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Subject: Request for Information, Technology for Camp Minden cleanup of M6 and CBI
Response to Follow-Up Questions from Minden Dialogue Committee Participants

Dear Mr. Sarno,

On March 4, 2015Clean Harbors and ECC presented our thermal oxidizer with feed preparation technology to the Minden Dialogue Committee. Using this alternative approach, we are confident that the Clean Harbors / ECC team can safely and efficiently perform the removal and destruction of 15,687,247 lb of M6 Propellant (M6) and 320,890 lb of Clean Burning Igniter (CBI) that is located in ninety seven storage igloos at the former Explo Systems Inc. Site located on Camp Minden, Louisiana.

On March 5, Clean Harbors received written follow-up questions from Karen Price, Senior Environmental Scientist, Louisiana Department of Environmental Quality and Frances Kelley, Director of Organizing, Louisiana Progress Action. The questions and responses are presented below.

Questions by Frances Kelley, dated Thursday, March 05, 2015 4:04 PM

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?

   Clean Harbors / ECC Response 1: The stack gas emission rate will range from ~1.5 to 2.0 dry standard cubic meters per pound of waste. (Note that we request clarification on the requested units of dry standard cubic meters per second per pound of waste, since the time element of the measure specified is something we are not familiar with.) The total amount of gaseous waste stream to be emitted will be ~2.5E+07 to 3.2E+07 dry standard cubic meters.

2a. 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.

Clean Harbors / ECC Response 2a: The following stack tests using EPA promulgated methods are anticipated during commissioning and during operation as required. The detection limits of each test are in accordance with the promulgated methods.

Pollutant	EPA Method
CO/O2	3a, 10
Opacity	9
PM	5
Metals	29
NOx	7
SO2	6
VOCs	0030
SVOCs	0010
TOM	1-4, 18
THC	18, 25a
PCDD/PCDF	23a

2b. If you cannot do continuous emissions monitoring for organic compounds, how will you monitor for them?

Clean Harbors / ECC Response 2b: The currently approved EPA Method 320 (Vapor Phase Organic & Inorganic Emissions by Extractive FTIR) does not support the CEMS detection of dibutyl phthalate or dinitrotoluene, the two listed hazardous air pollutants of Title III of the CAAA of 1990. EPA Method 320 is capable of monitoring for possible side products from the thermal treatment of M6 (i.e. benzene, toluene, phenol, etc.) cited during the presentation questions and answers.

The emissions for organic compounds, including the possible side products from the thermal treatment, will be determined by EPA Method 0030 during commissioning and periodically as required. The CO and THC analyzers of the continuous emission monitor systems (CEMS) then will be used as surrogate monitors during operation of the technology, along with the process control variables established during the commissioning stack test (i.e. temperature, residence time, flow rates, etc.). The use of CO and THC as surrogates is an EPA accepted method of monitoring per the emission ARARs. Stack testing using EPA Method 0030 can be added at scheduled intervals to verify emissions for organic compounds as required.

2c. 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?

Clean Harbors / ECC Response 2c: EPA Method 0030 will sample for a wide variety of standard organic compounds as determined by GC/MS, including the hazardous components of M6 (dibutyl phthalate and dinitrotoluene) and its degradation products. EPA Method 0030 is based on isokinetic stack sampling through sorbent cartridges and the detection limit of the sorbent cartridges is as low as 2 nanograms. The method detection limit can be decreased accordingly to evaluate lower concentrations by varying the volume of extracted stack gas passed through the sorbent cartridges.

2d. Is it possible for organic chemicals to reform in your process?

Clean Harbors / ECC Response 2d: It is not possible for the primary components of M6 (nitrocellulose, dibutyl phthalate, diphenylamine, and dinitrotoluene) to reform in our process, since the primary M6 components are converted to the thermodynamically favored carbon dioxide and water.

