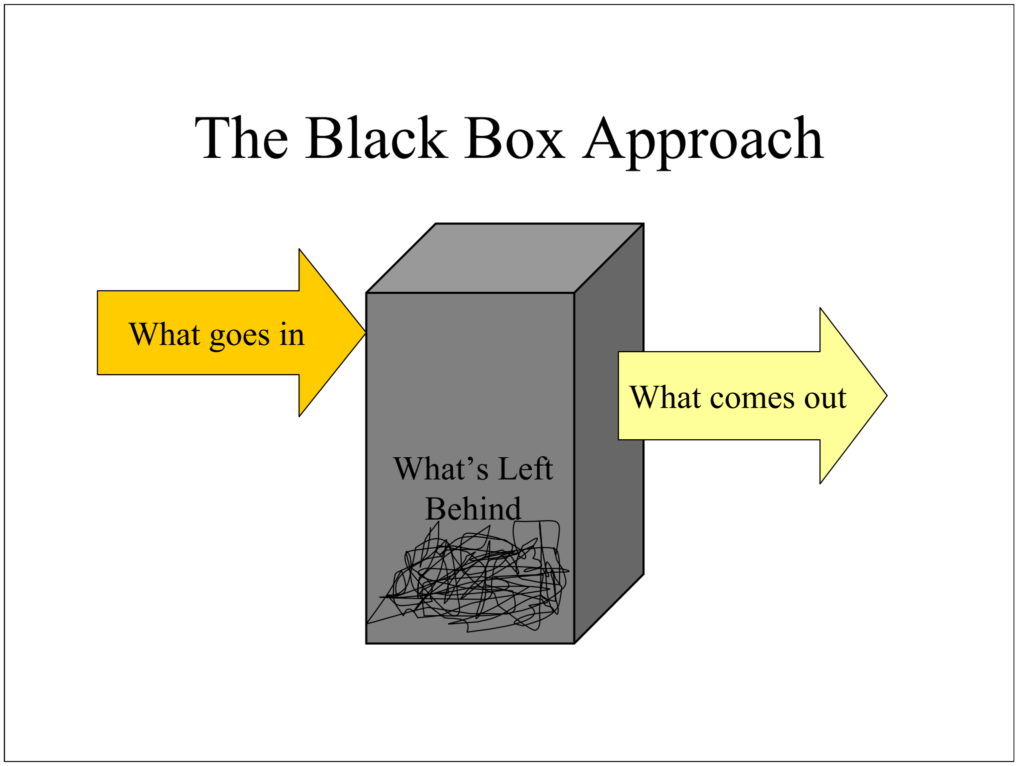
Subpart X Unit – Specific Technical Issues

Environmental Performance Standards



Start by examining the design and operation of the unit.

Then, consider what goes into the unit.

Consider what comes out of the unit.

And consider what gets left behind

Examine the Unit as a Black Box

- What does it look like?
- What does it do?
- How does it do it?
  - What design features allow it to do its job?
  - How is it operated?

Many times your introduction to the unit will by a written description (via the permit application). A photograph may be available as well (it should if the unit is the subject of the permit application). These initial considerations may be performed well before you actually visit the site and see the unit. In such cases, observations from the site visit will allow you to refine your assessment of the unit.

Variations in unit design could affect the potential for and magnitude of emissions as well as the throughput and the amount and type of residue. Design parameters or equipment specifications may be specified in the permit if they offer engineering control over releases to environmental media.

Operating parameters can also influence the potential for emissions, therefore, operating limits are frequently specified in the permit to control releases.

Examine the unit…

- Are there design or operating features that would be of special interest in the permitting of the unit?

For example:

Where does the unit "fit" in the process flow of the facility? Is it a "stand alone" unit or does it feed another TSD unit? If it feeds another unit, are the units physically connected?

Where are the potential emission points? Is there a need for airlocks, seals, or secondary containment? How about features with the potential for fugitive emissions?

Are there safety concerns during operation of the unit? How will maintenance activities influence the potential for releases to the environment?

Consider Impacts to Human Health and the Environment

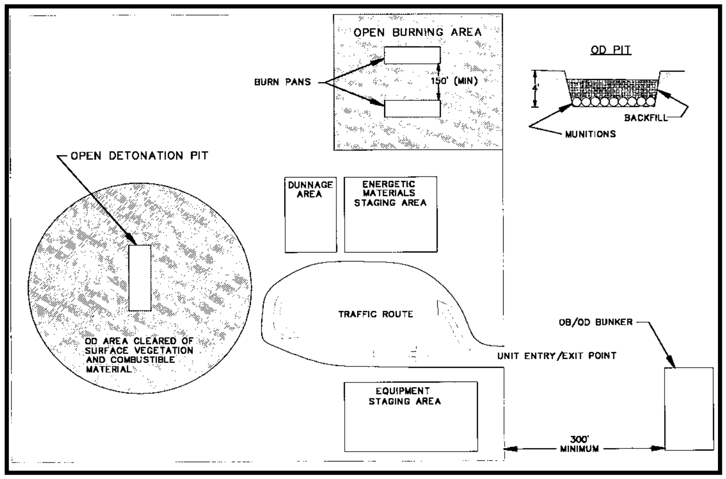
- Input Streams
- Output Streams
- Residues

For input streams, is the feed system "effectively" isolated from the environment? Does the design, operation, or maintenance of the unit create the potential for releases to the environment? Is there a potential for leaks?

For output streams, are some pieces of equipment vented? Should other pieces be vented as well? Are all discharge ducts/points effectively isolated from the environment? How about the output streams themselves (e.g., shredded metal, drained liquids): can the hazardous constituents find their way into the environment?

Are the process residues effectively captured and isolated from the environment? Does the design, operation, or maintenance of the unit create the potential for the release of residues into the environment? How about residue cleanup/transfer operations?

Example of an OB/OD Unit



Burn Pan

Note the covers in the background which can be rolled over the units to prevent accumulation of precipitation.

What Goes Into an OB/OD Unit?

- PEP (propellant, explosives, and pyrotechnics)
- Casings and bags
- Dunnage, auxiliary fuels
- Donor charges, initiators
- Others

What hazardous chemicals are contained in the munitions/PEP being treated?

Donor charges and initiators are used to start the treatment process. Auxiliary fuels (e.g., diesel oil) may also be used to provide additional energy input. Any hazardous constituents in these items must be considered in the environmental assessments performed on the unit.

What Comes Out of an OB/OD Unit

- Emissions plume
- Ejecta/fallout
- Other

Ejecta/fallout routinely occurs. A screen may be used in open burning to minimize the problem. Most facilities clear the area of large ejecta as part of a visual inspection conducted after the treatment event.

Poor design or operation can result in “boil over” during open burning, where burning PEP comes up over the sides of the burn pan, potentially releasing hazardous constituents into the environment.

What’s Left Behind

- Process Residues
  - Untreated wastes
  - Casings
  - Treatment residues (e.g., ash)
  - Other

Ejecta/fallout can be considered a residue as it is “left behind” after treatment.

What Exposure Pathways are Important for OB/OD Units

- Air
- Soil
- Surface water
- Ground water

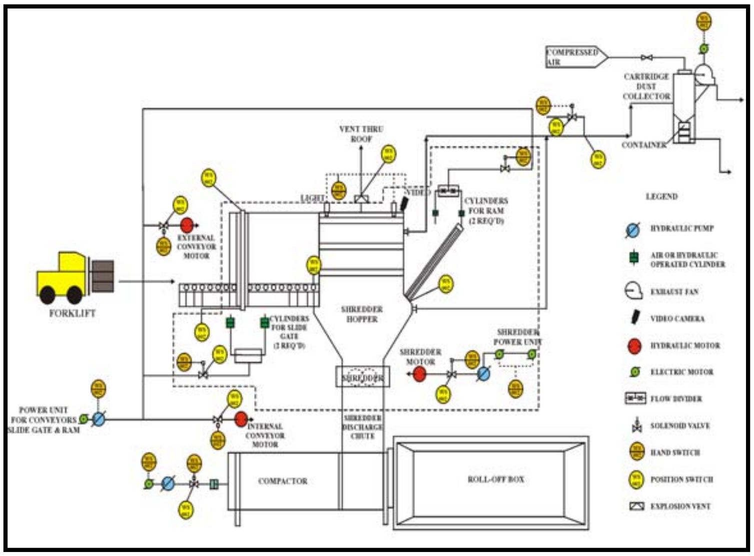
Emissions to the atmosphere will need to be analyzed.

