



# DESERT BREEZE

VOLUME IV ISSUE III

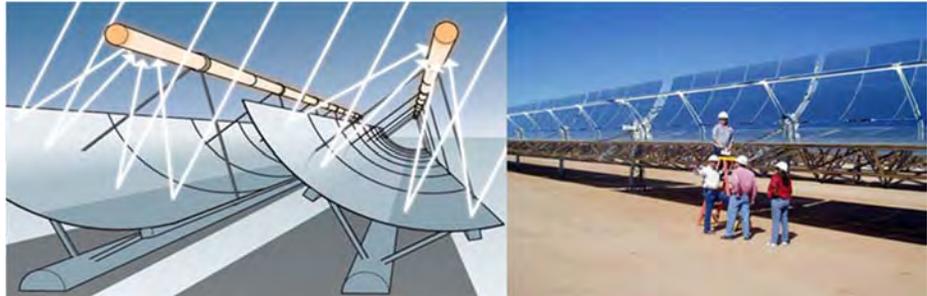
SEPTEMBER 2016

## SOLAR POWER PLANTS

(Part 3 of 3)

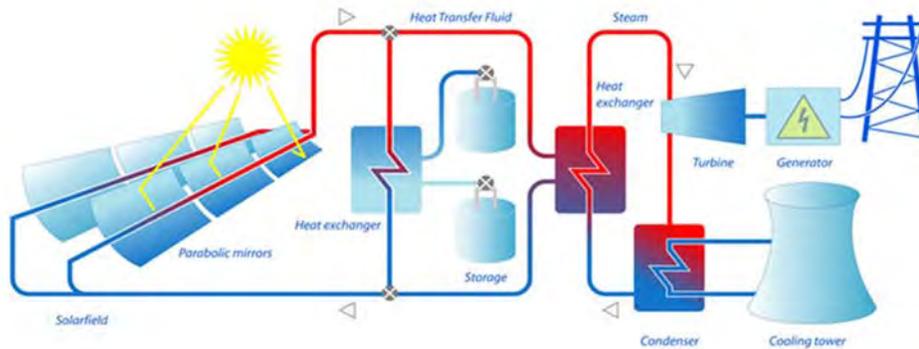
Last issue, photovoltaic (PV) power plants were the main topic. This issue, solar trough power plants will be discussed. Solar trough panels utilize concaved parabolic mirrors to concentrate the sun's rays to the adsorber pipe.

Fluid in the adsorber pipe is heated and pumped to the heat exchanger, the heated liquid converts water into steam, and the steam drives steam turbines to produce electricity. The facility may also include



thermal storage to extend the facility's operation past sundown.

The solar trough power plants are very similar to Ivanpah Solar Facility 51-miles outside Las Vegas, Nevada. These type of solar power facilities are called "Concentrating Solar Power" (CSP). Not many solar trough technology facilities have been built. However,



there is a 64-Megawatt (MW) facility in Boulder City, Nevada (31-miles from the Hoover Dam, 40-miles from Downtown Las Vegas). The 400-acre site is called Nevada Solar One, built by ACCIONA United States. You might

see the parabolic mirrors as you travel on Highway 95 as you go through Boulder City.

All solar facilities have an advantage over "conventional" (boiler) and "simple cycle" (gas turbine) power generation facilities because they produce no combustion emissions (nitrogen oxides, sulfur oxides, carbon monoxide, and carbon dioxide). The obvious advantage of conventional and simple cycle power plants have over solar power facilities is to produce great amounts of power in a small "foot print." For example the Pastoria Power plant near Lebec can produce 750-MW of power at a 30-acre area site. A solar power plant producing the same amount of electricity would cover approximately 6,500-acres. Additionally, natural gas fueled power plants have the capability to operate 24-hour per day; in contrast to solar power plants that operate when sunny, and a few hours after sundown. As with most things in life, balance is needed. We must utilize solar, wind, conventional, simple cycle, and combinations of each to produce the power needed to pump water and operate our air conditioners.



However, when driving through the desert one day, you may think you see a large lake, an oasis, in the distance. It might be a solar power plant giving needed power to people nearby, or it could be water. *By Glen E. Stephens*

## HYDROGEN CYANIDE

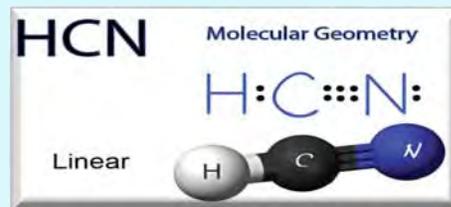
**H**ydrogen cyanide (HCN) is a colorless liquid (at room temperature) or gas that forms when a hydrogen atom becomes single bonded to a carbon atom and the carbon atom is triple bonded to a nitrogen atom. HCN as a liquid vaporizes at slightly above room temperature. It has the characteristic smell of almonds and can be extremely toxic when inhaled by humans and animals. HCN occurs in nature and is also used for a wide range of industrial processes. It can be found in the pits of cherries, apricots, and apples. It is also released by millipedes to ward off predators. Some industrial processes where hydrogen cyanide can be found include the hardening of iron and steel, electroplating, separation of metals from ore, and the preparation of acrylic fibers, synthetic rubber and plastics. HCN is at times used as a fumigant to kill insect pests of greenhouse plants and rodents. Trace amounts of HCN are dispersed into the air from the exhaust of vehicles (which happens to be the primary source of cyanide in the air), tobacco and wood smoke and the burning of nitrogen-containing plastics. It is a very important molecule in the creation of polymers, pharmaceuticals and sodium cyanide (NaCN).

