THE NEW ZEALAND INSTITUTION OF GAS ENGINEERS (INC)

NZIGE News

Volume 2005, Issue 3 **December 2005**

Newsletter to Members

December 2005

Welcome to this edition of the NZIGE News. These are produced on an 'occasional' basis to correspond with our members and keep you up to date with activities and areas of interest to the Institution. Please enjoy!

Feature articles…

- NZIGE Spring Technical Seminar 2005
- Gas Industry Conference
- Obstacle Detection for HDD
- Hazard Management in the Workplace
- Amazing Facts

2005 Technical seminar

The 2005 Spring Technical Seminar and 81st AGM were held in Lower Hutt on the 17th and 18th October 2005. "Keeping Pace with Change" was the title of this year's seminar and the topical presentations certainly demonstrated the huge amount of change occurring in the gas industry.

The council would like to acknowledge the time and effort that the presenters put in to delivering quality topical presentations. Thanks to:

Christine Southey	Gas Industry Company
Ramon Brown	Coal Research Limited
Dan Hynson	Powerco
Alan Masters	Powerco
Greg Brown	GES President
Stephen Parker	GANZ
Tony Hammond	GANZ
Chris Jobson	Utilitech
Tom Reece	EXITO
Ian Chapman	NGC
Duncan Walker	DW Associates
Michael Wright	NGC
Colin Anderson	Nova LPG
Judi Jones	Electricity and Gas Complaints Commissioner

The council would like to knowledge the following companies for supporting this year's seminar:

- Ampy Email Metering
- Lordco CWG (NZ) Ltd
- Custom Controls Ltd
- Instromet (NZ) Ltd
- System Control Engineering NZ Ltd
- Austral Powerflo Pty Ltd
- Jeff Booth Consulting Ltd
- Central Utility Supply Ltd

Horrocks Medal – 2005 seminar

The Horrocks Medal for the 2005 seminar was awarded to Ian Chapman, at a Council meeting on the 30 November, for his topical presentation titled *"Third Party Damage to Gas Distribution Assets"*.

The judges commented that the presentation was interesting, relevant and useful, well presented and accompanied by a very well prepared written paper, worthy of inclusion in the body of Gas Industry reference material.

The adjudicators and NZIGE Council acknowledge the efforts of Ian and all presenters for the high standard of presentations and the interesting topics covered at the seminar.

Ian Chapman (right) is awarded the Horrocks Medal by NZIGE President Craig Muirhead, for his presentation at the 2005 NZIGE Spring Technical Seminar.

NZIGE Golf Tournament

Anthony Salisbury about to sink another putt and Geoff Brown in the bunker again! The NZIGE Golf Tournament was held at Shandon Golf Club

NZIGE Service Fee

Background:

Since 1995 NZIGE has been a Technical Group of IPENZ. Through this relationship IPENZ has maintained our membership database and provided financial management services. This has removed a lot of the 'day to day' administration responsibilities from the President, Secretary and Treasurer which in modern company environments is a big advantage.

IPENZ have advised all Technical Groups that the current fee structure for providing these services has been reviewed with a resulting increase.

Details:

- IPENZ currently charge NZIGE $30 per member per annum incl. GST
- IPENZ has set the new fee at $33.75 per member per annum including GST being an increase of $3.75 per member per annum.
- NZIGE fee for all classes for membership will also be increased by $1.25 per member per annum incl. GST, giving a total increase of $5.00.
- The new fees are effective 1 October 2005, however due to our different subscription year; we will not be charged the increased fee until our next subscription year - 1 June 2006.
- NZIGE members who are also members of IPENZ will only have an increase of $1.25 incl. GST as they will already be paying the IPENZ increased service fee through their IPENZ subscription. Currently we have about 24 Members who are IPENZ members.
- IPENZ last had a subscription increase in 2003.

Gas Industry Conference

The NZIGE is working with the rest of the Gas Industry to hold a Gas Industry Conference in October 2006. The conference will be held in Auckland and will encompass the whole of the industry from exploration to consumer installations. This will mean that the annual NZIGE Spring Seminar will become part of the Gas Industry Conference. The NZIGE AGM will also be held during the Gas Industry Conference.

