2013 Pipeline Safety Seminar

National Grid
NYPSC Control Room Management Audit

U.S. Gas Control
September 24-26, 2013
National Grid US Overview

- Gas Transmission and Distribution in 3 states
- Approximately 3.5 million gas customers
- Approximately 36,000 miles of Distribution main
- Approximately 500 miles of Transmission main
- Approximately 2.6 million services
- Peak Day Capacity of 5.2 BCF
- Annual system throughput of about 700 BCF
Pipeline and Hazardous Materials Safety Administration (Part of the DOT)

- Control / Human Factors Final Rule - February 1st 2010
- 18 month period to Develop program – August 1st 2011
- 18 month period to Implement program – February 1st 2013
- On June 16th 2010 expedite Implementation – October 1st 2011 (San Bruno)

Exception; Adequate information, Fatigue mitigation, Alarm Mgmt and Training – August 1, 2012
Major Sections of Rule 192.631

- Roles and Responsibilities
- Adequate Information
- Fatigue Mitigation
- Alarm Management
- Change Management
- Operations Experience
- Operator Training
- Compliance Validation
- Compliance and Deviation
National Grid- Control Room Management Procedure

- Roles and Responsibilities
  - Defined the responsibilities of the operators during the following conditions.
    - Normal
    - Abnormal
    - Emergency

- Logging Procedure
  - Mandated Logging Procedure
  - E-Logging
Adequate Information

- SCADA Displays - API 1165
- Point-to-Point Verification
  - Policy 03002-PL and SCADA Point-to-Point Verification Policy
- Internal Communication Plan (BCP)
- Back Up SCADA
  - Center to Center Changeover
- Shift Turnover
### Control Room Management Shift Turnover Policy

#### Gas System Control – Shift Turnover Checklist

<table>
<thead>
<tr>
<th>Emergencies/Abnormal Operating Conditions</th>
<th>Yes</th>
<th>No</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>• Valves</td>
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<tr>
<td>• Gas System Events</td>
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<tr>
<td>• Pipeline Companies (OFO’s – Critical Notice)</td>
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<tr>
<td>• Weather Constraints</td>
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#### Daily Operating Information:

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<thead>
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<th>Daily Operating Information</th>
<th>Yes</th>
<th>No</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>• System Pressure Review (Bar Charts)</td>
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<tr>
<td>• Gate/Regulator Taken Out/Returned to Service</td>
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<tr>
<td>• Gate Stations Abnormal Conditions</td>
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<tr>
<td>• Power Plants</td>
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<tr>
<td>• LNG Equipment Status</td>
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<tr>
<td>• Pipeline</td>
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<tr>
<td>• SCADA Issues (Telecommunications Failures)</td>
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#### Gas Day Setup Information:

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<th>Yes</th>
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<tbody>
<tr>
<td>• Gas Scheduled at City Gate</td>
<td></td>
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<tr>
<td>• Progress on Gas Day/Remaining Balances</td>
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<tr>
<td>• Supplemental Supply Service In-Use: (LNG, LNG Trucking, Propane, and/or Peaking)</td>
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#### Status of Scheduled /Unscheduled Maintenance Activities:

<table>
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<th>Comments</th>
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<tbody>
<tr>
<td>• Ongoing Field Work</td>
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<tr>
<td>• SOP’s: Critical Jobs for Review</td>
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#### Incident Information:

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<tbody>
<tr>
<td>• Gas Main Interruptions/Damages</td>
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<tr>
<td>• Odorant Issues</td>
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#### Change of Physical Assets/Procedures:

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<th>Comments</th>
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<tbody>
<tr>
<td>• Physical Changes to Facilities</td>
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<tr>
<td>• Procedures for Review</td>
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#### Alarm Review:

<table>
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<tbody>
<tr>
<td>• Critical Alarms</td>
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<td>• Inhibited Alarms</td>
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<tr>
<td>• Nuisance Alarms</td>
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<tr>
<td>• Modified Alarms</td>
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</table>
Third Party Incidents – Potential Impact to Operations:

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<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Comments</th>
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<tr>
<td>PSC/Regulatory Notifs</td>
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<tr>
<td>Emergency Dispatch</td>
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<tr>
<td>Notifications</td>
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<tr>
<td>Security Notifs</td>
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Key Personnel Availability:

- Gas Control Manager/Chief System Operator
- Gas Control Operators
- I&R – Manager/Supervisor
- I&R – Off-Hour Coverage
- LNG – Manager/Supervisor

Box Key: Yes – Important Information Requires Discussion during Turnover

Operator on Duty: Exchanged information provides a status of current system operations and includes critical information based on a review of the operator logs.

