Available Tools and Information

Available Tools and Information

- CD Encyclopedia
  - Guidance and policy
  - Links to other resources
- Permit application
- BangBox data and emissions models
- Air dispersion and deposition models
- Risk assessment guidance
- Inspection checklists and guidance
- Other individuals, groups, regulatory programs
- Other reference materials

CD Encyclopedia

- Text based on EPA's document
  - RCRA 40 CFR Part 264, Subpart X Permit Writer's Technical Resource Document, Version 2, June 1997 (OSW, Subpart X Permit Writer's Workgroup)
- Includes links to
  - Subject-specific guidance
  - Policy memoranda
  - Models and databases
  - Other useful resources

Policy Memoranda

- EPA has issued numerous policy memoranda that interpret various aspects of the Subpart X regulations and agency guidance
  - Available in the RCRA Policy Compendium (OSWER)
  - Many of those pertinent to Subpart X permitting may be accessed via the internet at http://www.epa.gov/oswer/rcraonline

Permit Application

- RCRA Part A Permit Application
- RCRA Part B Permit Application
  - Facility description
  - Waste characteristics*
  - Process information*
  - Health and environmental assessments*
  - Ground water monitoring*
  - Procedures to prevent hazards
  - Contingency plan
  - Training plan
  - Closure plan
  - Federal and state laws

* Critical areas of Subpart X Permit Application

TechLaw February 2002 Day 2 Available Tools and Information 5

A complete RCRA Part A and B Permit Application must be submitted for a Subpart X unit.

Several components are similar for Subpart X units as for "regular" RCRA units; however, there are some differences (e.g., health and environmental assessments). Note the four requirements marked with an asterisk. These areas require critical consideration for a Subpart X unit. Since the design requirements for a Subpart X unit are not prescriptive, as with a standard unit, it is very important to scrutinize the sections on waste characteristics, health and environmental assessments, and groundwater monitoring.

- Facility description
- Waste characteristics
  - Waste analysis plan
- Process information
  - Design drawings of unit
  - Treatment effectiveness
  - SOPs for treatment process
- Health and environmental assessments
- Potential for air, soil, surface water, and groundwater pathways
- Ground-water monitoring

Unit Design and Operation

- Physical description of the unit(s) and associated systems
  - Including liners, covers, containment systems, run-on/run-off controls, pumps, airlocks, conveyors, emission control devices
- Description of how treatment is accomplished
- Description of operating procedures
  - Cradle to the grave – transport of wastes to unit(s) to management of ash/residue
  - Times and meteorological conditions during which treatment is restricted or prohibited
  - Time to complete treatment
  - Statement that operating procedures will be reviewed and updated whenever necessary

TechLaw February 2002 Day 2 Available Tools and Information 6

Dimensions, numbers of pans and pits used, maximum quantity of waste treated per unit at one time, and other design details should be provided. Items such as burn pans, concrete pads, covers should be illustrated in engineering drawings.

Relevant portions of standard operating procedures (SOPs) should be included in the application. Where SOPs are not available, a more detailed discussion of unit operation should be provided in the text of the permit application.

For OB/OD units, treatment times should include the duration of all emissions including smoldering after treatment. The elapsed time for the primary fireball should be provided as well.

Mechanical units can include ancillary equipment such as pumps, valves, airlocks, conveyors, and if needed, an emission control device. As with all Subpart X units, engineering drawings should be furnished with the permit application.

Unit Design and Operation (cont'd)

- Description of unit location
  - Illustrated on scaled drawings
  - Environmental setting
  - Depth to groundwater, if appropriate
  - Distances to surface water, physical structures, and potentially impacted populations
- Description of detection/monitoring systems
  - Groundwater
  - Lead detection
  - Meteorological conditions
- Description of inspection and maintenance procedures

Desire unit(s) in a remote location, separated from off-site buildings and residences.

The discussion of environmental setting should address the presence of endangered or threatened species and potential environmental impacts. If such impacts have been documented, the documentation (e.g., environmental impact statement (EIS)) should be a part of the permit application.

For OB/OD units, physical structures would include protective shelters for operation personnel. Also, the permit application should demonstrate that key distances conform to the safe distances recommended for OB/OD treatment operations.

