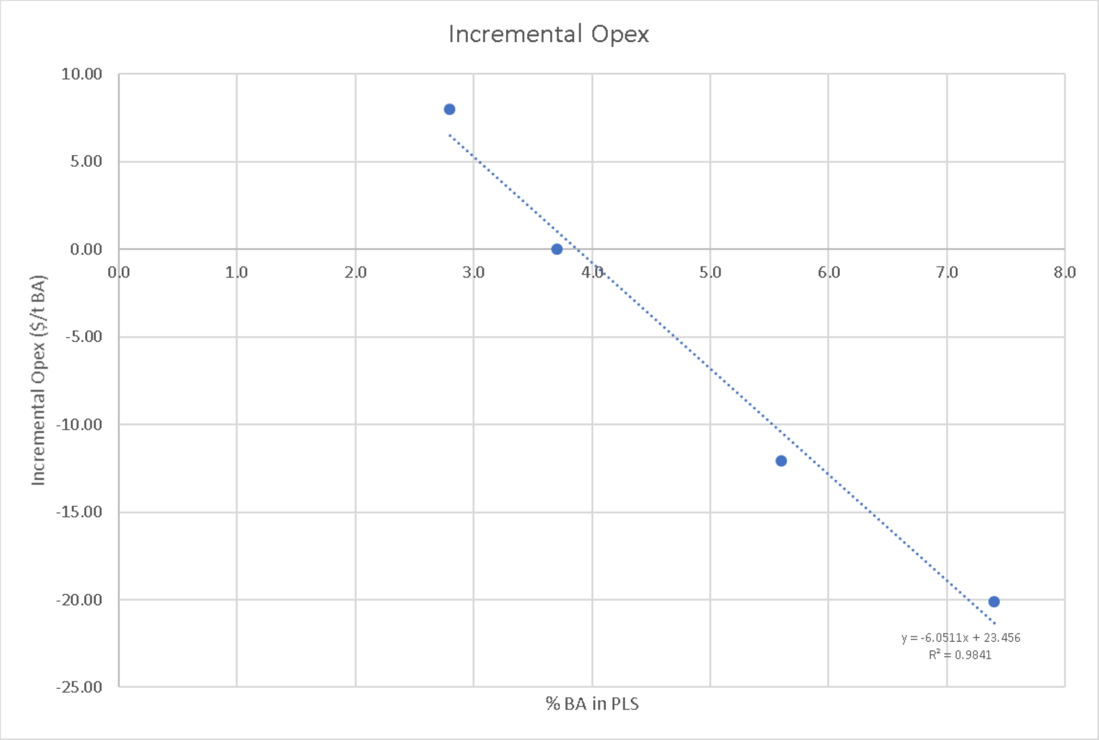

Figure 41. Incremental Opex Reduction with Head Grade Improvement

15 BORATE MARKET OVERVIEW

Commentary on the borate market has been obtained from industry publications and open file data. Borates are a group of boron-bearing minerals commonly referred to in the context of boric oxide (B_2O_3). Deposits of borates are associated with volcanic activity and arid climates, with the largest economically viable deposits located in the Mojave Desert of the United States, the Alpide belt in southern Asia, and the Andean belt of South America (U.S. Geological Survey, 2017).

Industrial demand for borate continues to grow at a rate higher than general economic or industrial growth, driven by population growth, urbanisation, increasing demand for high-end fiberglass insulation, rising agricultural nutrient demands, modern high-tech glass products and coatings (used in computers, LEDs, plasma screens, circuit boards and solar panels) and many other industrial manufacturing applications.

15.1 Production of Borates

World production of boron-bearing minerals was estimated at 7.7 Mt in 2013. Since 2000, production has shown an average rise of 3.3% pa, led by higher output in countries like Turkey and to a certain degree China (Roskill, 2015). The world's two largest producers of borates are Eti Maden (Turkey) and Rio Tinto Borates ("*RTB*" or "*RTM*"), part of the giant Rio Tinto Mining Group, via the Boron mine (previously US Borax), in California, USA. These two producers provide 80% of global borate supply. These two companies focus not only on mining but also on the downstream integration of refined borates.

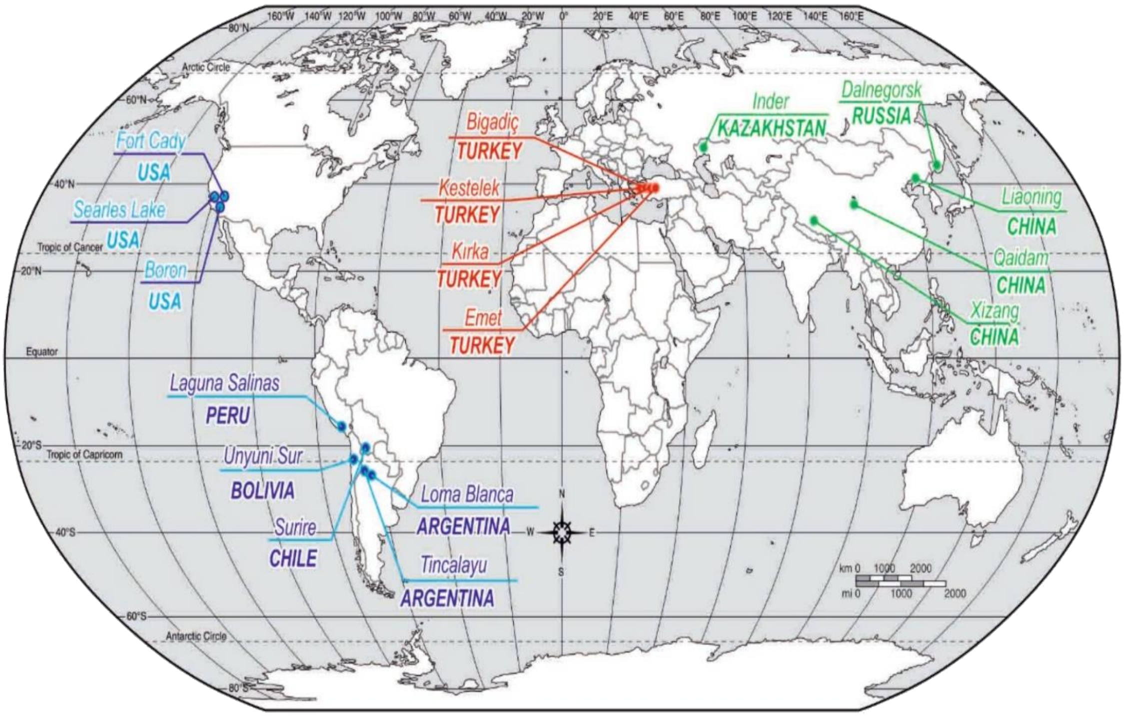

Figure 42a: Map showing borate production mines.

Boric acid equivalent demand in 2017 was 3.9m tonnes which represents a 3% CAGR on Roskill's 2013 forecast supply.

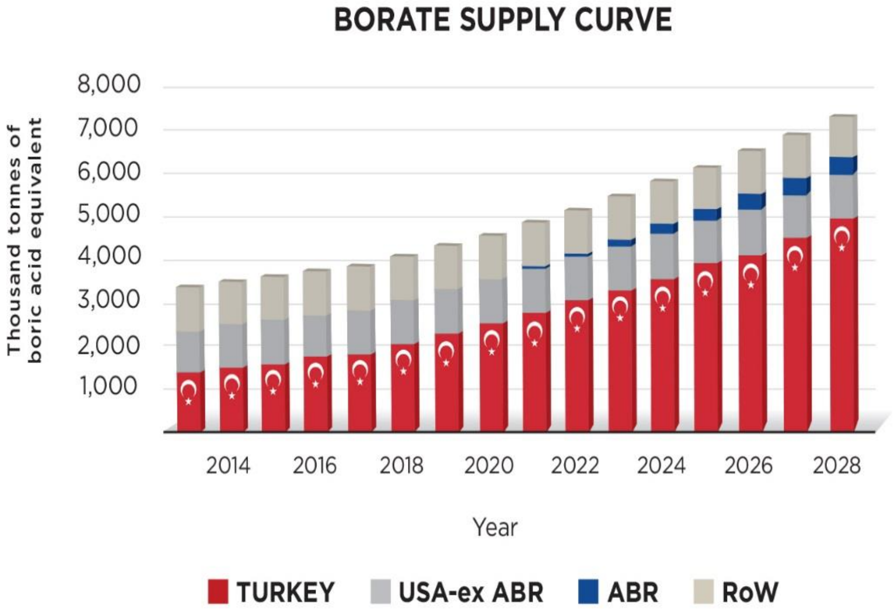

Figure 42b: Graph showing predicted global supply curve based on Roskill, Rio Tinto and Eti Maden analysis.

The borate market is tightly controlled thereby maintaining high operating margins in the sector (Figure 42). The main barrier to entry into the market is the scarcity of large and economic borate deposits around the world.

Turkey is the largest producer of natural borates worldwide. All production comes from the state-owned Eti Mine, which mines the minerals of ulexite, colemanite (such as at ABR's Fort Cady Project) and tincal minerals from open pit operations. Output of concentrates rose to 2.0Mt in 2013 and, it is believed that capacity increased to 3.3Mtpy by 2016 (Roskill, 2015).

U.S. production of borates is centred on two companies both located in California near the Company's Fort Cady Project. These companies produce natural and refined borates. RTB accounts for up to 90% of U.S. output, while Searles Valley Minerals, owned by Indian company Nirma Limited, produces the remainder.

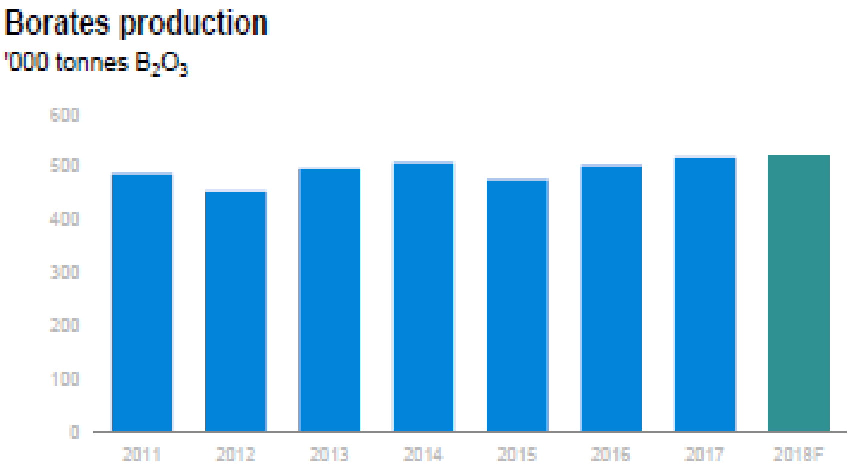

Figure 42c: Graph showing Rio Tinto annual production of borates between 2011 and 2017.

RTB production declined in 2012 after they sold their Argentine operations to Orocobre but in 2014 exports of all the major forms of refined borates increased in the US. More than half of U.S. production of refined borates is exported showing there are strong markets both within the U.S. and internationally (Roskill, 2015). International markets primarily target Asia based on the location of the operating mines in California and the close proximity to the U.S.'s two largest sea ports.

China, the largest importer of refined borates, is also the largest producer of boron minerals in terms of gross weight (Roskill, 2015). However, the B_2O_3 content of ludwigite and szaibelyite minerals produced within the country is very low, meaning China only accounting for around 13% of world output in 2013. Consequently, China is the world's largest importer of borates (TradingEconomics, 2017).

The Russian company BOR is the primary producer of boron minerals in that country. The production of borates comes by processing mined datolite which suffers high costs of production because of the complexity of extraction and as such has an undesirable effect on its sales and production which has shown a steady reduction in both over recent years. Nearly all output is processed by the company into the premium product of boric acid and exported mainly to the large Asian markets. Russian production accounts for approximately 3% of world production.

South America is the only other significant producer of boron minerals, often as a by-product of potash and lithium mining. The producers are made up by the countries of Peru, Bolivia, Argentina and Chile where boric acid is the primary product and Asia is the primary market.

Borates are commercially traded as either the mineral colemanite (lump or concentrate) or the refined boric acid product that APBL is targeting to produce. Boric acid currently trades at around US$900/t in the USA. Refined borates (like boric acid) are forecasted to have a higher demand growth profile than mineral borates such as colemanite (Rio Tinto, 2015 & UBS, 2017).