The potential for impacts to soil and surface water will be minimized or eliminated if the unit includes effective secondary containment. Other design and operating features can mitigate the potential impact to receptors by exposure to soil and surface water.

The ground water pathway should be considered if soil contamination from the operation of the unit exists.

High Torque Shredder

Shear Shredder



What Goes Into a Mechanical Unit?

- Waste streams
- Containers
- Process gases or liquids
- Energy inputs
- Others

Does the shredder handle hazardous waste streams? What chemicals are contained in the waste streams?

Shredders are used to reduce the size of containers that hold or used to hold wastes and/or the wastes themselves. Does the shredder handle containers, wastes, or both? Are the containers fed to the unit considered to be "RCRA Empty"? Among the additional points to consider are the size and material of construction of each type of container fed to the unit.

Shredders may use a gas like nitrogen to displace oxygen and minimize the potential for explosions during processing.

Liquids including water and solvents are sometimes used to flush or clean the inside of the containers before they are shredded.

Electricity, heat, and/or hydraulic fluids may be used for motive force or to change the characteristics of the waste streams.

What Comes Out of a Mechanical Unit

- Shredded/crushed metal
- Drained contents of the treated containers
- Process emissions
- Leaks and fugitive emissions
- Other

Residues may cling to the shredded metal. Sampling the shredded metal may be a challenge.

The drained drum contents will need to be characterized. Note that any liquids/solvents used to flush or clean the containers will be mixed in with the drained drum contents.

What’s Left Behind

- Process Residues
  - Metal scraps or particles
  - Waste residues
  - Other

Can gases become trapped in the equipment during a treatment cycle?

What Exposure Pathways are Important for Mechanical Units

- Soil
- Surface water
- Air
- Ground water

The potential for impacts to soil and surface water will be minimized or eliminated if the unit includes effective secondary containment. Other design and operating features can mitigate the potential impact to receptors by exposure to soil and surface water.

Emissions to the atmosphere will likely need to be analyzed unless all emissions are captured and conveyed to an effective control device.

The ground water pathway should be considered if soil contamination from the operation of the unit exists.

Permitting Subpart X Units Can be Difficult

- Wastes and emissions may be difficult to characterize
- Unit-specific design and operating characteristics vary
- Treatment operations may be highly variable
- Environmental performance standards require a lot of judgment
- Applicability of other regulations to Subpart X units

- Subpart X units are unique. Permit writers rely on environmental performance standards, instead of technological standards, to review the permit applications. Therefore, permitting may be more difficult for most Subpart X units than for other types of units.

  For example, characterizing explosive waste is more difficult than characterizing non-explosive wastes. Emissions from OB/OD units are very difficult to characterize and quantify.

  Demonstrating treatment effectiveness is more difficult for a new technology than for a seasoned technology.

    - There is no basis of comparison with which to judge the quality of the treatment.
    - Lack of well-established testing protocols.
    - May require permit limits to control waste treatment effectiveness.

  Assessing performance standards requires a lot of judgment on the part of the permit writer. By necessity, reviewing performance standards requires an interdisciplinary perspective and may require a team approach for complex units.

  Some units may also be subject to other regulations such as the RCRA air rules, the Clean Air Act, and the Clean Water Act.

Shredders – Problem Areas

- Fugitive emissions
  - Construction seams, access doors leak
  - Feed and discharge systems emit to the atmosphere

Shredders – Problem Areas (cont'd)

- Leakage and spillage
  - Discharged or drained liquids and residues leak or spill
  - Secondary containment not provided or not adequate

OB/OD Units – Problem Areas

- Treatment operations vary even in the same unit
- Contamination from previous operations may exist at the site
- Environmental performance standards require a lot of judgment
- Emissions are difficult to characterize and quantify
- Deposition fluxes and concentrations must be modeled for use in risk assessments

Often an issue for OB/OD units that have been in operation for 40 years and previously conducted treatment directly on the ground with little or no engineering controls to prevent migration of hazardous waste or hazardous constituents into the soil and groundwater. In addition, during this time frame, "other" types of hazardous waste and hazardous constituents may have been thermally treated at the unit.

•The interim status units are normally placed on top of these old previous sites, so if there is contamination, it is not possible to determine if it is from the interim status units or previous contamination.

•Existing data may be very limited or of poor quality regarding existing groundwater. Site-specific data may be lacking completely. Hydrogeologic characteristics of the uppermost aquifer or any interconnecting aquifers may not be provided in the Part B Permit Application.

•The use of emissions and air dispersion models introduces uncertainty into the analysis of the units.

Environmental Assessments for Subpart X Units

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

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

Environmental 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 meteorologic 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.

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.

Environmental Assessments for Subpart X Units (cont'd)

- Three types of site assessments
  - Preliminary
  - Screening
  - Detailed

Each Subpart X applicant must submit one or more site assessments for each environmental medium. One assessment, however, can consider all media, but should focus on media-specific releases. Each assessment type requires varying amounts and detail of information.

Preliminary assessments are based on largely a qualitative consideration of risk

Screening assessments are based on worst-case modeling data and, if available, monitoring data

Detailed assessments require site-specific monitoring and modeling

Preliminary site assessment is appropriate from applicants who can demonstrate that:

(1) No actual or potential releases are expected from the unit for a particular medium (e.g., if the unit uses RCRA controls); or

(2) Any actual or potential releases are predictable, controllable, and below acceptable levels for a particular medium.

Screening assessment is appropriate if, based on preliminary assessment, permit writer believes particular media may be adversely affected by release and need further analysis.

Detailed assessments are appropriate for applicants who cannot demonstrate that releases will be below agreed-upon levels at receptor locations (e.g., applicants who demonstrate through a screening assessment that unit is not protective).

Environmental Assessments for Subpart X Units (cont'd)

- Preliminary site assessment
  - Demonstrates whether unit poses unacceptable contamination risks to a particular medium
    - Conclusions based on common sense analysis of existing and readily-available information

Applicant may submit a preliminary assessment to demonstrate that contamination to a particular medium will be prevented or controlled below acceptable levels. Such assessments should be done on a media-specific basis and are often developed with existing documentation (i.e., without extensive original analysis).

In certain cases, the applicant may be able to rule out the possibility of a release into a particular pathway. If, after cross-examining the assumptions used, the permit writer agrees that no release will occur into a pathway, the permit writer can focus attention away from that particular pathway in subsequent assessments.

If risk exists, issue a NOD requiring further assessment.

If no risk exists, do not require further action.

Must demonstrate compliance with the environmental performance standards.

Requires information on treatment effectiveness, controls to prevent releases, unit operations, and site-specific environmental parameters.

Environmental Assessments for Subpart X Units (cont'd)

- To determine if a preliminary assessment is acceptable:
  - Review the information submitted in the permit application
  - Focus on unit design, unit operation, and wastes to be treated
  - Consider the characteristics of the environmental medium being assessed
  - Review the discussion of potential exposure pathways
  - Determine if the information is valid and representative

Generally, a preliminary assessment is not appropriate for units that are designed to release to the atmosphere. This includes OB/OD units. In fact, EPA Region 4 recommends a risk assessment be performed on these units.

Environmental Assessments for Subpart X Units (cont'd)

- If preliminary assessment indicates an adverse impact:
  - Require a "worst-case" screening assessment
  - Require a detailed assessment if screening assessment identifies adverse impact

Because a screening assessment uses conservative or worst-case release assumptions and estimates, it can be used to "screen" out any environmental medium that will not be adversely impacted.

If a screening assessment successfully demonstrates that a medium will not be adversely impacted, a detailed assessment for that medium is not warranted.

The screening assessment requires less site-specific information than the detailed assessment and, because it can eliminate certain media from further assessment, can save the applicant and permit writer time and resources.