A leak detection system is normally associated with a secondary containment system. These can be used for both thermal and mechanical units.

At a minimum, wind speed and wind direction should be monitored on-site to facilitate "go/no go" decisions for OB/OD treatment.

Periodic soil monitoring may be required if the environmental assessment shows a risk to human health or the environment due to soil contamination. If so, equipment and procedures should be described in the permit application.

For many mechanical units, inspection and maintenance activities can be especially important in preventing fugitive emissions.

Waste Characterization

- Wastes requiring characterization
  - All wastes entering the Subpart X unit
  - Essentially all residuals and degradation products generated by the treatment process
- Wastes can be characterized by analysis or process knowledge

TechLaw February 2002 Day 2 Available Tools and Information 8

Sampling procedures for soils would be required if the environmental assessments show a risk from soil contamination.

All wastes accepted for treatment in the unit must be characterized.

For OB/OD units, residues/ashes require characterization. For thermal units, stack emissions need to be characterized as well as waste residues from air pollution control equipment.

All waste streams from mechanical units require characterization. These include streams treated by emission control devices and metal scraps that may still be coated with hazardous constituents.

Sampling and analysis is used (and preferred) in nearly all cases with OB/OD serving as a notable exception.

Waste Analysis Plans (WAP)

- Components of an acceptable WAP
  - Applicant must identify processes generating wastes
  - Applicant must identify wastes to be accepted for treatment
  - Applicant must list parameters to be tested
    - Rationale for parameters
    - Methods used to test parameters
  - Specify frequency of analysis
  - Specify procedures for off-site wastes
  - Waste characterization for LDR

TechLaw February 2002 Day 2 Available Tools and Information 9

It is EPA's policy that precision and accuracy of data should be assessed on all monitoring and measurement projects. This includes WAPs.

Conduct reevaluations at least annually and when process changes, adjust the frequency of analysis based on waste information.

Additional requirements for facilities accepting wastes from off-site generators

- Facility must specify procedures for using information supplied by off- site generator instead of actual analysis.
- Facility must specify procedures for ensuring that wastes received correspond to the description on the manifest
- Acceptance/rejection criteria for each waste stream

Additional guidance on preparing waste analysis plans can be found in "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Wastes" (EPA/530-SW-84-012) dated April 24, 1994. This document is available on the EPA web-site at http:\es.epa.gov/oeca/ore/rcra/cmp/wap300.pdf.

Environmental Assessments for Subpart X Units

- Characterization of the potential effects of unit operation on environmental media
- Used to assess compliance with media-specific performance standards

TechLaw February 2002 Day 2 Available Tools and Information 10

The media of interest are air, groundwater, subsurface soils, surface soils, surface water, and wetlands.

Performance standards are set forth in 40 CFR §264.601.

Permit applicant must demonstrate that the unit will meet the performance standards by preparing environmental and health assessments which address pathways that release to the environment.

- Environmental and health assessments are unique to Subpart X permit applications – they are not required as part of the Part B permit application for a "regular" RCRA unit.
- The assessment evaluates the possible impacts of a Subpart X unit on environmental media, and describes preventive measures that have been or will be taken.

The assessment evaluates past, present, and potential effects of the unit on human health and the environment.

Environmental Assessments for Subpart X Units (cont'd)

- An environmental assessment must include:
  - Hydrologic, geologic, and meteorological assessments
  - Land use maps
  - Descriptions of potential exposure pathways for human and ecological receptors
  - A demonstration of treatment effectiveness
  - Any additional information deemed necessary by the EPA Regional Administrator or State equivalent

The assessments and land use maps should focus on the region in the vicinity of the site.

Hint: Having applicant develop a conceptual site model (CSM) as part of the environmental/risk assessment will help in understanding potential exposure pathways associated with each unit.

The description should address the potential magnitude and the nature of the exposure.

For each treatment unit a demonstration of treatment effectiveness is required.

Any additional information needed to evaluate the compliance of the unit with the environmental performance standards of 40 CFR §264.601 may be requested by the EPA Regional Administrator or State equivalent.

Closure Plan

- The closure plan should include:
  - Procedures for closing each unit at facility
    - Compliance with closure performance standard
  - Maximum inventory of hazardous waste ever onsite at facility
  - Maximum extent of unclosed operations during life of facility
  - Contingent post-closure plan

Closure plans for miscellaneous units are similar to those for conventional units.