The benefits to NZIGE members include:

- A larger pool of resources for obtaining presenters both within NZ and overseas.
- Industry wide interaction and conferring.
- Contribution to industry outcomes.
- Sessions which are relevant to their work.
- Exposure to new learning and sharing.
- Professional facilitators.
- Continue to improve and advance the technical training and general knowledge of our members.
- Greater exposure and opportunity for trade displays and

Differential Impedance Obstacle Detection Sensor for Horizontal Directional Drilling

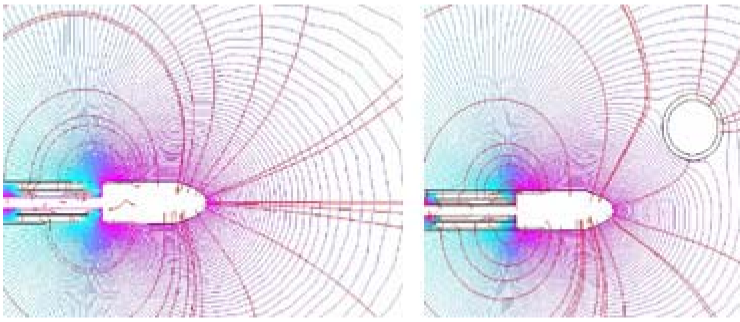
As horizontal directional drilling (HDD) grows in popularity, the natural gas industry has been increasingly concerned with the potential for striking crossing utility lines or other obstacles while conducting HDD operations. In response, Gas Technology Institute (GTI) is developing an obstacle detection system for HDD based on differential soil impedance techniques.

The Problem

With the costs for excavation and restoration accounting for about 80% of the costs of a common utility job, the gas industry has been increasingly using “trenchless” methods for infrastructure operations. For pipe installations, horizontal directional drilling (HDD) is being used to minimize the excavations and public inconvenience. With HDD, a drill rig pre-bores an underground pathway for new pipe, and then equipment pulls the pipe through the bored conduit. This technique allows for installing pipes under riverbeds and railways – installations that previously could not be performed using other techniques.

The advancement of HDD has improved the speed and efficiency of pipe installations; however, as utilities operate in increasingly congested environments, there have been cases where HDD operations inadvertently strike gas, electric, water, communications, or sewer lines. In most cases, a third party inadvertently strikes another utility, such as a gas pipe or sewer line. Consequently, researchers see a need to develop technologies that can sense obstacles in the HDD system’s path.

Some of the technologies being developed involve ground-penetrating radar (GPR). However, GPR has limitations. The high-frequency radio waves used by GPR systems are more readily absorbed by soil. Also, high-frequency operation raises the cost of the associated electronics and many require the use of an intermediate transmitter on the surface near the drill head to send data back to the drill operator.



Sensors on the drill head send signals ahead of and to the sides of the drill (left). Obstacles (right) cause changes in the electrical field.

The GTI Solution

For this project, GTI is developing a low-frequency system that addresses many of the issues of GPR-related technologies. The sensing system is self-contained and transmits the data, via the drill string, directly to the operator of the drill rig. The use of low frequency (about 50-200kHz) provides better depth of penetration compared to conventional GPR systems. In fact, a damp soil condition, which hinders the penetration of GPR, actually improves the effectiveness of the GTI system. The new system is designed to sense obstacles of all types, including metal, plastic, ceramic, and rock.

Prototype of HDD drill head with obstacle-detection capability being tested at GTI facilities.

The sensor will provide range and direction data for obstacles near the HDD head. The goal is to provide a simple, robust system that provides the information required to avoid obstacles. This must be done within the size and ruggedness constraints of the HDD equipment to cause as little modification as possible to current practices. Imaging obstacles is not within the scope of this work, as it would require a more elaborate sensor than is practical within the HDD head.

