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Enforcement Alert

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EPA Enforcement Reduces Threat from Polyvinyl Chloride Manufacturing Plants

Settlements with major manufacturers substantially reduce emissions of carcinogen vinyl chloride, increase compliance

Vinyl chloride (VC), an odorless gas, is a known human carcinogen also linked to neurological disorders. To reduce the total amount of VC entering the environment, EPA has ramped up enforcement against the polyvinyl chloride (PVC) manufacturing industry, which is responsible for the majority of our nation's air emissions of VC.

EPA is pursuing enforcement actions against PVC manufacturers under both the Clean Air Act (CAA) and the Resource Conservation and Recovery Act (RCRA). Four recent settlements demonstrate the significant reductions that can be achieved by PVC manufacturers. Together, they have reduced VC air emissions by approximately 140,000 pounds per year and resolved an array of alleged violations under the CAA, RCRA and other environmental laws.

Civil Enforcement Actions

Oxy Vinyls, L.P. - Oxy Vinyls, North America's largest PVC resin supplier, agreed in June 2006 to reduce VC air emissions by over 40,000 pounds per year. Oxy also paid a $140,000 total penalty to EPA and the Louisville, Kentucky Metropolitan Air Pollution Control District, and a $200,000 penalty to New Jersey for violations that occurred only in New Jersey.

Oxy will also spend over $1.2 million to implement three supplemental environmental projects (SEPs) to further reduce its VC emissions. A SEP is an environmentally beneficial project that a violator agrees to perform as part of a settlement. Oxy's SEPs include up-grading a rail car vapor unloading vacuum system and installing new stripper trays at a Texas facility.

Formosa Plastics Corporation - In a May 2005 settlement, Formosa agreed to resolve violations of six environmental laws at its Delaware plant, to reduce its permitted VC emissions by 36,000 pounds per year, and to eliminate up to 20,000 additional pounds per year through a unique incentive program. This program requires the company to meet stringent future VC reduction goals or, alternatively, pay stipulated penalties.

Formosa also paid a $450,000 civil penalty and performed a SEP costing $843,000 that automates certain manufacturing process control equipment to enhance VC emission reductions.

Occidental Chemical Corporation - In July 2004 Occidental Chemical entered into an administrative settlement with EPA resolving alleged violations under multiple environmental laws at its Pottstown, Pennsylvania, facility. Occidental agreed to perform three SEPs -- valued at $900,000 -- that include process changes and equipment up-grades to reduce VC emissions by 52,000 pounds per year and to reduce water usage. Occidental also paid a $150,000 civil penalty.

Criminal Enforcement Action

Keysor-Century Corporation - Keysor-Century, the only manufacturer of PVC resin in the western United States, pled guilty in June 2004 to federal felony charges. Keysor-Century agreed to pay more than $4 million in fines and restitution for violations at its California manufacturing facility and for lying about its employees' over-exposure to VC. Keysor-Century also settled civil violations with multiple state and federal agencies. The company was required to stop making PVC.

Common Violations

EPA has identified violations common to the PVC manufacturing sector, where compliance has the greatest potential for environmental and public health benefits. The most frequent violations fall under the regulatory requirements for leak detection and repair, and tanks/surface impoundments.

Leak Detection and Repair

Under the Clean Air Act, PVC facilities must develop and implement a Leak Detection and Repair (LDAR) program to control 'fugitive' emissions of VC and

other hazardous chemicals. Fugitive emissions result from leaky valves, pumps, compressors, flanges, connectors and other piping components. For each process unit, PVC manufacturers must routinely monitor for leaks and fix any leaking equipment, as required by 40 C.F.R §§ 61.65(b)(8), 61.242-7(d) and (e).

PVC manufacturing facilities may consist of multiple polymerization lines. EPA considers each separate polymerization line to be a process unit, as defined in 40 C.F.R § 61.241. Although individual leaks may be small, cumulatively the number and toxicity of chemical emissions may have significant health and environmental consequences.

