

# Crystal Peak Minerals Inc. Announces Results of the Feasibility Study for Its Sevier Playa Sulfate of Potash Project

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TORONTO, Jan. 11, 2018 (GLOBE NEWSWIRE) -- [Crystal Peak Minerals Inc.](#) ("Crystal Peak" or the "Company") (TSXV:CPM) (OTCQX:CPMMF) today announced the results of a Feasibility Study (FS) for the production of Sulfate of Potash (SOP) from its Sevier Playa Sulfate of Potash Project (the "Project") located in southwestern Utah. The FS was prepared by Novopro Projects Inc. (Novopro), Norwest Corporation (Norwest), and CH2M HILL Engineers, Inc. (CH2M).

John Mansanti, Chief Executive Officer of Crystal Peak, said, "We are very pleased with the results of this study. Through extensive fieldwork, comprehensive hydrologic modeling and analysis, bench scale and pilot test work, and thousands of hours of engineering, we have arrived at a study that demonstrates strong and robust fundamentals. This report captures the exciting potential for our project."

## Feasibility Study Highlights

The FS included significant changes implemented by Novopro in the coupling of the solar evaporation ponds and the process plant, resulting in a major increase in the utilization of natural evaporation and the elimination of an energy-intensive forced evaporation circuit. Improvements to the processing circuit were also introduced that transformed waste sulfate into SOP through the addition of muriate of potash (MOP) resulting in a significant contribution to plant output and positively impacting project economics. All dollar amounts reported in this release are US dollars and figures are rounded.

The FS forecasts average annual SOP production over the 30-year life of the Project of approximately 298,000 metric tonnes (t) with an estimated Net Present Value (NPV) of \$730 million (after tax, inflated, 8% discount rate) and an estimated Internal Rate of Return (IRR) of 21% (after tax, inflated). The financial model outputs indicate a strong project that is commercially viable and delivers robust Project metrics.

The FS includes a proven and probable produced mineral reserve of 6.171 million tonnes (Mt) of potassium sulfate (K<sub>2</sub>SO<sub>4</sub>). Produced reserves include reductions due to evaporation pond and processing losses and are net of all recovery factors.

## Economic Indicators

NPV (pretax, 8%)	\$ 900 M
NPV (after tax, 8%)	\$ 730 M
IRR (pretax)	23%
IRR (after tax)	21%
Mine Life	30 years
Initial Direct Capital Costs	\$ 288 M
Initial Indirect Capital Costs	\$ 70 M
Contingency (@P50)	\$ 32 M
Risk (@P50)	\$8 M
Inflation	\$14 M
Total Capital Costs	\$412 M
Deferred Capital Costs	\$9 M
Sustaining Capital Costs (LoM)	\$248 M
Average Operating Cost (over LoM)	\$222/t

SOP Price @ Rail Loadout Facility	\$630/t
Production Royalties (% of gross revenues)	5.61%
After- tax Payback Period (from initial production)	4.5 years
Proven & Probable K <sub>2</sub> SO <sub>4</sub> Produced Reserves	6.171 Mt

The economic analysis in the FS is based upon the following assumptions:

- 100% Equity
- Construction beginning January 2019 completed 2022
- SOP production ramp-up over three years; from first production of 27,500 t in 2022 to full capacity of at least 337,500 t in 2025
- Production continues at full capacity until 2040
- Production declines annually to 223,110 t by 2050
- Operating costs and revenues are based on product delivery to (e.g., MOP) or shipment from (SOP) CPM's Rail Loadout Facility
- Effective tax rate of approximately 15.6%
- Annual production royalties estimated at 5.61% of gross revenue, less allowable reagent costs
- Post-performance tax credit from the State of Utah of approximately \$112.5 million

The total capital costs of the Project, including contingency, risk, and inflation, are estimated to be \$412 million. Initial capital costs in the economic model are inflated by 1.27% annually beginning in year 2019. Contingency is 9.0% of the total project capital cost. To calculate contingency, an uncertainty profile for the Project was designed and a Monte Carlo simulation was run using "Risk"; a commercial risk evaluation program. The capital cost estimate has an accuracy of +/-15%.

The total uninflated average cash operating costs, including risk and contingency, are estimated to be \$222/t. Operating expenditures vary during the life of mine (LoM); therefore, an expenditure model was developed to capture these variations in the financial model. All operating costs in the economic model are inflated by 2% annually beginning in 2019 and include costs for reagents and consumables such as the purchase of MOP for reaction with excess sulfate in the playa brine for additional SOP production. The operating cost estimate has an accuracy of +/-10%.

