INVESTOR

INVESTOR LINKS

INDUSTRY TERMS

AMORPHOUS GRAPHITE

Is the microcrystalline form and lowest value product of the natural graphite family. It is primarily used as an additive to the steel industry and is most commonly sourced in southern China where it is briquetted for use in the Asian steel markets.

ANODE

A battery electrode that releases electrons on discharge through oxidation and is always negative. The anode in the majority of today's battery designs is made from graphite (carbon) — both naturally mined and synthetically created material. Typically, a battery will need more raw material for an anode than a cathode. As such, there is 10 to 30 times more graphite than there is lithium in a lithium-ion battery.

BATTERY MEGAFACTORIES

A term created by BENCHMARK MINERAL INTELLIGENCE to describe the surge of new, huge lithium-ion battery plants that have been scheduled since Tesla Motors announced the Gigafactory. A number of battery or electronics manufacturers have since announced plants to produce battery megafactories, including LG Chem, Foxconn Technology Group, BYD, and Boston Power. This is in addition to expansions from existing producers such as ATL and Samsung SDI.

BATTERY RAW MATERIALS

A collection of minerals and metals used to produce the key components that make up a battery. These minerals include battery cathode materials such as: lithium, cobalt, aluminum, vanadium, nickel, phosphate, sulphur (sulfur), and manganese. The battery abode is made from carbon — graphite — which is derived from natural flake graphite processed into coated/uncoated spherical graphite (SPG/CSPG) or synthetic graphite. The third major battery component is a separator most commonly manufactured from polymer.

CLAIM

A mining claim is a tract of public land, the right to mine of which is held under the Federal General Mining Law of 1872 and applicable local laws.

COATED GRAPHITE

Coating graphite with carbon or other chemicals reduces the effect of solid electrolyte interface (SEI; see below) and helps to maintain the maximum capacity possible for the battery.

COATED SPHERICAL GRAPHITE (CSPG)

Flakes of natural graphite processed into near-spherical shapes, purified and carbon coated. This decreases the surface area, to allow more graphite into a smaller volume thus creating a smaller, lighter, more efficient anode product for the battery. It also increases the rate at which the cell can be charged. Coating graphite with carbon or other chemicals reduces the effect of solid electrolyte interface (SEI; see below) and helps to maintain the maximum capacity possible for the battery. Japan, South Korea and China hold the vast majority of the world's spherical graphite coating capacity.

COIN CELL TESTS

Tests run on small single-cell battery, known as a lithium coin or button cell, to measure electrical energy storage capacity. Key parameters are reversible capacity (RC), by weight and by volume, and irreversible capacity loss (ICL).

COMMERCIAL ENERGY STORAGE

The ability to use very large batteries to power commercial units such as warehouses, factories or offices. While a battery large enough could have the capacity to power a full commercial operation, it is likely that these systems will be used to store renewable energy, increase an operation's power capacity, and as a low cost source of power during peak times. Commercial battery systems will range from 100kWh to over 10MWh.

CUT-OFF GRADE

Cut-off grade is determined by the following formula parameters: estimates over the relevant period of project costs, ore treatment costs, general and administrative costs, refining costs, royalty expenses, process and refining recovery rates and uranium prices.

ELECTRIC VEHICLE

The term 'electric vehicle' can refer to a whole family of vehicle designs that are battery-powered in some way. This can include cars (EV), Plug-in Hybrid Electric Vehicles (PHEV), hybrids, extended range vehicles, and electric bikes (E-Bikes). The major difference between each design is the size of the battery and the extent in which it uses the gasoline motor. At one end of the spectrum is the hybrid, which uses a small rechargeable battery and a larger gasoline motor, while at the other end is the full electric vehicle, which is 100% battery powered, with all other designs in between.

EXTENDED RANGE ELECTRIC VEHICLES (EREV)

While not commercially very common, Extended Range Electric Vehicles are available to the public. EREVs consist of an even smaller battery than the PHEV – for travelling on short journeys of up to 25 miles – and a small gasoline engine that backs up the battery. In essence, it is a step closer to the gasoline-powered vehicle than the PHEV. An EREV only uses the gasoline engine once the battery is exhausted, a key difference from the PHEV.

