DAMAGE PREVENTION ON GAS DISTRIBUTION ASSETS IN THE UNITED STATES

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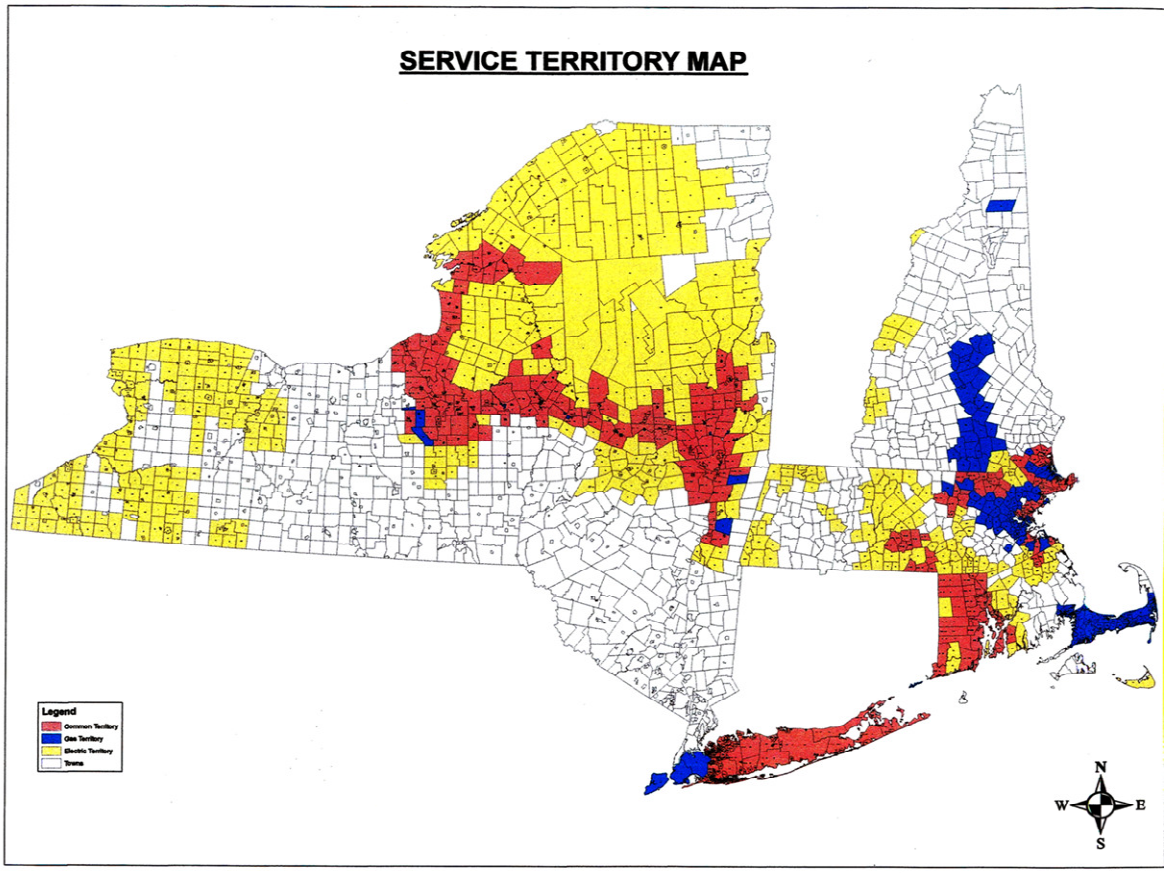
This paper will introduce the key steps and initiatives that have been taken within National Grid's US Gas Distribution business and will provide an overview of best practices and standardization steps being applied in the area of Third Party Damage Prevention.

In August 2007, National Grid completed a significant merger that put Gas Distribution on par with Electric Distribution. We had previously been primarily an electric company with some gas infrastructure; the merger created a portfolio of assets that are now 50% electric and 50% gas. The map below represents our current service territory (blue represents Gas only, red represents both Gas & Electric and yellow represents Electric only):



Our US Gas territory represents 3.4 million customers, covering nearly 32,000 miles of distribution pipeline and over 1,000 miles of transmission pipeline. Our throughput for calendar year 2008 was 696.7 MMDt (1 MMDt = 1,000,000 Dekatherms).

