DEPARTMENT OF THE ARMY
MASSACHUSETTS ARMY NATIONAL GUARD TRAINING SITE
CAMP EDWARDS, MASSACHUSETTS 02542-5003

REPLY TO
ATTENTION OF

October 26, 2009

MANG Executive Officer

Ms. Lynne Jennings
EPA-New England, Region I
1 Congress Street, Suite 1100
Boston, MA 02114-2023

Dear Ms. Jennings,

The National Guard Bureau (NGB) and the Massachusetts National Guard (MANG) petition EPA Region I for modification of Administrative Order (AO2) Scope of Work (SOW) issued in April 1997 in accordance with US EPA Region I EPA Docket No.: SDWA I-97-1030 (AO2) page 28, Section XXXIV MODIFICATION OF THE SOW, paragraph 125:

> "If the Respondent believes that a modification of the Work specified in the SOW . . . is necessary and appropriate, Respondent may petition to EPA for an EPA determination on such potential modification, submitting appropriate documentation. Within a reasonable time after the receipt of such petition EPA will make a determination whether the SOW should be modified. Bases for such a petition may include, but not be limited to the following …documentation demonstrating that the use of a propellant or pyrotechnic that is suspended pursuant to this order does not present a threat of harm to the public or the environment that would warrant its continued suspension under this order…"

This petition specifically requests that Section II, A., f., Response Activities, page 29 of the AO2 SOW, which "suspend(s) the following activities… All use of pyrotechnics at or near the Training Range and Impact Area" be modified to allow the use of a reformulated pyrotechnic device –M116A1 Hand Grenade (DODIC L601), in those areas of Camp Edwards.

In the past, pyrotechnic use at MMR was as stated in paragraph 19 through 22 of AO2:

"In 1996, approximately 29 types of pyrotechnics were used at MMR. …In 1996, 104 units of Grenade Hand Smoke HC AN-M8 pyrotechnic were used at MMR. Forty-seven percent (47%) of each unit of this pyrotechnic consists of hexachloroethane (HCE)…Zinc Chloride smoke is a screening agent. It is produced when mixtures of zinc oxide and hexachloroethane are ignited…. Many pyrotechnics used at Camp Edwards contain(ed) TNT… In addition other pyrotechnic devices used at MMR contain(ed) additional hazardous constituents such as lead thiocyanate, nitroglycerine, diethylphthalate and acetone."

None of the above-mentioned hazardous constituents are contained in the M116A1 Hand Grenade simulator (DODIC L601). Further, the new device has been reformulated by the Army and is now produced without perchlorate. Instead it contains a material comprised of black powder, aluminum, and silica sand. The Massachusetts National Guard believes the new device is an effective and

environmentally safe alternative that meets EPA's modification requirements and can be responsibly used in various required training scenarios throughout the base without additional restrictions. The grenade simulators contain no constituents of concern that would present a threat of harm to the public or the environment. The analytical results of the test demonstration conducted on 20 August, 2009, along with the list of exact constituents detailed in the attached Project Note, document and demonstrate that they are an environmentally acceptable alternative. Since the hazardous constituents cited above in the AO have been successfully eliminated in this device, the Massachusetts National Guard believes this petition is warranted in support of environmentally appropriate and necessary training.

To support this petition we have included:

- A copy of the Project Note, signed by each agency, to test the newly reformulated artillery simulators which are equivalent to the reformulated grenade simulators with the exception that they are completely perchlorate free. This project confirms that the use of the grenade simulators does not present a threat of harm to the public or the environment that would warrant its continued suspension;
- A constituent analysis of the reformulated grenade simulators which are equivalent to the artillery simulators used in the experiment with the exception that they are completely perchlorate free;
- Analytical results for the testing of the artillery simulators in conformance with the Project Note;
- Diagram showing parts of device that do not typically enter the environment as they are turned in for accountability purposes;
- A memorandum from Major Mike Koski, Plans and Training Officer, Camp Edwards Headquarters, identifying the necessity and appropriateness of using these devices for premobilization training of New England National Guardsmen and Reservists;

As has been discussed at the Command Group Meeting held on September 10th, the schedule for modification of the SOW to allow for the use of these pyrotechnics is requested to align with the eXportable Combat Training Capability (XCTC) training scheduled for June 2010.

As you know, one of the most present and deadly hazards our Soldiers face overseas is improvised explosive devices (IED's). With this pyrotechnic training tool available once again regionally, our local Soldiers will be able to be trained close to home with the necessary realism. This is an important goal for the MANG along with responsible stewardship and care of the environment and we appreciate your assistance to meet this goal.

Thank you for your continued cooperation and attention. If you have any questions please feel free to contact my office at any time.

Sincerely,

Colonel, MAARNG Francis M. McGinn
Post Commander

CF:
SARWG (w/encls)

Environmental and Readiness Center Camp Edwards, Massachusetts	**PROJECT NOTE**	

Confirmation of ☐ ☐ ☐	Date Held: Not applicable Location: Not applicable Date Issued: August 13, 2009 Recorded By:
Subject **TESTING OF ARTILLERY AND GRENADE SIMULATORS AT CAMP EDWARDS**	Issued By USACE on behalf of USAEC/MAARNG

Item		Action Required By

1.0 INTRODUCTION

Since 1997, the Massachusetts Army National Guard (MAARNG) has suspended the use of artillery and grenade simulator devices on Camp Edwards pursuant to the U.S. Environmental Protection Agency's (EPA) Administrative Order SDWA I-97-1-030 ("AO2"). This order was issued based on findings related to potential environmental impact to groundwater below the base.

Pyrotechnic devices used on MMR in the past contained such chemicals as hexachloroethane, zinc oxide mixtures, lead thiocyanate, nitroglycerin, diethylphthalate and acetone, all chemicals which have been eliminated in the reformulated devices.

Perchlorate was also one of the constituents in the simulators. Perchlorate is a contaminant of high solubility and has potential effects on human health

In "AO2", an allowance was made by EPA for modification of the "Scope of Work" prohibiting use of pyrotechnics in the Training Reserve. Specifically the AO allowed for "documentation demonstrating that the use of a propellant or pyrotechnic that is suspended pursuant to this order does not present a threat of harm to the public or the environment that would warrant its continued suspension under this order".

