Emission Factor Data Analysis (Task N.0801)

Statement of Need

Department of Defense (DoD) requires the capability to safely and cost effectively demilitarize excess, obsolete, and unserviceable military munitions. Based on decades of operational experience, Open Burning (OB) and Open Detonation (OD) treatment are proven safe, effective, and economical approaches for demilitarization (demil) of many waste military munitions. The OB and OD operations that treat Resource Conservation and Recovery Act (RCRA) - regulated energetic wastes are subject to Title 40 of the Code of Federal Regulations Part 264.600 (Subpart X) and generate pollutants regulated under the Clean Air Act. Subpart X permit applicants must: (1) evaluate the operation's impacts on groundwater, subsurface environment, surface water, wetlands, soil surface, and air; and, (2) demonstrate that any release from the operation will not adversely affect human health or the environment. Demonstrating compliance with these performance standards is particularly challenging due to the unconfined and violent nature of OB/OD reactions. A risk-based approach is used as the primary basis for establishing site-specific measures that are protective of human health and the environment.

On December 17, 2010, the U.S. Environmental Protection Agency (EPA) published a draft report "Recommended Procedures for Development of Emissions Factors and Use of the WebFIRE Emissions Factor Database" that describes the procedures, data evaluation criteria, and associated tools and data management systems that the agency recommends for developing air pollutant emissions factors (EFs). This is the proposed approach and new procedures that EPA will follow when developing new or revising existing EFs, and it is a significant change over previous guidance.

The DoD continuously seeks to validate, update, and improve the accuracy of EFs related to its operations. Because the current AP-42 Draft Chapter 16 EFs were developed under EPA's 1997 guidelines, the effectiveness and impact of the EPA 2010 proposed guidance in developing EFs for these unique, single event operations that have widely varying waste streams is unknown and uncertain. An evaluation of the EPA's proposed EFs development process with OB/OD data needs to be conducted in order for the DoD to determine the appropriate path forward in creating a sustainable and representative OB/OD EFs program that can be effectively used and updated as new data is generated.

Technical Approach

The purpose of this overall task was to determine the resulting EFs when the EPA proposed guidance is applied to OB and OD EFs data. This includes EFs for the static fire of rocket motors. It leveraged the spreadsheet tool, developed under NDCEE Task 561-A3, and demonstrated it in conjunction with ongoing EFs testing in order to finalize its development for continuous application to OB/OD emissions testing events. This tool allows the DoD to accurately and consistently prepare air emission test plans, test reports and related materials of the highest quality possible. The EPA WebFIRE checklist helped to improve the data quality rating of DoD OB/OD air EFs and ensured that EPA procedures and requirements are considered, and thus provided more representative data for use by DoD. The data generated will support acceptance and use of such EF data for reporting and permitting.

Government POC
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Status
Complete

The NDCEE performed a comprehensive analysis of all available OB/OD and static fire EFs, which helped identify errors, as well as analysis of reports/references that were used in the determination of an overall EF. Such analysis helped to identify individual data points, appropriate sources, and data quality rankings of each data point to allow the DoD to understand and evaluate the benefits and impacts of EPA's EF procedures and systems. This will help the DoD to decide on the best path forward for publishing the DoD OB/OD EFs. The analysis will also allow the DoD to evaluate and determine the best options for combining, presenting and publishing the OB/OD EFs.

Results and Benefits

- Presented the methodology, results and conclusions that were used in determining the resulting EFs when the EPA proposed guidance is applied to OB and OD EFs data.
  - Additional testing is recommended to increase the EF scores.
- Informed and showcased to the DoD how to accurately and consistently prepare air emission test plans/reports, and ensure the collection of related material so that the data receives the highest quality possible.
  - Additional representative data to support acceptance and use of such EF data for reporting and permitting is recommended.
- Researched and consolidated historic emissions data from OB and OD processes used to demilitarize munitions and developed a background document in order to compare the data to EPA AP42: Compilation of Air Emission Factors.
  - These EFs will be the EFs recommended for use by all DoD components.

Technology Transfer and Outreach

A spreadsheet tool to accurately and consistently prepare air emission test plans, test reports and related material was delivered to the Government. In support of this transition, the NDCEE trained Government project participants on how to use the tool.

The NDCEE evaluated how the OB/OD data is combined and calculated based upon propellant types, or as grouped propellant types (e.g. single-base, double-base, etc.), and compared the EFs for the combined pollutant and munitions data against several different combinations to demonstrate what, if any, combinations of propellants and data have on the resulting EFs.