

## **FY08 4<sup>th</sup> Quarter Construction Contractor Safety Seminar**

**Mountain View Club, 2:00 – 4:00 PM**

**July 8, 2008 Meeting Minutes**

**Speakers:** Introduction, Agenda & Preliminary Lessons Learned: Greg Kirsch, ES&H Program Manager for FMOC, Dept. 4827, Office Phone: 845-9497, e-mail: [gckirsc@sandia.gov](mailto:gckirsc@sandia.gov)

Lessons Learned - Failure of Valve on Heating System Boilers Results in Steam Leak: Greg Kirsch

Lessons Learned - Gas Line Damaged during Excavation Activities on the G&H Avenue Reconstruction Project: Dave Anglen, Industrial Hygiene, Dept 4827, Office Phone: 845-1340, pager: 530-2067, e-mail: [dmangle@sandia.gov](mailto:dmangle@sandia.gov)

Maintenance Limited Approach/Arc Flash Boundary Barricading Event Briefing: Randy Fellhoelter, Construction Safety, Dept 4122, Office Phone: 844-6395, pager: 530-0298, e-mail: [rfellho@sandia.gov](mailto:rfellho@sandia.gov)

Safety Observations Summary: Greg Kirsch

Lessons Learned 894 Roof Fire: Greg Kirsch

Crane Inspection Review: Mike Pacheco, Construction Observer, Dept 4827, Office Phone: 844-4172, pager: 540-8151, e-mail: [mapache@sandia.gov](mailto:mapache@sandia.gov)

BBS Trends & Analysis (Mar - May 08): William Tierney, BBS Steering Committee, Office Phone: 845-0633, Pager: 530-1343, e-mail: [witern@sandia.gov](mailto:witern@sandia.gov)

Respiratory Protection Program Elements: Diane Morrell, Industrial Hygiene, Dept 4127, Office Phone: 284-9289, e-mail: [dmorrel@sandia.gov](mailto:dmorrel@sandia.gov)

Safety Stars: William Tierney

### **Summary**

There were 73 attendees and 22 companies represented. The sign-in sheets are included at the end of the PowerPoint presentation for more detailed information.

### **Introduction**

Greg welcomed everyone to the Quarterly Construction Safety Seminar.

### **Preliminary Construction Occurrences: Greg Kirsch**

There were five preliminary construction occurrences shared by Greg Kirsch. The lessons learned will be shared at the 1<sup>st</sup> Quarter Seminar on October 21, 2008. See the Power Point slides for detailed information.

- Concrete Cutting Operations Contacts Energized 120 Volt Conductors
- Receptacle Supplying Power to Electric Welder Miss-wired Resulting in Electrical Shock
- FMOC Subcontractor Cuts Energized 120volt Conductor while Disconnecting & Removing Electrical Control
- Construction Mechanical Subcontract Employee Climbs onto the Railing of a Scissor Lift, 25 feet in the Air without Fall Protection
- Three Subcontract Workers Exposed to Respirable Silica during Concrete Floor Grinding Operations

### **Lessons Learned: Greg Kirsch**

There were seven construction events and zero construction recordable injuries in the 3<sup>rd</sup> Quarter of FY08. Greg Kirsch presented lessons learned from three of the events. See the Power Point slides for detailed information.

- Failure of Valve on Heating System Boilers Results in Steam Leak
- Gas Line Damaged during Excavation Activities on the G&H Avenue Reconstruction Project
- 894 Roof Fire

### **Maintenance Limited Approach/Arc Flash Boundary Barricading Event Briefing: Randy Fellhoelter**

Randy presented a briefing on the maintenance event involving arc flash boundary and provided NFPA guidance for training of workers in the field. Randy also presented Arc Flash and Shock Hazard PPE Matrix and Boundaries which was provided by electrical systems engineering (see attached).

### **Safety Observations Summary: Greg Kirsch**

Graphs were provided showing observations by OSHA 1926 Subpart and ES&H 01065 Specification categories, discipline trends, construction deficiencies and injuries for the period April - June 2008.

### **Crane Inspection Review: Mike Pacheco**

Mike presented SNL crane inspection reminders including the purpose of the inspections, SNL 01065 Spec requirements, the inspection process and examples.

### **BBS Trends & Analysis (Mar – May): William Tierney**

William presented the BBS Data summary for March - May 2008. There were a total of 801 observations during this period.

### **Respiratory Protection Program Elements: Diane Morrell**

Diane presented a summary of the minimum acceptable criteria for the Contractor Respiratory Protection Program. See the Power Point slides for detailed information.

### **Remembering Woody: Greg Kirsch**

James A. Woodward, (Woody), 63, the owner of Woodward Metal passed away very unexpectedly on May 25, 2008.

### **Best Practices: Troy Rogers**

Troy reviewed excavation best practices which involved underground duct banks.

### **Closing**

Mike Quinlan stated that he appreciates the attendance at these seminars. He urges you to pair new workers with someone that has been here before. Ask for help if you need it.

Please contact Greg if you have any topics or comments for future safety seminars.

Please mark your calendars and plan to attend the future Quarterly Safety Seminars:

**Location:** Mountain View Club

**Time:** 2:00 – 4:00 PM

**Date:** October 21, 2008  
January 20, 2009  
April 14, 2009  
July 14, 2009  
October 13, 2009

Meeting minutes and the presentation will be sent via email, and it is SNL's expectation that the information will be shared with employees and subcontractors. Please be sure to encourage attendance by your subcontractors. Advance notice is provided for these seminars to allow ample time to schedule attendance at these meetings, and reminders are sent out via the *Construction News Sense* and emails. The target audience is safety officers, superintendents, and foremen.



# ***QUARTERLY CONSTRUCTION SAFETY SEMINAR***

## **SNL FACILITIES**

**4<sup>th</sup> Quarter FY08**

**July 8, 2008**

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company,  
for the United States Department of Energy's National Nuclear Security Administration  
under contract DE-AC04-94AL85000.



# Agenda

- 2:00 PM Introduction and Preliminary Occurrences: Greg Kirsch
- 2:10 PM Lessons Learned – Failure of Valve on Heating System Boilers Results in Steam Leak: Greg Kirsch
- 2:15 PM Lessons Learned – Gas Line Damaged during Excavation Activities on the G&H Avenue Reconstruction Project: Dave Anglen
- 2:20 PM Maintenance Limited Approach/Arc Flash Boundary Barricading Event Briefing: Randy Fellhoelter
- 2:40 PM Safety Observations Summary: Greg Kirsch
- 2:50 PM 10 Minute Break
- 3:00 PM Lessons Learned – 894 Roof Fire: Greg Kirsch
- 3:05 PM Crane Inspection Review: Mike Pacheco
- 3:10 PM BBS Trends & Analysis (Mar – May): William Tierney
- 3:20 PM Respiratory Protection Program Elements: Diane Morrell
- 3:40 PM Remembering Woody: Greg Kirsch
- 3:45 PM Excavation Best Practices: Troy Rogers
- 3:45 PM Safety Stars: William Tierney
- 3:55 PM Closing: Greg Kirsch

# Is that safe, maybe line of fire?



# And So the Forklift Training Continues, ISMS?





# Preliminary Occurrences

**Greg Kirsch**



# Preliminary Occurrences

- Concrete Cutting Operations Contacts Energized 120 Volt Conductors
- Receptacle Supplying Power to Electric Welder Miss-wired Resulting in Electrical Shock
- FMOCC Subcontractor Cuts Energized 120volt Conductor while Disconnecting & Removing Electrical Control
- Construction Mechanical Subcontract Employee Climbs onto the Railing of a Scissor Lift, 25 feet in the Air without Fall Protection
- Three Subcontract Workers Exposed to Respirable Silica during Concrete Floor Grinding Operations

# Concrete Cutting Operations

## Contacts Energized 120 Volt Conductors

- A concrete cutting subcontractor was saw-cutting a concrete floor, located in the Bldg. 892 basement. While cutting the concrete, a 1" conduit with four 120 volt circuits were cut in the concrete slab.



# Concrete Cutting Operations

## Contacts Energized 120 Volt Conductors

- Site investigation identified one circuit that went through the slab and that breaker was locked and tagged out.





# Concrete Cutting Operations

## Contacts Energized 120 Volt Conductors

- A penetration permit had been issued for the saw cutting activity.
- Site investigation (including drawing reviews) and spotting had been performed.
- Current technology used for spotting can identify high voltage lines but is less reliable for low voltage circuits when rebar is in floor.
- PPE is required by FMOC for all penetration activities because of the limitations of site investigation and spotting techniques.
  - The person performing the saw cutting activity was wearing required PPE (electrically rated gloves and boots) to provide protection for shock hazards.



# Concrete Cutting Operations

## Contacts Energized 120 Volt Conductors

- Interim Actions – Contractor followed SNL procedures
  - Suspension of all concrete saw cutting and core drilling (excluding sidewalks and other areas where electrical circuits are not located).
  - Conduct a review of current penetration permit process and spotting techniques to identify areas for potential improvement.
  - Lessons learned will be shared stressing the importance of wearing electrically rated gloves and boots during saw cutting and coring activities.

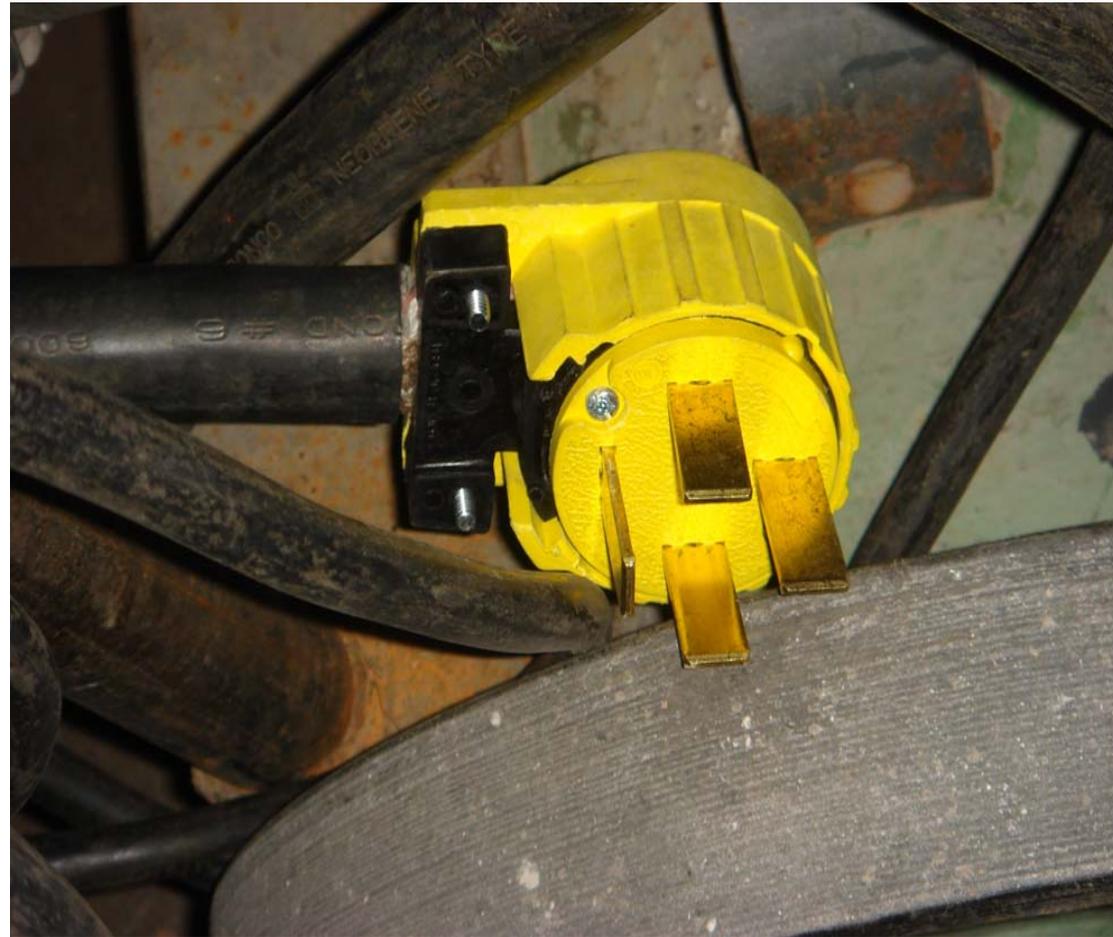
# Receptacle Supplying Power to Electric Welder Miss-wired Resulting in Electrical Shock

- A Mechanical Subcontract worker received a shock when the worker touched the building structure while leaning against an electric welder.