The Concept

In this concept, based on differential impedance techniques, the metallic drill head itself is used to inject a low-frequency AC signal into the soil. The current path of the electric field travels through the soil and returns to the aft portion of the sensor. Sense elements placed orthogonal to one another and just behind the tip are used to measure the changes in the electric field. There are four elements in total (two pairs). One pair of elements measures the differential of the symmetric axis, or the axis seen when the drill head is viewed from above. The other pair measures the differential of the asymmetric axis, or the axis seen when the drill head is viewed from the side. Taking the symmetric axis as an example, with no obstacle present in a homogenous soil, the signals seen by each element in the pair should be the same. When an obstacle is introduced, the signal seen by one of the elements is affected, creating an unbalanced condition. Each element scans a 90-degree field of view for a total or 360 degrees. The combination of the two axes allows for detection of obstacles directly ahead of the sensor, which has been a challenge with other technologies.

The signals from the sense elements are sent through signal-conditioning circuitry to amplify the signals to a sufficient level for display and transmission purposes. Timing is altered to allow the same coil that injects the signal in front of the drill head to also transmit the data via the drill string to a receiver at the drill rig.

Status

The development of a prototype was completed in Phase 1 in December 2004. The Phase 1 prototype was able to differentiate between plastic and metallic obstacles. A 90-degree per-sense-element view was achieved in soil with a range of at least three feet. Although proof-of-concept was achieved, the sensitivity was limited when trying to detect obstacles ahead of the tip. Phase 2 is currently under way. In this phase, a finite element-modelling program is being used to determine changes needed to better project the field lines ahead of the sensor. A new prototype based on these models and CAD models will be designed and tested in GTI's indoor soil test bed using obstacles of different materials. In-ground testing of the device in different soil properties is scheduled for 2006 to test the sensor's durability during an HDD installation.

Sponsors

- American Water Works Association Research Foundation (Phase 2)
- Gas Research Institute (Phase 1)
- U.S. Department of Energy/National Energy Technology Laboratory (Phase 1)

For more information, contact
gasoperationsinfo@gastechnology.org

Hazard Management in the Workplace

Hazard management is the cornerstone of health and safety management systems the key tool for meeting employer obligations to "take all practicable steps to prevent harm or injury". Using a systematic approach, we can identify and manage hazards so people are not harmed in the course of their work.

But where do we start?

We start by defining what we mean by 'hazard'. Put simply, we're talking about anything that could cause injury or illness in any way. In particular, we are interested in "significant" hazards — those with the potential to cause serious harm or injury.

What are the legal requirements for businesses with regard to Hazard Management?

The Health & Safety in Employment Act 1992 requires employers to identify and assess all workplace hazards, apply appropriate controls, and communicate all hazards to employees, contractors and members of the public. Hazards and controls must be periodically reviewed to ensure their ongoing effectiveness, and employees must be informed and trained in procedures to minimise harm and how to use emergency equipment. In addition, employers must give employees an opportunity to be involved in development of hazard management and emergency response procedures.

How do I meet Hazard Management requirements?

Step 1: Identification

Start by identifying all potential sources of harm or illness. To achieve this, there are three key approaches you can take:

• By area and the work activities carried out in each area (focus on activities)

• By occupation and the tasks they do (focus on people and tasks)

• By the total process used to convert raw materials into product for sale or to deliver a service (focus on process)

You'll need to determine which approach is most suited for your type of business. Keep in mind that each approach may have some limitations — in some cases, you may find it beneficial to approach hazard identification from more than one point of view.

Step 2: Risk Assessment

Once a hazard has been identified, you'll need to determine the level of risk associated with it. A risk assessment takes into consideration such factors as the frequency of exposure to the hazard, the likelihood of harm, and past history of incidents involving that hazard. It also considers the severity of the most likely degree of harm — an important distinction, as many hazards "could" prove fatal, but their most likely consequence is often something less serious. To keep hazard management practical, it must be based on realistic risk assessments — how often is it likely to happen, and what is the most likely consequence?

