LDEQ Questions

1. Would you provide a process flow diagram or schematic of the process and of the pollution control system? Could please provide a picture of the process unit and specifically the tunnel furnace?

   Response: ***The requested diagrams/figures are considered proprietary information at this time. These can be made available to LDEQ if procedural requirements are implemented to safeguard the confidential nature of the information.***

2. Can you identify successful demil projects your company completed in United States and what type and amount of material was processed?

   Response: ***Projects include Spring Valley, Aberdeen Proving Grounds, Schofield Barracks, Anniston Army Depot, Anniston Chemical Agent Disposal Facility. The material processed included conventional and chemical munitions.***

3. Can you identify the waste streams and how much waste material for each will be generated from this process?

   Response: ***The waste streams generated as a result of our proposed treatment process will include ash and off-gas treatment system residues/filters. Assuming that an estimated 15,700,000 lbs of M6 and 320,000 lbs of CBI require treatment, our process should yield approximately 800,000 lbs of ash using a conservative estimate of 99.95 percent efficiency.***

4. Can you identify all off-gases produced from this process, the amounts of each, and what air pollution controls are used for each?

   Response: ***Preliminary calculations indicate that the off gases and resulting hourly emissions to the atmosphere, after emission controls, from the burning of M6 propellant and the natural gas are:***

   - ***Carbon monoxide*** ***< 10 lbs***
   - ***Nitrogen oxides*** ***< 10 lbs***
   - ***Particulates*** ***< 1 lbs***
   - ***Methane*** ***< 1 lbs***
   - ***Non-methane hydrocarbons*** ***< 1 lbs***

   These quantity calculations are under quality control review and should not be considered final at this time. Off gas emission controls include: direct fire thermal oxidization, selective non-catalytic process to remove NO-X (NO2 and NO) and bag house filtration to remove particulates.

5. Can you provide any and all analytical data, including but not limited to air emissions, effluent testing, solid or hazardous waste testing. Please identify if any of the data relates to propellant, and specifically M6.

   Response: ***Result of a previous burn test of M6 propellant under little or no confinement. The propellant is assumed to burn initially without air as the burning propellant grains will***

generate sufficient gas from its internal oxygen source to prevent air reaching the propellant surface, the condition of this gas in the vicinity of the propellant bed is shown below as "Flame". The hot gas produced by the propellant will continue to burn as it mixes with ambient air due to the high concentration of the flammable gas CO (in this calculation all CO is assumed to be converted to CO2, in reality inefficient mixing of the air would result in a small percentage of CO remaining). This burnt gas is shown as "Complete". The burnt gas is then mixed with air, once the air temperature has been reduced the combustion reaction will cease and the products will remain "frozen". An additional 50lb of air per pound of propellant has been used as an estimate of the air drawn into the vicinity, this reduces the temperature to 417°F shown here as "Cooled".

Thermochemical Calculations Summary

M6	
1 lb	
0.016 ft^3	
293 °K	
68 °F	
NC	86.0%
DNT	9.0%
DPA	1.0%
DBP	3.0%
K_2SO_4	1.0%

Flame	
1 lb	
60.6 ft^3	
2,130 °K	
3,374 °F	
CO	58.3%
CO_2	14.8%
N_2	12.8%
H_2O	11.5%
H_2	1.6%
K	0.4%
SO_2	0.4%

Complete	
3 lb	
337.4ft^3	
2,532 °K	
4,098 °F	
N_2	54.8%
CO_2	28.1%
H_2O	8.2%
CO	4.9%
O_2	2.7%
NO_x	0.8%

Cooled	
54 lb	
1,194 ft^3	
487 °K	
417 °F	
N_2	75.5%
O_2	22.1%
CO_2	2.0%
H_2O	0.5%

Air
2 lb
52 ft^3
293 °K
68 °F

Air
51 lb
637 ft^3
293 °K
68 °F

Note: The products are shown as percentage by weight in these tables.

<u>Combustion Products</u>
These theoretical calculations assume good mixing of air in a controlled environment such as a rotary kiln. For an open burn imperfect mixing may result in higher concentrations than would be expected in the tunnel. In any case the maximum mass of noxious gases resulting from the combustion of 60lbs of M6 will be.

NOx 0.024 lbs max
SO2 0.2 lbs max

6. Please indicate the complete timeframe that will required to acquire, fabricate, and deploy a system? What will the estimated timeframe to complete proper testing of the system after setup?

<u>Response:</u> The time required to deploy the system is estimated 6-9 months, depending on the number of units required to meet the project schedule. Estimated timeframe to complete proper testing of the system is 30 days.

Dialogue Committee Questions

CH2M HILL/Dynasafe/Expal (Tunnel Furnace)

1. What is stack gas flow rate in dry standard cubic meters per second per pound of waste? What is the total amount of gaseous waste stream projected to be emitted throughout the process?