# Receptacle Supplying Power to Electric Welder Miss-wired Resulting in Electrical Shock

- The cause of the shock was an incorrectly wired 4-wire, 120/208V, 60A cord cap. The conductors feeding the ground terminal and one of the three phase terminals on the cord cap were reversed. When the welder was plugged into the wall outlet the frame of the welder became energized.





# Receptacle Supplying Power to Electric Welder Miss-wired Resulting in Electrical Shock

- Interim Actions Recent Construction
  - NEMA plug and receptacle configuration charts issued to all FMOC electrical subcontractors (ongoing).
  - HSM Subcontractor/FMOC ES&H meeting to discuss recent events and re-enforce SNL ES&H expectations (complete 6/19/08).
  - FMOC will hold a meeting with our electrical subcontractors to discuss recent events and obtain feedback on ways we can improve electrical performance on our construction sites.



## FMOC Subcontractor Cuts Energized 120volt Conductor while Disconnecting & Removing Electrical Control

- An electrical technician working for the Control Subcontractor on the Heating System Modernization Project cut an energized #16 blue conductor.
- The #16 blue conductor was terminated on a flow switch approximately three feet from the junction box where it was cut. The specs identify that #16 blue conductors are to be used for control less than 24 volt wiring.
- Following the incident, the #16 blue conductor was traced back to another junction box where it was spliced to a #12 black conductor. The #12 black conductor originated in the Modular Building Controller-I (MBC-I) where it was terminated on an energized 120-volt terminal strip. This condition was the result of mis-wiring during initial installation (approximately 1990).

# FMOC Subcontractor Cuts Energized 120volt Conductor while Disconnecting & Removing Electrical Control

- MBC/FID Cabinet
  - Two digital outputs (DO) were “pulled” to eliminate any 120volt power supplying the components to be removed
  - The digital outputs (DO) and digital inputs (DI) points were checked for zero voltage



# FMOC Subcontractor Cuts Energized 120volt Conductor while Disconnecting & Removing Electrical Control

- Junction Box
    - Location the contractor cut the energized 120volt conductor
    - Tool arced to junction box when conductor was cut
- \*Note work practice is to ensure side cutters contact box when cutting conductors





## FMOC Subcontractor Cuts Energized 120volt Conductor while Disconnecting & Removing Electrical Control

- Lessons learned will be shared with construction contractors at the next Construction Safety Seminar and in the July Construction News Sense, maintenance workers at monthly safety meetings, and through the SNL Corporate lessons learned process.
  - Lessons learned will focus on the benefits of utilizing tic tracers to identify the presents of voltage in conductors passing through electrical boxes with no terminations points.



# Construction Mechanical Subcontract Employee Climbs onto the Railing of a Scissor Lift, 25 feet in the Air without Fall Protection

- On June 18, 2008, at approximately 10:30 am, a Facilities Management and Operation Center (FMOC) Mechanical Subcontractor's foreman and a journeyman climbed onto the guard rail of a scissor lift without any fall protection equipment. The scissor lift was approximately 23-feet from of the floor at the time of the incident.
- The foreman and journeyman were part of the four-person crew that was installing an 6-inch schedule 40 black steel heating water pipe through a roof penetration. The mechanical crew was having difficulty positioning the pipe into a pipe hanger. The foreman and one of the journeymen went up in the scissor lift to reach the hanger and position the pipe.



## Construction Mechanical Subcontract Employee Climbs onto the Railing of a Scissor Lift, 25 feet in the Air without Fall Protection

- Continued: The journeyman then climbed onto the top guard rail of the scissor lift and the foreman climbed onto the middle rail and secured the pipe into the clamp thus securing the pipe in place.
- An FMOC Construction Observer was on the job site and observed the two individuals standing on the scissor lift guard rails. The Construction Observer suspended the work activity. The Prime Contractor's Project Manager suspended all of the mechanical subcontractor's work all 11:15 am. The Project Manager held a site safety meeting and sent all workers on the site home at 2:00 pm.



# Construction Mechanical Subcontract Employee Climbs onto the Railing of a Scissor Lift, 25 feet in the Air without Fall Protection

- OSHA interpretation identifies that scissor lifts are considered to be work platforms and fall under the OSHA Scaffold Subpart L. OSHA requires that personnel be protected by a personal fall arrest system or guard rail system. When the worker climbed onto the guard rail without fall protection, the worker violated OSHA Subpart L requirements.



## Three Subcontract Workers Exposed to Respirable Silica during Concrete Floor Grinding Operations

- While performing oversight compliance monitoring of a subcontract floor resurfacing project, the Sandia National Laboratories (SNL) Industrial Hygienist (IH) supporting Facilities Management and Operations Center (FMOC) identified that three of four subcontract workers were exposed to respirable silica dust exceeding the assigned protection factor of the 1/2-face air purifying respiratory protection (10 times TLV) worn while performing grinding operations (grinding, vacuuming, and vacuum filter cleaning).



## Three Subcontract Workers Exposed to Respirable Silica during Concrete Floor Grinding Operations

- The subcontractor had identified that grinding of the concrete floor would be part of the resurfacing activity. The following controls were identified: 1) grinder with vacuum attachments (boot attachment); 2) high efficiency filters would be used in the vacuum; 3) PPE would include: a) 1/2-face respirators with P100 cartridges, b) ear plugs, c) safety glasses, d) hard hat, and e) leather gloves, while performing the grinding operation.



## Three Subcontract Workers Exposed to Respirable Silica during Concrete Floor Grinding Operations

- The oversight compliance monitoring was performed on June 17, 2008. Samples were sent to the lab for analysis on June 18, 2008 and results were received by SNL IH on June 23rd. SNL IH performed calculations and determined that three of the four workers performing the grinding activities (grinding, vacuuming, and vacuum filter cleaning) had received exposures to respirable silica dust that exceeded the assigned protection factor of the 1/2 - face air purifying respirator provided by the subcontractor.



## Three Subcontract Workers Exposed to Respirable Silica during Concrete Floor Grinding Operations

- All four of the workers were exposed to respirable silica in excess of the ACGIH TLV for silica. The 1/2-face respirators worn by the subcontract workers provide a protection factor of 10 times the TLV and calculations identified the exposure to be approximately 14 times the TLV.
  - TLV for Respirable Silica Dust: 0.025 mg/m<sup>3</sup>
  - Protection Factor 10X TLV: 0.25 mg/m<sup>3</sup>
  - Worker #1: 0.36 mg/m<sup>3</sup>
  - Worker #2: 0.32 mg/m<sup>3</sup>
  - Worker #3: 0.24 mg/m<sup>3</sup>
  - Worker #4: 0.36 mg/m<sup>3</sup>



## Three Subcontract Workers Exposed to Respirable Silica during Concrete Floor Grinding Operations

- Initial investigation identified that the subcontractor has a respiratory protection program that meets the intent of 29 CFR 1910.134, including: 1) written program, 2) medical evaluations, 3) fit testing, and 4) training.
- Based on observation of the activities by the IH tech performing the air sampling, the controls appeared to be effective during grinding, but techniques used for emptying the vacuum and cleaning the filters resulted in visible airborne dust generation. The contractor actions followed requirements.



## **Lessons Learned**

# **Failure of Valve on Heating System Boilers Results in Steam Leak**

**Greg Kirsch**



## SNL Description of Event

- At approximately 11:15am, on April 2, 2008, a Construction worker was installing a hanger on a 4-inch steam piping header, when the worker heard steam escaping from a crack on a 1-inch Bronze Nibco T113 valve feeding a 1-inch condensate line, located at the east end of a 4-inch steam header. The worker was approximately 4-feet from the cracked valve on the opposite side from the leak. The worker immediately notified Steam Plant personnel located in the control room, the Mechanical Construction Observer, who was on-site, and the Mechanical Construction Contractor Supervisor. The area was cordoned off and notifications and investigation were initiated. No one was injured due to the unexpected release of the steam.



# SNL Analysis

- Design/Engineering Problem; Design Output not correct: Pipe stress analysis performed by the A&E firm using new stress analysis software (purchased following this event) identified that the design was not adequate to account for the thermal expansion of the system. The temporary boiler system was designed to connect to the existing steam supply system from the Steam Plant. This created a three dimensional piping design which resulted in additional thermal expansion stresses; these stresses were not adequately evaluated and accounted for in the design. No thermal pipe stress calculations were performed by the A&E Firm.



# SNL Analysis

- Design/Engineering Problem: Independent review of design/documentation LTA: The FMOC acceptance of design did not identify the lack of thermal pipe stress calculations in the design submittals, as required by the FMOC design standards. The FMOC did not identify the lack of calculations in the design submittals; therefore the A&E Firms failure to perform the calculations was not identified.



# SNL Analysis

- Change Management LTA: Inadequate vendor support of change: When the boiler start-up contractor inspected the installation, they identified concerns associated with thermal expansion of the piping system. The A&E firm determined that bellows should be installed in each of the four steam piping system between the temporary boilers and the main steam header. Once again no thermal pipe expansion calculations were performed and the header system was modified without ensuring that the changes would allow for appropriate pipe system expansion.



## SNL Recommended Actions

- Modifications to the temporary boiler system header piping system identified by the A&E firm in the pipe stress analysis will be completed by the Mechanical Contractor. Modifications include installation of expansion loops in the piping system.



## SNL Recommended Actions

- Facilities Management and Operations Center will share lessons learned from this event (stressing the need for thermal pipe stress calculations, and engineering authorization for any changes, including pipe supports).
- FMOC will develop a new Building Permit process that will be required prior to construction. The requester would submit the design package which will be reviewed by the customer and appropriate Subject Matter Experts (example: mechanical, fire protection, or electrical engineering). The Building Permit will designate the required Code Inspections (Structural, Mechanical, Electrical, etc) based on scope of work.



## **Lessons Learned**

# **Gas Line Damaged during Excavation Activities on the G&H Avenue Reconstruction Project**

**Dave Anglen**



## SNL Description of Event

- At approximately 2:00pm, on Wednesday 4/2/08, a Construction Prime Contract Backhoe Operator excavating on the Facilities Management & Operations Center (FMOC) managed Sandia Site Office (SSO) G & H Avenue Reconstruction Project, damaged a 4-inch high-density polypropylene (HDPE) natural gas line at the corner of G Avenue and 7th Street in SNL Tech Area 1.



## SNL Description of Event

- The damaged area where the backhoe had scraped the pipe was approximately 3 feet long. The pipe thickness is 1/2-inch in depth and the scrape ranged from 1/16-inch to 3/16-inch.



## SNL Description of Event

- The gas pressure on this system ranges from 18 to 20 psi which is identified as a low pressure gas line. The damage did not result in a release of gas, and no one was injured.



