# SCHOOL GAS SAFETY CASE STUDIES

## SAMPLE OF EDUCATION SECTOR SOLUTIONS

California values education, and MBS values safety. Natural gas is a critical resource for schools – heating them, and in many cases powering them. With a large campus footprint, with tangles of gas lines everywhere, many school campuses were constructed decades ago and the gas lines have not been monitored or maintained. The problem is serious and amounts to a black box of unknown unknowns – if not handled by an Emergency Management, Facilities, Maintenance, or Administrative shepherd.

To begin, gas leaks aren't exactly easy to detect without equipment. They can be buried or behind walls. MBS offers resources (graphics) on how to spot them, but the only sure-fire way is with state-of-the-art detection equipment (laser, infrared, or other).

There are literally a dozen ways gas lines, pressure regulators, valves can have problems – from electrical corrosion to old fashioned rust.

> *"The implications are disturbing, but I know of only one occasion on which we did not find a gas leak, following a detection survey on a school or college campus. Most of the time, we discover multiple leaks nobody knew about."*
>
> – MBS Engineer

The problem is compounded by facilities and maintenance people not knowing where shut off valves are located, or that they need to be exercised (periodically partially closed to prevent them from sticking). Campus safety is hugely dependent upon the ability to manually shut gas off at any building at any time. Some campuses, as

currently configured, have only *one location* for gas shut-off. The main meter can be located at the far end of the campus or otherwise inaccessible. This configuration can result in increased danger in the event of an emergency. So, the problem can be that the shut-off valve location isn't known, or it's not accessible.

Many schools don't have seismic shut-off valves, and in California, that's simply not acceptable. In an earthquake, there's seldom the time for a maintenance person to turn off the gas, on the off-chance they know where the shut-off valve is located.

School administrators may not be fully aware of the maintenance requirements and risks associated with a campus gas system. Many utility customers wrongly assume that their gas system is maintained by the utility company. This is a common misconception.

On the footprint of your campus – even if you are a municipal body (a school or town building) – your gas lines are not maintained by the power or gas utility. They may come and inspect a leak, at your request, but they will not maintain the gas lines, and they will not correct any leaks they find.

Seismic safety shut-off valves are installed on the customer side of the meter and are also outside of the utility company's jurisdiction. Gas line corrosion and leaks can lead to catastrophic damage to people and property. The installation of an automatic gas shut-off valve reduces the risk of fire and explosion.

Additionally, potholing/daylighting (getting eyes on old gas lines), cathodic testing of above-ground lines – are not something the utility typically helps with.

MBS remedies all these potential safety hazards:

1. Leak detection;
2. Mapping;
3. Potholing/Daylighting;

4. Re-piping and bypassing of bad piping;
5. Corrosion detection and protection;
6. New system design;
7. Seismic automatic gas shut-off valves.

## SAN MATEO COMMUNITY COLLEGE DISTRICT

The district identified a need to review and upgrade the campus gas system for seismic safety. This involved a complete system upgrade related to issues found on all three SMCCD campuses, including:

- Broken or frozen manual shut-off valves
- Regulators, broken or not properly positioned/calibrated
- Lack of seismic valve (automatic gas shut-off) protection
- Inability to isolate gas flow to a specific building for maintenance or other reason
- No manual shut-off valve
- Gas shut-off located only at the main meter

*Retrofit of seismic valve upgrade to main meter and separate building at Skyline College, SMCCD*

## MBS SOLUTION

A methodical plan was developed to address issues at each campus on a building-by-building basis. Work was coordinated with campus facility directors and communicated with all stakeholders.

