Executive Summary

Hazard Assessment for Munitions and Explosives of Concern
Workgroup Meeting

March 29-30, 2005

The Technical Work Group for Hazard Assessment met on March 29-30 in Washington, DC. The following action items, consensus items and schedule were agreed upon at that meeting.

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ACTION ITEMS:

- Edit and Finalize MEC HA Fact sheet (*Versar*)
- Send approved minutes, final fact sheet, and updated outreach matrix to EPA for website (*Versar*)
- Send final fact sheet to team members (including Dania) for distribution (*Versar*)
- Draft cover memo and send with fact sheet to Camp Beale team (*Versar*)
- Move forward with scheduling stakeholder meeting as soon as we get the go-ahead from EPA (Versar)
- Begin scheduling pilot test with Butner and Tobyhanna (*Versar*)
- Rework the schedule based on releasing the combined document after the pilot tests and stakeholder meeting (*Versar*)
- Update the Outreach Matrix as follows (*Versar*):
    - MRC—June 7-8
    - NAID—Denver, June 26-28. Dick to get TWG HA on agenda. Kevin, Doug, Vic or Dick to present. (*Since re-scheduled to June 4-7*)
    - Tribal Operations Committee
    - National Tribal Environmental Conference—June 7-9, Traverse City, MI.
    - TASWER Conference—October 17-19, Mohegan, CT.
    - ITRC—April 4 teleconference
    - ICMA
    - NARPM
    - DOD IRP
    - ASTSWMO—August 2005—we are on the agenda
    - BLM/FWS meeting of Land Transaction Working Group.
- Outreach related ACTION ITEMS:
    - *Syed* will provide details about the schedule, locations, and getting on the agenda of the Tribal Operations Committee, National Tribal Environmental Conference and TASWER Conference.
    - *Versar* will look into getting on the agenda of the ICMA annual conference.
    - *Vic* will follow up on the DOD IRP meetings and look into them as a venue for presenting the MEC HA
    - *Dwight* will see about making a presentation to the BLM/FWS Land Transaction working group.
    - *Kevin* will give a briefing at the April 4 teleconference of the ITRC.
    - *Kevin* will be on the agenda for NARPM meeting.
- Incorporate changes into the framework document per the discussions (*Versar*).
- *Versar* to revise and re-incorporate some version of the color-coded table explaining the types of input factors and how they change or not based on different actions.
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- *Syed* to provide some examples of tribal activities that may attract additional receptors to a site.
- *Lantz* will find and incorporate the definition for burial pit into the relevant input factor.
- *Clarence* to talk to Rick Mass at DTSC about using their offices in Sacramento for the pilot test. He will copy Holly, Clem, Laura, Kevin and Bill.
- Talk with Beale POC and see if we could do the windshield tour on the afternoon of the 10^{th} (*Versar*).
- *Clarence* to talk to Dania about reserving Hall of States room for August meeting (COMPLETED on 3/30)
- *Versar* to complete Mini-minutes and send to group within a week.

CARRYOVER ACTION ITEMS (from previous meetings):

- *Vic* will provide a text box clarifying the relationship between the MMRP sites that are apart of the DERP program, and sites such as buildings that may be contaminated with MEC or MC that DoD does not consider eligible for DERP funding.
- *Versar Staff* will provide draft responses to Doug Murray's comments on the annotated outline.

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CONSENSUS ITEMS:

- The group came to consensus on accepting the minutes from the December 2004 and January 2005 meetings and releasing them to be posted on the FFRRO website.
- The group approved the Fact Sheet with one minor correction and changes based on decisions made at the meeting (specifically the timing of public comment).
- The group came to consensus on delaying the release of the framework until:
    - At least two pilot tests completed
    - The Stakeholders meeting has taken place
    - MRC has been briefed again
- The group agreed to release the Framework and Guidance as a combined document after meeting the above requirements.
- Although the framework will not be released for public comment at this time, the group agreed to send the framework document to the pilot test teams, with instructions that it is only for internal use and not for public release.
- The group agreed to follow the schedule and approach below for the Camp Beale Pilot Test:
    - April 4-6 – send fact sheet, cover memo and schedule to project team.
    - April 15 – send data collection form and instructions
    - May 10 – windshield tour of facilities
    - May 11 – Preliminary briefing of the team. Provide full workbook and framework to the team. They are to have filled out a data collection form for one of their sites by this point.
    - Week of May 25^{th} – Conference call with the project team to address any questions or concerns that have arisen as they are filling out the forms for their sites.
    - June 7-8 – Final evaluation meeting to discuss their scoring results and experience using the MEC HA process.
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- The group came to consensus on a proposal for categorizing MEC sensitivity as below:

Current	Proposal
UXO Sensitive	UXO Special Case
UXO Normal	UXO
DMM-1	same
DMM-2	same
Unfuzed	same

- The group came to consensus on including language that would assume DMM for OB/OD areas unless evidence exists that UXO is present. Specific language drafted by Kevin is as follows:

  > "MEC at OB/OD sites will be scored as DMM. Situations where MEC can be scored as UXO include evidence of consolidated shots by EOD teams, proximity to range areas, etc. Further, if the condition and fuzing of the MEC item cannot be determined, it will be scored as UXO."

- The group came to consensus that burial pits should be defined as storage or approved disposal areas, it will not include the troop burial (which is covered under maneuver areas).
- The group agreed to adjust the approach to Cultural and Ecological Resources and Critical Infrastructure. It will be removed from the full scoring table, and included in a separate table. There will be a separate section in the document, with a text box explaining how it is to be addressed and incorporated into the Hazard Assessment.
- Consensus was reached on a number of changes to the framework document which will be incorporated and distributed separately.
- Consensus was reached on the schedule of work group activities as listed below.

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FUTURE MEETINGS AND SCHEDULE:

- May 11th, Preliminary Briefing for Camp Beale Pilot test.
- May 26th, 1 pm Eastern time—conference call to discuss results of preliminary pilot briefing.
- June 7-8, Evaluation Meeting for Camp Beale Pilot test.
- June workgroup meeting to be postponed until later.
- August 10-11—work group meeting, with possible Executive Sponsor Briefing as well.
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Draft Minutes
Technical Working Group on Hazard Assessment
March 29 – 30, 2005

Attendees:
Dick Wright, Mitretek
Vic Weiszek, Department of Defense
Dwight Hempel, Bureau of Land Management
Clarence Smith, State of Illinois
Jennifer Roberts, State of Alaska
Bill Veith, USACE, Huntsville
Dania Rodriguez, ASTSWMO
Syed Rizvi, TASWER
Kevin Oates, EPA
Doug Maddox, EPA

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

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WELCOME AND REVIEW OF AGENDA:

Clem Rastatter welcomed the group to the meeting and discussed shifting some of the agenda items; the scoring discussion was moved to later in the meeting and to continue onto the second day if necessary.

MINUTES FROM PREVIOUS MEETINGS:

The group reviewed the minutes from the December and January meetings. Both sets of minutes were accepted as submitted.

CONSENSUS: The group came to consensus on accepting the December and January minutes as submitted.

REVIEW OF ACTION ITEMS:

Clem reviewed the action items from the previous minutes. The group asked that a section be added to future action item lists to list those items which are carrying over from a previous meeting.

ACTION ITEM: Versar to add carryover section to action item list.

REVIEW/ACCEPTANCE OF FACT SHEET ON MEC HA

The work group discussed both the style and content of the fact sheet included in the packet of meeting materials. A sheet of potential logos for the use of the group was
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presented to the group. The TWG HA felt that the content of the fact sheet was good. One typographical error was pointed out, and will be corrected by Versar staff. The group decided against the use of a logo.

CONSENSUS: The work group approved the fact sheet, once the error is corrected, and agreed it could be released for distribution and posted on the FFRRO website. The Fact Sheet will also be sent to all the work group members for them to use and distribute as needed (final version attached).

Doug Maddox explained that there had been some changes in the process for posting material to the website and it will now take 2-3 weeks for materials to be posted so we need to take that into consideration when submitting materials.

SCHEDULING: STATUS OF STAKEHOLDER MEETING

Clem explained that Mike Carter of EPA has said that the paperwork has been sent forward to be able to get our contract lined up so we can pay the travel expenses for a meeting of stakeholders. Once the task has been awarded, we will go ahead with scheduling the meeting. The original goal was to schedule this meeting of stakeholders during the comment period on the framework document. Since there will no longer be separate comment periods on the framework and the draft guidance, the goal is to hold the workshop during the pilot test period.

SCHEDULING: REVIEW OF OVERALL SCHEDULE

The current schedule calls for completion of a revised framework document to be provided to the working group for review by April 12th. The group will be asked to respond back within a couple of days.

The group expressed concern about the timing of the release of the framework document for public review. Originally the framework document was to be a general conceptual document, and the plan was to release the framework for comment before the pilot testing so that comments could be incorporated for that the pilot test and the development of guidance. Over time, however, the framework has become more and more detailed. The group felt that perhaps it makes more sense to conduct the pilot tests before the comment period, and revise the detail in the framework before sending it out for public comment.

CONSENSUS: The group agreed on postponing the public release of the document until after at least two pilot tests are complete, the stakeholder meeting has taken place, and the MRC has been briefed again.

After coming to this agreement, the TWG HA discussed the remainder of the schedule. The pilot tests will likely not be completed until August. If we seek public comment on the framework document at this point, we will then have the write the guidance document, and seek public comment on that. This approach would significantly stretch out the time period for completion of the overall project.

The group also discussed the fact that it is very important to have stakeholder comment on basic ideas prior to a public comment period.