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

Clean Harbors / ECC Response 3: Chemical scrubbers can be added to the air pollution control train if required, but are not necessary to meet the emission criteria promulgated in the Applicable Relevant and Appropriate Requirements (ARARs). Currently, the air pollution control system consists of a water quench to reduce exhaust gas temperatures. It is not designed to remove specific contaminants. Following the water quench, exhaust gases are passed through a baghouse filter to remove particulates. All quench water is evaporated and discharged through the baghouse with the exhaust gases. There are no wastewater discharges from the treatment system. Since the request for an alternative proposal dated 11 February 2015 by Major General Curtis is “performance based”, the price of the air pollution control systems will be incorporated into the overall proposed price. Additional air pollution control systems above the promulgated ARARs can be added as an optional price if requested.

4. Is it possible to include an additional activated carbon scrubber at the final emission point?

Clean Harbors / ECC Response 4: Yes, an activated carbon scrubber may be provided at the final emission point if required. Similarly, at an additional cost, the destruction and removal efficiency (DRE) for the M6 and its associated hazardous components can be increased to 99.9999% or higher, which is higher than the minimum emission criteria of 99.99% promulgated in the ARARs.

5. It was discussed that this was a permanent on-site fabrication at Camp Minden but that it could be dismantled and taken by rail to Colfax, Louisiana following completion of the process. Could this be guaranteed as part of the cleanup process?

   Clean Harbors / ECC Response 5: As part of our proposed approach, it will be guaranteed that all treatment equipment will be removed from Camp Minden at the end of the project. We apologize if we inadequately described the configuration of our system. The treatment system, consisting of standard, off-the-shelf equipment, will be assembled onsite as a temporary treatment system. At completion of the project, the unit and all supporting equipment will be removed from the site, and transferred to another project, or one of our temporary storage locations. There are no plans to transfer the equipment to the Colfax facility.

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

   Clean Harbors / ECC Response 6: We conservatively estimate that less than 4 pounds of ash will be generated for each 1,000 lbs of propellant treated. The final disposal location is unknown at this time and will depend on the results of waste sampling and characterization analysis in accordance with 40 CFR 261. We anticipate the ash to be non-hazardous, and accordingly will be disposed at Allied Waste Services (Minden, LA) or equivalent.

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

   Clean Harbors / ECC Response 7: The treatment system will require utility infrastructure (i.e. electrical power, potable water, sewerage for onsite personnel, natural gas or propane, and phone / internet if available). If phone / internet are not available, then we will provide cellular service to onsite personnel.

   The treatment facility also will require modification to the existing civil infrastructure to create suitable concrete treatment pads for the equipment, and will require improvement to non-paved roads between the magazines and the treatment area as needed.

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

   Clean Harbors / ECC Response 8: Yes, the treatment equipment will generate noise. The noise will be less than 85 dB at 1-meter per OSHA for each component, as measured on prior projects and similar applications of this equipment.

9. Please name the manufacturer of the continuous monitoring system used with this equipment. Is the laboratory you use for testing of emissions accredited by the state and EPA?

Clean Harbors / ECC Response 9: The specific vendor for the continuous emission monitoring system has not been determined at this stage, but will be procured from a quality supplier like Emerson or California Analytical. The anticipated continuous emission monitoring system is standard, off-the-shelf equipment. Similarly, the stack testing specialty subcontractor and offsite analytical laboratory are unknown at this time but will be procured from a certified supplier like Maxxam Analytics for stack testing or GCAL for the offsite analytical laboratory analysis, which are both accredited by LDEQ.

Questions by Karen Price of LDEQ, dated Thursday, March 05, 2015 5:06 PM

1. Would you provide a process flow diagram or schematic of the process and of the pollution control system?

   Clean Harbors / ECC Response 1: A Camp Minden specific process flow diagram is being finalized at this time and will be included in the proposal due March 18, 2015. In the meantime, we refer you to the CH-ECC presentation to the Dialogue Committee that included a simplified block flow diagram.

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

   Clean Harbors / ECC Response 2: There is a single exhaust discharge from the treatment system at the stack following the air pollution control induction fan. The exhaust discharge will range from 175 to 190 standard cubic meters per minute (95 to 105 dry standard cubic meters per minute). To meet and exceed the ARAR criteria for emissions, the air pollution control will consist of a quench, baghouse, continuous emission monitoring system, and stack with associated process controls.