- Inspection of all manual shut-off valves to verify proper operation
- Installation of new manual shut-off valves to allow for gas shut-off at each building
- Located manual shut-off valves after regulators to reduce excessive gas pressure
- Inspection, re-calibration and replacement of regulators

- Installation of seismic valves at all buildings

- Collaboration with PG&E to retrofit main gas meters, allowing for the installation of seismic valves

## ALAMEDA UNIFIED SCHOOL DISTRICT

Upon completion of seismic upgrade work at the high school, it was determined that there were additional gas system issues. While on site, visual reporting identified extensive corrosion and potential gas leak issues. These were predominantly age-related issues involving electrolysis and/or high levels of selenium. With consideration to the age of the system and the advanced rust condition, a work order was created to inspect all AUSD campuses to perform cathodic testing. A gas sniffer test was also conducted in order to detect even slight gas leaks both above ground and sub-grade. Testing determined that five district campuses had gas system issues requiring immediate attention. All fees for inspection and evaluation were credited back toward the project work for each campus.

- Several of the 17 district campuses required installation of automatic gas shut-off valves
- Five campuses failed the corrosion leak detection test
- Sub-grade gas lines corroded and in poor condition
- Manual shut-off valves frozen or missing
- The main manual shut-off valve at one campus was in a locked, underground vault
- Most schools were configured with one location to shut off gas to the entire campus

## MBS SOLUTION

- Installation of seismic (automatic) gas shut-off valves
- Evaluation of condition and calibration of campus regulators
- Replacement of ineffective, inoperable regulators
- Replacement of corroded manual shut-off valves
- Provision of method to isolate gas flow to a specific building for maintenance or other reason with additional manual shut-off valves
- Performance of cathodic testing for corrosion and leak detection
- Replacement or repair of corroded gas lines

## GAS SYSTEM TESTING

MBS performs three different tests to help identify corrosion and to determine the severity of corrosion:

1. Visual Test - Seeks visible signs of rust or deterioration of metal. During the visual test, special attention is focused on bubbling or flaking metal as these are signs of corrosion and are a potentially dangerous condition for gas lines. Visual inspection can also identify electrical systems which utilize gas lines as a grounding source.

2. Gas Sniffer Test - Utilizing the same specialized equipment that PG&E uses, the gas sniffer can detect even the smallest leak in a gas line. The above ground system is inspected first, then the below ground system is checked by probing the dirt around the gas system.

3. Digital Cathodic Protection Voltmeter - An electrical iode test sends an electric pulse through each gas line. Each pulse is recorded as a ping. If the ping leaves the voltmeter at a .8 and returns at the same speed and strength, the pipe is considered clear and rust-free. If the ping returns at the same speed, but the signal is not as strong (.4), this suggests a measurable level of rust and corrosion. If the signal returns in the .2 range, this indicates that the pipe is severely compromised and should be replaced immediately as the integrity of the gas line is at risk.

Testing identifies a lack of cathodic protection by registering corrosion levels below the passing .8 result. Any structure with a gas system listed below this level is considered to have failed the test.

*Sub-grade corroded gas lines at AUSD, determined by using cathodic testing*

Professional Reference:
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"MB Services did an excellent job. They resolved issues found during the project. Excellent service and communication. They also provided pre- and post-project photos."

## PIEDMONT UNIFIED SCHOOL DISTRICT

The district was founded in 1931 and the gas system is approaching 100 years old. The district leadership requested that MBS to assess the safety of the gas system. The following determinations were made after inspection:

- All seven campuses required installation of automatic gas shut-off valves
- Sub-grade gas lines at multiple schools corroded and in poor condition
- Manual shut-off valves frozen or missing
- Regulators not calibrated properly
- Most schools were configured with one location to shut off gas to the entire campus

## MBS SOLUTION

*Completed work at Piedmont USD*

- Inspection of all manual shut-off valves
- Installation of new, manual shut off-valves to allow for gas shut off at all buildings as-needed
- Location of manual shut-off valves after regulators
- Inspection, re-calibration and replacement of regulators
- Installation of seismic (automatic) shut-off valves at all buildings

Project-Related Professional Reference: Bill Parsons. Piedmont Unified School District Phone: 510-594-2600 Email: BParsons@piedmont.k12.ca.us “Nice job of installing…they do their job well. MB Services delivered what they said they would within the expected time frame and for the expected price, no surprises. Nice addition to the school.”