- Permit writer must evaluate closure plans against the criteria in 40 CFR Part 264, Subparts I through O, where applicable, and Subpart X.
- In developing closure conditions for miscellaneous units, the permit writer may start with standards from a similar conventional unit.

The closure plan should include steps for unit closure, including:

- A rationale for the selection of the specific parameters to be used to demonstrate compliance with clean closure performance levels (if clean closure is proposed);
- Steps to control, minimize, or eliminate, as needed, post-closure releases through institutional controls (e.g., fencing and signs), engineering controls, and other methods.

The plan should provide an estimate of the maximum inventory of hazardous waste onsite over the active life of the facility and describe how, during closure, the waste will be removed, transported, treated, and stored or disposed of.

The plan should describe the maximum extent of unclosed operations during the life of the facility.

A contingent post-closure plan is necessary for those units proposing clean closure but which have operated in a manner where a release to soils has occurred (e.g., uncontrolled emissions from OB/OD have led to soils deposition).

Post-Closure Care Plan

- Post-closure care requirements apply to:
  - Miscellaneous units used for disposal
  - Miscellaneous units that are used for treatment or storage and have contaminated soils or ground water that cannot be completely removed or decontaminated during closure

TechLaw February 2002 Day 2 Available Tools and Information 13

Permit writer should look for post-closure plans for miscellaneous units used for disposal (e.g., geologic repositories) and miscellaneous units that are used for treatment or disposal and have contaminated soil or ground water that cannot be removed at closure.

- Subpart X unit may be defined as a disposal as a disposal unit if it affects the soil or is located on the ground.

On the other hand, Subpart X units that incorporate engineering zones of control may be defined as treatment units if their operation does not affect the soil or ground water, even if they are located on the ground.

- An exception may be open burning/open detonation units, however.

Parameters to be analyzed should be contaminants of concern, and background levels should be taken into consideration during sampling and analysis. Analytical methods should be carefully selected to ensure statistically relevant and useful results.

If the facility can demonstrate to the permit writer's satisfaction that the miscellaneous unit can be closed in a manner that will not pose an undue risk to human health and the environment, even if it cannot be clean closed, the type of post-closure monitoring requirements are left to the discretion of the permit writer and may be different from those for conventional units.

Treatment Effectiveness

- Effectiveness must be demonstrated for each waste stream to be treated
- Effectiveness is determined through sampling and analysis of treatment residuals
  - Air Emissions
  - Wastewaters
  - Solid and liquid residuals (e.g., ash)

TechLaw February 2002 Day 2 Available Tools and Information 14

Approaches include:

- Toxicity reduction: Destruction of hazardous constituents
  - Conversion of hazardous constituents into non-hazardous (or significantly less hazardous) constituents.
- Mobility reduction: Bonding the hazardous waste into a matrix. For example: stabilization of wastes prior to disposal in a geologic repository.
- Elimination of hazardous characteristics converting a reactive, corrosive, toxic, or ignitable waste into an inert residual. For example: open detonation of munitions (reactive hazardous waste) that results in excessive scattering of fragments that are still reactive is not effective treatment.

Sampling and analysis of the output streams of a mechanical unit is straightforward compared to the determination of treatment effectiveness of an OB/OD unit.

OB/OD Effectiveness

- Traditional Criteria
  - Solid residue test non-reactivity
    - No EPA test method for explosive reactivity
    - Use UN, DOT or U.S. Bureau of Mines (USBM) methods
- LDR Treatment Standards
- Detection limits
- Alternative effectiveness criteria

Apply an alternative effectiveness criteria when:

- Treated waste does not have LDR treatment standards
- Waste has detectable levels of hazardous constituents

Compare effectiveness of treatment to that of the best alternative such as a risk-based health effects level.

OB/OD Effectiveness (cont'd)

- Additional considerations
  - Air Emissions
    - A factor in almost all OB/OD operations
    - BangBox tests provide emission factors for some explosives
    - Very difficult and expensive to monitor emissions
  - Ground water or soil contamination
    - A factor if treatment is done in contact with ground – as are most OD operations
    - Not normally prevented, must monitor
    - Health-based criteria for a few materials given in RCRA 40 CFR Part 264, Subpart X Permit Writers Technical Resource Document (Version 2.0) dated June 1997

TechLaw February 2002 Day 2 Available Tools and Information 16

These additional considerations are addressed through the environmental assessments and/or risk assessments required of these units.

