Permissible Exposure Limit (PEL) = Maximum Exposure as Time Weighted Average (TWA) for 8 hour period

OSHA promulgated-- Designed to protect workers from dangerous chemicals, compounds, toxins and carcinogens.

New PEL Standard Reduced Chrome VI Exposure levels by factor of 10, Action Level by 20 times (previous 52ug/cu M)
CHROMIUM PERMISSIBLE EXPOSURE LIMIT

Compliance Extremely Difficult

- 5 ug/cu meter PEL Technically Challenging for “engineered controls” exhaust equipment design

- Financial burden of equipment purchase and operating costs can be prohibitive for many companies

- Achievable only by state-of-the-art exhaust control equipment to prevent compliance violation and perhaps mandatory shutdown by OSHA
CHROMIUM PEL ACTION LEVEL

Second most stringent standard for Chromium VI workplace exposure worldwide

- Compliance with "Action Level" (2.5 ug/cu meter; one half the PEL) allows relaxed "ancillary provisions and restrictions", that are still required with 5 ug/cu meter compliance

NON-COMPLIANCE WITH THE "ACTION LEVEL" (2.5 ug/cu M) REQUIRES THE USE OF FULL FACE RESPIRATORS, PROTECTIVE EQUIPMENT, HYGIENE AREAS, MEDICAL MONITORING, AND RESTRICTIONS ON EMPLOYEE MOVEMENT IN THE WORKPLACE
Many companies will go out of business or move offshore, because the financial burden to achieve compliance with this PEL will be prohibitive for them.

For those that stay in business and comply, correctly designed exhaust ventilation equipment will be *TOP PRIORITY*
INDUSTRIES EFFECTED BY THE NEW CHROMIUM PEL

- Electroplating
- Metal Finishing
- Anodizing
- Painting
- Welding
- Chemical Process
- Chemical Manufacture
- Steel Industry
- Others....
OSHA PREFERRED METHOD OF CONTROL
“ENGINEERED CONTROL TECHNOLOGY”

EXHAUST VENTILATION SYSTEMS MUST BE

- STATE OF THE ART
- BEST AVAILABLE ENGINEERED CONTROL TECHNOLOGY
- DESIGNED WITH PRECISION
- EMPLOY VERY AGGRESSIVE VOLUMES OF AIR
- or CUSTOM DESIGNED WITH SPECIAL COVERS, ETC
- EXTREMELY WELL MAINTAINED
- ENSURE THAT THE CAPTURE CAPABILITY OF THE EXHAUST EQUIPMENT IS AT MAXIMUM EFFICIENCY

MUST SPECIFICALLY PERFORM IN ACCORDANCE WITH ALL MANUALS OF RECOMMENDED PRACTICE
CHROMIUM PEL

- Exhaust ventilation systems must perform in accordance with the maximum rates set forth by the ACGIH, ANSI, and SMACNA.
- Systems must be engineered by the best exhaust professionals.
- Systems may need to be creatively engineered by those with the most experience in the given process or physicality of the source.
- It is critical that these exhaust or control systems are designed to ensure that virtually no chromium escapes into the workplace.
POSSIBLE CONTROL TECHNIQUES TO CONTROL CHROME GASSING AND ACHIEVE A VERY LOW PERMISSIBLE EXPOSURE LIMIT

- VERY HIGH EXHAUST RATES PER SQUARE FOOT OF TANK SURFACE AREA, ALSO REQUIRING MAXIMUM SIZED DUCTWORK, SCRUBBER, AND FAN

- COVERED TANK SYSTEMS REQUIRING EFFICIENT EXHAUST RATES WITH THE COVER CLOSED AND MAXIMUM EXHAUST RATES WITH THE COVER OPEN

- COMPLETE SEALED COVER OF CHROME TANK THAT IS REMOVED AFTER RECTIFIER IS OFF
TYPICAL "STATE OF THE ART" EXHAUST SYSTEM FOR CHROME PLATING, EXHAUSTING AT 250 CFM/FT2 OF TANK SURFACE AREA

VENTILATION SYSTEM DESIGN USING 250 CFM PER SQUARE FOOT
NOTE THE PLENUM DEPTHS, AND CORRECT GRADUATION OF DUCT DIAMETERS FOR 250 CFM PER SQ. FT. OF TANK SURFACE AREA
PROPER EXHAUST RATES FOR CHROME TANKS ARE CRITICAL INCLUDING PLENUM TO SLOT VELOCITY RATIOS
COVERED TANK SYSTEM EQUIPPED WITH ACTUATORS TO CONTROL OPENING OF COVERS, AND CONTROL OF DAMPERS (BEST OPTION)
COVERED TANK SYSTEM PREVENTS ESCAPE OF VIRTUALLY ALL CHROMIUM MIST WHEN RECTIFIER IS ENERGIZED AND COVER IS CLOSED

