Deadly LNG Incident Holds Key Lessons For Developers, Regulators

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When the Skikda gas-liquefaction plant in Algeria exploded in January, the blast shook buildings and shattered windows more than a mile away. But for the LNG industry, the reverberations and repercussions of Skikda are being felt halfway around the world, where the race is on to expand America’s regasification capacity.

Policymakers, the oil and gas industry, and consumers widely recognize that increasing LNG imports is crucial to help meet America’s energy needs and that specific sites for LNG terminals can be developed in a safe and secure fashion. The United States is developing a comprehensive regulatory framework to account for safety, environmental, and economic factors when deciding whether to authorize a new terminal. What happened at Skikda must be investigated and understood to best inform this decision-making process.

The Skikda tragedy claimed 27 lives and injured about 80 people, making it the deadliest incident at an LNG facility in more than 30 years. The precise cause of the explosion is still under investigation. Preliminary reports indicate Unit 40 had been shut down before the incident. Algerian officials said in mid-February that gas leaked from a pipeline, and the vapors were drawn into a boiler. When workers re-lit the unit’s boiler, it exploded.

Whatever is ultimately discovered to be the cause, opponents of LNG projects cite “Skikda” as evidence that LNG facilities are inherently dangerous. In Long Beach, CA where Mitsubishi hopes to build an LNG-receiving terminal, protesters conducted a memorial service Feb. 12 for the workers killed at Skikda. With bagpipes playing in the background, activists chanted slogans and carried protest signs. And community opposition, fueled by the Skikda incident, represented a key factor in ExxonMobil’s decision to shelve its planned LNG development at Mobile Bay, AL.

While LNG’s detractors are using the Skikda incident as a rallying cry, proponents of LNG projects are quick to disregard the event as something that could only happen at an antiquated, badly designed liquefaction facility. Oil and gas executives have claimed Skikda is irrelevant to U.S. siting decisions because regasification facilities in this nation do not use boilers.

Sonatrach’s “Preliminary Conclusions,” offered at an LNG conference in Qatar on March 21, shed light on the facility’s design, but gave little new insight as to why the accident happened and how similar ones could be averted in the future.

Unfortunately, both responses are inappropriate, because they reduce the Skikda incident to a symbol, rather than a real event that demands careful analysis. Only a deliberate investigation can reveal the full story of what occurred at Skikda on Jan. 19. The involvement of foreign experts, and the Federal Energy Regulatory Agency (FERC)’s endeavor to participate in the Algerian probe, demonstrate the importance of understanding Skikda for U.S. siting decisions.

A recent review of English-language reports (from Algeria and elsewhere) suggests there is more to this story than an equipment failure. Siting, design, operational and management factors likely played significant roles. By thoroughly studying the events and conditions surrounding the Skikda explosion, the industry and its stakeholders, as well as federal and local regulators and lawmakers, can learn vital lessons from this tragedy.

Ground Zero

At about 6:40 p.m. on Jan. 19, 2004, Unit 40 at the Skikda LNG plant exploded. Within seconds, the adjacent Units 20 and 30 also exploded in an apparent chain reaction. The blast spread outward, damaging surrounding structures and facilities — including a nearby power plant, one of the berths at the Skikda harbor and numerous homes and other buildings in the community.

At least six people died instantly in the explosion. The shockwave leveled the maintenance, security and administrative buildings near Unit 40, trapping workers under the debris. The force of the blast overturned security vehicles and ambulances that were parked near the facilities, and the heat was so intense that it melted the vehicles’ metal structures. Several people died in the ensuing fire, with some reportedly trapped by a chain-link fence that surrounded a fire-engulfed area.

When the explosion occurred, emergency crews from the Centre National de Coordination responded immediately, sending dozens of firefighters and ambulances. Land-line and cellular telephone networks in the area were interrupted, so military vehicles and personnel equipped with communication devices were dispatched to the scene. Emergency crews concentrated on rescuing the victims, fighting the inferno, and spraying water on surrounding installations to contain the fire and prevent additional explosions.

Firefighting continued for hours. By 7:30 the next morning, the fires had been extinguished, but gas leaks posed a continued threat, and in general the area still was not secure. The local refinery, although apparently undamaged, was forced to shut down because its supply of purified water came from the LNG plant. (The refinery was restarted about two weeks later.)

