Hazard Assessment for Munitions and Explosives of Concern
Workgroup Meeting
Hall of States, Washington, DC
November 4-5, 2004

ATTENDEES:

Dwight Hempel, Bureau of Land Management
Doug Maddox, EPA
Kevin Oates, EPA
Jennifer Roberts, State of Alaska
Clarence Smith, State of Illinois
Dick Wright, Mitretek
Vic Weiszek, DoD

Versar, Inc.
- Laura Wrench
- Clem Rastatter
- Norrell Lantzer
- Holly Riester

INTRODUCTION AND OPENING REMARKS

The meeting came to order at 9:15 am. Kevin Oates welcomed the group back together and filled them in on progress and the success of the two briefings that he had given. The response to those has generally been positive, with some caution expressed in regard to the likelihood on the development of a widely accepted final product. As the development of the framework and guidance continues, the work group may need to have more face-to-face meetings and discussions to maintain forward momentum and stick with the development schedule.

FRAMEWORK DEVELOPMENT INTRODUCTION

Laura Wrench presented information on the development of the framework and identified a couple of issues related to output categories for the group to discuss. In her analysis she identified five output categories, with 5 being a very low hazard and 1 being the highest hazard. Overarching issues identified included the manner in which the output categories are communicated. First, describing the output categories in a way that people can understand is challenging. The problem is how to describe what the output categories mean, and how to communicate with the public about it.

A second question was raised as to whether the content and outputs need to be readily understood by the public. The group agreed that yes it does need to be readily understood, but this should not drive the nature of the technical document. Rather there is a need for qualitative descriptions, in addition to the more technical descriptions. The group agreed that it was premature to discuss this issue in detail at this time, since what goes in the output categories will depend on what scenarios fall into each of the categories.

MEC HA INPUT FACTOR CATEGORIES, WEIGHTS, AND MAXIMUM SCORES

Laura Wrench presented information designed to describe the recommended input factor categories and present the maximum scores and weights in the current version.

Type of Filler

Currently the Type of Filler factor includes the categories of High Explosive, Incendiary, Propellant, and Spotting Charge. The question was put to the group whether these categories were sufficient or if there were others that should be included.

The group raised and discussed whether inert fillers should be included as a category as well. The MRSPP chose to include "inert" munitions and give these a score of "0". If this is the only hazard, then, the site goes no further. Some suggestions of the workgroup included taking the same approach as the MRSPP as a way of making certain that inert munitions are accounted for, and putting "inert" in the guidance with a recommendation that if you are certain that the materials of concern are inert, then you can stop the assessment at that point. This could also be done through having preliminary screening questions with one specific to inert materials. It could also be included as an option in the Type of Filler input factor, with instructions that if the filler is inert, you can stop the assessment there.

One participant raised a question about whether tracer rounds were something that needed to be included in the input factor. The group discussed this but felt that although tracer rounds have some fire hazard they are not an explosive issue and therefore should not be included as a specific category in the input factor.

CONSENSUS: The group discussed these options and came to consensus on including inert in the input factor. The definition of inert will need to be very specific and clearly defined. In terms of tracer rounds, they will be referenced in a footnote as a fire hazard as opposed to an explosive hazard.

The group also commented on the sourcing of definitions and requested that a DoD source always be included, where it could be located. The use of multiple definitional sources, so long as they are not contradictory is also recommended. **ACTION ITEM**: Versar staff will further research definitions and provide multiple sources wherever possible and practical.

Summary of Changes to Input Factor:

- Include "inert" as a filler type; define so that it applies to completely inert rounds.
- Incorporate concept of Amount of Filler into scoring rules as described in summary of changes for that input factor.

Amount of Filler

The current categories for Amount of Filler are: Type=Propellant: amount over a specific amount of propellant threshold; Type=Spotting Charge: amount over a specific amount of spotting charge threshold; and All Others.

The group was concerned that having the Amount of Filler as a separate input factor with thresholds for levels of Propellant and Spotting Charges would lead to the possibility of double-counting. Two suggestions were made to address this. One was to add a footnote clarifying the limited nature of the category, the other was to incorporate the threshold idea into the Type of Filler input factor either as a subcategory or as a scoring rule.

CONSENSUS: The group came to consensus on incorporating the Amount of Filler threshold element into the Type of Filler factor as a scoring rule. In this approach, a spotting charge over a threshold amount would be scored identically to high explosives.

Summary of Changes to Input Factor:

- Delete this input factor; incorporate the concept into the scoring rules for Type of Filler = Spotting Charge and Type of Filler = Propellant.