We have 3 regions:

Upstate New York (mainland New York State) ("UpNY")

Downstate New York (New York City & Long Island) ("DsNY")

New England (Massachusetts, New Hampshire, Rhode Island) ("NE")

National Grid's US Gas Distribution line of business has adopted a Process Ownership management model, whereby enterprise wide responsibility for a function resides. Damage Prevention is one identified process, with other examples being Leak Management, Emergency Response, Service (meter services work; read, bill & collect), Corrosion, Integrity Management, Fleet, etc. Process ownership responsibility is weighted approximately 50% during annual performance appraisals—evidence that standardization and consistency is paramount to our business as we move forward.

Over the past year, National Grid's enterprise wide Damage Prevention ("DP") team has worked diligently to avoid third party damage to our underground facilities and promote public safety. Across our US Gas Distribution line of business, we have reduced enterprise wide third party damages 20% from calendar year 2007 (2,594 damages; location request population = 555,762) to calendar year 2008 (2,109 damages; location request population = 574,873). Currently, our expected reduction (annualized) based on the first 6 months of calendar 2009, should be approximately 15%.

The team's reduction of third party damages as noted above was accomplished by:

- Closer supervision of locating staff
- Enhanced and continual training of locating staff
- Revised (& standardized) problem locate procedure
- Enhanced excavator & public awareness messages

A few of the benefits we gained by reducing damages are:

- Improved system reliability
- Reduced repair costs and related inefficiencies of dispatching a crew off scheduled work (improved financial performance and growth)
- Reduced third party damage claims & related collections process
- Met climate change initiatives by reducing release of gas to the atmosphere
- Improved relationships with regulators
- Improved company's reputation

Responsibilities of the Damage Prevention team consist of:

- Responding to tickets from the one call centers and marking out our underground infrastructure
- Responding to third party excavation damages & determining root cause
- Determining cast iron encroachments
- On site presence during blasting activity
- Responding to High Profile tickets (critical facilities)
- Improving service & mapping records
- Participating in Public Awareness and Education (Federal code)
- Participating in Excavator Education (partnering with one call centers)

Across the United States, federal code requires any excavator that intends to excavate with mechanized equipment to request utility locations (markouts) in their proposed excavation area. These requests are facilitated by one call centers. In the United States, one call centers offer "one stop shopping" for excavators relative to identifying all utilities within an excavation site. All utilities in each state provide infrastructure maps to their respective one call center. Those maps

are layered on top of each other. As a dig request is made by an excavator, the one call center's layered maps identify and list the utilities that are at the excavation site. Once the request is complete, the respective one call center notifies all utilities in the area of the excavation notice ("ticket"). Those utilities are required to respond within a statutory timeframe (usually 48 or 72 hours) and mark the area, indicating the underground infrastructure buried below.

It should be noted that one call centers do not exist within our UK business. Any contractor who intends to excavate must obtain the maps from the utility and self locate the utility to the best of their ability. The existence of international one call centers is limited—an on-line directory of one call centers indicates Australia, Canada, Finland, Scotland, Puerto Rico and the Republic of China have some form of one call centers.[1]

The enterprise wide US Damage Prevention workforce consists of an outsourced and in house workforce (internal, unionized employees). Approximately 75% of the locating work is outsourced. Regardless of who completes the work, our goals are the same:

- Improving safety (public and employee) and the company's reputation by reducing, and ultimately eliminating, the number one cause of public incidents.
- Provide an improved level of service at the lowest possible cost.
- Assist the excavator in practicing safe excavation practices.
- Improve the company's maps & records by recording deficiencies noted while in the field.
- Building relationships with contractors working on behalf of the Company.
- Ensuring the ratepayer is fully reimbursed by following a consistent third party damage claims/collection process.
- Educating the general public about buried underground facilities.
- Supporting Field Operations' environmental initiatives and the company's climate change initiatives.

