

**LNGWM Alert**

## Explosion at Sonatrach’s Skikda LNG Export Plant

The explosion Monday at Algeria’s Skikda LNG facility some 500 kilometers east of Algiers destroyed three of the six liquefaction trains that comprise the GL-1K complex. While the remaining three trains as well as the facility’s five storage tanks are thought to have escaped the explosion and subsequent fire unscathed, it may be weeks or even months before these units are restarted. An adjacent 335,000 barrel per day oil refinery and crude export terminal have been shut down as a precautionary measure but appear to have sustained only minor damage. Sonatrach itself has been reassuring customers who lift refined products and crude oil from the Skikda terminal that it intends to reopen these operations soon.

Skikda is one of three liquefaction centers in Algeria. The other two complexes are located at Arzew, which is home to the GL-4Z Camel plant that started up in 1964, and at Bethioua, which houses the newer GL-1Z and GL-2Z facilities. Arzew and Bethioua are situated just eight kilometers apart in northwest Algeria.

<b>Algerian LNG Production &amp; Capacity</b>			
<b>Complex</b>	<b># of Trains</b>	<b>Capacity Bcm/y</b>	<b>Production Bcm/y</b>
Arzew GL- 4Z	3	1.5	1.3
Bethioua GL-1Z	6	10.5	9.9
Bethioua GL-2Z	6	10.5	9.4
Skikda GL-1K	6	8.0	6.3

Source: Sonatrach

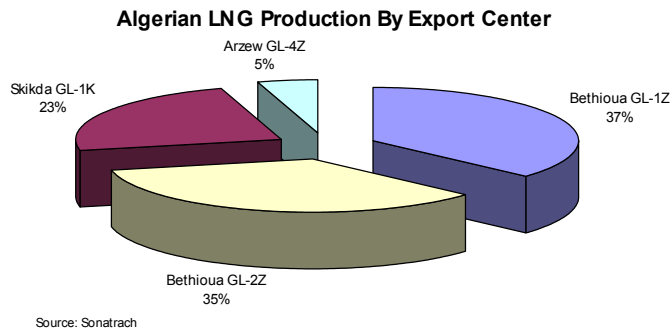
The blast, which reportedly killed 27 people and injured a further 74, apparently originated in a boiler that produces the steam necessary to run the main turbine associated with train 40, one of four parallel units. Early reports suggest that it occurred when plant personnel attempted to restart the boiler, whose furnace may not have been properly purged. The explosion triggered a fire that immediately spread to the mixed-refrigerant compressor. From there, the fire jumped to trains 30 and 20, two other adjacent liquefaction units (see plant diagram). The fact that the boiler explosion caused damage to the nearby process equipment raises questions about separation distances in this 1970s vintage process facility. This could explain why there was so much collateral damage from the initial explosion and why the resulting fire spread to the adjacent trains so rapidly.

The six-train Skikda complex is located on 92 hectares of land. Gas is sourced from the Hassi R’mel fields, which also supply the Bethioua and Arzew plants. Trains 10, 20, 30 and 40 are located parallel to one another east of the LNG storage area. The two remaining units known as trains 5P and 6P are situated on the west side of the storage tanks and thus were not affected by the explosion or the subsequent fire. Skikda was built in three phases with the first three trains (units 10, 20, 30) starting up in 1971 and 1973. These were built by France’s Technip and utilize the TEAL liquefaction process. Train 40, which was brought on-line in 1981 after a six-year delay, was built by Prichard Rhodes and represents Skikda’s second phase development. While it is directly adjacent to train 30 and uses the utility systems installed in the first phase, train 40 is based on Prichard’s PRICO technology. Trains 5P and 6P also utilize the PRICO process and were built by Prichard Rhodes. These two units began operating in 1981, some three to four years later than originally planned.

Trains 10, 20, 30 and 40 each have a design capacity of about 1.1 Bcm/y (0.85 MMt/y). In contrast, trains 5P and 6P are larger with a design capacity of some 1.64 Bcm/y (1.25 MMt/y) each. All six trains at Skikda were revamped as part of a revitalization and modernization program completed in the late 1990s. Published sources suggest that the steam boiler associated with unit 40 was the only boiler among the six that was not either revamped or replaced as part of this overall project. In contrast to the aging Skikda units, most new production facilities do not utilize steam boilers and turbines. Instead, new plant designs have eliminated the need for boilers entirely, replacing them with more efficient gas-fueled turbines and compressors.

If it is confirmed that the initial event was indeed an explosion in the steam boiler, attention is likely to focus on maintenance and operational issues as well as the space needed to provide sufficient blast dissipation in case of accident. "The fact that the explosion damaged the process equipment indicates that the boiler was too close to the liquefaction trains, not that the equipment itself was defective. This is almost certainly a maintenance and operational issue rather than an LNG technology failure," observes one industry official. A number of recent incidents indicate maintenance shortcomings on Sonatrach's part. At Bethioua, a fire at the GL-2Z plant on October 19 resulted in a month-long shut down of the facility and forced Sonatrach to declare *force majeure* on some European contract deliveries. This apparently followed an explosion at a nearby LPG unit that caused substantial damage. The crude oil refinery at Skikda has also had its share of troubles: failures discovered during a routine inspection apparently necessitated a temporary closure of the facility recently.

In 2002, the Skikda complex supplied 6.3 Bcm to LNG buyers in the Mediterranean, principally Gaz de France, Italy's ENI, Spain's Gas Natural and Greece's Depa. Skikda accounts for 23% of Algeria's 26.9 Bcm/y of LNG sales, with the two plants at Arzew and Bethioua in the northwest part of the country supplying the remainder.