BangBox and field testing have shown that the effectiveness of treatment by OB/OD is dependent on: the type of treatment method employed, the type of energetic material being treated, and the interaction with soil.

Discussion of effectiveness in RCRA 40 CFR Part 264, Subpart X Permit Writers Technical Resource Document (Version 2.0) dated June 1997.

Estimating Emissions: BangBox Data and Emissions Models

Subpart X Permitting Before BangBox

- Computer-simulated emissions data have not always been accepted by regulators, requiring that actual OB/OD test emissions data be submitted in Subpart X permits
- DoD (along with DOE and EPA) instituted the BangBox study to fill this need
- The primary objective was to provide waste characterization data for Subpart X permit applications
- The results would be used in dispersion modeling analyses to determine downwind impacts and, thus, conformance with environmental performance standards

Results from models used to predict emission products and emission factors from OB/OD operations have historically been viewed with skepticism. Regulators were never confident that these models adequately represented the metals and semi-volatiles that resulted from OB/OD operations. Proprietary models such as PCAD and ADORA have been developed and used. However, neither model has been subjected to a formal review process by EPA and, therefore, the results have not been accepted.

A test of four emissions models (POLU13, ADORA, PCAD, MERLIN) conducted by the Army Environmental Center showed that none of the models did a good job of predicting emission factors equal to those obtained from experimental (BangBox and Nevada Test Site) testing. POLU13 was, generally, most accurate for CO_2 and CO emission factors across all munitions considered. ADORA was the only model that predicted organic emissions, but underpredicted the experimental values in every case.

Funding was obtained from the Strategic Environmental Research and Development Program (SERDP), a partnership of DOD, DOE and EPA.

BangBox results could be used to identify and quantify emission products from OB/OD operations.

BangBox Data

- Testing at the DPG BangBox continues
- Testing results are maintained in an emissions database
- Other facilities have been constructed for further testing
  - ODOBi installed at DPG
  - Test chambers at Aberdeen Proving Grounds
- EPA developed a database of validated emission factors for use in Subpart X permitting

TechLaw February 2002 Day 2 Available Tools and Information 19

After acceptance of the BangBox emission factors by EPA, the Army installed a BangBox at DPG and initiated a program to characterize the compounds released when a wide variety of materials were destroyed by OB and OD. Testing continued through 1998. Two tests performed in 1998 included particle size measurements using an Anderson impactor.

The database is a living document. It is updated as new results become available.

The ODOBi has a tolerance of 25 pounds of NEW, allowing for testing of shrapnel-producing items. It is transportable and can be carried to other sites for emissions characterizations. Its design is flexible. It is easily modified to accommodate special applications testing. Test chambers have been installed at the Aberdeen Proving Grounds and testing has begun.

The results of the BangBox tests and the development of the validated database are described in *Emissions Factors for the Disposal of Energetic Materials by Open Burning and Open Detonation* (EPA/600/R-98/103). The emission factors for burns and detonations are contained in Appendices D and E, respectively.

Where Can I Get Emission Factors from the BangBox?

- Appendix D and Appendix E of *Emission Factors for the Disposal of Energetic Materials by Open Burning and Open Detonation* (EPA/600/R-98/103)
- Available in pdf format on the internet
  - http://www.hnd.usace.army.mil/oew/tech/EmissFac/emissfac.pdf

Future Availability of BangBox Emission Factors

- Emission factors from the BangBox database have been provided to the MIDAS database, however, they are not yet accessible
- CHIEF website

TechLaw February 2002 Day 2 Available Tools and Information 21

CHIEF is the website of the OAQPS Emission Factor and Inventory Group (EFIG). It is part of OAQPS's Technology Transfer Network (TTN) and can be accessed at: http://www.epa.gov/ttn/chief

At present, there is no set schedule for the posting of the emission factors to CHIEF.