This project is the first step in making the demonstration that the use of reformulated pyrotechnics "does not present a threat of harm to the public or environment that warrants its continued suspension under this order".

Further, as described in the **ENVIRONMENTAL PERFORMANCE STANDARDS** of July 11, 2007 under CAMP EDWARDS TRAINING AREA GENERAL PERFORMANCE STANDARDS, "Blank ammunition for small arms and simulated munitions may be used in areas outside of the small arms ranges, using only blank ammunition and simulated munitions identified on an approved list of munitions. Joint review and approval for the inclusion on the list shall be through the Environmental & Readiness Center (E &RC) and the EMC."

This project is also in support of obtaining the above cited listing on the E&RC and EMC list of approved munitions.

The M115A2 Artillery Ground Burst Simulator and the M116A1 Hand Grenade simulator are hand thrown military training devices used to simulate battlefield noises and effects during troop maneuvers and training. Use of these devices to prepare soldiers for the rigors of combat by simulating the stress and confusion of hand grenade and artillery explosions is an important aspect of military training.

The Department of Defense in a separate program has taken the initiative to develop a simulated grenade which uses no perchlorate, and an artillery simulator which uses minimal perchlorate in its design. In the artillery simulator the small amount (less than 1.4 g) of perchlorate is designed to be consumed when the characteristic whistle sound is produced. If the simunition does not whistle, it can be recovered so that there is no, or at worse case deminimus, exposure of this chemical to the environment. (As a point of comparison, after a common road flare burns out, the residue of each flare can result in up to 2000ppb of perchlorate in surface soil in a closed area.)

In recent Small Arms Working Group (SARWG) Meetings, the MAARNG proposed to resume using the redesigned M115A2 and M116A1 simulators at Camp Edwards. The EPA, DEP and EMC representative at the SARWG meeting requested that the redesigned simulators be tested to verify that they can be used without negative impact to the environment. In coordination with the SARWG, the MAARNG has developed this Project Note to determine the chemical composition of the residue left after using these devices.

Per the constituent information for these devices, there should be no environmental impact of concern, but a test was considered appropriate as a demonstration of the effectiveness of the devices in consuming the minor amount of perchlorate still used for the whistle in the artillery simulator.

The MAARNG has reviewed literature on the constituents in the redesigned M115A2 and M116A1 simulators and is confident that they can be used at Camp Edwards with no environmental impact to the groundwater, since the other materials making up the device are environmentally benign and there is no basis to expect the synthesis of any other chemicals of concern during the deflagration process.

The devices are simple cardboard tubes containing these constituents:

Black powder (a mixture of sulfur, charcoal and potassium nitrate);
Sodium salicylate (substance also used as a pain reliever);
Red gum (eucalyptus);
Aluminum (second most abundant metal in Earth's crust);
Potassium chlorate (the most common chlorate in industrial use – breaks down to oxygen, and Potassium chloride - a naturally occurring mineral);
Dextrin (breakdown product of starch);
Potassium nitrate (naturally occurring mineral used as a fertilizer). .

There is a metal wire visible on the outside, similar in appearance to a paperclip, and internally a wire can be seen in the drawings. These do not enter into the environment, but are held onto by the soldier when activating the device and turned in later as dunnage. Turning in dunnage by the soldiers is important as an accounting activity. Because of this there should be no concern of metals of concern being introduced to the

environment with use of these simulators.

This Project Note describes in detail the proposed testing and analysis to demonstrate that the new M115A2 and M116A1 simulators can be used for effective and necessary soldier training while still being protective of the environment.

2.0 OBJECTIVE

The objective of the proposed testing included herein is to provide regulators with data to determine whether or not the reformulated simulators are appropriate for use at Camp Edwards, and to support the MAARNG's upcoming formal request for modification of "AO2" to allow the use of these reformulated pyrotechnics as an appropriate and vital part of military training.

3.0 DESCRIPTION OF SIMULATOR DEVICES

The M115A2 Artillery Ground Burst Simulator and the M116A1 Hand Grenade simulator are hand thrown training devices used to simulate battlefield noises and effects. After initiation the M115A2 has a 6-10 second delay followed by a 3-6 second whistle and a flash/bang with a 138dB report. The M116A1 has a 6-11 second delay followed by a flash/bang with a 125dB report.

The M115A2 simulator consists of a M3A1 friction type initiator and a piece of safety fuse followed by a pressed whistle composition and 40 grams of a loose black powder/aluminum mixture. The simulator body consists of a 2 piece cylindrical cardboard tube measuring 6 inches long by 1.75 inches in diameter. The M116A1 simulator consists of a M3A1 friction type initiator and a piece of safety fuse and 40 grams of a loose black powder/aluminum mixture. The simulator body consists of a 2 piece cylindrical cardboard tube measuring 4 inches long by 1.5 inches in diameter.

A picture and diagram of each device is attached to this Project Note.

The composition of the simulators is reflected in the following two tables:

	MA115A2 Artillery Ground] Burst Simulator- New Design
Whistle Composition 2 g	Sodium Salicylate 28%
	Potassium Perchlorate 69%
	Red Gum (3%)
Flash Composition 40 g	Aluminum (flaked) 8 %
	Black Powder 92%
Fuse Igniter Charge 41 mg	Potassium Chlorate 88% mg
	Charcoal 10%
	Dextrin 2%
Primer Paste 2g	Potassium Nitrate 67%
	Charcoal 14%
	Binder Cell Nitrate 10%

	Sulfur 9%
Safety Fuse	Cotton
	Black Powder
Quick Match	Cotton
	Black Powder
Ignition Blasting Fuse (M3A1) Assembly	Steel wire
	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)
Ferrule	Steel Wire
	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)
Ignition Charge Wire 0.3 g Copper Alloy	Copper 95%, Zinc 4.92% Iron 0.05%, Lead 0.03%