The following Input Categories discussed under Proximity 1 and Proximity 2 reflect discussions by the work group on secondary human receptors who may be in proximity to the detonation of an MEC item due to interactions by a primary, or initiating receptor. The human secondary receptors may be present in such locations for a variety of reasons summarized below. In addition, the work group discussed possible inputs to address cultural and ecological resources that may also be affected by the explosion of an MEC item. Those discussions are summarized under Proximity 2.

Proximity 1 (Inhabited Buildings or Commonly Used Facilities)

This input factor is currently divided into: Buildings within Explosive Safety Quantity Distance (ESQD) and Outside ESQD. **ESQD represents t**he prescribed minimum distance between sites storing or handling hazard Class 1 explosive material and specified exposures (i.e., inhabited buildings, public highways, public railways, other storage or handling facilities or ships, aircraft, etc.) to afford an acceptable degree of protection and safety to the specified exposure. The size of the ESQD arc is proportional to the NEW present (DON Explosive Safety Manual). The group discussed whether it was more appropriate to continue using the ESQD or change to using the Hazardous Fragmentation Distance, which is generally larger than the ESQD and more concerned for the safety of people rather than the distance in relation to structures.

The discussion centered on the purpose of the ESQD versus the Hazardous Fragmentation Distance. As demonstrated in the definition above, the EQSD is specifically used in relation to structures and facilities. The Hazard Fragmentation Distance (HFD) is designed to calculate the maximum blast effect and the distance a piece of fragment can travel at a velocity that does damage, and is more related to potential harm to individuals. It was decided to use the HFD instead of the ESQD because the true concern is for the potential harm to individuals rather than to the structures; the proximity to the buildings or facilities was just used as a stand-in to represent places where people would be likely to be. In addition, to express this even more clearly, the group proposed changing the title of this input factor to something that would more directly indicate that the concern is for the individuals that may congregate in a location, as opposed to the buildings where they gather.

CONSENSUS: Consensus was reached on using the Hazardous Fragmentation Distance rather than ESQD in this category. In addition, the name of this input factor will be changed to "places where people congregate" to reflect that the primary concern is for people rather than facilities or buildings.

Summary of Changes for Input Factor:

- Rename and revise definition to emphasize that the concern is the distance between people and the hazard, as opposed to buildings
- Use hazardous fragmentation distance as the metric.

Proximity 2 (Critical Infrastructure, Cultural Resources, or Ecological Resources)

This input factor also uses Within ESQD and Outside ESQD as the categories. Some members of the work group expressed concern that the primary concern should be for direct impacts to people who are in the proximity to a detonation, and that impacts to cultural and ecological resources should be secondary to impacts to people. Others argued however, there are many stakeholders for whom this is a serious issue, and we need to address it in some way. Although clean-up and other activities cannot affect or change the relationships on this factor (and therefore the score would not change with clean up), this information can affect clean-up decisions and prioritization of sites within a single MRA.

The group discussed options for dealing with this factor, in particular whether it could/should be handled in a footnote. Another option was to value the potential impact in a strictly clinical way, but then use the CERCLA 9 criteria to further analyze sensitivity. A third option would be to separate it into three different factors, which are not necessarily mutually exclusive.

CONSENSUS: As a preliminary consensus the group agreed to keep in this input factor, but modify it by breaking it into three separate factors, keeping with the use of the ESQD rather than Hazardous Fragmentation Distance, as this factor is not concerned with people, as Proximity 1 is, but rather is concerned specifically with potential damage to the infrastructure or resources themselves.

Summary of Changes to Input Factor (see the continuation of this discussion at the end of the Input Factor discussion for more information):

- Split into 3 input factors (one for each type of resource).
- Examine the effects of the following three approaches:
  a) Score as other factors
  b) Only score if score for Proximity 1 is zero (in other words, don't double count a resource that attracts people).
  c) Exclude as MEC HA factors, discuss in guidance as an external factor to be addressed site-specifically.

Site Accessibility

The Site Accessibility Input Factor presented at the meeting used the categories "Fully Accessible", "Somewhat Limited Accessibility", "Very Limited Accessibility", and "Inaccessible". The discussion centered on concerns about the "inaccessible" categorization and how this would be identified. Is anything truly inaccessible? The question was also raised as to the number of categories needed to characterize the variations of accessibility.

Kevin Oates suggested that he felt we would need five categories ranging from casual effort needed to enter to deliberate effort needed to enter, although he did not have specific categories in mind. He led the group in a brainstorming discussion to try to identify specific descriptions for the proposed five categories. In that discussion the group actually developed four categories with descriptions as explained below:

1. Fully accessible: No barriers to entry
2. Moderately accessible: Fencing (barbed wire), not guarded with signs, or rough terrain (the latter needs to be defined clearly)
3. Limited accessibility: Island in a river (some equipment or transportation needed to access), or fenced with concertina wire and signs
4. Very limited accessibility: Need special equipment (e.g. mountain climbing equipment) and skills to get to the location

CONSENSUS: The group came to consensus on using four categories as described above. Nothing should be considered inaccessible. The guidance should also include in the description the idea of casual versus deliberate effort needed to access the site.