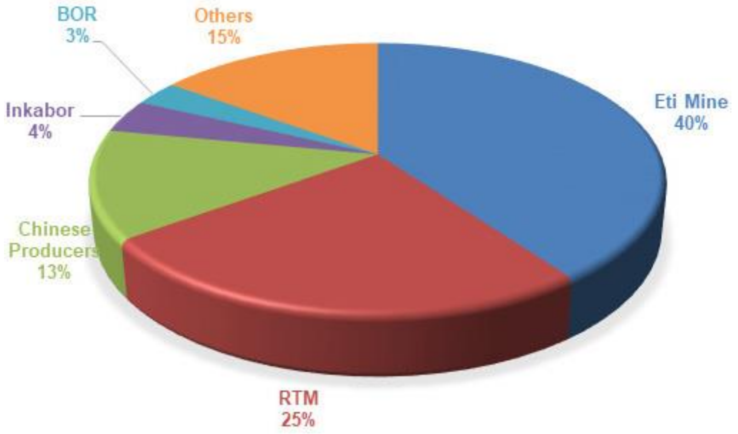

Figure 42: Borate (B2O3) production by company

15.2 Borate Market Uses

- Insulation and textile fibreglass is the largest use of borates worldwide.
- Specialty Glass – borates are found in many household appliances, solar panels and increasingly used for electrical devices.
- Ceramic glazes and porcelain enamels, with China becoming a large user in this sector and creating innovative ceramic technologies.
- In the agriculture industry, borates are one of the key micronutrients vital to crop production. Boron deficiency is the most widespread of all crop deficiencies, affecting almost all major crops globally.

- Borates are found in cleaning and detergent products, including soaps, washing powders and bleaches.
- Boron is uniquely capable of capturing neutrons and is becoming widely used in nuclear shielding and cooling of nuclear reactors.

15.3 Borate Demand

- World production of boron-bearing minerals reached 7.7m tonnes in 2013 (*source: Roskill*) and this substantial growth is expected to continue with the key driving factors being:
  - Growing urbanisation particularly in Asia (ceramics, insulation, consumer products);
  - Construction industry due to improved building standards (insulation, glass);
  - Continued global drive to boost agricultural yields and quality, particularly in emerging markets; and
  - Technological advances and energy efficiency drives (high end device glass, solar panels).
- Agricultural fertilisers and additives are the fastest growing segment of the borate market and are expected to remain so in the coming years.
- The more expensive refined borates (such as boric acid) are a larger and faster growing segment of the market than borate minerals (such as colemanite).
- China is the world's largest consumer of boron based minerals and derivatives.
- Although the largest consumer, China possesses minimal low-grade boron reserves and imports almost 100% of its borate consumption. Chinese imports from the United States and Turkey are expected to increase during the next several years as it continues to source a premium product.

15.4 Borate Supply

- Turkey holds the largest known resources of borate and is the world's largest producer, via the government-owned Eti Maden mining company.
- The United States is the world's second largest producing country. RTB is responsible for the vast majority of US borate production from its mine in Boron, California. This mine is located less than 100km from the Fort Cady deposit and has been in operation for over 140 years.
- The Searles Valley mine (SVM), also in California, has been producing borate and soda ash from brines since 1926. In 1962 the mine switched from conventional mining to lower cost solution mining, followed by solvent extraction, to produce the higher value boric acid product. This is the same mining and processing technique proposed for the Fort Cady project. SVM was acquired in 2008 by Nirma, a large industrial conglomerate based in India that is one of the world's largest manufacturers of soaps and detergents.
- Supply is highly concentrated and as a result profit margins have historically remained high.
- Turkey is expected to match all future demand as there are minimal, if any additional net sources of borate capacity outside of Turkey.

15.5 Future Trends in Production of Borates

Borates remain an important industrial mineral for modern society with demand expected to continue to grow. There are very few substitutes for borates especially in high-end applications and the ever-important market of agriculture. These key markets in particular are expected to grow as global population grows and countries and individuals become more affluent. This is also helped by a significant divergence of demand for borates driven by the construction and glass industries.

It is expected that China will continue to be the key market for growth but additional demand is expected within the U.S., India (as is evident of Nirma's acquisition of SVM) and the European Union (UBS, 2017).

Borates tend to be a high-margin industry but key factors for success are B_2O_3 grade, the ability to mine and mine proximity to infrastructure. Low grade or high cost mining and processing methods can quickly erode margins. Furthermore, geographically isolated mine developments have high capital requirements for infrastructure investment, further increasing the barrier to entry. In addition to complicated logistics, key input prices such as acid and energy can have an adverse impact on development opportunities.

In the absence of boron resources across Asian countries but with a constant and growing demand for its glass and ceramics, borate producers will continue to benefit from an increasing demand for borates.

16 GYPSUM MARKET OVERVIEW

Information on the borate market has been obtained from industry publications and open file data, as well as from a study commissioned by American Pacific through Context, an independent consultancy. Gypsum or calcium sulphate dihydrate is a calcium mineral, which contains calcium, sulphur bound to oxygen and chemically combined water. Deposits of gypsum are found in over 85 countries, with the United States, Canada, and Mexico having large high-quality reserves. Gypsum is also produced synthetically through flue gas desulfurization. This process produces almost one half of the gypsum consumed in the United States.

Demand for gypsum is tied to the construction industry as it is used to manufacture sheetrock, used in the production of cement as well as in building plasters. It is also used as an agricultural supplement, where the gypsum provides nutrients, treats aluminium toxicity, and improves soil structure.

16.1 Production of Gypsum

Gypsum is a low value, high bulk commodity product and as such is typically consumed near where it is produced. As such this section will focus on the domestic (US) gypsum market. While gypsum is produced in 81 countries, most of the gypsum consumed in the United States is produced domestically. This domestic production of gypsum is not evenly distributed across the States, and imports from Canada augment supply as well as the use of synthetically produced gypsum. In 2017, approximately 15.9 million tonnes of gypsum were mined in the United States. An additional 14.6 million tonnes of synthetic gypsum were produced primarily by flue gas desulfurization.

16.2 Gypsum Market Uses

- Wallboard (sheetrock) and plaster products consume most of the gypsum that is produced within the United States.
- The manufacturing of Portland cement consumes approximately 3.5 million tonnes of gypsum. Approximately three percent gypsum is added to cement clinker and acts as a set retarder, which aids workability, and as a strength accelerator. California is the second leading cement producing State. *(source:USGS)*
- Agricultural gypsum consumption in the United States is approximately three million metric tonnes. Gypsum provides nutrients to plants by providing calcium and sulphur. It also improves soil structure and treats aluminium toxicity.

16.3 Gypsum Demand

- The domestic production of gypsum is estimated to be 17.5 m tonnes in 2017 (*source: Mining Engineering*) growth in the market is largely tied to:
    - Building construction industry, with 95 percent of gypsum use being utilized to produce plasters, wallboard, and cement.
- Agricultural gypsum market in the United States is 3.0 M tonnes, with the use of gypsum in the agricultural market experiencing rapid growth since 2000.
    - This is due to an increase in sulfur deficiencies of which gypsum provides the most economic option to correct this deficiency.
    - U.S. Government subsidies to improve soil health and improve the quality of water.

  - Oil and gas industries use of gypsum to reclaim soil damaged by the use of salt during the process of drilling production wells.

16.4 Gypsum Supply

- The United States holds large quantities of gypsum resources, but the gypsum is not evenly distributed.
- Imports from Canada, and synthetic gypsum derived from coal fired power plants augments this uneven supply.
- There is little substitute for gypsum, other than synthetic gypsum and recycling of building products containing gypsum.

16.5 Future Trends in Production of Gypsum

As economic production of gypsum is tied to logistics costs of this bulk commodity, the location of the gypsum to the markets and end users becomes important. Currently nearly 50 percent of the gypsum supplied is from synthetic sources, largely from flue-gas desulfurization of coal fired power plants. As power plants are converted from coal fired, to plentiful less expensive natural gas, the production of synthetic gypsum may be affected.

Over two-thirds of the US agricultural gypsum use occurs in the Pacific growing region including California, Oregon, and Washington. This is due to the heavy soils of the region as well as the requirements for plant nutrition. California grows 99 percent of the US almonds, and a significant amount of fruits and vegetables which have a high need for the calcium that is supplied by gypsum. The historic agricultural use of gypsum has shown over a three percent CAGR increase in pricing due to increased usage as well as price escalation. (*source: Context*)

17 SOP MARKET OVERVIEW

17.1 SOP Production

Sulphate of Potash (SOP) is a high value specialty fertilizer used where crops have a sensitivity to chlorides. This fertiliser K_2SO_4, supplies approximately 50 percent K_2O and also 18 percent sulphur. There is currently only one producer of SOP in the United States, Compass Minerals that harvests and refines brines from the Great Salt Lake located in Utah. The consumption of SOP in the States grew at a CAGR of 7.6 percent from 2009 to 2013, with potash fertiliser consumption expected to grow at 4.4 percent through 2022. (*Context Network*)

Globally, the total SOP production is approximately 5.5 Mtpa. European Mannheim furnaces produce approximately 600,000 tpa, while 2 Mtpa is produced in China.

Global SOP capacity is estimated at 9.5Mtpa as of 2015 (CRU Consulting, 2017). China accounts for 55% of global production, while Europe accounts for 22%, with the remaining global production distributed among multiple regions and countries. In the US, there are no active SOP production facilities except for the aforementioned Compass Minerals facility.

The US SOP market is estimated at approximately 300,000 tonnes, with a value of $187MM. The California market for SOP is estimated at 103,000 tonnes, or over 35 percent of the US market.

17.2 SOP Market Uses

Crops sensitive to chloride include some fruits and vegetables, turf, and tobacco. These crops require SOP as fertilizer for growth. Also, for crops less sensitive to chloride, SOP is required for optimal growth if the soil accumulates chloride from irrigation water. SOP is also used in arid environments without sufficient rainfall to prevent chloride build-up, such as the Middle East.

California's climate and high level of crop production of almond, fruits, and vegetables account for 35% of the total US market.

Globally, Product Grades Standard grade SOP accounts for the majority of the market. In the US, most of the demand is for Granular grade, which is incorporated into nitrogen, phosphorus, and potassium (NPK) blends. Granular grade SOP works well in sandy soils. Water soluble SOP forms are also used in the US in arid regions.

17.3 SOP Demand

China is the largest market end market for global SOP production, and it is mostly supplied from internal producers making China primarily a self-contained market. The rest of the global market is estimated to be 2.5 Mt in 2015. Approximately 1 Mt of the global demand comes from Europe, 300,000 tonnes from the US, 0.5 Mt from Latin American and Africa, and the remainder from other parts of the world.

SOP demand by end use is broken down as shown in Figure 43.

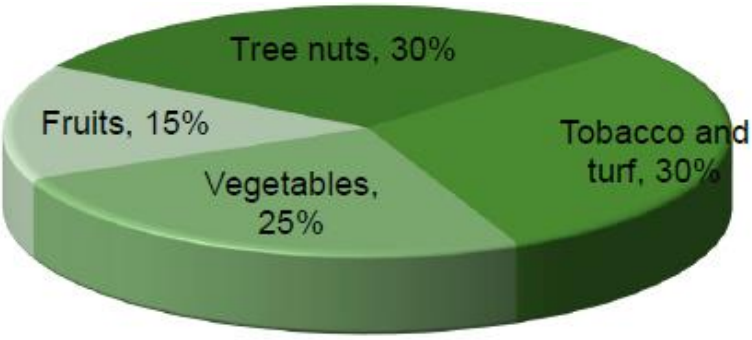

Figure 43: SOP demand by end use (Compass Minerals)

North America is traditionally the third largest global SOP market behind China and Europe. In the United States, the largest SOP consumers are in California and Florida, where significant amounts of fruit, vegetables, and nut crops are cultivated. In addition to these states, Washington and Oregon also have sizeable demand for SOP in the US.

North American demand for SOP is projected to increase at 4.8% per year into 2020 (CRU Consulting). As of 2016, the North American demand made up 5.4% of global SOP demand. Central and South American demand is expected to grow at 2.7% (CRU Consulting).

17.4 SOP Supply

With the current status of US supply discussed in the above sections, the Company is in a favourable strategic position to supply the available markets, starting with the local California markets.

17.5 Future Trends in Production of SOP

Globally, China is expected to continue to drive the SOP global demand. Cumulative annual growth rate (CAGR) of 7.1% has been observed from 2010 to 2016. Africa's SOP demand overtook North America's in 2016. The United Nations Food and Agricultural Organization (UN FAO) estimates that globally there are 509 million acres (206 million hectares) of chloride-sensitive crops, the significant majority of which are located in Asia.

Brazil and Southeast Asia also is expected to make a large portion of the future SOP demand. Global SOP demand is expected to reach 7 million tonnes by year 2020 (CRU Consulting).