	MA116A1 Hand Grenade Simulator- New Design
Flash Composition 40 g	Aluminum (flaked) 8 %
	Black Powder 92%
Fuse Igniter Charge 41 mg	Potassium Chlorate 88%
	Charcoal 10%
	Dextrin 2%
Primer Paste 2g	Potassium Nitrate 67%
	Charcoal 14%
	Binder Cell Nitrate 10%
	Sulfur 9%
Safety Fuse	Cotton
	Black Powder
	Primer Paste
Ignition Blasting Fuse (M3A1) Assembly	Steel Wire
	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)
Ferrule	Steel Wire
	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)
Ignition Charge Wire Assembly 0.3 g Copper Alloy	Copper 95%, Zinc 4.92% Iron 0.05%, Lead 0.03%

4.0 TESTING PROCEDURES

As discussed during recent SARWG meetings, the MAARNG recently observed the use of grenade simulators at Devens Reserve Forces Training Area. The observations were done to help plan for actual testing of the new design simulators at Camp Edwards. The

Devens' observations showed that small parts of the simulator can be dispersed 50 feet or more from the point of ignition. The testing was done in the open air and as would be expected under this condition wind also affected the distribution of simulator debris.

For testing at Camp Edwards, a steel shipping container or "connex" box will be used to minimize dispersion from the devices. Use of the connex box should reduce any potential impacts from wind on the tests; however, the testing will not be performed during a period of high winds (high winds are defined as sustained winds of 40 mph or more or gusts of 58 mph or more). To be conservative, the test will be delayed if wind conditions exceed 10 to 15 mph.

Steel connex boxes are located at the former soil washing pad adjacent to Range Control. The size of the connex boxes is approximately 8 foot x 20 foot x 8 foot. The connex boxes are in used condition and show evidence of general dirt, dust and grime. The interior of connex boxes used in this project will be inspected and cleaned via brushing, washing, or vacuuming , to help prevent any pre-existing substances from affecting sample results. A bed of clean sand will be placed in the connex at a depth of approximately 18 inches.

The connex boxes have several small vents and are not airtight. One of the swinging doors of the connex will be left slightly open during the test as required by safety procedures. The intent is to contain most of the simulator debris within the footprint area of the connex while not creating a hazardous over pressurized condition in the connex.

Simulators will be initiated by MAARNG personnel outside of the connex and tossed into the center of the connex onto the bed of sand. MAARNG personnel will employ personal protective equipment (PPE) and clothing appropriate for the simulator use. After tossing each simulator into the connex, MAARNG personnel will evacuate to a safe location away from the connex doors. Personnel onsite to witness the simulator testing will be kept back at least 100 feet from the connex box and be sufficiently protected from noise and potential flying debris.

Twenty M115A2 artillery simulators will be set off in the connex box. Twenty items was arbitrarily chosen as a reasonable number of items to provide a representative amount of residue from the items in the connex box. Training protocols for use of the devices on Camp Edwards have not yet been developed. After the twentieth item, the smoke will be allowed to settle and dissipate in the connex box. Air quality will be checked within the connex to ensure access is safe. Personnel with clean and appropriate PPE will enter the connex box and dry brush the ceiling and walls to move any residue onto the sand bed floor. Personnel will then collect soil samples as detailed below.

Testing will be completed on the M115A2 artillery simulators and the results will be evaluated and discussed with EPA, DEP and EMC. It is noted that the redesigned M116A1 grenade simulators contain no perchorate and the other constituents are equivalent to the artillery simulator so using only the M115A2 artillery simulators gives a worst case scenario. Assuming that soil sample results are favorable for the artillery simulator testing, these results can also be used to make a determination on whether the use of the grenade simulators is appropriate for Camp Edwards.

The testing date will be coordinated with the regulators such that a date agreeable to all parties is scheduled.

5.0 SOIL SAMPLING

Soil sampling analyses and rationale is based on review of the constituents listed for both types of simulator devices and shown in attached Table 1.

All soil samples will be 30-point multi-increment samples (MIS) collected from the sand bed. They will be collected via the random systematic method of collecting and compositing soil increments.

First the "clean" sand will be sampled to confirm there are no pre-existing contaminants of concern. Three samples will be collected and analyzed from a depth of 0-9" and one sample from a depth of 9-18". Analyses will include:
Perchlorate via Method 6850
Nitrate analysis by 9056 Ion Chromatography/Conductivity Detection
Metals analyses by Method 6010B ICP for Al, Cd, Cr, Cu, Zn, Fe and Pb

For testing the M115A2 artillery simulator devices the soil sampling will be as follows: After setting off 20 devices in the connex, 3 soil samples will be collected at a depth of 0-~~9~~" and 3 ~~soil samples will be collected at a depth of 9"-18~~".
3 5 point composites for three largest craters at 0-6"
Analyses will include: plus one sample of cardboard residue DAM 8/20/09
Perchlorate via Method 6850
Nitrate analysis by Method 9056 by Ion Chromatography/Conductivity Detection
Metals analyses by Method 6010B ICP for Al, Cd, Cr, Cu, Zn, Fe and Pb

6.0 SAMPLE PREPARATION

Samples will be handled in accordance with the IAGWSP QAPP. The 30-point MIS samples will not be ground. Grinding of the samples is not proposed due to concerns with the grinding affecting the metals analyses. To make the samples as representative as possible, the sample extraction process will be modified to include the following:

- Air drying on foil lined drying racks,
- Sieve through a #10 Sieve (2 mm),
- Homogenization by hand in zip-lock bags,
- Collect 30 1-gram sub-samples from the dried sample and mix thoroughly, and
- Collect 1-2 grams from the dried and mixed sample to be used for Method 9056 for Nitrate.
- Collect 1-2 grams and digest according to Method 3050B Nitric Acid Digestion for Soil (for metals analyses).
- Collect 25 grams from an additional sub-sample (30 1-2 gram sub-samples) for Method 6850 Perchlorate extracted in 100 ml's DI-water.

Standard reporting and minimum detection limits specified in the QAPP will be achieved for all analyses or the results may be rejected during data validation.

