El Dorado

1. What is stack gas flow rate in dry standard cubic meters per second per pound of waste? The specific flow rate is considered proprietary but I am listing fairly narrow ranges that will hopefully provide the necessary information.

Rotary Kiln EWI: approximately 1800-2500 dscfm per unit, with a production rate of 200-500 lbs per hour per unit.

Contained Burn: approximately 8,000 – 11,000 dscfm, with a production rate of 2000 – 2500 lbs per hour per unit. Note because this is a batch process emissions are only leaving the stack for about 60% of the operating time; the rest of the time fresh air is running through the system as the next load is being placed.

What is the total amount of gaseous wastestream projected to be emitted throughout the process?
We will be providing priced scrubber options ranging from those which meet the applicable regulatory standards, to those which result in emissions far, far below those standards. Total mass allowed by applicable regulatory standards is readily available. The most advanced pollution control system which we provide results in mass emissions which are orders of magnitude below regulatory standards.

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. We always test for all compounds which are required by the permit. I do not think that bidders will offer additional monitoring above what is required by the permit, in a competitive priced proposal selection process. We will offer additional monitoring as a priced option. The detection limits of the tests are per the accredited EPA methods for each compound.

We have vast experience in stack testing. Combining this with our explosive and atmospheric chemistry expertise, and work as environmental consultants, we typically have a good grasp of what compounds are of potential concern. I can prepare a document to forward which shows a partial list as an example of compounds for which we have experience performing stack testing during treatment of propellants; not all are necessarily applicable to M6.
If you cannot do continuous emissions monitoring for organic compounds, how will you monitor for them? Continuous monitoring can be performed for organic compounds, typically measured as total organics (TOC), or sometimes speciated as methane and non-methane organics (NMOC).


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Periodic monitoring can be performed via accredited EPA methods if it is desirable to achieve extremely low detection limits for speciated organic compounds. Basically these methods consist of drawing a gas sample from the stack for a long period of time through a sample train with a specific trap for the compounds you are testing for. The trap is then sent to an accredited lab which analyzes the compounds from the trap using accredited methods in a highly controlled lab environment.

When you take samples to monitor, what are the detection limits for testing for total organic compounds that your laboratories can do? Commercial laboratories would be used by any bidder; the detection limit is a function of the method and time period and quantity of sample obtained, see above. No bidder could accurately or credibly claim to have a better detection limit for laboratory analysis than another.
Are you able to test for specific organic compounds? Yes, see responses above.
Is it possible for organic chemicals to reform in your process? No, our process design specifically addresses this by controlling the process conditions to ensure no reforming of organics in the downstream scrubber equipment. Based on our experience, we actually use equipment that has a higher capital investment cost, compared to other technologies which have been fielded, to ensure no reforming of organics.

3. Please list the types of scrubbers used. How will the technologies you use to treat the gas stream factor into your overall budget? I have provided a list of the types of scrubbers we have used in our document on contained burn; it is again attached for your convenience. We will propose identical scrubber packages for either contained burn or EWI, based on our proven experience scrubbing exhaust gases from M6 propellant. The technologies for scrubbing the gas stream play a huge role in the overall budget, hence we will be providing priced options so the client can select according to environmental and budgetary considerations. We have field proven experience and technology for scrubbing exhaust gas from thermal treatment of M6 propellant that to our knowledge is unmatched. However, there is significant expense to achieve this level of performance, hence we are providing priced options.

We would like to understand the stakeholders requirements for scrubbing NOx. As you are aware many tons of NOx are produced when this material is thermally oxidized, with potential for much greater quantity (orders of magnitude) of NOx produced than other gaseous pollutant species. A major budget determination will be if actual robust field proven best available control technology for eliminating NOx from oxidation of M6 is required.

4. 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? Yes, we have done this in the past on multiple installations which processed propellants and explosives, although it should not be required for M6 and CBI. It can however be provided and is primarily a matter of capital cost, it would have no real impact on timeline of processing.

5. Is it possible to dismantle and remove this facility following completion of the project? If so, who would retain ownership? Yes it can be dismantled or mothballed. We plan to provide

the facility as a subcontractor to the prime contractor who we are teamed with (ESI), they would likely retain ownership. It is important to recognize that adding a costly requirement for dismantling may reduce the funding available for best available control technology for eliminating emissions.

6. What specific electrical power provisions would be required? Electricity is required for the instrumentation, control system, and the fan. These power requirements will be provided as part of our technical proposal.

7. Are there other infrastructure requirements? If so, please list. Infrastructure requirements include foundations to support equipment, weatherproof shelter for the loading area to prevent rainwater contamination, a fuel supply for the afterburner.

8. Please quantify specifically the destruction efficiency. It is important as you collect information on the destruction efficiency or destruction removal efficiency (DRE) to recognize exactly what is being reported. A DRE is typically calculated for specific compounds case by case. It is very important to understand the basis of this calculation and how the calculation is being performed to have meaningful information for comparison. A blanket statement of four 9s or six 9s needs to be qualified as to what is actually being stated. It is typically calculated on the basis of the amount measured in the stack for a specific compound versus what is fed.

