APPENDIX E

METHODOLGY USED TO OBTAIN BEATEN ZONE DATA FOR THE TRANSFORMATION EIS AND THE MCOE EIS

PURPOSE: To establish documentation on the methods used to obtain "beaten zone" data for the Base Realignment and Closure (BRAC)- Transformation Environmental Impact Statement (EIS) and the Maneuver Center of Excellence (MCOE) EIS.

GENERAL: There is no exact science to obtain beaten zone data before that zone is created by firing on a range. In order to gauge the true effects of munitions on the environment, the munitions are fired under varying conditions until the true effects are seen. Any beaten zone data that is required prior to this is calculated using the best technical methods available at the time. The beaten zone is estimated based on several factors. The proposed location of the range project, the type and quantity of munitions planned to be fired, and the type vegetation and surrounding terrain are some of the factors. This data is subject to change as the process of designing the range is refined. Based on inability to depict the "true" surface danger zone or "beaten zone" without knowing exact locations of firing points and targets at the time of the BRAC - Transformation EIS, the best technology available was used to create "worst case" scenarios for the proposed range projects. This data was provided to the Environmental Management Division (EMD) to be used in development of a Biological Assessment (BA) for the new range projects, and factored into the final EIS.

SCOPE: The best technical method available to create the beaten zone data for the BRAC-Transformation EIS was as follows:

1. The standard surface danger zone (SDZ) for the specific type of range was used based on data from DA PAM 385-63 (Range Safety) in relation to a range 'footprint'.
2. Because an SDZ does not represent the beaten area, the scale has been reduced, and areas outside the anticipated beaten area such as the ricochet area and/or area "A" are omitted. The method used to determine this reduced "beaten zone" is generally described in Army Regulation (AR) AR 385-63, Range Safety,19 May 2003. That method is used to assist in planning of range function, layout, design and most importantly serves as the basis for development of Surface Danger Zones which provide minimally safe containment of all rounds, possible ricochets and fragmentation.
3. Once these areas were removed from the SDZ, the distance that a given projectile would travel was factored in to determine how far the beaten zone would extend down range. The method used to calculate this data comes from a study done at Fort A.P. Hill, Virginia. The study is titled "Down Range Land Condition Study" by Jason Applegate and was conducted in May 2005.

These three factors have been used as the best available technology when ranges have not been designed and no munitions have been fired.

During the MCOE EIS, the method described above was used to calculate beaten zones for range projects that are new or were not looked at during the BRAC-Transformation EIS. This process, with additional capabilities resulting from delivery of 1-foot contour resolution; improved Range Manger Tool-Kit (Automated SDZ Plotting) tools; 3-dimensional line of sight capability are now the best available technology for projects not yet designed. Some projects that were looked at during the BRAC-Transformation EIS

require a second look due to slight relocation or minor scope changes. These projects are at or near 100% design. With better technologies and GIS capabilities, we can create a more accurate estimates of the beaten zone. For range projects that fit this category the following method is used to create the beaten zone:

1. The Computer Aided Design (CAD) file (that depicts the relationship of the firing positions to the targets on the range, and all support structures) is inserted onto the Geographical Information System (GIS) data of the range footprint.
2. Using the completed range picture in GIS, a line of site (LOS) analysis is conducted from each firing point to each target on that range.
3. The down range land condition range factors (described in #3 above) is applied, unless there is a berm or natural backstop that will keep the projectile from going down range, and a more technically correct depiction of a beaten area is developed.

Based on the utility tools available, the procedure described above will result in a more accurate beaten zone estimate.

CLOSING: Variations in beaten zone data between projects in the BRAC - Transformation EIS and the MCOE EIS are the result of the availability of the best information at the time the data is requested. The calculations used to obtain beaten zone data for both EIS's remains the same unless the range project is at or near design completion. Once design data becomes available, more accurate beaten zone data can be created and forwarded to EMD.

Frederick E. Weekley Jr.
Range Officer
Fort Benning, Georgia

SDZ Downrange Distance Calculations: % based on munitions:

9mm; AT4 Trainer / X=1600m
Beaten Area: 20%
Adjusted X=320m

.38cal / X=1806m
Beaten Area: 20%
Adjusted X=372m

5.56; Ball / X=3437m
Beaten Area:
Adjusted X=700m

7.62; Ball M80 / X=4100m
Beaten Area: 38%
Adjusted X=1558m

25mm; TP-T M793 / X=4792m
Beaten Area: 38%
Adjusted X=1821m

40mm; TP / X=2095m
Beaten Area: 50%
Adjusted X=1047m

.50cal; AP_M2 / X=6100m
Beaten Area: 50%
Adjusted X=3050m

.50cal; Ball / X=6500m
Beaten Area: 50%
Adjusted X=3250m

.50cal; SLAP-T M962 / X=9778m
Beaten Area: 50%
Adjusted X=4889m

120mm; M831 / X=6589m
Beaten Area: 50%
Adjusted X=3295m

120mm; M865 / X=7234m
Beaten Area: 50%
Adjusted X=3617m