Operator Reporting for Duty: I understand the exchange of information and accept the responsibility for the shift.
Fatigue Mitigation

- One of the PHMSA’s most important and stressed sections of the ruling
  - On the first trial audit, PHMSA brought 10 auditors with 4 focused solely on Fatigue Mitigation as well as outside fatigue experts.

- Schedules (HOS) and Fatigue Assessment
  - Maximum of 65 hours in a sliding 7 day work week.

- Education- Recognize signs of fatigue

- Commute Time- calculated in the minimum hours of rest.

- Fatigue Countermeasures
National Grid
Fatigue Mitigation Efforts

- **Circadian Technologies** – contracted in 2008 to provide needed services.

- **Completed Employee Diagnostic Survey**

- **Completed Schedule Assessment** – adopted schedule to provide off duty time allowing 8 hrs sleep between shifts.

- **Employee Training** – completed Spring 2010. Operators trained to recognize the effects of fatigue. “Managing a Shiftwork Lifestyle” discusses all aspects of sleep and fatigue, managing stress, substance use and abuse, social and family issues.

- **Established Fatigue Mitigation Plan** – supplemented by two additional policy’s – Overtime and Vacation Policies.
Alarm Management

- Alarm Philosophy

- Alarm Priority
  - Critical (SRE), Medium, Low and Informational
  - Annual Review of SRE Set points, Alarm Management Plan, Operator Content and Volume of Activity
  - Management of Change (SCADA)
Change Management

- Physical Changes to the Gas System
  - SOP Process
  - I&R Communication
  - Gas Control involvement in planning, meetings, etc.
Operating Experience

- Incident Review- Require Incident Review for Control Room contribution to accident if one of following met.
  - Death or personal injury requiring in-patient hospitalization
  - Estimated property damage of $50,000 or more
  - Unintentional estimated gas loss of three million cubic feet or more
  - Emergency shutdown of LNG facility
  - Judgment of the operator
Operating Experience

- Did Control Room contribute to incident with deficiencies in:
  - Controller Fatigue
  - Field Equipment
  - The operation of a relief device
  - Procedures
  - SCADA system configuration
  - SCADA system performance

- Lessons Learned
Operator Training

- Establish and track training for the following:
  - Abnormal Operating Condition
  - Table Top Training
  - Operator Emergencies
  - Pipeline Systems
  - Infrequently Used Operation Procedure
Compliance, Validation & Deviation

- We must comply with CRM ruling
  - We must submit procedure as requested
  - We must track deviations and analyze for continuous improvement to the procedure
    - Developed monthly deviation document to prompt Chief System Operator on possible deviations
National Grid’s Experience
NYPSC CRM Audit

- NYPSC audit scheduled for 3-1/2 days – Aug 26th to 29th – three weeks notice provided
- NYPSC followed PHMSA CRM inspection form
  - 55 page document
  - 114 specific questions
- National Grid was the 2nd LDC audited by the NYPSC
  - First was Central Hudson – ~75,000 cust. / 22 BCF/year
- In preparation of Audit
  - Performed detailed reviewed of CRM procedures
  - Answered all questions in advance
  - Created file to document examples of compliance
Inspection Tips
From Others

- Things to avoid:
  - Part Time Controllers
  - SCADA VS DCS
  - Ghost Shift Change
  - Controllers Commute time

- Be prepared to discuss
  - Roles and responsibilities
  - Emergency Response plans
  - Fatigue Mitigation
  - P2P testing
Gas Operations Organization

- COO US Operations
  - VP Control Centers – (reports to COO)
    - Gas System Control – Tom Amerige
  - Sr VP US Gas Operations – (reports to COO)
    - VP Operations NY – (reports to Sr VP)
    - VP Customer Meter Services - (reports Sr VP)
Gas Control Center
New York: By the Numbers

Controls LI, NYC and NY-Upstate including:
- 28 Take stations
- 2 Interconnects
- 2 LNG plants
- 952 District regulator stations
- 2.36 million gas customers
- Design Day Flow  3,302,612 dt