Environmental Assessments for Subpart X Units (cont'd)

- Review of screening assessment
  - Examine "worst-case" scenario
    - Release type, quantity, rate
    - Dispersion and migration conditions
    - Receptor exposure
    - All underlying estimates and assumptions
  - Evaluate unit's protectiveness
    - Compare contaminant concentrations at receptor locations to action levels
  - Require detailed assessment if contaminant concentrations exceed action levels

The screening assessment should provide the permit writer enough information to enable a determination of the unit's protectiveness and should include information on:

Release characteristics

Migration and dispersion patterns

Potential receptors

All underlying estimates and assumptions

The screening assessment incorporates modeling and monitoring to estimate emission rates and concentrations of the contaminant. The assessment should be a conservative approach for evaluating emissions by incorporating worst-case assumptions into a model. These assumptions, as well as the model, should be based on site-specific evaluation.

The permit writer should use this information, in addition to unit and waste characterization, to examine source-pathway-receptor relationships to determine if contaminant concentrations at receptor locations exceed action levels.

Permit writer should verify worst case assumptions and examine the scenario against waste information, unit characterization, and other relevant information.

If the contaminant concentrations at receptor locations exceed action levels, permit writer should require a detailed assessment.

Environmental Assessments for Subpart X Units (cont'd)

- Two types of detailed assessments
  - "Worst-case" scenario
  - Assumed or expected value
- Uses site-specific monitoring and modeling

Purpose of detailed assessment is to determine contaminant concentrations at receptor locations using a detailed methodology. It carries on where the screening assessment left off, using same assumptions and criteria. Permit writer should ensure such consistency. It is recommended that permit writer visit the site to better understand unit and site conditions.

There are two types of detailed assessments:

(1) Worst-case constituent release, fate and transport, and exposure scenario to demonstrate compliance with the performance standards.

Ensure QA/QC. For worst-case scenarios, examine information obtained from the unit description and waste characterization to ensure that applicant has quantified releases and to confirm assumptions and estimates.

Determine whether worst-case levels exceed acceptable levels (e.g., health-based levels).

Ensure consistency with assumptions in screening assessment.

(2) Estimates of actual constituent releases and of fate and transport mechanisms likely to occur at the site to demonstrate compliance with the performance standard.

Ensure QA/QC. For estimates that use assumed or expected values, determine validity of estimates. Confirm assumptions and estimates. Consult with experts.

Refer to guidances.

Environmental Assessments for Subpart X Units (cont'd)

- Review of detailed assessment
  - Examine monitoring and modeling data:
    - Release type, quantity, rate
    - Dispersion and migration conditions
    - Existing quality of media
    - Receptor exposure
    - Underlying estimates and assumptions
  - Evaluate unit's protectiveness through a risk assessment
    - Health-based levels
    - Background levels
    - Other

Permit writer must ensure that facility monitors for and models all applicable parameters. Permit writer should consider all modeling results in relation to unit description, waste analysis plan, and other information as needed.

In evaluating a detailed assessment, permit writer should use common sense and consultation with EPA guidances and experts on site and risk assessments, as needed.

Permit writer should ensure that appropriate QA/QC controls were used when collecting samples and analyzing data.

Once permit writer has concluded that application accurately estimates contaminant concentrations at receptor locations, they must compare these concentrations to agreed-upon levels, taking into account existing environmental media quality.

Environmental Assessments for Subpart X Units (cont'd)

Example:

- Facility B's detailed air assessment would consider:
  - Atmospheric, meteorologic, and topographic conditions
    - Wind
    - Atmospheric stability distributions
    - Temperature/Humidity
    - Precipitation
    - Atmospheric pressure
    - Terrain/Land use
  - Existing air quality
  - Human and ecological receptors

The level of information should vary depending on unit-specific circumstances. Because open burning, a high level of detail is needed in Facility B's detailed air assessment.

Detailed assessment must consider unit description, release locations, and waste data when developing exposure conclusions. Permit writer should also review unit description, waste analysis plans, and other relevant information to verify assumptions and estimates and ensure that assessment does, in fact, consider all relevant release parameters.

Atmospheric, meteorologic, and topographic conditions will affect the dispersion of particulates. For example, the potential for particulate release will be greater with higher wind speeds. Wind direction and frequency will influence the direction of plume migration and the receptors affected. Local precipitation, humidity, and cloud cover affect plume rise. Plume height can decrease as ambient moisture increases. Cloudless days can enhance dispersion, but also tend to reduce plume height and can lead to relatively high ground-level contamination. Also, terrain can affect plume direction and dispersion. Terrain obstacles such as hills and mountains can divert regional winds. Likewise, valleys can channel wind flows and limit horizontal dispersion. Additionally, complex terrain can result in diurnal wind circulations, affecting wind speed and atmospheric turbulence.

Existing air quality must be provided for the vicinity of the Subpart X unit. Such information will help permit writers compare before and after contaminant concentrations at receptor locations resulting from the burn event.

Human and ecological receptors should be identified: all workers, off-site populations, and flora/fauna at or downwind of the unit.

Emissions Characterization for Mechanical Units

- Measurements at emissions points
- EPA AP-42 methods for some fugitive emissions
- Assume that what goes into the unit comes out of the unit

Measurements can be taken at stacks, vents, and other discharge points. Samples should be taken and analyzed according to a sampling and analysis plan. Formalized testing, where conditions are controlled similar to a trial burn may be required where stacks and vents are involved.

AP-42 methods may be used to characterize some fugitive emission sources if the case under consideration is addressed in that publication.

If no data are available, it can be assumed that what goes into the treatment unit is emitted to the environment. This is an extremely conservative assumption, however.

Using BangBox Emission Factors for OB/OD Units

- BangBox emission factors may be used for OB/OD operations as long as the composition of the material being burned or detonated is the same as the composition of the material tested in the BangBox
- The emission factor for a compound is multiplied by the amount of material treated to determine the amount of compound emitted
- The amount emitted is multiplied by the appropriate air dispersion modeling result to determine the downwind concentration or deposition flux

BangBox emission factors are by far the best data available for OB/OD operations. In many cases, if the material or munitions being considered for permitting is not covered by the BangBox data, no alternative exists. If this situation should arise, approaches that use the BangBox emission factors as the basis for the emission factors for untested munitions should be considered and discussed with EPA.

BangBox emission factors are based on the mass of energetic material (MEM) treated. When applying these factors to the permitting of an OB/OD operation, calculations should be based on the MEM treated and not the total mass treated.

Limitations of the BangBox Emission Factors

- Only a limited number of energetic materials have been tested
- The fate of sulfur and metals needs further study to more fully characterize emissions from OB/OD operations

16 types of energetic materials have been burned and 23 have been detonated.

Low sulfur and metals recoveries were noted by BangBox researches, however, the reasons have yet to be determined. Also, some energetics.

Emissions Models

- POLU13L
- Proprietary models
  - ADORA
  - PCAD

POLU has been accepted by EPA for OB/OD units but it does have its limitations. Not all potentially emitted species/compounds are contained in its database. There may be problems with metals and organics.

ADORA is a proprietary model developed by BlazeTech in Massachusetts. It has not yet been “accepted” by EPA. It is however, under consideration by the Army for use in TRI reporting and in predicting constituents and quantities where emission factors have not been developed (http://www.blazetech.com).

PCAD is a proprietary model developed by El Dorado Engineering in Salt Lake City. It has yet to be approved by EPA but it has been used by some commercial manufacturers in their permit applications.

Emitted Constituents

- What goes in the unit comes out
  - Assume all the constituents in the munition/PEP being treated are released to the atmosphere as a result of treatment
  - Most conservative option

Air Dispersion Modeling

- Characterizing the Source
  - Classify as a point, area, volume, or line source
  - Classify as continuous, instantaneous, or intermittent
  - Classify releases as buoyant or negatively buoyant
  - Classify releases as vapor phase, particle phase, particle bound

The selection of the proper air dispersion model depends on the type of emission source being analyzed. First, sources must be classified as a point, area, volume, or line sources. In addition, each source must be classified as a continuous, instantaneous, or intermittent source; as a vapor-phase or particulate emission source; and, when modeling gaseous contaminants, as neutrally buoyant or negatively buoyant.