## SOP Markets and Price

The Company conducted extensive research and analysis based on public and private materials including industry studies, public reports, forecasts, and estimates. In addition, the Company commissioned a report prepared by The Parthenon Group (Parthenon), originally used for the Company's Preliminary Feasibility Study, and commissioned a report prepared specifically for the FS from CRU International Ltd (CRU).

According to Parthenon's analysis, many suppliers and retailers view the U.S. market as being in equilibrium at the current SOP price, though supply-demand dynamics and/or other factors can affect price. In its base case outlook, CRU does not include significant additional primary SOP capacity coming on-line within the next five years. With a well-executed market strategy, they anticipate that it should be possible for an operation with production capacity in the range of 300,000 t/year to be able to place product into the market while maintaining an international price premium.

The Company plans to sell most of its product into United States markets. Accordingly, the following are sources that have been consulted for pricing data as of the time of publication of this report:

- United States SOP-only sales price of \$631/t (annualized 2017), from the SOP market study prepared for the Company by CRU as of August 2017
- Average United States market SOP price range of \$633-\$641/t, quoted by Green Markets as of December 15, 2017
- Average selling price over the past five quarters of \$637/t based on prices published by Compass Minerals

There is no benchmark pricing for SOP because it is a specialty fertilizer produced in small volumes relative to MOP. Due to the relative scarcity of primary producers of SOP, and to the Mannheim production process

that requires MOP as an input, SOP has historically exhibited a premium over MOP, recently more than 50%. For the purposes of financial modeling, the Company has used a starting price for SOP of \$630/t, based on the above referenced data. This price is inflated within the financial model on the same basis as all other financial data during the period of operations.

#### Mine Plan, Ponds, and Processing

Brine from the Sevier Playa will be extracted through a series of trenches and wells distributed across the property. Extraction will focus on two shallow brine bearing horizons of the playa referred to as the Marl Clay Zone (MCZ) and the Siliceous Clay Zone (SCZ). A thin Fat Clay horizon overlies the MCZ.

Brine is extracted from both the mobile and immobile porosity domains within the low-permeability playa sediments. The extracted brine will be the main source of potassium and the only source of sulfate used to produce SOP in this project. The brine also contains significant amounts of magnesium, sodium, and chloride. Recharge of the brine aquifer via recharge trenches will be necessary to create adequate hydraulic gradients toward extraction trenches during the LoM to sustain target extraction rates.

Brine will be conveyed to large evaporation ponds, where water will be evaporated to produce the crude potassium minerals required to produce SOP. Two types of evaporation ponds are utilized: pre-concentration ponds and production ponds. The pre-concentration ponds will be used to concentrate the extracted brine up to potassium saturation while removing a large portion of halite from the brine. The concentrated brine will be transferred to the production ponds where water will be further evaporated to sequentially precipitate several potassium minerals in conjunction with other salt species.

The mixed salts will be harvested in the production ponds and transferred to the beneficiation plant where the salts will undergo several upgrading steps prior to being directed into the SOP crystallizer circuit. Purchased MOP will also be dissolved and added to the processing circuit to increase SOP output through reaction with the excess sulfate ions present in the harvested salts. The SOP crystals generated in the crystallizer will be recovered and dried, after which the SOP will be split into final products. The forecast total LoM SOP production is 9.244 Mt, with 6.161 Mt from playa sourced brine and 3.083 Mt produced through MOP reaction. All products will be transported from the processing facility by trucks to a dedicated rail loadout area where they are stored prior to being loaded into trucks or railcars for shipment to customers.

The FS only considers SOP production. The Company anticipates completing a study in early 2018 that will consider extraction and production of associated minerals including magnesium chloride, calcium sulfate, and other potentially valuable products.

#### Hydrologic Modelling

Norwest and CH2M, the groundwater modeling consultant team engaged by the Company, have developed an integrated numerical groundwater flow and solute transport model as part of the study. This groundwater flow and solute transport model was constructed to forecast the potential extractability of brine from the playa sediments under different brine extraction plans. Hydrologic and geologic information collected over five field seasons, along with literature values, were integrated into the numerical model to improve the understanding of the groundwater flow and transport components of the conceptual model of the playa aquifer system. This numerical model is considerably more complex than a typical numerical groundwater model, because the ultimate economic viability of the mining project will depend, in part, on several complex physical-chemical processes that are not routinely considered in typical numerical groundwater models. The ability to extract high-grade brine from the playa via extraction and recharge infrastructure will be constrained by specific and complex subsurface hydraulic and transport processes, such as density-dependent and viscosity-dependent flow and mass-transfer of target ions between the mobile and immobile porosity zones. Considerable effort was spent to account for these and other subsurface processes that influence the extractability of high-grade brine from the playa.

