

**Hazard Assessment for Munitions and Explosives of Concern
Concept Paper
October 2004**

What is the Purpose of this Paper ?

This paper presents consensus decisions of an inter-agency, State, and Tribal Technical Working Group on Hazard Assessment (TWG-HA) of Munitions and Explosives of Concern (MEC). Chaired by USEPA, the TWG-HA includes representatives from DOD, DOI, ASTSWMO, and TASWER. This paper is intended to provide an update on efforts by the TWG-HA to develop a site-specific MEC Hazard Assessment (MEC HA) methodology and guidance. The MEC HA guidance will be designed to meet seven major purposes:

- Present a framework for developing a site-specific hazard assessment.
- Organize site information in a consistent manner.
- Support hazard communication for the project team and with stakeholders.
- Provide site-specific information for selection of alternative remedies.
- Provide site-specific information on land use decisions.
- Support site-specific prioritization efforts where there are multiple areas that will need responses actions.
- Build confidence in the decision-making process.

The efforts of the TWH-HA to date do not include evaluation of a framework or methodology for underwater sites or chemical warfare materiel

Why is there a Need for a Site-Specific Hazard Assessment for Munitions and Explosives of Concern (MEC HA) ?

Currently there is no widely accepted method for the development of a site-specific assessment of explosive hazards at munitions response sites. Based on experience over the past decade, the TWG-HA believes the time is ripe to attempt to develop such a tool.

Project teams are faced with choices of using existing methods that have limitations (e.g. Ordnance and Explosives Risk Impact Assessment); deciding to not use a hazard assessment framework; or developing their own site-specific methodology. The outcome of working with an accepted, consistent framework can result in streamlined project activities, more consistent decision-making, and decisions with the documentation necessary to support and defend them.

What will the MEC HA Accomplish ?

- **Provide a consistent framework.** The development and application of a consistent framework for MEC HA will allow project teams to organize and communicate information systematically. It ensures that project teams in different parts of the country have a similar approach to addressing hazards and consequently increase the likelihood of making similar hazard management decisions for similar sites.
- **Assist project teams to manage uncertainty.** Site-specific hazard assessment guidance will provide a consistent framework for evaluating site explosive hazards, and can also be used to identify when sufficient quantity and quality of information is available to make management decisions supporting no action, removal, or remedial decisions.
- **Focus attention on hazard management choices.** Project teams can use a site specific hazard assessment to evaluate approaches to cleanup to support future land uses and assess the impact of those approaches in the decision making process.
- **Ensure continuity of hazard management evaluations and decisions.** When a consistent, accepted framework is in use, decisions for a munitions response site are more likely to continue to be supported when the project team changes, such as when new staff and contractors, and new stakeholders become involved.

How will this Relate to CERCLA and the NCP ?

The MEC HA is intended to fulfill the NCP requirement for site-specific risk assessments. Normally, the site-specific decision process will be the CERCLA process, which addresses both remedial and removal decisions. The process reflects the preference of DoD and EPA for a process consistent with CERCLA, as presented in the *Interim Final Management Principles for Implementing Response Actions at Closed, Transferred, and Transferring Ranges* (March 7, 2000). However, where a state has the lead in overseeing a cleanup, the cleanup may be conducted under state Resource Conservation and Recovery Act (RCRA) requirements, other federally delegated authorities, or other state authorities. Because the RCRA corrective action program is conducted in a manner similar to the CERCLA program, the integration of a hazard assessment under that process should be similar to integration under CERCLA.

The fundamental differences between the acute effects of explosive hazards and chronic effects of exposure to hazardous chemicals are a key factor that will be addressed through the MEC HA. Established chemical risk assessment processes will be used to assess the risk of munitions constituents to human health and the environment. The proposed MEC HA guidance is not intended to affect the established chemical risk assessment methods.

How does this Relate to the Munitions Response Site Prioritization Protocol ?

The Explosives Hazard Evaluation (EHE) module of the Munition Response Site Prioritization Protocol (MRSP) methodology for prioritization and funding of site response actions is being used as a resource for the development of the MEC HA guidance. The EHE was first assessed to determine whether it would meet the needs for site-specific hazard assessment. The assessment concluded that the module does not provide the specificity necessary to meet many of the requirements for a site-specific hazard assessment. Components of the EHE framework will be adopted or adjusted for use in the development of the MEC HA. This will ensure a strong link between the EHE and the MEC HA.

What are the Underlying Principles for the MEC-HA ?

Several underlying principles are significant in the development of a guidance document for the MEC HA process, including:

- **The MEC HA is required to support the management of uncertainty throughout the decision process.** Uncertainty will be explicitly addressed and managed throughout the MEC HA process. Furthermore, the introduction to the MEC HA guidance will acknowledge the likelihood of residual uncertainty by making the following statement:
“Due to uncertainty, there may be residual hazard at an MEC site where removal has occurred. At most of these sites, LUCs will be required. LUCs can range from an educational program, a simple deed notification, or posted signs, to more stringent deed restrictions and required permits.”
- **Dynamic Connection to the Conceptual Site Model (CSM):** Any investigation of a munitions response site with MEC starts with the gathering of existing information and the development of a Conceptual Site Model (CSM). The CSM is directly linked to the MEC HA and provides the key inputs to the assessment. Because the CSM may change as more information is gathered, an MEC HA completed at an early stage in the CERCLA process (e.g., prior to the RI) may also change as more accurate information is gathered.
- **The design of the MEC HA will balance the cost of data requirements with the benefit of the assessment.** The MEC HA process will be designed to support decision-making at the earliest time that sufficient information becomes available. This principle of acting when sufficient data are available, and of not collecting data just for the purpose of updating a hazard assessment, will carry forward through the guidance document. The guidance document will provide criteria to identify when reassessment is appropriate and when it may not be appropriate.
- **Communication with stakeholders is an important goal of the MEC HA.** The development of the guidance will take communication requirements into account, and when technical issues are discussed, every effort will be made to present these issues in ways that will be understandable to non-technical stakeholders.