Releases from point sources are those from stacks or vents; they exhibit well-defined exit parameters such as temperature, flow rate, and stack height. Releases from area sources are emitted at or near ground level and over a given surface area. Releases from volume sources are those that occur over a given area (like area sources), and also within a certain depth. Volume sources can be ground level or elevated sources. When entering data for a volume source, a model requires the initial lateral and vertical dimensions of the source. Releases from line sources are releases from roadways or from another source that emits over a long and narrow space. Some models simulate line sources with a series of volume or area sources adjacent to one another.

In general, a permit writer should evaluate the description of a source and decide whether an applicant's representation of the source in a modeling analysis is reasonable. As can be anticipated, the choice of source type can be left to professional judgment and based on how well a source fits into the regulatory definition of a given type of source.

Meteorological Parameters

- For a screening analysis, the models usually use built-in “worst case” meteorological conditions
- If user specified data must be entered, ensure that reasonable “worst case” conditions are used. Look for low wind speeds and stable atmospheric conditions

It is important that the permit writer ensure that appropriate meteorological data have been included in a modeling analysis. For screening analyses, the information is usually straightforward because most screening models use generic, worst-case meteorological conditions. Generally, the meteorological conditions that produce the highest modeled concentrations are low wind speeds and stable atmospheric conditions. For models that require the entry of a single set of conditions, such as dense-gas models, the permit writer should verify that reasonable worst-case conditions have been used. Reasonable worst-case conditions may be modified to reflect proposed operating restrictions. For example, OB/OD operations probably will be confined to daylight hours; therefore, worst-case stability might be the worst-case daylight stability conditions, since the atmosphere tends to become more stable at night.

Meteorological Parameters

- For a refined analysis, the minimum requirements are
  - One year of on-site meteorological data or
  - Five years of off-site data that is representative of on-site meteorological conditions

If a refined modeling analysis requires entry of real meteorological data, either on-site meteorological data for one year, or off-site data for five years are needed for a refined analysis. Off-site data can be obtained from nearby National Weather Service stations, military facilities, or industrial facilities. The permit writer should examine the location from which any off-site data were collected to ensure that the location resembles the site being modeled. Parameters to review include distance of the station from the site, unique features of the terrain that may change the wind flow patterns, and the exact location of the monitoring equipment. Some data are available on the SCRAM Bulletin Board System. Other information can be obtained from NOAA/NCDC in Asheville, North Carolina.

Receptor Locations

- Receptors must be chosen to evaluate direct and indirect exposures
- Model locations of potentially exposed individuals
- Model locations to identify the maximum exposed individual (MEI)
- Model potential ecological receptors
- Models vary in the way locations are specified

Any modeling analysis must define the locations where impacts will be calculated. For Subpart X permitting, the point of compliance (POC) receptors must be evaluated in a modeling analysis. POC receptors must be chosen to evaluate both direct exposure and indirect exposure from an air release. Indirect exposure may result when hazardous constituents are present in soil or water through deposition of particulates or gases. Permit applicants should identify locations of potentially exposed individuals; the potentially maximum exposed individual (MEI); potential ecological receptors, such as local plants and animals; and other sensitive environments and endangered species.

Dispersion models vary in the amount of data they require about receptors. Some screening models (e.g., SCREEN3 and TSCREEN) do not require exact locations, but only the distance to a receptor. For such models, the direction is not important because the models assume that meteorological conditions will be such that dispersion is in the exact direction of the chosen receptor. Other models accept discrete locations of receptors or a gridded receptor field. Models that consider terrain also require entry of elevations for receptors. Modeling for subpart X permitting should include all POC locations. When POC locations are uncertain or when the maximum concentration must be determined for a region, a full receptor grid may be necessary. The permit writer must evaluate, case-by-case, whether the modeled receptor locations are adequate to characterize potential effects to human and ecological receptors.

Modeling Terrain Features

- If surrounding terrain is important, receptor elevations must be specified
- Models vary in the way elevations are specified
- If terrain is complex, conservative assumptions can be applied in non-complex terrain models, however, the analysis becomes a screening analysis

When there are significant terrain features around a site, a model should be used that can simulate plume transport over or around such features. In complex terrain, CTSCREEN is the preferred screening model while CTDMPLUS is the preferred refined model. Both require extensive information and expertise of the user. ISCST3 was recently upgraded to handle complex terrain and is an acceptable model for such applications. When using a model that cannot address complex terrain, an applicant may choose to apply conservative assumptions to account for the terrain. Modeling analyses that include such assumptions should be considered screening level analyses. It is incumbent upon the permit writer to verify that the analysis has addressed the problems presented by complex terrain and that the applicant has used the best model available for the terrain features at the site.

Evaluation of Air Modeling Analyses

- If a screening model was used, determine if it was appropriate for the unit and site being modeled
  - If not, a refined modeling analysis must be performed
- If the screening analysis cannot demonstrate compliance with appropriate standards, a refined analysis must be performed

Permit writers should evaluate the capabilities of the screening model used and compare those capabilities with the characteristics of the unit and site to determine whether the model is appropriate. In cases where the permit writer determines that the screening model is inadequate, an NOD should be issued and a refined analysis should be performed.

If the screening model is appropriate for the unit and site, and is applied correctly, but fails to demonstrate compliance with regulatory standards, the permit writer must issue an NOD and require that a refined analysis using an appropriate refined air dispersion model be performed.

Evaluation of Air Modeling Analyses

- For a refined analysis, verify that the chosen model fits the special features of the site and the available data
- Carefully evaluate any models used by applicants that are not listed in Appendix A or B of the Guideline On Air Quality Models
  - Seek the advice of an expert in air dispersion modeling

The permit writer should evaluate carefully any screening models (or refined models) that are used by applicants that are not listed in Appendix A or B of the Guideline on Air Quality Models. In such cases, it must be determined that the alternative model is appropriate and that the results are equivalent or better than those obtained from the refined model recommended for the type of unit and site being analyzed. These determinations should be made with the assistance of air dispersion modeling experts.

Evaluation of Air Modeling Analyses

- Averaging times must be appropriate
- Applicants often use modeled concentrations for one averaging period to estimate concentrations for another averaging period
  - Adjustments are typically made for periods of no emissions
  - All adjustments and averaging time factors should be well documented and justified by the applicant

A permit writer must consider several factors when evaluating air dispersion modeling results. Averaging time, background concentrations, and an overall perspective of the input data are needed to determine whether the results are realistic.

Often, a modeling analysis must estimate short-term and long-term effects. Although most refined models can calculate impacts for several averaging periods, some can only handle one. Therefore, permit applicants frequently use modeled concentrations to estimate concentrations for other averaging periods. Results are weighted or averaged to account for intermittent unit operation or variations in meteorological conditions. Any such averaging or post-processing of air modeling results should be well documented and justified by the permit applicant.

Evaluation of Air Modeling Analyses

- Require the submittal of all computer files used in the analysis
  - Input and output files
  - Meteorological files
  - Terrain and/or receptor files
  - Source strength files
  - Plotting files

All files from emissions modeling, air dispersion modeling, and any supporting modeling analyses (e.g., building downwash analysis) should be submitted. This facilitates a thorough review and a partial re-creation of the analysis.

Ask for the files in electronic form.

Evaluation of Air Modeling Analyses

- Meteorological Parameters
  - Require submittal of all meteorological data including meteorological preprocessor output and log files
  - Make sure the meteorological data used are representative of weather conditions at the site being modeled
  - Review meteorological preprocessor log file
    - Check inputs used in processing the met data
    - Pay special attention to the surface roughness length for the site being modeled

Review the method used to fill in missing data in the meteorological data files. Confirm that the EPA method documented on the SCRAM web site was used. If an alternate method was employed, the applicant must describe how it differed from the EPA method and what effects the alternate approach had on the data file values.

Examine the warning messages in any meteorological preprocessor log files. Messages such as "rural mixing heights<10m" and "the program had to select a single precipitation type from multiple types" are normal. Other messages should be discussed with an experienced meteorologist or air modeler.

The calculation of the surface roughness length should be rigorously reviewed. Section 3.2.2.2 of the Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities presents one method of calculating this parameter.