LNG production, naturally, completely stopped at Skikda. However, the...
Skikda's Checkered Past

In the wake of the explosion, all eyes are now on Algeria. LNG experts from around the world are descending on Skikda to investigate. A commission comprised of 13 foreign experts, three Sonatrach specialists, and two representatives of the primary Algerian insurance company — Compagnie Algérienne des Assurances (CAAT) — arrived at the site on Jan. 26. Algeria's government also assembled an inter-ministerial commission to study the causes, and other regulatory agencies, including FERC, have offered support and requested involvement in the probe. The Ligue Algérienne des Droits de l'Homme (Algerian League for Human Rights) has requested that the Ministry of Justice handle its own investigation, focusing on the tragedy's causes, as well as humanitarian and environmental effects.

The pre-explosion condition of Skikda Unit 40, and operations and maintenance procedures at the plant, are coming under careful scrutiny. Some early reports in the Algerian Francophone press suggested the equipment was operating in a state of disrepair. Various sources report that Sonatrach had not renovated Unit 40 since it was commissioned in 1978. Historically, the unit was unable to reach full capacity, and frequent technical problems meant that the unit operated only intermittently since May 2003. Maintenance and security workers said Unit 40 had required significant technical intervention about every two weeks for the past six years — particularly at the cryogenic units, which allegedly were leaking gas.

Several accounts — including one quoting a former director of the LNG plant — suggested that plant managers were under pressure to meet production targets, and were pushing the envelope at Unit 40 to compensate for Unit 10, which was not operational. Some sources said they had repeatedly reported deficiencies in the boiler to upper management, with little apparent effect.

To what degree these claims will be born out in the investigation remains to be seen. But the known history of the LNG plant and Unit 40 in particular, suggests technical problems were documented at the facilities.

All six units at Skikda used steam boilers and turbines to drive the liquefaction process — an approach generally considered outdated today. Unit 40 was built in 1976 by Pritchard & Rhodes of the U.K., using a different technology from the other five units. But in 1978, U.S.-based Fullman & Kellogg attempted to correct design defects that limited the unit's output. In the late 1990s, Kellogg Brown & Root performed further renovation work at Skikda, but KBR sources said the unit was among the three surviving liquefaction trains in the site's three other LNG units (50, 5 and 40). Sonatrach specialists, and two representatives of the primary Algerian insurance company — Compagnie Algérienne des Assurances (CAAT) — arrived at the site on Jan. 26. Algeria's government also assembled an inter-ministerial commission to study the causes, and other regulatory agencies, including FERC, have offered support and requested involvement in the probe. The Ligue Algérienne des Droits de l'Homme (Algerian League for Human Rights) has requested that the Ministry of Justice handle its own investigation, focusing on the tragedy's causes, as well as humanitarian and environmental effects.

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Safety & Management Questions

In addition to technical and siting issues, key questions are emerging about safety and management practices at Skikda and other industrial installations in Algeria.

Numerous reports suggest that some of the Jan. 19 casualties might be attributed to inadequate emergency-preparedness measures. Workers said evacuation planning and training were neglected at Skikda, and that no pre-determined shelter exists on the site for refuge in case of an accident. Additionally, some accounts indicated that existing emergency exits were inoperable or inaccessible. A lack of emergency exits and evacuation procedures might have contributed to situations in which personnel reportedly were trapped by a chain-link fence that enclosed the site.

Some sources questioned the adequacy of emergency-response teams and medical facilities at the industrial zone. In the aftermath of the explosion, the government announced that it would include a burn-treatment unit in a new hospital to be built in the area.

The role of management and human-resources policies also merit further examination. Numerous accounts suggested that hiring and management policies contributed to the incident, and moreover that they pose a continued risk factor. For example, a policy of the Ministry of Energy & Mining reportedly requires employees to reapply for their own positions every few years. Critics charge that this policy, which is intended to affect merit-based compensation and promotion, actually encourages cronyism and drives out experienced and qualified mid-level personnel.

Learning From Skikda

Numerous industry sources have observed that modern LNG regasification plants, such as those being developed in North America, do not use pressurized boilers or steam turbines to drive their operations. Although true, this observation does not diminish the importance of fully examining and understanding the Skikda incident.

Little hard evidence has emerged about the explosion and subsequent fire. Nevertheless, even these few details suggest lines of inquiry that might prove instructive for the LNG industry as a whole. A thorough analysis will yield pertinent information about siting, design,
operations and management for many kinds of LNG facilities — not just aging liquefaction plants.

FERC and other regulatory agencies have set a high priority on understanding what happened at Skikda — and appropriately so. There is little question that the U.S. requires increased LNG regasification capacity and that these facilities can be built and operated safely. In this process, Skikda will be instructive for the U.S. LNG-terminal debate with respect to siting concerns, technological issues, the level of government oversight, and emergency preparedness. Such important inquiries merit the attention and involvement of regulators, and ultimately they will bear the burden of ensuring that Skikda’s lessons are learned and applied. P&GJ

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