PVC plants' LDAR programs consist of several elements, including: monitoring ambient air, identifying components to be included in the LDAR program, conducting routine monitoring of identified components, repairing leaking components, reporting results, and recording the results. These elements must be described in an approved facility-wide Leak Detection and Elimination Plan.

Tanks and Surface Impoundments

Both tanks and surface impoundments used to hold liquid hazardous wastes are common at PVC manufacturing facilities; they are regulated under Subtitle C of RCRA. Tanks with structural integrity and that do not leak can claim an exemption from RCRA regulation as wastewater treatment units.

In some situations, PVC manufacturing facilities have claimed exemptions from RCRA Subtitle C for treatment of wastewater. To be eligible, they must meet certain regulatory requirements.

Tanks Tanks containing hazardous waste must meet the RCRA Subtitle C requirements in 40 C.F.R. Part 264. To prevent tanks from collapsing or leaking, RCRA requires them to have adequate foundations, structural support, and protection from corrosion. A facility can demonstrate that it is meeting these requirements through certification by a registered professional engineer. This is particularly important for older facilities located in areas with high ground water tables where leaks could harm both public health and the environment.

If a tank meets the wastewater treatment unit exemption, it is exempt from Subtitle C requirements. To claim this exemption, a facility must demonstrate that: the unit is part of a wastewater treatment facility regulated under Clean Water Act § 402 or § 307(b); it receives and treats or stores a hazardous influent wastewater or sludge; and it meets the definition of a tank or tank system in 40 C.F.R. § 260.10 (*i.e.*, a stationary device designed to contain an accumulation of hazardous waste that is constructed primarily of non-earthen materials such as wood, concrete, steel or plastic, which provide structural support).

Surface impoundments A surface impoundment is a natural topographic depression, a man-made excavation or a diked area formed primarily of earthen materials (although it must be lined with man-made materials) that is designed to hold liquid wastes. 40 C.F.R. § 260.10.

Holding ponds, storage pits and settling lagoons are examples of surface impoundments. If an in-ground tank, when evaluated as if it were free-standing and filled to design capacity with the material it is intended to hold, is not capable of maintaining its structural integrity, it can be considered a surface impoundment.

If a facility utilizes surface impoundments for its wastewater, it must make a hazardous waste determination at the point where materials enter the impoundment. An impoundment that receives hazardous waste is subject to RCRA Subtitle C regulation. Impoundments that generate hazardous waste sludge are also subject to the requirements of RCRA Subtitle C.

Other Violations

Although the most common PVC violations occur under the CAA and RCRA, PVC facility emissions and wastes are also regulated under at least three other environmental laws: the Clean Water Act (40 C.F.R. § 414.111), the Comprehensive Environmental Response, Compensation, and Recovery Act (40 C.F.R. § 302), and the Emergency Planning and Community Right-to-Know Act (40 C.F.R. § 372.65).

Health and Environmental Impacts of Vinyl Chloride

EPA has classified VC as a known human carcinogen. VC releases to the air, water or soil can cause cancer of the liver after prolonged inhalation or oral exposure. VC also helps form ground-level ozone, which adversely affects breathing and interferes with photosynthesis in plants. For more information on the health effects of VC, visit EPA's air toxics web site at: http://www.epa.gov/ttn/atw/hlthef/vinylchl.html.

VC emissions can cause catastrophic accidents. In April 2004, discharged VC liquid and vapor caused an explosion at a Formosa Plastics Corporation PVC plant, resulting in the deaths of five workers and serious injuries to three others. About 150 people in the small community of Illiopolis, Illinois, were

Explosion at a Formosa Plastics Corporation PVC Plant

(continued from page 2)
evacuated and the facility has since closed.

The U.S. Chemical Safety and Hazard Investigation Board concluded that the accident occurred when an operator overrode a critical valve safety interlock on a pressurized vessel that was in the process of making PVC.

