

# Controlling Isoflurane Exposure

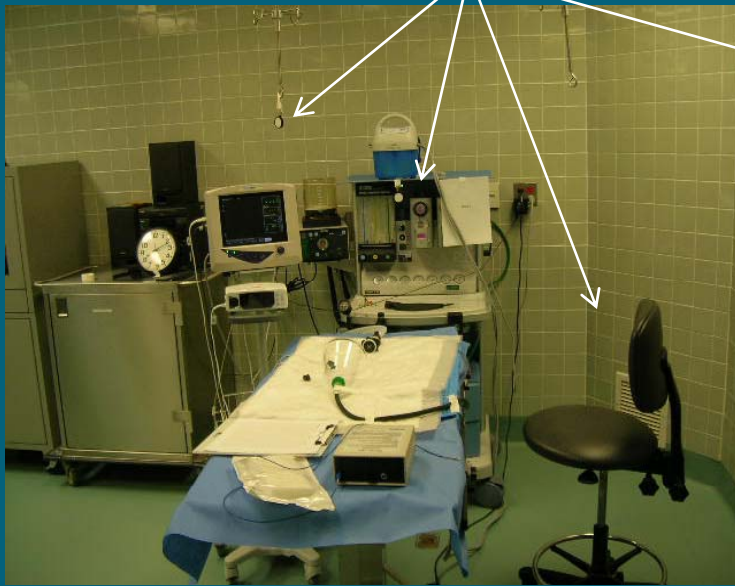


By: George S. Pruiett – Chief, Industrial Hygiene, DDEAMC

# PROCESS IMPROVEMENT

## Controlling Isoflurane Exposure

### Passive Dosimeters Placements in Small Animal Surgery Room



# Overview

- Issue
- Objectives
- Process Improvement
- Data Management
- Lesson Learned

# Issue

Routine laboratory sample report indicated DA personnel assigned to local animal research facility were being exposed to elevated levels of isoflurane.

# Objectives

- Use the process improvement approach to minimize and/or eliminate DA personnel exposure to waste anesthetic gases (isoflurane)
- Minimize negative impact to research protocols
- Share lessons learned
- Discuss data management via DOEHRS-IH

# PROCESS IMPROVEMENT

## F-O-C-U-S P-D-C-A

- Find a Process to Improve
  - Organize a Team
  - Clarify Knowledge
  - Understand the Process
  - Study Process
- 
- Plan the Process Improvement
  - Do the Process Improvement
  - Check the Process
  - Act to Hold the Gain