CONSENSUS: The group agreed to release the Framework and Guidance as a combined document after meeting the requirements below:

- At least two pilot tests completed
- The Stakeholders meeting has taken place
- MRC has been briefed again

The December 2005 completion date for the guidance is still the target date.

SCHEDULE: OUTREACH MATRIX:

The group discussed various outreach opportunities to be included in the outreach matrix, and related action item, as follows:

Updates to Outreach Matrix:

- MRC—June 7-8
- NAID—Denver, June 26-28. Dick to get TWG HA on agenda. Kevin, Doug, Vic or Dick to present. (*Since re-scheduled to June 4-7*)
- Tribal Operations Committee
- National Tribal Environmental Conference—June 7-9, Travers City, MI.
- TASWER Conference—October 17-19, Mohegan, CT.
- ITRC—April 4 teleconference
- ICMA
- NARPM
- DOD IRP
- ASTSWMO—August 2005—we are on the agenda
- BLM/FWS meeting of Land Transaction Working Group

Outreach Related Action Items:

- Syed will provide details about the schedule, locations, and getting on the agenda of the Tribal Operations Committee, National Tribal Environmental Conference and TASWER Conference.
- Versar will look into getting on the agenda of the ICMA annual conference.
- Vic will follow up on the DOD IRP meetings and look into them as a venue for presenting the MEC HA
- Dwight will see about making a presentation to the BLM/FWS Land Transaction working group.
- Kevin will give a briefing at the April 4 teleconference of the ITRC.
- Kevin will be on the agenda for NARPM meeting briefing of MEC HA

PILOT TEST SCHEDULES

Camp Beale schedule:

The workgroup developed a schedule for the Camp Beale pilot as outlined below:

April 4—Send Fact Sheet and general instructions to the project team

April 15—Data Collection form will be sent to the project team so they can start collecting data on the sites. The package will include: a description of input factors to which the data applies; a table listing input factors and crosswalking them with the numbered items on the form; the data collection form itself; instructions on identifying the area to be assessed; instructions on determining duration for total contact hours; and a glossary. The team will be asked to complete one site by the May 11th briefing.

May 11—Preliminary briefing will be held. The Framework document and MEC HA workbook will be handed out at the briefing. A windshield tour will be planned for the afternoon of the 10th, prior to the briefing.

May 25 (approximately)—A conference call will be scheduled approximately two weeks after the briefing to address any issues that have arisen.

June 7-8—Validation and evaluation meeting. There will be a second meeting to follow up with the project team on the scoring results and process. In particular the project team will be asked to comment on how the process went, and any questions or difficulties that may have arisen during scoring.

Note: This schedule was subsequently revised based on availability of the Camp Beale team.

The group discussed whether or not the framework should be released for comment in advance to the pilot test project teams. The plan has been to provide the project teams with pieces of the framework pulled out for them to use as needed, but that we wouldn't necessarily send out the whole framework document. They would get full instructions, but wouldn't get the full framework. Members of the group argued that it was important that the pilot project teams receive a complete and integrated understanding of the MEC HA process.

CONSENSUS: The group agreed that the internal draft framework would be provided to the pilot project teams, however it would only be provided in hard copy and marked as an internal draft, not for public release. It would reflect any changes made during this TWG HA meeting, but would not be fully "edited" as if for publication.

Versar plans to give the project teams give them written instructions (a road map) of the entire process -- what we will send them and what we need them to do and when. The data collection is likely to take the most time, so the project team will be given to the project teams as soon as possible. In addition, the final information to support the MEC HA, along with the scoring, should be validated by the team, regardless of whether they have an individual gather the information.

We may suggest that the initial filling out of the forms be done by those who are technically knowledgeable. We would then ask that at the final meeting they agree on the scoring of the site.

At the preliminary meeting we will walk through an example MRS with them, to get a little bit of the dynamics between the data and the scoring. It is at this preliminary briefing that the draft framework will be handed out to the teams.

We will also recommend a range of number of MRSs for them to evaluate—so that they don't get bogged down trying to do all of them. We will encourage them not to do too many, perhaps 3-5 sites with a variety of conditions.

CONSENSUS: The group came to consensus on the overall schedule and approach to the pilot test, as described above.

Clarence suggested that the briefing could be held at the DTSC office in Sacramento and offered to contact Rick Moss about making arrangements.

ACTION ITEM: Clarence to talk to Rick Mass at DTSC about using their offices in Sacramento for the pilot test. He will copy Holly, Clem, Laura, Kevin and Bill

DISCUSSION OF FRAMEWORK DOCUMENT
The work group discussed the current draft of the Framework Document and specific questions and concerns about it, as outlined below:

General Issues:

- The group suggested using more text boxes to highlight and clarify specific issues. Some specific examples are included in the chapter suggestions that follow.

Chapter 1 and executive summary:

- Someone pointed out that the term "sensitivity" is used in two different ways in the Executive Summary terminology and Chapter 2—that is, in terms of the sensitivity of the explosive hazard and the sensitivity of the MEC HA model in its ability to discriminate between different land use and remedial action scenarios..

  It was suggested that this be clarified through the use of a text box (placed early in Chapter 2) explaining the two different ways the term is used. It will also be included in the glossary with two definitions.

- Work group members were concerned about the way the section on land use (1.6) was worded. There seems to be too much detail that is causing confusion.

Someone also commented that we should point out that with a residential use, you can do more intensive and effective educational outreach than with a recreational use—you have a captive audience.

Chapter 2:

- In Section 2.1 the group was concerned about wording related to how much information is necessary to perform the hazard assessment. They suggested:
  - Reword this information to be consistent with the principle, but more clearly.
  - Add a text box explaining the issue of sufficiency of data.

- In Section 2.2.1 the group felt that the text should be rearranged and streamlined to provide additional clarity.

Chapter 3:

- Regarding Section 3.1 the group discussed how to address the issue of Critical Infrastructure and Cultural and Ecological Resources. One concern was how to indicate that the function these elements have as attracting additional receptors is covered under the section on additional receptors.

  It was suggested to include a text box at this point explaining the role of these three elements in the framework and under section 3.1.2 add in these as things that attract additional receptors.

  It is also important not to discuss these items in terms of scoring, or as input factors -- they are special cases and should be described as such.

- Someone pointed out that Table 2 had gotten split as it crossed pages, so Table 3 is actually part of Table 2.

  In terms of this table, the group asked that a note be added further explaining the inclusion of White Phosphorus with the incendiary items.

- The group was concerned with some of the wording in Section 3.1.3, particularly that relating to the proximity of people versus things. It was suggested that a diagram may be helpful in making the explanation.

- In the section on potential contact hours (3.2.2), the group asked that the term "exposure" be changed to "interaction".

- In Table 6/7 the group requested several minor wording changes.

- Relative to Table 8, the group discussed the issue of data sufficiency and how to address it. They agreed to not attempt to define what reasonable assurance

or sufficiency of data mean, and instead use the format "Site-specific Data indicates"

- Regarding Table 10, the group asked that piezoelectric be added and cock-striker removed.

- In Section 3.3.2, the last sentence, change "too heavy for receptors to move without special equipment" to "so heavy as to be unlikely to be moved".

Chapter 4:

- The group previously discussed the approach to Critical Infrastructure and Cultural and Ecological Resources (see comments under Chapter 3), which is addressed again in Chapter 4 in the scoring table. To carry those changes through, these items will be pulled out of the scoring table and treated separately as "Special Considerations" rather than input factors.

- In regards to Table 19, which proposed a series of scoring ranges and bands between the output categories, the group discussed the proposal and felt that it did not add clarity to the output. As a result, the bands will be eliminated and the categories will be used as previously established.

Appendices:

- In regards to Appendix A the group discussed having Syed provide a list of specific activities of Tribal communities with likely durations to the activity list. However, after additional discussion, the group agreed that the individual activities are so site-specific that the listing would not actually be helpful. Anywhere that those types of activities are taking place would need to have enough familiarity to use site-specific data rather than relying on anything that we could provide.

CONSENSUS: The group came to consensus on making all the changes to the framework discussed above.

DISCUSSION OF PICK LIST OPTIONS

Lantz gave a presentation of the Pick List and how it will be set up (attached). It goes into the inputs in the hazard assessment including type of munition, type of explosives and MHFD, as well as fuzing.

There will be pull-down menus, with defaults, and if there isn't a default, then you can enter the information and get the MHFD. There was a question of whether we need to include both the American and metric terms, or whether we could use pounds/inches with a conversion factor at the bottom. Lantz answered that we could automate it, allowing the user to choose the type of units (inches/mm) they want to use.

There are several different ways of getting the information if what you have is not one of the defaults. You can choose a "close –enough" similar munition, or you can calculate it yourself with the instructions that will be included.

In terms of fuzing there are just two tables and it does not need a pull-down list. As always, if you do not have the information on the fuzing, then you have to assume the worst case.

DMM—has distinction between category 1 and category 2—if you can activate it easily it is category. 1, everything else is category 2.

The group discussed options for the categories of fuzing, and determined that they were not happy with the current UXO categories (Sensitive and Normal). Instead it was proposed to use UXO Special Case in place of UXO Sensitive, and just UXO in place of UXO Normal. The new current and proposed categories are shown below.

Current	**Proposal**
UXO Sensitive	UXO Special Case
UXO Normal	UXO
DMM-1	DMM-1
DMM-2	DMM-2
Unfuzed	Unfuzed

CONSENSUS: The group agreed on the fuzing categories for UXO as proposed above.

The group next discussed the definition of UXO and whether it should be defined that UXO by definition is fuzed. This raised the question of how to address items that are not fuzed. The response was that even if you find one item at a location that does not have a fuze that does not mean that every other one of the same type of item at the site is also without a fuze. You have to assume the worst case, which is that the particular type of item usually has a particular type of fuze, and one that has lost its fuze does not necessarily mean that all items have lost their fuze.

