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Control Room Management



U.S. Gas Control

US Gas Control Facts National Grid

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- **Gas Transmission and Distribution in 4 states**
- **Approximately 3.4 million gas customers**
- **2 Existing Gas Control Centers, Hicksville Long Island, and Northborough, Mass.**
- **Approximately 40 Gas System Operators controlling a combined yearly throughput of about 700 BCF**

Gas Control Center
New York: By the Numbers

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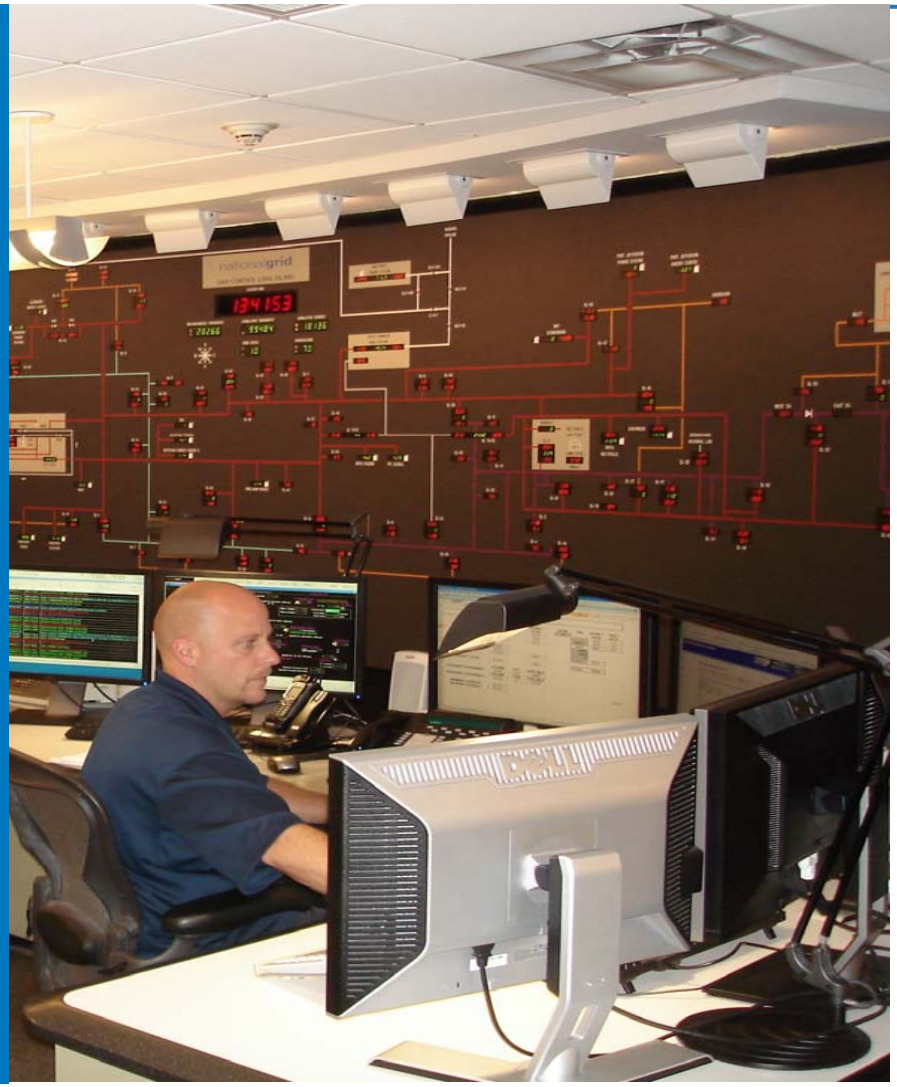
Controls LI, NYC and NY-Upstate including:

- **28 Take stations**
- **2 Interconnects**
- **2 LNG plants**
- **904 District regulator stations**
- **2.2 million gas customers**
- **Design Day Flow 3,335,000 BCF**

Staff :

20 Gas controllers
1 Chief gas controller
2 GC Managers- NY / LI&NYU
1 SOP/EBB Manager
2 SOP coordinators
1 Engineer
1 Gas scheduler



Where did this all come from?

- National Transportation Safety Board
  - 2005 Supervisory Control and Data Acquisition (SCADA) in Liquid Pipelines- Safety Study
    - Looked at 2004 Data- 141 Accidents resulting in 5 fatalities, 13 injuries and over 130 million dollars in property damage.
    - Highlighted 10 of these accidents where a combination of Human Factors combined with SCADA errors were found to be the root cause of the resulting accident.

