Explosives Safety Siting Software
Overview and Status

David Bianchi
david.bianchi@navy.mil
July 2018
Explosives Safety Siting (ESS) Software

- DoD sponsored software developed for use by all DoD services.
- Software developed and maintained by NAVFAC EXWC on behalf of the DDESB

What does ESS do?
- Automates the calculation and display of explosives safety quantity distance (ESQD) arcs.
- Automated and standardized Site Plan Package development.
- Automated and standardized Potential Explosion Site (PES) data.
ESS Software

- Explosives Safety Site Plans are required when construction occurs or explosives operations are changed.

- Many site plans contain errors and in non-standard formats that are difficult to review/approve which slows down the process.

- ESS software was developed to help automate, standardize, and speed up site plans generation and the review/approval process.
ESS Overview and Status

ESS Requires 3 Sets of Data

1. Map (GIS Data)
2. Real Property Inventory (RPI Data)
3. Potential Explosive Sites (PES Data)

The GIS, RPI, and PES data are linked together in the ESS database using the common facility number and accessed by the ESS software interface.
ESS Overview and Status

ESS Requires 3 Sets of Data

GIS Data: Used for the map display and spatial analysis.

PES Data: Provides details about each explosives site.
- Type (AGM, ECM, EOL, ...)
- Headwall (3-bar, 7-bar, Undefined)
- Arched, Front barricaded, etc.

RPI Data: Provides details about the use of each facility.
- Admin, Housing, Warehouse, Magazine, Airfield, Pier, etc.
The Basics of ESS

Step 1: Build Database

GIS + RPI + PES = ESS Database

Step 2: Run Analysis

QD or DQ Analysis + Mitigation + What-If Scenarios = Safety Arcs & Site Plans

Step 3: Generate Site Submittal Packages
ESS Overview and Status

- **QD Analysis options**
  - DoD – based on DoD 6055.09-M
  - Navy – based on NAVSEA OP-5
  - Air Force – based on AFMAN 91-201
  - Army – currently using DoD QD Engine

- **Plans for NATO QD Engine in the future**
ESS Overview and Status

QD Analysis

Inclusion Zone
ESS Overview and Status

QD Analysis

Inclusion Zone

Front Sector

Left Sector

Right Sector

Rear Sector
The QD Analysis measures the distance between the PES and ES.
The QD Analysis generates ESQD arcs

Inclusion Zone
ESQD arcs can be generated for one facility, a group of facilities, or for the entire base.
ESS Overview and Status

Union of ESQD arcs
ESS Overview and Status

Example of Analysis Arcs for each PES-ES pair

<table>
<thead>
<tr>
<th>Analysis Results Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility Number</td>
</tr>
<tr>
<td>Facility Description</td>
</tr>
<tr>
<td>Draw Arc</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>6004</td>
</tr>
<tr>
<td>6004</td>
</tr>
<tr>
<td>6004</td>
</tr>
<tr>
<td>6005</td>
</tr>
<tr>
<td>6006</td>
</tr>
<tr>
<td>6006</td>
</tr>
<tr>
<td>6007</td>
</tr>
<tr>
<td>6007</td>
</tr>
<tr>
<td>6010</td>
</tr>
<tr>
<td>6010</td>
</tr>
<tr>
<td>6008</td>
</tr>
<tr>
<td>6008</td>
</tr>
<tr>
<td>6024</td>
</tr>
<tr>
<td>1001</td>
</tr>
<tr>
<td>1002</td>
</tr>
<tr>
<td>1036</td>
</tr>
<tr>
<td>1036</td>
</tr>
</tbody>
</table>