7.0 CLEANUP

Debris from the simulator devices will be collected and properly disposed. The sand will initially be left in the connex box pending evaluation of the sample results. Final disposition of the sand will be pending evaluation of the soil sample results. As noted in section 4, the ceiling and walls of the connex box will be dry brushed to remove any potential residue on them. No wipe sampling of the connex box is proposed as the dry brushing decontamination is considered appropriate and sufficient.

8.0 EVALUATION OF SAMPLE RESULTS

Results of soil sampling will be provided to stakeholders and discussed at a SARWG meeting. The results will be evaluated to determine if training with the simulator devices is acceptable in terms of environmental protection. The proposed connex box enclosure used in the testing should effectively eliminate effects from wind. The connex box will also concentrate the debris and constituents of the devices into a smaller than usual footprint area, thus maximizing the constituent concentrations in the sample area.

9.0 SCHEDULE AND NEXT STEPS

With approval of this Project Note, the MAARNG will begin coordination to perform the testing. Coordination steps include coordinating with Camp Edwards Headquarters, coordinating with Range Control, cleaning a connex box and moving clean sand to the test area. The regulators will be notified a week in advance of the scheduled testing/demonstration such that they have the opportunity to be present for this testing.

10.0 CONCURRENCE

Concurrence with the activities presented in this project note is represented by the signatures below:

20 August 09
USEPA Representative

8/27/09
MassDEP Representative

MAARNG Representative

EMC Representative

Table 1 Evaluation by USACE project chemist

Pyrotechnics Composition and Analysis

	M115A2 Artillery Ground Burst Simulator-Old	MA115A2 Artillery Ground Burst Simulator- New	Possible Analyses and Rationale
Whistle Composition 2 g	Sodium Salicylate 28%	Sodium Salicylate 28%	***None***-slow burning fuel in whistle composition; compressed in short tube, also used as an aspirin-free substitute, salt of organic acid (non-toxic)
	Potassium Perchlorate 69%	Potassium Perchlorate 69%	***Method 314.0 or 6850***, strong oxidant of whistle composition (perchlorate-free whistle under design by REDCOM)
	Red Gum (3%)	Red Gum (3%)	***None***- Binder made of complex polysaccaride gum guars from tree bark (cambian layer), mixed with alcohol. Similar to shellac; cohesive force to hold composition together
Flash Composition 40 g	Aluminum (flaked) 42.5%	Aluminum (flaked) 8 %	***6010B ICP-Al or none required***, Al; 2nd most abundant metal/element in earth crust
	Potassium Perchlorate 57.5%	Black Powder 92%	***Nitrate analysis or None***- Black powder is potassium nitrate, sulfur and carbon black; nitrate salt and elements S and C
Fuse Igniter Charge 41 mg	Potassium Chlorate 88%	Potassium Chlorate 88% KCLO3	***Method 314.0 or 6850 or none***; small amount (41 mg); strong oxidizer in igniter charge or low-explosives meaning that it burns rapidly rather than explodes.
	Charcoal 10%	Charcoal 10%	***None***- carbon
	Dextrin 2%	Dextrin 2%	***None***- low molecular weight carbohydrate produced by the hydrolysis of starch, biodegradable and non-toxic
Primer Paste 2g	Potassium Nitrate 67%	Potassium Nitrate 67%	***Nitrate analysis or none***; nitrate anion and nutrient, combusted in primer charge
	Charcoal 14%	Charcoal 14%	***None***- carbon
	Binder Cell Nitrate 10%	Binder Cell Nitrate 10%	***None***- same as nitrocellulose (NC), insoluble nitroester
	Sulfur 9%	Sulfur 9%	None- sulfur
Safety Fuse	Cotton	Cotton	***None***- insoluble fiber, non-toxic
	Black Powder	Black Powder	***Nitrate analysis or None***- Black powder is potassium nitrate, sulfur and carbon black; nitrate salt and

			elements S and C
Quick Match	Cotton	Cotton	***None***- insoluble fiber, non-toxic
	Black Powder	Black Powder	***Nitrate analysis or None***- Black powder is potassium nitrate, sulfur and carbon black; nitrate salt and elements S and C
Ignition Blasting Fuse (M3A1) Assembly	Steel wire	Steel wire	***None***- mainly iron
	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)	***6010B- Cd and Cr***
Ferrule	Steel Wire	Steel Wire	***None- mainly iron***
	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)	***6010B- Cd and Cr***
Ignition Charge Wire Assembly 0.3 g Copper Alloy	Copper 95% Zinc 4.92% Iron 0.05% Lead 0.03%	Copper 95% Zinc 4.92% Iron 0.05% Lead 0.03%	***6010B- Cu, Zn, Fe and Pb***

Hand Grenade Simulator

	M116A1 Hand Grenade Simulator-Old	**MA116A1 Hand Grenade Simulator- New**	**Possible Analyses and Rationale**
Flash Composition 40 g	Aluminum (flaked) 42.5%	Aluminum (flaked) 8 %	***6010B ICP-Al or none required***, Al; 2nd most abundant metal/element in earth crust
	Potassium Perchlorate 57.5%	Black Powder 92%	***Nitrate analysis or None***- Black powder is potassium nitrate, sulfur and carbon black; nitrate salt and elements S and C
Fuse Igniter Charge 41 mg	Potassium Chlorate 88%	Potassium Chlorate 88% KCLO3	***Method 314.0 or 6850 or none***; small amount (41 mg) strong oxidizer in igniter charge or low-order meaning that it burns rapidly rather than explodes.
	Charcoal 10%	Charcoal 10%	***None***- carbon
	Dextrin 2%	Dextrin 2%	***None***- low molecular carbohydrate produced by the