Emission Estimates for Mechanical Units

- If vented, emissions can be determined by stack testing methods
- If released from the process or process equipment, the emission factors presented in EPA's AP-42 should be considered
  - http://www.epa.gov/ttn/chief/ap2/index.html
- Specialty software is also available for some equipment and processes
  - http://www.epa.gov/ttn/chief/software/index.html

Stack testing methods are available in the SW-846 Compendium and discussed in Appendix B of the *Risk Burn Guidance for Hazardous Waste Combustion Facilities* (available at http://www.epa.gov/epaoswer/hazwaste/combust.htm).

Information on estimating emissions is available at EPA's CHIEF web site.

The most frequently used specialty program, TANK, estimates emissions from tanks.

Emission Estimates for Mechanical Units (cont'd)

- If no EPA-approved methods are available, estimates should be based on basic, accepted engineering principles
  - Conservation of mass
  - Conservation of energy

TechLaw February 2002 Day 2 Available Tools and Information 23

What goes in is equal to the sum of what is stored and what comes out!

Air Dispersion Modeling

- Modeling predicts concentrations and deposition fluxes at many locations and under multiple meteorological conditions.
- Used when monitoring is impractical or infeasible.
- Used in conjunction with air monitoring to characterize air releases.

Where the number of monitoring stations may be limited, an air dispersion model can predict concentrations and deposition fluxes at almost any location specified by the user.

Air dispersion models can be used to supplement air monitoring efforts by filling in data gaps, can aid in the interpretation of monitoring results, and can be used to design an air monitoring program.

Modeling Process

- "Screen" with screening model for worst-case impacts using minimal data
- If worst-case is significant, obtain more data
- Use site-specific data with a more refined model to provide more accurate assessment of impacts
- Object is to minimize costs, efforts

If a screening model appropriate for the source can be identified, it can be applied to determine if the source presents a threat to human health and/or the environment. If the results of the screening modeling show that health or ecological impacts could occur, a refined model should be used in conjunction with more site-specific data to predict impacts from atmospheric releases.

Unnecessary costs and efforts can be avoided if an appropriate screening model is correctly applied and shows that impacts from the source are below regulatory target levels.

Selecting the Appropriate Air Dispersion Model

- Models are available for specific types of sources, atmospheric conditions, terrain, and chemical and physical processes
- Models are available for either screening or refined analysis

TechLaw February 2002 Day 2 Available Tools and Information 26

Air dispersion models are available for a variety of sources such as stacks, vents, spills, fugitive emissions sources, and open burning and detonation units. The permit writer should ensure that a model has been selected for use that is appropriate for the source being analyzed. Terrain effects are also important. Most models can be used in either a rural or urban setting but some are suitable for only one type of surrounding landscape. Also, the height of the surrounding terrain affects a model's ability to accurately predict concentrations and deposition fluxes. Models suitable for complex terrain must be used in areas where the terrain rises above the release height of the source. Some models can account for the effect of nearby buildings on the dispersion of pollutants while others cannot. Not all models are capable of predicting deposition fluxes and some can estimate dry deposition but not wet deposition. Models have different ways of handling meteorological information and modeled receptor locations. Some of these differences depend on whether or not a "screening" or "refined" model is being used.

Screening models are generally easier to use as they require less site-specific data than refined models. For example, most screening models use "worst-case" meteorological conditions that are contained within the program to predict maximum concentrations.

Refer to handout on "Subpart X Model Selection Decision Tree."

Selecting the Appropriate Air Dispersion Model (cont'd)

- Of the refined models, ISCST3 is the most commonly used and accepted
  - Appropriate for continuous releases, especially for units that emit hazardous constituents
    - From stacks or vents
    - Over an area or a volume
  - Model is full-featured to support a comprehensive multipathway risk assessment
- Recommended models for open burning and detonation operations
  - INPUFF
  - OBODM

TechLaw February 2002 Day 2 Available Tools and Information 27

The ISCST3 model is a full-featured gaussian plume air dispersion model that is capable of supporting a comprehensive multipathway risk assessment. In a single run, the model can account for the effect of nearby buildings on dispersion, estimate concentrations and dry and wet deposition fluxes (including depletion processes), perform dispersion calculations in simple, complex, and intermediate terrain, handle multiple sources, and perform calculations for several averaging periods. It is EPA's workhorse air dispersion model and is appropriate for continuous releases from stacks, vents, area, and volume sources.