Video

- http://youtu.be/EZ6YbUrnxVM

Abstract

- **National Transportation Safety Board. 2011. *Pacific Gas and Electric Company Natural Gas Transmission Pipeline Rupture and Fire, San Bruno, California, September 9, 2010*. Pipeline Accident Report NTSB/PAR-11/01. Washington, DC.**
- **Abstract:** On September 9, 2010, about 6:11 p.m. Pacific daylight time, a 30-inch-diameter segment of an intrastate natural gas transmission pipeline known as Line 132, owned and operated by the Pacific Gas and Electric Company, ruptured in a residential area in San Bruno, California. The rupture occurred at mile point 39.28 of Line 132, at the intersection of Earl Avenue and Glenview Drive. The rupture produced a crater about 72 feet long by 26 feet wide. The section of pipe that ruptured, which was about 28 feet long and weighed about 3,000 pounds, was found 100 feet south of the crater. The Pacific Gas and Electric Company estimated that 47.6 million standard cubic feet of natural gas was released. The released natural gas ignited, resulting in a fire that destroyed 38 homes and damaged 70. Eight people were killed, many were injured, and many more were evacuated from the area.
- As a result of its investigation of this accident, the National Transportation Safety Board makes recommendations to the U.S. Secretary of Transportation, the Pipeline and Hazardous Materials Safety Administration, the governor of the state of California, the California Public Utilities Commission, the Pacific Gas and Electric Company, the American Gas Association, and the Interstate Natural Gas Association of America.
- The National Transportation Safety Board is an independent

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Incident Sky View

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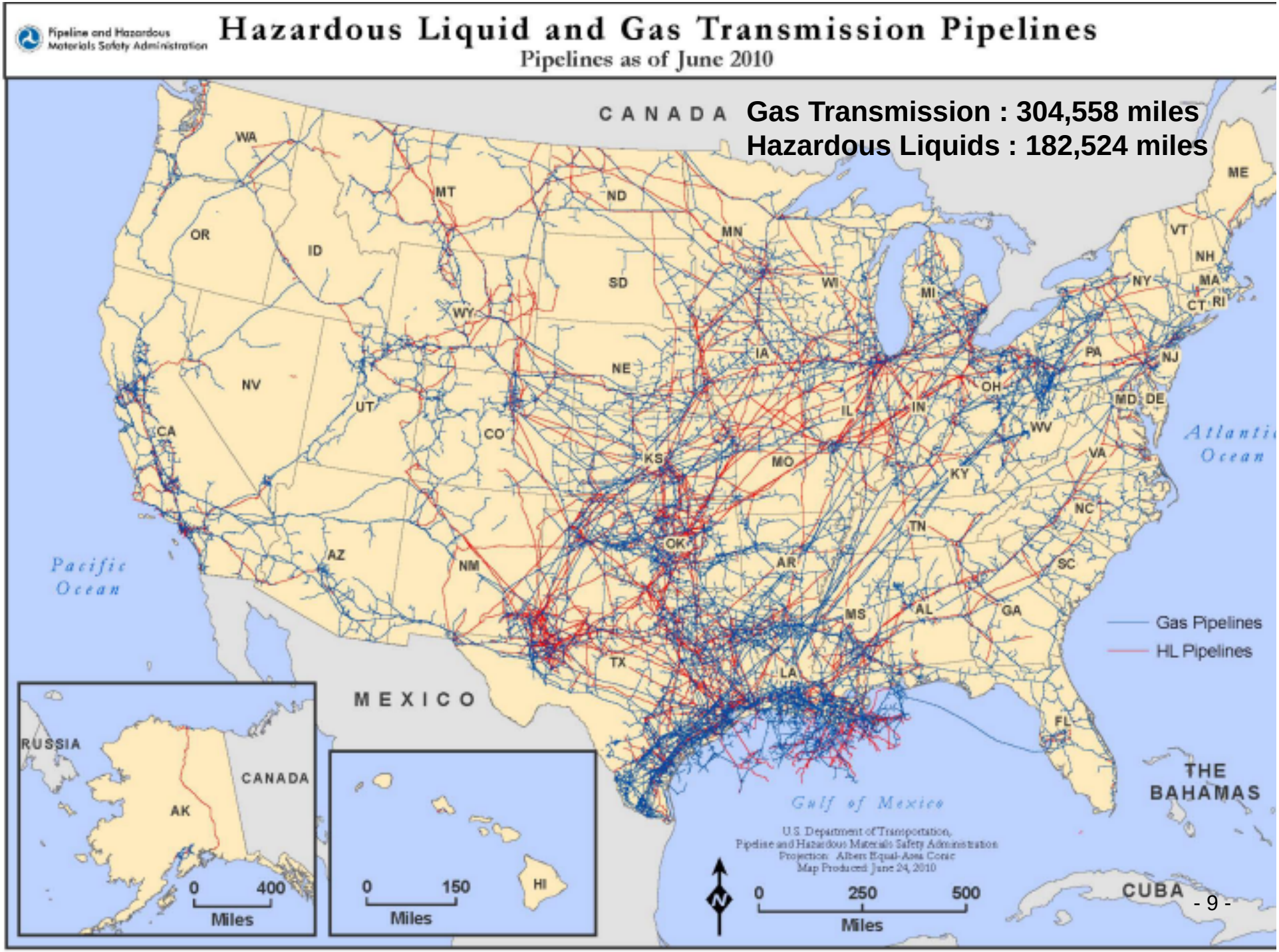
Location of the Fire