18 HYDROCHLORIC ACID MARKET OVERVIEW

18.1 Hydrochloric Acid Production

Hydrochloric acid is one of the names for muriatic acid with the chemical formula HCl. It is also known as acidum salis or spirits of salt. Hydrochloric acid is a, transparent, very strong solution of hydrogen chloride in water. It is an extremely important product of the chemical industry and used in many industrial processes such as used in manufacture of organic compounds, as cleaning agent, neutralise water in swimming pools, to regulate pH level, regenerate ion exchangers, oil-well acidization, Production of inorganic compounds, and other industrial applications.

About 40 processes generate HCl as a coproduct and about 110 chemical manufacturing processes utilize hydrochloric acid as a raw material, (source: Merson).

Major US producers of hydrochloric acid include BASF, Olin, Occidental Chemical, Westlake Chemical, Formosa Plastics, Covestro and Huntsman. (Source: ICIS)

18.2 Hydrochloric Acid Market Uses

Hydrochloric acid is synthetically produced for a variety of industrial and commercial applications. (Source: Continental Chemicals)

These applications include:

- Oil Well Acidising – Hydrochloric acid is used in large quantities as a bore-hole drilling agent. This fracture stimulation fluid reduces the pH of drilling fluid systems and helps dissolve rock during drilling for the Oil and Gas Industry.
- Metal Finishing – Hydrochloric acid is used extensively in the Iron and Steel Industry to remove iron oxide (also known as rust or scale) from basic steel prior to additional steel manufacturing process.
- Food Processing – Hydrochloric acid is utilised in a variety food processing applications. Hydrolysis, purification and even neutralization are some of the areas hydrochloric acid is applied.
- Industrial Wastewater/Water Treatment – Hydrochloric acid can be used in the clarification and neutralisation of the waste streams.
- Ore Processing – Hydrochloric acid is used in mining applications for the treatment, extraction, separation, and purification of minerals, as well as for water treatment. Materials treated include, tungsten, uranium, zirconium and rare earth metal extraction. HCl can be used for solution mining of borates, and as a PH regulator in the potash flotation process.

Hydrochloric acid is also used in the production of batteries, photoflash bulbs, fireworks and used to produce food products such as sugar and gelatin. (Source: Continental Chemicals)

18.3 Hydrochloric Acid Demand

The US HCl market has steady and predictable demand for several industrial sectors, including for the production of plastic, water treatment, pulp and paper industry, for steel pickling, production of high-fructose corn syrup and chemical processing.

HCl prices have already surged since the second quarter of 2017 and have continued to push higher on unplanned outages and continually rising demand from oilfield drilling.

In particular demand has boomed since HCl was found to be useful in the hydraulic fracturing process for breaking up shale deposits to release oil and natural gas trapped in these formations. As oil prices increase HCl consumption increases in line associated with oil well development.

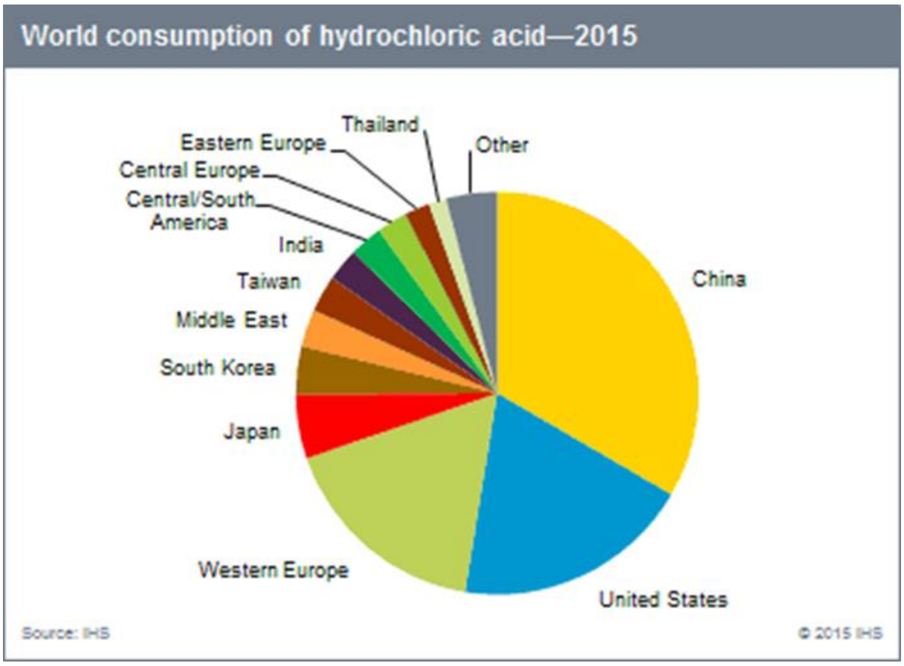

Figure 44: Global HCl Consumption (Source HIS)

The second-largest growth rates for HCl consumption are expected to occur in North America. (Source ICIS)

18.4 Hydrochloric Acid Supply

90 percent of hydrochloric acid supply in the United States is created as a co-product. Most of this production is through the chlorination of organic chemicals, often used to produce plastics, including PVC. Other processes used to create HCl include the, Mannheim process for the production of SOP (salt-sulfuric acid production), the combination of hydrogen and chlorine, and a small amount is formed through the burning of chlorine gas.

18.5 Future Trends in Production of Hydrochloric Acid

Global Hydrochloric Acid Market Will Grow at a CAGR 1.7% and Reach USD 8.3 Billion by 2023. (Source: Digital Journal)

19 FINANCIAL METRICS

19.1 Financial Analysis

Tables below highlight the financial outcomes of the Study. Readers are referred to appendices for further details about the parameters and assumptions underpinning target production targets financial forecasts for the Project.

There is a low level of geological confidence associated with Inferred Mineral Resources and there is no certainty that further exploration work will result in the determination of Measured or Indicated Mineral Resources or that the Production Target or preliminary economic assessment will be realised. The above results are based on the key assumptions in Table 20. Escalator factors have been applied to revenue and costs.

The net present value (NPV) shown in the tables below demonstrate the effect of changes to the boric acid price, boric acid operating expenditure and capital expenditure on the base case NPV. The NPV is calculated at a 10% discount rate and post-tax basis.

As outlined elsewhere in this document, the Fort Cady Project consists of two major product lines; Boric Acid and Sulphate of Potash (SoP). The Project in entirety, and also the discrete product lines, are designed to be built in three separate phases building up to full production. The production contemplated for each phase is summarised below:

Table 18: Summary of Production by Phase

	Boric Acid (metric tonnes)	SoP (metric tonnes)
Phase 1	81,647	36,287
Phase 2	163,293	36,287
Phase 3	163,293	36,287
Total (3 Phases)	**408,233**	**108,862**

Financial Metrics for the Fort Cady Project, as well as for the discrete product lines, can be seen for all Phases in Table 19 below.

Table 19: Financial Metrics for Combined Operation

Fort Cady Project (Boric Acid and SoP Production)	
Phase 1 Only	
NPV_{10}	\$460.0 million
IRR	36.0%
Phase 1 & 2 Only	
NPV_{10}	\$983.2 million
IRR	39.3%
Full Project (Phases 1, 2, & 3)	
NPV_{10}	**\$1,246.6 million**
IRR	**40.7%**

Table 19 Continued: Financial Metrics for BA Plant. Only

Boric Acid Operation Only	
Phase 1 Only	
NPV_{10}	\$242.6 million
IRR	26.2%
Phase 1 & 2 Only	
NPV_{10}	\$633.6 million
IRR	31.5%
Full Project (Phases 1, 2, & 3)	
NPV_{10}	**\$836.1 million**
IRR	**33.5%**

Table 19 Continued: Financial Metrics for SOP Plant. Only

SoP Operation Only	
Phase 1 Only	
NPV_{10}	\$217.4 million
IRR	100.1%
Phase 1 & 2 Only	
NPV_{10}	\$349.6 million
IRR	100.6%
Full Project (Phases 1, 2, & 3)	
NPV_{10}	**\$410.5 million**
IRR	**100.8%**

Please note that all dollar (\$) figures in this section are in USD.

19.2 Sensitivity Analysis

Sensitivities have been run on the Fort Cady Project financial model for all three phases. The results of key sensitivities can be seen in the tables below (Table 19).

Table 20: Sensitivity Analysis

Capex Sensitivity

Capex Sensitivity					
Capex Sensitivity	-30%	-15%	0%	15%	30%
Total Capex (\$ million)	361.3	438.8	516.2	593.6	671.1
NPV_{10} (\$ million)	1,380.6	1,313.6	1,246.6	1,179.6	1,112.6

Table 20 Continued: Opex Sensitivity

Opex Sensitivity					
Opex Sensitivity	-30%	-15%	0%	15%	30%
C3 Opex (\$/tonne BA)	166.13	201.73	237.33	272.93	308.53
NPV_{10} (\$ million)	1,615.4	1,431.0	1,246.6	1,062.2	877.9

Table 20 Continued: BA Price Sensitivity

Boric Acid Price Sensitivity					
BA Price Sensitivity	-30%	-15%	0%	15%	30%
BA Price ($/tonne)	560.00	680.00	800.00	920.00	1,040.00
NPV$_{10}$ ($ million)	675.5	961.0	1,246.6	1,532.2	1,817.8

Table 20 Continued: SOP Price Sensitivity

SoP Price Sensitivity					
SoP Price Sensitivity	-30%	-15%	0%	15%	30%
SoP Price ($/tonne)	507.72	616.52	725.32	834.12	942.92
NPV$_{10}$ ($ million)	1,103.1	1,174.9	1,246.6	1,318.4	1,390.1

19.3 Summary of Key Assumptions

The table below outlines key assumptions used in the financial model for the Fort Cady Project.

Table 21: Key Assumptions

Key Assumptions	
Assumption	Value
Phase 1 Construction Start Date	Q4 2019
Phase 1 Production Start Date	Q4 2020
Phase 2 Construction Start Date	Q2 2022
Phase 2 Production Start Date	Q2 2023
Phase 3 Construction Start Date	Q2 2024
Phase 3 Production Start Date	Q2 2025
Mine Life: Phase 1 Only	80 Years
Mine Life: Phase 1 & 2 Only	30 Years
Mine Life: Phase 1, 2, and 3	21 Years
Boric Acid Price	$800.00/metric tonne
SoP Price	$725.32/metric tonne
Hydrochloric Acid Price	$275.58/metric tonne
Gypsum Production	76% of Boric Acid, by weight
Gypsum Price	$33.00/metric tonne
Sulphuric Acid Price	$181.88/metric tonne
Muriate of Potash (MoP) Price	$297.62/metric tonne
Escalation (revenues and costs)	3.0%
Remediation Expense	10.0% of initial capex at end of mine life
Federal Tax Rate	22.0%
State Tax Rate	9.0%

19.4 Construction Financing

The Company believes there is a reasonable basis to assume that the necessary funding for the Project will be able to be obtained, because of (but not limited to) the following:

- The positive financial metrics of the project and the underlying demand growth for the commodities;
- The 21 year mine life and the likely percentage of Indicated Resources that should be able to be converted to Reserves to establish a long “Reserve tail” that is generally a pre requisite for debt capital markets participation in mining projects;

- The proven and well understood processing route reducing technical risk;
- The location of the Project and the positive geopolitical risk profile associated with it; and
- The expected size of the capex which is likely to mean significantly more financing options than projects with larger capex.

The Company believes its funding options include:

- US denominated bond issuers;
- North American and European project finance banks;
- Equity capital markets;
- Large consumers of boric acid seeking supply certainty and an interest in upstream production;
- Equipment finance providers;
- Large private equity and debt focussed global natural resources' funds; and
- Forward sales contract counterparties.

The Company expects to progress discussions with financing partners in the new year as part of its progression of its Definitive Feasibility Study and product development and partners business stream.

20 RISKS

Risks for the project were identified and classified according to the likelihood and consequence of their occurrence. Risk mitigation strategies outlined by the Company has commenced planning the actions required to implement the strategies which are presently underway where appropriate.

The major risks identified were, accurately estimating the modifying factors moving from resource to reserve and in particular, solution mining extraction rates and leaching make-up solution physical and chemical parameters. The Company is undertook core leach test programs as well as pilot-scale field bulk sampling tests. These tests are expected to assist the Company in the optimal flow design and mine planning studies feeding into a feasibility study.

Permitting risk is always a risk with proposed mining developments. Given that Phase One production targets are in-line with historical permit and operating approvals, the Company is targeting rapid advancement of this part of the Project. The expanded Phase Two and Phase Three operations as proposed will require and addendum to the pre-existing conditions of operation or re-compliance under new terms of operation. The Company will implement a strategy in relation to the permitting that focuses on maximising the benefit to all stakeholder in the Project, including the local community, local and regional populations and resources and the Company.