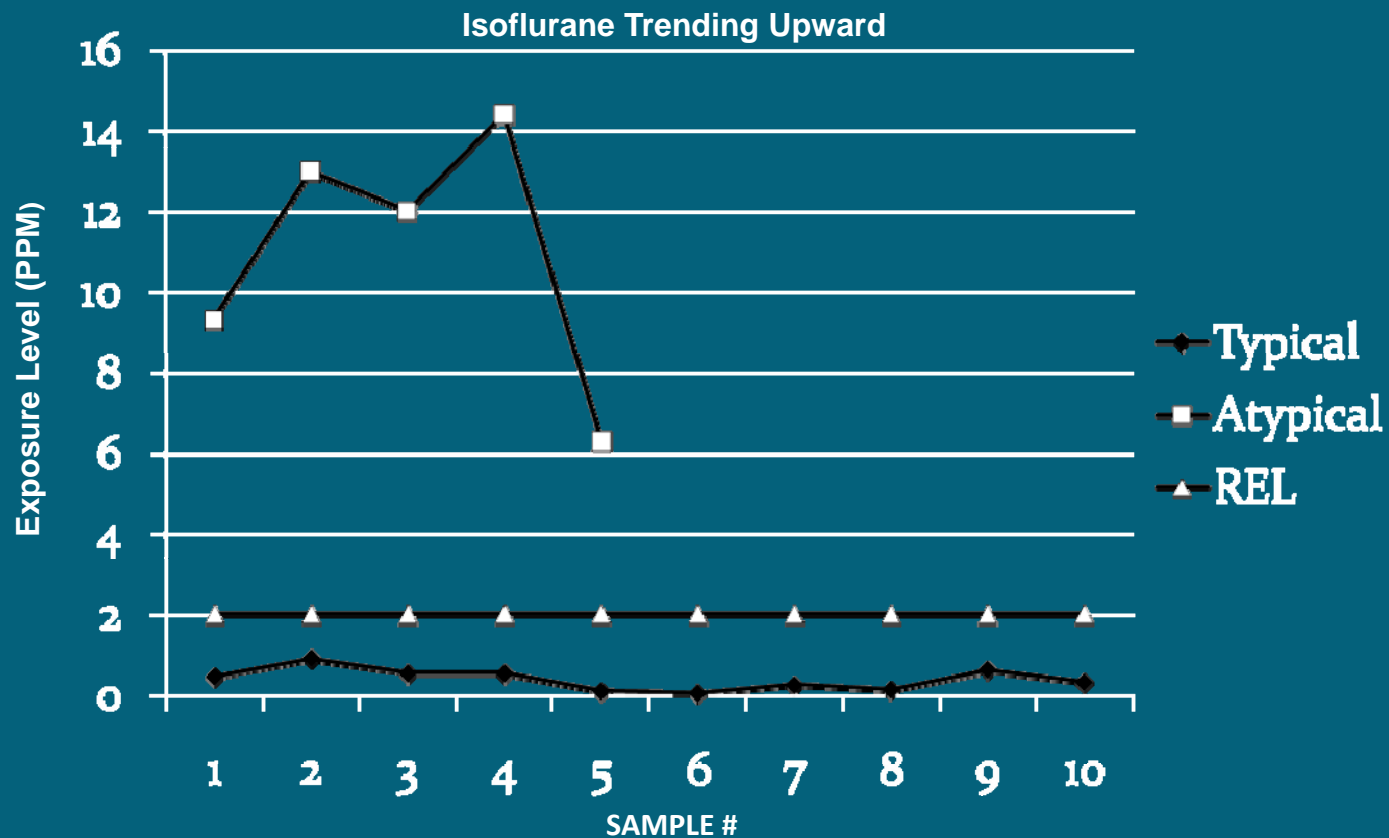




# Find a Process to Improve



## Monitoring & Controlling DA Personnel Exposures



Data source: DDEAMC, Preventive Medicine Careline – Industrial Hygiene Section, October 2010

# Organize a Team

- Organize Team & Eliminate Cause of Increasing Exposure
- Evaluate:
  - Sampling Errors
  - Procedure Errors
  - Engineering Control Issues
  - Design Issues
  - Maintenance Issues
- Team: IH staff, Research personnel, Senior Leaders  
Clinical Engineering, Maintenance Personnel &  
Equipment Manufacturer's Technical Rep  
EAMC Environment of Care Committee





# Clarify Knowledge

- Where? Clinical Investigation (CI) Animal Research Facility – Operating Room
- Who? Research Physicians and CI Staff
- What? Elevated Exposure To Waste Anesthetic Gas – Isoflurane
- How? FOCUS PDCA



# Understand the Cause of the Process

- Review IH Sampling Methods
- Review Research Protocol
- Review Engineering Controls
- Understand Clinical Engineering Preventive Maintenance Process (Leak Tests within specs)
- CI Staff Training (WAG Equipment)
- NIOSH/OSHA Sampling Protocol
- Management Employee Relations
- WAG Equipment Design
- Workload Demand (time constraints & # animals in protocol)
- Exposure, Small vs. Large Animals Procedures