Pipeline and Hazardous Materials Safety Administration
Hazardous Liquid and Gas Transmission Pipelines
Pipelines as of June 2010
Gas Transmission : 304,558 miles
Hazardous Liquids : 182,524 miles
CANADA
MEXICO
Pacific Ocean
Atlantic Ocean
Gulf of Mexico
THE BAHAMAS
CUBA
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
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OH
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GA
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PA
NY
MD
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NJ
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RI
MA
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NH
ME
Gas Pipelines
HL Pipelines
RUSSIA
CANADA
AK
0 400
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HI
0 150
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Miles
U.S. Department of Transportation,
Pipeline and Hazardous Materials Safety Administration
Projection: Albers Equal-Area Conic
Map Produced: June 24, 2010

PHMSA

- **Pipeline and Hazardous Materials Safety Administration** (Part of the DOT)
  - Created in 2004, focused solely on its pipeline and hazardous materials transportation programs.
  - CFR 192.631 created to regulate Control Room Management (CRM).
  - Original Deadline for CRM Regulations was February 1, 2013.
    - Moved forward to August 1, 2013
      - 182,524 miles of hazardous liquid pipeline
      - 304,558 miles of gas transmission. 1.9 million miles of gas distribution pipeline.

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

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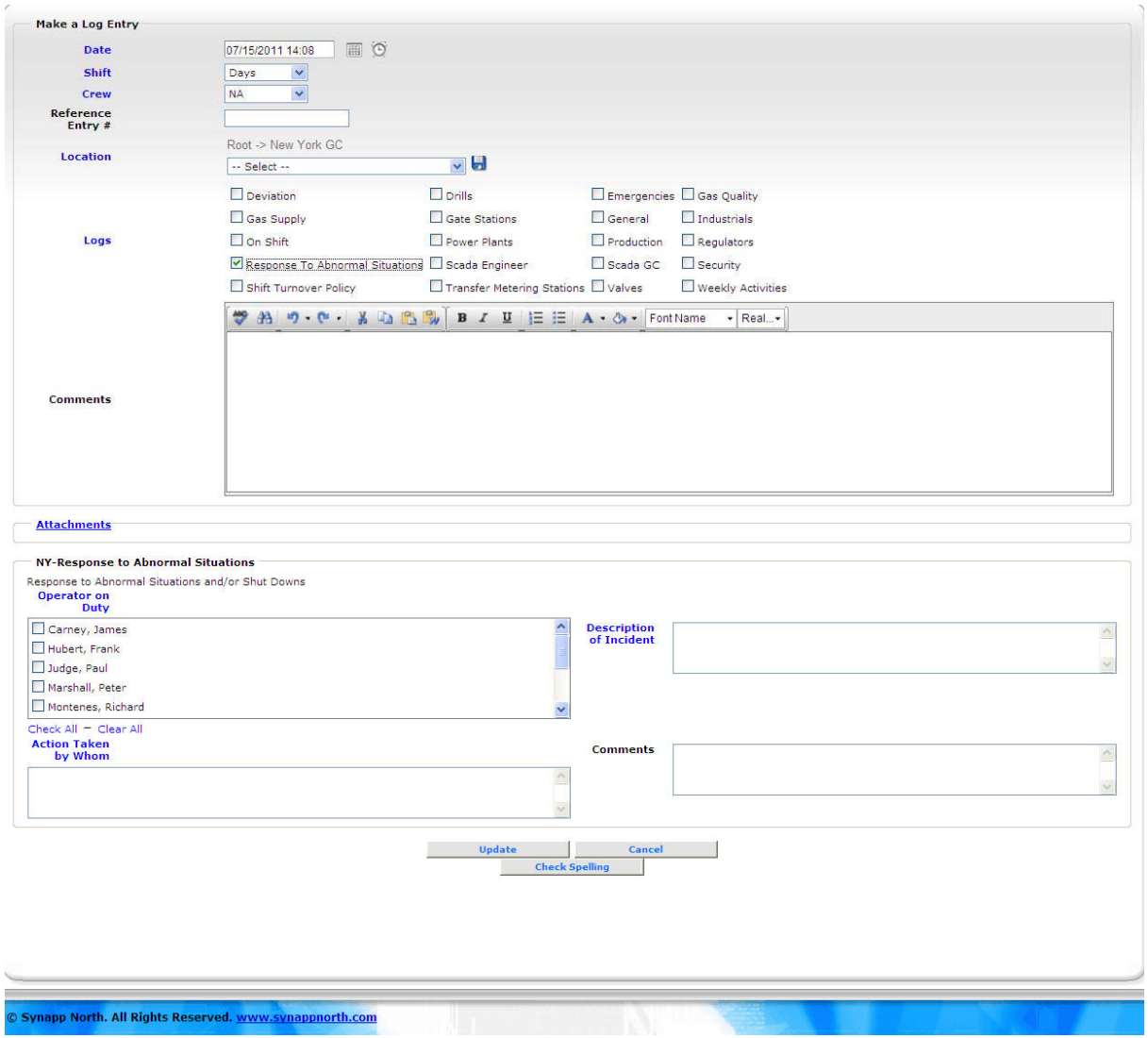
- Roles and Responsibilities
  - Defined the responsibilities of the operators during the following conditions.
    - Normal
    - Abnormal
    - Emergency
  - Logging Procedure
    - Mandated Logging Procedure
    - E-Logging