Summary of Changes to Input Factor:

Implement and define the following categories:

- Full accessibility (including sites with signage, but no fencing)
- Moderate accessibility (barbed wire fencing and signage, or rough terrain)
- Limited accessibility (unguarded chain link fence with barbed wire, or requires transportation [transportation required needs to be defined])
- Very limited accessibility (guarded chain link fence or requiring special skills and equipment [e.g. mountain climbing equipment] to access)

Frequency of Entry

There are four options for dealing with this issue as described more fully in the Framework Technical Description: the traditional approach, which uses ranges of absolute values such as < 1 entry per month, 2 – 8 entries per month, etc; a very finely divided set of categories, such as < 1 entry per month, 1, entry per month, 2 entries per month, etc; a combined option using ranges such as in the traditional approach but users are instructed that if there is a tie, they should use a relative frequency to rank their results; and finally a fully ranked option, which has users rank each MRS or land use scenario from most frequently entered to least frequently entered, and then are instructed in how to assign frequency of entry scores based on that ranking.

Issues:

- With option 2, the very finely divided categories, how would someone know where to place their site in that list? Would they even have information that specific?
- What about sites where there are usually no entries at all, but occasionally some (or many) people are there at one time (for example a desert area with a once-a-year off-road festival, so you have 10,000 people once-a-year).
- What exactly is the issue of concern here, is it the frequency of entries, the number of entries, the quality of entries, or the potential encounters for the year?

In discussing these questions the group proposed using an approach based on the total number of potential encounters (i.e. entries) per year. This approach replaces frequency with the number of person hours on site annually. This is calculated by multiplying the number of people on site annually for a specific activity (e.g. camping) by the duration of the activity (e.g. 30 hours average duration). Using an average annual number of people one could even out the peaks over the span of a year and create some comparability among uses. For example, if you had 10,000 people coming to a one-day event that lasts 8 hours, you would have 80,000 exposure hours per year. Alternatively, you could have 3000 people camping at 48 hours duration each, and arrive at 144,000 exposure hours per year.

In addition to the group feeling that this approach is more meaningful than frequency, and addresses the factors that really affect accessibility to a hazard, this approach brings in the specific land use activities (e.g. camping, hiking, fishing, residential industrial) that people are familiar with addressing.

The group agreed that project teams will be expected to arrive at the average number of people on site per year site specifically. There was concern that duration of activities might require a starting place. The discussion of duration of use of certain activities centered around where data might be available that would assist project teams in arriving at duration of use for specific activities. Two sources mentioned as

places to look included the EPA Exposure Factors Handbook, and the DoD OE CERT guidance document.

Even if the project teams are instructed on how to determine their own exposure hours per year, there is still the issue of how to apply a score to the number that they determine. We may need to have groupings of activities or ranges of exposure hours with scores attached to a particular range. The question then is where would the break points be to move from one scoring range to the next. This would need to be very carefully set to determine and highlight differences between land uses.

One member of the group raised the question of whether the same information could be represented by using just the number of hours that *any* person used the site, as opposed to calculating amount of time that everyone who entered the site remained there and used it. For example, if you went back to the 10,000-person festival, you would have 8 hours of exposure, instead of 80,000. In the camping example, assume that the 3000 people participating were spread over 30 weekends, then your number would be 48 times 30, or 1,440. The group felt that it is important to incorporate both the number of people using the site and the length of time they are there, going back to the idea of total exposure hours.

ACTION ITEM: Versar staff will research sources of standard exposure hours for various activities that are of particular relevance for MRSs.

Summary of changes to Input Factor:

- Revise to "Duration of use"
- Use number of users per year times the hours of use to get people-hours of exposure per year.
- Explore EPA Exposure Factors Handbook and OE*Cert* appendices as sources for default assumptions regarding hours of use.

Amount of MEC

Currently this input factor is based on the previous munitions related use of the site (e.g. target area, firing point), to provide a surrogate for *how much* MEC is there, not the *type or density* of MEC that is there.

One question that arose is how one would determine the line between the target and buffer areas. The response was that it is an investigation issue. The framework can indicate that these boundaries are to be determined as part of the investigation. The role of the HA is to provide the score once the area has been identified.

The suggestion was made that an additional category be added for OB/OD kick-out area and the definition of OB/OD be tightened to include only the area where OB/OD occurs.

