Case Study
Subpart X and Air Emissions

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This case study will discuss some problem areas I have experienced with the control of air emissions from RCRA Subpart X units, and associated operations. If there are questions on this or other issues you have experienced, please feel free to call or E-mail me.

Compliance Issues and Subpart X

- There are no interim status standards for Subpart X units
- There are no controls absent a RCRA permit
- Permit should be as specific as possible; ambiguity creates problems for the inspector

Subpart X was created as a catch-all category for those hazardous waste management units which did not fit into the normally recognized categories of hazardous waste units normally seen by regulatory personnel, including tanks, containers, surface impoundments, waste piles, landfills, etc. These categories of RCRA units are more clear cut and the Agency was able to develop interim-status standards for the units, which could also be used by RCRA permit writers when issuing final permits to either operate or close the units.

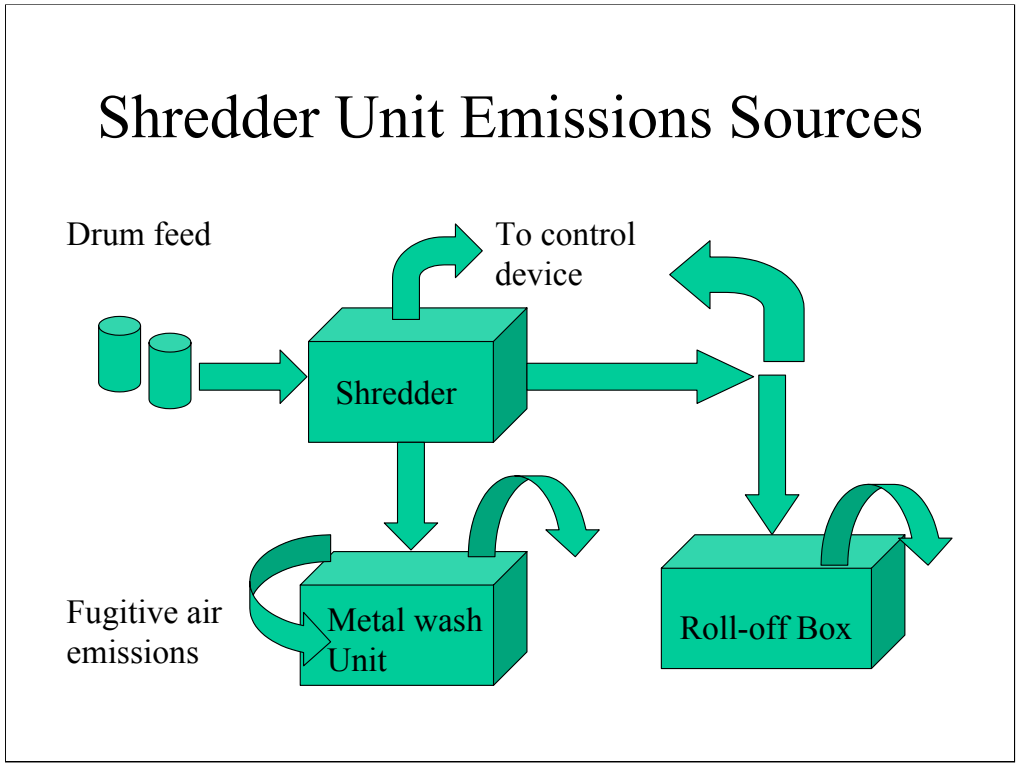
Due to the site-specific nature of Subpart X units, it was not efficient for EPA to develop interim status standards for the varied units Agency or State personnel were likely to encounter in the field. The down side, from a regulatory perspective, was that absent promulgated interim-status standards, there are no controls required for Subpart X units until such time as final RCRA permit is issued.

It is not obvious, in most cases, what RCRA air emissions standards apply to Subpart X units, and how they apply. Therefore, site-specific interpretations of the applicable standards by the permit writer are necessary in order for an inspector to make an unambiguous compliance determination. Generic language which is not tailored to the specific units at the facility is generally not sufficient. A streamlined approach to permit writing is not appropriate with respect to Subpart X units.