Someone suggested addressing this issue with a text box. The box needs to explain that one needs to go with the most hazardous item on site, so that other, less hazardous items don't rise to the same level of importance. Absent complete knowledge of all site characteristics, you always assume the most hazardous.

Lantz asked the group whether the inputs that use the HFD should instead use the overpressure distance. The group felt that it was important to lean on the overly safe side and go with the HFD rather than the overpressure.

REVIEW OF SCORING (FROM FRAMEWORK DOCUMENT)

Dry Run Results

Laura gave a presentation (attached) describing her dry runs of the draft framework using real data. These runs helped in development of the data forms. The filled in workbook is a good example (attached), showing how this worked.

Laura commented on one particular scenario—adding fencing to the OB/OD area. Because the intrusive activity is mostly camping, when you add the fencing, you will severely discourage campers from entering the site, so the nature of the activity changes and therefore the intrusive depth changes. This is an important point for the guidance—when you make different choices/assumptions it affects the result. We have to tell the teams how these things interact.

Several situations raised the importance of communicating through the guidance to project teams. For example, generally OB/OD areas will have DMM, but if there is other evidence (e.g., that it was used as a disposal pit by EOD people for consolidated detonation) that there is UXO there, then you must treat it as UXO. *If you can't tell the difference, treat it like UXO.*

For this situation, you would start with the assumption that there is DMM there, but in addition, there are other conditions that may imply that there is UXO there—near a range, consolidated detonation, etc. and in those cases you must treat it as if UXO is present.

Someone asked the question of what to do when there are data gaps and uncertainty—do you assume DMM at an OB/OD site unless there is evidence of other munitions or do you assume that there is UXO present? The group agreed that one should assume DMM for OB/OD areas unless there is evidence of UXO.

CONSENSUS: The group came to consensus on including language that would assume DMM for OB/OD areas unless evidence exists that UXO is present. Specific language drafted by Kevin is as follows:

> "MEC at OB/OD sites will be scored as DMM. Situations where MEC can be scored as UXO include evidence of consolidated shots by EOD teams, proximity to range areas, etc. Further, if the condition and fuzing of the MEC item cannot be determined, it will be scored as UXO."

The group also discussed burial pits and raised the question of whether two scored categories for amount of munitions are needed – one for OB/OD areas and a separate one for burial pits.

ACTION ITEM: Lantz will find and incorporate a definition of burial pits into the relevant input factor. Troop burial will not be included in the definition as it is already covered under maneuver areas.

REVIEW OF GUIDANCE DOCUMENT OUTLINE

As the group has decided to move straight into writing the guidance, rather than releasing the framework for public comment separately first, the main issue is shifting from building the framework to writing a guidance document. There will need to be some discussion about what needs to be in the guidance in terms of policy.

We will also probably need another meeting with the Executive Steering Committee in August as the guidance is under development.

FUTURE MEETINGS AND SCHEDULE
The group discussed plans for upcoming meetings and conference calls. Someone raised the question as to whether the June meeting was still appropriate timing given the change to the Framework/Guidance schedule, and our needing to fit the pilots in as quickly as possible. The group agreed to postpone that meeting until after at least one of the pilot tests could be completed. The following schedule was approved:

- May 11th, Preliminary Briefing for Camp Beale Pilot test.
- May 26th, 1 pm Eastern time—conference call to discuss results of preliminary pilot briefing.
- June 7-8, Evaluation Meeting for Camp Beale Pilot test.
- June workgroup meeting to be postponed until later.
- August 10-11—work group meeting, with possible Executive Sponsor Briefing as well.

The group broke for lunch followed by the briefing for the Executive Sponsor Committee. Minutes of that briefing will be provided separately.

REVIEW OF FEEDBACK FROM EXECUTIVE COMMITTEE
The group felt that overall the briefing was well received and that the executive sponsors were supportive of the process and where we are.

Specifically, Jim Woolford indicated that we are on the right track with the approach and draft framework and is optimistic that the work group will produce a good product that people will use.

TASWER management also supports it, they expressed that they are very pleased with it. They really want to help present the information and get it out there to the community. That will help a lot as we work on communicating the MEC HA to a broader audience. DOD was also very supportive.

Someone suggested that in future briefings it would be helpful to explain what the acronyms are, especially for those who do not work in this area extensively.

Dwight told the group that Dr. Taylor would like him to make a briefing on this at a BLM/FWS meeting of Land Transaction Working Group. They deal mostly with the Land and Water acquisition side, as well as some BRAC lands. The briefing also showed that it will be important to have an FAQ at the end of the guidance addressing some of those issues where questions were raised.

Munitions and Explosives of Concern: Hazard Assessment

April 2005

What is the Purpose of this Fact Sheet?

To introduce stakeholders to the Munitions and Explosives of Concern Hazard Assessment (MEC HA) Initiative.

How did this Initiative Start?

In March 2004, the U.S. EPA Federal Facilities Restoration and Reuse Office requested Federal agencies and State and Tribal organizations to form a technical working group to develop a consensus methodology and guidance document for site-specific assessment of explosive hazards associated with MEC at munitions response sites. The participants include representatives from the Department of Defense, Department of Interior, Association of State and Territorial Solid Waste Management Officials, and Tribal Association for Solid Waste and Emergency Response, along with EPA. An executive committee composed of senior-level officials from each of the participating organizations was established to guide policy choices.

The organizations were invited to provide personnel to help develop a technical framework to help evaluate explosive hazards. A technical working group has met several times since May of 2004 in support of this initiative.

Why is the MEC HA Necessary?

Currently project teams do not have a standard methodology for assessing explosive hazards at munitions response sites. Project teams are faced with the choice of using existing methods to assess and manage hazards, some of which have limitations, or developing their own site-specific methodology. By working with an accepted, consistent framework, project teams would be able to streamline their project activities, make more consistent decisions, and have the necessary documentation to support those decisions. The organizations that are collaborating on the development of this guidance believe that the time is ripe to attempt to develop such a tool.

What is the Purpose of the MEC HA?

It will help project teams focus on the hazard management choices that must be made during site evaluation and cleanup of MEC under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Project teams can use a site-specific hazard assessment to evaluate the impact of different cleanup approaches, as well as different uses and activities to help ensure protectiveness for current and future land uses. In addition, it will fulfill the National Contingency Plan requirement for site-specific risk assessments under CERCLA. It will also do the following:

- **Provide a consistent framework for organizing information to be used in the decision processes.** Project teams will make similar hazard management decisions for similar site situations.
- **Assist project teams in managing uncertainty.** Use of a MEC HA process will help identify when the team has collected a sufficient quantity and quality of information to make management decisions supporting no-action, removal, or remedial decisions.
- **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, contractors, or stakeholders become involved.

What is the Progress to Date?

The technical working group has examined a wide variety of technical aspects for MEC sites and information that is relied upon to make evaluations and decisions in the CERCLA process. Several issue papers have been developed that discuss these aspects. A list of some of the key issue papers and topics is described below.

- The relationship of the MEC HA to the DoD Munitions Response Site Prioritization Protocol (MRSPP)
- Evaluation of existing risk/hazard assessment methodologies for strengths and limitations.
- Identify the purposes and roles of a MEC HA in the CERCLA decision process.
- Criteria that the MEC HA should address to be successful in meeting project team needs for hazard management decisions.
- Resolve specific issues related to the structure and the function of the MEC HA, such as input factors and expression of output categories for different levels of hazards.

The working group currently is identifying the input factors that will go into a draft technical framework, evaluating the scoring for those input factors, and assessing how the output should be expressed and explained. The working group is also testing the way the different input factors relate to each other to create a hazard score. The output of this effort will be a framework that describes in detail the proposed MEC HA process. The issue papers and related information can be found at the following EPA website:

http://www.epa.gov/fedfac/documents/munitions.htm

The draft MEC HA framework will undergo pilot tests at a variety of MEC sites starting in May 2005 to get feedback on its ease of use and on how well it meets the stated goals and criteria. A draft guidance document that describes the complete application and use of the MEC HA is expected to be released for public comment in the late summer of 2005. Please check the website for the exact dates. The final MEC HA guidance document is expected to be completed by December 2005.

MEC HA Technical Working Group

Munitions "*Pick List*"

Munition Pick List Issue Statement

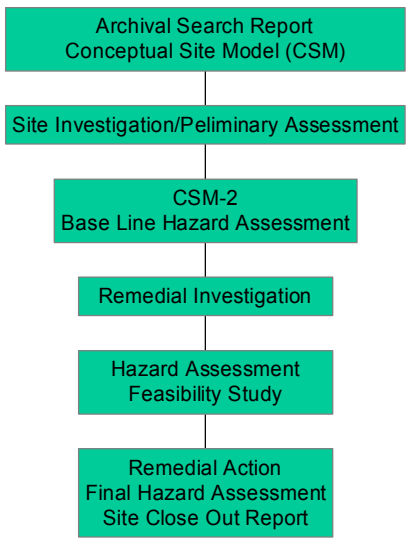
Use of the type of munition and/or the amount of explosives as part of the ***pick list*** to give the Maximum Horizontal Fragment Distance (MHFD) in a table, setting the table with defaults using Technical Paper 16 calculations.

Use fuze categories to provide HA imputs for both Very sensitive, sensitive and DMM. DMM will also provide categories 1 or 2 for imputs

Munition Pick List

- Previous TWG questions to be answered:
  - Is there a logical break point with munitions in the fragmentation calculations? If so, what are the break points?
  - Where does the pick list fit into the process?
  - Does the ATF explosives definitions fit within the DoD definitions?