## SNL Description of Event

- The contractor was excavating with a John Deere (310SG) backhoe around a storm sewer drop inlet when the line was damaged. Because the damage did not result in a natural gas release the contractor did not feel that early notification to SNL or SSO was required. An FMOC Construction Observer (CO) was performing a field visit on Thursday, April 3rd, at approximately 2:00pm at the project and saw the damaged HDPE line.



# SNL Description of Event

- The FMOC CO suspended the excavation activity at this location and notified the FMOC Safety Engineer, Team Lead, Construction Department Manager, SSO project team, Sandia Emergency Response, and Sandia Utility Maintenance.



## SNL Description of Event

- There was an SNL Excavation Permit issued for the excavation activity, and the line was clearly identified on prints and marked in the field.
- Initial investigation identified that the operator did not reference the permit or drawings prior to performing the excavation activity at this location.



# SNL Analysis

- The following safety regulations were violated during this incident:
  - Title 29 Code of Federal Regulations, Part 1926.651(b) Specific Excavation Requirements. "The estimated location of utility installations such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.
  - 1926.651(b)(3) "When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means."



# SNL Analysis

- Contractor Safety Plan. Part D "Excavation and Trenching Program", section 10. "Until a utility is visibly located, no mechanical excavation is allowed within 18" of a utility and/or hand excavation within 5 feet of a utility."
  - 1926.956(c)(3) "When underground facilities are exposed (electric, gas, water, telephone, etc.) they shall be protected as necessary to avoid damage."
  - Title 10, Code of Federal Regulations, Part 851.22 & 23 "Hazard Analysis."



# SNL Recommended Actions

- Contractor's Contract Specific Safety Plan will be updated to require:
  1. superintendent review all plans, permits and line spots with employees prior to starting excavation work;
  2. address actions to be taken when superintendant is not available by radio;
  3. require daily plan briefs;
  4. address actions to be taken following an ES&H incident/accident; and
  5. requirement for daily safety checks to be performed by superintendant or qualified delegate.



## SNL Recommended Actions

- Contractor will provide training to contract personnel on changes to the Contractor's Contract Specific Safety Plan



# SNL Recommended Actions

- Contractor will provide all personnel performing excavation operations training on SNL's permit requirements, contractor's excavation processes/requirements which will include: 1) hand digging requirements, 2) spotter markings, and 3) roles and responsibilities of personnel operating excavation equipment, spotting, hand digging or provide oversight to excavation activities.



# **Maintenance Limited Approach/ARC Flash Boundary Barricading Event Briefing**

Randy Fellhoelter



## Maintenance Limited Approach Boundary Event

- A Maintenance Electrical Craftsperson was performing infrared scanning on a 208 volt distribution panel located in a hallway in Building 802.
- A building occupant questioned the craftsperson on this activity and requirements for establishing a limited approach and arc flash boundary with barricading to ensure unqualified personnel did not enter the approach boundary.
- The activity that the craftsperson was performing required removal of the panel dead front cover for infrared testing purposes.



## Maintenance Limited Approach Boundary Event

- The Maintenance Electrical Craftsperson answered that he knew the boundary requirements, but he felt people in the area would not pay attention to the barricading so he did not install any and was using the cart carrying his tools as a barricade.
- The maintenance requirements for establishing arc flash and limited approach boundaries are identified in a maintenance electrical procedure and the craftsperson had received training on the procedure.
- The requirements for barricading are also covered by another maintenance procedure and the craftsperson had received training on that procedure, also.



## Maintenance Limited Approach Boundary Event

- Although the observer suspended the work prior to the craftsperson removing the panel's dead front cover, the craftsperson identified that he had already completed scanning 6 panels prior to the work being suspended.
- Because there was no arc flash calculation performed on the panel prior to the work the maintenance electrical procedure requires the 208 volt panel to be treated as a hazard/risk category 1-2, and a 6 foot boundary is required to be established.
- The craftsperson performing the work did wear PPE required by the maintenance electrical procedure: electrically rated gloves, leather gauntlets, FR pants and shirt, hard hat, and rated face shield.



## Maintenance Limited Approach Boundary Event

- Arc Flash calculations performed by Electrical Engineering (following the incident) identified the panels arc flash hazard/risk category to be zero.
- The maintenance electrical procedure requires a 3.5 foot boundary be established for hazard/risk category zero work.
- The craftsman identified that although barricading was not installed, the use of the cart resulted in pedestrian traffic not entering within 3.5 feet of the exposed energized electrical parts.



## Maintenance Limited Approach Boundary Event

- The event was categorized by maintenance as meeting DOE Occurrence Reporting Criteria: Hazardous Energy Control - Significance Category 3 - (2) Failure to follow a prescribed hazardous energy control process but does not meet the criteria for the near miss of a shock.
- A notification report was submitted into the DOE Occurrence Reporting System.
- A Causal Analysis is being performed that will identify causes and corrective actions.
- A stand down meeting was held with all maintenance personnel performing electrical work to ensure they have a full understanding of barricading requirements and management expectations.



# **NFPA 70E Boundary & Barricading Requirements**



# Purpose & Scope

- **Approach by Unqualified Persons.** Unqualified persons shall not be permitted to enter spaces that are required under 400.16(A) to be accessible to qualified employees only, unless the electric conductors and equipment involved are in an electrically safe work condition.
- **Working At or Close to the Limited Approach Boundary.** Where one or more unqualified persons are working at or close to the Limited Approach Boundary, the designated person in charge of the work space where the electrical hazard exists shall cooperate with the designated person in charge of the unqualified person(s) to ensure that all work can be done safely. This shall include advising the unqualified person(s) of the electrical hazard and warning him or her to stay outside of the Limited Approach Boundary.

# NFPA Guarding of Live Part – 400.16

- **(A) Live Parts Guarded Against Accidental Contact.** Except as elsewhere required or permitted by this standard, live parts of electric equipment operating at 50 volts or more shall be guarded against accidental contact by approved enclosures or by any of the following means:
  - (1) By location in a room, vault, or similar enclosure that is accessible only to qualified persons.
  - (2) By suitable permanent, substantial partitions or screens arranged so that only qualified persons have access to the space within reach of the live parts. Any openings in such partitions or screens shall be sized and located so that persons are not likely to come into accidental contact with the live parts or to bring conducting objects into contact with them.
  - (3) By location on a suitable balcony, gallery, or platform elevated and arranged so as to exclude unqualified persons.
  - (4) By elevation of 2.5 m (8 ft) or more above the floor or other working surface.



# Alerting Techniques

- **(1) Safety Signs and Tags.** Safety signs, safety symbols, or accident prevention tags shall be used where necessary to warn employees about electrical hazards that might endanger them. Such signs and tags shall meet the requirements of ANSI Standard Z535 given in Table 130.7(F).
- **(2) Barricades.** Barricades shall be used in conjunction with safety signs where it is necessary to prevent or limit employee access to work areas containing live parts. Conductive barricades shall not be used where it might cause an electrical hazard. Barricades shall be placed no closer than the Limited Approach Boundary given in Table 130.2(C).



# Alerting Techniques

- **(3) Attendants.** If signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant shall be stationed to warn and protect employees. The primary duty and responsibility of an attendant providing manual signaling and alerting shall be to keep unqualified employees outside a work area where the unqualified employee might be exposed to electrical hazards. An attendant shall remain in the area as long as there is a potential for employees to be exposed to the electrical hazards.



# Lessons Learned

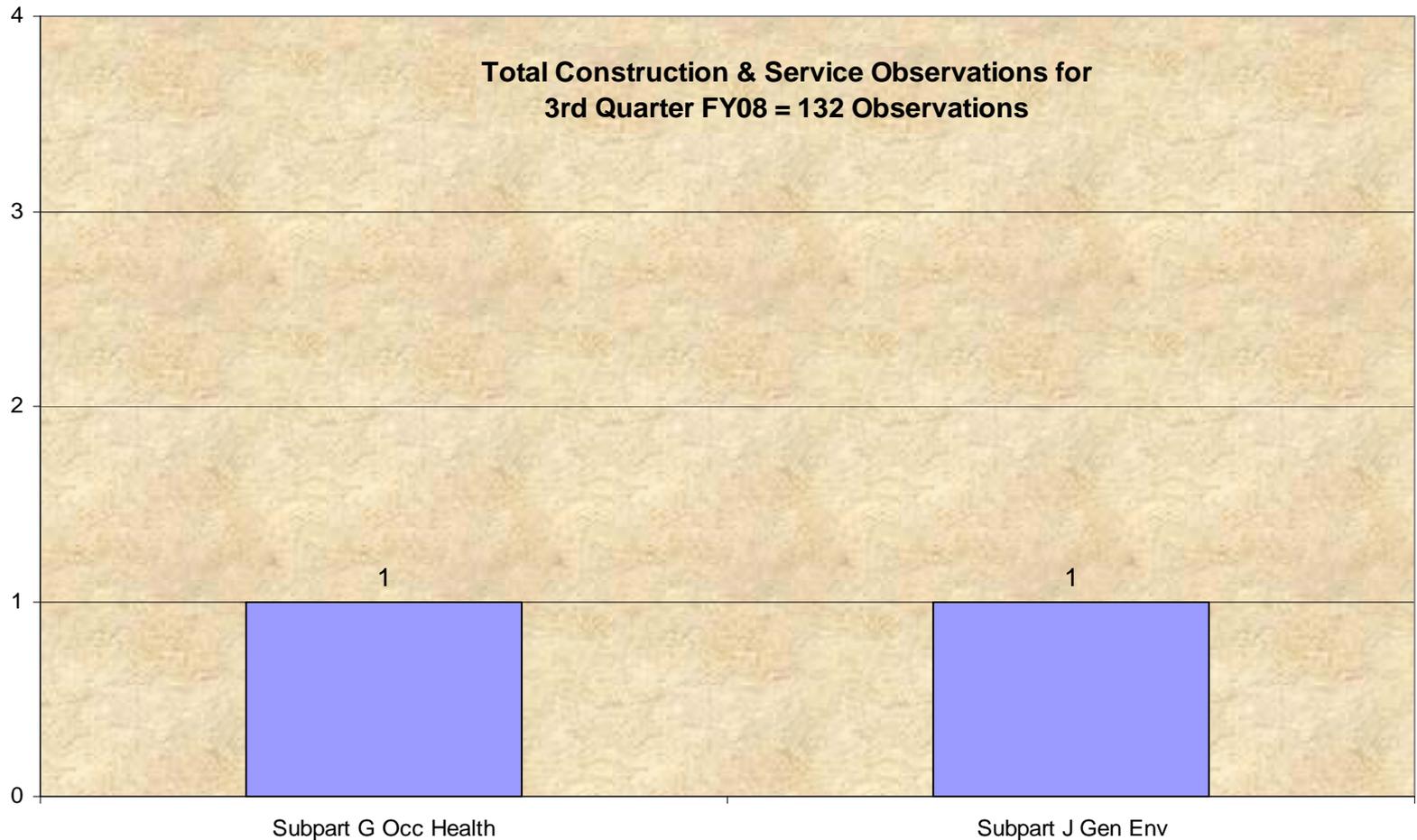
- Ensure that you have a full understanding of your company's NFPA 70E arc flash and limited approach boundary requirements prior to performing any testing or troubleshooting activities on energized electrical parts/equipment.
- Your company's Contract Specific Safety Plan should identify boundary/barricading and PPE requirements based on hazard/risk categories.
- Any energized work, excluding testing and troubleshooting, requires an energized work permit and authorization from SNL.
- You can request arc flash hazard calculations through your Project Manager.



