ALOHA "Status" Files and "Pass" Files
(Obtaining ALOHA's Threat Zone Information at Run-Time)

April 2007

This document describes:

- the two status files "ALO_FTP.PAS" and "ALO_CLP.PAS" and

- the pass file "MAR_CLP.PAS".

Note: In versions of ALOHA prior to 5.4, the term footprint was used instead of threat zone, and FOOTPRINT is still used in the source code.

The "ALO_FTP.PAS" status file

ALOHA makes its threat zone information available to other applications by creating a "status" or "pass" file, which contains the information necessary to draw the threat zones. This pass file was originally used by the applications MARPLOT (DOS) and Bitplot (Windows) to display a threat zone on a background map. Although current versions of MARPLOT use a different protocol for obtaining ALOHA threat zone information, this pass file is still generated and available from the current version of ALOHA (both Windows and Macintosh).

Whenever a threat zone is generated in ALOHA, ALOHA creates a file named "ALO_FTP.PAS" in the ALOHA directory. This is an ASCII text file that can be opened and viewed with a text editor, contains some general information about the scenario that created the threat zone, as well as all the necessary data that another application can use to draw that threat zone. The file is created when a threat zone is generated, and is deleted when either the threat zone is no longer available, or the user quits ALOHA.

Starting with ALOHA 5.4, the ALOHA interface allows the user to specify from one to three threat zones. In addition to the threat zone itself, those threat zones that are based on scenarios which use dispersion calculations have an associated polygon representing "confidence lines". The user can chose to display either just the confidence lines for the longest threat zone or to display the confidence lines associated with each of the threat zones displayed.

Thus the "ALO_FTP.PAS" file may contain from one to three threat zones with either no confidence lines (in the case of non-dispersion threat zones) or one set of confidence lines (for the longest threat zone) or may include a set of confidence lines for each threat zone.

The threat zones are in "draw order" in the file, with the longest threat zone first and shortest threat zone last. The confidence lines, if present, immediately follow the corresponding threat zone.

Note: ALOHA 5.3 only had toxic dispersion threat zones and so an ALOHA 5.3 "ALO_FTP.PAS" file always contained at least one set of confidence lines. An ALOHA 5.4 "ALO_FTP.PAS" pass file need not contain any confidence lines. In ALOHA versions before 5.3, the "ALO_FTP.PAS" file always contained exactly one threat zone and one set of confidence lines. The file was slightly different in that some tags were not present and "Arc" commands were used. An example is included in the appendix.

The following is an example of an "ALO_FTP.PAS" file with 3 threat zones and only one set of confidence lines.

```
T ALOHA heavy gas threat zone
T CHLORINE
FOOTPRINT [LOC: 0.5 ppm = AEGL-1(60 min)] [COLOR: YELLOW]
M 4.5 -0.4
L 4.5 0.0
L 4.5 0.4
 <more lines of data>
L 16.7 -14.9
L 4.5 -0.4
CONFIDENCE LINES [LOC: 0.5 ppm = AEGL-1(60 min)] [COLOR: YELLOW]
M -4.5 0.4
L -22.7 -2.5
L -36.4 -5.8
 <more lines of data>
L 21.9 -6.4
L 4.5 -0.4
t  Time: April 5, 2006 & 1423 hours CDT (using computer's clock)
t  Chemical Name: CHLORINE
t    Carcinogenic risk - see CAMEO
t  Wind: 5 knots from 5° true at 3 meters
t  THREAT ZONE:
t    Model Run: Heavy Gas
t    Red   : 1331 yards --- (20 ppm = AEGL-3(60 min))
t    Orange: 1.7 miles --- (2 ppm = AEGL-2(60 min))
t    Yellow: 2.8 miles --- (0.5 ppm = AEGL-1(60 min))
FOOTPRINT [LOC: 2 ppm = AEGL-2(60 min)] [COLOR: LIGHT ORANGE]
M 4.5 -0.4
L 4.5 0.0
<more lines of data>
L 29.2 -25.0
L 16.7 -14.9
L 4.5 -0.4
FOOTPRINT [LOC: 20 ppm = AEGL-3(60 min)] [COLOR: RED]
M 4.5 -0.4
L 4.5 0.0
L 4.5 0.4
<more lines of data>
L 24.8 -24.6
L 16.7 -14.9
L 4.5 -0.4
```

Information in this file is tagged by the first letter that appears on each line. In addition, the two tags "FOOTPRINT" and "CONFIDENCE LINES" mark where threat zone and confidence line data begin. The general format of this file is as follows (in order of appearance):

- Lines of text beginning with "T" are lines of very brief summary text. This is the text that appeared in the old MARPLOT DOS when it was displaying an ALOHA threat zone. Although there is no explicit limit on the length of a line of text, the line length is not expected to exceed 128 characters.

- The tag "FOOTPRINT" signifies that the lines that follow contain the information on how to draw the threat zone. Those lines begin with "M" or "L" and contain numerical data, which is explained below. The LOC tag can be used to identify the threat zone. The COLOR tag

indicates the color being used in ALOHA to draw the threat zone. It is one of the values "RED", "LIGHT ORANGE" or "YELLOW".

- The tag "CONFIDENCE LINES" signifies that the lines that follow contain information on how to draw the confidence lines. The LOC and COLOR tags could be used to "match" the confidence lines to its corresponding threat zone, but one can count on the fact that the confidence lines (if present) always immediately follow the threat zone they are associated with.

- Lines of text beginning with "t" are lines of informational text. This text contains more information about the scenario than the old style capital "T" summary text. The "t" informational text contained in the pass file is the same text that would appear in an ALOHA printout of the threat zone.