An additional suggestion was made to include disposal areas/burial pits.

CONSENSUS: The group agreed to add categories for OB/OD kick-out and Disposal areas/burial pits and to tighten the definition of OB/OD to only include the area where the OB/OD activities occur.

Summary of changes to Input Factor:

- Incorporate concept of a "buffer area" surrounding sites where OB/OD activities occurred that may contain kick-outs (analogous to range fans for target areas)
- Tighten definition of OB/OD areas to focus on the area most likely to contain MEC
- Add burial pits as a category.

Minimum Depth of MEC / Maximum Intrusive Depth of Activity

The categories for this input factor going into the meeting included: MEC on surface; MEC on subsurface, intrusive depth overlaps; MEC subsurface, intrusive depth does not overlap; subsurface clearance below intrusive depth. Laura Wrench explained that this input factor includes a scoring category for cleared land (subsurface clearance below intrusive depth) due to the element of uncertainty. Even if the land has been cleared below the intrusive depth, there is always some uncertainty about whether every item has been found, and so there is some residual hazard, which is represented by this score.

One participant raised a concern about the wording of the category for land that has been cleared (subsurface clearance below intrusive depth)—saying that when we clear land, by definition we clear it to depth. Laura Wrench responded that that is a policy issue, as opposed to a definition issue, but suggested changing the wording of that category to be "subsurface clearance, to or below expected intrusive depth". Additionally, the group suggested slightly tweaking the wording of the categories to more clearly indicate that it is the "intrusive depth of activity", along with other clarifications.

They also asked that the descriptions of the categories be very clearly defined with descriptions including an explanation that the categorization could occur either before or after clearance.

CONSENSUS: The group came to consensus on minor wording changes and instructions to staff for clarification and description of the categories.

Summary of changes to Input Factor:

- Revise subsurface clearance description to read: "Subsurface clearance at or below intrusive depth of activity."

Migration Potential:

Laura Wrench explained that she had adjusted the categories in this factor to have only two, rather than three categories. The original categories were Very Likely, Possible, and Very Unlikely; the new categories are Possible and Very Unlikely. She asked if the group felt that it is important to incorporate the interaction with portability into this input factor? The group felt that it was not applicable to this input factor and sufficiently covered under the portability factor.

CONSENSUS: The working group came to consensus on using the categories of Possible and Very Unlikely for the Migration Potential input factor.

Summary of changes to Input Factor:

Revise definitions as follows:

- Possible:
  - Small MEC items are present on the surface of the area; or,
  - Historical or physical evidence indicates that it is possible for natural physical forces in the area (frost heave, erosion, etc.) to expose subsurface or move surface or subsurface MEC items.
- Unlikely:

- Historical or physical evidence indicates that natural physical forces in the area (frost heave, erosion, etc.) are unlikely to expose subsurface or move surface or subsurface MEC items.

MEC Category

This input factor includes two categories of MEC: UXO and DMM. In the absence of proof, the default is UXO.

The question was raised as to whether explosive soils needed to be included as well. The group felt that explosive soils are more of a munitions constituents issue. Although they may be found at an MRS, that is the exception rather than the rule. They need to be managed for the explosive hazard potential and they do have some explosive hazard but it is investigated differently, remediated differently, and it is not fuzed.

CONSENSUS: The group came to consensus on leaving explosive soils out of the framework, but including a footnote explaining why, although explosive soils may be found, they are not included in the Hazard Assessment.

Summary of changes to Input Factor:

- Add a footnote explaining why explosive soils are not addressed by this hazard assessment.

Fuzing Sensitivity

Laura Wrench introduced the categories of the Fuzing Sensitivity input factor: Armed, sensitive; Armed, normal; Unarmed, fuzed; and Unfuzed. She explained that the armed categories translate into UXO and the unarmed categories translate into Discarded Military Munitions (DMM). Someone asked how one would determine what constitutes a "sensitive" fuze and what would you do if you don't know the fuze sensitivity at the MRS? The response was that sensitive fuzes are those described by DoD as "Do Not Pick Up". In regards to what to do if you do not know the type of fuze at the site, you would need to default to a sensitive fuze, just as you default to UXO if you don't know the munitions type.

Another issue that arose was in regards to items that are unarmed, but are easily functioned as compared to items that are not easily functioned? e.g., a grenade. It was suggested that maybe there should be two categories of unarmed, fuzed MEC. Category 1 would be unarmed items that are easily functioned and Category 2 would be unarmed items that are not easily functioned. Items in Category 2 may well have the same score as unfuzed items, however that would need to be researched to determine the level of hazard added by the fuze in an unarmed, and not easily functioned item. **ACTION ITEM**: Versar staff will research the level to which the fuze contributes to the hazard of a MEC item, including other types of fuzes, such as piezoelectric that may have their own safety mechanisms.