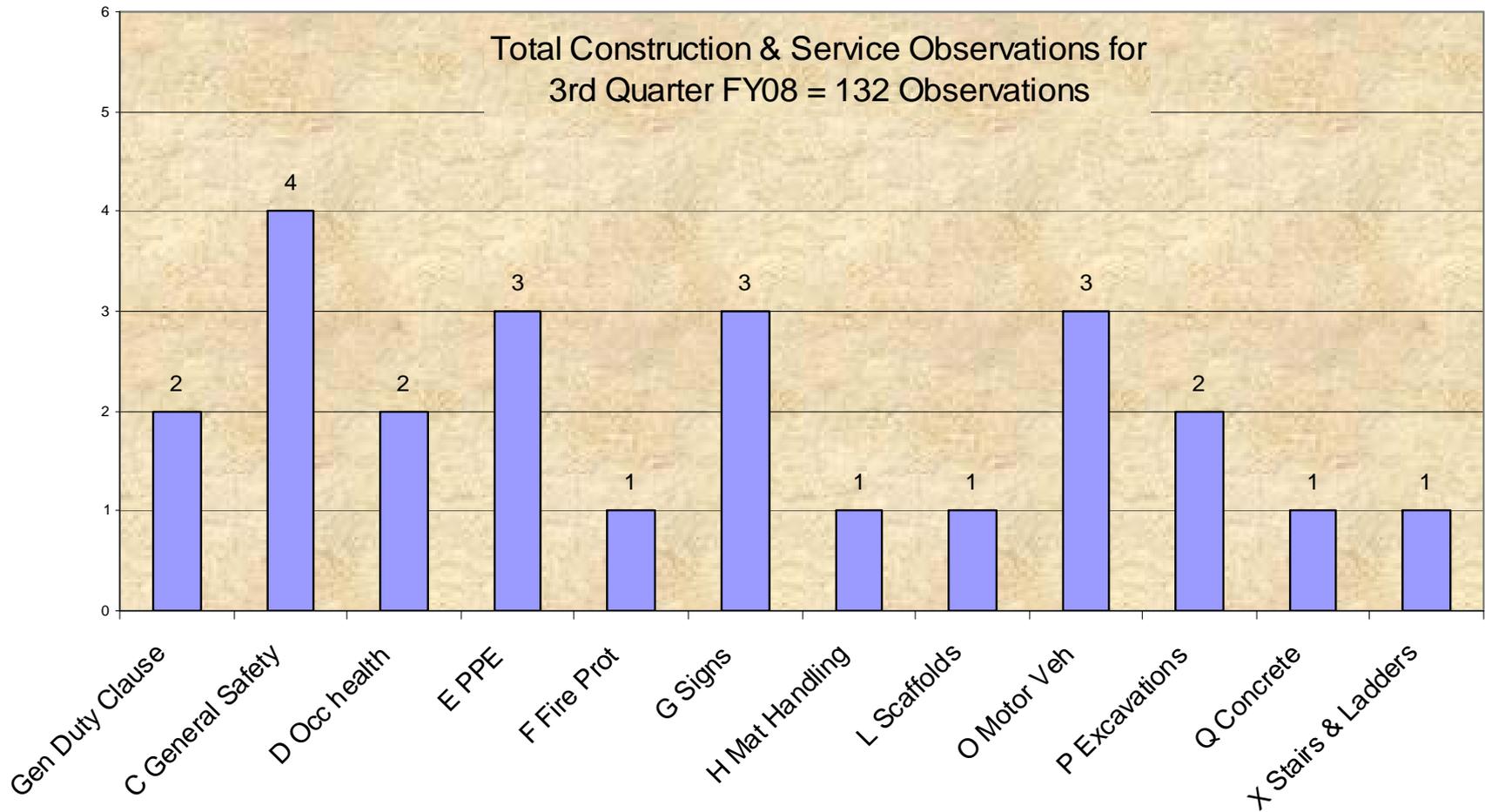
# **Safety Observations Summary**

**Greg Kirsch**  
ES&H Program Manager

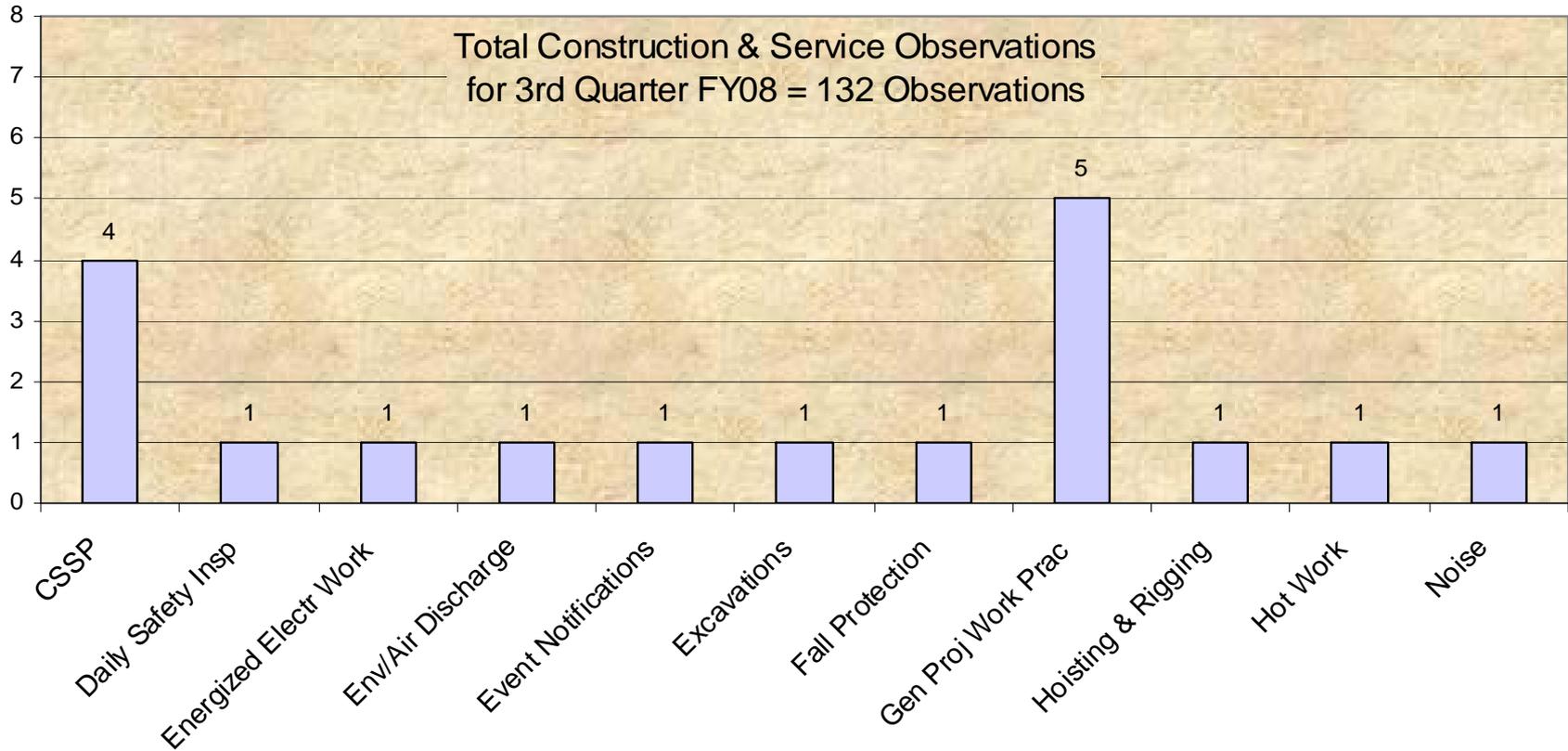
# Non-compliant Observations OSHA 1910 for Apr - Jun 2008



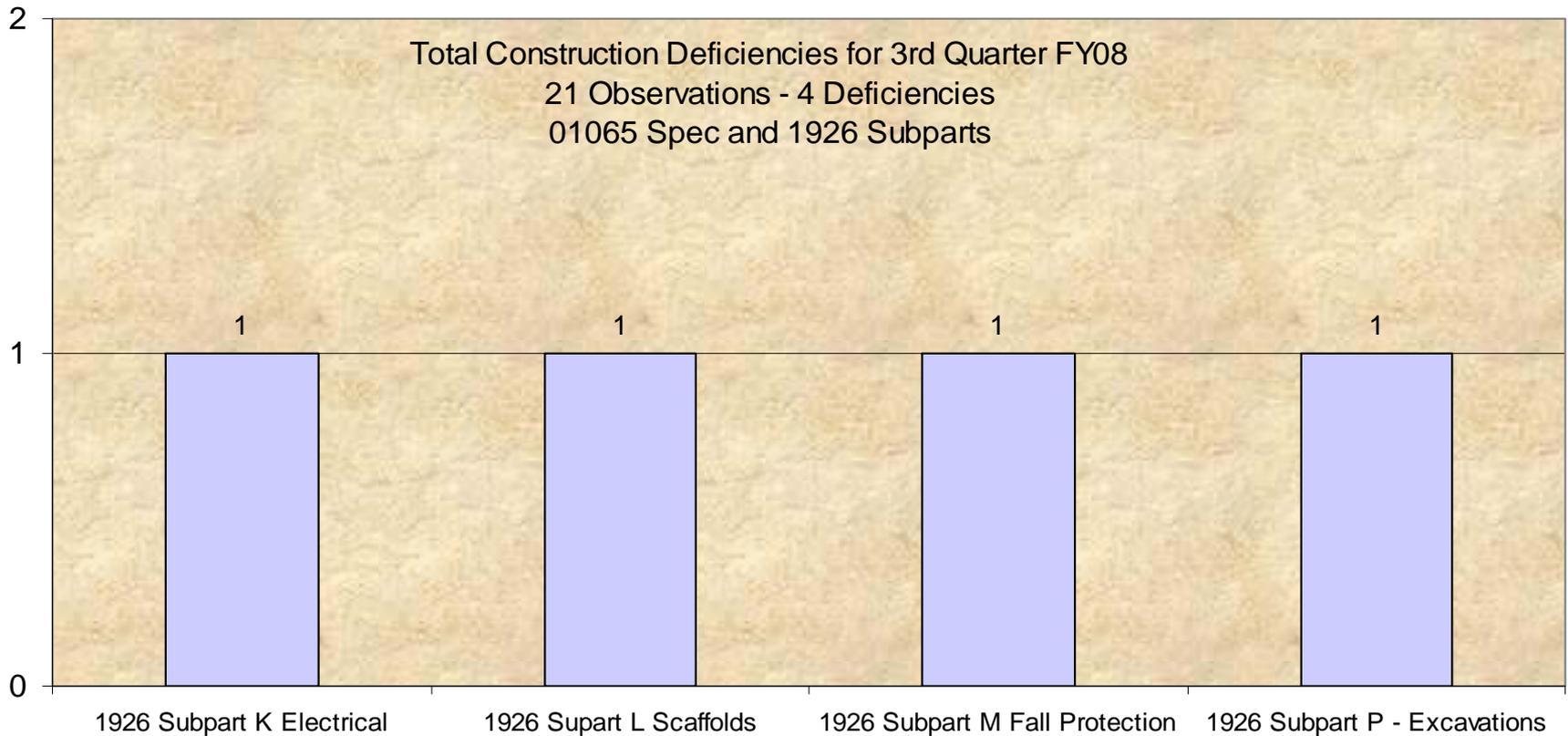
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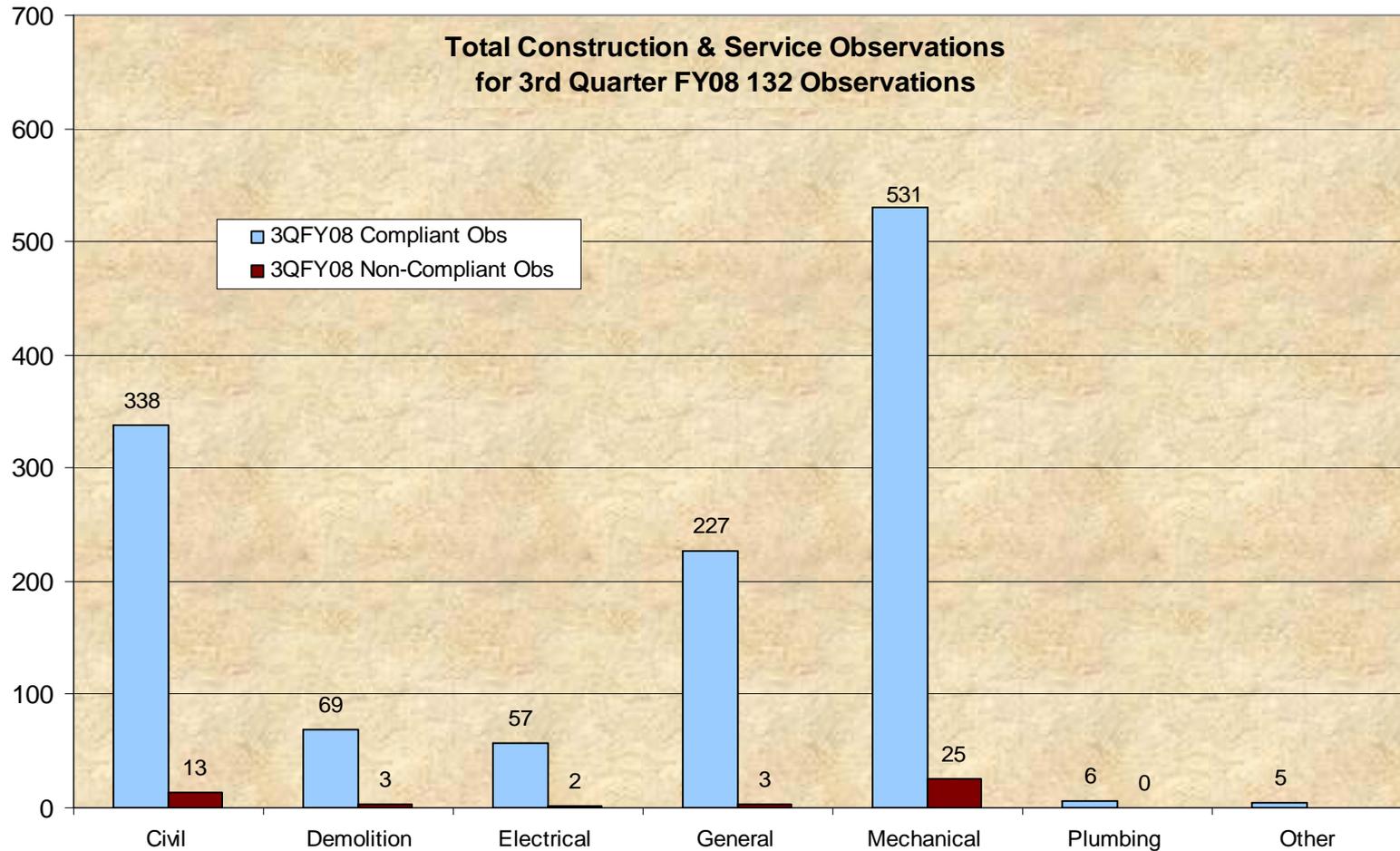
# Non-compliant Observations 01065 Spec for Apr - Jun 2008