Given the above, including the Project's economic metrics and its low-risk location in the U.S., the Company has concluded it has a reasonable basis to expect that the Project's development capital cost could be funded following the completion of a positive Feasibility Study and obtaining the necessary project approvals.

21 OPPORTUNITY

The Company is satisfied with the results of the Study and believes the positive results justify the Company to commitment to advancing to the next level of development by progressing through to feasibility level studies.

The borate resource at Fort Cady is large enough to support multiple development options, including increasing boric acid throughput and capitalising on reagent synergies between boric acid and SOP production, whereby SOP production produced HCl as a by-product which in turn is the key reagent required for boric acid production. The Company is committed to capitalising on the strategic nature of the commodities it proposes to produce at Fort Cady as they are considered to be high value products with strong demand in both domestic U.S. and international markets.

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23 ANNEXURE A – MATERIAL ASSUMPTIONS

The modifying factors included in the JORC Code (2012) have been assessed as part of the Study, including mining, processing, infrastructure, economic, marketing, legal, environmental, social and government factors. Material assumptions used in the preparation of the Study are set out in the following table.

Criteria	Commentary
Study Status	This Definitive Feasibility Study is suitable for authorisation of funds and to proceed with detailed design.
Resource Classification	Refer to Section 5 of this report.
Mining Factors or Assumptions	The Study assumes 70% extraction rate of the in-situ mineral resource with losses attributed to partial leaching or cavern development-based estimates made by FCMC in the 1980's during pilot plant studies and reported in the EIS/EIR. Mass balance calculations made by FCMC indicate maximum extraction ratio of *c.* 88%. It is assumed mining would occur by solution mining. Owing to the conceptual nature of the Study and the variation in deposit grade and thickness, it is assumed the production wells would be spudded sequentially in a grid pattern over the deposit leaching the MRE Category grade. Individual well life is estimated at 8 years. Mining in the first 14 years occur in the Reserves category. See Section 5 for details.
Metallurgical Factors or Assumptions	99% Metallurgical recovery and 1.6% solution loss has been assumed, based on the metallurgy and process design by the engineering consultant (Barr Engineering) based on its review of historical feasibility studies, test work and pilot plant test studies. Preliminary leach test work by Saskatchewan Research Council (SRC) on core supplied by ABR has shown rapid dissolution of boric acid and partial leaching of Li in the formation being targeted for solution mining. Refer to Sections 6 and 7 in this report for details.
Ore Mineralogy	Refer to Section 3 in this report.
Environmental	Refer to Section 11 in this report
Infrastructure	Refer to Section 10 in this report. The project has excellent in-place infrastructure, greatly reducing capital expenditure requirements.
Commodity Price Assumptions	Refer to Section 19 in this report for details. Pricing in the boric acid market is similar to other industrial commodities in that pricing not openly reported like commonly traded commodities. Anecdotal evidence collected by the Company indicates pricing in the range of US$800 to US$1,000/t. Publicly available whole sale prices on Alibaba range between US$700 to US$1,100/t. Sulphate of potash price is assumed to be US$725/t which is based on Quarterly reporting in Q3 CY18 by Compass Minerals.
Exchange Rate Assumptions	All financial metrics reported in US$
Capital & Operating Costs	Refer to Section 13 and 14 in this report.
Mine Closure	The Mine Closure costs are estimated at 10% of initial Capex for all three Phases escalated through to the finality of mining operations in Year 21.
Marketing	Refer to relevant Section 15 in this report
Economic	Refer to Sections 5 and 19 in this report; key inputs and assumptions are outlined throughout this document to allow analysts and investors to calculate project valuations based on their own revenue assumptions.
Land Title Ownership and Operating Permit	The Company through it 100% owned subsidiary hold the key Land Use Permits and EIS/EIR for mining at Fort Cady. As discussed in this report, a portion of the resource occurs in the SCE Land Title. ABR does not currently have an access agreement in-place for exploiting the resource within the SCE Land Title but is confident an agreement can be put in-place prior to the Company needing to exploit the resource in this area. See Section 2 in this report.
Development and Funding	The Company has only completed this Study for the Project and is not currently funded for the estimated initial development capital cost of US$138.2m (including contingency).

	The Company remains confident that its market capitalisation will converge closer to the Company's future funding requirement as the Project is de-risked and greater certainty of initial development capital cost funding is obtained. This share price appreciation and the resulting increase in market capitalisation reduces the dilution from further equity financings and allows larger funding scenarios, improving the potential ability of the Company to finance the Project into production in the future. Financing for development of mining companies often involves a broader mix of funding sources rather than just traditional debt and equity, and the potential funding alternatives available to the Company include, but are not limited to: prepaid off-take agreements; equity; joint venture participation; strategic partners/investors at project or company level; senior secured debt/project finance; secondary secured debt; and equipment leasing. It is important to note that no funding arrangements have yet been put in place, as these discussions will usually, and are expected to, commence concurrently with the completion of the feasibility studies. The composition of the funding arrangements ultimately put in place may also vary, so it is not possible at this stage to provide any further information about the composition of potential funding arrangement. The Board of APBL believe there is a reasonable basis to assume that the necessary funding for the Project will be obtained, because of (but not limited to) the following: • The increasing demand and price of the commodity which attracts high margins; • The magnitude of pre-production financing required is relatively small compared to the potential economic returns of the project. • The economics of the Study are highly attractive and for this reason it is reasonable for the Company to anticipate that equity financing will be available to further develop the Project; • In addition to future equity financing, the Company plans to commence discussions with potential partners and debt providers to progress funding options. It is expected given the economics of the project, the stable jurisdiction and long mine life, debt financing will be available for a part of the project funding; • The recent conversion of the JORC Resource to Reserve category further confirms the attractive economics of the project
Permitting	The Company is in ongoing dialogue with the local, state and federal agencies in relation to project permitting and obligations. The expanded Phase Two and Three production scenario and SOP production will require additional permitting approvals prior to commencing production. The Company is initially focused on complying and reinstating all permits required for Phase One production as historically envisaged for the project. In tandem, it will commence the necessary work requires to apply for Phase Two targeted production and SOP production. Refer to Section 11 in this report.

24 APPENDIX A – THE JORC CODE, 2012 ED – TABLE 1

APPENDIX A. THE JORC CODE, 2012 EDITION – TABLE 1

Section 1 Sampling Techniques and Data

(Criteria in this section apply to all succeeding sections.)

Criteria	JORC Code explanation	Commentary
Sampling techniques	• *Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.* • *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* • *Aspects of the determination of mineralisation that are Material to the Public Report.* • *In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.*	HISTORICAL • No historic procedures or flow sheets were sighted that explain the historic drilling and sampling processes completed at the Fort Cady project. • Discussions held with Pamela A.K. Wilkinson who was an exploration geologist for Duval at the time of drilling and sampling highlight that drilling through the target zone was completed via HQ diamond drilling techniques and drill core recovery was typically very good (Wilkinson, 2017). • Sampling through the logged evaporate sequence was completed based on logged geology and geophysics. Sample intervals vary from 0.1 ft to 15 ft and sample weights varied accordingly. • Drilling through the overburden material was completed using a rotary air blast (RAB) drilling technique with samples taken from cuttings every 10 ft. MODERN ABR PROGRAM • A SciApps Z-300 field portable LIBS analyser was used during the program for qualitative drilling and sampling control. The device was calibrated with field blanks and standard settings as instructed by the manufacturer. • A full suite of modern logging, including standard geological, geotechnical and density sampling was completed on each core recovered during the program. • The holes drilled by ABR comprise a tophole section (pre-collar), which are drilled by conventional rotary methods. Sampling of cuttings was undertaken on 10ft intervals but have not been assayed. The bottom hole section which encompasses the entirety of the known mineralised sequence was drilled using diamond coring methods. After recovery, and standard logging procedures, the core was sampled from above the mineralised section, down to TD or well past the mineralised section into non-mineralised sandstones. Core sample intervals were subdivided based on lithology principally to ensure appropriate delineation of the mineralisation in conjunction with host rock. Sample intervals of a maximum of 6ft were marked up and the core was cut and ½ core sent to SRC Geoanalytical Laboratories, Saskatoon, while ½ core remined in the coe boxes stored securely on site. • Samples were crushed, split and pulverised according to industry standards. An aliquot of pulp was digested using a mixture of concentrated HF:HNO$_3$:HClO$_4$ and multi-element analysis carried out by ICP-OES. For Boron analysis, an aliquot of pulp was fused in a mixture of NaO$_2$:NaCO$_3$ and dissolved in deionised water and analysed by ICP-OES. Instruments used in analysis were calibrated using certified commercial standards and duplicates were taken.

Criteria	JORC Code explanation	Commentary
		• Every 6th sample submitted by ABR was a control samples (blank, duplicate or standard) inserted for QA/QC purposes. • All lithium brine samples were sent to ALS Laboratories in Reno, Nevada. Samples were subjected to an acidification prior to an ICP-AES analytical method examining 27 elements. ALS inserted specific Certified Reference Materials suitable for brines and reported in the results to ABR. • Industry standards were used for the collection, preparation and analysis of samples and drilling, sampling and assaying was undertaken by geologists and technicians contracted to ABR directly or via a contracting agency.
Drilling techniques	• *Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	HISTORICAL • Drilling through the overburden sequence was completed using rotary air blast (RAB) drilling technique. • Drilling through the evaporate sequence / target zone was completed using HQ diamond core. MODERN ABR PROGRAM • Drilling through the overburden sequence to core point was completed using rotary air blast (RAB) drilling technique. • Drilling through the evaporate sequence / target zone was completed using HQ diamond core on all drill holes with the exception of 17FTCBL010, which was completed using NQ diamond coring due to drilling conditions. • HWT (4”) casing was set through the rotary section to core point to maintain drill hole integrity while completing diamond coring through the evaporite / target zone. • Hole 17FTCGT0001 was completed with diamond coring throughout, no RAB. • All drill holes were completed vertically with no greater tge 5 degrees of deviation.
Drill sample recovery	• *Method of recording and assessing core and chip sample recoveries and results assessed.* • *Measures taken to maximise sample recovery and ensure representative nature of the samples.* • *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.*	HISTORICAL • Drill core recovery has been reported by Duval geologists to be excellent (95%-100%). • Drill core recovery was not routinely recorded. • Geologists highlighted areas of poor recovery during geological logging by making comment within the geological log at the appropriate drill hole intervals. • A review of the limited amount of drill core that is stored at site indicates drill core recovery was good. Refer to Appendix E for pictures of drill core. MODERN ABR PROGRAM • Core recovery was first recorded at the drill site by the driller following each core run. The total lengthed cored and total length recovered for each core run was recorded and marked on the run blocks placed in the core boxes after each core run. Experienced geologist then pieced together and measured each core run and

Criteria	JORC Code explanation	Commentary
		determine the total recovery. If any core loss was observed the location and amount was recorded in the geological logs and marked in the sample ledger as core loss / no recovery. • Overall the core recovery was very good through both the fine grained clay sequences and evaporitic sequences that host lithium and boron mineralisation. • Conservative drilling practices and a specifically designed mud program was utilised to maintatin the integrity of the core and maximise core recovery throughout the drill program. • Recovery was continually reviewed on a run-by-run and hole-by-hole basis, and changes to drilling practices and the mud program were made when required to ensure continuous improvement throughout the program. • The specific intention of the program was to recover all discrete lithologies to better evaluate the relationship between potentially mineralised sequences and host units. There is no bias in recovery for one host versus any other. • There is no observed relationship between sample recovery and grade. • All cored holes will be geologically logged over their entire length to a level of detail sufficient to define a JORC (2012) Mineral Resource Estimate.