312 rows found.
### Example of ESQD Arcs for each hazard class, orientation, and exposure

| Draw Arc | ES Number | Hazard Class | Sited NEW (lbs) | ES Type | Exposure | Related Code | Orientation | Act Dist (ft) | Rqd Dist (ft) | DQ NEW (lbs) | Governing | Arc Type | NOTES |
|----------|-----------|--------------|-----------------|---------|----------|--------------|-------------|--------------|--------------|-------------|------------|----------|---------|-------|
| 1.1      | 449       |              |                 | IB      |          |              | Front       | 700          |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | TR      |          |              | Front       | 420          |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | IL      |          |              | Front       | 138          |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | IM      |          |              | Front       | 84           |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | IB      |          |              | Front       | 250          |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | TR      |          |              | Front       | 150          |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | IL      |          |              | Front       | 123          |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | IM      |          |              | Front       | 46           |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | IB      |          |              | Front       | 250          |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | TR      |          |              | Front       | 150          |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | IM      |          |              | Front       | 92           |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | IB      |          |              | Front       | 46           |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | IB      |          |              | Front       | 250          |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | TR      |          |              | Front       | 150          |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | IL      |          |              | Front       | 123          |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | IM      |          |              | Front       | 46           |             |            | ESQD       |          |         |       |
| 1.1      | 449       |              |                 | IB      |          |              | Front       | 250          |             |            | ESQD       |          |         |       |
| 1.2.1    | 1036      |              |                 | IB      |          |              | Front       | 718          |             |            | ESQD       |          |         |       |
| 1.2.1    | 1000      |              |                 | TR      |          |              | Front       | 150          |             |            | ESQD       |          |         |       |
| 1.2.1    | 1049      |              |                 | IL      |          |              | Front       | 123          |             |            | ESQD       |          |         |       |
| 1.2.1    | 1049      |              |                 | IM      |          |              | Front       | 46           |             |            | ESQD       |          |         |       |
Site Submittal Packages
Navy, Marine Corps, Army, Air Force and DOD Business Practice Compliant

• Enclosures

• Electronic Submittal and Review
# Explosives Safety Site Plan

## Section I - General Information

<table>
<thead>
<tr>
<th>Installation</th>
<th>Location</th>
<th>Date</th>
<th>QD Engine</th>
<th>ESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alameda</td>
<td></td>
<td>04 Jul 2018</td>
<td>NAVY2016JUN02</td>
<td>6.1.3.19.8</td>
</tr>
</tbody>
</table>

## Section II - Data on Facility to be Sited

<table>
<thead>
<tr>
<th>FAC &amp; OWNER</th>
<th>FACILITY DESC</th>
<th>RQD IBD</th>
<th>RQD PTR</th>
<th>1.1 (xx)</th>
<th>1.2.1 MCE</th>
<th>1.2.2</th>
<th>1.2.3 MCE (xx)</th>
<th>1.3</th>
<th>1.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1063 Alameda</td>
<td>ECM Undefined HW HIGH EXPLOSIVE MAGAZINE</td>
<td>Front: 702 ft Side: 300 ft Rear: 300 ft</td>
<td>Front: 421 ft</td>
<td>150 lbs &gt;= 26' X 60'</td>
<td>1000 lbs</td>
<td>225000 lbs</td>
<td>225000 lbs</td>
<td>0 lbs</td>
<td>240000 lbs</td>
</tr>
</tbody>
</table>

