DESERT BREEZE

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SOLAR POWER PLANTS

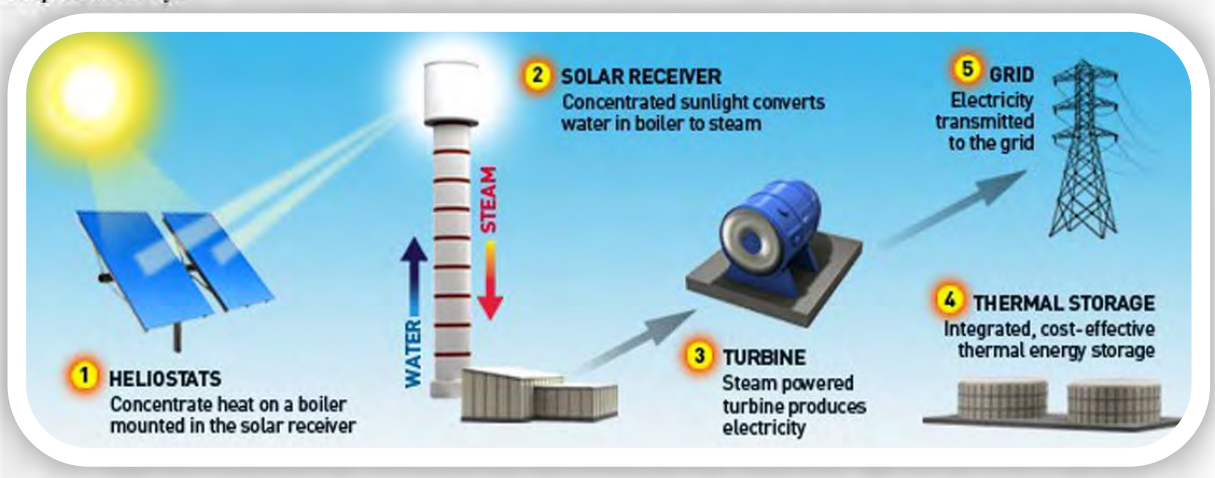
Solar Thermal Power: Part 1 of a 3 part series

I was driving to Las Vegas, last year, and saw three glowing cubes about 51-miles outside of Las Vegas. It was the Ivanpah Solar Power Facility located at Ivanpah Dry Lake, California.

The 377-megawatt (MW) solar power generating facility utilizes mirrors to focus the sun's energy to the solar receivers atop power towers. Fluid in the towers is heated, the heated liquid converts water into steam, and the steam drives steam turbines to produce electricity. The facility also includes thermal storage to extend the facility's operation past sundown.

The power generating facility, is located approximately 50 miles northwest of Needles, California (about five miles from the California-Nevada border), and is located on federal land managed by the Bureau of Land Management. The electricity generated by all three plants is enough to serve more than 140,000 homes in California during the peak hours of the day. The facility will reduce carbon dioxide (CO_2) emissions by more than 400,000 tons per year.

Unfortunately, nothing is without controversy. Biologist estimate the plant was responsible for injuring or killing over 3000 birds during operations between October 2013 and October 2014. It is assumed the birds are attracted to the glowing cubes and are damaged or killed by the intense heat. Biologist are seeking methods to keep birds away.



On a more positive note, the Ivanpah power generating facility, currently, has the distinction of being the largest solar thermal power plant in the world. The plant was built in three separate phases between 2010 and 2013. The facility currently delivers power to PG&E (Pacific Gas and Electric) and SCE (Southern California Edison).

Closer to home, all the solar power generating facilities in Eastern Kern County, currently, utilize photovoltaic (PV) cell; however, we will talk about that in the next issue.

DMV Grant Program Project Selection Meeting

The District will be holding its annual DMV Grant Program project selection meeting April 13, 2016, beginning 10 a.m. at the Mojave Veterans Center located at 15580 O St Mojave, CA 93501. This is a public meeting and all interested parties are welcome to attend.

The DMV Grant Program is generally over-subscribed each funding cycle. Project proposals submitted by February 26, 2016 and deemed eligible by staff have equal merit because each project can achieve desired emissions reductions. In an effort to promote fair, unbiased funding distribution, eligible projects from each Tier category will be awarded through a random selection process. At least two projects from each oversubscribed Tier category will be placed on a standby list.

Total allocation of DMV Program Grant Funds per Tier Category is as follows:

Tier I, Low-Emitting Vehicle Purchase, $100,000 ($2,000 to $5,000 per project).

Tier II, Infrastructure and Public Education, $150,000 (up to $50,000 per project).

Tier III, Road Improvement, $150,000 (up to $50,000 per project).

Portland Cement Manufacturing Process

Mining and Raw Material Processing: Part 1 of a 3 part series on the cement manufacturing process.

Because of the significant deposits of limestone, strategic position to major highways, railways, and purchase markets there are 3 cement plants in Eastern Kern County. There are only nine active cement manufacturing plants in California. Also, there are two additional plants that do finish grinding only (manufacturing is done at one of the other nine plants). The cement processing industry accounts for, approximately, 5% of man-made carbon dioxide (CO_2) emissions. The CO_2 emissions will be discussed in detail in Part 2 of this series.