Skikda plays a unique role in the short-haul Mediterranean market. It is the primary source of supply for terminals that cannot accommodate large LNG carriers. In recent years, the plant supplied the following outlets:

- About 3.3 Bcm/y at Gaz de France's Fos terminal;
- About half of the more than 3 Bcm/y delivered in small cargo lots to Italy's Panagaglia terminal;
- Just over 1.2 Bcm/y at Spain's Barcelona terminal; and
- About 0.7 Bcm/y at Depa's Revithousa terminal in Greece.

Once Skikda's three remaining trains resume production, and it is uncertain when this will be, Sonatrach will still have to find roughly 3 Bcm/y of additional product if it is to honor its sales commitments into these four main outlets. Of this, it is estimated that:

- The Maghreb-Europe gas pipeline could supply an additional 1 Bcm/y to Spain. Compression now under construction will boost line capacity by a further 2 to 3 Bcm/y within a couple of weeks;
- The Trans-Mediterranean line could increase deliveries into Italy by nearly 2 Bcm/y; and
- Spare capacity at Bethioua/Arzew of about 1 to 1.5 Bcm/y could also be tapped.

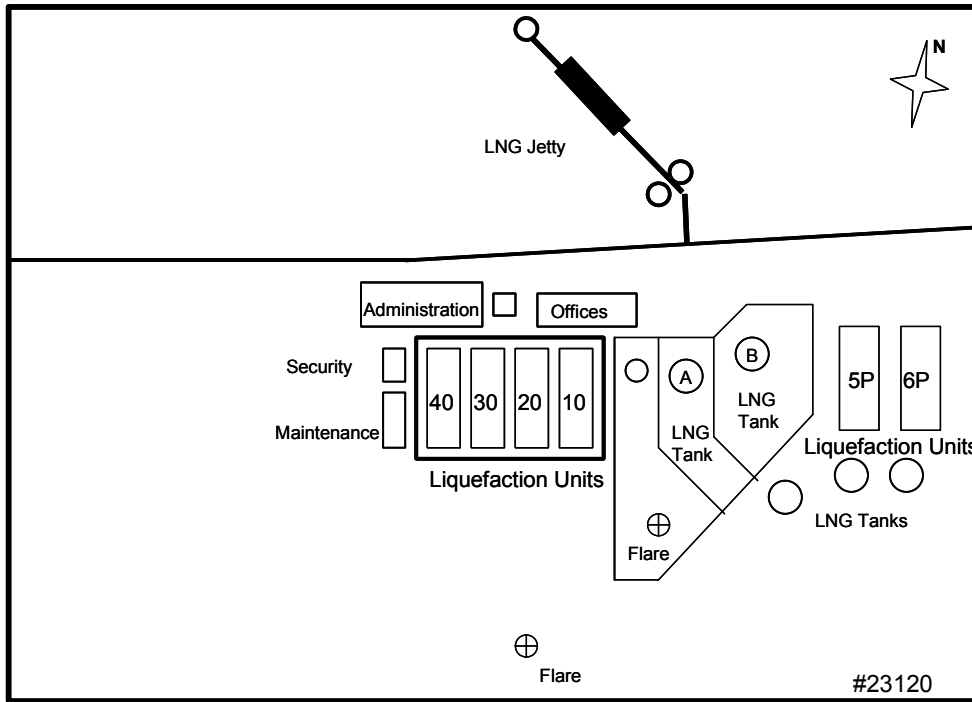
In addition, Turkey's Botas is expected to be over-supplied this year and has been holding talks with various parties to divert spare contract volumes from Algeria. The Turkish company purchases some 3.9 Bcm/y of LNG from Sonatrach and a further 1.2 Bcm/y from Nigeria LNG.

It is unclear what impact the loss of production at Skikda will have on the United States, where Sonatrach has a very small share of the market. Of the 19 cargoes totaling an estimated 1.0 MMT delivered into the US from Algeria in 2003, all were sourced from Bethioua, which is the only one of the country's three liquefaction centers that can handle the larger ships. Louisiana's Lake Charles terminal was the destination for 18 of these cargoes while Maryland's newly reactivated Cove Point facility accounted for a single cargo delivered during the last month of the year.

- While Algeria was once an important supplier into Boston's Everett terminal, Trinidad has entirely replaced the North African producer in this trade. Tractebel, which owns Everett, has said publicly that it no longer has any term deals in effect with Sonatrach for the US.
- Statoil purchases about 1 Bcm/y (0.7 MMT/y) of LNG from Sonatrach for Cove Point under a three-year deal that commenced last month. The Norwegian firm, which is one of three companies with access rights at the terminal, received its first cargo from the Bethioua plant on December 7 while a second shipment is thought to have arrived in early January. A third Algerian cargo is due at the end of this month.
- BG regularly buys spot cargoes from Algeria for Lake Charles, where it is now the sole capacity holder. At this point, the British firm has not been notified of any changes in deliveries as a result of the accident. Only one cargo from Algeria is programmed into Lake Charles in January and that is thought to have already arrived. Multiple cargoes are expected from February onwards, however, and it remains to be seen if the situation at Skikda results in the diversion of any of these shipments to established term customers in Europe.

The accident at Skikda will undoubtedly galvanize those who oppose the many LNG import and regasification terminals that have been proposed for the US and Europe. However, the large steam boilers of the type in which this explosion occurred are typically found at power generating plants as well as at some oil refineries. They are not used at LNG receiving facilities. In addition, about the only thing a regasification facility has in common with a liquefaction plant is its storage tanks and marine facilities and this equipment does not appear to have been a factor in the recent incident at Skikda.

### Skikda GL1K Liquefied Natural Gas Complex



Source: Sonatrach, Poten & Partners

