

The ABC's of Subparts AA, BB, and CC: A Practical Guide to Compliance with RCRA Air Emission Standards

Over the past several years, a specially trained team of the Indiana Department of Environmental Management (IDEM) has conducted approximately fifty inspections to evaluate facility compliance with Resource Conservation and Recovery Act (RCRA) Subparts AA, BB and CC. These subparts constitute air emission and leak detection and repair (LDAR) standards for both hazardous waste generators and treatment, storage and disposal (TSD) facilities. As a result of the inspection program, IDEM has identified common misconceptions and questions about the regulations as well as common violations. The purpose of this paper is to provide practical guidance to industrial facilities for complying with Subparts AA, BB, and CC.

Clean Air Act Overlap

The air emission standards found in Subparts AA, BB and CC were promulgated to control volatile organic air emissions from equipment associated with RCRA hazardous waste management practices. The regulations are found at 40 CFR 264 for permitted TSDs and at 40 CFR part 265 for interim status TSDs and Large Quantity Generators (LQGs). The technical standards are identical under both part 264 and part 265. IDEM has found that for most facilities, the regulations apply primarily to equipment such as hazardous waste storage/accumulation tanks, equipment associated with hazardous waste tanks, and hazardous waste containers. Many facilities believe that an existing air permit issued under the authority of the Clean Air Act (CAA) somehow shields or exempts them from RCRA regulations. This is true only if the owner or operator certifies that that equipment is equipped with and operating air emission controls in accordance with CAA regulations found specifically at 40 CFR 60, 61, or 63. These specific CAA regulations are virtually identical to the RCRA requirements, and also address LDAR programs and fugitive emission controls. At this time, it has been IDEM's experience that relatively few facilities have implemented LDAR programs under the CAA and applied them to hazardous waste management units in lieu of RCRA regulations.

Subpart AA (40 CFR 264/265. 1030)

Subpart AA applies specifically to process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air/steam stripping operations subject to a permit. The hazardous waste must have organic concentrations of at least 10 parts per million by weight (ppmw). Because of recycling provisions, operations such as distillation of hazardous waste at generator facilities are generally exempt from permitting, with the practical effect that subpart AA is generally only applicable at TSD facilities. Subpart AA requires facilities to reduce emissions from affected process vents below 3 lb/hr and 3.1 tons/yr or reduce, by use of a control device, emissions from affected process vents by 95 weight percent. Acceptable control devices include those involving vapor recovery (e.g. a condenser or adsorber), enclosed combustion devices (e.g. thermal or catalytic vapor incinerator, boiler, or process heater) or a flare. If a facility uses a control device, it must meet certain equipment and work practice standards. For example, a catalytic oxidizer must reduce vent emissions by 95 percent, be equipped with a temperature monitoring device with a continuous recorder, and be monitored for leaks. While the applicability of Subpart AA is limited, it is important to note that subsequent requirements of Subparts BB and CC refer back to the control device standards of Subpart AA.

Subpart BB (40 CFR 264/265.1050)

Subpart BB applies to both TSDs and LQGs. Subpart BB is a leak detection and repair program which applies to pumps, valves, compressors, pressure relief devices, sampling connections, and connections such as threaded joints and flanges, which contact hazardous waste with organic concentrations of at least 10 percent by weight. IDEM has found that by far the primary application of Subpart BB is to hazardous waste tank systems with solvent-containing wastestreams. IDEM has found that the majority of components that are affected consist of pumps, valves, and connections. Standards apply depending on whether the waste is considered "light liquid", "heavy liquid", or "gas/vapor". Wastes generated from parts cleaning, degreasing operations, and painting systems often contain constituents such as xylene, toluene, acetone, or other petroleum distillates that are considered "light liquids" by virtue of their relatively high vapor pressure. "Heavy liquid" or "gas/vapor" wastestreams are only occasionally encountered.

Marking

One of the primary requirements is that each piece of equipment to which Subpart BB applies shall be “marked in such a manner that it can be distinguished readily from other pieces of equipment”. As a result of this requirement, most facilities have marked each pump and valve which contacts hazardous waste with some sort of tag containing a unique identifying code. Programs are available which allow facilities to bar-code each component. Technically, the marking requirement can be interpreted to apply to each flange in a system. The requirement to mark each flange in addition to pumps and valves obviously results in a large number of tags and an ongoing tag management challenge. Some states may have a more flexible approach.

Monitoring

Subpart BB requires that certain equipment be monitored to detect VOC emissions. This monitoring must comply with Federal Reference Method 21, which basically requires the use of a photo or flame ionization detector (PID or FID) meeting certain performance criteria. Some facilities choose to purchase their own monitoring instrument, while others contract out for this activity. PIDs typically cost several thousand dollars, while FIDs are even more expensive. Personnel using monitoring instruments must be trained to properly calibrate and use the device and be aware of the proper techniques and applications. Method 21 requires the use of specific calibration gases, and each device potentially responds differently to different wastestreams. Monitoring results must be accurately interpreted to assure compliance with regulatory requirements. Once the instrument is calibrated and operating, the instrument probe is traversed around possible leak points, such as shaft penetrations on pumps and valves, gasket or o-ring surfaces, and body and housing interfaces. If an instrument reading of 10,000 ppm or greater is measured, a leak is detected. Many facilities consider any emission above background to be a leak.