Criteria	JORC Code explanation	Commentary
Logging	• *Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* • *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* • *The total length and percentage of the relevant intersections logged.*	HISTORICAL • Geological logging was completed on every drillhole. • Geological logs for all drill holes have been observed and are held by APBL. • Downhole geophysical logs (Gamma Ray Neutron logs) were completed on each of the Duval exploration drill holes. Calibration procedures are unknown. • Downhole density logs were completed on select drill holes (DHB1, DHB3, DHB7, DHB8) MODERN ABR PROGRAM • Detailed geological and geotechnical logging was completed on every drill hole. • Rotary chips were geologically logged through the upper rotary drilled section while diamond core was geologicaly and geotechnicaly logged through the diamond cored interval. • Downhole geophysical logs were completed on each drill hole. Gamma Ray was completed from surface to TD and induction and caliper was completed through the diamond cored sections to TD on all drill holes with the exception of 17FTCBL009. • Calibration procedures for the downhole geophysical tools are performed by the contractor as per industry standards. • Logging across the various techniques can be classed as both qualitative and quantitative. For the purposes of the code, ABR presents measurements measured by personnel as qualitative and measurements taken by machine as quantitative (excluding LIBS). • All core is logged and photographed according to standard procedures and relevant intersections are included in that gross logged sequence.
Sub-sampling techniques and sample preparation	• *If core, whether cut or sawn and whether quarter, half or all core taken.* • *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* • *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* • *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* • *Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.* • *Whether sample sizes are appropriate to the grain size of the material being sampled.*	HISTORICAL • Drill core was transported from site to the Duval office in Tucson, Arizona. • Following a review of logging and geophysical data, prospective zones were identified and drill core was marked for sampling. • Drill core was halved and then one half was halved again. • The procedure used for obtaining a ¼ core sample is currently unknown. A review of limited drill core present on site (DBH16) highlights that the core was cut using a diamond saw. • No evidence to date has been observed that duplicate samples were taken. • The entire ¼ core sample was crushed and split to obtain a sample for analysis. The crushing process, splitting process, size of crushed particles and amount of sample supplied to laboratory for analysis are unknown. MODERN ABR PROGRAM • Drill core selected for sampling was ½ cut by a core saw and core splitter on site. • Depending on the length of the composite interval, the weight of a sample varied. • Every 6th sample submitted for analysis was a control sample, either a blank,

Criteria	JORC Code explanation	Commentary
		standard, or duplicate. • The samples are representative of the in-situ rock formation. Further, sub sampling based on lithology ensured that no bias (be it a high or low reading), would be likely to occur across any mineralised section. • For brine samples, a filter was used onsite to screen out residual heavy fraction (sands/clays) as best as possible while collecting the sample in a 1 Lt bottle. Brine analysis being undertaken by ALS necessitates the insertion of industry standard CRM's by the laboratory. • Very good/high recoveries in drilling support the contention that samples are representative of the target stratigraphic succession. • Samples were appropriate to the grain size of the material being sampled. • Metallurgical sample from drill hole 17FTCBL008 is a 5kg composite sample made from the assay rejects from multiple samples between 395.9m and 426.4m (downhole depths). Weights of individual samples from this interval were split such that the composite had a weighted average grade that reflected the known grade of the mineralised zone. The composite sample was homogenised and was split to 200 g aliquots for tests and a head sample for ICP total digestion and Boron assaying (methods described below). • No assay samples were taken from hole 17FTCGT0001

Quality of assay data and laboratory tests	• *The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* • *For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.* • *Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.*	HISTORICAL • Historic analytical procedures and associated quality control and quality assurance completed by Duval are unknown. • Discussions held with Pamela A.K. Wilkinson, who was an exploration geologist for Duval at the time of drilling and sampling, indicate that Duval had internal quality control and quality assurance procedures in place to ensure that assay results were accurate. • In excess of 3,000 samples were analysed by Duval at either their Tucson, West Texas (Culberson Mine) or New Mexico (Duval Potash mine) laboratories. Elements analysed for were Al, As, Ba, B_2O_3, CO_3, Ca, Fe, K, Li, Pb, Mo, Mg, Na, Rb, S, Si, Sr, Ti, Zn, Zr. • Mineralogy was identified from XRF analysis. XRF results were reportedly checked against logging and assay data (Wilkinson, 2017). MODERN ABR PROGRAM • All drillcore selected for sampling is ½ cut, and a sample length of a maximum of 6ft is put into individual sample bags. Care is taken to ensure that there is no inappropriate mixing of lithology to ensure representative samples of mineralisation style can be detected (as related to lithology). • Samples were sent to SRC Geoanalytical Laboratories in Saskatoon, Saskatchewan, where complete analysis was undertaken to detect the same elements as Duval targeted (see above), with the extension of modern techniques being applied. • Quality control procedures used include the usage of regular and random blanks, standard and duplicate samples in line with standard industry practice to meet code compliance for future reporting purposes. This establishes an acceptable level of accuracy and QA/QC. • After recovery, and standard logging procedures, the core was sampled from above the mineralised section to TD. Core sample intervals were subdivided based on lithology, principally to ensure appropriate delineation of the target layer and its encasing lithology. Sample intervals of a maximum of 7ft were marked up, cut and ½ core and sent to SRC. • At SRC, samples were crushed, split and pulverised according to industry standards. An aliquot of pulp was digested using a mixture of concentrated $HF:HNO_3:HClO_4$ and multi-element analysis carried out by ICP-OES. For Boron analysis, an aliquot of pulp was fused in a mixture of $NaO_2:NaCO_3$ and dissolved in deionised water and analysed by ICP-OES. Instruments used in analysis were calibrated using certified commercial standards and duplicates were taken. Every 6th sample submitted by ABR was a control samples (blank, duplicate or standard) inserted for QA/QC purposes. • Residues for the metallurgical sample composited from drill hole 17FTCBL008 were prepared and analysed at SRC by the aforementioned methods. The pregnant leach solution (PLS) sample was analysed by the aforementioned methods. • All lithium brine samples were sent to ALS Laboratories in Reno (comprising holes 17FTCLI003, 17FTCLI005, 17FTCLI006). These samples were subjected to an

Criteria	JORC Code explanation	Commentary
		acidification prior to an ICP-AES analytical method examining 27 elements. ALS inserted specific Certified Reference Materials suitable for brines and reported in the results to ABR. • The procedures and methodology for analysis offered by ALS Minerals and SRC offers a higher standard of accuracy than historical procedures as a result of technology and process improvements over time. The techniques used by ALS are regarded as having acceptable levels of accuracy. • A SciApps Z-300 field portable LIBS analyser is being used for drilling and sampling control. Samples were measured singularly, every 1/10th of 1ft, across the entire core. Currently the Company is using the technology to optimise sampling and operational decision making during the drilling program. • The device was calibrated using manufacturer standard settings and blanks. • The accuracy of the SciApps Z-300 field portable LIBS analyser was used to optimise sampling and operational decision making during the drill program. • The device was calibrated using manufacturer standard settings and blanks. • The accuracy of the SciApps Z-300 field portable LIBS analyser has been partially demonstrated by other users, such as Lithium Australia (see various ASX releases), and in the case of this program, is to be further tested by the comparison with assay results. In this sense, the LIBS analyser is a qualitative tool, as opposed to a truly quantitative measurement device versus traditional assays. This is considered to be in line with best practice industry practice.
Verification of sampling and assaying	• *The verification of significant intersections by either independent or alternative company personnel.* • *The use of twinned holes.* • *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* • *Discuss any adjustment to assay data.*	HISTORICAL • Verification of significant intersections by independent or alternative company personnel has not been completed. • The majority of drill core has been discarded and verification of results from the remaining drill core is not possible. • Data entry, data verification and data storage processes are unknown. • Hard copy assay reports, geological logs and geophysical logs have been sourced and are stored with APBL. MODERN ABR PROGRAM • Verification of significant intersections is undertaken geochemically, via the sampling of core and processing by ALS Minerals in Reno, Nevada and Saskatchewan Research Council of SRC. Currently no final reliance is placed on observations by any company personnel in the field. That is, there is no quantitative assessment of grade made by any person in ABR. • The program involved the drilling of three twin holes to test older reported mineralisation. • Drill core is stored in industry standard wax proof boxes. The core is sampled (½ cut) and one half is sent to the geochemical lab, and one half is retained in the box for further assessment or repeat assessment as deemed necessary. • In the case of brines, drill holes 17FTCLI0005 and 17FTCLI0006 had three 1lt

Criteria	JORC Code explanation	Commentary
		filtered samples were taken at each sample depth location. One sampe was sent to ALS Minerals for analysis, while the other two were stored by ABR for future reference. Drill hole 17FTCLI0003 had only one filtered sample taken at each sample depth location and was then sent to ALS Minerals for analysis. • All data provided by the process of evaluation (be it onsite logging or third party assessment such as assay) is stored digitally by the company in a secure database. • Data entry is verified by multiple reviews of any given product (geological logging, assay data, geophysical downhole data and similar), prior to final acceptance and storage. • No adjustments have been made to any assay data.
Location of data points	• *Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* • *Specification of the grid system used.* • *Quality and adequacy of topographic control.*	HISTORICAL • No procedural documentation sighted regarding historic surveying procedure of drillhole collars. Surveying procedure used and associated accuracy is unknown. Checks by PT GMT Indonesia in 2015 on collar coordinates highlighted differences in excess of 50 ft in easting and northing locations were present for drill holes DBH7, DBH18, DBH20, DBH25, DBH26, DBH31, DBH33 and DBH34. • A total of 21 drill holes do not have surveyed collar elevations (DHB18, DHB19, DHB20, DHB21, DHB22, DHB23, DHB24, DHB25, DHB26, DHB27, DHB28, DHB29, DHB30,DHB31, DHB32, DHB33, DHB34, P2, P3, P4 and P5). These drill holes have been currently assigned an elevation from Google Earth. • No downhole surveys are present for Duval exploration drill holes (DHB series of drill holes). Downhole surveys for some production / injection drill holes were completed (SMT1, SMT2, SMT6, P5, P6 and P7). A review of this data highlights that significant deviation of the drill holes has not occurred and the end of drill hole position compares favourably (within 10 m) with the drill hole collar location. The exception is drillhole P5 where the end of this planned vertical drill hole is situated approximately 40 m laterally from the drill hole collar position. MODERN ABR PROGRAM • Drill hole collar locations, provided in Table 2 below, were surveyed by a qualified surveyer. • The geospatial survey co-ordinates used by the company are UTM Zone 11 N, on a NAD 83 datum. • Downhole surveys were completed using modern technology, which involves continuous calibration to assure accuracy is within an acceptable range. Surveys were completed 100ft from surface to TD
Data spacing and distribution	• *Data spacing for reporting of Exploration Results.* • *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* • *Whether sample compositing has been applied.*	HISTORIC • Historic drilling was undertaken on irregular spacing in multiple directions. • The final determination to proceed with a pilot plant saw the drilling of closely spaced holes for the purposes of production.

Criteria	JORC Code explanation	Commentary
		MODERN ABR PROGRAM • Drill holes were positioned so as to infill the historic drill holes and confirm the historic drilling by twinning the historic drill holes. The ABR drill holes were collared on a nominal 210-250m grid spacing. Drill holes are drilled vertically. • Drilling on an 210-250m spacing is appropriate to define the approximate extents and thickness of the evaporite sequence as in conjunction with the historic Duval drilling represents a nominal 160m grid spacing over the identified mineralised zone. Infill drilling will be required to accurately define the true extents, thickness and grade of mineralisation within the deposit. • Mineralised sections of drill core have a similar thickness in adjacent drill holes and significant variability in thickness is not expected on a local scale. • Drill spacing is considered appropriate for the purpose of the Mineral Resource Estimate. • No sample compositing has been applied
Orientation of data in relation to geological structure	• *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* • *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	HISTORICAL • The orientation of sampling did achieve relative certainty such that a pilot plant was successfully installed on the site. • The relationship between sampling orientation and key mineralised structures is considered acceptable froma historical perspective MODERN ABR PROGRAM • Exploration drilling was completed nominally on a 230m grid spacing. Drill holes are being drilled vertically and intersect the relative flat lying deposit close to perpendicular to the dip of the deposit. The southwest margin of the deposit is quite sharp and is considered fault controlled. • Drilling vertically intersects the target mineralised horizon roughly perpendicular, giving an unbiased test of the true thickness of the unit considering the deposit type. This drilling ensures no bias is introduced to the sampling. • Drill holes were oriented vertically so as to intersect the mineralisation orthogonally. Consequently there is no bias in sampling.
Sample security	• *The measures taken to ensure sample security.*	HISTORICAL • Sample security measures during transport and sample preparation are unknown. MODERN ABR PROGRAM • Drill core is under direct control of the driller until it is picked up or dropped off at the APBL secured core shack where it is under control of experienced geologist. • Sample preparation and packaging is completed by experienced geologists and once packaged samples are stored in a secured location on site awaiting transportation to SRC Laboratories. • Secured transport of samples to the assay laboratory is standard practice in the industry and adhered to on this program;

Criteria	JORC Code explanation	Commentary
		- No site personnel have access to the samples once they are placed in bags and sealed. - Samples are taken offsite within 48-96 hours of being bagged
Audits or reviews	- *The results of any audits or reviews of sampling techniques and data.*	HISTORICAL - No details sighted on any previous sampling reviews or audits. MODERN ABR PROGRAM - A review of the sampling techniques and data storage was completed by a consultant geologist - No items of concern were identified.

Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

Criteria		Commentary
Mineral tenement and land tenure status	- *Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* - *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	- The APBL project area consists of approximately 4,409 acres of which 240 acres are patented lands owned by Fort Cady (California) Corporation; 269 acres of patented property with surface rights held by Fort Cady (California) Corporation and mineral rights held by the State of California; 2,380 acres of unpatented mining claims held by Fort Cady (California) Corporation; and 1,520 acres of unpatented mining claims leased by Fort Cady (California) Corporation from Elementis Specialties Inc., owner and operator of the Hector Mine, an adjoining industrial mineral facility. In addition, 100 acres of unpatented mill claims are held by the Company which is designated for water wells. APBL intend to increase its land tenure by 464 acres via negotiations with Southern California Edison. The below table lists the land titles which cover the APBL's Fort Cady project and surrounding exploration regions:

<table>
<tr><th colspan="2">Criteria</th><th>Commentary</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Land Title Type</th><th>Land Titles</th></tr>
<tr><td>Private (Patented) Property with surface and mineral rights in Fee Simple Title owned by FCCC</td><td>Parcels 0529-251-01; 0529-251-03</td></tr>
<tr><td>Private (Patented) Property with surface rights in Fee Simple Title owned by FCCC; Mineral rights owned by State of California</td><td>Parcel 0529-251-04</td></tr>
<tr><td>Unpatented Placer Mining Claims held under Lease to FCCC (from Elementis)</td><td>Company 1 Group; Company 4; Litigation 1 Group; Litigation 2; Litigation 3; Litigation 4 Group; Litigation 5 Group; Litigation 6; Litigation 11; Geyser View 1</td></tr>
<tr><td>Unpatented Lode Mining Claims held under Lease to FCCC (from Elementis)</td><td>HEC 124 - 127; HEC 129; HEC 131; HEC 343; HEC 344; HEC 365; HEC 369; HEC 371; HEC 372; HEC 374 - 376</td></tr>
<tr><td>Unpatented Placer Mining Claims Recorded and Located by FCCC</td><td>HEC #19; HEC #21; HEC# 23; HEC#25; HEC #34 - #41; HEC #43 - #67; HEC #70 - #82; HEC #85 - #93; HEC #182; HEC #184; HEC #288; HEC #290; HEC #292; HEC #294; HEC #296 - #297; HEC #299 - #350</td></tr>
</table>
</td></tr>
<tr><td><i>Exploration done by other parties</i></td><td>• <i>Acknowledgment and appraisal of exploration by other parties.</i></td><td>• Commencement of exploration activities in the Hector Basin occurred in the early 1960’s, when exploration companies realised that the Hector Basin had a similar geological setting to the Kramer Basin to the northwest that hosted the massive Boron deposit. Discovery of the Fort Cady borate deposit occurred in 1964 when Congdon and Carey Minerals Exploration Company found several zones of colemanite, at depths of 400 m to 500 m below surface.
• During the late 1970’s the Duval Corporation became interested in the project and started land acquisition in 1978 with drilling commencing in February 1979. The first drillhole (DBH1) intersected a 27 m thick sequence of colemanite-rich material at 369 m grading better than 7% B_2O_3. Exploration drilling, sampling, and assaying continued for a further two years through to February 1981 with a total of 33 exploration drill holes (DBH series of holes) totalling in excess of 18,200 m being drilled. Approximately 5,800 m of diamond drill core was obtained. Geological and geophysical logging of each hole was completed. Following a review of logging and geophysical data, prospective zones were ¼ core sampled for chemical analysis. In excess of 3,000 samples were analysed at Duval’s laboratories in either Tucson, West Texas (Culberson Mine) or in New Mexico (Duval Potash mine). Elements</td></tr>
</table>

Criteria		Commentary
		analysed for were Al, As, Ba, B_2O_3, CO_3, Ca, Fe, K, Li, Pb, Mo, Mg, Na, Rb, S, Si, Sr, Ti, Zn, Zr. • In February 1981, the first solution mine test hole was drilled and by late 1981 a small scale pilot plant was operational to test in-situ solution mining of the colemanite deposit. Significant processing test work was then completed by Duval with the aim of optimising the in-situ solution mining process and process design. In 1995 the Fort Cady Minerals Corp received all final approvals and permits to operate a 90,000 stpy pilot borate production facility. The pilot plant began operations in 1996, it remained on site, was modified and used for limited commercial production of calcium borate (marketed as Cady Cal 100) until 2001 when operations ceased due to owner cash flow problems. A total production tonnage of 1,942 tonnes of CadyCal 100 was reported to have been produced.
Geology	• *Deposit type, geological setting and style of mineralisation.*	• The project area comprises the west central portion of a Pliocene age dry lake basin (Hector Basin) which has been partially dissected by wrench and block faulting related to the San Andreas system. The Hector Basin is believed to have once been part of a much larger evaporite basin or perhaps a chain of basins in what has been termed the Barstow – Bristol Trough. • The main borate deposit area lies between 350 m to 450 m below the current surface. The deposit comprises a sequence of mudstone and tuff. The borate mineralisation occurs primarily as colemanite ($2CaO\ 3B_2O_3\ 5H_2O$) in thinly laminated silt, clay and gypsum beds. • In plan view, the concentration of boron-rich evaporites is roughly ellipsoidal with the long axis trending N40-50W. A zone of >5% B_2O_3 mineralisation, ranging in thickness from 20 m to 68 m (70 ft to 225 ft), is approximately 600 m wide and 2,500 m long (Figure 4.3 in May 2017 Prospectus). • Boron is believed to have been sourced from thermal waters that flowed from hot springs in the region during times of active volcanism. These hot springs vented into the Hector Basin that contained a large desert lake. Borates were precipitated as the thermal waters entered the lake and cooled or as the lake waters evaporated and became saturated with boron. Based on assay results, it appears if minerallisation took place in several cycles, resulting in somewhat distinct mineralised horizons. • Ultimately the project is classified internally as a sediment hosted Lithium-Boron deposit.
Drill hole Information	• *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:* ○ *easting and northing of the drill hole collar* ○ *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar* ○ *dip and azimuth of the hole* ○ *down hole length and interception depth* ○ *hole length.*	• Refer to Appendix B in Independent Geologist's Report of the May 2017 Prospectus for drill hole listing. • Refer to Appendix D for drill hole location map in Independent Geologist's Report of the May 2017 Prospectus. • A total of 21 drill holes do not have surveyed collar elevations (DHB18, DHB19, DHB20, DHB21, DHB22, DHB23, DHB24, DHB25, DHB26, DHB27, DHB28, DHB29, DHB30, DHB31, DHB32, DHB33, DHB34, P2, P3, P4 and P5). These drill holes have

Criteria		Commentary
	- *If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.*	been currently assigned an elevation from Google Earth. The error in assigned elevations is estimated to be no greater than 15 m vertically. Survey pickup of all drill hole collars is planned. - The location of all completed drill holes are noted within this report (Table 2 below).
Data aggregation methods	- *In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.* - *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* - *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	HISTORICAL - Drill hole data was composited to 10 ft lengths for statistical analysis and used in the PT GMT Indonesia 2015 resource estimate. No density weighting was applied in the compositing process. - No cutting of high grade values was completed. - Statistical analysis of the dataset highlights the distribution is positively skewed. MODERN ABR PROGRAM - The selection of core for cutting is based on both qualitative and quantitative measurements. To ensure a lack of bias in any selection, the company determines the top of mineralisation using a combination of LIBS and visual assessment, completes standard logging protocols, then cuts the core to be sent for analysis. Of particular note is the differentiation of lithology to ensure composite samples do not potentially dilute mineralised values of Lithium and Borate. A maximum sample length of 7ft is used, and smaller where deemed onsite to contain too much of a particular lithology such that results could be unrepresentative. This ensures that core is assayed appropriately for the mineralisation it could contain, and that the length of intervals sampled, thus reported, lack a weighting/averaging bias. - Grades of reported minerals were calculated by simple weighted averaging. - No cut-off grades were used. Mineralised intervals are reported at weighted average grades of +5% B_2O_3 which coincided with the solution mining zone as identified by Duval Corp. - No upper cutting was applied as the style and grade of the mineralisation does not require it. - No metal equivalent values are being reported.
Relationship between mineralisation widths and intercept lengths	- *These relationships are particularly important in the reporting of Exploration Results.* - *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* - *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').*	HISTORICAL - Holes were drilled vertically to intersect the flat lying body perpendicularly. - Production drilling for the pilot program refined the target depth of the high grade unit, and thus the length of the main mineralised sequence for solution mining. MODERN ABR PROGRAM - Drill holes are being drilled vertically and intersect the relative flat lying deposit close to perpendicular to the dip of the deposit. - By intersecting the mineralisation at roughly 90 degrees, this provides the highest confidence in the thickness of the reported unit, thus the inference that can be

Criteria		**Commentary**
		made from its results as presented. - It is expected that mineralisation will be dispersed through this flat lying sequence and where a slight dip may occur in the base of a potential half graben, the sequence may thicken, but remain flat lying for the purposes of drilling and assessment.
Diagrams	- *Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	- Refer to Figure 6 for drill hole collar location map. - Refer also to Figures 19, 20 and 20 for sectional views.
Balanced reporting	- *Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	- Refer to Appendix C within the Independent Geologists Report in APBL's May 2017 prospectus for listing of significant intercepts for the historic drilling. - Refer to ASX announcements dated 3 October 2017, 5 October 2017, 8 November 2017, 17 November 2017, 5 December 2017 and 15 January 2018 for ABR drilling results.. - The drilling results have come from samples prepared in accordance with the highest industry standards, and are considered representative of the subsurface. These results are also consistent with previously assayed holes in the Fort Cady area.
Other substantive exploration data	- *Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	HISTORICAL - A number of historic studies have been completed by a variety of companies on the Fort Cady project. - Duval Corporation completed the 33 exploration drill holes and associated metallurgical and solution mining test work. - Refer to bibliography of the May 2017 ABR prospectus for listing of references. - All relevant information has been disclosed for these results. MODERN ABR PROGRAM - Metallurgical samples from drill hole 17FTCBL008 were taken from a 5kg composite sample made from the assay rejects of multiple samples between 395.9m and 426.4m (downhole depths). Weights of individual reject samples incorporated in the composite sample were split proportionally such that the composite had a weighted average B_2O3 and Li grade that is substantially the same for the same assayed interval and overall non-JORC historic mineral estimate. The composite sample was homogenised and was split to 200 g aliquots for tests and a head sample for checking the composite sample grade with the original individual assayed samples. - The metallurgical sample was sent to SRC Geoanalytical Laboratories in Saskatoon, Saskatchewan, where complete analysis was undertaken. Residue samples were crushed, split and pulverised according to industry standards. An aliquot of pulp was digested using a mixture of concentrated $HF:HNO_3:HClO_4$ and multi-element analysis carried out by ICP-OES. For Boron analysis, an aliquot of pulp was fused in a mixture of $NaO_2:NaCO_3$ and dissolved in deionised water and analysed by ICP-

Criteria		Commentary
		OES. The pregnant leach solution (PLS) sample was also analysed by the aforementioned methods.
Further work	- *The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling).* - *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	- APBL has prepared a two year exploration programme to assess the prospects over its exploration areas, Fort Cady and Hector as detailed in the May 2017 Prospectus. - The Company is currently analysing all results and planning of Phase 2 drill program has commenced. Additional drilling will be targeted at improving resource confidence and identifying areas to commence solution mining. - In addition to extensive physical work on the ground which are directed at potentially extending the thickness, extent and quality of mineral resources, the Company is also advancing the design of production wells and scoping studies to ensure further subsurface assessment is also correlated with engineering and commercial outcomes. This will ensure high grading of technical work, and could result in significant changes to the program. It is expected that the company will work towards preparation of a Definitive Feasibility Study in 2H CY18.