Target production brine flow rates and potassium grade targets were 136.38 cubic meters per minute and 2,240 milligrams per liter (mg/L) respectively. Mine planning simulations were conducted to gain insight into a trench and extraction well layout that may be needed to achieve the extraction flow and potassium ion (K<sup>+</sup>) concentration targets during operations. The forecast model simulations indicate that the proposed mine plan could meet the brine extraction targets for approximately two-thirds of the 30-year mine life. Modeling

indicates that there could be a decrease in annual average K<sup>+</sup> concentration due to dilution of the mobile-phase brine as freshwater is recharged into the playa sediments. This will cause a dilution of the run-of-mine grade delivered from the playa into the pre-concentration ponds. The K<sup>+</sup> grade could decline by approximately 5% per year for the last 10 years (approximately one-third) of the mine life without the use of additional capital expenditures to support the grade target. This expected decline in brine grade has been addressed in the pond and process design and projected pond and process efficiencies estimated by Novopro, and is accounted for in the following estimated available potassium reserves.

### Reserve Estimate

Reserve estimates were determined from the results of the integrated groundwater model and production simulations using the numerical models described above. Reported reserves do not include any K<sub>2</sub>SO<sub>4</sub> produced through the reaction of excess sulfate with MOP. There are two categories of reserves delineated by this study:

- Available Reserves: reserves estimated prior to losses due to evaporation pond and processing factors; and
- Produced Reserves: net reserves estimated including losses due to evaporation pond and processing factors

Available Reserves are defined as the quantity of potassium contained in brine that is forecast to be technically extractable from the playa and delivered to the first pre-concentration pond exclusive of pond or processing losses. These values were calculated using the numerical model outputs from the mine plan simulation described above and categorized by level of assurance into proven and probable reserves. A process recovery factor of 79.79% was applied to convert from available reserves to produced reserves. The process recovery factor accounts for leakage and entrainment losses and process efficiency.

Proven and probable available reserves of K<sup>+</sup> and equivalent K<sub>2</sub>SO<sub>4</sub> are summarized in Tables 1 and 2. Remaining in-place resources after the 30-year mine plan simulation are summarized in Table 3. Remaining in-place measured plus indicated resources were calculated by subtracting the total available reserves from the in-place measured plus indicated resources. Remaining inferred resource is the initial in-place inferred resource.

Table 1: Available Potassium and K<sub>2</sub>SO<sub>4</sub> Reserves

Aquifer	Proven		Probable		Total	
	K <sup>+</sup> Metric Tonnes &lsquo;000	Equivalent K <sub>2</sub> SO <sub>4</sub> <sup>1</sup> Metric Tonnes &lsquo;000	K <sup>+</sup> Metric Tonnes &lsquo;000	Equivalent K <sub>2</sub> SO <sub>4</sub> <sup>1</sup> Metric Tonnes &lsquo;000	K <sup>+</sup> Metric Tonnes &lsquo;000	Equivalent K <sub>2</sub> SO <sub>4</sub> <sup>1</sup> Metric Tonnes &lsquo;000
Fat Clay	0	0	302	673	302	673
Marl Clay	431	961	1,870	4,168	2,301	5,139
Siliceous Clay	39	88	827	1,844	866	1,932
Total	471	1,049	3,000	6,685	3,471	7,704

<sup>1</sup> K<sup>+</sup> to K<sub>2</sub>SO<sub>4</sub> production based on ratio of 2.2285 (rounded) based on atomic weights.

Table 2: Available and Produced Reserves of K<sub>2</sub>SO<sub>4</sub>

Category	Proven Metric Tonnes &lsquo;000	Probable Metric Tonnes &lsquo;000	Total Metric Tonnes &lsquo;000
Available Reserves	1,049	6,685	7,734
Produced Reserves <sup>1</sup>	837	5,334	6,171

<sup>1</sup> Produced reserves include losses due to evaporation pond and processing factors and are based on overall recovery factor of 79.79%