Valves

Valves and pumps in light liquid service are subject to VOC monitoring. Even a simple system such as a drum pump-out station plumbed to a small hazardous waste tank would be subject to Subpart BB. Again, IDEM has found the majority of equipment subject to Subpart BB is in light liquid service. Valves in light liquid service must initially be monitored monthly. If a leak is detected, the component must be tagged, and initial repairs must be attempted within 5 days, and generally completed within 15 days. If no leaks are detected for two successive months, valves may be monitored the first month of every succeeding quarter (i.e. 3 month period). Valves may also be designated for no detectable emissions if there is no contact with waste by external parts (e.g. some diaphragm valves), emissions are below 500 ppm, and the valve is tested annually. Valves may also be designated as unsafe to monitor, in which case a monitoring plan must be developed. Valves that require elevating monitoring personnel more than 2 meters may generally be designated as difficult to monitor, which requires annual monitoring. A facility may also elect to have all valves comply with an alternative standard which allows no greater than 2% of all valves to leak, with annual monitoring required. IDEM has found that almost all facilities with an established valve monitoring program can go to quarterly or annual monitoring.

Pumps

Pumps in light liquid service must be visually inspected weekly and monitored monthly. Dripping liquids or readings of 10,000 ppm or greater are considered leaks. Pump leaks must be addressed in the same manner as valve leaks (tagged, initial repair attempt within 5 days, completed within 15 days). Pumps with no external parts in contact with the waste (e.g. diaphragm pumps) may be designated for no detectable emissions (reading less than 500 ppm, annual monitoring). There are also provisions for pumps equipped with dual mechanical seals or closed vent systems, but those types of pumps are rare. In practice, IDEM has found that most pumps require monthly monitoring.

Connectors and other devices

Flanges and other connectors, regardless if the waste is considered a light or heavy liquid, are only required to be monitored if evidence of a potential leak is found by visual, audible, olfactory, or any other method. Some facilities monitor connections on a regular basis, although it is not technically required. Pumps and valves in heavy liquid service and pressure relief devices in heavy or light liquid are also subject to monitoring when evidence of a leak is found. Pressure relief devices in gas or vapor service must be operated with no detectable emission, as evidenced by an instrument reading of less than 500 ppm above background. After a pressure

release, a pressure relief device must be monitored within 5 days. Sampling connection systems must collect or recycle all purge fluids. Open-ended valves and lines must be capped or sealed.

Recordkeeping

There are, of course, recordkeeping requirements associated with Subpart BB monitoring. Facilities must list each piece of equipment (pump, valve, flange) by type and location along with wastestream information (percent organics and physical state) and method of compliance (e.g. “monthly monitoring and repair”). Leak repairs must be documented in an inspection log with the date, instrument and operator identification, dates of repair attempts, repair methods, and other information. Facilities must also maintain lists and information pertaining to valves designated as unsafe, difficult to monitor, or subject to the 2% alternative.

IDEM Inspection Results

In general, IDEM found that most LQGs were not aware of or complying with Subpart BB equipment monitoring requirements. Many facilities believed they were exempt from Subpart BB because they held various types of general air permits. Facilities have indicated that initial efforts to establish necessary monitoring can be costly and problematic. IDEM monitoring during inspections has discovered few VOC emissions from valves, pumps or connectors.

Subpart CC (40 CFR 264/265. 1080)

Subpart CC regulations are limited to tanks, surface impoundments, and containers that manage wastestreams with an average volatile organic concentration of 500 ppmw or greater. IDEM has found that the broadest application is to tanks and containers managing solvent-containing waste. Similar to Subpart BB, IDEM found that many industrial facilities were unaware of the regulations or believed they did not apply.

Level 1 Tanks

Subpart CC classifies tanks as either Level 1 or Level 2, depending on the following tank size and wastestream vapor pressure:

Size	Maximum Vapor Pressure
0-20,000 gal (<75 cu. m)	11.1 psi (76.6 kPa)
20,000-40,000 gal (76-150 cu. m)	4 psi (27.6 kPa)
>40,000 gal (>151 cu. m)	.75 psi (5.2 kPa)

