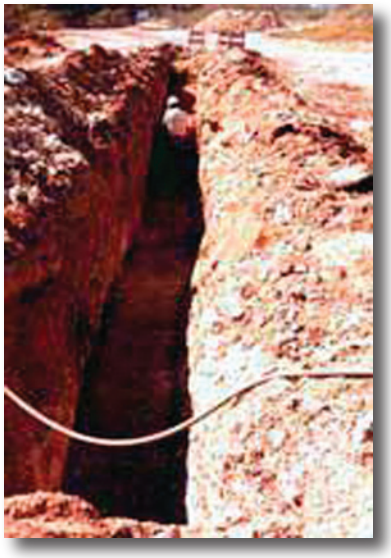
The PIPELINE

2009 I VOLUME ONE

Safety In The Trenches



This worker is in a trench with no protective system, is not sloped or benched, and has no means of egress.

Trench cave-ins cause dozens of fatalities and thousands of serious injuries annually. Fortunately, these losses are preventable. Almost without exception, these injuries and fatalities could have been prevented by installing adequate worker protective systems.

Trench cave-ins are most often caused by:

- Failure to install adequate protective systems,
- Vibration of nearby construction equipment and/or vehicular traffic,
- Surcharge loads from the weight of construction equipment and/or soil stockpiles placed too close to the ditch edge,
- Poor native soils and/or soil saturation from ground or surface waters,
- Previously excavated soils that were not adequately compacted and are unstable, and
- Changes in the soil moisture content, which weakens the trench walls.

OSHA regulations (Title 29, Code of Federal Regulations, Parts 1926.651 and 652) require the installation of protective systems for trenches five (5) feet or greater in depth. These protective systems may consist of adequate sloping and/or benching of the trench walls, the installation of aluminum hydraulic or other types of supports, the installation of protective shields, or a combination of these systems. Protective systems twenty (20) feet or more in depth must be designed by a registered professional engineer. These designs must consider: the native soil type and classification, the depth of the cut, potential changes to the soil water content, depth to groundwater, possible changes in the site conditions due to weather or climate, and surcharge loads (e.g., spoil, adjacent surface structures, traffic, construction equipment, vibration, etc.).

In all cases, a competent person is required to observe the actual on-site condition of the excavation and the protective system. This individual must be capable of: identifying existing hazards and predicting potentially hazardous, unsanitary, or dangerous conditions. The competent person must be authorized to take prompt corrective measures to eliminate or control these hazardous and potentially hazardous conditions. To fulfill this role, this individual must be knowledgeable of applicable OSHA regulations, have adequate field construction experience, and have the authority to stop work if potentially unsafe conditions are observed.

(continued on page 3)

Just Launched!

Visit Our Re-designed Web Site

EDM Services, Inc. is very excited to announce the launch of its re-designed Web Site. New features on our Web Site include Useful Links, Publications and Brochures, PDF Files, Client Testimonials, and Project Spotlights. We invite you to visit us at ***www.edmsvc.com***, where you can learn more about our services, recent projects, and exciting career opportunities!

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Kirby Hills Natural Gas Storage Engineering Peer Review/Plan Check

Lodi Gas Storage, LLC - Kirby Hills Phase II Compressor Complex

EDM Services, Inc. provides engineering peer reviews and delegate building official plan check services. Our staff has many years of experience with building and industry code compliance and interpretation. In the early 1990s, the firm began providing oil and gas plan review services to Santa Barbara County. Over the years, this business has grown to include providing delegate building official services to the California Energy Commission (CEC) and the California Public Utilities Commission (CPUC), through subcontracts with Aspen Environmental Group of Agoura Hills, California.

This type of work involves the design review of all aspects of California Building Code compliance. A typical industrial facility code compliance review includes the following:

- Seismic and wind design criteria,
- Geotechnical design criteria,
- California Plumbing Code, California Mechanical Code, and ASME Piping Codes (e.g., ASME B31.1, B31.3, B31.4, B31.8, etc.) as appropriate,
- Fire suppression systems and special equipment protection,
- Recommended practices referenced within the building codes,
- Pre-fabricated assemblies (PFAs) including approval of a fabricator as off-site structural fabricator,
- Materials to be labeled and listed (or material testing certifications) to assure minimum quality and performance standards,
- Hazardous material storage spacing for setbacks within the facility,
- ADA and OSHA requirements for handrails/platforms,
- Secondary tank containment,
- Construction inspection record keeping and inspection processes, and
- Temporary facilities during facility construction.

In 2006, EDM Services began working with the CPUC, to perform combined peer and code compliance reviews for a natural gas transportation and storage facility in Northern California, near Fairfield. In this capacity, the firm performed building and industry code reviews of a natural gas pipeline system and compressor station in cooperation with the Solano County Building and Safety Department (the local building authority). The CPUC wanted to insure that the facilities being constructed under their jurisdictional authority complied with applicable industry standards.