Munitions Process (Simplified)



Munition Categories

Munitions Type

Rockets
Guided and Ballistic Missiles
Bombs
Cluster Munitions and Dispensers
Warhead
Artillery
Mortars
Grenades
Mines: sea and land
Torpedoes
Depth Charges
Demolition Charges
JATOS/RATOS
Pyrotechnics
Cartridge-actuated devices

Fuze Categories; Functioning Action

- **Impact**
  - **Point Detonating (PD)**
  - **Base Detonating (BD)**
  - **Point Initiating Base Detonating (PIBD)**
  - **Delay (short or long)**
- **Graze**
- **Time**
  - **Pyrotechnic Time (PT)**
  - **Mechanical Time (MT)**
  - **Electric Time (ET)**
  - **Self-Destruction (SD)**
- **Proximity**
- **Pressure**
  - **Hydrostatic**
  - **Barometric**

Example

Munition Pick List: What Is Unexploded Ordnance (UXO)?

Military munitions that have been

- primed, fuzed, armed, or otherwise prepared for action, and have been
- fired, dropped, launched, projected, or placed in such a manner as to
- constitute a hazard to operations, installation, personnel, or material and
- remain unexploded either by malfunction, design, or any other cause

(Military Munitions Rule 40 CFR 266.201)

MEC HA Dry Run Results

29-30 March 2005

Purpose of Dry Run

- Apply MEC HA to “real” data
  - Test reasonableness of data requirements
  - Aide in development of data forms and worksheets
- Assess reasonableness of results

Adak MRSs

- Mitt Lake
  - Two target areas
  - Firing point
  - Safety buffer
- Open Burn/Open Detonation Area
- Rifle Grenade Range
- Disposal area in the urban area

Current/Future Use

- All sites fully or moderately accessible
- Some MRSs currently in restricted access area
- Recreational/Subsistence/Wildlife Management Activities
- Future Commercial Activities in Urban Area site
- No places for additional potential receptors
- No critical infrastructure, cultural or ecological resources

Potential Contact Hours - Recreational

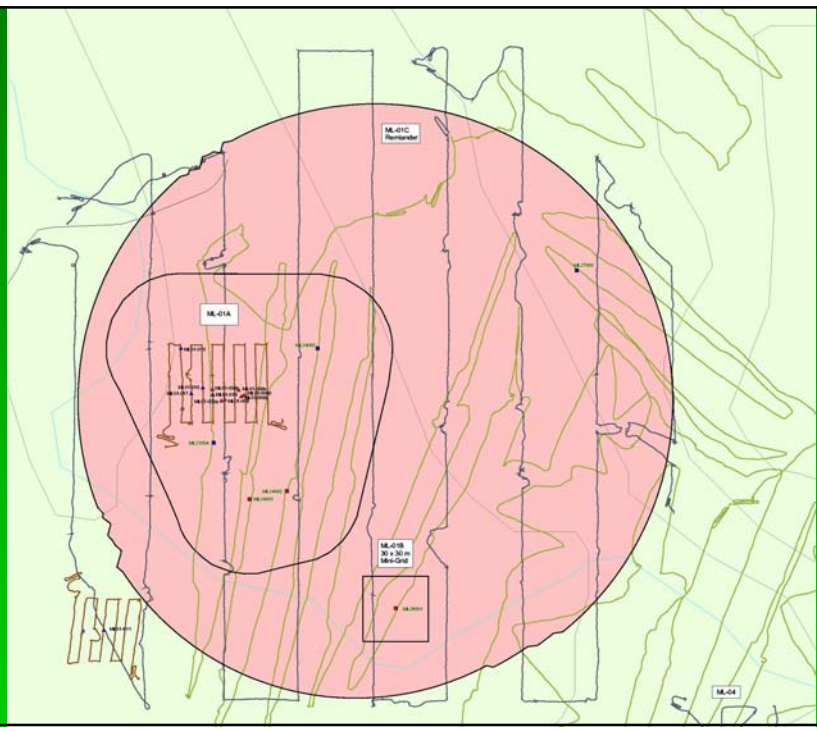
Column (1)	Column (2)	Column (3)	Column (4)	Column (5)
Activity	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Hours (multiply column 2 x column 3) (receptor hours/year)	Maximum Intrusive depth (ft) of the activity
Hunting	5/mo = 60/yr	6	360	0
Fishing	5/mo = 60/yr	4	240	2
Camping	2/mo = 24/yr	9	216	2
Plant harvesting	10/mo = 120/yr	4	480	1
Total			1296	

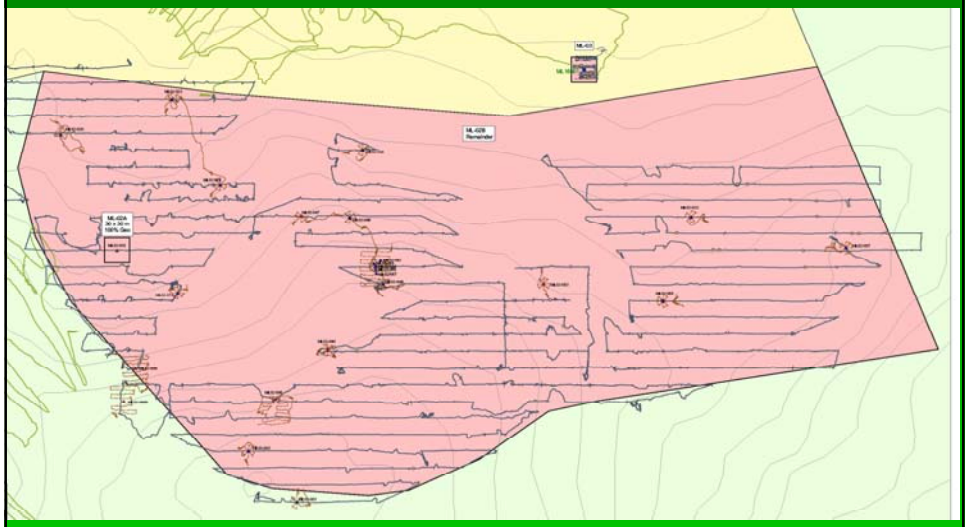
Potential Contact Hours - Commercial

Column (1)	Column (2)	Column (3)	Column (4)	Column (5)
Activity	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Hours (multiply column 2 x column 3) (receptor hours/year)	Maximum Intrusive depth (ft) of the activity
Construction	1200 (assume 4 mo)	7	8400	>4
Site Maintenance	1/week x 50 weeks = 50	3	150	>4
Commercial Activities	30/week x 50 weeks = 1500	0.5	750	0
1st Year Total			9300	
Out year Total			900	

Mitt Lake Target Areas

- ML-01
  - 60 mm mortars (HE) UXO
  - From surface to 14 inches
  - Full Accessibility
- ML-02 –target
  - 20mm/40mm Anti-aircraft (HE) UXO
  - From surface to 6 inches
  - Moderate Accessibility (Rough Terrain)





Mitt Lake Safety Buffer and Firing Point

- ML-03 (Firing Point)
  - 20mm/40mm Anti-aircraft (HE) DMM
  - Assume surface
  - Full Accessibility
- ML-04 (Safety Buffer)
  - 20mm/40mm Anti-aircraft (HE) UXO
  - Assume surface-6 inches (same as ML-02)
  - Full Accessibility

Mitt Lake Assessment Results

MRS	Current Conditions		Surface Clearance		Subsurface Clearance	
	Category	Score	Category	Score	Category	Score
ML-01	2	795	3	690	4	335
ML-02	2	770	3	655	4	330
ML-03	3	635	3	525	4	260
ML-04	3	715	3	645	4	400

Open Burn/Open Detonation Area

- Assume UXO and HE
  - At depths from surface to 4 feet
  - Sensitive fuzing (hand grenade found during SI)
- Moderate Accessibility (Navy Access Restriction Area)

OB/OD Assessment Results

Alternative	Category	Score
Current Conditions	2	840
Future Activities (full accessibility)	1	865
Surface Clearance	2	780
Subsurface Clearance	4	405
Interim fencing (limited accessibility)	2	800
Interim fencing w/ surface clearance	2	730

"Rifle Grenade" (40mm) Range (RG-01)

- 40mm "grenade" UXO (HE)
- Assume surface
- Moderate Accessibility (Navy Access Restriction Area)

RG-01 Results

Alternative	Category	Score
Current Conditions	2	840
Future Activities (full accessibility)	1	865
Surface Clearance	2	760
Subsurface Clearance	4	405

Urban Area Disposal Pit (UA-02)

- Partially burned incendiary bomblets
  - UXO? (Small, sensitive fuze)
  - DMM? (Small, category 1 fuze)
  - All subsurface
- Burial Pit? OB/OD?
- Full Accessibility
- Current use – Recreation
- Future use – Commercial

UA-02 Assessment Results

Alternative	Burial Pit w/ DMM		Burial Pit w/ UXO		OB/OD	
	Category	Score	Category	Score	Category	Score
Currently	3	600	3	675	2	825
Surface	3	575	3	650	2	760
Subsurface	4	290	4	365	4	385

Dry Run - Conclusions

- MEC HA was used to assess all of the MRSs selected for the dry run.
- Required data was easily obtained from PA/SI and RI/FS reports.
- Data Form and Worksheets were functional and substantially complete

Recommendations

- Add a category to Potential Contact Hours for <1000 receptor hours/year
- Increase the Amount of MEC score for the “Burial Pit” category

Other Scoring Issue – Target Areas and Access

		Small, Sensitive			Small, Normal		
		HE	Prop/Inced	Spotting	HE	Prop/Inced	Spotting
Accessibility	Contact Hours	Category	Category	Category	Category	Category	Category
Full	Many	1	1	1	1	1	2
Full	Very Few	1	2	2	2	2	3
Moderate	Very Few	2	2	2	2	2	3
Limited	Very Few	2	2	2	2	3	3
Very Limited	Very Few	2	2	3	2	3	3

Target Area (Cont.)