# Construction Observations April - June 2008



# Compliant vs. Non-compliant Observations by Discipline Apr - Jun 2008





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# 10 Minute Break

# Bucketman!



# The Safest Forehead





## Lessons Learned

# Roofing Adhesive Ignites Causing Fire on Roof

Greg Kirsch



## SNL Description of Event

- A roofing services company was applying a UL Listed FM approved Bonding Adhesive to repair a single-ply-roofing system. The Bonding Adhesive contained a flammable liquid. Application of the adhesive involved using a medium nap solvent-resistant roller that was dipped into the 5 gallon metal pail, and rolled onto the roofing membranes. Workers applying the adhesive were required to walk across the roofing membrane surfaces. As a worker was using the roller in the adhesive pail a flash fire occurred within the bucket and on the roller brush.

# SNL Description of Event





## SNL Description of Event

- The worker immediately backed away from the pail and placed the burning roller down on the roof. A flash fire occurred across the roofing membranes that had been coated with bonding adhesive. The fire was extinguished quickly by a worker using a portable dry chemical fire extinguisher. There were no injuries and minimal damage to the roof.

# SNL Description of Event





# SNL Analysis

- Analysis of work activities contributing to the fire were reviewed, including work practices focusing on the manufacturers documentation of precautionary measures related to the use of the product as listed on the container labeling.
- These precautionary measures listed on the label indicated that vapors form explosive mixtures with air, and to keep away from heat, sparks, flame pilot lights and other ignition sources.
- In addition, the container labeling stated that the container and equipment used for handling, storing, or transfer of the bonding adhesive must be grounded and bonded.



# SNL Analysis

- Potential sources of ignition causal to a fire were examined and eliminated due to lack of a presence on site related to the specific work activity.
- These included: open flames, lightning, hot surfaces, radiant heat, smoking, cutting and welding, spontaneous ignition, frictional heat or sparks, electrical sparks, stray currents, ovens, furnaces, and heating equipment.



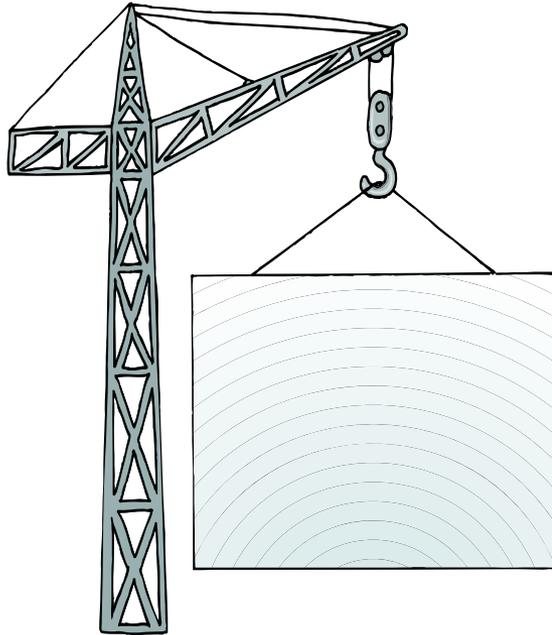
# SNL Analysis

- Static electricity, involving separation charging (also called triboelectric charging or frictional charging) was considered to be the most probable source of fire ignition resulting from static accumulation by personnel working in dry weather, very low humidity and walking across exposed roofing membranes (e.g., un-faced polyiso insulation) without properly bonding and grounding the adhesive roller to the outside the pail to dissipate and equalize the static potential.



# SNL Recommendations

- Roofing Contractor will develop an Activity Hazard Analysis and provide training to workers who use this type of adhesive product.
- When introducing a new potentially hazardous product into the workplace, contractors should perform a hazard analysis to determine hazards and suitable controls.



# SNL Crane Inspection Reminders

Michael Pacheco

SNL Construction Inspection and Acceptance



# Purpose of Inspections

- Perform inspection prior to use in work activities
- CO shall verify if a lift plan (Documented or Critical) is required. If a lift plan is required, the CO should review the plan with the crane operator, competent person for the lift, construction superintendent, and any other persons the contractor and CO deem necessary prior to commencing with the lift.
- CO shall perform physical verification of crane and rigging in accordance with the Pre-Operational Mobile Crane Inspection form.



# Purpose of Inspections

- CO shall perform physical verification of contractor safe zone based on proposed lift area to keep all unauthorized personnel out as required in ANSI B30.5.
- CO and crane operator shall review the lift area and crane set-up area for any additional hazards
- Prior to lift a pre-operational safety meeting is held to ensure that all involved understand their responsibilities
- Bottom Line: Everyone goes home the same way they came to work



# Requirements (SNL Specification 01065)

- Applies to all hoisting and rigging lifting operations involving but not limited to chain falls, bridge cranes, mobile cranes, forklifts, and all terrain lifts
- SCO shall document review of crane placement, and lifting plan or sequence with the Contractor and Contractor's crane operator, as appropriate



# Requirements (SNL Specification 01065)

- The inspection shall include but is not limited to verification of license or training, load charts, inspection reports, and physical verification of ropes, slings, undercarriage, outriggers, boom, and any other equipment associated with the lift



# Requirements (SNL Specification 01065)

- Crane operators shall be properly trained and experienced in operation of the crane or hoisting device. Crane operator shall have one of the following in possession during crane inspection and operation:
  - Valid State of New Mexico Crane Operator's License
  - Or Certification that indicates completion of a State of New Mexico recognized, in-house training course based on ASME B30 standards for hoisting operators, and who is employed by the entity that taught the training course or contracted to have the training course taught



# Requirements (SNL Specification 01065)

- Provide a copy of the annual inspection by a competent person of hoisting machinery available for review as required in OSHA 1926.550.
- Ensure that documentation of periodic reviews is available as required in ANSI B30.5, Section 5.2.1



# Inspection Process

- Complete the SNL Periodic Crane Inspection form:
  - Review operators credentials
  - Inspect the unit
  - Inspect the rigging
  - Review the lift plan
  - Conduct Pre-Lift meeting