Section 3 Estimation and Reporting of Mineral Resources

(Criteria listed in Section 1 and where relevant in section 2, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Database Integrity	• Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes. • Data validation procedures used.	• Drill hole data used to estimate the Fort Cady Indicated and Inferred Resource have been captured in a GEMS database. Drill hole information within the Access database was validated against relevant historic Duval Corporation datasets. These were transcribed externally with the transcripts being checked against original data sheets for veracity. • Modern data was checked against sample ledgers and digital lab reports. • It is assumed that due care was taken historically with the process of transcribing data from field notes into digital format for statutory annual reporting.
Site visits	• Comment on any site visits undertaken by the Competent Person and the outcome of those visits. • If no site visits have been undertaken indicate why this is the case.	• Two site visits were undertaken by the CP • The first was undertaken prior to the start of the current drilling program in late August 2017. Historic collar locations and planned drilling was verified on this visit. • The second was undertaken in early November 2017, to verify current drilling, logging and sampling operations. • An additional visit to the Assaying laboratory, the SRC in Saskatoon, Canada, was also undertaken in late October 2017 to inspect received samples.
Geological Interpretation	• Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit. • Nature of the data used and of any assumptions made. • The effect, if any, of alternative interpretations on Mineral Resource estimation. • The use of geology in guiding and controlling Mineral Resource estimation. • The factors affecting continuity both of grade and geology	• While current drilling confirmed the historic geology broadly, it was found that all lacustrine-associated units have very gradual facies transitions, meaning that lithological distinctions can be arbitrary. • Historic lithological data was examined in the light of drill cores in the current drill program. An assumption that the mineralisation occurs largely within the evaporitic sequence has been borne out by assay results. • Alternative geological interpretations would have little to no effect on the Mineral Resource Estimate, as the latter was based on Indicator Kriging of mineralisation, thus defining the mineralized ore independent of geological interpretation • While the geology only controls the broad zones wherein mineralisation occurs (the evaporitic-dominated facies of the lacustrine sediments), it does not assist in narrowly defining the mineralisation, which is quite diffuse within this zone, though with a marked high grade zone towards the upper end of the mineralisation sequence. • The minerallisation, when viewed independently, is present in at least 4 distinct mineralised horizons, with good lateral continuity. These were named the Upper, Main, Intermediate and Lower Mineralised Horizons. • Grade continuity is well defined throughout the deposit, especially in the high grade zone. Faulting clearly bounds the deposit on the west (Pisgah Fault), and this boundary was implemented. Previously interpreted faults (such as Fault B) occur to

Criteria	JORC Code explanation	Commentary
		the east of the defined mineralized zone, and are therefore not a factor in the interpretation.
Dimensions	• The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.	• The modelled mineralised body continues for a 3.7 km along a northwest-southeast strike, with a width of approximately 1800m. It dips towards the southwest, where it reaches a maximum depth of 29 m above sea level, and reaches 311 m above sea level at its highest point in the north east. It averages around 90-130m in thickness.
Estimates and modelling techniques	• The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used. • The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data. • The assumptions made regarding recovery of by-products. • Estimation of deleterious elements or other non-grade variables of economic significance (eg sulphur for acid mine drainage characterisation). • In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed. • Any assumptions behind modelling of selective mining units. • Any assumptions about correlation between variables. • Description of how the geological interpretation was used to control the resource estimates. • Discussion of basis for using or not using grade cutting or capping • The process of validation, the checking process used, the comparison of model data to drillhole data, and the use of reconciliation data if available.	Detailed examination of the assay results indicated that there are distinct mineralised horizons. The deposit was there divided based on these patterns of mineralisation, into 4 mineralised horizons, and 2 non- to weakly mineralised interbeds. Based on these defined horizons, a Vulcan grid model was constructed across the deposit area, with 25m x 25m grid cells. Lithological grids were built, including horizon thicknesses, roofs and floors. Interpolation for the lithological grids were by Inverse Distance Squared. As per the previous report, the deposit was limited by an ore body boundary, using a distance of 150m from the last intersection of a mineralised on the outside of the orebody. The previous ore boundary was extended by new drilling, especially in the northern parts of the deposit. The grids were masked outside the ore boundary. Based on seam composites, variograms were constructed for B_2O_3 (no lithium oxide variograms were possible). Ranges for the omnidirectional, horizontal variograms ranged between 400 m and 530 m. A Resource Classification was therefore defined as 0 – 200m Measured, 200-400m Indicated, and 400 – 800m Inferred. • A Historical Resources is available, but there is no detail on the estimation methodology, or the limits thereof, and how it was implemented. It is therefore no better than a rough guideline. This Resource was 115 MMT @ 7.4% B_2O_3 (unclassified). Comparatively, the tonnage of the Indicated and Inferred as described here well exceed that amount, with a lower average grade. With the difficulty in ascertaining how the deposit was bounded (thus increasing grade and decreasing tonnage), this difference is not seen as critical. • The only by-product reported here is lithium. The exact nature of the lithium mineralisation is unclear. It is thought to be associated with the interbedded clays, and a marked negative grade correlation with Boron does exist. In addition, historical assays has intermittent lithium analyses, and by convention non-assayed intervals are assigned a zero grade. Current efforts are under way in determining the leaching potential of lithium from the clays. It should be noted that due to these factors, and to the fact that lithium is reported as a by-product, and thus within the higher grade boron zones, the reported lithium grade is significantly lower than some of the higher grade intersections seen. • No deleterious elements have been identified thus far

Criteria	JORC Code explanation	Commentary
		• As mineralisation is diffuse, with very variable assays even in the high grade zone block sizes cannot be confined by lithological constraints. Sampling size is very variable, with the average sample being just under 1 m (inclusive of historic assays), ranging to well in excess of 5m in some historical holes. Due to these variable factors, seam composites are seen as a reasonable, unbiased compromise for the vertical dimension of the blocks. The 250m horizontal dimensions were based on getting a reasonable number of grid cells between (other than the production and twin holes, holes are more than 100m apart on average. • No assumptions were made as to variable correlations, although a negative correlation between lithium and boron was noted. • Geological interpretation based on minerallisation, rather than lithology, played a role in defining the horizons, and therefore the Resource. • Grade capping was not applied • An inverse distance model was run to see if any kriging bias was found. The model was visually checked, and histograms were compared of all input composites and all interpolated blocks – with excellent correlation, for both B_2O_3 and Li.
Moisture	• Whether the tonnages are estimated on a dry basis or with natural moisture, and the determination of the moisture contents.	• Tonnages and grades are estimated on a wet-in situ basis
Cut-off parameters	• The basis of the adopted cut-off grade(s) or quality parameters applied.	• The B_2O_3 cut-off of 5% is based on historic reported cut-offs for this deposit.
Mining factors or assumptions	• Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.	• It is assumed that the deposit will be mined as solution mine/in-situ leach. The appropriate cut-offs were applied for this method. Underground mining is not suitable due to ground conditions, as historically noted.
Metallurgical factors or assumptions	• The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.	• Initial metallurgical test works complete on representative sample core from colemanite mineralisation containing 6.2% B_2O_3 (11.0% H_3BO_3*) and 505 ppm lithium, were completed with a total of five hydrochloric acid (HCl) leach tests were performed . Boron recoveries were near 100%, while just under 50% lithium was recovered. Based on these early results, and pending further testing, the solution mining / in-situ leaching appears to successful. Further metallurgical tests are proceeding.
Environmental factors or assumptions	• Assumptions made regarding possible waste and process residue disposal options • It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made	• Whereas solution mining is a minimum disturbance form of mining, and previous activities at the site using similar processes have not resulted in any environmental degradation, APBL will undertake a full EIS at the appropriate time in order to identify and mitigate any potential environmental concerns. The only specific requirement currently from the State if California is the fencing of all worksites with tortoise fencing, to protect the endangered species. In a solution mining project, this requirement can be comfortably accommodated.

Criteria	JORC Code explanation	Commentary
Bulk density	• Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples. • The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit. • Discuss assumptions for bulk density estimates used in the evaluation process of the different materials	• A total of 388 density measurements, using the water immersion technique, were taken from drill core at the Fort Cady project, during the current drill program. • It is assumed that there are minimal void spaces within the core • Since the ore is finally laminated, it is assumed that the large quantity of regular density samples will account for all components.
	• The basis for the classification of the Mineral Resources into varying confidence categories. • Whether appropriate account has been taken of all relevant factors (ie relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data). • Whether the result appropriately reflects the Competent Person's view of the deposit	• Measured, Indicated and Inferred Category Resources were applied in compliance with the 2012 Edition of the JORC code. These were applied both on the variogram ranges of the primary economic constituent (B2O3), and the reliability of the data. Indicated was defined as the Variogram range, but only utilizing the data from the current drill program and Inferred as twice the variogram range, and utilised the current and historic data. • Variography indicated that the current data spacing is more than sufficient. Twin holes indicated reasonable duplication of historic results. The diffuse nature of the mineralisation within the deposit was adequately taken into account by the utilization of the Indicator Kriging approach. • The Mineral Resource estimate appropriately reflects the view of the Competent Person.
Audits / reviews	• The results of any audits or reviews of Mineral Resource estimates.	• Reviews have been completed by the CP and APBL which verified inputs, assumptions, methodology and results.
Discussion of relative accuracy/ confidence	• Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate. • The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used. • These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.	• The deposit geometry and continuity has been adequately interpreted to reflect the applied level of Inferred and Indicated Mineral Resource. The data quality is good and the drill holes have detailed geological logs. A recognized laboratory was used for all analyses. • The Mineral Resource statement relates to global estimates of tonnes and grade. • No check estimates were available. • Historic production data is limited, but does not contradict the modern exploration data.

Section 4 Estimation and Reporting of Ore Reserves

(Criteria listed in section 1, and where relevant in sections 2 and 3, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral Resource estimate for conversion to Ore Reserves	• *Description of the Mineral Resource estimate used as a basis for the conversion to an Ore Reserve.* • *Clear statement as to whether the Mineral Resources are reported additional to, or inclusive of, the Ore Reserves.*	• See Resource Table above (JORC Table 1 Section 3 – Estimation and Reporting of Mineral Resource). The modeling process and Mineral Reserve estimations are also detailed above. • Indicated and Measured Resources are reported inclusive of Ore Reserves. • No Inferred Mineral Resources are included in the Reserve estimate.
Site visits	• *Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* • *If no site visits have been undertaken indicate why this is the case.*	• Mike Rockandel, process Competent Person, has made multiple site visits • Philip Solseng, infrastructure Competent Person, has made site visit • Daniel Palo, lead for Cost Estimation, has made multiple site visits • Tabetha Stirrett reserve Competent person was not able to schedule the site visit between the contract authorization and deliverable date. • A RESPEC employee made multiple visits to the site during October 2018 to assist with drilling the exploration wells discussed above in drilling techniques (JORC Table 1 Section 1 - Sampling Techniques and Data).
Study status	• *The type and level of study undertaken to enable Mineral Resources to be converted to Ore Reserves.* • *The Code requires that a study to at least Pre-Feasibility Study level has been undertaken to convert Mineral Resources to Ore Reserves. Such studies will have been carried out and will have determined a mine plan that is technically achievable and economically viable, and that material Modifying Factors have been considered.*	• The Ore Reserve Estimate has been completed in conjunction with a DFS. • All Measured and Indicated Resources were converted to Proven and Probable Reserves respectively. The following Modifying factors were applied: ○ An extraction ratio of 70% of Resources ○
Cut-off parameters	• *The basis of the cut-off grade(s) or quality parameters applied.*	• The same cut-off grade of 5% B_2O_3 used for the Resource in Section 3 -Estimation and Reporting of Mineral Resources was used for the Reserve cut-off. • This cut-off coincided with the small-scale solution mining production completed on the property by Duval Corp.
Mining factors or assumptions	• *The method and assumptions used as reported in the Pre-Feasibility or Feasibility Study to convert the Mineral Resource to an Ore Reserve (i.e. either by application of appropriate factors by optimisation or by preliminary or detailed design).* • *The choice, nature and appropriateness of the selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc.* • *The assumptions made regarding geotechnical parameters (eg pit slopes, stope sizes, etc), grade control and pre-production drilling.* • *The major assumptions made and Mineral Resource model used for pit and stope optimisation (if appropriate).*	<u>Method and Assumptions</u> • A small-scale commercial plant was operated on the site between 1982 and 2002 first by Duval, then by Mountain States and finally by Ft. Cady Mineral Corporation (FCMC, part of Duval). The mining factors used during that time are the basis of this study. • The Fort Cady Project (FCP) will begin operation using so-called push-pull mining whereby the same well is used for injecting a dilute hydrochloric acid (HCl) into the ore body (the “push”) followed by pumping the solution out (the “pull”). It is understood that a time period between the push and pull operations would be employed to allow the acid to dissolve the borate mineralization in the ore body. The optimal timing of the “push-wait-pull” cycle to maximize production would be determined by experimentation with the wells. • The orebody is favorable for in-situ solution mining as it is located below water tables, confined vertically by impermeable layers and the ore body and its confining layers are weak in structural