# Select - Analyze The Process In Real-Time



**Multi Gas Analyzer**



**WAG Unit**

**38 PPM**



**Potential Leak Points**

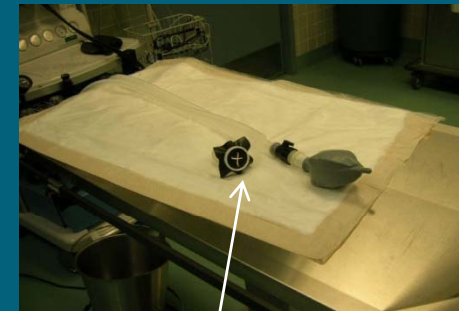


**Induction Chamber**

**297 PPM**



**Equipment Inspection**



**Small Animal Nose Cone Interface**

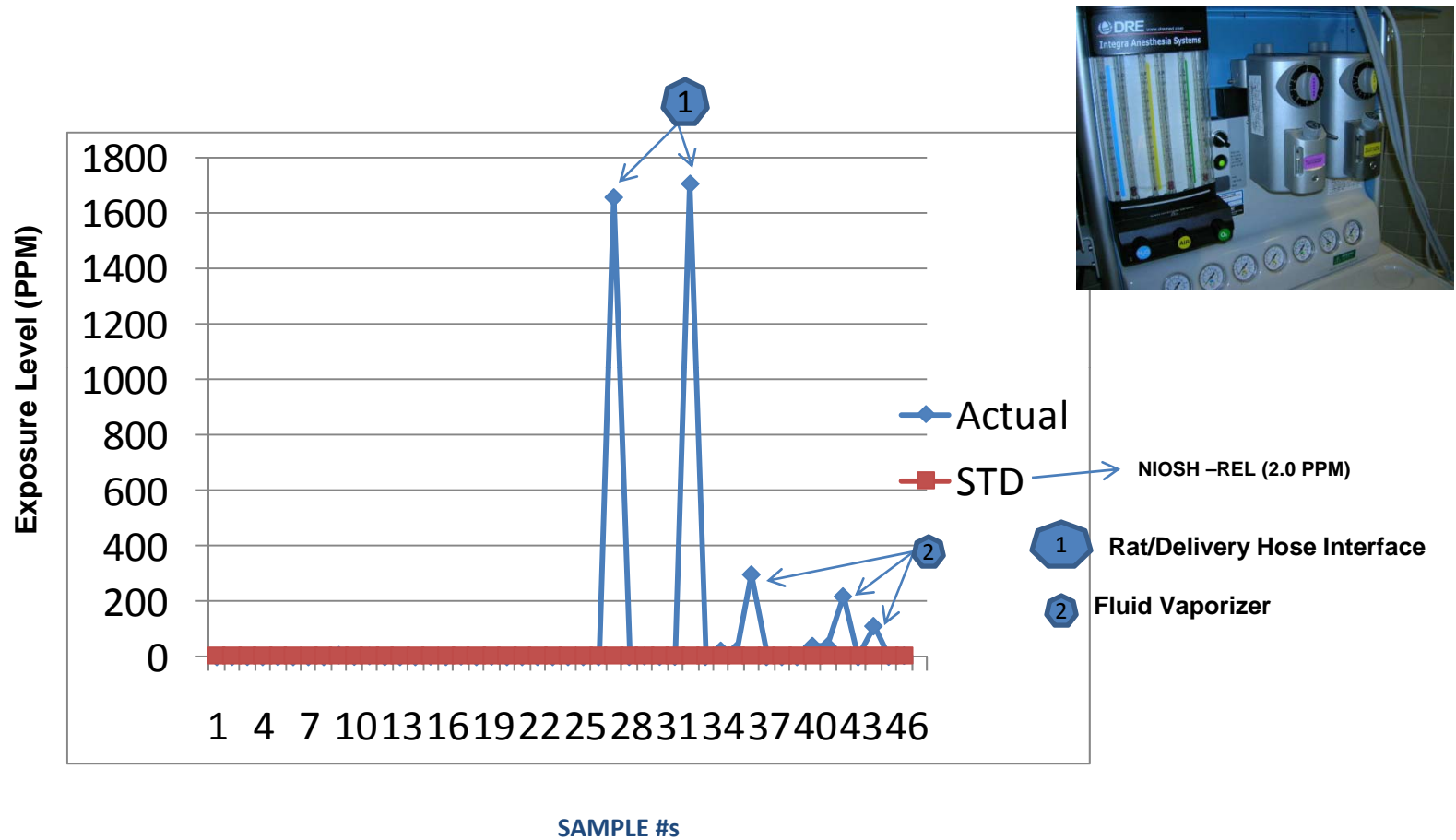
**1,657 PPM**

# Plan The Process Improvement

- Advise CI staff of IH Findings (Town Hall Meetings)
- Re-sample Process
- Rotate CI Staff In/Out OR
- Procure Mobile Filtration Units
- Brief EOC Committee
- Conduct Real-time Monitoring
- Use Alternate work location with Local Exhaust
- Phase In Return To Normal Protocol



# Do The Improvement – Troubleshoot Process



Data source: DDEAMC, Preventive Medicine Careline – Industrial Hygiene Section, 5 Jan 2011.