When you consider M6 and its constituents, such as DNT, you can physically measure for DNT or Toluene in the stack and then make a calculation for the DNT itself. When you consider particulate removal efficiency you must look at how much is removed by the filter system, which is typically expressed as removal efficiency percentage as a function of particle size. CO is typically used to evaluate efficiency of the oxidation of carbon, which may be somewhat less meaningful than considering DRE for other volatile organic compounds.

Our test data allows for this calculation for some species which demonstrates very high DRE for all tested compounds of interest when running M6. I will double check all of our data files, but speciated organic compound measurements have not generally been performed when running M6, as measurement of total organics are typically done when running chlorinated compounds or other materials which can produce compounds of greater concern at low concentrations. We have run speciated organics when running other materials through our system which were of greater concern for organic species. I can look up this data and provide calculations for any species of interest. This will show that we achieve well above six 9s for all organic compounds of interest. We need to consider how much we share prior to the proposal for destruction removal efficiencies which we achieve as this is a key competitive advantage.

A publicly available reference with a lot of speciated organic compound data for DRE achieved by the same method of thermal treatment with high temperature afterburner utilization is published for chemical demilitarization programs which we have worked on. For these projects where extensive measurement of organics was performed, six 9s is easily met, with seven 9s usually validated depending on analysis method detection limits. These trial burns are a matter

of public record which include spiking feed with principal organic hazardous constituents (POHCs) such as trichlorbenzene and tetrachloroethylene. We employ basically the same control technology to destroy organics, with the measurement typically being non-detect with the most accurate detection limit possible. A calculation is then made based on the specific detection limit of that method.

Our particulate filters have well characterized removal efficiencies based on particle size, and typically result in no-detect for particulate. When these measurements are made a baseline measurement is also taken with fresh air (blank). Measurements are then made on the blank to see what "zero" is from fresh air. We often end up with negative values when results are analyzed on this basis as particulate levels and organics from our stack utilizing our best available technology are below "fresh air".

9. Please clarify which of your proposed processes is projected to have:
a. Best emissions output – The processes are equally good for emissions output. The emissions are based on the scrubber systems utilized, and we would propose the same scrubber technology which we have successfully proven on M6 for either process. The rotary kiln (EWI) has an additional burner in the kiln itself, so would produce slightly more carbon dioxide, however pollutants of concern would be the same.
b. Best destruction efficiency – The processes are equally good for destruction efficiency. Utilizing a high temperature afterburner in the scrubber and our proven scrubber technology for PM and NOX, each process will achieve very high levels of destruction and removal efficiency, as described herein.
c. Best/most productive throughput – We think our contained burn technology will have the most productive throughput on an equal life cycle cost basis due to a combination of lower capital cost for a single unit versus multiple EWI units required to meet high throughput. Contained burn also has reduced handling requirements from an operations standpoint which equals less risk for personnel and less potential for operational interruptions.

10. Please quantify the estimated volume/pounds of ash waste that would be diverted to an appropriate landfill. Where would the ash be sent? This is to be provided. This is highly dependent on whether the treatment of M6 is done with or without the existing packaging.

I have been quite concerned that the dialogue committee does not appear to have carefully considered the fate of existing packaging. If the propellant is removed from this packaging, what happens to the packaging? The packaging can be contaminated with propellant and DNT. Even when this is determined by multiple visual inspections to be so called "clean" I would be suspicious, we have been involved with many projects to destroy contaminated packaging and are aware of major safety and environmental problems which have resulted from release of contaminated materials after only a visible inspection – typically called 3X in the industry. At Minden, with only a cursory visual inspection the packaging could then be sent to a recycler or landfill which can result in a direct pathway for hazardous chemical release to the environment and public exposure, as well as liability for all involved. This is something which we have seen at many sites and have dealt successfully with for many clients, which is why we

typically propose to thermally destroy not only the hazardous propellant materials, but also the potentially contaminated packaging. That way all ash materials are considered 5X, which mitigates this risk. I would be very concerned about the huge mass of contaminated packaging that can exit the facility . No one ever samples it as no practical sampling methods are available to absolutely ensure it is all clean. The best way to ensure it is clean is on site thermal treatment.

All ash resulting from our proposed processes, including thermal treatment of all packaging, would have undergone the established standards for thermal treatment so that it would have eliminated all reactive and toxic hazards resulting in non-hazardous waste that can be safely landfilled.

11. Is there noise associated with this process? If so, please define in estimated decibels. Because both systems result in burning of M6 instead of detonations, the noise levels of the process will be very minimal. The loudest piece of equipment is the induced draft fan, which is typically less than 85 dBA at regulated nearby distance from the fan where an operator might stand; silencer options for the fan can be provided. There is no expected noise pollution from the facility that would impact anything outside the facility. There is some noise from driving vehicles and forklifts.

12. Please name the manufacturer of the continuous monitoring system used with this equipment. There are a many vendors of CEMS which meet all the necessary specifications. We have used several different reputable vendor systems over the years and have experience to know those which work the best. Our selection is based on a combination of price, delivery schedule, local maintenance support availability, and of course our past experience with that vendor and their equipment in terms of accuracy and reliability.
Is the laboratory you use for testing of emissions accredited by the state and EPA? We always use accredited laboratories. We have used many accredited laboratories and know from experience which ones provide the best service.