There are important Subpart X units, such as open burning and detonation units, that are intermittent in nature. These are better modeled by puff models like INPUFF, OBODM, and, possibly, CALPUFF. Each of these models has advantages and drawbacks. INPUFF has been widely accepted for modeling open burning and open detonation units but the newer OBODM air dispersion model is winning favor as it was developed specifically to model the dispersion from open burning as well as open and underground detonation operations. Although CALPUFF is easily the most sophisticated of the three models discussed here, it requires the most data and is the most difficult to use. We will discuss the use of INPUFF and OBODM in more detail.

ISCST3

- Available on SCRAM
  - http://www.epa.gov/scram001
- A Gaussian model for evaluating concentrations and deposition fluxes
- Accounts for nearby buildings and terrain effects
- Can be used in areas of complex terrain
- EPA’s preferred model for continuous, stationary sources

INPUFF

- Available from NTIS, not on SCRAM
- A Gaussian integrated puff model for evaluating concentrations and deposition fluxes
- Continuous and intermittent sources
- Most common model for OB/OD operations
- Limitations in modeling OB/OD operations

INPUFF is a Gaussian integrated puff model for evaluating downwind concentrations or deposition fluxes from continuous or noncontinuous sources. INPUFF is capable of modeling multiple sources at as many as 100 receptors and for as many as 144 meteorological periods. Moving or stationary sources may be simulated with puffs that disperse over a gridded wind field. The puffs from a source are released in a series of user-specified time steps. INPUFF usually is applied to noncontinuous sources and is the most common model for use for OB/OD operations. INPUFF is a suitable model for OB/OD releases under most circumstances, but it does have significant limitations including: use of dispersion parameters for long-term releases, rather than short-term releases; use of plume rise equations for continuous sources; and unrealistic simulation of atmospheric turbulence. Unfortunately, there are few alternative models available to address OB/OD releases. The limitations of INPUFF should be recognized when evaluating a modeling plan that uses the model.

When INPUFF is used to model OB/OD operations, source parameters should be input into the model to best fit the actual release characteristics of the source. Because INPUFF is not able to specifically address OB/OD type releases, the input parameters must be modified to fit the input requirements of another source type, and still exhibit the release and dispersion characteristics of the OB/OD operation.

OBODM

- Available from Cramer & Associates, Inc., the Dugway Test Center, and on SCRAM
- Can handle open burning, open detonation, and underground detonation

TechLaw February 2002 Day 2 Available Tools and Information 30

The OBODM is a gaussian dispersion model for evaluating downwind concentrations and dry deposition values from open burn and detonation operations. A gaussian puff approach is used for open detonation sources, and open burn sources are evaluated using puff, integrated-puff, and plume dispersion techniques. OBODM has been designed to simulate contaminant release and dispersion characteristics that occur with OB and OD sources. OBODM features dispersion expressions that address cloud and plume rise from high energy releases, plume penetration of inversion layers, and the turbulence structure of the planetary boundary layer. The model provides continuous treatment of dispersion as a release changes from instantaneous to continuous. OBODM is a menu-driven program with separate submenus for entering receptor information, source data, meteorological data, and control and printing options.

OBODM (cont'd)

- Can account for operation restrictions and variations in emission strength
- Calculates peak and time-mean concentrations, dosage, and particulate gravitational deposition
- Calculates concentrations in complex terrain
- Options can be specified to conform with "Guideline" requirements

OBODM can be configured to incorporate typical operational restrictions, such as no nighttime operations, into its calculations. Alternatively, an auxiliary file can be used that allows the emission strength (or other source data) to vary with each hour in the meteorological data file.

The model can perform multiple calculations in a single run. Up to six concentration averaging times or deposition summation times can be specified as well as calculation of dosage (time integrated concentration).

OBODM can calculate contaminant concentrations in complex terrain, however, deposition values can only be calculated in simple terrain.

Switches can be set to execute the model runs according to the preferences presented in the Guideline on Air Quality Models (e.g., treatment of calms, use of final plume rise).

