SAFETY OF SOLAR THERMAL INSTALLATION

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INTRODUCTION

The cooling fluids and storage tanks in thermal solar plants contain flammable fluids and chemical treatment substances such as sulfuric acid and caustic soda. Solar reflectors and collectors made of glass are subject to damage from high winds carrying dust particles and even from birds collisions. Solar panels require a sustained maintenance program in replacing the damage components.

FIRE HAZARD

A 3,400 m^3 tank (900,000 USA gallons) thermal storage tank caught fire in February 1999 at the SEGS II solar power plant at Daggett, California. A surrounding area of 1.3 km^2 or 0.5 square mile was evacuated.

WIND DAMAGE

The parabolic mirrors are formed of panels made of glass that is 94 percent reflective. A typical mirror is only 70 percent reflective. The mirrors automatically track the sun throughout the day. The greatest source of mirror breakage is wind, with 3,000 typically replaced each year.

Figure 1. Trough reflector system showing damaged mirrors needing replacement.

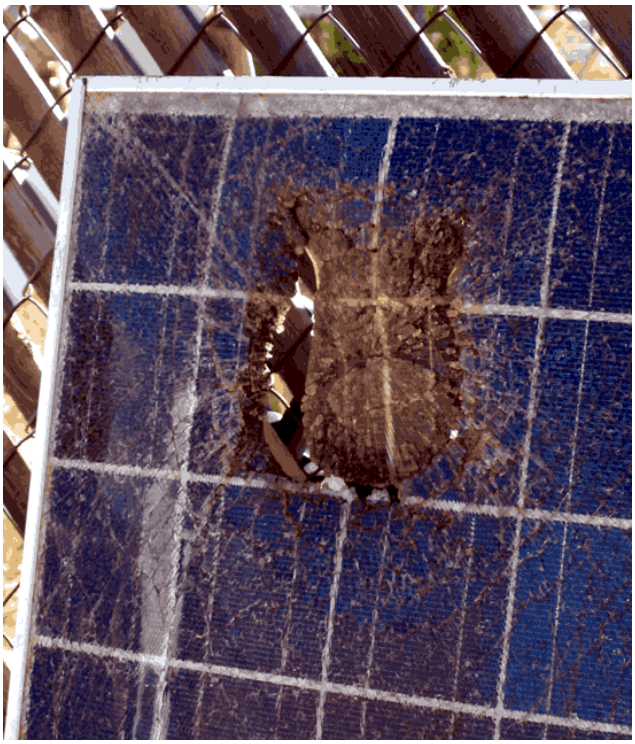

Figure 2. Damage to a PV flat solar panel.

Walls are added to protect the structures against wind loading sand erosion and dust in desert areas.

Figure 2, Protective walls to protect structures against wind loading at Al Kuraymat, Egypt [16]..

Figure 3. Gravel substrate and surrounding rigid wall for dust and wind suppression at Al Kuraymat, Egypt [16].

Operators can turn the mirrors to protect them during intense wind storms. An automated washing mechanism is used to periodically clean the parabolic reflective panels. Local labor can be used for cleanup in the absence of water resources.

Figure 4. Parabolic trough mirrors washing process.