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	• *The mining dilution factors used.* • *The mining recovery factors used.* • *Any minimum mining widths used.* • *The manner in which Inferred Mineral Resources are utilised in mining studies and the sensitivity of the outcome to their inclusion.* • *The infrastructure requirements of the selected mining methods.*	strength and rubbilize easily. Faults in the area further confine the ore zone. • Preliminary designs call for wells spaced on 60 to 76 m (200 to 250 ft) centers, though other well designs may be considered later. • Initially the wellfield will be operated in "push and pull" mode until the wells naturally connect. A well life of 8 years was assumed based on pilot test well life. • The Inferred Mineral Resources have not been utilised in the mining studies. • The thickness of the ore body varies between 20 to 130 m thick. • An average recovery or dissolution of 70% of the colemanite is assumed across the entire site based on the pilot test. • Plant recovery is assumed to be 99.9% as the mining stream keeps getting recovered and reprocessed. • **Hydrological Properties:** Well tests indicate the ore body (an evaporite-rich mudstone) has sufficient initial permeability that increases with acidulation to inject and recover fluids at proposed rates of 25 (average) to 75 (maximum) gallons per minute. • In situ leach mining requires an infrastructure consisting of a network of wells and pipes from the ore body/well field to the processing facility. • **Subsidence**: Several conservative assumptions were used to calculate potential subsidence caused by solution mining and based on these estimates, subsidence is not considered a major problem at the Fort Cady Project. • **Drilling and Completions Design:** Based on experience during the drilling of the exploration drillholes, the drilling methods proposed in DFS are reasonable. It is important to note that the wells will be drilled with conventional rotary drilling technology and will utilize drilling fluids rather than air to prevent the 12.25" holes from collapsing prior to installing the casing strings. The specifications for the 7" fiberglass casing strings will be the same as used during previous operations. • During the exploration drilling, many of the existing wells were re-entered to determine the integrity of the casing; only one well showed signs of damage which indicates that the long-term integrity of the casing is sufficient
Metallurgical factors or assumptions	• *The metallurgical process proposed and the appropriateness of that process to the style of mineralisation.* • *Whether the metallurgical process is well-tested technology or novel in nature.* • *The nature, amount and representativeness of metallurgical test work undertaken, the nature of the metallurgical domaining applied and the corresponding metallurgical recovery factors applied.* • *Any assumptions or allowances made for deleterious elements.* • *The existence of any bulk sample or pilot scale test work and the degree to which such samples are considered representative of the orebody as a whole.* • *For minerals that are defined by a specification, has the ore reserve estimation been based on the appropriate mineralogy to meet the specifications?*	• The ore body is proposed to be solution mined followed by solvent extraction/crystallization processing. These methods are considered known and proven technologies. • Historical solution mining and processing tests have been completed on the ore body a number of times since the 1980s, with continuous operation from 1996 to 2001. These periods of testing and operation are considered representative. • Ore leaching kinetics and assumptions have been addressed by tests at SRC and via historical records with assistance of Barr Engineering and concluded in the DFS sections 6 and 7, • Barr Engineering has worked as the consultant to produce the process design. • Mass and energy balance for the entire process have been developed using Metsim (a general-purpose process simulation system designed to assist the engineer in performing mass and energy balances of complex processes). This work was conducted by Barr Engineering. • Further information is available in the APBL DFS sections 6 and 7 covering solution mining for the ore and processing of boric acid, including significant information regarding assumptions. • The process is not novel and was earlier pilot-tested at Fort Cady by previous owners of the project on more than one occasion with encouraging results.

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		• Pilot study data from previous project owners is available. A key issue is the selectivity of the leach since both colemanite and calcite are present in significant amounts. The pilot data from 1987 resulted in Boric Acid (B.A.) to Ca ratios greater than 4.62 indicating a very selective borate leach. This implies HCl consumption can be minimized per unit of boric acid produced, but the use of sulfuric acid in the area of these wells before the 1987 study complicates interpretation of the data. It is possible that B.A. to Ca ratios are high because calcium precipitated in a reaction with residual sulfate from the use of sulfuric acid rather than from selective leaching of colemanite. Two wells were used in the1987 study, but a larger pilot using at least six more wells produced about 2000 tons of boric acid equivalent from 1995 until 2002. B.A./Ca ratios were apparently not measured in the later study. • Calcite consumption of acid is a possible deleterious element, but available data cited immediately above indicates this is may be a manageable problem if the leach is preferential for colemanite as opposed to calcite. • Maps were not found to indicate where the pilot project wells were drilled in relation to the ore body, but the historical pilot scale work is substantial as described earlier in this section. In addition to the two pilot projects already described, Duval Corporation also ran a very early pilot project that indicated commercial promise for the project.
Environmen-tal	• *The status of studies of potential environmental impacts of the mining and processing operation. Details of waste rock characterisation and the consideration of potential sites, status of design options considered and, where applicable, the status of approvals for process residue storage and waste dumps should be reported.*	• The project has an EIS/EIR, approved by the BLM and San Bernardino County. This includes all applicable studies for the siting of process facilities, including the gypsum storage area. There is no waste rock, nor tailings generated in the process. American Pacific is in the process of renewing the air permit and obtaining the stormwater and UIC permits.
Infrastructure	• *The existence of appropriate infrastructure: availability of land for plant development, power, water, transportation (particularly for bulk commodities), labour, accommodation; or the ease with which the infrastructure can be provided, or accessed.*	• APBL DFS addresses infrastructure in sections 7-10 of the DFS • Labor and operating costs have been estimated and included in the APBL DFS section 14
Costs	• *The derivation of, or assumptions made, regarding projected capital costs in the study.* • *The methodology used to estimate operating costs.* • *Allowances made for the content of deleterious elements.* • *The source of exchange rates used in the study.* • *Derivation of transportation charges.* • *The basis for forecasting or source of treatment and refining charges, penalties for failure to meet specification, etc.* • *The allowances made for royalties payable, both Government and private.*	• Barr Engineering prepared capital cost estimates, which were built by line items and include contingency allowances • OpEx costs have been built up from first principles where appropriate. Costs for major raw materials include public reports from various producers including Compass Minerals, Intrepid Potash, and consumer price indexes including additional costs for freight to site; Further detail on OpEx can be found in section 14 of the DFS. • Treatment options are discussed in section 9 and 6 within this report. No penalties for failure to meet specification are expected and are therefore not included in forecasts. • Royalty and other allowances have been taken into account and are reflected in the operating cost estimates in section 14 of the DFS. • Minimizing HCl consumption per ton of produced B.A. will be critical in determining the economic success of the mine.
Revenue factors	• *The derivation of, or assumptions made regarding revenue factors including head grade, metal or commodity price(s) exchange rates, transportation and treatment charges, penalties, net smelter returns, etc.* • *The derivation of assumptions made of metal or commodity price(s), for the principal*	• Major assumptions and sources include: the cost of MoP which is based upon the Intrepid Potash average sales price of FY18 Q3 plus freight to site. SOP is based on Compass Minerals average selling price from FY18 Q3 quarterly report. Sulfuric acid is based upon the consumer price index plus freight to site. Hydrochloric acid pricing is sourced from MP Materials, a major consumer of

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	metals, minerals and co-products.	hydrochloric acid in Mountain Pass, California. • Head grade assumptions are based on the historical head grade of 3.7 percent boric acid which was achieved in test work. These assumptions are discussed in detail in sections 2 and 14 of the DFS.
Market assessment	• *The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the future.* • *A customer and competitor analysis along with the identification of likely market windows for the product.* • *Price and volume forecasts and the basis for these forecasts.* • *For industrial minerals the customer specification, testing and acceptance requirements prior to a supply contract.*	• Marketing and pricing forecasts have been included in the APBL DFS sections 15-18.
Economic	• *The inputs to the economic analysis to produce the net present value (NPV) in the study, the source and confidence of these economic inputs including estimated inflation, discount rate, etc.* • *NPV ranges and sensitivity to variations in the significant assumptions and inputs.*	• APBL's financial models and the results, with sensitivity analysis and variations at 15% intervals are included in the APBL DFS section 19.
Social	• *The status of agreements with key stakeholders and matters leading to social licence to operate.*	• The project has an existing EIS/EIR The project will provide local employment with expected direct job creation on site as well as ancillary employment for goods and services provided to the mine. All of this will have a positive local economic impact.
Other	• *To the extent relevant, the impact of the following on the project and/or on the estimation and classification of the Ore Reserves:* ○ *Any identified material naturally occurring risks.* ○ *The status of material legal agreements and marketing arrangements.* ○ *The status of governmental agreements and approvals critical to the viability of the project, such as mineral tenement status, and government and statutory approvals. There must be reasonable grounds to expect that all necessary Government approvals will be received within the timeframes anticipated in the Pre-Feasibility or Feasibility study. Highlight and discuss the materiality of any unresolved matter that is dependent on a third party on which extraction of the reserve is contingent.*	• The project has an EIS/EIR approved by the BLM and San Bernardino County. Air permit and UIC permit applications are underway. Meetings with applicable regulatory agencies have not identified any potential permitting issues. • There is a potential hydrogeologic risk that production will decrease over time and the entire thickness of the ore body will not be accessible if acid is consumed along conduits developed within the ore body. • The dissolution and precipitation of calcite within the ore body as well as the processing circuit is not well understood, and a geochemistry study should be undertaken. That study should attempt to characterize and compare the leach kinetics for dissolving colemanite and for dissolving calcite in the ore body since preferential colemanite dissolution is so important to the mine economics. • There are currently some unknown hydrogeologic connections, particularly around Fault B; additional test holes and investigation of that area is currently being undertaken.
Classification	• *The basis for the classification of the Ore Reserves into varying confidence categories.* • *Whether the result appropriately reflects the Competent Person's view of the deposit.* • *The proportion of Probable Ore Reserves that have been derived from Measured Mineral Resources (if any).*	• Proven and Probable Reserves have been estimated. • Proven Reserves have come from the exploration wells in the Measured category defined by a Radius of Influence (ROI) of 200m from the well center. The Probable Reserves have come from the Indicated category defined by a ROI of 400m from the well center. • Results reflect the Competent Person's view of the deposit. • No Measured Mineral Reserves are included in the Probable Ore Reserves Category.
Audits or reviews	• *The results of any audits or reviews of Ore Reserve estimates.*	• The Mineral Resource and Ore Reserve was reviewed by the Competent Persons.

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Discussion of relative accuracy/ confidence	• *Where appropriate a statement of the relative accuracy and confidence level in the Ore Reserve estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which could affect the relative accuracy and confidence of the estimate.* • *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* • *Accuracy and confidence discussions should extend to specific discussions of any applied Modifying Factors that may have a material impact on Ore Reserve viability, or for which there are remaining areas of uncertainty at the current study stage.* • *It is recognised that this may not be possible or appropriate in all circumstances. These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	• Boric Acid/Ca ratios determined during a series of 1987 field tests can be interpreted as evidence of a preferential leach favoring colemanite over calcite, but the earlier use of sulfuric acid in the wells may have skewed the ratios by precipitating gypsum. If the latter explanation is correct, the reserve calculation could potentially be less. If the former explanation is correct, calcite would have little impact on ore reserves. • The flow rates described in the DFS do deliver enough HCl leach solution annually to produce 90,000 tons of B.A. if calcite side reactions are minimal it is possible that a bottleneck in the rate of the leach might limit production, but a long-term pilot project suggests leach rates might accommodate the planned production. See the next bullet point for a discussion of this issue. • Fort Cady pilot plant data from January 1996 to December 2002 were examined to estimate whether leach rates for scaling production up to 90,000 tons is feasible. It is difficult to determine exactly how the previous pilot work was completed, but the test data suggests that this is likely achievable with proper optimization. The obvious two opportunities for optimization are: ○ Pilot plant solvent extraction (SX) efficiency was low, so the gap to 90,000 tpy might be closed by optimizing this plant unit. The key assumption here is that scale-up of production flows results in proportional increases in production. Additional work has been carried out by Hazen Research indicating that an alcohol extractant upgrades and purifies the Pregnant Liquor Solution to a level (approximately nine percent) that will reduce OpEx associated with mechanical vapor re-compressor (MVR) crystallization. ○ Determining the optimal mode of operation of wells as push-pull or as dedicated injection and recovery points is likely a key challenge. • HCl consumption per ton of B.A. produced is a significant factor in the determining the viability of the ore reserve estimate. • A scenario analysis, using Monte Carlo simulation, was conducted on the key inputs to the model to determine overall impact on net present value and internal rate of return. The key financial inputs provided by ABR are production volumes, timelines for construction and production, and commodity prices; and capital and operating cost totals from studies completed by Barr Engineering. The project was evaluated based on a normal distribution of values for each input. The stochastic reveals the following: ○ Net present value with a discount rate is positive for all scenarios is positive with a low coefficient of variation. ○ The boric acid (BA) price is the key input contributing to the greatest degree of risk to the project.