We have several departments we interface with during the normal course of business including:

- Corporate Communications (public awareness)
- IT (website, maps & records, third party damage data summarization & trending)
- Dispatch (third party damage notifications)
- Field Operations (assistance when facilities are unlocatable, cast iron encroachments, excavations near critical facilities)
- Integrity Management (transmission pipeline patrols)
- Customer Metering Services (third party damage first responders)
- Mapping (maps & records updates)
- Claims/Collection (billing and collection of third party damages)
- QA/QC (quality assurance and control of markouts and markout process)
- Learning & Development (locator training and operator qualifications)
- Network Strategy (identification of cast iron encroachments with potential for replacement)
- Asset Management (PAS 55 certification)
- Supply Chain Management (contract renegotiations and contract issue resolution)
- Finance (monthly budgetary reporting and forecast preparation)

[1] *One Call Directory: Dig Safely*. (2003, April). Retrieved July 14, 2009, from http://www.allbusiness.com/real-estate-rental-leasing/rental-leasing/533046-1.html

One of the first things our team implemented across our entire US gas distribution footprint was a Cable Avoidance Tool ("CAT"). This was a tool promoted by the UK that has been and still is used with much success. Prior to our crews digging, the excavation area is swept for "stray" or unidentified electric cables. It is not a locating tool, but it is a safety device to protect our crews from electric cable strikes. The US Gas Distribution crews have been using this for a year now; in recent crew location meetings, we received feedback from our gas crews indicating they need additional training on the use of the tool—an encouraging sign that the crews are, in fact, using the tool as a safety device. We are working with the manufacturer of the CAT to create a short training video, a corresponding list of FAQ's and conduct site visits with crews for hands on training.

Most of what the enterprise wide team has accomplished since we officially merged surrounds continuous improvements made to our processes. In that light, National Grid supports the use of local MBA students to assist in identifying both common and unique practices across regions and to help understand regulatory and statutory differences. The Company's support of the MBA program allows students to apply classroom learning to real world managerial situations. In the fall of 2007, the Company piloted its first MBA program. The pilot program was targeted towards Damage Prevention, as the process is very mature.

Using a baseline damage prevention process flow for the UpNY territory (created using Visio), the students were able to meet with regional damage prevention managers and lay out the process flows within the remaining regions. This afforded them with a very good platform that exposed similarities and differences among all regions. The students also reviewed third party damage reporting across all regions. Suggestions were made to 1) streamline the reports so that any reader could evaluate them, understand the statistics and easily compare regions and 2) automate the report generation (currently, the various regions spend a considerable amount of time at the beginning of each month pulling ticket counts and reporting third party damage information).

A final task the students were able to complete was an online excavator survey emailed to excavators on record (registered with our one call centers) within our US Gas Distribution territory. The primary reason for the survey was to collect information from outside the company with regard to the QUALITY of locates (timeliness, accuracy, legibility) and to determine if best practices exist in regions that we might not be aware of. Additionally, we were interested in getting feedback regarding excavator education (preferred communication methods) and increasing public awareness about safe digging practices. Some results of the survey will be discussed later.

The work the MBA students performed helped us to move forward in standardizing:

- Third party damage ROOT CAUSES
- Third party damage reporting, at 3 levels
    - US Gas Distribution (high level--reviewed by US Gas Distribution senior leadership & reported to state regulators)
    - Common Ground Alliance Damage Information Reporting Tool ("CGA DIRT")
    - Damage Prevention managers/supervisors (detailed reports with root causes)
- Reporting third party damages (and collection activity) through a common IT platform
    - auto generate reports
    - enhanced trending analysis
    - integrate with operational work scheduling and management systems
- Public awareness campaigns
    - awareness of 811, the federally-mandated, nationwide "Call Before You Dig" number, designed to eliminate confusion over multiple "Call Before You Dig" numbers
    - effectiveness of damage prevention messages on our website (www.nationalgridus.com)

Recently, we have standardized across the enterprise, our process for identifying unlocatable facilities, commonly referred to as "problem locates". We consider a facility unlocatable when a sketch or map does not correspond with the signal that is received from the locating device. At this point, we spend extra time trying to locate the facility. This time includes traveling to the company's operating facility to determine if additional records exist (service records, as built maps). If they don't exist, a call to a field supervisor is made. Many times the field supervisor has institutional knowledge of the installed facility, along with several years of construction experience, and can sometimes verify a machine's signal or suggest further action. In some instances, that action includes a low dig option for digging in the vicinity of the proposed excavation. Low dig options are: hand digging or vacuum excavation. Once the facility is identified, we induce tone, trace out the facility and then prepare a map/service record update (turned in to mapping department for incorporation into and update of our records). This standardized problem locate process reduces third party damages, complies with our climate change initiative (reduction in damages results in less gas released to the atmosphere), improves our maps and records, improves our system reliability and improves our safety to the public and our employees.