			hydrolysis of starch, biodegradable and non-toxic
Primer Paste 2g	Potassium Nitrate 67%	Potassium Nitrate 67%	***Nitrate analysis or none***; nitrate anion and nutrient, combusted in primer charge
	Charcoal 14%	Charcoal 14%	***None***- carbon
	Binder Cell Nitrate 10%	Binder Cell Nitrate 10%	***None***- same as nitrocellulose (NC); insoluble nitroester
	Sulfur 9%	Sulfur 9%	None- sulfur
Safety Fuse	Cotton	Cotton	***None***- insoluble fiber, non-toxic
	Black Powder	Black Powder	***Nitrate analysis or None***- Black powder is potassium nitrate, sulfur and carbon black; nitrate salt and elements S and C
	Prime Paste	Primer Paste	***See Above (Primer Paste)***
Ignition Blasting Fuse (M3A1) Assembly	Steel Wire	Steel Wire	***None***- mainly iron (Fe)
	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)	***6010B- Cd and Cr***
Ferrule	Steel Wire	Steel Wire	***None- mainly iron***
	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)	***6010B- Cd and Cr***
Ignition Charge Wire Assembly 0.3 g Copper Alloy	Copper 95% Zinc 4.92% Iron 0.05% Lead 0.03%	Copper 95% Zinc 4.92% Iron 0.05% Lead 0.03%	***6010B- Cu, Zn, Fe and Pb***

Photo of M115A2 Artillery simulator:

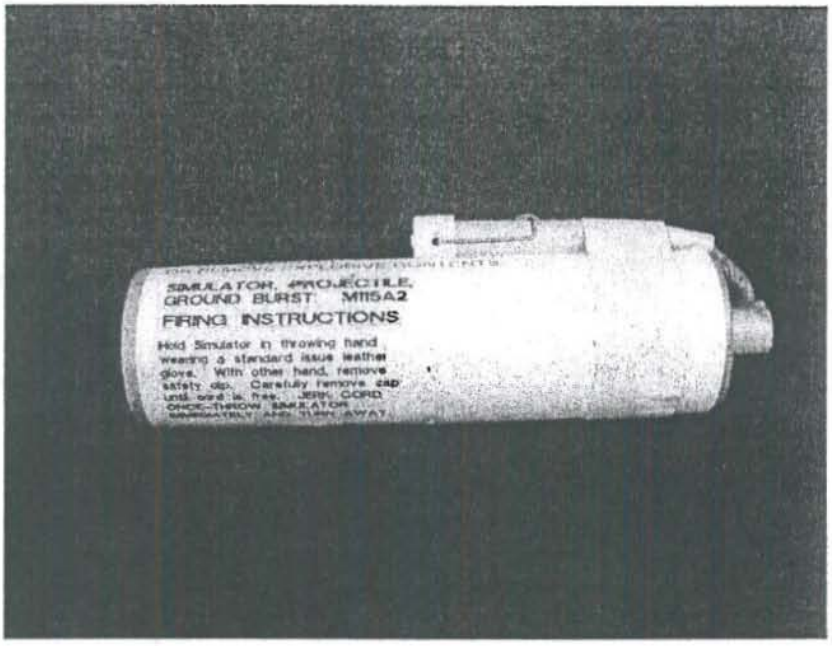

Photo of M116A1 grenade simulator:

All Samples

0-3" - 30 point composite (with 2 repl. cores)

0-6" - 3 crates - 5 point composite

label crates by size

1 sample cardboard residue

Reformulated Hand Grenade Simulator

Constituent Analysis

Flash Composition 40 g	Aluminum (flaked) 8 %
	Black Powder 92%
Fuse Igniter Charge 41 mg	Potassium Chlorate 88%
	Charcoal 10%
	Dextrin 2%
Primer Paste 2g	Potassium Nitrate 67%
	Charcoal 14%
	Binder Cell Nitrate 10%
	Sulfur 9%
Safety Fuse	Cotton
	Black Powder
	Primer Paste
Ignition Blasting Fuse (M3A1) Assembly	Steel Wire
	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)
Ferrule	Steel Wire
	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)
Ignition Charge Wire Assembly 0.3 g Copper Alloy	Copper 95%, Zinc 4.92% Iron 0.05%, Lead 0.03%