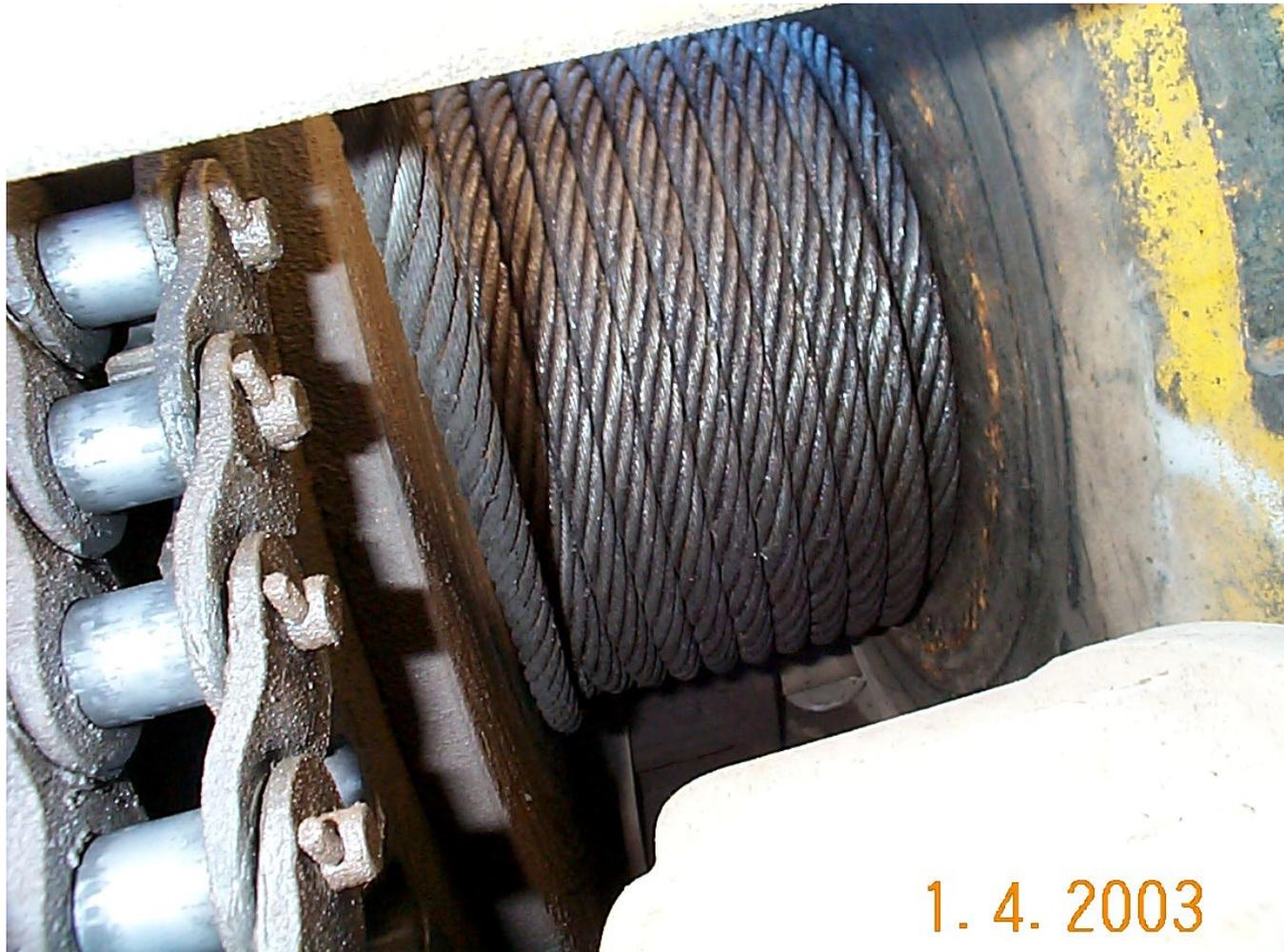
# Examples



# Examples



# Examples



# Examples



# Examples



# Examples



# Examples



# Examples



# Examples





# BBS Behavior- 3rd Qtr FY 2008 Data Review



Sandia National Laboratories

William Tierney

7/8/08

# 3rd Qtr Data Summary

Dates From: 3/1/2008 To: 5/31/2008

Observations

SOS: Construction & Service

801

Observer Workgroup: Construction & Service

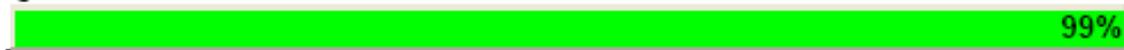
## Housekeeping



## PPE Fall/Anchor Point



## Alignment



## Proper Tool for Job



## Footing



## Get Help



## Pre-job Inspection



## Eyes on Path/Task



## Overview Total





# 3rd Qtr Data Summary

- March-May
- Total of 801 Observations
- Overall % Safe= 99% (98% last qtr)
- Lowest % Safe
  - Housekeeping-98% (94% last qtr)
- Improvements
  - PPE Fall/Anchor 99% (89% last qtr)
  - Pre- Job Inspection-100% (98% last qtr)

# Housekeeping Example



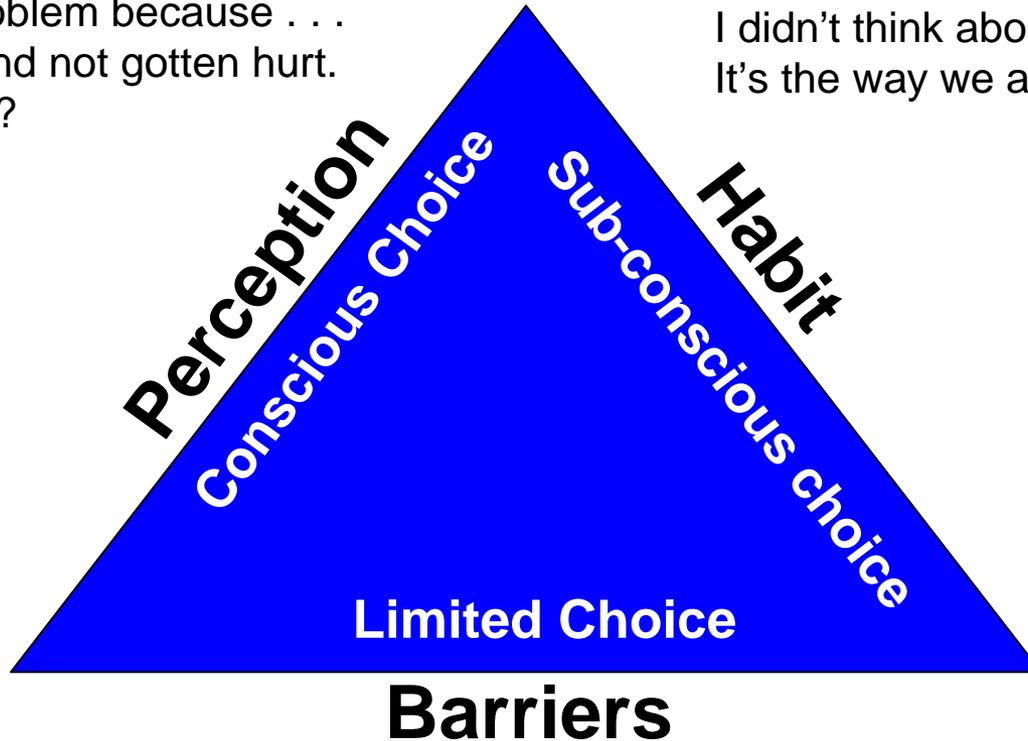
# Housekeeping Example



# Data Categorization

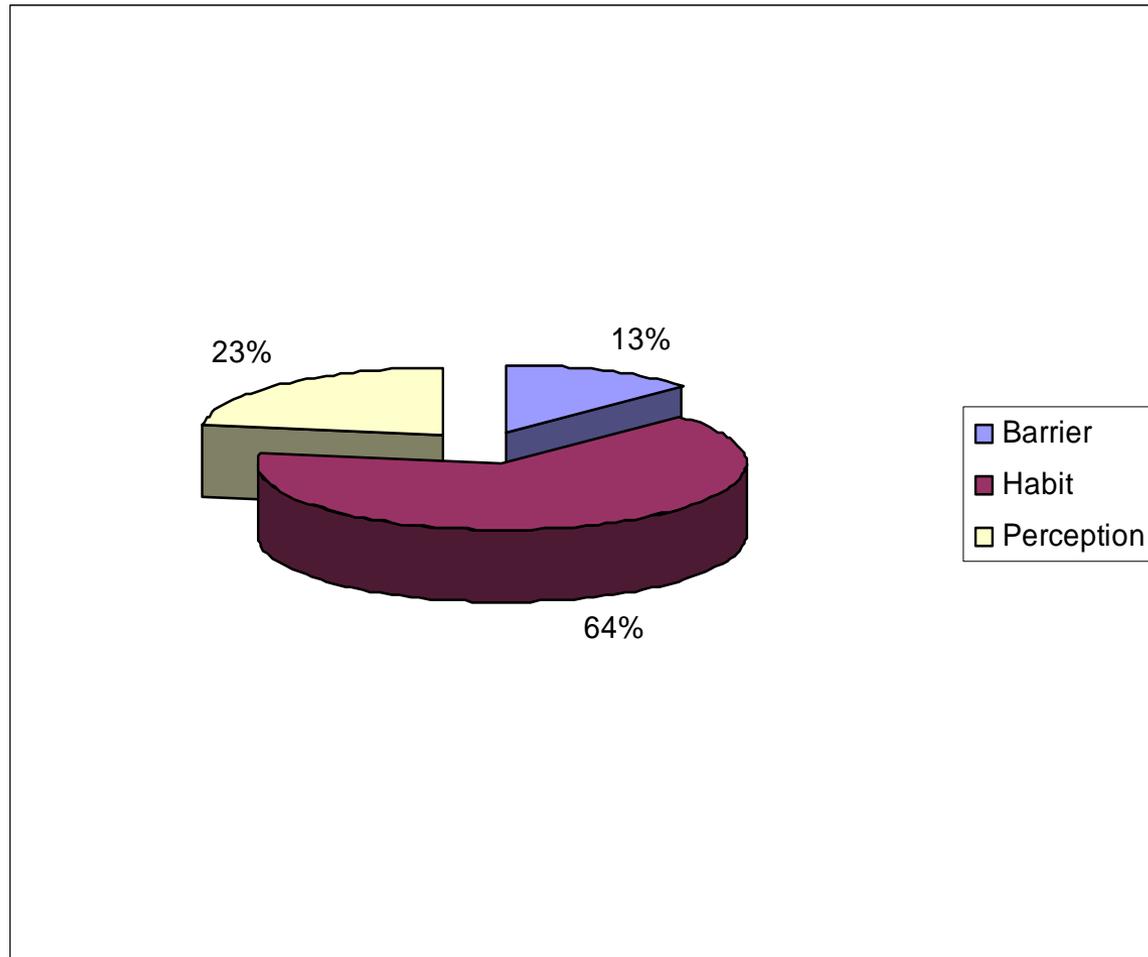
In my opinion . . .  
In my experience  
I don't think it's a problem because . . .  
I've done it before and not gotten hurt.  
What's wrong with it?

That's the way I always do it!  
I don't know.  
I didn't think about it.  
It's the way we always do it around here



I can't do it any other way because . . .  
It would be difficult to do it that way because . . .  
If I do it that way, (this would happen).

# Data Categorization: March-May



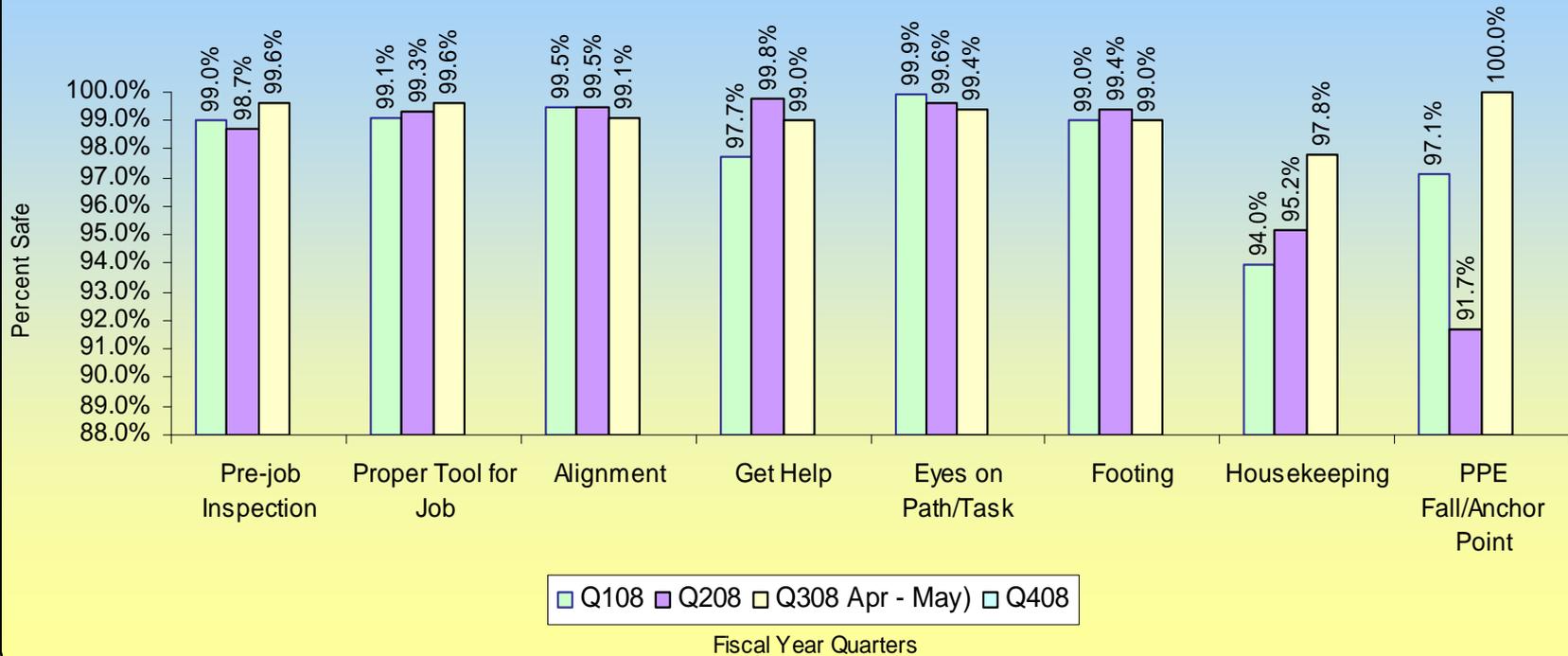


# Data Analysis

- Habit was first category (third last month)
  - Highest number of concerns: Housekeeping
- Perception was second category
  - Highest number of concerns: Eyes on Path/Task
- Barriers was third category (first last month)
  - Highest number of concerns: Footing