Response: ***The stack gas flow rate in dry standard cubic meters per second per pound of waste is 2.31 scm/lb (mixed units). The total amount of gaseous waste stream projected to be emitted throughout the process is 44,190,949 standard cubic meters (scm) over the period of operation.***

2. Please list all specific compounds, inorganic and organic, that you will test for during continuous emissions monitoring, how you will test for them, and what the detection limits of the tests are.

Response: ***The CEMS we have specified measures O2, CO, and CO2. The detection limits are not specified at this time, but are IAW industry standards and will meet all LDEQ and EPA requirements.***

3. If you cannot do continuous emissions monitoring for organic compounds, how will you monitor for them?

Response: ***Our system provides continuous monitoring capabilities for air emissions. If required by the State, a Trail Burn will be conducted IAW EPA protocols for such compounds. We would monitor for them continuously.***

4. When you take samples to monitor, what are the detection limits for testing for total organic compounds that your laboratories can do? Are you able to test for specific organic compounds?

Response: ***The CEM monitors deployed will be selected and calibrated to measure the emissions specified by the Agency and appropriate laboratory analytical methods. Total Organic compounds can be measured.***

5. Is it possible for organic chemicals to reform in your process?

Response: ***The rapid quench used in the off-gas treatment system eliminates re-formation of organic compounds in the flue gas. If the question relates to the re-formation of dioxins and furans in the flue gas from chloride compounds, the M6 and CBI being treated does not contain chlorides, TCDD and TCDF, and therefore, will not be formed.***

6. Please list the types of scrubbers used. How will the technologies you use to treat the gas stream factor into your overall budget?

Response: ***The off-gas treatment (OGT) system consists of, a thermal oxidizer to burn condensable and non-condensable gases formed in the combustion zone followed by chemical treatment to remove NOx, if required, and removal of fine particulates by filtration before the flue gas is emitted to the atmosphere through the stack.***

7. Is it possible to include an additional activated carbon scrubber at the final emission point? If so, how would this affect the overall timeline of processing in weeks?

Response: ***A granular activated carbon (GAC) unit can be installed in the OGT after the fine particulates are removed in the filter. It is not needed, however, since the flue gas will not contain any compounds that would be removed by GAC.***

8. Is it possible to add a hold/test/release function to this equipment since this is not a continuous flow process, but rather more similar to a batch process?

Response: ***Although it is feasible to add a hold/test/release system to our thermal treatment unit, it will not be needed, because our process to thermally treat M6 and CBI is a continuous process, not a batch process. Off gas emissions will be continuously monitored - 24/7. In the event that emissions exceed regulatory criteria, the feed system will automatically stopped, so that the problem can be rectified. If required for some reason, a hold/test/release function will reduce the anticipated throughput of M6 and CBI in our thermal treatment unit.***

9. Please name the manufacturer of the continuous monitoring system used with this equipment.

Response: ***CEM systems are manufactured by several vendors. The equipment employed will be certified to meet the air emissions requirements of the Agency. Given the competitive nature of the ongoing procurement, this is information is considered confidential. Names of vendors can be made available, if procedural requirements are implemented to safeguard the confidential nature of the information.***

10. Is it possible to dismantle and remove this facility following completion of the project? If so, who would retain ownership?

Response: ***The thermal treatment unit is capable of being transported off the facility and ownership would belong to CH2M HILL.***

11. Regarding the "ample space and utilities" mentioned in the presentation: Does this mean that no additional infrastructure provisions would need to be provided other than what is currently on site and the companies have pre-determined the infrastructure to be satisfactory as-is?

Response: ***The only additional infrastructure is the addition of a new Concrete slab, two blast walls and the extension of existing nearby utilities (electricity, water, gas, etc.) to the slab.***

12. Are there other infrastructure requirements? If so, please list.

Response: ***None identified at this time.***

13. Please quantify the estimated volume/pounds of ash waste that would be diverted to an appropriate landfill. Where the ash would be sent?

Response: ***Assuming a burn efficiency of 99.95%, approximately 800,000 pounds of waste would be generated and require characterization to determine the correct disposal method. Depending on the***

analytical waste characteristics of the ash, it along with the packaging materials will be transported offsite and disposed of at an appropriately permitted disposal facility. We anticipate that the wastes will be characterized as non-hazardous and will go to the Waste Management or Republic disposal facilities.

14. Is there noise associated with this process? If so, please define in estimated decibels.

Response: ***There is some noise at the site. However it will be well below an 85 dB level a short distance away.***

15. Is the laboratory you use for testing of emissions accredited by the state and EPA?

Response: ***Yes.***