Evaluation of Air Modeling Analyses

- Location Datum
  - Most USGS paper 7.5-minute topographic maps are published in the North American Datum system from 1927 (NAD 27)
  - Most digital elevation data uses the 1983 revised system (NAD 83)
  - Ensure that data from the two systems are not mixed

The applicant should submit a discussion that demonstrates that locations based on different datum were not mixed in the modeling analysis. If information was obtained from different sources or based on different datum, make sure that all data were converted to a common datum before being used in the modeling analysis.

The Army Corp of Engineers offers CORPSCON, a program capable of converting between UTM and state coordinate systems as well as converting UTM coordinates to NAD 27 or NAD 83.

Evaluation of Air Modeling Analyses

- Building Downwash
  - Plot the source and building locations in the BPIP file and compare the results to the site plot plan
  - Check the stack and building elevations in the BPIP file against the site plot plan and/or USGS map
  - If these two comparisons check out, the building downwash analysis is likely correct

If the applicant submitted the locations in the NAD 83 coordinate system, building locations may be shifted when compared to a USGS published 7.5-minute topographic map.

Evaluation of Air Modeling Analyses

- Particle Size Data
  - Spot-check the particle size distribution calculations
  - Make sure the calculations correlate with the raw data on which they are based
  - If wet deposition was modeled, make sure that the scavenging coefficients were specified correctly
  - Make sure that the particle density was specified correctly

Particle size information may be based on the results of stack testing or taken from tests of similar units. The applicant should thoroughly document the source of the particle size data used in the modeling analysis and provide a description of how the parameter values used in the air dispersion modeling were obtained. For OB/OD units, good data may be difficult to find. Some size data have been collected in Bangbox tests, but they are not available for use. Additional testing is needed. AP-42 emission factors may be applicable to some processes like underground detonation.

Particle sizes determined by cascade impactor are presented as aerodynamic diameters. The have a density of 1 gram per cubic centimeter. Particle sizes determined by electron microscopy are presented as optical diameters and their density must be determined (and the method used documented) by the applicant.

Evaluation of Air Modeling Analyses

- Test Runs
  - Check applicant's input files for accuracy
  - Use the files submitted by the applicant to recreate a critical model run at a critical receptor location
  - Compare the results to the results presented by the applicant

A critical run might be the model run that produced the highest risk. Likewise, a critical receptor might be the location of the highest impact or risk. When performing the test run, delete all modeled locations except the critical receptor.

Review of Air Dispersion Modeling Files

- Modeling Options
  - Make sure that techniques required for regulatory applications of air modeling were used in the analysis
  - Make sure that the required averaging periods were specified
  - Make sure that dispersion coefficients representative of the surrounding land use and vegetation coverage were used
  - Make sure that the correct dispersion, deposition, and depletion options were used
  - Make sure that the most recent version of the air dispersion model was used in the analysis

The regulatory defaults include: stack-tip downwash, buoyancy-induced dispersion, neglecting gradual plume rise, use of calms processing routines, use of upper-bound concentration estimates for sources influenced by building downwash from "super-squat" buildings, use of default wind speed profile exponents, and use of default vertical potential temperature gradients. Some air dispersion models (e.g., ISCST3) provide a regulatory option that will activate all regulatory defaults. In other models, each option must be specified separately.

Annual averages must be used in the assessment of chronic exposures. Different short-term averages may be needed for different purposes. For example, a one-hour average may be needed for assessing acute risks and/or comparison to ambient air quality criteria. Other short-term averages may required depending on the objectives of the air modeling analysis.

The choice of dispersion coefficient (rural or urban) is based on land use within a 3 kilometer radius of the site. A detailed procedure making the determination is presented in Section 3.2.2.1 of the Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities.

The receptor grid requirements for hazardous waste combustion units are outlined in Section 3.7.1 of the Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities.

Models such as ISCST3, OBODM, and BPIP are routinely updated. So are ancillary programs such as met data preprocessors.

Review of Air Dispersion Modeling Files (cont'd)

- Source Characteristics
  - Plot the source location used in the analysis and compare it to the site plot plan and other maps and figures
  - Make sure that release heights used in the analysis agree with release heights documented by the applicant
  - Make sure that the source parameter values are representative of the proposed operating conditions and that they agree with the values documented by the applicant
  - Make sure the appropriate emission rates were used in the analysis

Ensure that the GEP stack height determined by BPIP was not used in the air modeling analysis.

Source parameters include size, gas temperature, gas velocity, initial fireball diameter, emission rate, and particle size information for deposition calculations.

Some models will allow the use of a unit emission rate so that one set of modeling results can be applied to all chemicals of concern. Other models require that each chemical of concern be modeled separately and constituent-specific emission rates or emission factors must be specified.

Review of Air Dispersion Modeling Files (cont'd)

– Spot-check input files to ensure that all source characteristic data were input correctly. Check at least one file for each modeled phase
  - Vapor
  - Particle
  - Particle-bound

The check of the source characteristic data should include location, operating characteristics and particle size data (including scavenging coefficients and particle density). Building downwash parameters should be compared to the output from BPIP.

Review of Air Dispersion Modeling Files (cont'd)

- Modeled Receptor Locations
  - Make sure that the modeled receptor locations meet the requirements of the governing guidance document and fulfill the purpose of the analysis
  - Spot-check several modeled receptor elevations against a USGS map.

Look at the plotted receptor grids in the modeling report. If not furnished, they may be plotted from the files used in the modeling analysis by a graphics program like Surfer. The plots should be compared to the requirements in the governing guidance documents and the descriptions provided by the applicant to determine if the modeled locations are sufficient to meet the analysis objectives.

If elevations are used in the analysis, check the receptor lists or files to ensure that the elevation array contains non-zero values and to identify values that may have been specified incorrectly.

Review of Air Dispersion Modeling Files (cont'd)

- Meteorological Data
  - Check the anemometer height to ensure that it is correct for the station and years used in the analysis
  - Make sure that all meteorological file identifiers were specified correctly in the air dispersion model input file
  - If a multi-year meteorological file was used, make sure that the file was created correctly

Note that the anemometer height may change from year to year. Two sources of anemometer height information are the state air modeler/meteorologist and the Local Climatological Data Summaries (LCD) available from NOAA/NCDC in Asheville, NC.

Both names and identification numbers of the weather station may be required. Some models also need the year or beginning year of the met data file. Ensure that the appropriate met data file is specified in the air dispersion model.

Procedures for creating multi-year files can be found in the User's Guide for the air dispersion model. The procedures for the ISCST3 model are also presented in Section 3.7.4 of the Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities.

Review of Air Dispersion Modeling Files (cont'd)

- Other considerations
  - Make sure that the plot files needed for post-processing of modeling results were created when the air modeling was performed
  - Make sure that any ancillary files (e.g., source strength files, receptor files, terrain grid files) were specified correctly in the air dispersion model
  - Review the output files and identify the concentrations and deposition rates used in subsequent exposure calculations

Risk Assessments for Subpart X Units

- Risk assessment should include:
  - Waste analysis data
  - Concentrations of contaminants at receptor locations
  - Estimate of rate and duration of exposure
  - Quantification of risk
  - Any uncertainties associated with assessment

As part of a detailed assessment, permit applicants must conduct a risk assessment to demonstrate that releases from Subpart X unit will not pose unacceptable risks.

Risk assessments should be concentrated on risks posed throughout the life of the permit, not just at the time the permit is issued. That means long-term (chronic) exposures should be assessed.

Permit writer must ensure that assessment includes all of the above parameters.

Risk Assessments for Subpart X Units (cont'd)

- Review of risk assessment
  - Verify underlying assumptions, estimates, and consistency with detailed assessment, unit description, and WAP
  - Evaluate results
    - If concentrations of contaminants and deposition fluxes at receptor locations exceed acceptable risk levels, issue NOD requiring containment or pollution prevention
    - If concentrations and deposition fluxes do not exceed acceptable risk levels, do not require further action
    - If information provided is insufficient to determine risk, issue NOD requiring information needed

Permit writer should examine unit description and waste analysis to determine the types of hazardous waste constituents that could be released.

The permit writer should be able to determine the concentrations of deposition fluxes of hazardous waste constituents at receptor locations through a combination of information provided by the permit applicant, including:

Monitoring and modeling results;

Information on existing air quality; and,

Receptor data.