Overall, standardization is happening at a slower pace than anticipated. One of the major reasons is the lack of a standard staffing model for the Damage Prevention group. As noted earlier, we currently perform damage prevention work with different staff, as follows:

Region	Current Gas locator	Current Electric locator
Upstate NY	Contractor 100%	Contractor 100%
New England - Massachusetts & New Hampshire	In House 100%	Contractor 100%
New England - Rhode Island	In House 100%	Contractor 100%
Downstate NY-Long Island	Contractor 100%	Contractor 100%
Downstate NY-Brooklyn/Queens	Contractor ~60%	NA
Downstate NY-Staten Island	In House 100%	NA

Additionally, in certain areas, there are "extended damage prevention teams" that partner with Damage Prevention. These teams are made up of gas operations employees that report to operating yards. They assist us with our problem locates, transmission line patrols, cast iron encroachments and other miscellaneous activities that arise. It should be noted that these employees don't report to Damage Prevention management. They work for the managers of the operating yard and their costs are budgeted within the yards' annual operating budgets; however, the damage prevention manager controls the budget for the activities when they assist us. This creates an issue when trying to capture the true costs of damage prevention. Transparency of the actual cost of damage prevention becomes obscured. This transparency and full disclosure reporting creates another opportunity for improvement.

It should also be noted that in areas where the damage prevention work has been outsourced, there are different operating models as well. In our UpNY territory, it is a complete turnkey operation beginning with the receipt of the ticket from the one call center to the positive response to the excavator. The locating contractor handles all cast iron encroachment reporting, high profile tickets (ex., transmission gas main or electric transmission lines), quality assurance. In the DsNY area, cast iron and high profile tickets are turned over to the operating yards and dispatching of the tickets (to the contractor) is handled by in house staff.

Going forward, the Damage Prevention group will be working towards developing a staffing model and organization that will support a consistent approach to all aspects of damage prevention. Key areas of improvement include: 1) enterprise wide devoted organization that will be responsible for its own budget and all its own activities and 2) consistent staffing across all

regions, so that supervisors in all regions are completing the same tasks the same way. Once we are able to "look" the same, then we will be able to insert the model for any future opportunities.

In addition to the above differences in staffing, our electronic mapping and ticket management systems are also inconsistent. Our electronic mapping (for gas mains) differs in each state we operate in, although prior to the most recent merger, National Grid's mapping systems were aligned and consistent. There are pros & cons for the systems we currently use.

Pros include:

- Some maps were scanned using digitization (scan that recognizes certain characteristics such as color codes representing pipeline material or pressure).
- Some maps have a relational database, which allows the user to form an immediate image of the service connections (however, this is a more costly up-front option and could also be misleading to users not familiar with the data).

Cons include:

- Most of our service laterals are simple scanned pictures (raster documents). This requires more memory and retrieval is slow. Additionally, records are missing.
- Some maps must be converted by the locator (using a 30 scale tool).

The worldwide economic recession has impacted the company's technology strategy and has temporarily placed efforts on hold enterprise wide. Certain technology change is still on course in the UK and it is anticipated that once complete in a few years, the same suite of systems will be implemented in the US. Work management systems and mapping systems, however, are current victims of the "hold". Once the project resumes, we intend to participate in discussions over what the future electronic mapping/records needs of the Damage Prevention group will be. It is uncertain at this time if a data cleanup will occur during the transformation project; that is an arduous task and will be addressed later. A standard mapping platform will further improve our standardization.

As a result of the recent merger, we inherited four different ticket management systems. Ticket management systems are software solutions used by damage prevention staffs that help provide reliable, streamlined and affordable dig request processing. This processing consists of receiving, distributing and responding to tickets and also allows the user to run ad hoc reports. As noted earlier, the one call centers in the US all interface with a respective ticket management system (regardless of who performs the damage prevention work); there are many products available. We are hopeful that by mid 2010, we will have one ticket management system that will satisfy all our needs. It will need to be accessible by the contracted workforce and the same purview needs to be available to in house staff managing the contractor. It also needs to be integrated into the operational work scheduling and management system in our NE region, as that is the mechanism used by the internal workforce (provides for daily workload of tickets and timesheet entry). One ticket management system will help all regions review tickets on a standardized and consistent basis and is, again, another opportunity for comparisons, trending and improvement.