# Do The Improvement – Controls In Place

- Final Clinical Engineering Checks/WAG Units
- Air flow Studies on Mobile Filtration Units
- Administrative control - Rotation of Staff
- Final confirmation Testing/Exposure Levels
- Confirmation of Root Exposure Cause

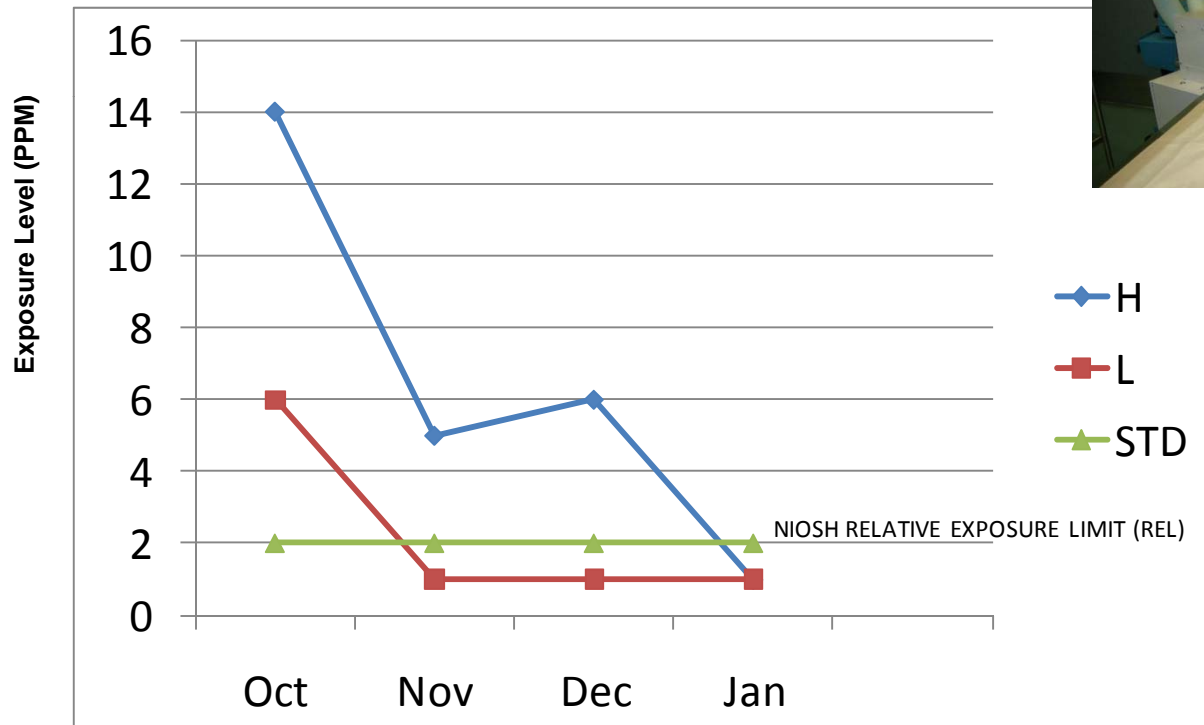
\*\*\*\*Design Issue With WAG Unit Vaporizer\*\*\*\*