Permit writer should evaluate assumptions and estimates made in estimating intake of hazardous constituents by receptors by direct <u>and</u> indirect routes. (Direct routes would include inhalation of airborne contaminants and direct uptake by plants for example. Indirect routes would include ingestion of contaminated plants and animal products.)

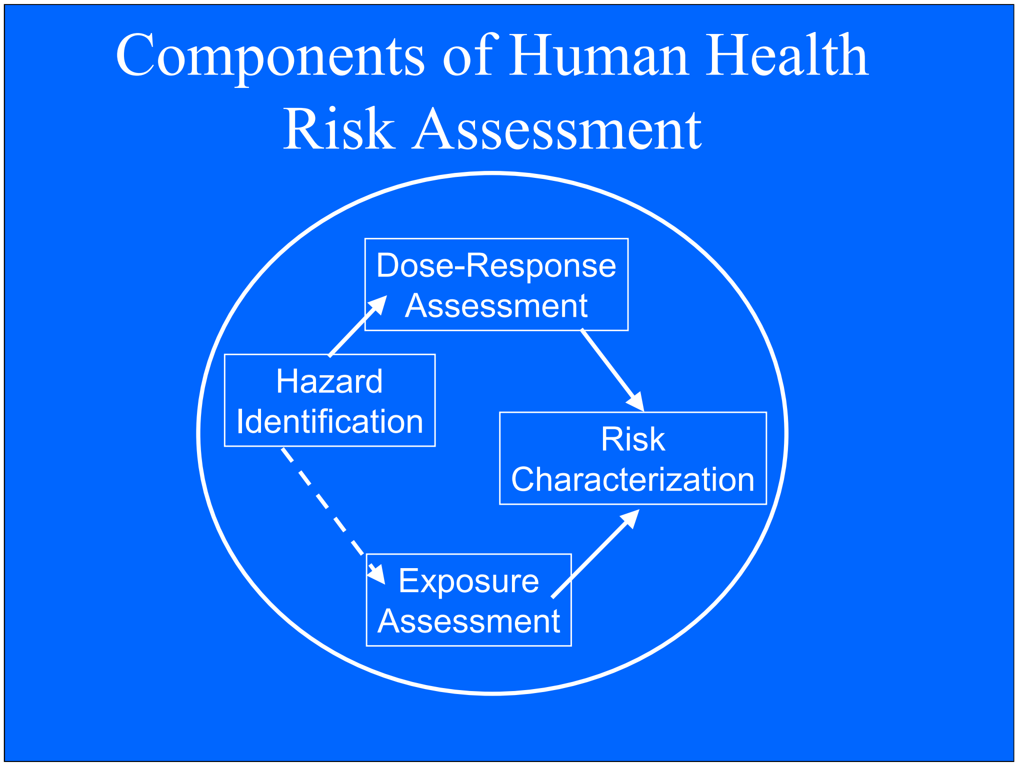
Permit writer may require applicant to develop information on toxicity of hazardous constituents released from unit.

Evaluate risk levels proposed by applicant.

Evaluate credibility of assessment.

Evaluate defensibility of assessment.

Once all information is compiled, permit writer should evaluate unit's risks to human health and environment. Because there is no universally accepted risk level, this determination is subjective and may require outside support.



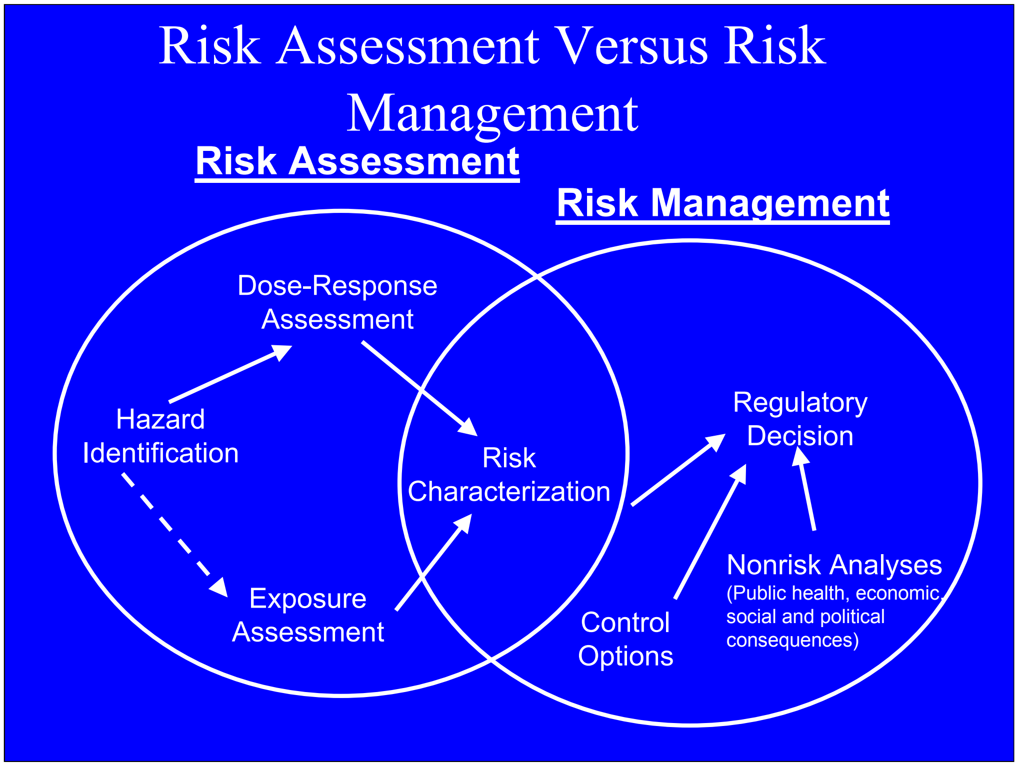
According to the National Academy of Sciences (1983), a complete risk assessment requires four steps.

Hazard identification involves gathering and evaluating toxicity data on the types of adverse health effects that a substance may produce.

Dose-response assessment involves describing the quantitative relationship between the amount of exposure to a substance and the extent of toxic injury or disease.

Exposure assessment involves describing the nature and size of populations exposed to a substance and the magnitude and duration of their exposures. Direct and indirect routes of exposure should be considered.

Risk characterization involves integration of the data and analyses involved in the other three steps. When characterizing cancer risk, you estimate a PROBABILITY (i.e., a risk) of contracting cancer. When characterizing non-cancer effect, you estimate a HAZARD INDEX (a numeric indicator, not a probability) for the given health effect.



Risk assessment results are integrated with the results of other analyses to make risk management decisions.

This figure illustrates that the results of the risk assessment are not the final answer. For this reason it's important that risk assessments are performed using a consistent methodology and that they are described in clear and concise language.

Risk Assessments for Subpart X Units

- Risk management considerations
  - Current and future land use
  - Proximity to population centers, industry, agriculture, recreation areas
  - Acceptable risk level
  - Effect of unit design and operation on calculated risk

This is where permit writers do their work – it's time to decide if the data are sufficient to support the protectiveness determination.

These factors must be considered because they impact the magnitude of an exposure. For example, if land is zoned industrial and can never be used for residential purposes, more extensive waste disposal can occur than if future residential use is a possibility.

In another example, if an exposure occurs close to an agricultural area, it has the potential to have a greater adverse impact because food may become contaminated (and will affect people across a larger area during food distribution).

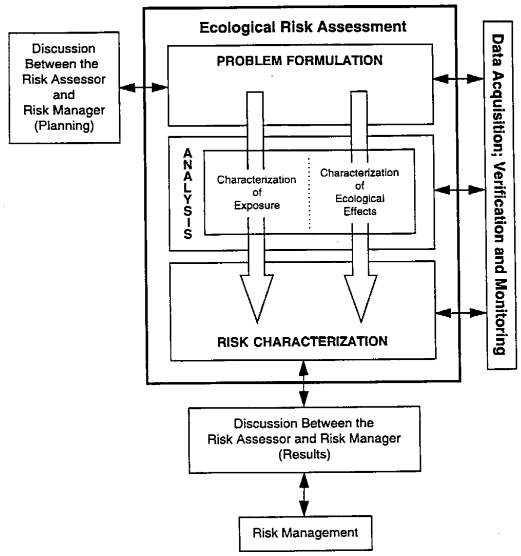
EPA's established acceptable risk level is between 10^{-4} and 10^{-6} and a Hazard Index less than 1. States may be more stringent. EPA Region 4 uses a cancer target risk level of 10^{-5} and HI=0.25 to allow for background and/or multiple sources in risk assessments performed on combustion sources such as OB/OD units.