Preferred Screening Models

MODEL CHARACTERISTIC	SCREEN3	TSCREEN	CTSCREEN
Source Types	Point/Area/Volume/Flare	Numerous	Point
Terrain Types	Simple, Complex	Simple, Complex	Complex
Release Mode	Continuous	Continuous, Instantaneous	Continuous
Averaging Time	1 Hour	15 Minutes to Annual	1 Hour to Annual
Land Use	Rural or Urban	Rural or Urban	Rural or Urban
Contaminant Type	Gas or Particulate	Gas, Particulate	Gas or Particulate
Applicable Range	≤ 100 km	≤ 100 km	≤ 50 km
Generic or Real Met Data?	Generic	Generic	Generic
Model Chemical Reactions?	No	No	No
Model Building Wake Effects?	Yes	Yes	No
Dry Deposition Calculations?	No	No	No
Wet Deposition Calculations?	No	No	No
Negatively Buoyant Gases?	No	Yes	No
Single/ Multiple Sources per Run?	Single	Single	Multiple

Refined Air Dispersion Models

MODEL ITEM	ISCST3	INPUFF	OBODM
Source Type	Point, Area, Volume	Point, Area	Open burn, Open detonation
Terrain Type	Simple, Complex	Simple	Simple, Complex
Release Mode	Continuous	Continuous, Instantaneous	Instantaneous, Short-duration, Continuous
Averaging Time	1 Hour to Annual	Minutes to a Few Hours	Unknown
Land Use	Rural or Urban	Rural or Urban	Unknown
Contaminant Type	Gas or Particulate	Gas or Particulate	Gas or Particulate
Applicable Range	50 km	To 10s of Kilometers	
Generic/ Real Met Data?	Real	Real, with Gridded Wind Field	Real
Chemical Reactions?	Exp. Decay Only	No	No
Dry Deposition?	Yes	Yes	No
Wet Deposition?	Yes	No	Yes
Negatively Buoyant Gases?	No	No	
Single/ Multiple Sources per run?	Multiple	Multiple	Multiple

Refined Air Dispersion Models (cont'd)

MODEL ITEM	RAM	CTDMPLUS	CALPUFF	DEGADIS	HGSYSTEM	SLAB
Source Type	Point, Area	Point	Point, Area, Volume, Line	Point, Area	Point, Liquid Pool	Point, Liquid Pool, Volume
Terrain Type	Simple	Complex	Simple, Complex	Flat, Unobstructed	Flat, Unobstructed	Flat, Unobstructed
Release Mode	Continuous	Continuous	Continuous, Instantaneous, Time Variant	Continuous, Instantaneous, Time Variant	Continuous, Instantaneous, Time Variant	Continuous, Instantaneous, Time Limited
Averaging Time	1 Hr to Annual	1 Hr to Annual	1 Hr to Annual	1 Hour or less	1 Hour or less	1 Hour or less
Land Use	Urban	Rural or Urban	Rural or Urban	Rural or Urban	Rural or Urban	Rural or Urban
Contaminant Type	Gas or Particulate	Gas or Particulate	Gas or Particulate	Gas or Aerosol	Gas or Aerosol	Gasr Aer
Applicable Range	$\leq$50 km	$\leq$50 km	To 100s of Kilometers	Computed by Model	Computed by Model	Computed by Model
Generic/ Real Met Data?	Real	Real	Real, Time and Space Variable	Real, Limited	Real, Limited	Real, Limited
Chemical Reactions?	Exp. Decay Only	No	Common Reactions	No	Hydrogen Fluoride Only	No
Dry Deposition?	No	No	Yes	No	No	No
Wet Deposition?	No	No	Yes	No	No	No
Negatively Buoyant Gases?	No	No	No	Yes	Yes	Yes
Single/Multiple Sources per run?	Multiple	Multiple	Multiple	Single	Single	Single

Guidance for Risk Assessments

- Guidance for human health assessments is available
  – Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (OSWER)
  – Methodology for Assessing Health Risks Associated With Multiple Pathways of Exposure to Combustor Emissions (NCEA)
  – RAGS, Volume 1, Part A
- Screening values and procedures appropriate for some indirect pathways may be found in
  - EPA's Soil Screening Guidance
  - Region IX PRGs

Guidance for Permitting OB/OD Units

- EPA
  - RCRA 40 CFR Part 264, Subpart X Permit Writer's Technical Resource Document, Version 2, June 1997 (OSW, Subpart X Permit Writer's Workgroup)
- Some States may offer guidance on permitting OB/OD units

TechLaw February 2002 Day 2 Available Tools and Information 36

The EPA document served as a framework for the text of the CD Encyclopedia.