# Check The Process Improvement Results

Exposure Range - High (H) Low (L) Oct 2010 - Jan 2011

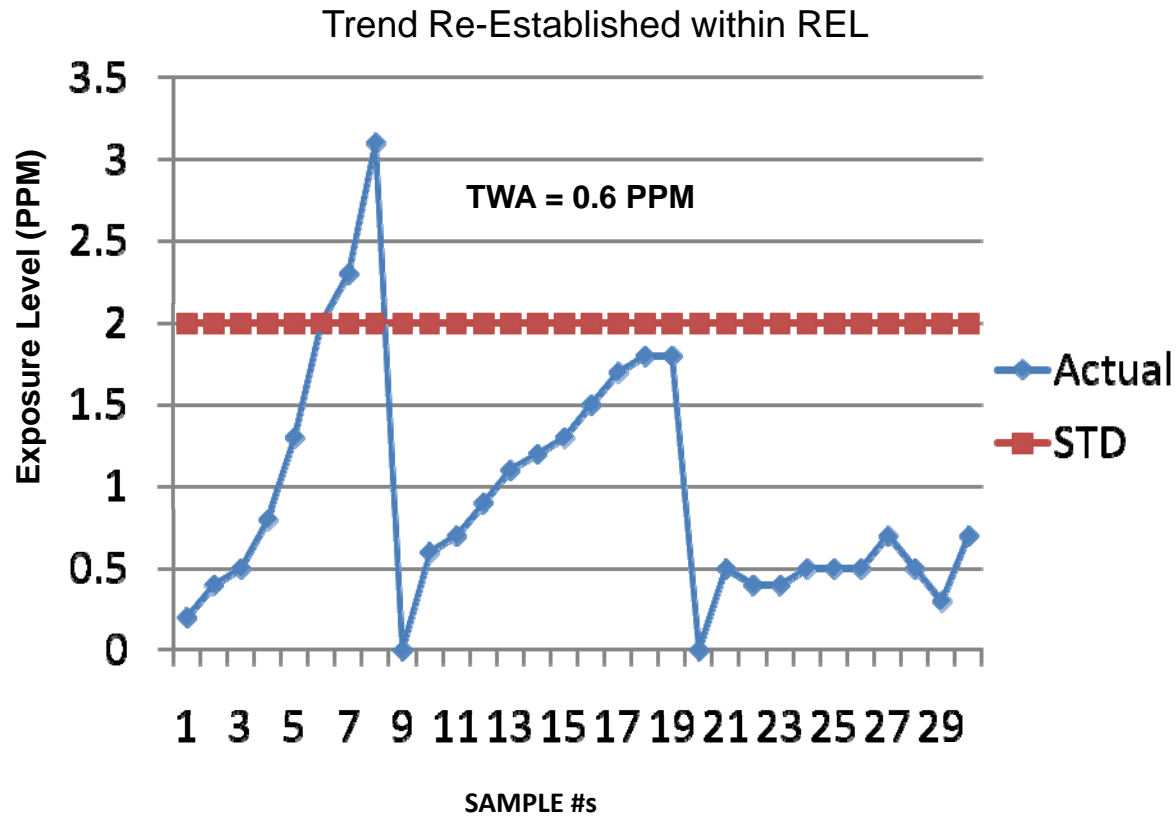


Data source: DDEAMC, Preventive Medicine Careline – Industrial Hygiene Section, 21 Jan 2011.





# Act To Hold The Gain



Sample #s 1-6 taken at Induction chamber; #s 7-30 taken every 15 minutes within operating room @ table # 3

Data source: DDEAMC, Preventive Medicine Careline – Industrial Hygiene Section, 18 Jan 2011.



# Act To Hold The Gain

## Manage Exposure Data/DOEHRS-IH



https://doehrs-ih.csd.disa.mil/Doehrs/DisplayEditShop.do?entryLocation=SearchResults&id=40523

File Edit View Favorites Tools Help

DOEHRS Shop - Detail

Defense Occupational and Environmental Health Readiness System

Welcome, George Pruitt

You are here: Home > Shop > Shop Detail

Current Program Office: 09, GA, P-1, G-6-6-6, (12285)

Parent: W3QM DD EISENHOWER ARMY M

Save Save and Add Subordinate Location Cancel

Shop Information

Shop Name\* B14g28705\_C1\_1so Data Sam Shop Code

Official Name Office Symbol

Organization/LIC Name\* W3QM DD EISENHOWER ARMY M LIC W3QMAA

Start Date\* 2011/01/18 (y/mm/dd) Stop Date (y/mm/dd)

Start Priority\* 1 - High 2 - Medium 3 - Low

Shop Description CT Isoflurane Representative Exposure Sample Data

Mission Statement

Comments

Address

City FT GOR DON

State/ZIP Code Georgia (GA) 30905000

Country United States (NATO member)

Location information

Attachments (7)

Select	Associated Attachment File	Description	Upload Date
<input type="checkbox"/>	Re Isoflurane Exposures CI - B104 38705 (UNCLASSIFIED).doc		2011/01/26
<input type="checkbox"/>	MIRAN Sample Data 5-Jan2011.doc		2011/01/26
<input type="checkbox"/>	MIRAN Sample Data.doc		2011/01/26
<input type="checkbox"/>	DOEAMC - CI Isoflurane Exposures Summary Jan 2011.pdf		2011/02/09
<input type="checkbox"/>	DOEAMC - HAZARDOUS GASES & VAPORS Summary 2010.pdf		2011/02/09
<input type="checkbox"/>	DOEAMC - HAZARDOUS GASES & VAPORS Summary CI Oct09-2010.pdf		2011/02/09
<input type="checkbox"/>	B104 38705 CI MIRAN Sample Data 27 Jan 2011.doc		2011/02/09

Program Office information

Contact information

Cost Center information

Demographic information

Trusted sites 75%

DOEHRS-IH Screen Shot Exposure Data Files

Data source: DDEAMC, Preventive Medicine Careline – Industrial Hygiene Section, 18 Jan 2011.

# Share Lessons Learned & Celebrate!!!!

- Trust & verify Your Equipment Performance
- Maintain Partnerships
- Changes in Quality Directly Impacts Exposure!!
- Implemented Product Substitution
- Implemented Operational Checklist

Replacement Unit



0.4 – 0.9 PPM, Background

Old Unit



1.0 – 7.0 PPM, Background

# Questions?

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