		Large, Sensitive			Large, Normal		
		HE	Prop/Inced	Spotting	HE	Prop/Inced	Spotting
Accessibility	Contact Hours	Category	Category	Category	Category	Category	Category
Full	Many	1	1	2	1	2	2
Full	Very Few	2	2	2	2	2	3
Moderate	Very Few	2	2	2	2	3	3
Limited	Very Few	2	2	3	3	3	3
Very Limited	Very Few	2	2	3	3	3	3

Constructive Suggestions?

MEC HA Workbook
Prototype (Rev. 0)
March 2005

An example completed for ML-02, a suspected 20mm/40mm target area in the Mitt Lake MRS on Adak Island.

MEC HA Data Form

The Data Collection form is divided into Parts I-V. Each part is divided into sections designated by capital letters (e.g., A, B, C, etc.). Each section has numbered questions or instructions.

Part I: Site Identifying Information
Sections A-D
Part II: Site Physical Characteristics
Sections A-F
Part III: Results of Past Munitions-Related Activities
Sections A-B
Part IV: Current and Future Land Use Activities
Sections A-D
Part V: Planned Response Actions
Section A

Data Tables:

- Data Table 1: Cased Munitions Information
- Data Table 2: Bulk Explosive Information
- Data Table 3: Activities *Currently* Occurring at the Site
- Data Table 4: Activities *Planned for the Future* at the Site

Complete one Data Form for each MRS.

MEC HA Data Collection Form

I. Site Identifying Information
Please identify the single specific area to be assessed in this hazard assessment. (See …. For more information on identifying the area to be assessed). From this point, all references to "site" or "MRS" refer to this area that you have defined.
A) Enter a unique identifier for the site: ML-02
B) Describe the site. Include information about how the boundary has been determined, and the level of certainty about the boundary location: A suspected 20mm/40mm AA target area. Estimated boundary determined by plotting coordinates given in firing orders. Final boundary will be determined from investigation.
C) Have there been any response actions at the site? (circle number that applies) (1) No, none 2. Yes, surface clearance 3. Yes, subsurface clearance
D) Attach a map of the site.

II. Site Physical Characteristics
A) Site Accessibility.
1. Circle the letter that best describes the *current* site accessibility.
a. Full Accessibility: No barriers to entry, or only signage.
(b) Moderate Accessibility: Some barriers to entry, such as barbed wire fencing or rough terrain
c. Limited Accessibility: Significant barriers to entry, such as unguarded chain link fence or requirements for special transportation to reach the site.
d. Very Limited Accessibility: A site with guarded chain link fence or terrain that requires special skills and equipment (e.g., rock climbing) to access.
B) Facilities that attract people.
1. Are there *currently* any facilities or other features that attract people within the MRS or within 4000[1] feet of the MRS boundary (circle letter that applies)? A. Yes (b) No If No, skip to Section C.
2. Describe the facility or feature:
3. Describe the location of the facility or feature (circle letter that applies): a. Within the boundaries of the MRS. b. Within 4000 feet of the MRS boundary
4. If you answered b., what is the distance of the feature or facility from the MRS boundary? _____ Feet
5. Indicate the location of the feature or facility on the site map.

[1] 4000 feet is slightly greater than the maximum horizontal fragmentation distance for a 2000 pound bomb. The site-specific maximum horizontal fragmentation distance will be calculated in Worksheet #1

II. Site Physical Characteristics
C) Critical Infrastructure.
1. Is there any critical infrastructure within the MRS or within 4000 feet of the MRS boundary (circle letter that applies)? A. Yes (b) No If No, skip to Section D.
2. Describe the critical infrastructure:
3. Describe the location of the critical infrastructure (circle letter that applies): a. Within the boundaries of the MRS. b. Within 4000 feet of the MRS boundary
4. If you answered b., what is the distance of the critical infrastructure from the MRS boundary? _____ Feet
5. Indicate the location of the critical infrastructure on the site map.
D) Cultural Resources.
1. Are there any cultural resources within the MRS or within 4000 feet of the MRS boundary (circle letter that applies)? A. Yes (b) No If No, skip to section E.
2. Describe the cultural resource:
3. Describe the location of the cultural resource (circle letter that applies): a. Within the boundaries of the MRS. b. Within 4000 feet of the MRS boundary
4. If you answered b., what is the distance of the cultural resource from the MRS boundary? _____ Feet
5. Indicate the location of the cultural resource on the site map.
E) Ecological Resources.
1. Are any ecological resources within the MRS or within 4000 feet of the MRS boundary (circle letter that applies)? A. Yes (b) No If No, skip to Section F.
2. Describe the ecological resource:
3. Describe the location of the ecological resource (circle letter that applies): a. Within the boundaries of the MRS. b. Within 4000 feet of the MRS boundary
4. If you answered b., what is the distance of the ecological resource from the MRS boundary? _____ Feet
5. Indicate the location of the cultural resource on the site map.
F) Migration Potential. 1. Is there any physical or historical evidence of the presence of natural forces that could lead to the migration of subsurface MEC items to the surface, or move surface MEC items to a different location on the site? (select answer) (1) Yes 2. No

III. Results of Past Munitions Related Activities
A) Munitions-Related Source Area Type
1. Circle the number for the source area type that applies to the site. If the area had multiple past uses, circle the first number that applies.
(a) Target Area: Areas at which munitions fire was directed.
b. OB/OD Area: Sites where munitions were disposed of by open burn or open detonation methods. This category refers to the core activity area of an OB/OD area – the safety buffer to contain kick-outs is addressed in another category.
c. QA Function Test Range: Areas where the functionality of stored munitions or weapons systems are tested. Testing may include components, partial functioning or complete functions of stockpile or developmental items.
d. Maneuver Areas: Areas used for conducting military exercises in a simulated conflict area or war zone.
e. Firing Points: The location from which a projectile, bomb, grenade, flare, ground troop signal, rocket, guided missile, or other device is to be ignited, propelled, or released.
f. Safety Buffer Areas: Areas outside of target areas, test ranges, or OB/OD areas that were designed to act as a safety zone to contain munitions that do not hit targets or to contain kick-outs from OB/OD areas.
g. Burial Pit: The location of a burial of large quantities of MEC items.
h. Storage: Any facility used for the storage of military munitions, such as earth-covered magazines, above ground magazines, and open-air storage areas.
i. Explosive-Related Industrial Facility: Former munitions manufacturing or demilitarization sites.
B) MEC Information
1. Are any cased munitions known or suspected to be at the site? (a) Yes b. No
2. If yes, enter the requested information for each type of munition in Data Table 1.
3. Are there any bulk explosives known or suspected to be at the site? a. Yes (b) No
4. If yes, enter the requested information for each type of explosive in Data Table 2.

IV. Current and Future Land Use Activities
A) Current Use Activities
1. Provide a brief description of the current use of the site. Recreational – hunting, subsistence gathering, wildlife refuge
2. Enter the requested information about each activity in Data Table 3.
B) Future Use Activities
1. Are the planned future activities different from the current activities addressed in Section A? a. Yes (b) No If no, skip to Section C.
2. If yes, provide a brief description of the planned future use of the site.
3. Enter the requested information about each activity in Data Table 4
C) Planned changes to site accessibility
1. Are there plans to modify the accessibility of the site to accommodate future use activities? a. Yes (b) No If no, skip to Section D.
2. Circle the letter that best what the site accessibility will be.
a. Full Accessibility: No barriers to entry, or only signage.
b. Moderate Accessibility: Some barriers to entry, such as barbed wire fencing or rough terrain
c. Limited Accessibility: Significant barriers to entry, such as unguarded chain link fence or requirements for special transportation to reach the site.
d. Very Limited Accessibility: A site with guarded chain link fence or terrain that requires special skills and equipment (e.g., rock climbing) to access.
D) Planned facilities or features that attract people.
1. Are there *plans to construct* any facilities or other features that attract people within the MRS or within 4000 feet of the MRS boundary (circle letter that applies)? A. Yes (b.) No If No, skip to Part V.
2. Describe the facility or feature:
3. Describe the location of the facility or feature (circle letter that applies): a. Within the boundaries of the MRS. b. Within 4000 feet of the MRS boundary
4. If you answered b., what is the distance of the feature or facility from the MRS boundary? _____ Feet
5. Indicate the planned location of the feature or facility on the site map.