Utah has developed the Permit Writer's Guidance for Open Burning and Open Detonation (OB/OD) Treatment Facilities (DEQ, DSHW). The State of Virginia has a draft of OB/OD permitting guidelines but neither document is available to the general public.

Guidance for Risk Assessments

- Guidance for ecological risk assessments is available
  - Region 4 Ecological Screening Levels are available at
    - http://www.epa.gov/region4/waste/ots/ecobul.htm
  - Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities (OSWER)
  - Ecological Risk Assessment Guidance for Superfund, Process for Designing and Conducting Ecological Risk Assessments (OSWER)

In Region 4, facilities should screen out constituents using Region 4 procedures and eco screening levels before conducted detailed analyses. This applies to both combustion and mechanical units.

Inspection Checklists and Guidance

- Guidance is available from EPA and from Region 4
  - RCRA Inspection Manual
    - http://es.epa.gov/oeca/ore/rcra/cmp/110098a.pdf
  - Process-Based Investigation Guide
    - http://es.epa.gov/oeca/oceft/meic/probased.pdf
  - Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM)
    - http://www.epa.gov/region04/sesd/eisopqam.pdf
- The RCRA Inspection Manual includes checklists
  - However, they are not specific to Subpart X units
- Inspectors typically develop checklists for Subpart X units on a site-by-site basis

TechLaw February 2002 Day 2 Available Tools and Information 38

The EISOPQAM addresses all aspects of field investigations. Section 2.7 focuses on performing investigations for a RCRA inspection.

Appendix IV of the RCRA Inspection Manual contains unit-specific checklists, however, none are directly applicable to Subpart X units, they must be modified to fit the Subpart X unit.

Other Individuals, Groups, and Regulatory Programs

- Denise Housley is the EPA Region 4 contact for EPA's Subpart X Workgroup
- Issues can be raised to and discussed by EPA's Subpart X Workgroup
- Other programs and agencies include
  - Federal and state air programs, water programs
  - Bureau of Alcohol, Tobacco, and Firearms (ATF)
  - Department of Transportation
  - Others

Should also consider "specialists" such as Dr. Bill Mitchell for emissions/BangBox information, OAQPS for "approved" air dispersion models, model developers such as Cramer and Associates for non-EPA models such as OBODM. Contractors may also have expertise in permitting or analysis of Subpart X units.

Other Reference Materials

- For waste and residuals
  - SW-846, ASTM, DoD, UN, Bureau of Mines methods
  - Manufacturers' methods and/or product formulation data
  - Institute of Makers of Explosives methods
    - http://www.ime.org
  - Methods proposed by applicant
  - DoD Technical Manuals (e.g., TM9-1300-214, Military Explosives)
  - Munition Items Disposition Action System (MIDAS)
    - http://www.dac.army.mil/TD/Midas/index.htm

The following are potential sources of analytical or sampling methods:

- American Society for the Testing of Materials (ASTM)
- Department of Defense (U.S. Army Toxic and Hazardous Material Agency has many methods relating to the analysis of explosive waste)
- United Nations (UN) Manual
- Manufacturers (almost all manufactured materials have analytical methods for quality control purposes)
- Institute for the Makers of Explosives
- Applicant

You must register to access the on-line MIDAS data base. In addition to the component information provided in the data base, the site provides links to other organizations and information related to munitions that can be accessed without registration. For example, there is information on other demilitarization technologies being studied by the DoD.

Other Reference Materials (cont'd)

- DoD Ammunition and Explosives Safety Standard, Department of Defense Explosives Safety Board, DoD 5154.4, 1978
- RCRA Part B Permit Writer's Guidance Manual for Commercial Explosives Industry, Institute of Makers of Explosives
    - http://www.ime.org

The IME guidance document is not available to non-members via the web-site store.

More Resources for Permit Writers and Inspectors

- Issued permits for Subpart X units
- EPA Subpart X Model Permit
- Checklist for Review of Subpart X RCRA Part A and Part B Permit Applications

EPA Regions and states may offer risk assessment guidance similar to that offered by Region 4.