FLAKE GRAPHITE

A crystalline form of natural graphite that occurs in different sized flakes in the ground. Flakes can range from small (-150 mesh) to medium (-100 mesh), large (+100, +80 mesh), and extra-large or jumbo (+50 mesh). Flake graphite ore is processed into a concentrate through crushing, grinding, flotation, and drying. The average carbon content of flake graphite concentrate is 94-95% C, but can also range from 88-93% C and 95-98% C. This concentrate can also be subjected to chemical and thermal purification and milling methods, which produces a purity of in excess of 99.5% C for high-value markets such as batteries. Flake graphite is the feedstock for spherical or battery-grade graphite.

FULL ELECTRIC VEHICLE (EV)

An electric vehicle or EV is a vehicle that is propelled by one or more electric motors that is powered by a rechargeable battery. An EV needs to be fully recharged from an external power source after every full discharge or use of the battery. The most famous EVs include the Model S and Model X by Tesla Motors and the Leaf by Nissan, which solely require a battery to power the vehicle with no back up gasoline engine. An EV's battery capacity can range from 36kWh to 85kWh in capacity, the latter being the largest on the market and installed in the Model S. The range of an EV can vary from 200-300 miles. Other terms include Battery Electric Vehicle (BEV).

GIGAFACTORY

'GIGAFACTORY 1' is TESLA MOTORS' lithium-ion battery plant, currently under construction in Nevada, USA. Announced in early 2014, the Gigafactory is a $5-billion project to build the world's largest lithium-ion battery plant. Expected to launch in 2017 and reach its 35GW production capacity in 2020, the Gigafactory will be so large that it will produce the equivalent of the world's total battery production in 2013 and dwarf any battery plant that existed pre-2015. The goal for Tesla Motors, a high end electric vehicle manufacturer, is to produce lithium-ion batteries cheap enough to use in its range of electric vehicles — Model S, Model X and Model III — in a bid to lower the total production cost of the car and spark mass uptake. Tesla Motors is hoping that by mass-producing lithium-ion batteries at the Gigafactory, it can reduce the cost of lithium-ion batteries by 30% on 2014 levels. As a result, Tesla Motors will require huge volumes of battery raw materials including graphite, lithium, and cobalt. The company's long-standing partnership with Japan's Panasonic Corp will continue with the Gigafactory, with Tesla Motors using the Panasonic design lithium-ion cell technology based on a nickel cobalt aluminum cathode. This means Tesla Motors will need to source the less common lithium hydroxide as a starting raw material for the Gigafactory. It is understood that while there is an agreement in place, Tesla Motors will have to do the bulk of the raw material sourcing separate from Panasonic, who will aid with the cell construction once the plant is operational. The Gigafactory is located at the Reno-Tahoe Industrial Center in Storey County, near Reno, Nevada, USA.

GRADE

Term used to describe the size of the graphite flakes and their purity.

GRAM (G)

A unit of weight measurement; a metric unit of mass equal to one thousandth of a kilogram.

GRAPHITE

One of the purest and most crystalline forms of carbon and is one of the key input raw materials into batteries. It can be either mined or synthetically made. Natural graphite is mined in three forms — vein, flake and amorphous (microcrystalline). Flake graphite is the feedstock or precursor to the battery grade material known as spherical graphite. Synthetic graphite powder also competes with its natural counterpart in the battery space. Graphite's other major uses are in steel, as refractories and recarburizers, lubricants and industrial shapes and components such as gaskets and carbon brushes. There are no viable substitutes to natural or synthetic graphite.

GRAPHITE PROCESSING

Graphitic ore is reduced to a size to liberate the graphite as flakes free from the host rock. This is done by mechanical comminution in stages. The product is dispersed in water in flotation tanks to which chemicals are added. The tanks are stirred and air is bubbled in. The chemicals help the air bubbles to stick to the graphite flakes so that they float to the surface where they are skimmed off. This process is commonly repeated to extract as much graphite from the ore as is possible (high yield). Additional steps to obtain a high-purity graphite concentrate are screening, polishing, and magnetic separation.

GRAPHITIC CARBON (CG)

The amount of carbon within the flake that is graphitic. It does not include other sources of carbon such as carbonates and chemical reagents used in processing.

GROSS ACRES

Total acres under which we have mineral rights and can recover uranium.

HIGH PURITY

A term used when discussing the carbon content after additional processing of run-of-mine (ROM) concentrate product.