V. Planned Remedial or Removal Actions				
A) Provide the following information for each planned response action				
Column (1)	Column (2)	Column (3)	Column (4)	Column (5)
Response Action No.	Response Action Description	Expected Resulting Minimum MEC Depth (ft)	Expected Resulting Maximum Intrusive Depth of Receptor Activities (ft)	Expected Resulting Site Accessibility (Full, Moderate, Limited or Very Limited)
1	Surface Clearance	>0, <1	2	Moderate
2	Clearance to 2 ft	>2	2	Moderate

Data Table 1: Cased Munitions Information

Column (1)	Col. (2)	Col. (3)	Column (4)	Column (5)	Col. (6)	Column (7)	Column (8)	Column (9)
Munition Type (e.g., mortar, projectile, etc.)	**Munition Size**	**Units (mm, in., lbs)**	**Filler Type (HE, Incendiary, Propellant, Spotting Charge)**	**If HE, Net Explosive Weight (lbs)**	**Is Munition Fuzed? (Yes, No)**	**If fuzed, Fuzing Type (if known)**	**If fuzed, Fuze Condition (armed, unarmed)**	**Minimum Depth for Munition (ft)**
Anti-aircraft projectile	20	mm	HE	0.026	Yes	Point detonating	Armed	0

Data Table 2: Bulk Explosive Information

Column (1)	Column (2)
Explosive Type	**Net Explosive Weight (lbs) associated with the Maximum Credible Event**

Data Table 3: Activities *Currently* Occurring at the Site

Column (1)	Column (2)	Column (3)	Column (4)	Column (5)
Activity	**Number of people per year who participate in the activity**	**Number of hours a single person spends on the activity**	**Potential Contact Hours (multiply column 2 x column 3) (receptor hours/year)**	**Maximum intrusive depth (ft) of the activity**
Hunting	5/mo = 60/yr	6	360	0
Fishing	5/mo = 60/yr	4	240	2
Camping	2/mo = 24/yr	9	216	2
Plant harvesting	10/mo = 120/yr	4	480	1

Data Table 4: Activities *Planned for the Future* at the Site

Column (1)	Column (2)	Column (3)	Column (4)	Column (5)
Activity	**Number of people per year who participate in the activity**	**Number of hours a single person spends on the activity**	**Potential Contact Hours (multiply column 2 x column 3) (receptor hours/year)**	**Maximum intrusive depth (ft) of the activity**

MEC HA Worksheets

Contents

Worksheet 1: Assessment of Current Site Conditions

Complete the Assessment of Current Site Conditions Worksheet to score the current conditions at the MRS.

Worksheet 1 is divided into Parts I-V. Each part is divided into sections designated by capital letters (e.g., A, B, C, etc.). Each section has numbered questions or instructions.

Part 1: Identifying Information
Part II: Input Factor Categories for the Severity Component
    Sections A-E
Part III: Input Factor Categories for the Accessibility Component
    Sections A-E
Part IV: Input Factor Categories for the Sensitivity Component
    Sections A-B
Part V: Current Conditions Summary and Scoring Table
    Sections A-C

Worksheet 1: Assessment of Current Site Conditions

I. Identifying Information	
Site Identifier: ML-02	Date: _____
Selection of input factor categories for current use activities.	
Selection of input factor categories for untreated MRS.	

II. Input Factor Categories for the Severity Component
A) Type of Filler Category
1. The types of fillers are listed below in the order of most hazardous to least hazardous. What is the most hazardous type of filler listed in Column (4) of Data Table 1? (circle applicable filler type) (a.) High Explosive b. Incendiary c. Propellant d. Spotting Charge 2. The circled filler type is the category for the Type of Filler input factor.
B) Distance of Additional Potential Receptors to Explosive Hazard Category
1. Is the Type of Filler category "High Explosive"? (a.) Yes b. No If no, then the category for this input factor is: "*Non-HE Filler Type*". Skip to Section C.
2. If the Type of Filler is "High Explosive", are there features or facilities within the MRS, or within 4000 feet of the MRS boundary that attract people? (see answer to question 1 in section B of Part II of the Data Form) a. Yes (b.) No If the answer is no, then the category for this input factor is: "*Outside the hazardous distance*". Skip to Section C.
3. If the answer was yes, is the feature or facility located within the MRS? (see answer to question 3 in section B of Part II of the data form) a. Yes b. No If it is located within the MRS, then the category for this input factor is "*Within the MRS or within the hazardous distance of the MRS boundary*". Skip to Section C.
4. The facility or feature is outside of the MRS, but within 4000 feet of the MRS boundary. Complete the maximum horizontal fragmentation distance calculation in Table 1.
5. Is the distance of the facility or feature from the MRS boundary (see question 4 in section B of Part II of the data form) less than or equal to the maximum horizontal fragmentation distance calculated in Table 1? A. Yes b. No If yes, the category for this input factor is "*Within the MRS or within the hazardous distance of the MRS boundary".*
6. If the distance from the MRS boundary is greater than the maximum horizontal fragmentation distance, then the category for this input factor is "*Outside the hazardous distance"*

II. Input Factor Categories for the Severity Component
C) Proximity of Critical Infrastructure to the Explosive Hazard Category
1. Is the Type of Filler category "High Explosive"? (a) Yes b. No If no, then the category for this input factor is: "*Non-HE Filler Type*". Skip to Section D.
2. If the Type of Filler is "High Explosive", is there critical infrastructure within the MRS, or within 4000 feet of the MRS boundary? (see answer to question 1 in section C of Part II of the Data Form) a. Yes (b) No If the answer is no, then the category for this input factor is: "*Outside the hazardous distance*". Skip to Section D.
3. If the answer was yes, is the critical infrastructure located within the MRS? (see answer to question 3 in section C of Part II of the data form) a. Yes b. No If it is located within the MRS, then the category for this input factor is "*Within the MRS or within the hazardous distance of the MRS boundary*". Skip to Section D.
4. The critical infrastructure is outside of the MRS, but within 4000 feet of the MRS boundary. Complete the hazardous fragmentation distance calculation in Table 2.
5. Is the distance of the critical infrastructure from the MRS boundary (see question 4 in section C of Part II of the data form) less than or equal to the maximum horizontal fragmentation distance calculated in Table 2 ? a. Yes b. No If yes, the category for this input factor is "*Within the MRS or within the hazardous distance of the MRS boundary".*
6. If the distance from the MRS boundary is greater than the maximum horizontal fragmentation distance, then the category for this input factor is "*Outside the hazardous distance"*
D) Proximity of Cultural Resources to the Explosive Hazard Category
1. Is the Type of Filler category "High Explosive"? (a) Yes b. No If no, then the category for this input factor is: "*Non-HE Filler Type*". Skip to Section E.
2. If the Type of Filler is "High Explosive", are there cultural resources within the MRS, or within 4000 feet of the MRS boundary? (see answer to question 1 in section D of Part II of the Data Form) a. Yes (b) No If the answer is no, then the category for this input factor is: "*Outside the hazardous distance*". Skip to Section E.
3. If the answer was yes, is the cultural resource located within the MRS? (see answer to question 3 in section D of Part II of the data form) a. Yes b. No If it is located within the MRS, then the category for this input factor is "*Within the MRS or within the hazardous distance of the MRS boundary*". Skip to Section E.
4. The facility or feature is outside of the MRS, but within 4000 feet of the MRS boundary. Complete the maximum horizontal fragmentation distance calculation in Table 2.
5. Is the distance of the cultural resource from the MRS boundary (see question 4 in section D of Part II of the data form) less than or equal to the maximum horizontal fragmentation distance calculated in Table 2? A. Yes b. No If yes, the category for this input factor is "*Within the MRS or within the hazardous distance of the MRS boundary".*
6. If the distance from the MRS boundary is greater than the maximum horizontal fragmentation distance, then the category for this input factor is "*Outside the hazardous distance"*

II. Input Factor Categories for the Severity Component
E) Proximity of Ecological Resources to the Explosive Hazard Category
1. Is the Type of Filler category "High Explosive"? (a.) Yes b. No If no, then the category for this input factor is: "*Non-HE Filler Type*". Skip to Part III.
2. If the Type of Filler is "High Explosive", are there ecological resources within the MRS, or within 4000 feet of the MRS boundary? (see answer to question 1 in section E of Part II of the Data Form) a. Yes (b) No If the answer is no, then the category for this input factor is: "*Outside the hazardous distance*". Skip to Part III.
3. If the answer was yes, is the ecological resource located within the MRS? (see answer to question 3 in section E of Part II of the data form) a. Yes b. No If it is located within the MRS, then the category for this input factor is "*Within the MRS or within the hazardous distance of the MRS boundary*". Skip to Part III.
4. The ecological resource is outside of the MRS, but within 4000 feet of the MRS boundary. Complete the maximum horizontal fragmentation distance calculation in Table 2.
5. Is the distance of the ecological resource from the MRS boundary (see question 4 in section E of Part II of the data form) less than or equal to the maximum horizontal fragmentation distance calculated in Table 2? A. Yes b. No If yes, the category for this input factor is "*Within the MRS or within the hazardous distance of the MRS boundary"*.
6. If the distance from the MRS boundary is greater than the maximum horizontal fragmentation distance, then the category for this input factor is "*Outside the hazardous distance"*

III. Input Factor Categories for the Accessibility Component			
A) Site Accessibility Category			
1. Which category was circled in question 1 of section A of Part II of the data form?			
a. Full Accessibility	(b.) Moderate Accessibility	c. Limited Accessibility	d. Very Limited Accessibility
2. This is the category for the Site Accessibility input factor.			
B) Potential Contact Hours Category			
1. Sum the results of the individual activity Potential Contact Hours calculations in column 4 of Data Table 3. 1296 receptor hours			
2. Circle the letter for the Potential Contact Hours category by comparing the sum to the receptor-hour/year ranges given in the second column below:			

Category	Receptor-hours/year Range
a. Many Hours	≥ 1,000,000 receptor-hours/year
b. Some Hours	100,000 to 999,999 receptor-hours/year
c. Few Hours	10,000 to 99,999 receptor-hours/year
(d.) Very Few Hours	< 10,000 receptor-hours/year

C) Amount of MEC Category		
1. What source area type was circled in question 1 of Section A of Part III of the data form?		
(a.) Target Area	d. Maneuver Areas	g. Burial Pit
b. OB/OD Area	e. Firing Points	h. Storage
c. QA Function Test Range.	f. Safety Buffer Areas	i. Explosive-Related Industrial Facility
2. This is the category for the Amount of MEC input factor.		

