

Potash Crystallization System Expansion

Chemical / Fertilizer | Case Study

Dead Sea Works

Sdom, Israel - Dead Sea Works, a business unit of ICL Fertilizers, is the world's fourth largest producer and supplier of potash products, as well as a broad range of chemical products. These include magnesium chloride, industrial salts, de-icers, bath salts, table salt and raw materials for the cosmetic industry.

Dead Sea Works serves customers in over 60 countries from manufacturing and support operations in Israel and in Spain, through their wholly-owned subsidiary, Iberpotash.



Project Description

When the Dead Sea Works (DSW) expansion project was in the design stage, it was clear that it would be a large-scale and complex undertaking. The main product manufactured at DSW



is potash (KCl) for use as fertilizer. The facility also produces bromine and magnesium chloride, that like the potash, is derived from the highly concentrated brine feed from the mineral rich Dead Sea on which the plant is located.

The plan called for an almost 30% increase in capacity for potash production. A completely new crystallization production system would need to be integrated into the existing plant. This new addition would replace an older production line while providing additional output. When completed, Dead Sea Works would be operating one of the largest potassium chloride crystallizer trains in the world.

The Client's Needs

The installed crystallization system would need to assure that the minimum nameplate capacity rating of 153 t/h of KCl crystals was met with a high system availability. In reaching this goal, consistent crystal size and purity of greater than 98% KCl was also required in the production process.

Another challenging aspect of the project was the location of the new crystallizer train. The optimal battery limits for integration into Dead Sea Works' current operations were in the middle of the existing plant. To accommodate these large vessels, field erection was necessary due to clearance issues in accessing the proposed expansion area.

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Process Description

Veolia Water Technologies was selected to supply the engineering design and major process equipment during the early stages of planning the expansion with Dead Sea Works taking responsibility for installation. Veolia's experience and expertise to design large, complex crystallization systems on a global basis provided the client with the confidence for this project.

The original plan by DSW was to utilize a four-stage train for the expansion. However, through discussions, a new five-stage train was proposed using PIC™ (draft tube baffle), HPD® crystallizer technology. The design provided efficient heat recovery that was available by adding the additional effect. The sizable savings in energy consumption more than justified the additional cost while adding bypass capabilities to the system to keep capacity at a stable rate.

This innovative process solution, together with a unique business proposal, was the turning point of the Dead Sea Works project.

The Solution

What started out as an engineering and equipment supply opportunity, evolved into a full, turnkey project as DSW awarded Veolia with responsibility for the entire crystallizer plant. This included all aspects of the installation of what would be one of the largest KCl crystallizer trains in the world.

The comprehensive scope of supply involved full engineering and installation of the system including:

- Project management, installation and construction management
- Process and mechanical engineering
- Detailed engineering
- Civil engineering and foundations
- Electrical and instrumentation

Veolia also provided all major equipment to support the crystallizer plant such as hotwells, feed tank, pumps and a custom agitator design for all five stages. The engineering also included structural steel design, pipe routing, complete instrumentation and electrical with an elevator system to provide the necessary access to the production area.

The Results

Despite some of the challenges in executing the project such as limited communication windows, regional climate and extremely tight battery limits, the project at Dead Sea Works was a successful installation of HPD crystallizer technology.

The high system availability requirement is on target, meeting the designed production rates. Since start-up, crystal size and purity have consistently met the standards mandated by DSW for KCl production.



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