HOME ENERGY STORAGE

Also known as residential storage, home energy storage is the ability to store electricity and power an individual house via a single battery pack. A home battery pack is likely to be slightly larger in capacity that that of a full EV. New models such as the Tesla Motors Powerwall range from 7kWh for daily use and 10kWh to store enough energy as backup power in times of a blackout. Both units will have continuous power of 2kWh and will be lithium-ion cells. The idea to use batteries on this scale is new, but the concept to use batteries to store back up power has long been in place in commercial buildings or important utilities such as hospitals. Home Energy Storage batteries hold the greatest potential to bring continuous power to areas of the world that are not connected to the power grid. When connected with renewable energy sources such as solar, communities could have continuous power off-grid without the need for gasoline generators.

HYBRID ELECTRIC VEHICLE (HEV)

A predecessor to its PHEV cousin, a Hybrid Electric Vehicle (HEV) uses a smaller battery, which is charged via gasoline engine and regenerative breaking. It cannot be charged via plugging it into an electricity supply. HEVs are designed to be more economical with fuel, and to cut idle emissions rather than be battery powered.

IMPURITIES

Non-graphitic elements attached/ bonded/intercalated to the graphite crystal.

IRREVERSIBLE CAPACITY LOSS (ICL)

A measure of the amount of lithium permanently tied up in the graphite, and unavailable to supply energy. It is desirable to have % ICL as low as possible. Normally about 6.5 % capacity is lost due to ICL. ICL is a function of the graphite source and it's processing.

KILOGRAM (KG)

A unit of weight measurement; a metric unit of mass equal to 1,00 grams.

LITHIUM-ENRICHED BRINE

Naturally occurring brackish (salty) groundwater that contains dissolved lithium.

MAGNETIC SEPARATORS

These remove free iron and magnetic minerals.

MESH

Industry sizing term; measurement of particle size. The mesh is the number of openings in one inch of screen. The number of openings is the mesh size. For example, an 80-mesh screen means there are 80 little squares across one linear inch of screen. A 100-mesh screen has 100 openings, and so on. As the number describing the mesh size increases, the size of the particles decreases. Higher numbers equal finer material. Mesh size is not a precise measurement of particle size. Mesh sizes are denoted by either minus (–) and plus (+) plus signs. –200-mesh would mean that all particles smaller than 200-mesh would pass through. +200 mesh means that all the particles 200-mesh or larger are retained. The finer the screen's weave, the closer the screen's wires get together, eventually leaving no space between them at all. For this reason, beyond 325-mesh particle size is usually described in "microns."

MICRON (M)

Industry sizing term; measurement of particle size, denoted by the symbol 'µ'. The µ character is the Greek letter 'mu' which is the standard prefix for millionth. A micron is one-millionth of a meter or one twenty-five

thousandth of an inch.

MICRONIZATION

Reducing the size of the graphite flakes, by mechanical means to make graphite powders that are 1 to 50 microns (μ) in diameter.

MINERALIZED MATERIAL

A mineralized body which has been delineated by appropriately spaced drilling and/or underground sampling to support a sufficient tonnage and average grade is classified as “mineralized material” under US SEC definitions. Such a deposit does not qualify as a reserve, until a comprehensive evaluation based upon unit cost, grade, recoveries, and other material factors conclude legal and economic feasibility.

NET ACRES

Actual acres under lease which may differ from gross acres when fractional mineral interests are not leased.

OFFTAKE AGREEMENT/SUPPLY AGREEMENT

A contract to supply an end-using company with graphite for a specified period of time. A supply agreement states the terms and conditions under which one company will manufacture and supply goods to another. A supply contract may be exclusive or non-exclusive, include standards on product quality, and should state how product orders will be handled.

ORE

Naturally occurring mineralized material of sufficient concentration and size from which a mineral or minerals of economic value can be extracted at a reasonable profit.

OVER FEEDING

Operating enrichment plants in a manner that reduces plant operating costs but increases the amount of uranium required to produce a given quantity of enriched uranium.

PLUG-IN HYBRID ELECTRIC VEHICLE (PHEV)

While this is a form of electric vehicle (EV), the PHEV is a plug-in hybrid design that alternates between a battery-powered electric motor and a gasoline engine. For most designs the gasoline engine works as a back up to the battery or is used when the car travels over a certain speed. It serves to extend the range of the vehicle while making it more economical on fuel consumption. The batteries are much smaller than in EVs and require less charging as they tend to get recharged by the gasoline motor; however, they still need to be plugged into an external power source and charged. The typical electric range is 40 miles. The most famous examples of a PHEV are the newer models of the Toyota Prius, the first hybrid available in 1997, and the Chevrolet Volt.

POLISHING MILL:

Scrubs the surface of the graphite flakes and thus removes the gangue minerals that are adhered.