III. Input Factor Categories for the Accessibility Component
D) Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth Category
1. Are any of the minimum munitions depths given in Column (9) of Data Table 1 0? (In other words, are any of the munitions on the surface?) (a) Yes b. No If yes, then the category for this input factor is "*MEC located on surface*". Skip to section E.
2. If not, then what is the shallowest minimum depth listed in Column (9) of Data Table 1? _____ Feet
3. What is the deepest intrusive depth listed in Column (5) of Data Table 3? _____ Feet
4. Is the depth in question 2 less than or equal to the depth in question 3? A. Yes b. No If yes, then the category for this input factor is "*MEC located subsurface, intrusive depth overlaps*". Skip to section E.
5. The depth in question 2 is greater than the depth in question 3. The category for this input factor is "*MEC located subsurface, intrusive depth does not overlap*".
E) Migration Potential Category
1. Is there physical or historical evidence that MEC items could be exposed or moved? (see answer to question 1 in section F of Part II of the data form.) (a) Yes b. No
2. If yes, then the category for the Migration Potential category is "*Possible*". Skip to Part IV.
3. If there is no physical or historical evidence, then the category for Migration Potential is "*Unlikely*".

IV. Input Factor Categories for the Sensitivity Component
A) MEC Category
1. Was the MEC amount category any of the following: Maneuver Area, Firing Point, Burial Pit, Storage, or Explosive-related Industrial Facility or were the fuze conditions entered in Column (8) of Data Table 1 all "unarmed"? a. Yes (b) No If yes, then skip to question 4.
2. The conservative assumption is that the MEC items in this MRS are UXO. Do any of the fuze types listed in Column (7) of Data Table 1 match the list in Table 3? a. Yes (b) No If yes, then the category for this input factor is "*UXO with sensitive fuzing*". Skip to section B.
3. If none of the fuze types match the list in Table 3, then the category for this input factor is "*UXO with normal fuzing*". Skip to section B.
4. It can be assumed that the MEC items in this MRS are DMM. Do any of the munitions types listed in Column (1) and sizes listed in Column (2) of Data Table 1 match the types and sizes listed in Table 4? a. Yes b. No If yes, then the category for this input factor is "*DMM with category 1 fuzes*". Skip to section B.
5. If there are no matches with the munitions types and sizes in Table 4, then are any of the items listed in Data Table 1fuzed? In other words, were any of the entries in Column (6) of Data Table 1 "Yes"? a. Yes b. No If yes, then the category for this input factor is "*DMM with category 2 fuzes*". Skip to section B.
6. The category for this input factor is "*Unfuzed DMM*".
B) MEC Size Category
1. Are any of the entries in Columns (2) and (3) of Data Table 1less than or equal to 107mm or 4.2 inches? (a) Yes b. No If yes, then the category for the MEC Size input factor is "*Small*". Got to Part V.
2. If no, then the category for the MEC Size input factor is "*Large*". Go to Part V.

V. Current Conditions Summary and Scoring Table

A) Enter the input factor categories and assign the scores for the current conditions.

1. Input Factor Category Selection: The sources for the input factor categories are given in the "Reference" columns.

2. Scoring: Assign the scores from the "Untreated" column (column 1) of Reference Table 1.

	Reference			Input Factor	Input Factor Category	Score
	Worksheet	Part	Section			
Row (1)	1	II	A	Type of Filler	HE	100
Row (2)	1	II	B	Distance of Additional Potential Receptors to Explosive Hazard	Outside of Hazardous Distance	0
Row (3)	1	II	C	Proximity of Critical Infrastructure to Explosive Hazard	Outside of Hazardous Distance	No
Row (4)	1	II	D	Proximity of Cultural Resources to Explosive Hazard	Outside of Hazardous Distance	No
Row (5)	1	II	E	Proximity of Ecological Resources to Explosive Hazard	Outside of Hazardous Distance	No
Row (6)	1	III	A	Site Accessibility	Moderate Accessibility	55
Row (7)	1	III	B	Total Exposure Hours	Very Few Hours	15
Row (8)	1	III	C	Amount of MEC	Target Area	180
Row (9)	1	III	D	Minimum MEC Depth/ Maximum Intrusive Depth	ME located on surface	240
Row (10)	1	III	E	Migration Potential	Possible	30
Row (11)	1	IV	A	MEC Category	UXO with normal fuzing	110
Row (12)	1	IV	B	MEC Size	Small	40
B) Sum the scores →	→	→	→	→	→	→	→	770

C) Assign the Output Category based on the score (see Reference Table 2 for the output category scoring ranges):

1. Category 1 (2.) Category 2 3. Category 3 4. Category 4

5. Provide any additional comments or information on the scoring or the output categories:

Worksheet 2: Assessment of Future Use Activities

This worksheet is to be completed if the planned future use activities differ from the current use activities (see the answer to question 1 of section B in Part IV of the Data Form). It assesses the planned future use activities against the untreated status of the MRS. It addresses input factors for the Severity and Accessibility Components.

Worksheet 2 is divided into Parts I-IV. Each part is divided into sections designated by capital letters (e.g., A, B, C, etc.). Each section has numbered questions or instructions.

Part I: Identifying Information
Part II: Input Factor Categories for the Severity Component
    Section A
Part III: Input Factor Categories for the Accessibility Component
    Sections A-C
Part IV: Future Use Activities Summary and Scoring Table
    Sections A-C

Worksheet 2 not applicable for ML-02

Worksheet 3: Assessment of Remedial and Removal Alternatives

Complete the Assessment of Remedial and Removal Alternatives Worksheet for each response alternative identified in Part V of the Data Form. It assesses the impact of alternative responses on the MRS. It addresses input factors for the Accessibility Component.

Worksheet 3 is divided into Parts I-III. Each part is divided into sections designated by capital letters (e.g., A, B, C, etc.). Each section has numbered questions or instructions.

Part I: Identifying Information
Part II: Input Factor Categories for the Accessibility Component
Sections A-B
Part III: Remedial and Removal Alternatives Summary and Scoring Table
Sections A-C

Worksheet 3: Assessment of Remedial and Removal Alternatives

I. Identifying Information		
Site Identifier: ML-02	Date: _____	
1. Response action number (from Column 1 of the table in section A of Part V of the Data Form): 1		
2. Selection of input factor categories for (circle one): (a) current use activities b. future use activities		
3. Does this response action include MEC removal (circle one)?		
a. No	(b.) Yes, a surface clearance	c. Yes, a subsurface clearance

II. Input Factor Categories for the Accessibility Component			
A) Site Accessibility Category			
1. What is the site accessibility expected to result from the response action (see Column (5) of the table in section A of Part V of the Data Form)?			
a. Full Accessibility	(b.) Moderate Accessibility	c. Limited Accessibility	d. Very Limited Accessibility
2. This is the category for the Site Accessibility input factor.			
B) Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth Category			
1. Is the expected minimum munitions depth given in Column (3) of the table in section A of Part V of the Data Form 0? (In other words, will munitions remain on the surface?) a. Yes (b) No If yes, then the category for this input factor is "*MEC located on surface*". Skip to section E.			
2. If not, then what is the expected minimum depth listed in Column (3) of the table in section A of Part V of the Data Form? < 1 Foot			
3. What is the expected intrusive depth listed in Column (4) of the table in section A of Part V of the Data Form? 2 Feet			
4. Is the depth in question 2 less than or equal to the depth in question 3? (a.) Yes b. No If yes, then the category for this input factor is "*MEC located subsurface, intrusive depth overlaps*". Skip to section E.			
5. The depth in question 2 is greater than the depth in question 3. The category for this input factor is "*MEC located subsurface, intrusive depth does not overlap*".			

III. Remedial and Removal Alternatives Summary and Scoring Table

A) Enter the input factor categories and assign the scores for this response action.

1. Input Factor Category Selection: The sources for the input factor categories are given in the "Reference" columns. For the rows with two references, the first reference is the source for the current use activities, and the second reference is for the future use activities. The answer to question 2 of Part I indicates which reference should be used. The rows with input factor categories determined in this worksheet (Worksheet 3) have been shaded.

2. Scoring: Assign the scores from the applicable column of Reference Table 1. If the answer to question 3 in Part I was "No" (i.e., the response action did not involve MEC removal), then the applicable column is "Untreated" (column 1). If the answer was "Yes, surface clearance", then the applicable column is "Surface MEC Treatment" (column 2). If the response involved a subsurface clearance, then the applicable column is "Subsurface MEC Treatment" (column 3).