- **The MEC HA will make a relative, rather than an absolute, assessment of the hazard of a munitions response site.** The MEC HA will not develop a numeric estimate of injury or death associated with a probabilistic risk of exposure to MEC. Previous efforts associated with probabilistic risk have relied upon numeric models to predict human behavior. The MEC HA will not require the estimation of human behavior. It will rely on a combination of qualitative and quantitative input factors that will result in a qualitative output.
- **The MEC HA will be compatible with the Munitions Response Site Prioritization Protocol (MRSPP).** The MEC HA structure will be developed relative to the protocol to preclude redundancy and capitalize on previous work.

How is the TWG-HA Planning and Developing the MEC-HA ?

The framework of an MEC HA can be described by specifying its input factors, its structure (the way in which the input factors are weighted and combined), and the nature of its output.

Input Factors

Input factors describe the characteristics of a site that contribute to the explosive hazard at the site. A large number of hazard assessment models exist that have used almost every kind of input factor that could possibly be related to the assessment of explosive hazards.

Traditionally, input factors are sorted into three categories, reflecting the three parts of the Conceptual Site Model (CSM):

- **Source** — factors that describe the explosive hazard inherent in the site. These include factors like munition type, fuzing sensitivity and source area type.
- **Pathway** — factors that describe site characteristics that affect the likelihood that people will come into contact with MEC, including site accessibility, MEC depth, and potential for erosion or other migration mechanisms.
- **Receptors** — factors that describe specific actions of receptors that may bring them into contact with MEC. These include factors like activity intensity, intrusive depth and frequency of entry.

However, the above organization does not reflect the understanding that a MEC HA is fundamentally different from traditional chemical risk assessment. This is due to the fact that for MEC the effects are acute and immediate, whereas for traditional chemical risk assessment, chronic effects are evaluated. Therefore, the description of the functional relationships between input factors will differ from the traditional “source, pathway, receptor” organization. The functional relationships addressed in the MEC HA are:

- **Severity:** The potential severity of the result should an MEC item function.
- **Accessibility:** The likelihood that a receptor will be able to interact with an MEC item.
- **Sensitivity:** The likelihood that an MEC item will function should a receptor interact with it.

The table below describes the planned organization of the MEC HA, and its relationship to the more traditional CSM categories.

Explosive Hazard Component	Input Factor	Relationship to “Traditional” CSM Categories
Severity	Type of filler	Source Pathway
	Amount of filler	
	Proximity to Inhabited Buildings or Commonly Used Public Facilities	
	Proximity to Critical Infrastructure, Cultural Resources, or Ecological Resources	
Accessibility	Site accessibility	Pathway Receptor
	Frequency of entry	
	Amount of MEC	
	Minimum MEC depth/Maximum intrusive depth	
	Migration potential	
Sensitivity	MEC Category	Source Receptor
	Fuzing sensitivity	
	MEC portability	
	Intensity of Activity	

For several of the input factors from the table above (Filler Type, Filler Amount and MEC Portability), a lookup table (pick list) based on standard munitions classifications will be developed as a user tool to facilitate use of the hazard assessment and promote consistency.

Hazard Assessment Structure

The hazard assessment structure encompasses the methods used to score, weight and combine the input factors. The methods used to score, weight and combine input factors will use a relative numeric approach, similar to the approach used in the EHE module. The organization of the structure will follow the severity, accessibility, and sensitivity components described above.

Output

The MEC HA output for individual sites will be based on defined categories of hazards that will have a relative scale, where one end of the scale may require immediate action and the other no action, or no action with some measure of institutional or engineering controls. Use of the relative numeric approach will provide greater flexibility in the identification and definition of these categories. The MEC HA will support reclassification of the hazard of a site based on new information or changes in conditions at the site.

What Outreach Efforts will there be for Interested Parties and Stakeholders ?

Outreach is a critical component to developing wider stakeholder involvement with and buy-in to the process. The TWG-HA is currently developing an outreach plan that will detail activities and outreach opportunities over the course of the development of the MEC HA. The outreach plan will include:

- Involvement and buy-in by the Munitions Response Committee (MRC).
- Identification of opportunities for stakeholder involvement.
- Establishment of a schedule for informational briefings.
- Identification of outlets such as websites, fact sheets and mailing lists.

What will be the Interim and Final Products and When will they be Available ?

The final product will be a guidance document that may be jointly released by the participating agencies or released by EPA with the endorsement of the participating agencies. The guidance will specify the process and rules for data interpretation, and will include detailed tools (e.g. fill in the blank tables) supporting a consistent format in the development and presentation of the MEC HA information. The TWG-HA expects to issue a draft framework document in early 2005, and a draft guidance document in late spring 2005. Public comment will be sought for both documents. The final MEC HA guidance is expected to be completed by December 2005.