If there are multiple units, the risk should be stated as a sum of all of the units.

What types of judgment calls have you had to make in reviewing risk assessments?

How have you dealt with inadequate risk assessments? NODs? Denials?

Components of Ecological Risk Assessment



Ecological risk assessment is a four-step process.

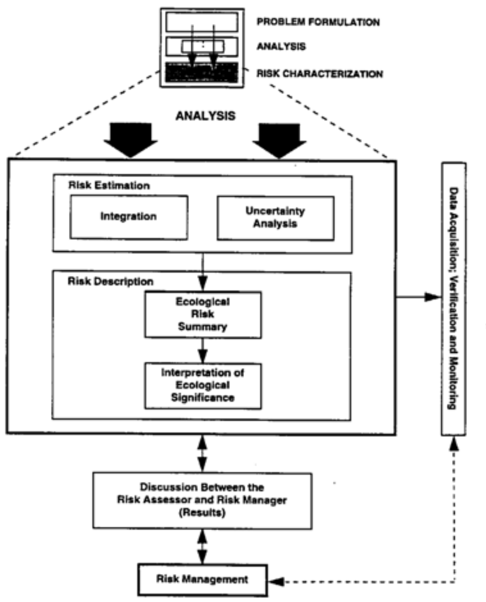
Receptor characterization and endpoint selection involves identifying ecological receptors, effects, and contaminants of concern. Essentially, it is the qualitative evaluation of contaminant release, migration, and fate. Sources of information include EPA databases and publications, field or lab studies, wildlife consumption advisories, and reports of unusual events.

Exposure (or stress regime) assessment involves quantifying the magnitude and type of actual or potential exposures of ecological receptors. Data sources include direct sampling (RFA/RFI data) and chemical fate and transport modeling.

Ecological effects identification involves quantitative linking of contaminant concentrations to adverse effects on ecological receptors, and requires dose-response information. Dose-response information can be obtained from literature, toxicity testing, and field studies.

Risk characterization integrates the first three into an estimation of current and future adverse effects.

Ecological Risk Characterization



Risk characterization integrates the first three components into a measurement or estimation of both the current and future adverse effects. It identifies the probability that adverse effects will occur and describes the magnitude and temporal characteristics of each effect.

Combines applied professional judgment with observation, data collection, and testing.

The risk characterization submitted by the applicant should include a summary of risks and uncertainties and an interpretation of the ecological significance of observed and predicted effects, including the likelihood of recovery.

Ecological Risk Assessment

- Level I criteria
  - Are there obvious environmental degradation that may be related to site contamination?
  - Are ecological action levels exceeded?
  - Are there any biomarkers of potential exposures or effects?
- Level II criteria
  - Pathway criteria
  - Receptor criteria
  - Chemical criteria

EPA has identified two levels of criteria for determining whether an ecological risk assessment is necessary. An answer of "yes" to any of the Level I criteria automatically requires that an ecological risk assessment be conducted. Level II criteria are more indirect measures of potential ecological exposure and should only be assessed if no Level I criteria are triggered.

Examples of obvious environmental degradation include dead vegetation or fish kills. Biomarkers or potential effects include lesions, tumors, or other morphological abnormalities.

Pathway criteria relate to media (e.g., soil, ground water). Receptor criteria are specific to animals or fish. Chemical criteria relate to the chemical and physical characteristics of contaminants.

These criteria apply not only to site remediation, but can also identify risks for operating units.

Ecological Risk Assessment (cont'd)

- Available resources
  - Guidance
  - Databases
  - Agencies

Guidance has been discussed earlier (e.g., combustion, Superfund, EPA Region 4 eco screening levels).

Databases

AWQC

AQUIRE

Agencies

U.S. Department of Interior - Fish and Wildlife Service, National Park Service, and Bureau of Land Management

U.S. Department of Commerce - National Oceanic and Atmospheric Administration

U.S. Department of Agriculture - Forest Service

Differences Between Human Health and Ecological Risk Assessment

- Ecological risk assessment protects populations rather than individuals
- Investigator must determine values and species to protect
- More professional judgement necessary

Ecological risk assessment is an evolving process that requires more applied professional judgment than human health risk assessment.

In an ecological assessment, the investigator must determine what values and species will be protected. In human health assessment, it is predetermined that the most sensitive individuals must be protected.

Investigators must also determine what risks will be considered significant. For example, if population decline is the parameter, at what level will the decline be a significant risk to the stability of a population (i.e., when can it not recover)?

Investigators must also determine what effects will be evaluated. For instance, will it be persistence or gross, acute effects? In addition, some effects that are relevant to ecosystems may not be relevant to human health (e.g., eggshell thinning or eutrophication).

Ecological risk assessment protects populations, while human health risk protects individuals.

Permitting and Ecological Risk

- Location
  - Presence of threatened or endangered plants and animal species
  - Migratory pathways
  - Level of impact to environmental receptors

Ecological risk assessment is an evolving process that requires more applied professional judgment than human health risk assessment.

In an ecological assessment, the investigator must determine what values and species will be protected. In human health assessment, it is predetermined that the most sensitive individuals must be protected.

Investigators must also determine what risks will be considered significant. For example, if population decline is the parameter, at what level will the decline be a significant risk to the stability of a population (i.e., when can it not recover)?

Investigators must also determine what effects will be evaluated. For instance, will it be persistence or gross, acute effects? In addition, some effects that are relevant to ecosystems may not be relevant to human health (e.g., eggshell thinning or eutrophication).

Ecological risk assessment protects populations, while human health risk protects individuals.

Endangered Species

- Determination that no threatened or endangered species will be adversely impacted by proposed activities
- Certify in the permit application that no such species are in the area
  - Biological assessment or
  - Literature review
- If species present, develop a plan to minimize impacts to those organisms

Ecological risk assessment is an evolving process that requires more applied professional judgment than human health risk assessment.

In an ecological assessment, the investigator must determine what values and species will be protected. In human health assessment, it is predetermined that the most sensitive individuals must be protected.

Investigators must also determine what risks will be considered significant. For example, if population decline is the parameter, at what level will the decline be a significant risk to the stability of a population (i.e., when can it not recover)?

Investigators must also determine what effects will be evaluated. For instance, will it be persistence or gross, acute effects? In addition, some effects that are relevant to ecosystems may not be relevant to human health (e.g., eggshell thinning or eutrophication).

Ecological risk assessment protects populations, while human health risk protects individuals.

Migratory Pathways

- For land animals
  - Physical barriers such as fences
- For birds and animals
  - Modification of operating schedule to accommodate migratory habits

Ecological risk assessment is an evolving process that requires more applied professional judgment than human health risk assessment.

In an ecological assessment, the investigator must determine what values and species will be protected. In human health assessment, it is predetermined that the most sensitive individuals must be protected.

Investigators must also determine what risks will be considered significant. For example, if population decline is the parameter, at what level will the decline be a significant risk to the stability of a population (i.e., when can it not recover)?

Investigators must also determine what effects will be evaluated. For instance, will it be persistence or gross, acute effects? In addition, some effects that are relevant to ecosystems may not be relevant to human health (e.g., eggshell thinning or eutrophication).

Ecological risk assessment protects populations, while human health risk protects individuals.

Documented Environmental Impacts

- Based on an environmental impact statement (EIS), facility not able to obtain
  - Finding of no significant impact (FONSI) or
  - Categorical exclusion for the operation
- Permit application must include
  - Findings of the required EIS
  - Mitigation and monitoring plans from the EIS

Ecological risk assessment is an evolving process that requires more applied professional judgment than human health risk assessment.

In an ecological assessment, the investigator must determine what values and species will be protected. In human health assessment, it is predetermined that the most sensitive individuals must be protected.