Pyro Test Analytical Results

Description	LOC_ID	Sample ID	Date Sampled	SBD	SED	Method	Analyte	Result	Qualifier	Units	RL	%RSD
PreTest 30 point MIS	ERCTEST	ERCTEST_PREA1	8/17/2009	0	0.75	SW846/6010B	Aluminum	726		mg/Kg	10	
PreTest 30 point MIS Rep1	ERCTEST	ERCTEST_PREA2	8/17/2009	0	0.75	SW846/6010B	Aluminum	620		mg/Kg	10	
PreTest 30 point MIS Rep2	ERCTEST	ERCTEST_PREA3	8/19/2009	0	0.75	SW846/6010B	Aluminum	610		mg/Kg	10	9.86
PreTest 30 point MIS	ERCTEST	ERCTEST_PREA1	8/17/2009	0	0.75	SW846/6010B	Cadmium	ND	U	mg/Kg	0.25	
PreTest 30 point MIS Rep1	ERCTEST	ERCTEST_PREA2	8/17/2009	0	0.75	SW846/6010B	Cadmium	ND	U	mg/Kg	0.25	
PreTest 30 point MIS Rep2	ERCTEST	ERCTEST_PREA3	8/19/2009	0	0.75	SW846/6010B	Cadmium	ND	U	mg/Kg	0.25	NA
PreTest 30 point MIS	ERCTEST	ERCTEST_PREA1	8/17/2009	0	0.75	SW846/6010B	Chromium	1.2		mg/Kg	0.5	
PreTest 30 point MIS Rep1	ERCTEST	ERCTEST_PREA2	8/17/2009	0	0.75	SW846/6010B	Chromium	1.2		mg/Kg	0.5	
PreTest 30 point MIS Rep2	ERCTEST	ERCTEST_PREA3	8/19/2009	0	0.75	SW846/6010B	Chromium	1.2		mg/Kg	0.5	0
PreTest 30 point MIS	ERCTEST	ERCTEST_PREA1	8/17/2009	0	0.75	SW846/6010B	Copper	0.96	J	mg/Kg	1.25	
PreTest 30 point MIS Rep1	ERCTEST	ERCTEST_PREA2	8/17/2009	0	0.75	SW846/6010B	Copper	0.77	J	mg/Kg	1.25	
PreTest 30 point MIS Rep2	ERCTEST	ERCTEST_PREA3	8/19/2009	0	0.75	SW846/6010B	Copper	0.89	J	mg/Kg	1.25	11.00
PreTest 30 point MIS	ERCTEST	ERCTEST_PREA1	8/17/2009	0	0.75	SW846/6010B	Iron	2440		mg/Kg	1.0	
PreTest 30 point MIS Rep1	ERCTEST	ERCTEST_PREA2	8/17/2009	0	0.75	SW846/6010B	Iron	2210		mg/Kg	1.0	
PreTest 30 point MIS Rep2	ERCTEST	ERCTEST_PREA3	8/19/2009	0	0.75	SW846/6010B	Iron	2630		mg/Kg	1.0	8.67
PreTest 30 point MIS	ERCTEST	ERCTEST_PREA1	8/17/2009	0	0.75	SW846/6010B	Lead	1.1		mg/Kg	0.5	
PreTest 30 point MIS Rep1	ERCTEST	ERCTEST_PREA2	8/17/2009	0	0.75	SW846/6010B	Lead	0.8		mg/Kg	0.5	
PreTest 30 point MIS Rep2	ERCTEST	ERCTEST_PREA3	8/19/2009	0	0.75	SW846/6010B	Lead	1.3		mg/Kg	0.5	23.59
PreTest 30 point MIS	ERCTEST	ERCTEST_PREA1	8/17/2009	0	0.75	SW846/6010B	Zinc	3.4		mg/Kg	1.0	
PreTest 30 point MIS Rep1	ERCTEST	ERCTEST_PREA2	8/17/2009	0	0.75	SW846/6010B	Zinc	2.6		mg/Kg	1.0	
PreTest 30 point MIS Rep2	ERCTEST	ERCTEST_PREA3	8/19/2009	0	0.75	SW846/6010B	Zinc	2.7		mg/Kg	1.0	15.03
PreTest 30 point MIS	ERCTEST	ERCTEST_PREA1	8/17/2009	0	0.75	SW846/9056	Nitrate as N	ND	U	mg/Kg	0.98	
PreTest 30 point MIS Rep1	ERCTEST	ERCTEST_PREA2	8/17/2009	0	0.75	SW846/9056	Nitrate as N	ND	U	mg/Kg	1.00	
PreTest 30 point MIS Rep2	ERCTEST	ERCTEST_PREA3	8/19/2009	0	0.75	SW846/9056	Nitrate as N	ND	U	mg/Kg	0.97	
Post Test 30 point MIS	ERCTEST	ERCTEST_POA1	8/20/2009	0	0.25	SW846/6010B	Aluminum	747		mg/Kg	10	
Post Test 30 point MIS Rep1	ERCTEST	ERCTEST_POA2	8/20/2009	0	0.25	SW846/6010B	Aluminum	695		mg/Kg	10	
Post Test 30 point MIS Rep2	ERCTEST	ERCTEST_POA3	8/20/2009	0	0.25	SW846/6010B	Aluminum	591		mg/Kg	10	11.72
Post Test 30 point MIS	ERCTEST	ERCTEST_POA1	8/20/2009	0	0.25	SW846/6010B	Cadmium	ND	U	mg/Kg	0.25	
Post Test 30 point MIS Rep1	ERCTEST	ERCTEST_POA2	8/20/2009	0	0.25	SW846/6010B	Cadmium	ND	U	mg/Kg	0.25	
Post Test 30 point MIS Rep2	ERCTEST	ERCTEST_POA3	8/20/2009	0	0.25	SW846/6010B	Cadmium	ND	U	mg/Kg	0.25	NA
Post Test 30 point MIS	ERCTEST	ERCTEST_POA1	8/20/2009	0	0.25	SW846/6010B	Chromium	1.7		mg/Kg	0.5	
Post Test 30 point MIS Rep1	ERCTEST	ERCTEST_POA2	8/20/2009	0	0.25	SW846/6010B	Chromium	1.6		mg/Kg	0.5	
Post Test 30 point MIS Rep2	ERCTEST	ERCTEST_POA3	8/20/2009	0	0.25	SW846/6010B	Chromium	1.3		mg/Kg	0.5	13.58
Post Test 30 point MIS	ERCTEST	ERCTEST_POA1	8/20/2009	0	0.25	SW846/6010B	Copper	1.1	J	mg/Kg	1.25	
Post Test 30 point MIS Rep1	ERCTEST	ERCTEST_POA2	8/20/2009	0	0.25	SW846/6010B	Copper	1.5		mg/Kg	1.25	
Post Test 30 point MIS Rep2	ERCTEST	ERCTEST_POA3	8/20/2009	0	0.25	SW846/6010B	Copper	0.97	J	mg/Kg	1.25	23.21
Post Test 30 point MIS	ERCTEST	ERCTEST_POA1	8/20/2009	0	0.25	SW846/6010B	Iron	3150		mg/Kg	1.0	
Post Test 30 point MIS Rep1	ERCTEST	ERCTEST_POA2	8/20/2009	0	0.25	SW846/6010B	Iron	4990		mg/Kg	1.0	
Post Test 30 point MIS Rep2	ERCTEST	ERCTEST_POA3	8/20/2009	0	0.25	SW846/6010B	Iron	2170		mg/Kg	1.0	41.66
Post Test 30 point MIS	ERCTEST	ERCTEST_POA1	8/20/2009	0	0.25	SW846/6010B	Lead	1.2		mg/Kg	0.5	
Post Test 30 point MIS Rep1	ERCTEST	ERCTEST_POA2	8/20/2009	0	0.25	SW846/6010B	Lead	1.3		mg/Kg	0.5	

SBD = Sample beginning depth
SED = Sample ending depth

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Pyro Test Analytical Results