One of the indirect uses of hydrogen cyanide in our district is with the Merrill-Crowe process. This process helps extract

gold from ore. Ore is rock that contains different metals and minerals. Hydrogen cyanide is the precursor to the sodium cyanide used to attach to gold so that it can be recovered later on in the process. Hydrogen cyanide is treated with sodium hydroxide and a reaction occurs that produces sodium cyanide and water. Sodium cyanide and water solution is added to the ore sample after it is crushed by crushers and mills. The cyanide anion (-CN) then binds to the gold in the crushed ore. To make sure that hydrogen cyanide is not created in the process, soda or slaked lime is added to solution to make sure it stays over pH\* 10.5 (strongly basic). When a molecule like HCN is in a strongly basic solution, it causes the molecule to stay separated into an H<sup>+</sup> cation (positively charged ion) and an -CN anion (negatively charged ion). This does not allow the H<sup>+</sup> and -CN to bind with each other to create HCN. It is then agitated and oxygen is blown into the mixture setting off a chemical reaction that causes the gold cyanide to dissolve and leach into the surrounding water in solution. A filter then separates the water/gold cyanide solution from the solids. Zinc powder is added to the water/gold solution to precipitate the dissolved gold.

Hydrogen cyanide poisoning happens due to the cyanide anion binding to important molecules in the body that act in

cellular respiration. This action stops cellular respiration and causes the cell to die. As uncommon as it is to come across a significantly dangerous amount of HCN gas in the everyday world (unless you work in the industries that use it), it is very important to note the symptoms of HCN poisoning so that one could get medical attention as soon as possible. Short term exposure via inhalation to 49 milligrams per cubic meter or less can result in these symptoms: increased heart rate, problems breathing, headache, skin and eye irritation and restlessness. Short term exposure via inhalation to 100 milligrams per cubic meter or more can lead to death. It is very hard to achieve a high concentration of HCN gas in the open air due to its volatility. Industries work hard to create an environment where dangerous amounts of HCN gas cannot form by enlisting side reactions to keep it under control as seen in the Merrill-Crowe process.



*By Nicole Dickerson*

## *WASTELAND WEEKEND in the Desert*

**W**asteland Weekend, a fully immersive participatory experience of the Post-Apocalyptic genre, is coming to California City September 22nd through the 25th, 2016. Featuring live music, Wasteland Radio, fully themed Tribes, campsites, costumes, and vendors, and Wasteland Car Cruises, one will be hard pressed to stop by the Café for Fresh Roadkill, or Tarantula Tostadas. This year's event follows on the heels of several successful annual events, each more detailed and elaborate than the last. Event participants are encouraged to reserve tickets, as a sell-out is a distinct possibility this year. The details, rules, frequently asked questions, previous event photos, and suggestions can all be found at [www.wastelandweekend.com](http://www.wastelandweekend.com). More than 2,000 fans, from all over the country, and even the world, are expected to travel to the desert, to camp in the less populated Eastern area of California City. Their presence in California City can be a boon to local businesses. Event organizers work hard every year to obtain the appropriate permits, insurance, and coordinate with City Officials to keep the event safe and legal. Enthusiasts are reminded that an event of this magnitude is structured, and there are rules. Please read the rules, and do not bring persons under the age of 18, pets, or weapons that are not strictly ornamental.

Enthusiasts and city residents are reminded that courtesy and understanding can help to resolve disputes and soften hard feelings. There will be dust, please understand that there will be dust, and do not make the dust worse. Please understand that there will be bright light and noise in what is usually a dark and quiet area, do not make more light and noise than necessary (to have a really good time), please respect that some prefer the desert to be dark and quiet. Please remember that this location, on this Weekend, is a Wasteland. Please pack out trash, and do not feed the wild animals. Together we can make this the best Wasteland Weekend.

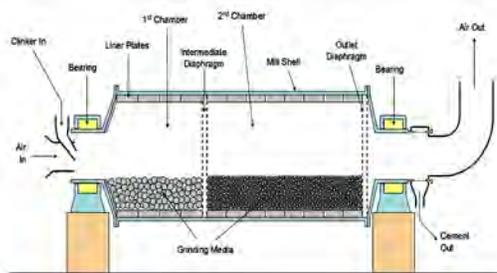
*By Brenton Smith*

## Portland Cement Manufacturing Process

Finish Grinding: Part 3 of a 3 part series on the cement manufacturing process.