Investigators must also determine what risks will be considered significant. For example, if population decline is the parameter, at what level will the decline be a significant risk to the stability of a population (i.e., when can it not recover)?

Investigators must also determine what effects will be evaluated. For instance, will it be persistence or gross, acute effects? In addition, some effects that are relevant to ecosystems may not be relevant to human health (e.g., eggshell thinning or eutrophication).

Ecological risk assessment protects populations, while human health risk protects individuals.

Documented Environmental Impacts (cont'd)

- Applicant must discuss how mitigation and monitoring plans will be implemented
  - Finding of no significant impact (FONSI) or
  - Categorical exclusion for the operation
- Permit writer must evaluate EIS and implementation information
  - Are all requirements of the mitigation and monitoring plans met
  - Do requirements impact unit operation

Permit Conditions – Risk Reduction

- Facility siting
- Design modifications
- Limits on operation

Deliberate siting of facilities away from population centers can reduce risk to human health. Careful consideration of site geology, hydrology, and wildlife habitats can reduce risk to the ecosystem.

Placing certain limits on operation (e.g., amount of material that can be treated at one time, hours of operation or operations restricted during periods of high winds or precipitation events) can reduce risk potential by limiting the amount of material that enters the environment. The MIDAS Database includes a list of the limitations that already exist.

Risk Assessment and Land Use

- Risk Assessment
  - Controls Required
  - Management Plan
- Land Use Provisions
  - Recordkeeping
  - Control Implementation

Challenges in Calculating Risk for OB/OD Units

- Short-term, highly variable emissions
- Difficulty of measuring and modeling contaminant concentrations and deposition fluxes
- Scarcity of risk data
- Monitoring equipment

Several challenges are associated with calculating risk of OB/OD units

Emissions may be highly variable and difficult to measure.

Existing risk data for OB/OD units is scarce because of the unusual processes and treatment of energetic compounds. Permit applicants are often the first to evaluate risks from these processes.

Equipment often is not sufficiently sensitive or monitoring is dangerous

Toxicity data do not exist for many constituents treated by OB/OD units

Identification and adequate characterization of sources of uncertainty

OB/OD Units – Permit Conditions

- Operating and Maintenance Requirements
  - Usually addressed in the permit as an Attachment
  - Includes Standard Operating Procedures (SOPs)
    - Includes loading/unloading procedures
    - Addresses hazardous wastes which are placed in the unit or procedures for managing wastes (i.e., flow rates for waste, volume of waste placed in each burn pan, etc.)
    - How the waste will be ignited
    - Duration of burns, duration of a burn campaign, number of burns per day, week or year
    - Releases to the environment

•The permit writer may consider adding an attachment to the permit outlining a preventive maintenance schedule and critical operating protocols.

OB/OD Units – Permit Conditions (cont'd)

– Management of accumulated precipitation
– Management of air emissions from the unit
  - Minimizing air emissions
  - Exposure of public to hazardous or toxic emissions
  - Meteorological information

OB/OD Units – Permit Conditions (cont'd)

- Operating and Maintenance Requirements (cont'd)
  - For open detonation units, management of noise should address:
    - Facility design
    - Wind direction
    - Sound buffers
  - Management of ash/residues
    - How and when collected
    - Type of ash/residues
    - Determination if the ash or residues are hazardous waste
    - Sampling and analysis
    - Storage of ash/residues

OB/OD Units – Permit Conditions (cont'd)

- Operating Conditions
  - Establish operating conditions depending on nature of unit
  - Included usually as a Permit Attachment
  - Examples for OB/OD type unit
    - Minimum safe distance
    - Operation required during daylight hours
    - Required to operate within a wind speed range (i.e., between 3 and 15mph)
    - No operations during electrical storm within 3 miles
    - No operations during inclement weather or if storms are forecasted
    - No operations during a weather inversion, or if an inversion is forecasted

•Discuss various examples and request examples from participants.

•Again depending on the type of unit, special performance testing requirements may be necessary (such as a trial burn).

Other Thermal Treatment Units (cont'd)

- Operating Conditions (cont'd)
  - Examples for thermal treatment units
    - Maximum waste feed rate
    - Acceptable pH levels
    - Operating temperature range
    - Differential pressure
    - Automatic Waste Feed Cutoff (AWFCO) controls
    - Air pollution control devices
    - Handling and Storage Requirements
      - Special storage/accumulation requirements for waste prior to treatment in Subpart X unit
      - Personnel safety concerns
      - Prevention of unintended ignition or reaction of waste

Permit Conditions (cont'd)

- III.G Monitoring Requirements
  - Groundwater monitoring
    - Usually references a Permit Attachment
    - Highly site-specific, may reference groundwater module
  - Air monitoring
    - Usually references a Permit Attachment
    - Should specify the type of air monitoring, a schedule for air monitoring and the type of instrumentation used
      - Example: air monitoring shall occur downwind during open detonation events
      - Background air level shall be determined
    - A sampling and monitoring plan may be necessary

•Discuss the examples of monitoring requirements for air and groundwater with the participants.

•Groundwater has its own module so there may be no reason to address groundwater monitoring in this module.

Permit Conditions (cont'd)

- III.G Monitoring Requirements (cont'd)
  - Surface-Water Monitoring
    - Usually a reference to a Permit Attachment
    - Should specify the types of surface monitoring, sampling points, the schedule and instrumentation
    - A sampling and monitoring plan may be necessary
  - Soil Monitoring
    - Usually a reference to a Permit Attachment
      - Should specify the type of soil sampling, depth of samples, type of sampling, and schedule
      - A sampling and monitoring plan may be necessary

Module 5 - Groundwater Monitoring for Subpart X

- Major Issues
- Other Complications and Existing Data for OB/OD Units
- Types of Groundwater Monitoring for Subpart X Units
- Example of a Compliance Monitoring Permit Module

•Because of some of the issues and complications associated with groundwater monitoring, we are not going to immediately discuss setting permit conditions and only one example will be provided.

•This introductory slide addresses the 4 issues we are going to discuss.

Module 5 (cont'd)

- Major Issues
  - Groundwater monitoring is not explicitly required in 40 CFR 264 Subpart X
  - The Permit writer will have to determine the potential for releases from the unit

•Miscellaneous units which have the potential to affect the groundwater should be required to install a groundwater monitoring system.

•Most Regions and States require OB/OD units to monitor groundwater.

•Units like shredders, that are located inside buildings, are not normally required to have a groundwater monitoring program.

OB/OD Units – Permit Conditions (cont'd)

- Other Complications and Existing Data for OB/OD Units
  - There may be previous releases from operations in the same area
    - Releases from Interim Status operations (Burn Pans)
    - Difficult to differentiate the releases from different stages of the unit's life
  - Existing data, including data for the environmental assessment, may be of poor quality

•Often an issue for OB/OD units that have been in operation for 40 years and previously conducted treatment directly on the ground with little or no engineering controls to prevent migration of hazardous waste or hazardous constituents into the soil and groundwater. In addition, during this time frame, "other" types of hazardous waste and hazardous constituents may have been thermally treated at the unit.

•The interim status units are normally placed on top of these old previous sites, so if there is contamination, it is not possible to determine if it is from the interim status units or previous contamination.

•Existing data may be of poor quality, or very limited regarding existing groundwater. Site-specific data may be lacking completely. Hydrogeologic characteristics of the uppermost aquifer or any interconnecting aquifers may not be provided in the Part B Permit Application.

Shredders – Permit Conditions

- Conditions address primarily the problem areas
- Controls must be negotiated and included in application
- Permit condition usually references the description contained in the application "Constructed and maintained as described in…"

Shredders – Permit Conditions (cont'd)

- Fugitive emissions control conditions
  - Emissions control device
  - Enclosure, hooding, or building vented to a control device
  - Negative operating pressure, if used

Shredders – Permit Conditions (cont'd)

- Leakage and spillage conditions
  - Specifications for sealed feed, liquid drainage, and discharge systems
  - Specifications for secondary containment

Shredders – Permit Conditions (cont'd)

- Other permit conditions important in controlling potential risks
  - System operating conditions
  - Maintenance
  - Inspections
  - Monitoring reports