## Section III - PES/ES QD Paired Relationships with Facilities Being Sited

<table>
<thead>
<tr>
<th>FAC &amp; OWNER</th>
<th>FACILITY DESC</th>
<th>ACT &amp; RQD DIST</th>
<th>ORIENTATION</th>
<th>1.1 (xx)</th>
<th>1.2.1 MCE</th>
<th>1.2.2</th>
<th>1.2.3 MCE (xx)</th>
<th>1.3</th>
<th>1.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1064 Alameda IM</td>
<td>ECM Undefined HW HIGH EXPLOSIVE MAGAZINE</td>
<td>Actual: 446.28 ft Required: 15 ft</td>
<td>As PES (reverse) PES Front ES Rear</td>
<td>400 lbs 15 ft T7-13 ECM(FU) : ECM-U(R)</td>
<td>200000 lbs 0 ft T7-18 ECM(F) : ECM-U(R)</td>
<td>200000 lbs 0 ft T7-20 FN4 T7-20</td>
<td>70000 lbs 9 ft T7-22 AGS-H: IMD</td>
<td>200000 lbs 0 ft T7-20 IMD</td>
<td></td>
</tr>
<tr>
<td>1065 Alameda IM</td>
<td>AGM HIGH EXPLOSIVE MAGAZINE</td>
<td>Actual: 947.04 ft Required: 185 ft</td>
<td>As PES (reverse) ES Rear</td>
<td>4000 lbs 95 ft T7-13 AGM(UB) : ECM-U(R)</td>
<td>170000 lbs 0 ft T7-18 AGS-L : ECM-U(R)</td>
<td>170000 lbs 0 ft T7-20 IMD</td>
<td>75000 lbs 185 ft T7-22 AGS-H: IMD</td>
<td>170000 lbs 0 ft T7-22 AGS-H: IMD</td>
<td></td>
</tr>
<tr>
<td>6001 Alameda TR</td>
<td>AMR RUNWAY / FIXED WING</td>
<td>Actual: 430.17 ft Required: 421 ft</td>
<td>As ES PES Front</td>
<td>300 ft 7-6.2.1.2</td>
<td>421 ft T7-15 PTR</td>
<td>415 ft T7-17 PTR</td>
<td>242 ft T7-20 IBD</td>
<td>0 ft T7-20 PTR</td>
<td>100 ft T7-22 IBD&gt;=3000</td>
</tr>
</tbody>
</table>
ESS Overview and Status

ESS Software Status

ESS 6.1.3:

• Latest version of ESS in use at Army, Navy, USMC, and Air Force installations.
• Approximately 600 users at 200 installations.
• Used by Facility Planners, Explosives Safety Officers, and GIS managers.
• Used on desktop computers and over Citrix & Internet at the NAVFAC Information Technology Center (NITC).

Software Requirements:

• Windows 7 or 10
• ArcGIS software versions 10.1 to 10.6
• 4GB RAM or more
• 2GHz process or better
• 32 or 64 bit operating system
ESS Overview and Status

ESS v6.1.4 (Planned - Near Completion)
- Planned Release Date - Second Half 2018
- RBESS (Risk Based Explosives Safety Siting)
  - Tier 1- Hazard Zone Model ASAP-X
  - Tier 2a- Physics-based model HAZX
  - Tier 2b planned for later versions of ESS
- MRAS (Munitions Risk Assessment System)
  - ASAP-X algorithms
  - Port assessment procedure
- NEES (Navy Enterprise Explosives Safety) database

ESS v6.1.5 (Planned- Under Development)
- Release Date – 2019
- One last build to bridge the gap between the ESS desktop and the Web version
- Merged QD engine
- Critical capabilities that can’t wait for the Web version
- Critical bug fixes
ESS Overview and Status

Web-Based ESS

ESS Desktop

• Currently runs on stand-alone computers.
• ESS database is stored on the local computers.
• Single user access.

Web-based ESS

• Users access through Internet browser.
• Centralized storage of ESS datasets.
• ESS Web Beta V1.0 Dec 2018.
• v1.1 Site Plans Summer 2019.
ESS Overview and Status

ESS Software Support & Training

• ESS Help Desk support and training are offered by the NAVFAC Engineering and Expeditionary Warfare Center (EXWC), Army Technical Center for Explosives Safety (USATCES), and Air Force Safety Center.

• Over 1000 students trained.

• Classroom and Web meeting training.

• Training videos are currently being updated.

• Training guides, Reference guides, Configuration guides, and Workbook exercises
ESS Benefits

• Fewer errors interpreting/implementing complex explosives safety criteria.
• Elimination of “math” errors in measurements and calculations.
• Significantly less time to create submittal packages.
• More accurate, complete, and standardized submittal packages.
• Faster review/approval of submittal packages.
• Data organized to DoD standards, saved in database readily available for analysis.
• Greatly enhanced “what-if” analysis capabilities.
• Identification of unknown violations.
• Optimized explosives storage capacity.
Questions

David Bianchi, GISP
Naval Facilities Engineering Command
Engineering and Expeditionary Warfare Center (EXWC)

1100 23rd Ave.
Port Hueneme, CA 93043
805-982-1607  DSN: 551-1607
david.bianchi@navy.mil

ESS Help Desk Support:  ESS@navy.mil  805-982-3637