



Cadmium in Defense Industries - Nov 2006

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Situation

Subcontractor cleaning cables found Cd in air

Air monitoring found Cd levels that exceed PEL

Levels found did not make sense based on historical data and normal process layout

Needed to know where the Cd was coming from

Closed plant

Wanted to do the right thing



Cadmium Standard - major requirements

PEL 5 ug/m³ Action level 2.5 ug/m³

Air Monitoring- Double negative or 6 months

Regulated Areas if > PEL for more than 30 days

Engineering and Work Practice then Respirators

SECALS- Six industries of 15- 50

Written Compliance Program

HEPA filters for Respirators and re-circulated air

Clothing, Housekeeping, Change Rooms

Medical Surveillance

Employee communication and training

Signs and recordkeeping



Background

Overhaul and renovations –

Reset

Remanufacture

**Corrosion Control- Cd plated bolts, rivets,
fasteners, cable connectors**

Removing bolts with impact wrench

**In process of taking wipes/ collecting dust
samples**



Wipe Standards and Guidelines

Lead	EPA/HUD 40 ug/ft² floor 250ug/ft² sills 400 ppm soil
Beryllium	DOE 0.2 ug/100cm² non work 3.0 ug/100cm² work areas/dust
PCBs	EPA 10 and CT 1ug/100cm²
Cadmium	???????? (note 11 x 100cm² = ft²)



Wipe Standards and Guidelines

TLV based on ug per m³

Average person inhales about 1 m³ per hour

Lead = 50 ug/m³ x 10m³ = 500 ug / day

**EPA safety/absorption/age/weight/illness factor or
kids eat 12 Ft²**

100 cm² = Palm size

Arsenic TLV = 10ug/m³ 100 ug / day

Cadmium PEL = 5 ug/m³ 50 ug / day



Identification of Cd parts

Lab testing of parts

Wipes and send for lab testing – metal digestion

Collect dust and lab test – SEM/TEM

Innov-X Systems Portable XRF – Direct Read



Wipe test and other test conclusions

Cadmium coated bolts and rosanns

Cable connectors cadmium

Battery terminals zinc

Visual inspection cannot differentiate Cd and Cr



Plan

Remediate dust in building

HEPA vac and wet wipe / mop

Air monitoring of remediators

Pre and post wipe Cd analysis

Communicate with Employees

Update meeting, Haz Comm, Schedule

Occ Doc, spirometry, Fit testing, PPE training

All regulated areas for first week



Medical Requirements

Pulmonary Function Test -

Blood work – < 5 ug/L whole blood = A, B 5-10

Urine – <3 ug Cd/g cret = A, B 3-7

Urine - <300 ug B2-microglob /g cret = A, 300-750

Chest Xrays -



Air testing during remediation

Nine cleaners sampled over first 3 days

Seven were less than 0.06 ug / m³

Others were 0.15 and 0.27 ug / m³

Concluded staff could clean own parts and machines

Purchasing bought PPE, HEPA etc

Set up supplies and key staff to organize/train



Past Activities

Use compressed air to clean and blow holes out

No exhaust systems or vacuum control devices

Drilled out and cut off Cd plated bolts

Same with rosanns

Used wire brushes, brooms and dust pans

Had work clothes but change rooms not separate

Lunch eaten at stations – Size/location of lunch rooms



Discussed Air Results with each employee

Discussed Cd air levels found and PEL with individuals

Developed in depth description of duties/tasks

Asked for employee input on how to reduce dust levels during disassembly

Posted all air results for the specific departments

Developed conclusions of likely sources of Cd

- ◆ More bolts removed, cut, sanded, ground
- ◆ Turret activities major source (40ug/m³)- most bolts, cables- confined
- ◆ Compressed air cleaning - Rear impact wrench discharge

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Define Work Practices

No longer use compressed air to clean

Partial disassemble and pre rinse

**No grinding, sanding or removing Cd parts
without a control device or exhaust vent**

**Improve housekeeping - HEPA vacuum areas at
defined times**

Use of PPE, showers, change areas, lunch areas

Increase use of wet floor sweeper for aisles

Enforce contracts – Cables, disassembly



Issues

Not enough showers and changing areas

Plant layout not segregated

Lunch room across plant from office area

Plant engineer communicate with production

Exhaust of Aluminum dust (NFPA 651)



Controls

Manual / verses air drive impact wrench

Insulated / coated

No existing exhaust

Vacuum assisted tools (rear exhaust)

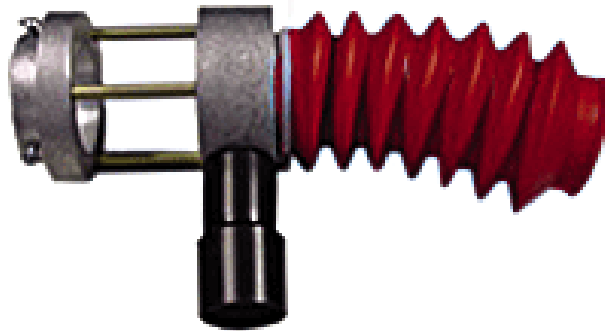
<http://dcmcleanair.com/tools.htm>

Down Draft tables



Nilfisk vacuum assisted tools

Drill shield, needle descaler, sander, grinder





Duty to notify and document

Cleaning and janitorial

Candy/Soda machine re fillers

Garbage and recyclers

Sales persons - restrictions

Clients receiving parts



Wipe sampling results

	preclean	prewash	post
Ammo case	440		17
Turret floor	1900		72
Lunch table	10		1.5
Turret (horiz)		3400	1200
Turret (vert)		350	190
Shipping crate	32		
Parts Box	18		



Warning Signs and Labels

Regulated area sign

**DANGER
CADMIUM
CANCER HAZARD
CAN CAUSE LUNG AND
KIDNEY DISEASE
AUTHORIZED PERSONNEL
ONLY
RESPIRATORS REQUIRED IN
THIS AREA**

Label

**DANGER
CONTAINS CADMIUM
CANCER HAZARD
AVOID CREATING DUST
CAN CAUSE LUNG AND
KIDNEY DISEASE**