E-Logger


Make a Log Entry
Date
07/15/2011 14:08
Shift
Days
Crew
NA
Reference Entry #
Location
Root -> New York GC
-- Select --
Logs
Deviation
Drills
Emergencies
Gas Quality
Gas Supply
Gate Stations
General
Industrials
On Shift
Power Plants
Production
Regulators
Response To Abnormal Situations
Scada Engineer
Scada GC
Security
Shift Turnover Policy
Transfer Metering Stations
Valves
Weekly Activities
Font Name
Real...
Comments
Attachments
NY-Response to Abnormal Situations
Response to Abnormal Situations and/or Shut Downs
Operator on Duty
Carney, James
Hubert, Frank
Judge, Paul
Marshall, Peter
Montenes, Richard
Check All - Clear All
Description of Incident
Action Taken by Whom
Comments
Update
Cancel
Check Spelling
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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

Shift Turnover Log (pg 1)

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Control Room Management Shift Turnover Policy

Gas System Control – Shift Turnover Checklist

	Yes	*No*	*Comments*
Emergencies/Abnormal Operating Conditions:			
• Valves	☐	☐	
• Gas System Events	☐	☐	
• Pipeline Companies (OFO's – Critical Notice)	☐	☐	
• Weather Constraints	☐	☐	
Daily Operating Information:			
• System Pressure Review (Bar Charts)	☐	☐	
• Gate/Regulator Taken Out/Returned to Service	☐	☐	
• Gate Stations Abnormal Conditions	☐	☐	
• Power Plants	☐	☐	
• LNG Equipment Status	☐	☐	
• Pipeline	☐	☐	
• SCADA Issues (Telecommunications Failures)	☐	☐	
Gas Day Setup Information:			
• Gas Scheduled at City Gate	☐	☐	
• Progress on Gas Day/Remaining Balances	☐	☐	
• Supplemental Supply Service In-Use: (LNG, LNG Trucking, Propane, and/or Peaking)	☐	☐	
Status of Scheduled /Unscheduled Maintenance Activities:			
• Ongoing Field Work	☐	☐	
• SOP's: Critical Jobs for Review	☐	☐	
Incident Information:			
• Gas Main Interruptions/Damages	☐	☐	
• Odorant Issues	☐	☐	
Change of Physical Assets/Procedures:			
• Physical Changes to Facilities	☐	☐	
• Procedures for Review	☐	☐	
Alarm Review:			
• Critical Alarms	☐	☐	
• Inhibited Alarms	☐	☐	
• Nuisance Alarms	☐	☐	
• Modified Alarms	☐	☐	

Shift Turnover Log (pg 2)

Third Party Incidents – Potential Impact to Operations:			
	Yes	*No*	*Comments*
• PSC/Regulatory Notifications	☐	☐	
• Emergency Dispatch Notifications	☐	☐	
• Security Notifications	☐	☐	
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

No – No Information to Report

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

_____ _____ _____

Time *Initial* *Date*

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

_____ _____ _____

Time *Initial* *Date*

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

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- **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
  - Monthly Review of inhibited, forced, manual and false alarms.
  - 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

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- 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

Inspection Tips 2013

- Part Time Controllers
- SCADA VS DCS
- Ghost Shift Change
- Controllers Commute time
- Emergency Response plans

Questions ??

- Roundtable discussion