# BBS Data-LTD

**BBS Safety Observation Percent Safe by Behavior - Quarterly  
Construction/Service Team  
All Behaviors**





# BBS Program Updates

- Contractor Pilot Program
  - 3rd Qtly Data showed progress for all companies, however not at worker level
  - 4<sup>th</sup> Qtr Data next month
  - Developed contractual requirements for new Partnership contracts
  - Pilot program completion June 2008



# Respiratory Protection Programs

**Diane Morrell**



## Minimum Acceptable Criteria for Contractor Respiratory Protection Program

- A written respiratory protection program that complies with 29 CFR 1910.134 is required and will be reviewed SNL IH.
- The contractor must designate a Respiratory Protection Program Administrator, who's training or experience is appropriate fulfill the minimum standard requirements of recognizing, evaluating, and controlling the hazards identified by the written program



# Minimum Acceptable Criteria for Contractor Respiratory Protection Program

- Methods used in the respirator selection process such as estimating exposure level. Provide types of respiratory protection to be used, if known.
- Training requirements and records for respirator users.
- Medical evaluation requirements and medical clearances (not records or test results) for respirator users.
- Fit testing requirements, procedures and records for respirator users.



# Minimum Acceptable Criteria for Contractor Respiratory Protection Program

- Methods used to determine cartridge or canister change-out schedules, if applicable.
- Procedures for respirator use, inspection, cleaning and disinfecting, storage, and repair.
- Procedures for voluntary use of respirators.



# Minimum Acceptable Criteria for Contractor Respiratory Protection Program

- If atmosphere-supplying respirators will be used, describe methods used in providing and maintaining Grade D breathing air.
- Describe methods to be used to evaluate the effectiveness of your respiratory protection program, including a formal evaluation that is conducted at least annually.



# Review Criteria

- An IH reviews and evaluates written respiratory protection programs for each element required by the minimum criteria.

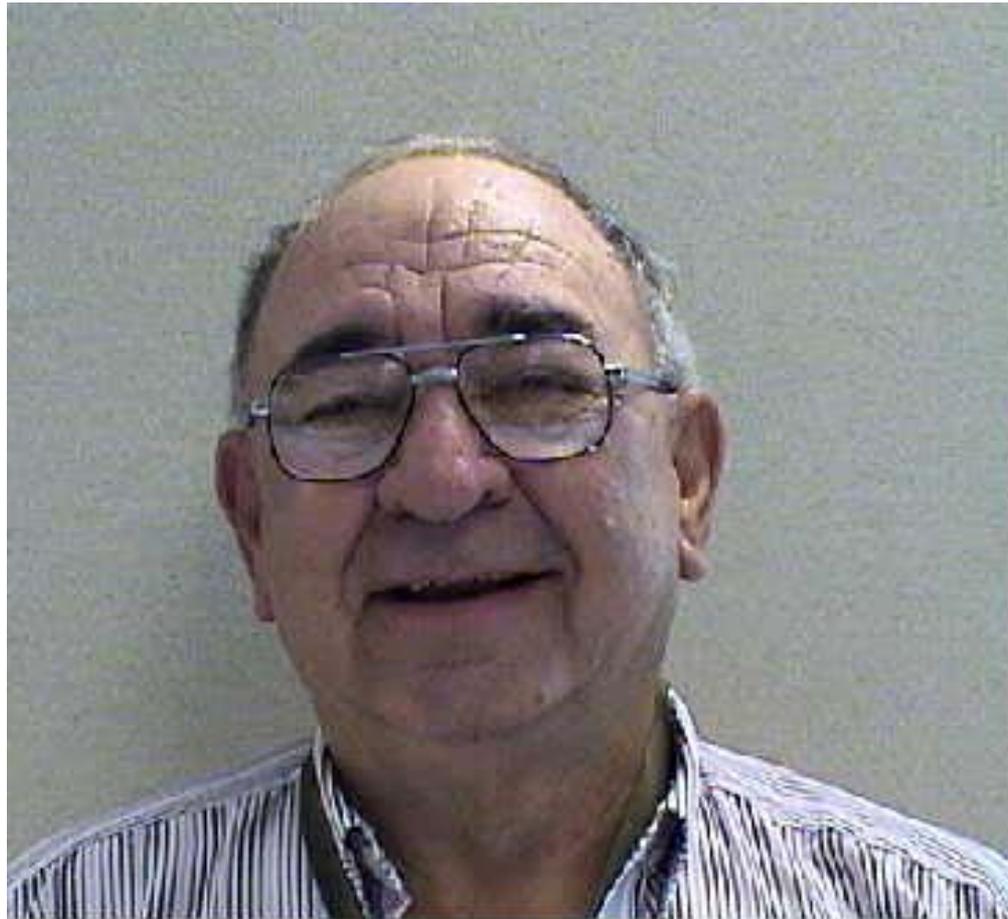


# Help

- Ask the FMOC IH questions – We will not write, manage, or implement your program, but we can answer questions.
- Local consultants – use them
- Small entity compliance guide for the revised Respiratory Protection Standard
  - [http://www.osha.gov/Publications/SECG\\_RPS/secgrev-current.pdf](http://www.osha.gov/Publications/SECG_RPS/secgrev-current.pdf)



# Remembering Woody



# Troy Communicates Best Practice





# Safety Stars

**William Tierney**  
Construction and Inspection



# Closing Announcements

# Construction Safety Seminar Schedule

**Location:** Mountain View Club

**Time:** 2:00 – 4:00 PM

**Future Seminars:**

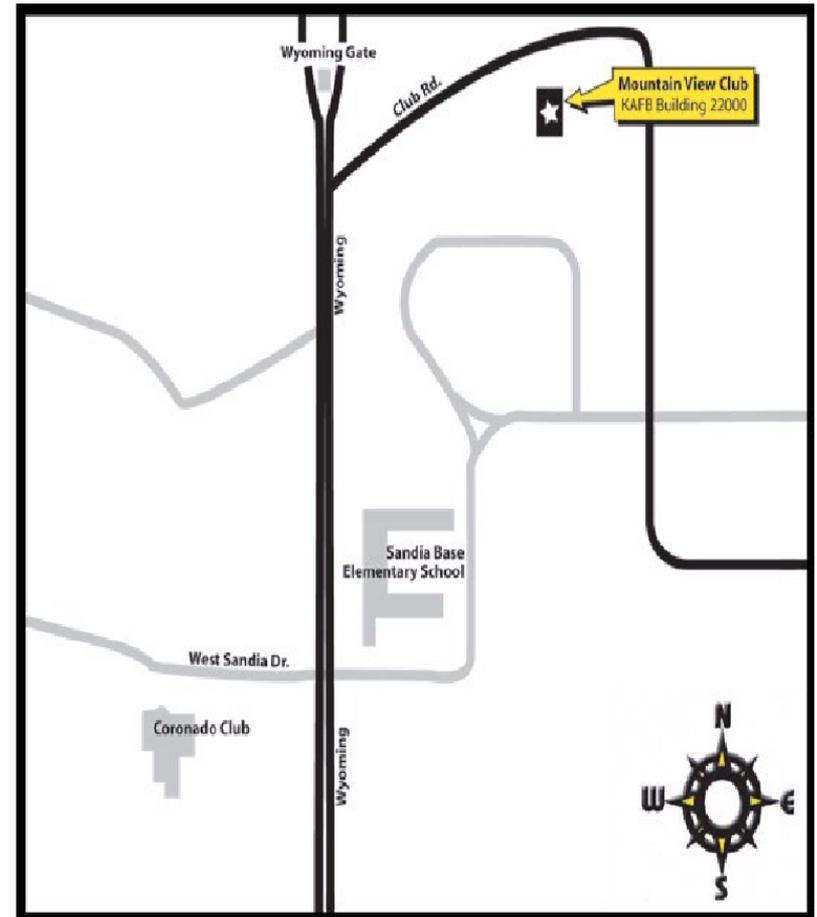
**October 21, 2008**

**January 20, 2009**

**April 14, 2009**

**July 14, 2009**

**October 13, 2009**



## ATTACHMENTS

- Arc Flash and Shock Hazard PPE Matrix and Warning Labels
- Attendance Sheets

**Table 6.2: Arc Flash and Shock Hazard PPE Matrix**

Level	Category	Incident Energy (cal/cm <sup>2</sup> )	Flash Boundary (feet)	Required PPE	PPE Code
I	-1 and 0	0 – 2	3	FR Work Clothing, Class O Gloves w/leather protectors, and safety glasses	Green
II	1 and 2	2 – 8	6	FR Work Clothing, Class 0 gloves w/leather protectors, safety glasses, hard hat w/FR-rated face shield, hearing protection, and leather boots or shoes	Blue
III	3	8 – 25	Contact Electrical Systems Engineer	Intermediate Switching Clothing, Class 0 gloves w/leather protectors, hearing protection, and leather boots or shoes	Yellow
IV	4	25 – 40		Electrical Switching Clothing, Class 0 gloves w/leather protectors, hearing protection, and leather boots or shoes	Orange
V	N/A	> 40		Identified by Electrical System Engineer	Red

**Notes:**

**FR Work Clothing:** FR long-sleeve shirt (min arc rating of 8) with FR pants (min arc rating of 11), untreated cotton t-shirt can be worn under FR shirt.

**Intermediate Switching Clothing (ISC):** FR Work Clothing plus FR Coveralls (min arc rating = 25) and double-layer switching hood.

**Electrical Switching Clothing (ESC):** FR Work Clothing plus 40-calorie switching suit w/rated hood and gloves.

*Note: Electrically rated gloves may be replaced with leather if the person is observing/inspecting a work activity and does not come within one foot of energized/live parts/systems.*

**Electrical Testing Equipment**

- Voltage Testing (over 50 volts)

The test equipment must be rated for the voltage being tested. Begin with the highest setting on the test equipment and work down to the proper range. **NOTE: WHEN MAKING PHASE TO GROUND MEASUREMENTS ON UNGROUNDED DELTA/WYE SYSTEMS, CERTAIN INSTRUMENTS, SUCH AS A KNOPP/WIGGINS, MAY NOT SHOW THE PRESENCE OF VOLTAGE. ON SUCH SYSTEMS, AN APPROVED HIGH IMPEDANCE MEASUREMENT DEVICE, SUCH AS A PROPERLY RATED DIGITAL VOLTMETER (DVM) OR DIGITAL MULTIMETER (DMM) SHALL BE USED.**

Use only insulated probes rated for the voltage being tested.