PPM

“Parts per million” – A unit of measurement of the concentration of elements in rock, soil or water.

RECLAMATION

Reclamation involves the return of the surface area of a mine or wellfield operating areas to a condition similar to pre-mining.

RECOVERABLE RESERVES

Reserves that are concentrations of minerals that are classed either proven or probable, are physically minable and can be profitably recovered under conditions specified at the time of the appraisal, based on a positive feasibility study. The calculation of usable reserves is adjusted for potential recovery and dilution.

RESERVE

That part of a mineral deposit which could be economically and legally extracted or produced at the time of the reserve determination.

RESOURCES

Resources are naturally occurring concentration of minerals in such a form that economic extraction is potentially feasible.

RESTORATION

Restoration involves returning a groundwater aquifer to a condition consistent with its pre-extraction use and removing evidences of surface disturbance. The restoration of a wellfield can be accomplished by flushing the ore zone with native ground water and/or using reverse osmosis to remove elements and components to provide clean water for reinjection to flush the ore zone.

REVERSIBLE CAPACITY (RC)

The amount of energy storage in the battery (typically ranges from 345 to 355 ampere hours/kilogram (Ah/kg).

ROLL FRONT

The configuration of sedimentary uranium ore bodies as they appear within the host sand. A term that depicts an elongate uranium ore mass that is ‘C’ shaped in cross section.

RUN-OF-MINE (ROM) CONCENTRATE

Run-of-mine (ROM) product is the result of the basic metallurgical process at the mine.

SHUT IN

A term that refers to ceasing production or the absence of production.

SHUT-IN ROYALTY

A lease clause permitting the extension of a lease not held by production by payment of a per-acre royalty.

SLURRY

Fine particles of materials concentrated and suspended in water.

SOLID ELECTROLYTE INTERFACE (SEI)

Initially, reaction of electrolyte with graphite reduces capacity, but once formed, this layer reduces further decomposition of the electrolyte and actually protects the graphite anode from exfoliating.

SPHERICAL GRAPHITE (SPG)

Also known as battery-grade graphite, is the product that is consumed as an anode in lithium-ion batteries. Flake graphite concentrate is processed into ultra-high-purity (>99.95% C), microscopic (15 to 5 microns) spheres, which are used as a battery anode material. This decreases the surface area, to allow more graphite into a smaller volume thus creating a smaller, lighter, more efficient anode product for the battery. It also increases the rate at which the cell can be charged. China dominates nearly all production for uncoated spherical graphite.

SPHERONIZATION

The process used to spheronize the graphite; to transform/shape graphite flakes into sphere-like (or 'potato-like') shapes.

SPOT PRICE

The price at which uranium may be purchased for delivery within one year.

STATIONARY/UTILITY ENERGY STORAGE

Stationary or utility energy storage is the use of a battery for large-scale, immobile applications rather than the smaller-scale mobile applications needed in mobile technology or electric vehicles. This is a new market that requires much larger batteries and is only just beginning to see commercial traction and new products being designed. The two main utility storage markets that are expected to develop over the next few years are home and commercial. Because these batteries are stationary, this widens the opportunity for other battery chemistries besides lithium-ion to enter the marketplace. Vanadium redox flow battery is one such design that is being touted as a suitable chemistry for commercial energy storage, but cost of production is likely to be the deciding factor over which battery design is adopted.

SUPPLY AGREEMENT/OFFTAKE AGREEMENT

A contract to supply an end-using company with graphite for a specified period of time. A supply agreement states the terms and conditions under which one company will manufacture and supply goods to another. A supply contract may be exclusive or non-exclusive, include standards on product quality, and should state how product orders will be handled.

SURETY OBLIGATIONS

A bond, letter of credit, or financial guarantee posted by a party in favor of a beneficiary to ensure the performance of its or another party's obligations, e.g., reclamation bonds, workers' compensation bond, or guarantees of debt instruments.

SYNTHETIC GRAPHITE

A man-made graphite that is produced from processing or graphitizing carbon-rich raw materials such as petroleum coke (pet coke) — an oil by-product — and binder at temperatures in excess of 2,000 degrees Celsius. This required extensive high-temperature processing, which makes it expensive. It is also has up to 20% lower capacity than properly prepared natural graphite. Primary synthetic graphite is made-for-purpose for high value markets such as lithium-ion batteries. Major producers of synthetic graphite are China, US, Germany, Japan and France.