Summary of changes to Input Factor:

- Split "Unarmed, Fuzed" category into two, as described below:
  - Category 1: Unarmed, fuzed items with fuzes that can be armed and functioned through human activities (e.g., hand grenade pin removal)
  - Category 2: Unarmed, fuzed items with fuzes that require high inertial energy (e.g., g-forces, rapid rotation) to be armed.

MEC Portability

At the time of the meeting, the framework was set up so that portability only increases the hazard score if the MEC category is also UXO. If you do not have UXO, the portability score is zero, regardless of the size. Laura Wrench asked the group if they felt that this was appropriate. The response was no, they would prefer to remove the distinction between UXO and DMM in this input factor. Those issues are already covered under other input factors. A range of sizes or weights or some type of distinction should be added in.

Another issue that was discussed was whether some interaction with migration potential was important for this factor. The group felt that portability had more to do with human interaction than natural forces. Natural forces are already covered under the migration potential factor and so they do not need to be included here. One suggestion was to change the title of this element to something like transportability, move-ability, transport potential or another similar term.

CONSENSUS: The group came to consensus on maintaining this as a separate input factor (rather than incorporating it into the migration potential factor) and having staff recommend changes to what it is called as well as incorporating the size or weight distinctions. **ACTION ITEM**: Versar staff will develop new categories for portability based on the discussions and recommendations of the TWG HA removing the distinction for UXO and DMM.

Summary of changes to Input Factor:

- Change input factor name to MEC Size
- Revise definitions as follows:
    - Small: MEC items located on the surface that are small enough for a receptor to move (107mm-4.2 inch and smaller)
    - Large: all subsurface MEC items; MEC items located on the surface that are too large for a receptor to move (greater than 107 mm)

Intensity of Activity

Surface activities versus intrusive activities that also impart energy: The group pointed out that intrusive activities (such as digging) can also impart energy (intensity) to a MEC item, and asked how these activities are accounted for in this factor? To account for this we would need to include a list or groupings of activities, perhaps also divided into categories for surface only and breaking the surface (i.e. heavy equipment activity that is only on the surface and heavy equipment activity that breaks through the surface).

There is a difference between surface activities, but we have to be careful how finely we define and/or divide them. There are two elements of hazard to the intrusiveness, one exposes it (accessibility) and one imparts energy to the ground or the item (sensitivity).

Thermal Activity: There was a great deal of discussion about the role of thermal activity in the Intensity of Activity input factor. Three main different types of thermal activity were at issue: small fires such as campfires, controlled burns, and wildfires. Some questions that were raised include:

- Does a campfire impart enough thermal energy to be an issue?
- Is thermal activity worth the highest possible score (is it more likely to set off rounds than other types of energy imparted to the ground)?
- Is there a difference between intentional versus accidental thermal activity?

There seemed to be general agreement that thermal activity was not likely to initiate a round that was subsurface, but that it would have to be near surface, or on the surface.

The discussion on the intensity of use continued with a focus on whether thermal energy imparted to the ground through wildfires should be included as an element of intensity of use. Two arguments were put forward that initially led to different proposals.

- Several parties initially argued that if a wildfire starts in an area where ordnance is present, the hazards to nearby communities could be increased because the fire fighters will not go into an area that has not been cleared of ordnance. They suggested, therefore, that thermal hazards due to fires be explicitly considered in the MEC HA.
- Others argued that the increase in hazard due to wildfires is an increase in the fire hazard, not in the inherent hazard of the site due to the presence of MEC. The potential for an increased fire hazard should therefore be considered in the hazard management decisions that take place after the data from the hazard assessment is presented, but should not be included in the hazard assessment itself.

The group agreed to the second argument.

CONSENSUS: The decision was made to drop thermal hazards as a specific factor under intensity of use, and to note that both the potential for wildfires and increased hazards of controlled burns should be noted as special concerns that should be addressed through the nine criteria (e.g. long term effectiveness, short term effectiveness) as part of the hazard management decisions at the site.

Summary of changes to Input Factor:

- Develop a footnote to address thermal activities
- Assign the most hazardous of the following categories (listed below from most hazardous to least hazardous):
    - Breaking the ground surface through manual or mechanical means
    - Vehicular traffic
    - Foot traffic, including riding and pack animals

Ecological and Cultural Resources

The group returned to the discussion of Proximity of the hazard to special ecological and cultural resources which had originally been proposed as an element of the explosives hazards factor. The workgroup had an intense discussion around whether there is a separate hazard to cultural and ecological resources that should be accounted for, or whether the only hazard that needs to be addressed is to the people that will be attracted to those resources. If the only concern is the people who will be attracted to the resource, the hazard to them is accounted for in several other factors, including several measures in the accessibility factor – site accessibility and annual person hours of use.