The numerical data following the lines "FOOTPRINT" and "CONFIDENCE LINES" give all the information needed to draw the threat zone and confidence lines, as a series of connected lines. The two numerical values after the "M" or "L" characters are x, y coordinates in meters east and north from the source point (which is considered to be at location 0,0). Points to the north and east are positive, and points to the south and west are negative. These values include the wind rotation. This method of describing data is originally based on drawing routines where drawing is done with a "pen" and graphics routines are based on the current pen position. For instance, a MoveTo function moves the pen to a specified position. A LineTo function requires two parameters that specify the horizontal and vertical positions of the ending point, and draws a line from the current pen position to the specified ending point, which then becomes the new pen position. The meaning of each line of data is described by the letter preceding it, either "L" or "M". The interpretation of these letter headings is as follows:

- "M" stands for "MoveTo". The following values represent the x (N-S) coordinate, and the y (E-W) coordinate respectively of the location to be moved to, in meters.

- "L" stands for "LineTo". The following values represent the x (N-S) coordinate, and the y (E-W) coordinate respectively of the line's end point, in meters.

The "ALO_CLP.PAS" status file

In addition to the threat zone status file, ALOHA also generates a threat point information file labeled "ALO_CLP.PAS" whenever a user sets the location of point specific measurements in ALOHA. (This location is often referred to as a clickpoint, since the user can set this location in ALOHA by double-clicking on the threat zone plot). This file contains two integers, which are the x and y coordinates of the clickpoint, in meters, relative to the source. For example, if an ALOHA user set the clickpoint at 260 meters east and 5900 meters south of the source point, the ALO_CLP.PAS file would look like the following:

```
260 -5900
```

The "MAR_CLP.PAS" pass file

An application can change the clickpoint location in ALOHA by generating a clickpoint file using the "ALO_CLP.PAS" file format described above, and saving the file in the ALOHA directory under the name "MAR_CLP.PAS". This was the method originally used by MARPLOT DOS to pass information to ALOHA when a user set a new clickpoint location in MARPLOT. The current version of MARPLOT uses a different method for passing click point information to ALOHA, but the pass file method is still supported and is available in both the Macintosh and Windows versions of ALOHA.

Appendix 1: Converting Meters East North to Latitude Longitude

```
#define  DEGREESLATPERMETER .00000900537959 7642522
#define  MILESTOMETERS 1609.344


DOUBLE LongToLatRatio(DOUBLE baseLat)
{ return cos(baseLat * PI/180); }


DOUBLE MilesPerDegreeLong(DOUBLE baseLat)
{ return 69 * LongToLatRatio(baseLat); }


DOUBLE MetersPerDegreeLong(DOUBLE baseLat)
{ return MILESTOMETERS * MilesPerDegreeLong(baseLat); }


DOUBLE DegreesLongPerMeter(DOUBLE baseLat)
{ return 1 / MetersPerDegreeLong(baseLat); }


// convert the values to lat long
for (i = 0 ; i < sNumPoints ; i++) {
    // note: x is longitude, y is lat
    theLat =  (float)(gSourceLat + XY[i].y *DEGREESLATPERMETER
    theLng =  (float)(gSourceLng + XY[i].x *
DegreesLongPerMeter(gSourceLat));
    // we are using eastern hemisphere as positive so we now add rather than
subtract
    XY[i].x = theLng;
    XY[i].y = theLat;
}
```

Appendix 2: Pre-ALOHA 5.3 PAS files

The following is an example of a pre-ALOHA 5.3 "ALO_FTP.PAS" file.

```
T ALOHA heavy gas footprint
T CHLORINE
T LOC: IDLH (30 ppm)
FOOTPRINT
A 0.0 180.0 1.9
M -1.9 0.0
L -11.6 -11.6
L -19.3 -23.1
L -25.1 -36.6
<more lines of data>
L -28.9 -50.1
L 19.3 -23.1
L 11.6 -11.6
L 1.9 -0.0
CONFIDENCE LINES
M -1.9 0.0
L -13.5 -9.6
L -23.1 -19.3
L -30.9 -32.8
<more lines of data>
L 13.5 -9.6
L 1.9 -0.0
t Chemical Name: CHLORINE
t Model Run: Heavy Gas
t Wind: 12 mph from n
t  FOOTPRINT INFORMATION:
t     Model Run: Heavy Gas
t     User specified LOC: equals IDLH (30 ppm)
t     Max Threat Zone for LOC: 2.0 kilometers
t     Note: The Heavy Gas footprint is an initial screening.
t        For short releases it may be an overestimation.
t        Be sure to check concentration information at specific locations.
```

Notice that the LOC and COLOR tags are missing. These tags were added for ALOHA 5.3.

Note that some lines begin with "A". These lines are "Arc" commands. These arc commands were removed in ALOHA 5.3 and replaced by a series of "L" commands to simply the coding burden on users of PAS file.

"A" refers to a circular arc, and the following values represent the arc's starting angle (degrees), ending angle (degrees), and radius (meters) respectively. The center of the arc is always located at the source point (0, 0). The 0º point is in the east, and increases counter-clockwise.

Using the example pass file above, an application would draw the threat zone as follows: First, a circular arc would be drawn from 0º to 180º (i.e., from east to west, counterclockwise), with a radius scaled to 1.9 meters. Next, the pen would be moved 1.9 meters west, and 0 meters south of the source point. A line would then be drawn to an end point 11.6 meters west and 11.6 meters south of the source point. This process would be continued until all of the points were drawn.