TAILINGS

Waste material from a mineral processing mill after the metals and minerals of a commercial nature have been extracted; or that portion of the ore which remains after the valuable minerals have been extracted.

THERMAL PURIFICATION PROCESS

A final step in removing the impurities from the graphite by using heat alone. Typically, temperatures of 2500 to 2800 degrees Celsius are needed, which require high CAPEX/OPEX equipment. Oxygen must be excluded from the furnace or the graphite will be converted into gases.

THERMOCHEMICAL PURIFICATION

Graphite may be purified by a combination of heat and gaseous chemicals. The temperature used is much lower than for purely thermal purification. This reduces the cost. Also the cost of disposal of waste products is much lower than in the wet chemical process.

TON

A unit of weight measurement (also referred to as short ton) that is the equivalent of 2,000 pounds. It is the standard industry term used in the United States; however most offshore sales of graphite are made in long tons (also referred to as tonne or metric ton). To convert to tonne, or long ton, multiply by 0.9072.

TONNE

A unit of weight measurement, the tonne is a metric system unit of mass equal to 1,000 kilograms (2,204.6 pounds). To avoid confusion with the ton, it is also known as the metric tonne, long ton and metric ton in the United States. To convert to short ton, multiply by 1.1023.

U_3O_8

Triuranium octoxide equivalent contained in uranium concentrates, referred to as uranium concentrate.

URANIUM OR URANIUM CONCENTRATES

U_3O_8 or triuranium octoxide.

VALUE ADDED/VALUE ADD

The amount by which the value of a product is increased at each stage of its production, exclusive of initial costs; having features added to a basic line or model for which the buyer is prepared to pay extra. As it pertains to graphite, value-added graphite is run-of-mine, primary-processed graphite (e.g. conventional graphite concentrate) that has been further secondary processed into a higher-value, specialized graphite (e.g. battery-ready, coated spherical graphite — or CSPG — for use in Lithium-ion batteries).

VEIN GRAPHITE

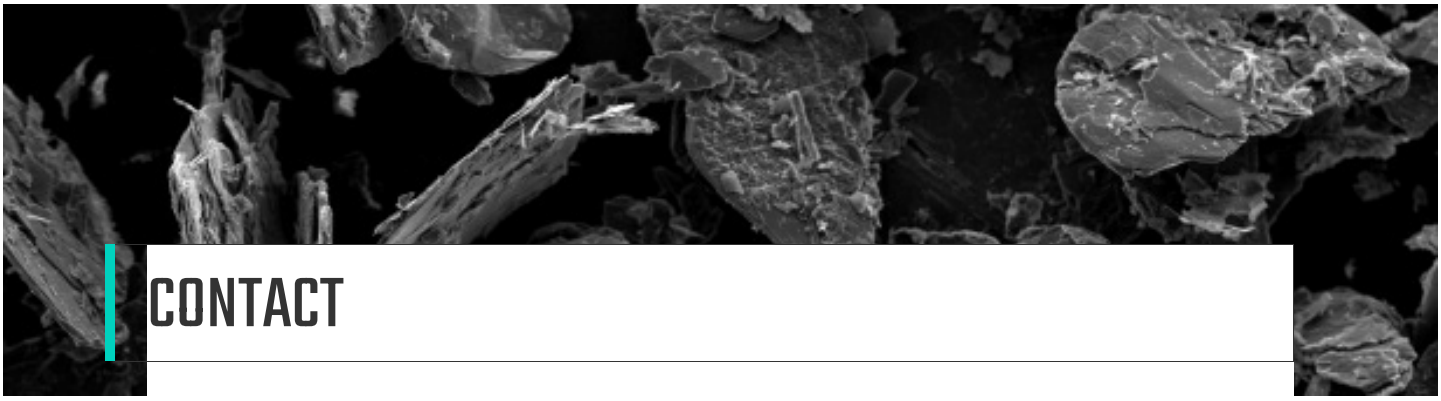
Vein graphite is not disseminated in the host rock but is found in veins that penetrate the rock, which does not contain graphite. Lumps can be as large as 30 cm. Vein graphite is very pure 90-99.5% pure and commercially is sold in purities of 94-99%. It is mainly found in Sri Lanka, where it is mined mainly by hand labor. A niche market with marginal demand, less than 5,000 tonnes of lump/vein graphite per annum are produced and exported. Vein graphite is also known as Ceylon graphite and lump graphite.

WASTE

Barren rock or uranium in a rock formation that is too low in grade to be processed and milled at a profit.