Subpart X Considerations

- Each Subpart X unit needs to be evaluated with respect to all emission sources from the unit
- Hazardous waste stream in: hazardous waste, air emissions, solid waste stream out

Subpart X units need to be considered from a total emissions or mass-balance standpoint when evaluating controls. A single waste stream into a Subpart X unit can create several waste, air or other side streams which need to be evaluated for the unit's impact on human health and the environment. For example, if the Subpart X unit is quacking like a tank, and the tank standards (only) are applied, the permit writer may be ignoring the air emissions from the side streams which would not exist if it were not for the Subpart X unit. Under these circumstances, the permit writer has the authority to require control of the emissions, which in many cases are quite significant.



In this case at a RCRA TSD, drums of hazardous wastes are received at the facility, sampled, and staged in a drum warehouse which contains a shredding unit. Drums are lifted to the top of the dual shredder, then moved into a feed chamber which is then filled with nitrogen. Upon reducing the oxygen percentage to a safe level, the floor drops out and the drums fall onto a rotating shredder, which shreds the drums and their contents. The material drops down onto the second stage shredder for further particle size reduction. After the second stage shredder, the waste material drops down the chute and is fed to another (Subpart X) blending unit or (for solids) augured into a roll-off box located outside the building. Air emissions from within the unit are routed through a closed vent system to a 95%+ efficient thermal oxidizer. Metals from the shredded drums, which can be heavily contaminated with the contents of the drums, are sorted out of the waste stream by a rotating magnetic separator, then dropped down another chute to a metal cleaning machine feed bin. Both the outside roll-off box, and the metal cleaning feed bin, were found to be substantial sources of fugitive air emissions which could be controlled via the RCRA permit.

Subpart X Considerations

- Under Subpart X or RCRA 3005 omnibus authority, all emissions can be regulated
- Waste transfers can be a large source of air emissions associated with Subpart X units which need to be controlled

Subpart X regulations were promulgated on December 10, 1987, see 52 FR 96964. These regulations are fairly broad with respect to what permits for the units must contain, including, but not limited to, as appropriate, design and operating requirements, detection and monitoring requirements, and requirements for responses to releases of hazardous waste or hazardous constituents form the units. See 40 CFR 264.601. In addition, permit terms and conditions must include those requirements of Part 264 Subparts I through O and Subparts AA through CC, Part 270, Part 63 Subpart EEE, and Part 146 which are appropriate for the Unit. Without specific and clear standards in the permit as to how each of these requirements are applied, it may be ambiguous to the inspector what standards are being applied. An example of ambiguous permit language as it relates to Subpart X units: The permittee shall comply with the air emissions requirements of 40 CFR 264, Subparts AA, BB and CC, as applicable.

RCRA 3005's Omnibus authority provides additional flexibility to the permit writer for control of Subpart X units. "Permits issued … shall contain such terms and conditions … necessary to protect human health and the environment." This language allows permit writers to require more stringent controls on a case-by-case basis.

In many cases, Subpart X units are considered quite narrowly when the permit is written. The air emissions associated with waste transfers need to be considered in detail when establishing permit conditions. Waste transfers can be a large source of air emissions, and both Subpart X and the Omnibus authority give permit writers the authority needed to control the emissions.

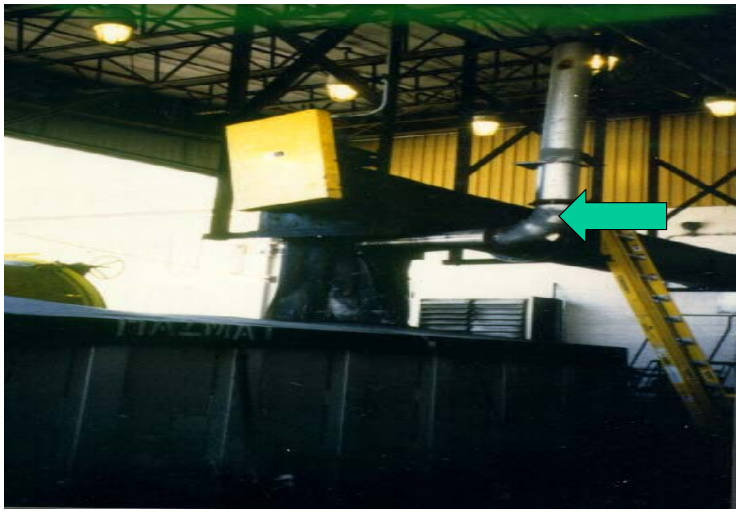
Examples of Emissions Which Need Control - 1