The Board found that the company had underestimated the importance of implementing rigorous safeguards to prevent this from occurring, despite reports of numerous similar incidents in the industry, including some at the same company's facilities. *Investigation Report: Vinyl Chloride Monomer Explosion – Formosa Plastics Corp.,* Chemical Safety Board Report No. 2004-10-I-IL (March 2007). For more information on the Formosa Plastics explosion and to view a safety video, go to www.csb.gov.

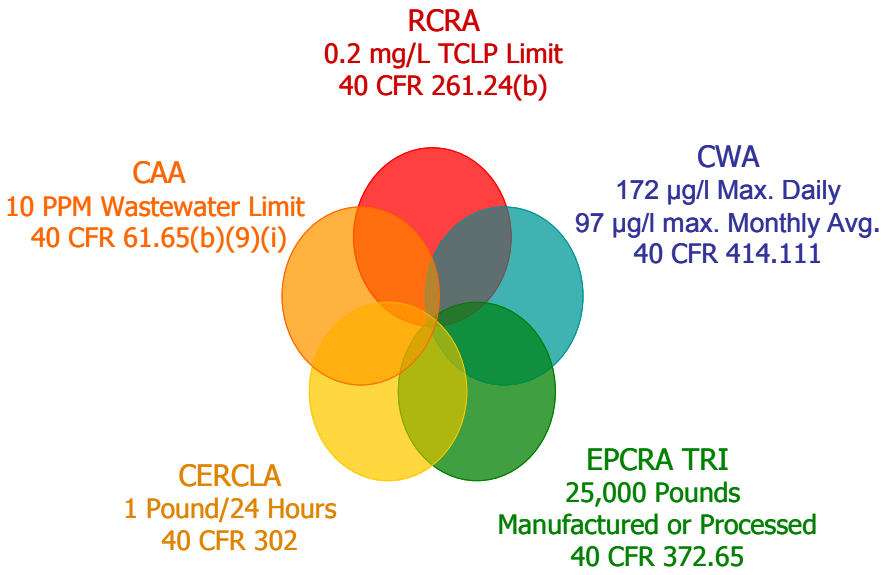
Facility Process Changes Can Reduce Vinyl Chloride Emissions

- **Enhance unloading operations** through use of a railcar vapor unloading vacuum system to capture emissions.
- **Replace ambient cooling systems** with refrigeration to produce consistent polymerization and avoid seasonal variations.
- **Improve stripping efficiency** in columns and reactors. The VC removed by improving efficiencies can be recycled back into the process rather than lost through air emissions in the PVC dryers.
- **Minimize open conveyances and treatment units** that facilitate volatilization of vinyl chloride into the environment.
- **Strip off-spec materials** to the lowest Residual Vinyl Chloride Monomer possible.
- **Enhance piping systems** by using seamless and dual mechanical seal pumps, diaphragm valves for gas and liquids, and sampling connection systems with closed purge lines.
- **Minimize off-spec solids production** and manage such solids to prevent PVC from entering the wastewater system.
- **Automate process controls** to minimize operator error and production variables.
- **Integrate safety and environmental controls** into a Distributive Control System.
- **Improve tracking and use of ambient air monitoring data** to locate and eliminate leaks.
- **Enhance Leak Detection and Repair programs**, *e.g.,* lower leak definitions and more frequent monitoring.

PVC Manufacturing Vessels

Photograph and graphic courtesy of the U.S. Chemical Safety Board

Key Regulatory Provisions Related to PVC Manufacturing



RCRA - Resource Conservation and Recovery Act, 42 U.S.C. § 6901, *et seq*.
CAA - Clean Air Act, U.S.C. 42 U.S.C. § 7401, *et seq*.
CWA - Clean Water Act, 33 U.S.C. § 1251, *et seq*.
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601, *et seq*.
EPCRA - Emergency Planning and Community Right-to-Know Act, 42 U.S.C. § 1101, *et seq*.
TRI - Toxics Release Inventory, 42 U.S.C. § 4245, *et seq*.

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Enforcement Alert
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Director, Office of Civil Enforcement: Walker B. Smith

Editor, Office of Civil Enforcement: Melissa Page Marshall

Please send all address and name changes or subscription requests to: ncepiwo@one.net

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