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New Circular Released

Arizona Mining Update—2007, Circular 129, by Nyal Niemuth has been released and is available at the Mining Information Center or as a download at our website. The circular is an overview of exploration and mining in Arizona for last year, with production charts, company activity, and commodity reviews covering copper, uranium, and industrial minerals.

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ARIZONA

No. 48 June, 2008

Mineral Resource

Renewable Energy - Pros and Cons

by Dr. Madan M. Singh, Director

Although there is considerable debate as to the causes of global warming, it is clear that there has been an increase in the overall temperature in the environment of our planet over the past few decades. It is accepted by some that one of the contributing factors to this climate change is the increase in the carbon in the atmosphere. Much of this is in the form of carbon dioxide (CO₂) emissions from a variety of sources. The use of fossil fuels in the production of electricity has been blamed for a portion of this contaminant. This has led to a campaign for the development of "clean energy." The United States' dependence on foreign oil has been another motivation. Some strategies suggested for Arizona are discussed below.

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Solar power refers to electricity generated from solar energy. Although the uppermost layers of the earth's at-

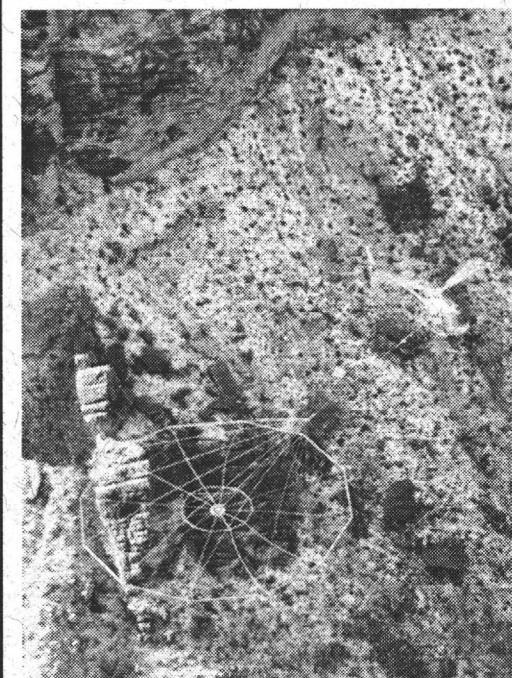
mosphere receive 174 petawatts (Pw) of incoming solar radiation (insolation), 6% of it is reflected back and 16% is absorbed during its passage through the air. Because of clouds, dust, and particulate material, about 20% of the remaining insolation is reflected and another 3% is absorbed. However, there is still more than enough that reaches the earth's surface compared to that used by mankind. The average daily solar insolation density is 3-7 kwh/m² for the contiguous United States. For Arizona cities this figure varies from 5.5 to 7.5, with an average of around 6.5.

One common method of converting solar light to electricity is with photovoltaic cells, often referred to as solar cells. The first photovoltaic cells (PV) were invented by Charles Fritts in 1883 and made of selenium. These were only 1% efficient. Gradual progress in the production and efficiency of PVs has been made over the years, with a special impetus provided by the oil embargo

of 1973. The manufacturing costs have fallen from \$100 per watt in 1970 to around \$3-\$4 per watt at this time. Efficiencies have also increased to about 10% and are expected to reach 14% or 15% in the next few years. These improvements will make the cost of PV electricity more competitive with conventionally-produced power. According to Solarbuzz, an industry website, the costs for residential energy in May 2008 is 37.61 cents per kilowatt-hour (kwh), for commercial use it is 27.33 cents/kwh, and for industrial plants 21.29 cents/kwh. These do not compare favorably with the 8-10 cents/kwh that is available from conventional fuels (coal, oil or natural gas; nuclear power costs 3-4 cents/kwh to generate).

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Conclusion

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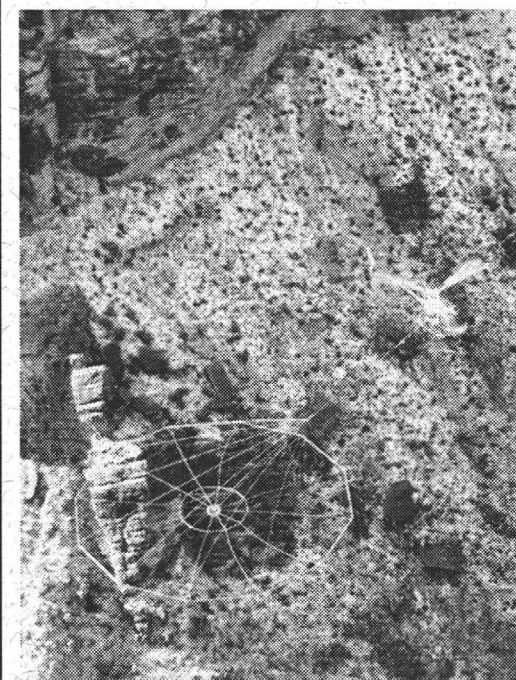
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