The Kirby Hills Natural Gas Storage Facility was designed and constructed in two phases by Lodi Gas Storage, LLC. EDM Services reviewed more than 2,000 engineering drawings and other documents over a two year period. These documents included:

- Civil, structural, process piping, pipeline, electrical, and instrumentation plan and detail drawings,
- Design calculations to demonstrate code compliance,
- Construction specifications,
- Material specifications,
- Hydrostatic testing plans,
- Welding procedures, and
- Various other project documents including third party supplied equipment drawings.

All documents were transmitted to/from the client/engineer via a secure FTP Web site in Adobe Acrobat® file format. The secure digital signatures feature of Adobe Acrobat® were utilized to provide a means to electronically transmit documents in a timely and cost effective manner while maintaining content security and document source identification. The presence of these digital signatures was periodically verified on hard copy prints during site visits to insure that the construction was proceeding using AHJ (authority having jurisdiction) reviewed and approved documents.

The Phase I design document review work began in May 2006 and was completed in 2007. This phase included the construction of a six mile, 16-inch diameter bi-directional natural gas pipeline to connect the natural gas storage facility to an existing PG&E natural gas pipeline. Other smaller diameter gas storage injection and extraction pipelines were constructed to connect this main supply pipeline to the various storage areas.

(continued on page 3)

Peer Review

(continued from page 2)

The natural gas is stored in a porous geological formation far below the earth's surface. A number of out of service natural gas production wells in the area were converted to injection and extraction wells. A central natural gas compression and dehydration facility was also constructed to control gas flows into and out of the below grade storage facility while maintaining gas quality.

The Phase I central plant included two Caterpillar® engine powered (Model 3516's) natural gas compressors and a natural gas dehydration plant. Both compressors were housed in a pre-engineered metal building. In addition to the California Building Code requirements, these natural gas transportation facilities, including the compressor building, are jurisdictional to 49 CFR Part 192 – Transportation of Natural Gas and Other Gas by Pipeline. A late Phase I scope change increased the number of connected storage wells, thereby increasing overall storage capacity.

Phase II of the project plan review began in March of 2008. This phase increased the number and volumetric capacity of the facility compressors with the installation of two new engine powered compressor units (Caterpillar® Models 3608 and 3612) housed in a separate compressor building; the overall facility storage capacity was increased by connecting additional natural gas injection and extraction wells. Construction of the second phase of this project is scheduled to be completed by late summer 2009.

Improving Trench Safety

(continued from page 1)

This individual's specific responsibilities normally include:

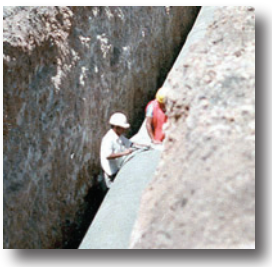
- Inspect trenches and protective systems at the start of each shift and following key events (e.g., rainstorms, seismic events, etc.),
- Test the trench for oxygen, hazardous fumes and toxic gases,
- Keep equipment and spoils away from the ditch edge,
- Provide stairs, ladders, ramps or other safe means of ingress and egress within 25-feet of workers,
- Prevent material from falling into the ditch,
- Contact Underground Service Alert (USA) at least 48 hours prior to beginning any excavation,
- Inspect the ditch and remove any trip and fall and other hazards, and
- Monitor the adequacy and stability of the protective system to provide adequate protection of workers and protection of adjacent surface facilities and substructures.

The spoil pile is required to be at least two feet from the edge of the trench and/or retained to prevent it from falling into the trench.

OSHA provides the federal regulations, along with a wealth of trench safety information and guidelines in both English and Spanish at their Web site, available at the following URL address:

http://www.osha.gov/SLTC/trenchingexcavation/construction.html

This excavation was properly inspected before the workers were allowed to work.



These workers are not protected from a cave-in, nor do they have any apparent safe access or egress from the trench.

The EDM Services team is very experienced in the design of site specific and generic shoring systems and has provided dozens of site specific shoring designs to support the construction of freeways, tunnels, pipelines, casings, high rise buildings, aqueducts and the like. The firm also provides engineering services to trench box manufacturers and has provided innovative shield designs for heavy soil loading and the long spans required to support boring and tunneling equipment. We would be pleased to consult with you regarding your excavation engineering needs.

In The Spotlight

Mohammed Kabir *graduated from California State University, Northridge in 2007 with a B.S. degree in Civil Engineering. Mohammed received career advice from his father, an architect, which helped make Mohammed's transition from student to professional a success. We are pleased that the first step of his professional life is with our firm.*

Mohammed migrated to the United States from Bangladesh in 2000. It was an interesting transition; adapting to a new culture was much more difficult than he had originally thought. However, Mohammed has always worked well under stress and high pressure situations and rose to this challenge.

Mohammed's philosophy is to work hard, be successful, achieve greatness, live well and make the best out of every opportunity that comes his way; with hard work, Mohammed believes that anything is achievable.

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