Check to verify that test equipment is working properly before and after each use.

When testing a circuit or equipment for de-energization, always test both phase-to-phase and phase-to-ground. Test all combinations of circuit paths each time you test a circuit.

Wear PPE specified in 6.2.C below.

ATTACHMENT A  
ARC FLASH HAZARD WARNING LABELS

Level I (HC-0) Label

**WARNING**  
ARC FLASH & SHOCK HAZARD

BUILDING	867	LOCATION	PANEL MSB1
INCIDENT ENERGY @ 18"	< 2 cal/cm <sup>2</sup>	HAZARD CATEGORY	0
APPROACH BOUNDARY	3 ft	PPE LEVEL	I
SOURCE	TF-0867-1	MAXIMO	
		DATE	10/05/07

Level II (HC-1 and HC-2) Label

**WARNING**  
ARC FLASH & SHOCK HAZARD

BUILDING	752	LOCATION	PANEL 1BH1
INCIDENT ENERGY @ 18"	6.9 cal/cm <sup>2</sup>	HAZARD CATEGORY	2
APPROACH BOUNDARY	3.8 ft	PPE LEVEL	II
SOURCE	TF-0752-1	MAXIMO	
		DATE	10/05/07

### Level III (HC-3) Label

**WARNING**  
ARC FLASH & SHOCK HAZARD

BUILDING	703	LOCATION	PANEL MDP
INCIDENT ENERGY @ 18"	12.8 cal/cm <sup>2</sup>	HAZARD CATEGORY	3
APPROACH BOUNDARY	10.6 ft	PPE LEVEL	III
SOURCE	TF-0804-1	MAXIMO	1103462
		DATE	10/15/07

### Level IV (HC-4) Label

**WARNING**  
ARC FLASH & SHOCK HAZARD

BUILDING	726	LOCATION	MCC-A
INCIDENT ENERGY @ 18"	30.7 cal/cm <sup>2</sup>	HAZARD CATEGORY	4
APPROACH BOUNDARY	10.6 ft	PPE LEVEL	IV
SOURCE	TF-0726-1	MAXIMO	
		DATE	10/15/07

Level V (Over 40 cal/cm<sup>2</sup>) Label

**DANGER**

**EXTREME ARC FLASH & SHOCK HAZARD  
DE-ENERGIZE EQUIPMENT PRIOR TO  
PERFORMING WORK**

BUILDING

**894**

LOCATION

**SWBD-1**

ARC FLASH HAZARD APPROACH BOUNDARY

**14.4** ft

INCIDENT ENERGY @ 18"

**60.8** cal/cm<sup>2</sup>

HAZARD CATEGORY

**EXCEEDS NFPA LIMITS**

**CONTACT SYSTEMS ENGINEERING FOR ASSISTANCE**

SOURCE: TF-0894-1

DATE: 11/05/07

Maximo #

# Contractors Quarterly Safety Seminar Sign-In Sheet

PRINT CLEARLY

Company	Name	Position (Safety Officer, Foreman, etc.)	Office Phone	Cell Phone	Email Address
1. SNL	Linda Sells	Admin	844-8552		lsells@sandia.gov
2. SNL	Randy Fellhelter	Safety	844-6395		RFellh@Sandia.gov
3. BUSINESS ENVIRONMENTS	Mike Daniel	PSO/OPERATIONS	888-4400		mdaniel@businessenvironments.com
4. SNL	Jeff Quinlan	Director	845-0544		
5. ECI	Scott Gifford	PM/Safety Officer	206-9920	427-7116	sgifford@eciconcast.net
6. Rupert Plumbing & Heating	Chris A. Auger	PM/Safety Off.	217-8138-12		chris@rupertph.com
7. RUPERT P3H	CAROL WILSON	SUPER	321-0762		carol@rupertph.com
8. DEL RIO ENTERPRISES, INC.	NEIL LUNDY	PM	341-9055	977-5898	nlundy@delrio.com
9. <del>VIC OLESSEN</del> BRYCON	Vic Olesen	Safety	892-6163	250-1764	volesen@brycon.com
10. SNL	BILL LUCY	MG. P.	5-8870		BLUCY@SANDIA.GOV
11. SDV Construction	MARVIN DUNCAN	PROJ. ENGR.	903-0804		marvin@sdvconstruction.com
12. TEF Construction	Wendy Raymer	Intern	293-2343		TEFconst@yahoo.com
13. TEF construction	Emily Miller	PSO/Safety	293-2343	269-0438	TEFconstem@aol.com
14. SNL	Anthony M. BACA	Mgr.	844-3553		ambaca@Sandia.com
15. ENTER PRIZE	Antonio Gonzales	Safety	275-9369	319-4411	agonzalesiii@entelcom.com
16. SNL	CAROLYN JONES	Team Lead	844-8012		ljones@Sandia.gov
17. SNL	Mike Quinlan	Senior Mgr.	844-6022		
18. Yearest Mechanical	James Magoffe	Safety Mgr.	991-5070	872-6380	James@Yearest.com
19. SNL	BRYANT REEVES	INSPECTOR	284-2996	331-4113	BREEVES@SNL.GOV
20. SNL/SSA	Joseph Cordova	CM	294-8028	977-3208	joscord@SANDIA
21. Southwest Hazard Control	Lois Dlagos	Project Manager	298-6930	228-0622	lolaque@swhaz.com
22. BED Ind.	Kenny Easley	P.M.	299-4444	991-3073	keasley@bed-electric.com
23. ECI	BILL BURRESS	PM	268-9920	482-7714	BBURRESS@ECI.com
24. SNL	Greg Kinsel	Safety	845-4457		NET
25.					

# Contractors Quarterly Safety Seminar Sign-In Sheet

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	Company	Name	Position (Safety Officer, Foreman, etc.)	Office Phone	Cell Phone	Email Address
1.	BRYCON	Russ Snyder	MANAGER	592 6165	350 3897	RSnyder@Brycon.com
2.	SNL	CW Humber	SE	234 2799	—	cwhumber@sandia.gov
3.	SNL	Dave Anglen	TH	845-1340		
4.	Brycon	Gary Benavidez	PM	450-1274	..	gbenavidez@brycon.com
5.	Brycon	CHRIS McNamee	GM	977 7547		CMcNamee@Brycon.com
6.	DREL	KEVIN GARCIA	PRES	341-9055		KGARCIA@DREL-NA.com
7.	SDV	JAMES Vigil	Safety	341-8000		james@safety.solutionsm.com
8.	Woodward Metal Co	Michelle Rivera	President	237-1122		woodmetal@msn.com
9.	Woodward Metal Co.	Rod. Rivera	VP	237-1122		" "
10.	R/D Electric	Jose Martinez	Em	979-736		JoseM@R-D-Electric.com
11.	B&D ELECTRIC	PRECILIANO NAVAIZ		975-7318		
12.	RMLT inc	Jeremie P. Schaefer	Foreman	345-0008	681-9065	
13.	ALPHA CONST	Tim Medina	Supervisor	867 4706		
14.	"	John Martinez	Safety	667 4700		
15.	SANDIA	DAVID NORMAN	INSPECTOR	944-1905		
16.	Summit Construction	JAMES NORTH	COMPLIANCE ADMINISTRATOR	264-9923		James@summitconst.com
17.	JB HENDERSON	JOHN J. ORTEGA	SAFETY REP	975 2329		jortega@jbhenderson.com
18.	ECL	Anthony Salcido	Gen Foreman	260 9920	907 9551	asalcido.ecl@concast.net
19.	USELECTRICAL CORP	LARRY ECKHARDT	PROD MANAGER	260-1000	331 8337	larrye@uselectricalcorp.com
20.	Summit Const	Clayton Thomas	Superintendent	842-8113	804-6518	clayton@summitconst.com
21.	Summit Const	Lita Vigil	Superintendent	842-8113	489-6992	litav@summitconst.com
22.	Summit Const	KAY MOVA	Gen. Superintendent	842-8113	980-4405	kaymesummitconst.com
23.	Summit CONST	MILORE THOMAS	Foreman	842 8113	263 0851	Milore@summitconst.com
24.	TRIANGLE PAVING	ANTHONY TAGUILEGAMI	SAFETY OFF.	247-2970		tripsue@msa.com
25.	DEL RIO ENT INC.	RICHARD CONNELLY	FIELD SUPR.	259-8213		

# Contractors Quarterly Safety Seminar Sign-In Sheet

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Company	Name	Position (Safety Officer, Foreman, etc.)	Office Phone	Cell Phone	Email Address
1. SDV Construction	Jerry Morgan	PPS Manager	885-3176	903-0165	Jerry@sdvconstruction.com
2. SNL	William Toney	SNL, SRM	945-0633	681-0111	Wtoney@snl.com
3. <del>Delta</del> SNL	Debra Lee, Rick	Inspection	254-3700	239-6891	debralee@snl.com
4. SNL	James L. Rush	Manager	844-4912	-	jlrush@sandia.gov
5. DOE-SSO	Wayne Walker	FR	845-4210	-	wwalker@doe.gov
6. B&D Electric Co.	Richard W. Wabert	Manager	277-4061	991-6627	R.Wabert@b-d.com
7. FESI	Joey Sols	PM	275-9369	804-3842	jsols@erotel.com
8. COMARK Ltd Systems	Tommy Snyl	Safety Mgr.	-	944-2142	tsnyl@comark.com
9. Sandia	Blaine Maxwell	Itb	284-9289	-	blmaxwell@sandia.gov
10. SNL	MICHAEL A PACHECO	C.I.O.	259-4362	259-4362	m.pacheco@snl.com
11. SNL 04827	TROY ROGERS	ELEC INS.	275-9672	-	trogers@sandia.gov
12. Sandia Staffing Alliance 4826	Carol Bicher	FE PM	284-1748	-	cbicher@sandia.gov
13. SNL 4826	Patsy Rowland	FE PL	844-5315	-	prowla@sandia.gov
14. SNL	Karen PRINKE	FE PM	284-9717	-	koprink@sandia.gov
15. BMCZ	Craig P Miller	Super.	975-9521	-	Cpmiller@bmcinc.com
16. BNCE	Tyler Traylor	Foreman	-	681-9171	-
17. FAIT/ATC NMLL	GARRY WATSON	Project Manager	844-5067	379-1611	BKWatson@sandia.gov
18. SNL	Jim Hunter	Proj. Mgr	45844	-	jhunter@snl.com
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# Contractors Quarterly Safety Seminar Sign-In Sheet

PRINT CLEARLY

	Company	Name	Position (Safety Officer, Foreman, etc.)	Office Phone	Cell Phone	Email Address
1.	SNL	John Harding	BLDG INSP	845-3167	235-9679	
2.	RAMPART P/H	RAY L. WOLF	CONCRETE FOREMAN	847-8758-15	315-9078	
3.	SNL/LAMARCA	Carlos Giron	ASC Inspec		238 9917	cgiron@sanctio.gov
4.	SILANDT CONST	TONY THOMAS	President	842-8113		SILANDT@SILANDTCONSTRUCTION.COM
5.	SDU Construction	Doris Schreiber	Project Manager	885 3176	905-0164	Doris@sdconstruction.com
6.	DM SHAW #82	Dave Hendrix	INSPT.	844-1773	235-9679	
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