Another idea that could significantly help us improve is to push a nationwide effort of benchmarking. Currently, through the CGA, utilities can enter their annual third party damage statistics into a tool supported by CGA called CGA-DIRT (Common Ground Alliance Damage Information Reporting Tool (www.cga-dirt.com)). The reporting is anonymous and allows utilities to see how the industry is performing on a regional and overall basis.

Although CGA DIRT is a very useful tool, a nationwide benchmarking effort focused specifically on classifying third party damages consistently and appropriately and also calculating damage ratios would be even more useful. In early 2010, it is anticipated that the American Gas

Association ("AGA") will hold a Damage Prevention committee meeting that will discuss "all things damage prevention". We are hopeful it will include discussion on how to properly count tickets (for purposes of calculating damage ratios) and how to appropriately classify third party damages (locator errors, map/record errors, company (crew) damages to our facilities, excavator errors, etc.). These items are handled extremely differently across utilities nationwide, so it is rather difficult to fairly compare and benchmark statistics.

Data clean up is critical to improving our safety record and one way to accomplish that is to record GPS coordinates of mains and services. While it would take a great deal of time and effort to complete, the benefits could be significant: reduce third party damages, reduce future O&M costs, enhance facility locating and keyhole technology and reduce future restoration costs. The idea would be to initially implement in areas where underground utilities are new or being replaced—when as-built drawings are turned in post completion, every bend or change in direction has had GPS coordinates taken and recorded. An inventory would need to be kept of which underground facilities have GPS coordinates and mapping systems would need to be enhanced to offer this capability. This would significantly decrease damages—for the tickets that are called in. Another area of importance and opportunity will be effectively educating excavators who are new to the industry or who don't care about digging safely.

One of the final efforts we are taking action on is in the area of enhancing our public awareness campaigns. As noted in the survey the MBA students performed for us, excavators want to use industry meetings and our website to get information about safe digging. In the past, we have typically limited our public awareness campaign to that required by the federal government—the once a year bill insert. The problem is that medium has not kept pace with technology…and in fact, the survey results indicated that was the least effective way to educate excavators. There are many customers who are enrolled in the budget plan (pay the same amount every month, spread out over a year) and subsequently, never open their utility bills when they arrive in the mail. Additionally, there are several customers who no longer receive bills through the mail—they receive their statements and pay their bill online. So we are finding that our education programs need to keep pace with the technology changes. To enhance the innovativeness of our public awareness campaigns and effectively reach excavators, who many times are also our customers, we have implemented or are in the process of implementing the following:

- Enhancing our external website (www.nationalgridus.com) with safe digging messages and including the nationwide 811 logo. The message below was displayed on our external website during the month of April:

- Enhancing the Company's web pages frequently visited (ex., turn on/turn off requests; online bill paying, etc.) with safe digging messages, including the 811 logo:

- Damage Prevention staff now participate in the Company's annual gas mechanic refresher training (stressing importance of service records & installation practices).
- Partnering with our business & economic development departments to include our Damage Prevention message in community outreach letters (ex., requests for paving

letters are sent to municipalities annually—we have been successful at including a damage prevention message in those letters).
- Focus specific education messages towards towns and municipalities and holding specific education sessions with and for them.
- Including the 811 logo on our entire National Grid fleet (gas and electric—approx 10,000 vehicles company wide).
- Including damage prevention messages in our email signatures.

It becomes apparent that although we have made great strides in improving our safety statistics by reducing third party damages, we have a long way to go to become fully standardized. Third party damages are the number one concern of federal and state regulators which is why damage prevention at National Grid is so critically important. The next few years will be pivotal for us and the ideas noted above represent a clear path for the actions that need to be taken to get us to a world class damage prevention organization.

Some of the information above can also be referenced at Common Ground Alliance's Damage Prevention Best Practices Report.[2]

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The power of action.

[2] US Dept of Transportation, Office of Pipeline Safety. (1999, August). Chapters 3-6. In *Common Ground: Study of One-Call Systems & Damage Prevention Best Practices* [Best Practices Report]. Retrieved July 14, 2009, from United States Department of Transportation; Research and Special Web site: http://www.commongroundalliance.com/Content/NavigationMenu/Best_Practices/Common_Ground_Study/CommonGroundStudy090499.pdf