Several strongly held views were expressed. A strong argument was made that one would never put people at risk (e.g. UXO technicians, EOD specialists) solely to protect cultural and ecological resources. Since the presence of people around these resources is accounted for elsewhere, proximity to important cultural and ecological resources should not be scored as a separate factor. A counter argument was that although the above may be true, it is important that Native Americans and others concerned about these resources see their concerns reflected.

Three options were discussed:

- Treat ecological and cultural resources in the same manner as fire fighting. Protection of these resources as a desirable goal should be addressed in the guidance as a part of the hazard management considerations to be evaluated during the CERCLA nine criteria evaluation.
- Keep ecological and cultural resources in the model at a fairly low level; ensure that we are not double counting the people and accessibility factors, with the proximity to cultural and ecological resource factor.
- Through the guidance document, allow project teams to adjust the category of the hazard upward to reflect the presence of important cultural and ecological resources.

No decision was made on this issue. **ACTION ITEM:** Versar will examine the manner in which scoring proximity to cultural and ecological resources effects the output of the hazard assessment to better inform the group as to whether assigning a score to protection and ecological resources could ever result in a designation of a high hazard without also having people around.

MEC HA SCORING AND OUTPUT CATEGORIES

Laura Wrench presented information on how scores were assigned to different factors, and five potential output categories. A total of 390 points were assigned to the three categories. Information handed out before and during the meeting showed how those points were allocated (what percent to each factor). Laura showed a variety of different scenarios and how they scored. Several issues were raised:

- The lowest scoring scenario was below 100. Concerns were expressed that if the scores could be something that the MRSPP could generate, people might be confused. Kevin Oates requested that we raise the total score to 1000 so that it is not possible for stakeholders to confuse the MRSPP score and the MEC HA score.
- The descriptions of the output categories do not adequately describe what differentiates the category. This is primarily an editorial issue that must be addressed before the framework is complete. However, it will probably not be possible to address this entirely until the TWG HA is comfortable with what scenarios go in each output category.
- An issue for scoring is whether there is enough of a difference between the highest and lowest scores. Expanding the number of points for scoring will probably help this.
- The suggestion was made that the contract team test scenarios that it believes should fall into the different categories, and test the scoring process and the output categories that way.

FOLLOW UP ACTIVITIES

The group agreed that it wished to meet more frequently in this important developmental stage. The next meeting will be in Salt Lake City on December 16 and 17. The topics for the meeting will be:

- Durations of use approach – source of the duration information; role of site-specific information.
- Review of reworked factors as determined at this meeting.
- Focus on scoring
- Pilot test planning.

In addition, the group agreed to additional meetings as follows:

- January meeting of the TWG HA on January 11 and 12, 2005, in Washington, DC

- Focus group meeting of stakeholders on January 13, 2005 (subsequently changed to February 24 in Denver, Colorado)
- Briefing of DOI managers similar to the briefing of DOD managers on January 13, 2005.

ACTION ITEM: Clem Rastatter and Kevin Oates to contact Lenny Siegel and Aimee Houghton from CPEO for assistance in planning the meeting.

ACTION ITEM: Dwight Hempel to plan the DOI meeting.

MEC HA Framework Development - Introduction

4 November 2004

Where we are:

- Input factors described
- Input factor categories identified and defined
- Under development:
  - Maximum scores and weights for input factors
  - Scores for individual input factor categories
  - Ways of defining output categories

Agenda for Today

- Discuss, come to consensus on input factor categories
  - Resolve “gray shaded” issues from outline
  - Address and resolve any other issues
- Discuss and demonstrate processes used to test scoring and weighting

Criteria for Input Factors

- Input factors can be clearly and unambiguously defined.
- **The categories for input factors are easy to determine or estimate.**
- **The ranges of possible input factors categories encompass all likely values for that factor.**
- Input factors included in the framework add to the functionality of the MEC HA process – each factor contributes to assessing the level of hazard for a site
- Input factors included in the framework address all site characteristics that may lead to explosive hazards.

Criteria for Structure

- **The scores and weights assigned to input factors reflect the relative contribution of each factor to the overall site hazard level.**
- The method(s) used to combine input factors to assess the site-specific hazard level is easy to understand and implement.
- **The method(s) used to combine input factors to assess the site-specific hazard level accurately captures the effects of the interactions between input factors.**
- The scores, weights and combination method(s) are defined clearly and unambiguously.