Table 3: Remaining In-Place Potassium and K<sub>2</sub>SO<sub>4</sub> Resource

Aquifer	Measured Plus Indicated		Inferred		Total	
	K <sup>+</sup>	Equivalent K <sub>2</sub> SO <sub>4</sub> <sup>1</sup>	K <sup>+</sup>	Equivalent K <sub>2</sub> SO <sub>4</sub> <sup>1</sup>	K <sup>+</sup>	Equivalent K <sub>2</sub> SO <sub>4</sub> <sup>1</sup>
	Metric	Metric	Metric	Metric	Metric	Metric
	Tonnes &lsquo;000	Tonnes &lsquo;000	Tonnes &lsquo;000	Tonnes &lsquo;000	Tonnes &lsquo;000	Tonnes &lsquo;000
Fat Clay	2,682	5,977	142	317	2,824	6,294
Marl Clay	1,483	3,306	218	485	1,701	3,791
Siliceous Clay	7,870	17,538	377	840	8,247	18,378
Total	12,036	26,821	737	1,642	12,773	28,411

<sup>1</sup> K<sup>+</sup> to K<sub>2</sub>SO<sub>4</sub> production based on ratio of 2.2285 (rounded) based on atomic weights.

#### Qualified Persons

Each of the qualified persons shown below has reviewed and approved the scientific and technical disclosures contained in the FS for their respective report sections, as well as in this press release, and is independent of the Company. Qualified persons have reviewed or verified all data including sampling, analytical, and test results underlying the information or opinions contained herein.

The qualified persons are:

- Mr. J. Brebner P. Eng., QP, (Novopro) is the qualified person responsible for the infrastructure, market studies and contracts, capital cost, environmental studies, permitting, social/ community impact, and the overall preparation of the report.
- Mr. A. Lefaivre P. Eng., QP, (Novopro) is the qualified person responsible for the mineral processing and metallurgical testing and recovery methods.
- Mr. D. Bairos P. Eng., QP, (Novopro) is the qualified person responsible for the capital cost and operating cost estimates, and risk analysis portions of the report.
- Mr. C. Laxer P. Eng., QP, (Novopro) is the qualified person responsible for the economic analysis portions of the report.
- Mr. L. Henchel, P. Geo., (Norwest) is the qualified person responsible for the history, geology, exploration, drilling, sample preparation, analyses and security, data verification, and mineral resource estimate portions of the report.
- Mr. R. Reinke, P. Geo., (Norwest) is the qualified person responsible for the mineral reserve estimate, groundwater modelling, and mining methods portion of the report.

The content of this news release has been read and approved by Dean Pekeski, P. Geo, Vice President-Project Development of the Company, a Qualified Person as defined by NI 43-101.

The Company expects to file the completed FS technical report in accordance with National Instrument 43-101 within 45 days from the date of this press release on SEDAR ([www.sedar.com](http://www.sedar.com)) as well as on the Company's website ([www.crystalpeakminerals.com](http://www.crystalpeakminerals.com)).

#### About Crystal Peak Minerals Inc.

Crystal Peak is focused on the production of premium specialty fertilizers. The Company controls, directly or through agreement, mineral leases on more than 124,000 acres on its Sevier Playa property in Millard County, Utah. With a brine mineral resource known to contain potassium, magnesium, lithium, sulfate, and other beneficial minerals, Crystal Peak is targeting the production of specialty fertilizers and related products through brine extraction and the use of a cost-effective solar evaporation process. SOP and other specialty fertilizers are used in the production of high value, chloride-sensitive crops such as fruits, vegetables, and tree nuts.

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#### Forward-Looking Information

This news release contains "forward-looking information" within the meaning of applicable Canadian securities legislation. Forward-looking information includes, but is not limited to, the feasibility study and the results thereof; the targeting of the development and production of specialty fertilizers and associated minerals, including SOP, lithium, and magnesium compounds through the use of a cost-effective solar evaporation process; and Crystal Peak's future business. Generally, forward-looking information can be identified by the use of forward-looking terminology such as "plans", "is expected", "expects" or "does not expect", "budget", "scheduled", "estimates", "forecasts", "intends", "anticipates" or "does not anticipate", "believes", or variations of such words and phrases; or terms that state that certain actions, events, or results "may", "could", "would", "might", or "will be taken", "could occur", or "be achieved". Forward-looking information is based on the opinions and estimates of management at the date the information is made, and is based on a number of assumptions and is subject to known and unknown risks, uncertainties and other factors that may cause the actual results, level of activity, performance or achievements of Crystal Peak to be materially different from those expressed or implied by such forward-looking information. Although Crystal Peak has attempted to identify important factors that could cause actual results to differ materially from those contained in forward-looking information, there may be other factors that cause results not to be as anticipated, estimated, or intended. There can be no assurance that such information will prove to be accurate, as actual results and future events could differ materially from those anticipated in such information. Accordingly, readers should not place undue reliance on forward-looking information. Crystal Peak does not undertake to update any forward-looking information, except in accordance with applicable securities laws.

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