Step 3: Controls

Now that you know it's a hazard and what the most likely consequence is, determine what is needed to prevent that consequence. To control hazards most effectively, apply the principles of the "hierarchy of controls" to find the more appropriate solution:

1. Eliminate - Can you get rid of the hazard altogether — eg, stop using the machine or chemical by re-engineering the process so it is no longer needed.

2. Isolate - provide an enclosure or bather to minimise worker exposure to the hazard. E.g., installation of closed pipe work to transfer hazardous substances, enclosure of a hazardous machine or chemical process, install exhaust ventilation systems.

3. Minimise - Personal protective equipment (PPE) is a common means of minimising exposure risk, but it should only be used as the last line of defence if other controls are not feasible.

Step 4: Monitor and Review

When setting up controls, determine what you can do to check that the controls are effective. Periodic monitoring at appropriate intervals will ensure any gaps or ineffective controls can be proactively addressed to avoid harm. Monitoring may include examination of records of inspections, maintenance logs, registers, training records, workplace exposure and health monitoring records, and workplace observations, which can be checked during workplace inspections or audits.

What does the Hazard Management system need to include?

The hazard management system is inherently linked to other management systems such as:

• Corrective actions — to ensure actions are implemented and effective

• Incident reporting — to ensure any new hazards are identified and addressed

• Contractor management — to ensure contractors are aware of existing hazards and that any new hazards they may introduce are adequately managed

• Workplace exposure and workplace health monitoring — to measure effectiveness of controls

• Approval of new chemicals and new equipment — to ensure all new hazards are identified and managed.

As with any management system, the hazard management system should be periodically reviewed in its entirety to assess its effectiveness in managing hazards.

Where do I find out more?

Resources include:

• Approved Code of Practice for Managing Hazards to Prevent Major Industrial Accidents: www.osh.govt.nz

• How to Manage Hazards — for Small Business: www. osh.govt.nz

• Risk Management Standard AS/NZS4360:1999

Amazing Facts

Big slow change -- The Golden Gate Bridge connects two different areas that are moving toward each other. At one time they were 1,000 miles apart.

Chocolate kills dogs! True, chocolate affects a dog's heart and nervous system; a few ounces are enough to kill a small dog.

Insect control -- The 20 million Mexican free-tail bats from Bracken Cave, Texas eat 250 tons of insects nightly.

Maximum sparks -- A Positive Giant is a lightning strike that hits the ground up to 20 miles away from the storm. Because it seems to strike from a clear sky it is known as "A Bolt from the Blue". These Positive Giant flashes strike between the storm's top "anvil" and the Earth and carry several times the destructive energy of a regular lightning strike.

Oldies but goodies? -- Scientists have successfully revived some bacterial spores that were found enclosed in amber. The spores were at least 25 million years old.

Many died -- In 1918 a flu epidemic killed 548,000 people in the United States. Worldwide over 20 million people died. About half of the deaths were of people between 20 and 40 years old.

Huge leaves -- The plant with the largest leaves is a kind of palm tree called raffia (RAF-ee-uh). It has leaves that are up to 65 feet (20 m) long. That's about as long as two school busses parked end to end.

Email addresses

If you received this newsletter by post, we don't have an email address for you on our database. If you have email, please advise Bill Miller so we can add this to our list.

Email enables us to communicate quickly and cost effectively with our members.

Change of details

Could all members please ensure that any changes to contact details - address, phone no's, employer, email etc are notified to IPENZ so we can keep our membership database up to date.

We currently have a number of members that we can't contact due to incorrect details. If you know of anyone who hasn't heard from us recently, please get them to contact Bill Miller with their updated details.

NZIGE Council

The members of the NZIGE Council as elected at the AGM are:

Craig Muirhead
President
Peter Thorley
Past President
Dan Hynson
Representing Corporate Members
Geoff Brown
Representing Associate Members

Geoff Evans
Vice President
Bill Miller
Secretary/Treasurer
Gerry Thompson
Representing Corporate Members
Ian Gallaugher
Representing Associate Members

Contacts

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Our Website: http://www.nzige.org.nz/