Criteria for Output

- **Output categories are descriptive of the site hazard level.**
- The number of output levels is sufficient to reflect the relative impacts of different remedial alternatives and differences in choices of land use.

Laura's goals for the meeting

- Finalize input factor categories
- Develop goals for future sensitivity runs
- Develop useful ways of communicating and comparing sensitivity run results
- Develop useful ways of describing output categories

MEC HA
Input Factor Categories, Weights, and Maximum Scores

4 November 2004

Purpose of Presentation

- Describe recommended input factor categories
- Present maximum scores and weights (current versions)

Process (Proposed)

- Run through categories for each input factor
- Discuss and resolve issues
  - Remember, category scoring will be addressed later today
- Come to consensus
- Present approach to development of maximum scores and weights
- Discuss

Type of Filler

- High Explosive
- Incendiary
- Propellant
- Spotting Charge

Amount of Filler

- Type=Propellant, amount over propellant threshold
- Type=Spotting Charge, amount over spotting charge threshold
- All others

Proximity 1

- Inhabited Buildings or Commonly used Facilities
  - Within EQSD
  - Outside of EQSD
- **Issue: Include Critical Infrastructure?**
- **Issue: Replace EQSD with Hazardous Fragmentation Distance?**

Proximity 2

- Critical Infrastructure, Cultural Resources, or Ecological Resources
  - Within EQSD
  - Outside of EQSD
- **Issue: Replace EQSD with Hazardous Fragmentation Distance?**

Site Accessibility

- Fully accessible
- Somewhat limited accessibility
- Very limited accessibility
- Inaccessible
- **Issue: Difference between "somewhat limited" and "very limited"**
- **Issue: Criteria for inaccessibility**

Frequency of Entry

- Very frequently
- Somewhat frequently
- Infrequently
- **Issue: How best to define the categories of this input factor.**

Amount of MEC

- Target area
- OB/OD area
- QA function test range
- Maneuver areas
- Storage
- Firing points
- Range fans/buffer areas

Min Depth/Max Depth

- MEC on surface
- MEC subsurface, intrusive depth overlaps
- MEC subsurface, intrusive depth does not overlap
- Subsurface clearance below intrusive depth

Migration Potential

- Possible
- Very unlikely
- **Issue: Interaction with Portability factor**

MEC Category

- UXO
- DMM

Fuzing Sensitivity

- Armed, sensitive
- Armed, normal
- Unarmed, fuzed
- Unfuzed
- **Issue: What constitutes a "sensitive" fuze?**

MEC Portability

- Portable, surface, UXO
- Portable, subsurface, UXO
- Not portable or DMM
- **Issue: Currently, portability only increases hazard if MEC category is UXO**
- **Issue: Interaction with Migration factor**

Intensity of Activity

- Thermal
- Sensitive fuze, depth < 1 foot, vehicle or livestock, unremediated
- Sensitive fuze, depth < 1 foot, foot traffic, unremediated
- Vehicle or livestock otherwise
- All others (incl. remediated)

Maximum Scores and Weights

Considerations Associated with Input Factor Weighting

- Some input factors are not affected by land use decisions or clean up activities
- These factors must be scored high enough to assure reasonable results
- But not so high that they diminish the representativeness of other factors

Considerations (cont.)

- How to find appropriate balance between weights for factors associated with land use and for those associated with clean up?

Current Maximum Scores and Weights

Explosive Hazard Component		Input Factor	Maximum Score	Weight
Potential Severity of the impact should an MEC item function	G	Type of Filler	35	9%
	G	Amount of Filler	0	0%
	Y	Proximity to Inhabited Buildings or Commonly Used Public Facilities	20	5%
	Y	Proximity to Critical Infrastructure, Cultural Resources, or Ecological Resources	15	4%
		Category total	*70*	*18%*
Likelihood that a receptor can interact with an MEC item	O	Site Accessibility	50	13%
	O	Frequency of Entry	40	10%
	B	Amount of MEC	65	17%
	B	Minimum MEC Depth/ Maximum Intrusive Depth	65	17%
	Y	Migration Potential	10	3%
		Category total	*230*	*59%*
Likelihood that item will function should receptor interaction occur	G	MEC Category	40	10%
	G	Fuzing Sensitivity	10	3%
	G	MEC Portability	10	3%
	O	Intensity of Activity	30	8%
		Category total	*90*	*23%*
		Total Score	**390**	**100%**

G	Green total	95	24%
Y	Yellow Total	45	12%
B	Blue Total	130	33%
O	Orange Total	120	31%

Discussion?
Questions?