If a tank exceeds the specified vapor pressure for its' size, it must be managed as a Level 2 Tank. Based on IDEM's experience, almost all tanks at manufacturing facilities can be managed as Level 1 tanks. TSDs typically choose to manage their tanks as Level 2 due to variability in wastestream constituents or larger tank size. Level 1 tanks must be equipped with a fixed roof with closure devices on all openings. An open pipe would need a closure device of some sort, typically a conservation vent. Closure devices such as a hatch cover, plate, lid, seal, valve, level sensor, alarm, vent, or any other fitting that blocks an opening should be designed to operate without visible cracks, gaps, holes or other open spaces in the device or between the opening and the closure device. Many closure devices utilize a gasket or o-ring, which must be compatible with the waste and able to withstand the effects of weather. Facilities are required to conduct an initial and annual inspection of Level 1 tanks to visually look for cracks, gaps or openings in closure devices. While closure devices may be opened for routine activities such as filling, sampling and maintenance operations, they must be secured or reinstalled when finished. As mentioned above, conservation vents are allowed. A conservation vent is used to discharge vapors to the atmosphere during normal operations to maintain the tank internal pressure in accordance with tank design specifications. Conservation vents allow a tank to “breathe” as they are filled or emptied or as temperatures change and material expands or contracts. However, when a conservation vent is in the closed position, i.e. the tank system is stable, it should operate with no detectable emissions as evidenced by VOC emissions below 500 ppm.

Common Problems

During IDEM inspections of Level 1 tanks, problems with closure devices are routine. It is not uncommon to find closure devices that have been left open. Hatches are not fastened down; bolts are missing from lids. IDEM has also noted numerous problems with gaskets and o-rings that are cracked and broken, an indication they may

not be made of materials compatible with the waste or tank usage. Conservation vents can be especially problematic. Flaps and gates located inside conservation vents may not seat securely, or gaskets may be damaged, with the result that conservation vents are the source of ongoing VOC emissions even in the closed position.

Level 2 Tanks

Level 2 tanks must be tanks with a floating roof, a tank utilizing a closed vent system to a control device, a pressure tank or a tank located inside an enclosure that is vented to a thermal control device. Floating roofs and pressurized tanks utilized for hazardous waste storage seem to be rare (IDEM is unaware of any in Indiana). Almost all Level 2 tanks tend to be equipped and operated with a closed vent system routed to a control device. Control device options are the same as those specified in Subpart AA (thermal incinerators, flares, carbon adsorbers, etc.). Carbon adsorbers seem to be the most frequently encountered control device. Carbon systems must be properly designed and operated. The breakthrough of organic constituents must be monitored on a daily basis or addressed through routine carbon replacement. IDEM has found several instances where breakthrough was allowed to occur on a carbon system.

Closure devices on Level 2 Tanks must be operated with no detectable emissions as evidenced by Method 21 readings below 500 ppm. Annual inspections must be conducted with properly calibrated monitoring instruments. Facility personnel have sometimes conducted the annual monitoring improperly, or misinterpreted the results. As is the case with Level 1 Tanks, it has been common during IDEM inspections to find open or unlatched closure devices or component interfaces such as agitator shafts, gaskets, and seals that leak. Conservation vents on Level 2 Tanks should be vented to a control device.

Containers

Containers are classified under Subpart CC as either Level 1, Level 2, or Level 3. Level 1 containers are those with a capacity of 26 to 122 gallons and meet DOT requirements or are managed with covers without visible cracks, gaps or openings. Containers greater than 122 gallons are Level 2, and must be DOT approved or operated with no detectable emissions (below 500 ppm). Transfer of "light liquid" hazardous waste into or out of Level 2 containers must be conducted in such a manner as to minimize volatilization of the waste. Submerged-fill methods (a submerged-fill pipe) or vapor recovery systems are commonly used. Containers larger than 26 gallons that are employed for waste treatment by stabilization must be managed as Level 3 containers, but are not commonly utilized. IDEM has found that the majority of waste is managed in 55 gallon DOT drums. Facilities can comply with Subpart CC Level 1 container management standards for the most part simply by keeping containers closed when not in use.

Paperwork

Facilities must maintain records that show the dates of annual tank inspections, vapor pressure determinations, control device design and operation, and carbon management information.

Subpart CC inspections conducted by IDEM have had the same results as those noted for Subpart BB. Facilities often were unaware of the regulations or how they applied to their hazardous waste management operations. It has not been uncommon to find numerous leaks associated with tank closure devices, vents and control devices.

Conclusions

IDEM inspections conducted to date suggest that there is a general lack of awareness of the applicability and requirements of RCRA Subparts AA, BB, and CC among industrial and manufacturing facilities. TSDs seem to have a greater awareness and higher level of compliance. Facilities often cite the overlap of air regulations as a mitigating factor. Monitoring during the inspections has generally revealed a low leakage rate of equipment regulated by Subpart BB (primarily pumps, valves, and connectors) and a relatively high leakage rate of tank closure devices and vents regulated under Subpart CC. Facility personnel are often unfamiliar with Method 21 monitoring protocols and monitoring equipment operation, suggesting the need for effective training or contracting efforts. Government compliance awareness and assistance programs should continue, with the goal of increasing general awareness and compliance with RCRA Subparts AA, BB and CC.