	Reference			Input Factor	Input Factor Category	Score
	Worksheet	Part	Section			
Row (1)	1	II	A	Type of Filler	HE	100
Row (2)	Current: 1	II	B	Distance of Additional Potential Receptors to Explosive Hazard	Outside of Hazardous Distance	0
	Future: 2	II	A			
Row (3)	1	II	C	Proximity of Critical Infrastructure to Explosive Hazard	Outside of Hazardous Distance	No
Row (4)	1	II	D	Proximity of Cultural Resources to Explosive Hazard	Outside of Hazardous Distance	No
Row (5)	1	II	E	Proximity of Ecological Resources to Explosive Hazard	Outside of Hazardous Distance	No
Row (6)	3	II	A	Site Accessibility	Moderate Accessibility	25
Row (7)	Current: 1	III	B	Total Exposure Hours	Very Few Hours	10
	Future: 2	III	B			
Row (8)	1	III	C	Amount of MEC	Target Area	120
Row (9)	3	II	B	Minimum MEC Depth/ Maximum Intrusive Depth	MEC located subsurface, intrusive depth overlaps	220
Row (10)	1	III	E	Migration Potential	Possible	30
Row (11)	1	IV	A	MEC Category	UXO with normal fuzing	110
Row (12)	1	IV	B	MEC Size	Small	40
B) Sum the scores →	→	→	→	→	→	→	→	→	655

III. Remedial and Removal Alternatives Summary and Scoring Table

C) Assign the Output Category based on the score (see Reference Table 2 **for the output category scoring ranges):**

1. Category 1 2. Category 2 (3.) Category 3 4. Category 4

5. Provide any additional comments or information on the scoring or the output categories:

Worksheet 3: Assessment of Remedial and Removal Alternatives

I. Identifying Information		
Site Identifier: ML-02	Date: _____	
1. Response action number (from Column 1 of the table in section A of Part V of the Data Form): 2		
2. Selection of input factor categories for (circle one): (a) current use activities b. future use activities		
3. Does this response action include MEC removal (circle one)?		
a. No	b. Yes, a surface clearance	(c) Yes, a subsurface clearance

II. Input Factor Categories for the Accessibility Component			
A) Site Accessibility Category			
1. What is the site accessibility expected to result from the response action (see Column (5) of the table in section A of Part V of the Data Form)?			
a. Full Accessibility	(b.) Moderate Accessibility	c. Limited Accessibility	d. Very Limited Accessibility
2. This is the category for the Site Accessibility input factor.			
B) Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth Category			
1. Is the expected minimum munitions depth given in Column (3) of the table in section A of Part V of the Data Form 0? (In other words, will munitions remain on the surface?) a. Yes (b) No If yes, then the category for this input factor is "*MEC located on surface*". Skip to section E.			
2. If not, then what is the expected minimum depth listed in Column (3) of the table in section A of Part V of the Data Form? >2 Feet			
3. What is the expected intrusive depth listed in Column (4) of the table in section A of Part V of the Data Form? 2 Feet			
4. Is the depth in question 2 less than or equal to the depth in question 3? a. Yes (b.) No If yes, then the category for this input factor is "*MEC located subsurface, intrusive depth overlaps*". Skip to section E.			
5. The depth in question 2 is greater than the depth in question 3. The category for this input factor is "*MEC located subsurface, intrusive depth does not overlap*".			

III. Remedial and Removal Alternatives Summary and Scoring Table

A) Enter the input factor categories and assign the scores for this response action.

1. Input Factor Category Selection: The sources for the input factor categories are given in the "Reference" columns. For the rows with two references, the first reference is the source for the current use activities, and the second reference is for the future use activities. The answer to question 2 of Part I indicates which reference should be used. The rows with input factor categories determined in this worksheet (Worksheet 3) have been shaded.

2. Scoring: Assign the scores from the applicable column of Reference Table 1. If the answer to question 3 in Part I was "No" (i.e., the response action did not involve MEC removal), then the applicable column is "Untreated" (column 1). If the answer was "Yes, surface clearance", then the applicable column is "Surface MEC Treatment" (column 2). If the response involved a subsurface clearance, then the applicable column is "Subsurface MEC Treatment" (column 3).

	Reference			Input Factor	Input Factor Category	Score
	Worksheet	Part	Section			
Row (1)	1	II	A	Type of Filler	HE	100
Row (2)	Current: 1	II	B	Distance of Additional Potential Receptors to Explosive Hazard	Outside of Hazardous Distance	0
	Future: 2	II	A			
Row (3)	1	II	C	Proximity of Critical Infrastructure to Explosive Hazard	Outside of Hazardous Distance	No
Row (4)	1	II	D	Proximity of Cultural Resources to Explosive Hazard	Outside of Hazardous Distance	No
Row (5)	1	II	E	Proximity of Ecological Resources to Explosive Hazard	Outside of Hazardous Distance	No
Row (6)	3	II	A	Site Accessibility	Moderate Accessibility	10
Row (7)	Current: 1	III	B	Total Exposure Hours	Very Few Hours	5
	Future: 2	III	B			
Row (8)	1	III	C	Amount of MEC	Target Area	30
Row (9)	3	II	B	Minimum MEC Depth/ Maximum Intrusive Depth	MEC located subsurface, intrusive depth does not overlap	25
Row (10)	1	III	E	Migration Potential	Possible	10
Row (11)	1	IV	A	MEC Category	UXO with normal fuzing	110
Row (12)	1	IV	B	MEC Size	Small	40
B) Sum the scores →	→	→	→	→	→	→	→	→	330

III. Remedial and Removal Alternatives Summary and Scoring Table

C) Assign the Output Category based on the score (see Reference Table 2 **for the output category scoring ranges):**

1. Category 1 2. Category 2 3. Category 3 (4.) Category 4

5. Provide any additional comments or information on the scoring or the output categories:

Worksheet 4: Assessment Results Summary

The Assessment Results Summary worksheet facilitates the comparison of assessment results for current conditions, future use activities, and response alternatives.

Worksheet 4 is divided into Parts I and II. Each part is divided into sections designated by capital letters (e.g., A, B, C, etc.). Each section has numbered questions or instructions.

Part I: Identifying Information
Part II: Summary of Assessment Results
Sections A-B

Worksheet 4: Assessment Results Summary

I. Identifying Information	
Site Identifier: ML-02	Date: _____

II. Summary of Assessment Results

A) Enter the output categories and the scores from the assessments completed in previous worksheets.

Reference	Assessment	Output Category	Score
Worksheet 1, Part V	Current Conditions	2	770
Worksheet 2, Part IV	Future Use Activities (not applicable to ML-02)	--	--
Worksheet 3, Part III	Response Alternative No. 1	3	655
Worksheet 3, Part III	Response Alternative No. 2	4	330
Worksheet 3, Part III	Response Alternative No. _____		
Worksheet 3, Part III	Response Alternative No. _____		

B) Enter the information about the presence or absence of the following physical characteristics in or near the MRS.

Reference	Physical Characteristic		
Worksheet 1, Part V	Is there critical infrastructure within the MRS or within the hazardous fragmentation distance of the MRS?	a. Yes	(b.) No
	Are there cultural resources within the MRS or within the hazardous fragmentation distance of the MRS?	a. Yes	(b.) No
	Are there ecological resources within the MRS or within the hazardous fragmentation distance of the MRS?	a. Yes	(b.) No

Calculation Tables

Table 1: Maximum Fragmentation Horizontal Distance Calculation Table

TBD				

Table 2: Hazardous Fragmentation Distance Calculation Table

TBD				

Table 3: Sensitive Fuze List

TBD				

Table 4: DMM Category 1 Fuze List

TBD				

Reference Tables

Reference Table 1: Input Factor Category Scores

Input Factor	Category or Value	Score		
		Column (1)	Column (2)	Column (3)
		Untreated	Surface MEC Treatment	Subsurface MEC Treatment
Filler Type	High Explosive	100	100	100
	Incendiary	80	80	80
	Spotting Charge	80	80	80
	Propellant	20	20	20
Distance of Additional Potential Receptors to Explosive Hazard	Within MRS or hazardous distance of the MRS boundary	30	30	30
	Outside of the hazardous distance	0	0	0
	Non-HE filler type	0	0	0
Proximity of Critical Infrastructure to Explosive Hazard	Within MRS or hazardous distance of the MRS boundary	Yes		
	Outside of the hazardous distance	No		
	Non-HE filler type	No		
Proximity of Cultural Resources to Explosive Hazard	Within MRS or hazardous distance of the MRS boundary	Yes		
	Outside of the hazardous distance	No		
	Non-HE filler type	No		
Proximity of Ecological Resources to Explosive Hazard	Within MRS or hazardous distance of the MRS boundary	Yes		
	Outside of the hazardous distance	No		
	Non-HE filler type	No		
Site Accessibility	Full accessibility	80	60	15
	Moderate Accessibility	55	25	10
	Limited Accessibility	15	10	5
	Very Limited Accessibility	5	5	5
Potential Contact Hours	Many Hours	120	90	30
	Some Hours	70	50	20
	Few Hours	40	20	10
	Very Few Hours	15	10	5
Amount of MEC	Target area	180	120	30
	OB/OD area	180	140	30
	QA function test range	165	90	25
	Maneuver areas	115	15	5
	Firing points	75	10	10
	Safety buffer areas (Range safety fans and OB/OD kick-out areas)	30	5	5
	Burial Pit	30	30	10
	Storage	25	10	5
	Explosive-related industrial facility	20	10	5
Minimum MEC Depth Relative to the Maximum Intrusive Depth	MEC located on surface	240	#N/A	#N/A
	MEC located subsurface, intrusive depth overlaps	220	220	150

Input Factor	Category or Value	Score		
		Column (1)	Column (2)	Column (3)
		Untreated	Surface MEC Treatment	Subsurface MEC Treatment
	MEC located subsurface, intrusive depth does not overlap	25	25	25
Migration Potential	Possible	30	30	10
	Unlikely	10	10	10
MEC Category	UXO with sensitive fuzing	180	180	180
	UXO with normal fuzing	110	110	110
	DMM with category 1 fuzes	105	105	105
	DMM with category 2 fuzes.	55	55	55
	Unfuzed DMM	45	45	45
MEC Size	Small	40	40	40
	Large	0	0	0
	Minimum Possible Score	140	120	115
	Maximum Possible Score	1000	890	655

Reference Table 2: Output Category Score Ranges

Output Category	Maximum MEC HA Score	Minimum MEC HA Score
Category 1	1000	860
Category 1 to 2 Band	870	845
Category 2	855	720
Category 2 to 3 Band	730	705
Category 3	715	475
Category 3 to 4 Band	485	460
Category 4	470	115