- Roll-off Box associated with Subpart X waste shredding unit
- Calculated capture efficiency of less than 1% of emissions based on existing configuration
- Based on 24/7 operation, existing emissions were 26,300 lb/yr

Typically, Subpart X units require that wastes be transferred to other units after processing in the Subpart X units. Both the transfer and the management in the other unit are potentially large sources of RCRA air emissions which need to be controlled.

In this example, a roll-off box was used to store volatile hazardous wastes prior to shipment to a cement kiln as a supplemental fuel. The waste was augured from the Subpart X unit and dropped into a roll-off box located outside the building. A duct was fitted near the end of the auger where the waste dropped into the box and emissions were routed to a combustion control device which was the control device used for most regulated emissions from the facility. It was alleged that the roll-off box was not in compliance with the Subpart CC standards for waste transfers. As part of the case, the facility calculated the existing emissions from the unit and the percent of the emissions captured for destruction in the 99% efficient control device. It was less than 1%! Under the new configuration which was permitted, emissions from this regulated unit will be reduced to 4,420 lb/yr, in part by limiting the hours of operation of the unit. This is a reduction of about 83%.

Roll-Off Box Associated With Subpart X Unit



This roll-off box receives shredded solids from a Subpart X drum shredding unit. The solids are augured out of the unit to the box. There is a vapor pick-up point above the box at the exit of the augur. Due to the nature of the wastes, the emissions capture was thought to be quite low. Calculations of the emissions control rate based on the exiting system and 24/7 operation were estimated at less than 1%. The bottom of the augur was at least 4 feet above the box, contributing to the low capture efficiency.

Examples of Emissions Which Need Control - 2

- Hopper associated with Subpart X waste blending unit
- Calculated capture efficiency less than 35%; 11,800 lb/yr emissions
- Emission reduction to 162.5 lb/yr after construction of 3-sided enclosure

A Subpart X waste blending unit discharges solids which cannot pass a fine mesh screen to a hopper. The existing configuration had air emissions control via a hood, but the hood was elevated too far from the emission source, resulting in poor capture of less than 35% of the 11,800 lb/yr annual emission estimate based on a 24/7 operation. The facility agreed to put in enclosures for the hoppers and re-design to have an inward face velocity consistent with Procedure T total enclosure standards, which is targeted to reduce emissions to 162.5 lb/yr after construction of the new system. The emission reduction is estimated at almost 99%.

Hopper Associated With Subpart X Unit

Solids from a Subpart X unit are routed out of the unit via a conveyor to a hopper. See arrow. The hopper is placed under a hood to capture some of the emissions. The existing configuration had calculated capture efficiency of less than 35%. The new configuration will reduce emissions by almost 99%.

Examples of Emissions Which Need Control - 3

- Metal (from shredder) contaminated with hazardous waste fed to metal wash unit
- Existing emissions were calculated at 10,900 lb/yr with a capture efficiency of just under 40%
- Emissions from feed bin of replacement unit will be reduced to 220 lb/yr

The contaminated metal from the magnetic separator is dropped onto a feed table for a metal washing machine. Solids dropping off the metal are routed to a hopper which is then re-fed to the blending machine. Metal pieces drop into the washing machine. The facility considered this to be an unregulated unit, as it considered the material to be scrap metal. EPA's determination was that the material was not scrap metal since it was heavily contaminated with both characteristic and listed hazardous wastes. The facility agreed to apply for a RCRA permit for the unit, as well as further control air emissions from the operation. Existing emissions from the unit were calculated at about 10,900 lb/yr as fugitives based on the existing configuration, with a capture efficiency of about 40%. The new configuration agreed upon as part of the settlement agreement is expected to reduce emissions to about 220 lb/yr, a reduction of 98%.