Cement manufacturing begins at the mine. The chief components entering the cement process, termed raw mix are: limestone (calcium carbonate – $CaCO_3$), silica (silicone dioxide –SiO_2), iron (Fe_2O_3, or various other iron containing compounds), alumina (aluminum oxide – Al_2O_3), and magnesium oxide-(MgO). Limestone accounts for 70% to 80% of the raw mix, silica 10% to 15%, alumina 4%, and iron 4%. Limestone, silica and alumina, and magnesium are mined near the plant. Silica and alumina, are found in shales, and clays. Magnesium oxide is found in trace amounts in the mining process. Other constituents (including additional sources for aluminum), iron ore, and iron slag, are trucked to the plant. Often clays, such as laterite (source for alumina), and diatomaceous earth (source for silica) may be imported from an off-site quarry. Iron acts as a flux, reducing the reaction temperatures necessary for the chemical reactions. Iron also accounts for the gray color of Portland cement.

Removing limestone and shale from the quarry is accomplished by using explosives to blast the rocks. After blasting, huge front-end loaders are used to load material into haul trucks and transport to the primary crusher. These constituents are quarried in separate processes and are intermixed at a later time.

Initially, limestone and silica containing materials are crushed separately, generally, to a six-inch "diameter" size. The limestone is then transferred via conveyor belt to a storage facility. The storage facility utilizes a stacker that assures the quality (chemical composition) of the material will be consistent throughout the pile. The silica can be applied to the pile of limestone and/or to separate bins for more precise blending.

From the storage facility, the materials are transferred to the raw mill processing facility. At this facility, limestone, silica, and iron and other materials previously mentioned are blended in precise quantities and introduced to the raw mill. At the raw mill (huge roller mill), rocks are ground to a fine powder called "raw meal" and transferred to the blending silo. The blending silo is a huge concrete cylindrical structure that stores and mixes this "raw meal" as it becomes the kiln feed for the pyroprocess (burning) section.

From an air quality standpoint, all emissions from Part 1 are particulate matter. The District is concerned about the dust and particulate matter emissions that are emitted by the following sources: drilling of the holes for the explosive charges, the explosion, front-end loader, haul trucks on dirt roads, dust coming off of conveyors at drop points, dust collector system (baghouse) serving the raw mill, crusher, and blending silo.

Next quarter will address the pyroprocess (heating) of the cement manufacturing process.

FORMALDEHYDE

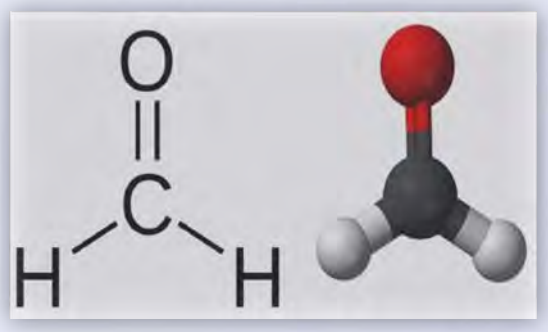
Formaldehyde is a colorless, flammable, strong-smelling gas at room temperature. Chemical symbol for formaldehyde is **CH_2O**. It is one of 187 hazardous air pollutants/toxic air pollutants that are known to cause cancer and other serious health effects. It is also a volatile organic compound (VOC); therefore, formaldehyde can react with nitrogen oxides (NOx) in the atmosphere to form ground-level or "bad" ozone which can cause health problems.

Formaldehyde is used in some foods as a preservative, and is also found in various household products (glues, paints, coatings, dishwashing liquids, fabric softeners, carpet cleaners, antiseptics, et. al.). Formaldehyde is also released into the air as a byproduct from the combustion of kerosene, diesel fuel, and natural gas in engines, burning of cigarettes and other tobacco products,

and burning of wood. One of the most common uses of formaldehyde, in the U.S., is in manufacturing of resins used in composite wood products such as particle board, plywood and medium-density fiberboard. Therefore, formaldehyde can be found in the air at home, at work, and outdoors.

Humans are exposed to formaldehyde by breathing air containing formaldehyde. Exposure to low levels of formaldehyde can irritate and burn the eyes, nose, throat, and skin. Formaldehyde is listed as a human carcinogen; therefore, long-term and high-levels of exposure to formaldehyde may cause some types of cancers.

Additionally, long-term and high-levels of exposure can cause lungs damage that may lead to the following



Formaldehyde Molecule

symptoms: a build-up of fluid in the lungs, severe shortness of breath, bronchitis, and rapid heart rate.

Environmental Protection Agency (EPA) and California Air Resources Board (ARB) have taken measures to reduce emissions of formaldehyde. Currently, there are no national standards for formaldehyde in composite wood products. However, EPA is in the process of finalizing rules that will set limits on formaldehyde emissions from composite wood products. The California, ARB adopted Airborne Toxic Control Measures (ATCMs) to reduce formaldehyde emissions from composite wood products in 2008. The composite wood products covered by this regulation are hardwood plywood, particleboard, and medium density fiberboard. The suit filed against Lumber Liquidators was based on this regulation. More information about the regulation can be found at http://www.arb.ca.gov/toxics/atcm/atcm.htm. While EPA and ARB are implementing rules and regulations to reduce formaldehyde emissions, District suggests that ensuring adequate ventilation, moderate temperatures, and reduced humidity levels through the use of air conditioners and dehumidifiers helps reduce formaldehyde levels in homes.

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

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For news updates and other information, please visit the Eastern Kern APCD website at www.kernair.org

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