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

   Clean Harbors / ECC Response 3: The following emission data is publically available from our team's confidential thermal destruction of waste M6 propellant in the U.S. This test data is from the commissioning of the unit, June 13-15, 2000.

   The unit is a permitted RCRA system. The measured destruction and removal efficiency was determined at 99.99997%. The measured destruction and removal efficiency was based on using one-half the detection limit from the stack testing, since the M6 components were not detected in the emissions.

Parameter	Units	Value
Thermal Oxidizer Feed		
M6 Feed Rate	lbs/hr	1,222
	MMBtu/hr	8.2
Ash Feed Content	wt.%	0.3
Thermal Oxidizer & Air Pollution Control		
Oxidizer Exit Temperature	^{o}F	1,801
Fabric Filter Pressure Drop	in. w.c	8.84
Fabric Filter Inlet Temperature	^{o}F	356.2
Stack Flow Rate	dscfm	2,637
Oxygen Content	vol.%	7.7
Moisture Content	vol.%	53.6
Stack Emissions		
CO	ppmv	3.4
HCl	ppmv	0.05
Total Chlorine	ppmv	0.10
PM	gr/dscf	0.004
Antimony	µg/dscm	1.53
Arsenic	µg/dscm	0.30
Barium	µg/dscm	10.43
Beryllium	µg/dscm	0.04
Cadmium	µg/dscm	0.38
Chromium	µg/dscm	3.98
Lead	µg/dscm	577.25
Mercury	µg/dscm	0.16
Nickel	µg/dscm	5.55
Selenium	µg/dscm	0.85
Silver	µg/dscm	0.12
Thallium	µg/dscm	0.20

There is no water effluent from the system, so there is no applicable effluent testing.

We do not have access to the actual solid or hazardous waste testing data since the system is operated by a third party but the ash is tested for hazardous waste characteristics per 40 CFR 261 (i.e., TCLP and reactivity) and disposed as non-hazardous waste.

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

Clean Harbors / ECC Response 4:

Location	Dates	Amount of Material	Type of Material
Clean Harbors Colfax, LLC, Colfax, LA	1993 - Ongoing	561,700 lbs Annually	High explosives, munitions, propellants and related materials
Confidential Client, Camp Minden, LA	2014	849,000 lbs	Nitrocellulose
Kosteny Rocket Base, Belarus, DSWA	1998	5,000 tons	Heavy fuel oil, VOCs & PAHs
Iowa Army Ammunition Plant, IA (USACE Omaha)	1999	4,740 tons	VOCs, RDX
Confidential client, MA USACE New England	Ongoing	40,000 tons	RDX/ HMX, Perchlorates
Confidential Client	2000 - Ongoing	1,200 lbs/hr	M6 Propellant
Robstown	2008 - Ongoing	68,000 tons Annually	Hazardous Waste
Letterkenny Munitions Center, PA	2009 – Ongoing	Live Testing Nov 2015; 10K cycles/yr	Ammonium Perchlorate
Buckmaster Depot and Taji ASP, Captured Enemy Ammunition Program, Iraq, (USACE Redstone, AL)	2004 - 2005	40,000 tons and 340,000 pieces of UXO demolition	Conventional air and ground munitions including 1,000 tons of propellant

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

   Clean Harbors / ECC Response 5: We estimate that the treatment system will be deployed and commissioned, including performance testing, within 4 months from approval to proceed. The commissioning will involve a variety of electrical and mechanical verification phases across approximately two weeks, and will include a full scale performance test with exhaust stack testing using EPA promulgated methods (and the continuous emission monitoring system).

We appreciate the opportunity to address these questions and look forward to additional opportunities to provide information on our proposed solution to the cleanup of M6 and CBI at Camp Minden.

Sincerely,

Peter J. Mondeel, Proposal Manger
Clean Harbors North American Remediation Organization