MEC HA Scoring and Output Categories

4 November 2004

Purpose of Presentation

- Present current scores for input factor categories
- Describe scenarios run thus far
- Present some results
- Discuss:
  - Issues associated with scoring
  - How to describe output categories

Current Input Factor Category Scores

Revision 3

Type of Filler	High Explosive	35
	Incendiary	25
	Propellant	10
	Spotting Charge	10
Amount of Filler	Type=Propellant, amount over propellant threshold	25
	Type=Spotting Charge, amount over spotting charge threshold	25
	All others	0
Proximity to Inhabited Buildings or Commonly Used Public Facilities	Within EQSD	20
	Outside of EQSD	0
Proximity to Critical Infrastructure, Cultural Resources, or Ecological Resources	Within EQSD	15
	Outside of EQSD	0

Site Accessibility	Fully accessible	50		
	Somewhat limited	30		
	Very limited	15		
	Inaccessible	5		
Frequency of Entry	Very frequent	40		
	Somewhat frequently	20		
	Infrequently	10		
Amount of MEC	Category	Untreated	Surface	Subsurface
	Target area	65	30	10
	OB/OD area	65	30	10
	QA function test range	50	25	10
	Maneuver areas	20	10	5
	Storage	15	5	0
	Firing points	15	5	0
	Range fans/buffer areas	5	0	0
Minimum MEC Depth/ Maximum Intrusive Depth	MEC on surface	65		
	MEC subsurface, intrusive depth overlaps	45		
	MEC subsurface, intrusive depth does not overlap	20		
	Subsurace clearance below intrusive depth	10		
Migration Potential	Possible	10		
	Very unlikely	5		

MEC Category	UXO	40
	DMM	5
Fuzing Sensitivity	Armed, sensitive	10
	Armed, normal	0
	Unarmed, fuzed	5
	Unfuzed	0
MEC Portability	Portable, surface, UXO	10
	Portable, subsurface, UXO	5
	Not portable or DMM	0
Intensity of Activity	Thermal	30
	Sensitive fuze, depth < 1 foot, vehicle or livestock, unremediated	20
	Sensitive fuze, depth < 1 foot, foot traffic, unremediated	10
	Vehicle or livestock otherwise	5
	All others (incl. remediated)	0

Scenarios for Sensitivity Runs

Munitions-Related Factors

- Filler Type
  - HE
  - Spotting Charge
- Amount of Filler
  - below threshold for spotting charge
- Fuzing Sensitivity
  - For UXO, sensitive and normal armed fuzes
  - For DMM, unarmed fuzed and unfuzed
- Portability
  - Portable
  - Not Portable

Past Use Related Factors

- Amount of MEC
  - Target Area-same score as OB/OD area (UXO only)
  - QA Function Range (UXO only)
  - Maneuver Area (DMM only)
  - Storage-same score as Firing Point (DMM only)
  - Range Fans/Buffer Areas (UXO only)

Past Use Related (cont.)

- Minimum MEC Depth/Maximum Intrusive Depth
  - Surface
  - Subsurface, Overlap
  - Subsurface, no overlap
  - Subsurface clearance

Current/Future Use

- "Least Restrictive" Land Use, consisting of:
  - Proximity factors both within EQSD
  - Site Accessibility factor set to fully accessible
  - Frequency of Entry factor set to very frequently
  - Intensity of Activity factor set to Thermal

Current/Future Use (cont.)

- "Most Restrictive" Land Use, Consisting of:
  - Proximity factors both outside of EQSD
  - Site Accessibility factor set to inaccessible
  - Frequency of Entry factor set to very infrequently
  - Intensity of Activity factor set to "all others" (0)

Current/Future Use (cont.)

- "Treatment Status" consisting of:
  - Untreated (all depth values except subsurface clearance)
  - Surface clearance (Overlap and No Overlap depth values)
  - Subsurface clearance (Subsurface clearance depth value only)

Results of Sensitivity Runs

Ways of Assessing Results

- Charts
- Relative Comparisons
  - For example: Is untreated storage area 50% less hazardous than surface cleared target area?
- Use of ranks to compare results of modifications to scoring

Scoring Issues

- 390 points chosen for convenience (13 input factors) – not sacrosanct – may want to increase total score
- “Green” (munitions-related) factors still weighted too heavily?
  - Are Range Fans still scoring too highly?
  - Increase DMM score to compensate?

Output Categories

- First cut – divide difference between maximum and minimum scores by 5 or 6
- Criteria for deciding:
  - Appropriate number of categories (No more than 8? No fewer than 5? Enough to do the job?)
  - Reasonable breakpoints
- Biggest issue: Developing succinct descriptions of category characteristics
  - For TWG use in assessing results
  - For communication to users

Discussion? Questions?