Description	LOC_ID	Sample ID	Date Sampled	SBD	SED	Method	Analyte	Result	Qualifier	Units	RL	%RSD
Post Test 30 point MIS Rep2	ERCTEST	ERCTEST_POA3	8/20/2009	0	0.25	SW846/6010B	Lead	1.0		mg/Kg	0.5	13.09
Post Test 30 point MIS	ERCTEST	ERCTEST_POA1	8/20/2009	0	0.25	SW846/6010B	Zinc	3.4		mg/Kg	1.0	
Post Test 30 point MIS Rep1	ERCTEST	ERCTEST_POA2	8/20/2009	0	0.25	SW846/6010B	Zinc	5.1		mg/Kg	1.0	
Post Test 30 point MIS Rep2	ERCTEST	ERCTEST_POA3	8/20/2009	0	0.25	SW846/6010B	Zinc	2.5		mg/Kg	1.0	36.01
Post Test 30 point MIS	ERCTEST	ERCTEST_POA1	8/20/2009	0	0.25	SW846/9056	Nitrate as N	15		mg/Kg	0.99	
Post Test 30 point MIS Rep1	ERCTEST	ERCTEST_POA2	8/20/2009	0	0.25	SW846/9056	Nitrate as N	13		mg/Kg	0.98	
Post Test 30 point MIS Rep2	ERCTEST	ERCTEST_POA3	8/20/2009	0	0.25	SW846/9056	Nitrate as N	16		mg/Kg	0.99	10.41
Pyro Scrap Rep1	ERCTEST	ERCTEST_SCR1	9/4/2009	0	0	SW846/6010B	Aluminum	2340		mg/Kg	10	
Pyro Scrap Rep2	ERCTEST	ERCTEST_SCR2	9/4/2009	0	0	SW846/6010B	Aluminum	2760		mg/Kg	10	
Pyro Scrap Rep3	ERCTEST	ERCTEST_SCR3	9/4/2009	0	0	SW846/6010B	Aluminum	2010		mg/Kg	10	15.86
Pyro Scrap Rep1	ERCTEST	ERCTEST_SCR1	9/4/2009	0	0	SW846/6010B	Cadmium	0.093	J	mg/Kg	0.25	
Pyro Scrap Rep2	ERCTEST	ERCTEST_SCR2	9/4/2009	0	0	SW846/6010B	Cadmium	0.8	J	mg/Kg	0.25	
Pyro Scrap Rep3	ERCTEST	ERCTEST_SCR3	9/4/2009	0	0	SW846/6010B	Cadmium	0.2	J	mg/Kg	0.25	104.59
Pyro Scrap Rep1	ERCTEST	ERCTEST_SCR1	9/4/2009	0	0	SW846/6010B	Chromium	2.7		mg/Kg	0.5	
Pyro Scrap Rep2	ERCTEST	ERCTEST_SCR2	9/4/2009	0	0	SW846/6010B	Chromium	3.0		mg/Kg	0.5	
Pyro Scrap Rep3	ERCTEST	ERCTEST_SCR3	9/4/2009	0	0	SW846/6010B	Chromium	2.9		mg/Kg	0.5	5.33
Pyro Scrap Rep1	ERCTEST	ERCTEST_SCR1	9/4/2009	0	0	SW846/6010B	Copper	12.5		mg/Kg	1.25	
Pyro Scrap Rep2	ERCTEST	ERCTEST_SCR2	9/4/2009	0	0	SW846/6010B	Copper	13.1		mg/Kg	1.25	
Pyro Scrap Rep3	ERCTEST	ERCTEST_SCR3	9/4/2009	0	0	SW846/6010B	Copper	16.4		mg/Kg	1.25	15.00
Pyro Scrap Rep1	ERCTEST	ERCTEST_SCR1	9/4/2009	0	0	SW846/6010B	Iron	350		mg/Kg	1.0	
Pyro Scrap Rep2	ERCTEST	ERCTEST_SCR2	9/4/2009	0	0	SW846/6010B	Iron	439		mg/Kg	1.0	
Pyro Scrap Rep3	ERCTEST	ERCTEST_SCR3	9/4/2009	0	0	SW846/6010B	Iron	297		mg/Kg	1.0	19.82
Pyro Scrap Rep1	ERCTEST	ERCTEST_SCR1	9/4/2009	0	0	SW846/6010B	Lead	3.4		mg/Kg	0.5	
Pyro Scrap Rep2	ERCTEST	ERCTEST_SCR2	9/4/2009	0	0	SW846/6010B	Lead	3.1		mg/Kg	0.5	
Pyro Scrap Rep3	ERCTEST	ERCTEST_SCR3	9/4/2009	0	0	SW846/6010B	Lead	3.0		mg/Kg	0.5	6.57
Pyro Scrap Rep1	ERCTEST	ERCTEST_SCR1	9/4/2009	0	0	SW846/6010B	Zinc	127		mg/Kg	1.0	
Pyro Scrap Rep2	ERCTEST	ERCTEST_SCR2	9/4/2009	0	0	SW846/6010B	Zinc	517		mg/Kg	1.0	
Pyro Scrap Rep3	ERCTEST	ERCTEST_SCR3	9/4/2009	0	0	SW846/6010B	Zinc	28		mg/Kg	1.0	115.41
Pyro Scrap Rep1	ERCTEST	ERCTEST_SCR1	9/4/2009	0	0	SW846/9056	Nitrate as N	100		mg/Kg	11.0	
Pyro Scrap Rep2	ERCTEST	ERCTEST_SCR2	9/4/2009	0	0	SW846/9056	Nitrate as N	82		mg/Kg	10.0	
Pyro Scrap Rep3	ERCTEST	ERCTEST_SCR3	9/4/2009	0	0	SW846/9056	Nitrate as N	87		mg/Kg	9.3	10.36
PreTest 30 point MIS	ERCTEST	ERCTEST_PREB1	8/17/2009	0.75	1.5	SW846/6010B	Aluminum	954		mg/Kg	10	
9-18 inches	ERCTEST	ERCTEST_PREB1	8/17/2009	0.75	1.5	SW846/6010B	Cadmium	ND	U	mg/Kg	0.25	
	ERCTEST	ERCTEST_PREB1	8/17/2009	0.75	1.5	SW846/6010B	Chromium	1.5		mg/Kg	0.5	
	ERCTEST	ERCTEST_PREB1	8/17/2009	0.75	1.5	SW846/6010B	Copper	0.99	J	mg/Kg	1.25	
	ERCTEST	ERCTEST_PREB1	8/17/2009	0.75	1.5	SW846/6010B	Iron	2930		mg/Kg	1.0	
	ERCTEST	ERCTEST_PREB1	8/17/2009	0.75	1.5	SW846/6010B	Lead	1.4		mg/Kg	0.5	
	ERCTEST	ERCTEST_PREB1	8/17/2009	0.75	1.5	SW846/6010B	Zinc	4.1		mg/Kg	1.0	
	ERCTEST	ERCTEST_PREB1	8/17/2009	0.75	1.5	SW846/9056	Nitrate as N	ND	U	mg/Kg	0.96	
Post Test Crater1 (5 point)	ERCTEST	ERCTEST_POCR1	8/20/2009	0	0.5	SW846/6010B	Aluminum	536		mg/Kg	10	