COVERED TANK SYSTEM CAN BE CUSTOM DESIGNED AND CAN BE MODIFIED, TO ADJUST HEIGHT FOR WORK BARS, BUSSING, RACKING, CONFORMING ANODES, ETC

COVERS CAN BE DESIGNED AS BI-FOLD OR FLAT PANELS

CAN BE SIMI-AUTOMATIC OR FULLY AUTOMATIC
EXAMPLE OF TANK COVERS EXHAUSTED BY A DOUBLE LATERAL TYPE HOOD
DIAGRAM OF COVERED TANK SYSTEM WITH HOODS COVERS, ACTUATORS, AND DAMPER SYSTEM
AUTOMATED TANK COVERS AND DAMPER SYSTEMS ON AUTOMATIC PLATING MACHINES ALSO RESULT IN:

- MAINTAINING A MINIMAL PARAMETER OF BREATHING ZONE ENABLING ACHIEVEMENT OF AN EXTREMELY LOW PEL

- ENABLE SUBSTANTIAL ENERGY SAVINGS BY REDUCED CONTINUOUS EXHAUST RATES AND COSTS TO PROVIDE HEATED OR COOLED MAKE UP AIR

- REQUIRE SMALLER EXHAUST/SCRUBBER SYSTEMS RESULTING IN LOWER CAPITAL COSTS
AUTOMATIC PLATING MACHINE WITH FULLY AUTOMATED COVER AND DAMPER SYSTEM
TO ACHIEVE COMPLIANCE WITH THIS EXTREMELY LOW PEL AND ACTIONS LEVEL, ON A CONSISTANT BASIS, DAY AFTER DAY, WE MUST EMPLOY BEST AND MOST CONSERVATIVE TECHNOLOGIES, BUT ALSO........

SENSIBLE WORK PRACTICES TO MINIMIZE ANY EXPOSURE TO EVEN THE SMALLEST AMBIENT CONCENTRATIONS OF CHROMIUM

REMEMBER..THIS PEL IS ENFORCED AS AN AVERAGE EXPOSURE TO CHROMIUM VI, OVER AN 8 HOUR PERIOD
EVEN WITH THE BEST CONTROL TECHNOLOGY, COMPLIANCE MAY BE DIFFICULT WITHOUT PROPER “WORK PRACTICE STANDARDS”

- WORKERS MUST STAY OUT OF THE “BREATHING ZONE”, (EXPOSURE AREA), UNLESS IT IS ABSOLUTELY NECESSARY TO PERFORM WORK

- EXAMPLE OF A WORK PRACTICE SCHEDULE, WOULD BE TO HAVE A VERY EFFICIENT EXHAUST THAT WOULD POSSIBLY ENABLE 5 UG/M3

- THEN WORK IN THE BREATHING ZONE 50% OF THE TIME AND STAY OUT OF THE BREATHING ZONE 50% OF THE TIME, AVERAGING AN 8 HR TWA OF 1 UG.
WORK PRACTICE STANDARDS

- The breathing zone, in which chromium can be detected, will be smaller with the best exhaust technology, but would be much greater with inferior exhaust systems or control technology.

- Therefore, it is of great importance to employ the best exhaust control technology, in conjunction with intelligent work practice standards.
WHAT IS THE ESTABLISHED BREATHING ZONE?
THE BREATHING ZONE

- The breathing zone must be kept as small as possible with the use of very high efficiency fume capture technology.

- The distance from the chromium source where Chrome VI can be detected must be minimized.

- Utilize the best available fume control technology to minimize the chrome concentration in the breathing zone, thereby helping to achieve the action level as a time weighted average (TWA).
CONCENTRATIONS OF CHROMIUM WITHIN THE BREATHING ZONE

- WE MUST MAINTAIN LOWEST CHROMIUM CONCENTRATIONS WITHIN CLOSE PROXIMITY OF THE CHROME SOURCE

- LOW CONCENTRATION OF CHROMIUM WITHIN CLOSE PROXIMITY OF THE SOURCE, ENABLES US TO MAINTAIN ZERO CONCENTRATION, IN A LARGER AREA, OUTSIDE OUR ESTABLISHED BREATHING ZONE.
SUMMARY

- This chromium PEL is extremely low.
- Will create economic hardship for most chromium processors in USA.
- Critical to employ best available engineered control exhaust technology.
- Good work practice standards must be employed in conjunction with best exhaust technology.
- Remember compliance is based on 8 hr time period.
SUMMARY, CONT

- The best fume control technologies must be utilized to control and minimize the size the “breathing zone” or exposure area.

- Well engineered exhaust systems that utilize high exhaust volumes.

- Tank cover systems that minimize exhaust air with cover closed, and maximize exhaust air when cover is open.

- Sealed tank covers, removed only when rectifier is off.
Texas Instruments
Phaser-X-45,000 C.F.M. Fume Scrubber