WET CHEMICAL PURIFICATION PROCESS

Graphite can also be purified by the use of acids, such as sulphuric, hydrochloric and hydrofluoric, sometimes with alkalis. These processes generate very large amounts of toxic acidic wastes. In China, these wastes are often discharged into ponds, lakes and rivers and cause severe pollution. In developed countries, these wastes must be properly treated before disposal. The cost of this disposal is many times the cost of the purification steps.



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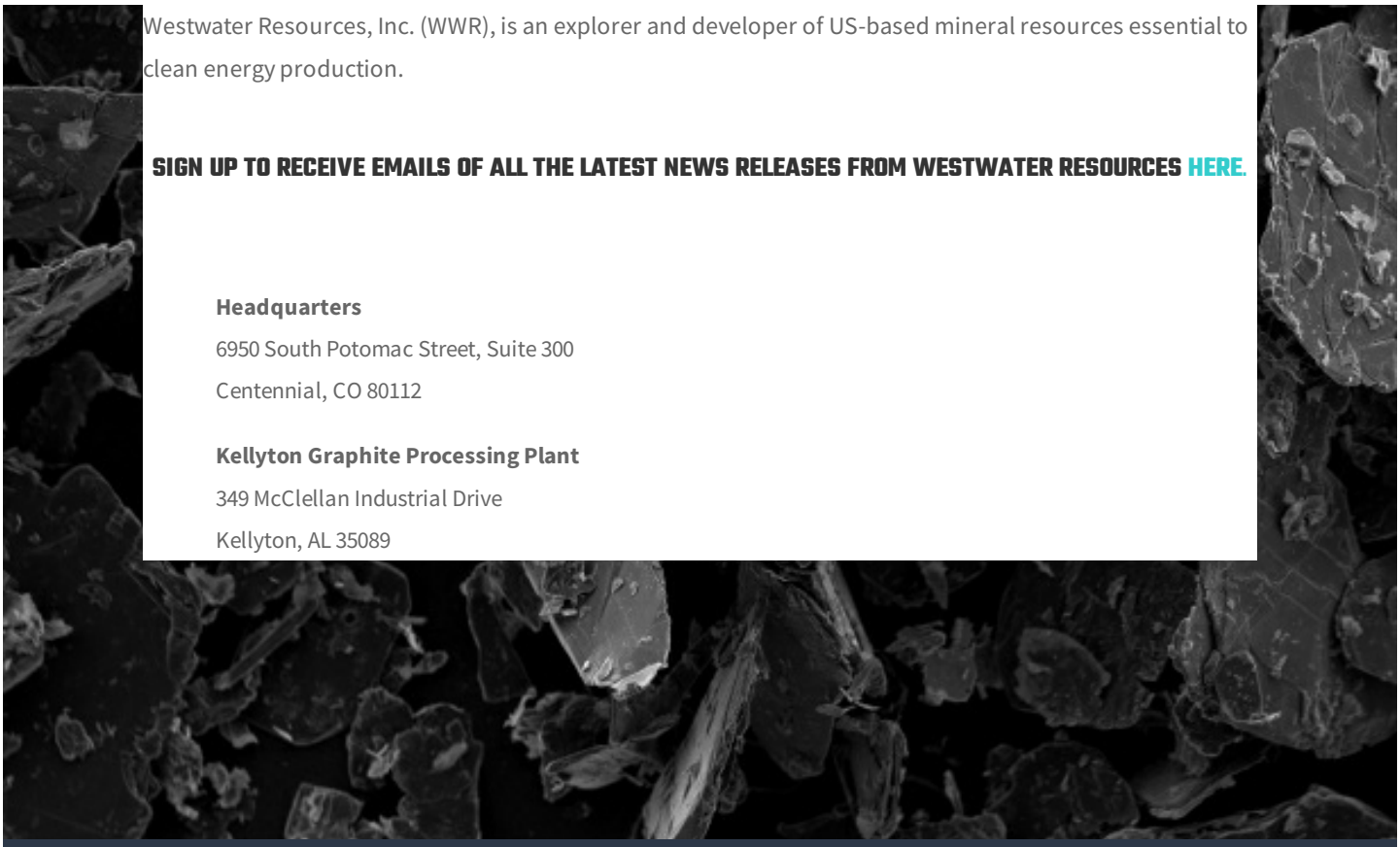

Westwater Resources, Inc. (WWR), is an explorer and developer of US-based mineral resources essential to clean energy production.

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