



Hill Air Force Base, Utah

Final

Recommendations Report, Demilitarized Bomb Munitions Iron (DBMI) Project

January 2008

EXECUTIVE SUMMARY

MWH Americas Inc (MWH) was tasked by Hill Air Force Base (AFB) under Contract F42650-03-D-0004, Task Orders (TOs) 003 and 004, to provide engineering support to the Demilitarized Bomb Munitions Iron (DBMI) Project. Specifically, MWH evaluated methods and equipment capable of crushing 4-inch minus scrap iron composed of previously demilitarized Bomb Dummy Unit-33 (BDU-33) to the grain-size distribution between a -8 and +50 United States (US) Standard Mesh grain-size distribution. As part of this evaluation, a cost-benefit analysis was performed to determine if the recycled DBMI is a cost-effective alternative to commercially-available iron for use in permeable reactive barriers (PRBs).

Out of the 29 companies who received samples of the 4-inch minus scrap iron, only Schutte-Buffalo Hammer Mill of Buffalo, New York chose to pursue the project. Schutte-Buffalo Hammer Mill was able to successfully crush the preliminary and secondary shipments of 4-inch minus scrap iron (approximately 10 and 70 pounds, respectively) to the desired grain-size distribution using hammermills. They have provided technical design specifications and a cost quote for a system of customized hammer mills to reduce the 4-inch minus scrap iron to the grain-size distribution specified for the processed iron.

For the *Draft Recommendation Report*, a cost-benefit analysis was performed based on an iron requirement for a full-scale PRB at Hill AFB Operable Unit (OU) 5. However, due to concerns over the performance of the OU 12 PRB, alternative uses for the crushed iron were considered for the cost-benefit analysis for this final report. The alternatives evaluated include various configurations of partial PRB walls and iron filled borings for use at OU 5 and OU 12. Ultimately, an option involving the installation of iron filled borings to treat trichloroethylene (TCE) concentrations of 100 µg/l and above at the OU 5 was retained for the cost-benefit analysis. This option requires less iron (approximately 200 tons) to be crushed and presents a more conservative alternative to the installation of a full-scale PRB at OU 5.

Cost estimates were developed for crushing the scrap iron using the Schutte-Buffalo Hammer Mill crushing alternative at Bennett's Yard in Hill AFB. The final cost for crushing the scrap iron (\$3,105/ton) was standardized to a dollar per ton (\$/ton) value and compared to the cost of commercially-available iron from Peerless Metal Powders and Abrasives (\$810/ton). A summary of the unit costs of iron for the crushing alternative and the commercially-available source of iron is provided below:

Summary of Unit Costs of Iron

Source of Iron	Cost (\$/ton)
Schutte-Buffalo Hammer Mill, Hill AFB Location (Crushing Alternative)	3,105
Peerless Metal Powders and Abrasives (Commercial Iron Source)	810

The results of the cost-benefit analysis indicate that the Schutte-Buffalo Hammer Mill crushing alternative presents a long-term cost benefit for obtaining iron for use in PRBs. Although the unit costs for the required 200 tons of iron are higher for the Schutte-

Buffalo Hammer Mill crushing alternative than for purchasing commercial iron from Peerless Metal Powders and Abrasives, the crushing alternative may provide opportunities for Hill AFB or other military and government institutions to utilize the developed technology at other sites. A break-even analysis determined that a total of 876 tons of iron would need to be crushed to make the cost of crushing iron comparable to that from commercial sources.

Despite the cost differences between the iron obtained from the crushing system and commercial sources, it is recommended that the DBMI Project proceed because of the potential long-term benefits to the Air Force. Depending upon the success of the project and quantities of iron crushed, the crushing system presented in this report could provide a long-term beneficial use for the DBMI while reducing the cost for obtaining iron for PRBs at Air Force installations.