Examples of Emissions Which Need Control - 4

- Subpart X drum emptying unit
- Emissions routed to control device through P/V vent
- Only a fraction of emissions captured
- Some exited through leak points
- Others escaped when drums fed into unit

Another example is a Subpart X drum emptying unit which was installed at a RCRA TSD facility to eliminate a manual drum emptying line. The unit was installed to provide greater worker protection than the manual line, with emissions from the unit piped to a control device. However, performance testing showed significant fugitive emissions from operations as well as from leaks resulted in greater emissions from the unit and associated units to the environment than actually were routed to the control device. Design of the emissions control system was developed with conservation of nitrogen in mind as well as emissions control. As such, emissions are routed to the control device only after pressure settings on the pressure valves cause the valve to open. This results in less emissions getting to the control device than escaping to the environment when the feed door is opened, as well as through leak points on the enclosure in which the operation occurs.

Subpart X Drum Unit

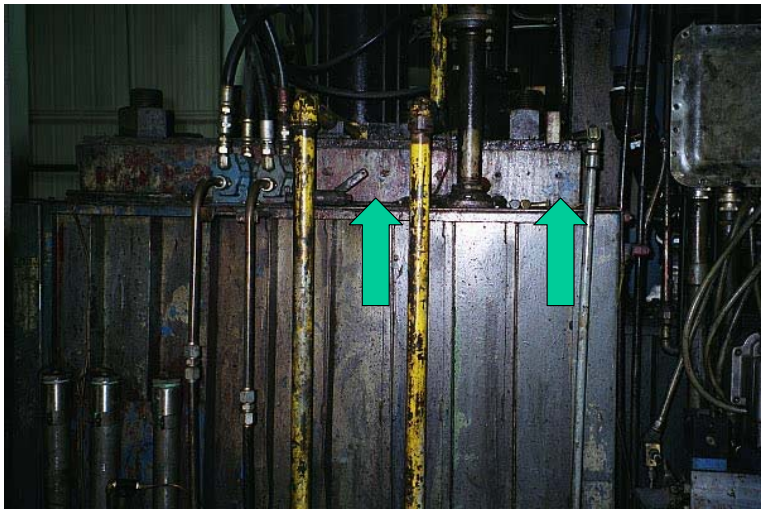


Photo shown is exterior of Subpart X drum unit. Drums are fed one at a time into airlock, which closes and nitrogen is added to reduce oxygen percentage below flammable levels. The drum is held in place over a spike which punctures the bottom of the drum and the liquids inside drain down a chute. A hydraulic ram then crushes the drum, which the facility considers RCRA-empty, and pushes it down another chute where it is loaded into a roll-off box to be sent to another facility to be further processed into scrap steel for sale to a broker or mini-mill. Emissions occur both as door is opened and residual organics escape, and through holes shown on unit. Inside of unit had a welded steel plate over the holes, put emissions still escaped. Units such as these need regular monitoring for leaks or substantial fugitive emissions could occur.

Conclusions

- Control of emissions from Subpart X units requires that all emissions sources be quantified as part of permit application
- Quantification of sources will direct permit writer's attention to significant sources requiring control
- Leak detection monitoring should be part of required program
- Unambiguous requirements are enforceable

The permitting process for Subpart X units gives the permit writer flexibility to request information on regulated units and all waste and side streams generated as a result of Subpart X unit operation, even if such units may not be traditionally regulated. Quantification of all emissions by the facility may identify side streams which require air emission control, which can then be controlled by specific language in the RCRA permit.

Due to the significant potential for leaks from units operated under pressure, leak detection monitoring should be required on a frequent basis, and repair of leaks required consistent with the schedule in Subpart BB. This will result in greater human health and environmental protection at RCRA facilities.