**F**inish Grinding is the final process necessary to produce Portland cement (please see Parts 1 and 2 for review). Essentially finish grinding produces the final product, Portland cement by pulverizing clinker with a small quantity of gypsum (added at about 3% proportion to the clinker). There are two types of finish grinding processes: ball mills and vertical roller mills. Ball mills consist of a tube rotating about its horizontal axis. Roller mills are just like the mill that grinds the raw materials for the raw mix discussed in Part 1. Both processes use high volume draft fans to transport materials through the process.

Grinding aid(s) are also added to this mill feed blend. Typically ethylene glycol is “dripped” onto the conveyor belt that feeds the finish grinding equipment. Grinding aids reduce the amount



**Ball Mills**

of energy required to grind the materials by impeding the agglomeration tendencies of the cement particles. This also reduces the pack set index of finished

Portland cement, thus yielding better flowability during transportation and ready-mix concrete production. Particle size reduction throughout the cement production process account for over 75 % of the energy consumption in cement plants. Cement plants strive to efficiently manage their energy consumption. Whether ball mills or roller mills are used in the finished grinding, the overall concept is the same. The above mentioned materials are blended and then, via conveyor belt, introduced into the mills. Ball mills use a mix of heavy, hard balls enclosed in a cylindrical fast rotating structure. The balls come into contact with the material and the sides of the mill and break the material into smaller particles. The first compartment containing larger balls breaks up the large lumps of clinker and the smaller balls (second compartment) are needed to grind the material into finer particles. The two compartments are separated by a slotted diaphragm that allows cement material and air to pass but not the balls. Mills are filled to about 30 % of its capacity with the balls. It is estimated that the average particle resides in the mill for about 30 minutes until it is small enough to pass through.

Envision an old flour mill powered by oxen, except that in cement production the table rotates and the roller assembly remains stationary.

required to grind the materials by impeding the agglomeration tendencies of the cement particles.

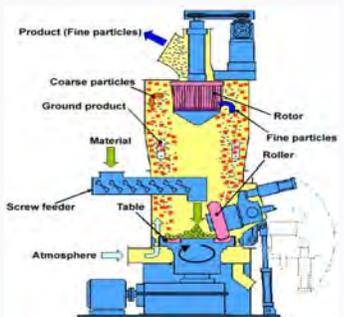
This also reduces the pack set index of finished

Materials in both types of finish mills are moved through the process by huge induction fans. The air “sweeps” the materials through. Small particles are swept quickly; those too large to be deemed Portland cement are separated and returned to the mill for regrinding. Small particles, moving faster, are drawn under the fan power through the separator, thus “escaping” the separator. These particles are then captured by huge dust collectors. At this moment it becomes the final product, Portland cement. The product is then transported by a combination of air-slides, conveyor belts, FK pumps, and bucket elevators to the cement storage silos.

From the storage silos the cement is ready for shipping at the packhouse. This facility houses silos, pumps, dust collectors and scales for the loading of Portland cement into either trucks or rail cars.

Portland cement is defined by ASTM (American Society for Testing and Materials). The on-site quality assurance labs, and physical test lab verifies some of the following characteristics: chemistry, air content, fineness, particle size distribution, pack set (fluidity), expansion, strength, heat of hydration, and setting time. Most of the physical tests are carried out using mortar or paste created from the cement. This testing confirms that cement has the ability to perform well in concrete; however, the performance of concrete in the field is determined by other factors as well.

There are three cement plants within the Eastern Kern Air Pollution Control District. Cement manufacturing is a high temperature, high energy, and a potentially dusty process. Plants are heavily regulated by local, state and federal agencies to prevent significant air pollution emissions. Cement manufacturers spend hundreds of thousands of dollars every year in order to



**Roller Mills**

eliminate and reduce the emitting of pollutants. Every year there are new challenges for them due to new legislation. Challenges include, but not limited to the following: NOx, CO, Sulfur, CO2, mercury, and dust from the process, the quarry, and the over -all site. Cement plants carry many air quality permits with this district that stipulate strict operational conditions. Fortunately we have a good open communication line with our permitted plants. Each plant has an engineer that is totally dedicated to environmental compliance.

*By John Hayes*

The District will end the Subscription Program as of December 31, 2016. In our continuing efforts to keep you informed, please refer to our website at [www.kernair.org](http://www.kernair.org) for the most current District information available regarding our Board of Directors, grants, rule development, agendas, public notices, news, reports, and forms available.

**Board of Directors**

Ed Grimes, Chair (Councilman, Tehachapi)  
Rick Warren, Vice Chair (Councilman, California City)  
Peggy Breeden (Mayor, Ridgecrest)  
Mick Gleason (KC 1st District Supervisor)  
Zack Scrivner (KC 2nd District Supervisor)

Board of Directors usually meet once every two months starting in January at various locations.

**Air Pollution Control Officer**

Glen E. Stephens, P.E.

**Hearing Board Members**

Bill Deaver  
Doris Lora  
Dr. Wallace Kleck  
Chris Ellis  
Charles Arbaut



For news updates and other information, please visit the Eastern Kern APCD website at [www.kernair.org](http://www.kernair.org)

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