Staff
20 Gas controllers
2 SOP coordinator
1 Engineer
1 Gas scheduler
1 Chief gas controller
3 Managers
Gas Control Center
New England: By the Numbers

Controls Grid MA and RI including:
- 54 Take Stations
- 2 Interconnects
- 11 LNG Plants
- LNG Liquid Transport
- 729 District Regulator Stations
- 1.1 million gas customers
- MA – 1,500,588 DTH
- RI – 351,936 DTH

Staff:
- 11 Gas Controllers
- 2 SOP Coordinators
- 1 Gas Scheduler
- 1 Chief Gas Controller
- 1 Manager
Gas Control has consolidated the number of control rooms from 9 to 2. Operates in:
Northborough, Massachusetts
Hicksville, New York

Each Control Room has the ability to operate the entire gas system

Each Control Room acts as the alternate control room for the other.
Gas System Control Overview

- **Gas System Control is responsible for:**
  - Operating, monitoring and controlling National Grid’s US Gas Transmission and Distribution systems. Gas System Control monitors the gas system on a 24x7x365-day basis. It also coordinates all construction and maintenance activity that may alter or affect the flow of natural gas within the network by issuing and tracking permits to work or System Operating Procedures.
  - Monitoring upstream interstate pipeline operations to ensure gas quality and supply reliability in accordance with applicable pipeline tariff provisions.
  - Identifying system gas requirements and allocating city gate capacity on a daily and non-discriminatory basis, confirming the delivery of all gas being delivered to its “city gates” by third-party marketers, as well as gas being delivered to meet National Grid’s own system supply requirements.
  - Issuing system notices and alerts as needed to ensure the reliability of the gas system during peak critical-load periods and emergencies to ensure system reliability.

- **Organization: New York Gas Control operations are split into two functions:**
  - Desk Operations - Day to day operations – monitor, operate and control gas system - 24 Employees
  - Back-office Support - Gas Scheduling and SOP support – Maintain SOP and EBB websites, nominations/confirmations and issue permits to work to Field Operations. - 5 Employees
National Grid’s CRM Philosophy

- Comply with code as written but also comply with the spirit of the rule.
- Be best in class. Use industry “best practices”.
- Provide our operators with the tools and training such that our operators can recognize and mitigate system conditions before they become critical alarms.
- Recognize that no plan is perfect and we need the ability to modify the plan as needed to stay best in class.
- Use experts as needed and steal shamelessly.
NY PSC Audit Kickoff
Gas NY Operations

- Tour of Gas Control Center
- Access and Security
- PSC Interaction with Operators
- Gas Control Audit Team
  - Gas Control Managers - Keith Rooney, Phil Echevarrio
  - SOP/EBB Manager - Clara Giustino
  - Chief Gas Operator - Rich Delaney (Lead)
  - SCADA Manager - Mike Benedicto
  - Director Gas Control / Meter Data - Tom Amerige
National Grid’s Experience
NYPSC CRM Audit

- Focus on shift schedules and 65 hour rule
  - Changes and deviations – approval process
- Fatigue and Counter measures
  - Breaks / Exercise Equipment
  - Coffee / Sleep Room
  - Light Control
  - Employee interaction
- Business Continuation Plans and testing
- Metrics on Fatigue Management
- Inclusion of PHMSA FAQ’s
- Shift turn-over
National Grid’s Experience
NYPSC CRM Audit

- Review and signs-off on CRM procedures
- Record Keeping is critical
  - e-logger
  - SAP (time entry)
  - SCADA log-on/off
  - Shift turn over form
- Point to point testing and training
- Change control process
- SCADA System design - production/testing
- Roles and responsibilities
National Grid’s Experience
NYPSC CRM Audit

- Main focus of Audit was the plan itself.
- Having Documented Procedures covering all 9 sections
- Specific documentation to ensure conformance and performance will likely be future focus
- Operator Training
Other LDC Experiences

PHMSA CRM Audit

- Audit last 4 - 5 days
- Interviewed operators for 2.5 hours
- Interviewed Trainers
- Multiple regulatory auditors 1-4
- BCP’s and alternate sites
- Critical sites
- Checked light levels, breaks, exercise
- Documentation focus – Training, Fatigue Mgmt, SCADA, P2P