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Pyro Test Analytical Results

Description	LOC_ID	Sample ID	Date Sampled	SBD	SED	Method	Analyte	Result	Qualifier	Units	RL	%RSD
	ERCTEST	ERCTEST_POCR1	8/20/2009	0	0.5	SW846/6010B	Cadmium	ND	U	mg/Kg	0.25	
	ERCTEST	ERCTEST_POCR1	8/20/2009	0	0.5	SW846/6010B	Chromium	1.5		mg/Kg	0.5	
	ERCTEST	ERCTEST_POCR1	8/20/2009	0	0.5	SW846/6010B	Copper	0.91	J	mg/Kg	1.25	
	ERCTEST	ERCTEST_POCR1	8/20/2009	0	0.5	SW846/6010B	Iron	3480		mg/Kg	1.0	
	ERCTEST	ERCTEST_POCR1	8/20/2009	0	0.5	SW846/6010B	Lead	1.2		mg/Kg	0.5	
	ERCTEST	ERCTEST_POCR1	8/20/2009	0	0.5	SW846/6010B	Zinc	3.0		mg/Kg	1.0	
	ERCTEST	ERCTEST_POCR1	8/20/2009	0	0.5	SW846/9056	Nitrate as N	2.5		mg/Kg	0.99	
Post Test Crater2 (5 point)	ERCTEST	ERCTEST_POCR2	8/20/2009	0	0.5	SW846/6010B	Aluminum	831		mg/Kg	10	
	ERCTEST	ERCTEST_POCR2	8/20/2009	0	0.5	SW846/6010B	Cadmium	ND	U	mg/Kg	0.25	
	ERCTEST	ERCTEST_POCR2	8/20/2009	0	0.5	SW846/6010B	Chromium	2.5		mg/Kg	0.5	
	ERCTEST	ERCTEST_POCR2	8/20/2009	0	0.5	SW846/6010B	Copper	1.3		mg/Kg	1.25	
	ERCTEST	ERCTEST_POCR2	8/20/2009	0	0.5	SW846/6010B	Iron	3190		mg/Kg	1.0	
	ERCTEST	ERCTEST_POCR2	8/20/2009	0	0.5	SW846/6010B	Lead	1.2		mg/Kg	0.5	
	ERCTEST	ERCTEST_POCR2	8/20/2009	0	0.5	SW846/6010B	Zinc	3.5		mg/Kg	1.0	
	ERCTEST	ERCTEST_POCR2	8/20/2009	0	0.5	SW846/9056	Nitrate as N	8.1		mg/Kg	0.96	
Post Test Crater3 (5 point)	ERCTEST	ERCTEST_POCR3	8/20/2009	0	0.5	SW846/6010B	Aluminum	752		mg/Kg	10	
	ERCTEST	ERCTEST_POCR3	8/20/2009	0	0.5	SW846/6010B	Cadmium	ND	U	mg/Kg	0.25	
	ERCTEST	ERCTEST_POCR3	8/20/2009	0	0.5	SW846/6010B	Chromium	1.4		mg/Kg	0.5	
	ERCTEST	ERCTEST_POCR3	8/20/2009	0	0.5	SW846/6010B	Copper	1.2		mg/Kg	1.25	
	ERCTEST	ERCTEST_POCR3	8/20/2009	0	0.5	SW846/6010B	Iron	3050		mg/Kg	1.0	
	ERCTEST	ERCTEST_POCR3	8/20/2009	0	0.5	SW846/6010B	Lead	1.2		mg/Kg	0.5	
	ERCTEST	ERCTEST_POCR3	8/20/2009	0	0.5	SW846/6010B	Zinc	4.0		mg/Kg	1.0	
	ERCTEST	ERCTEST_POCR3	8/20/2009	0	0.5	SW846/9056	Nitrate as N	10		mg/Kg	0.99	
Pyro Scrap	ERCTEST	ERCTEST_SCR	8/20/2009	0	0	SW846/6010B	Aluminum	2710		mg/Kg	10	
	ERCTEST	ERCTEST_SCR	8/20/2009	0	0	SW846/6010B	Cadmium	ND	U	mg/Kg	0.25	
	ERCTEST	ERCTEST_SCR	8/20/2009	0	0	SW846/6010B	Chromium	3.1		mg/Kg	0.5	
	ERCTEST	ERCTEST_SCR	8/20/2009	0	0	SW846/6010B	Copper	15	J	mg/Kg	1.25	
	ERCTEST	ERCTEST_SCR	8/20/2009	0	0	SW846/6010B	Iron	408		mg/Kg	1.0	
	ERCTEST	ERCTEST_SCR	8/20/2009	0	0	SW846/6010B	Lead	4.2		mg/Kg	0.5	
	ERCTEST	ERCTEST_SCR	8/20/2009	0	0	SW846/6010B	Zinc	27.2		mg/Kg	1.0	
	ERCTEST	ERCTEST_SCR	8/20/2009	0	0	SW846/9056	Nitrate as N	110		mg/Kg	11.00	

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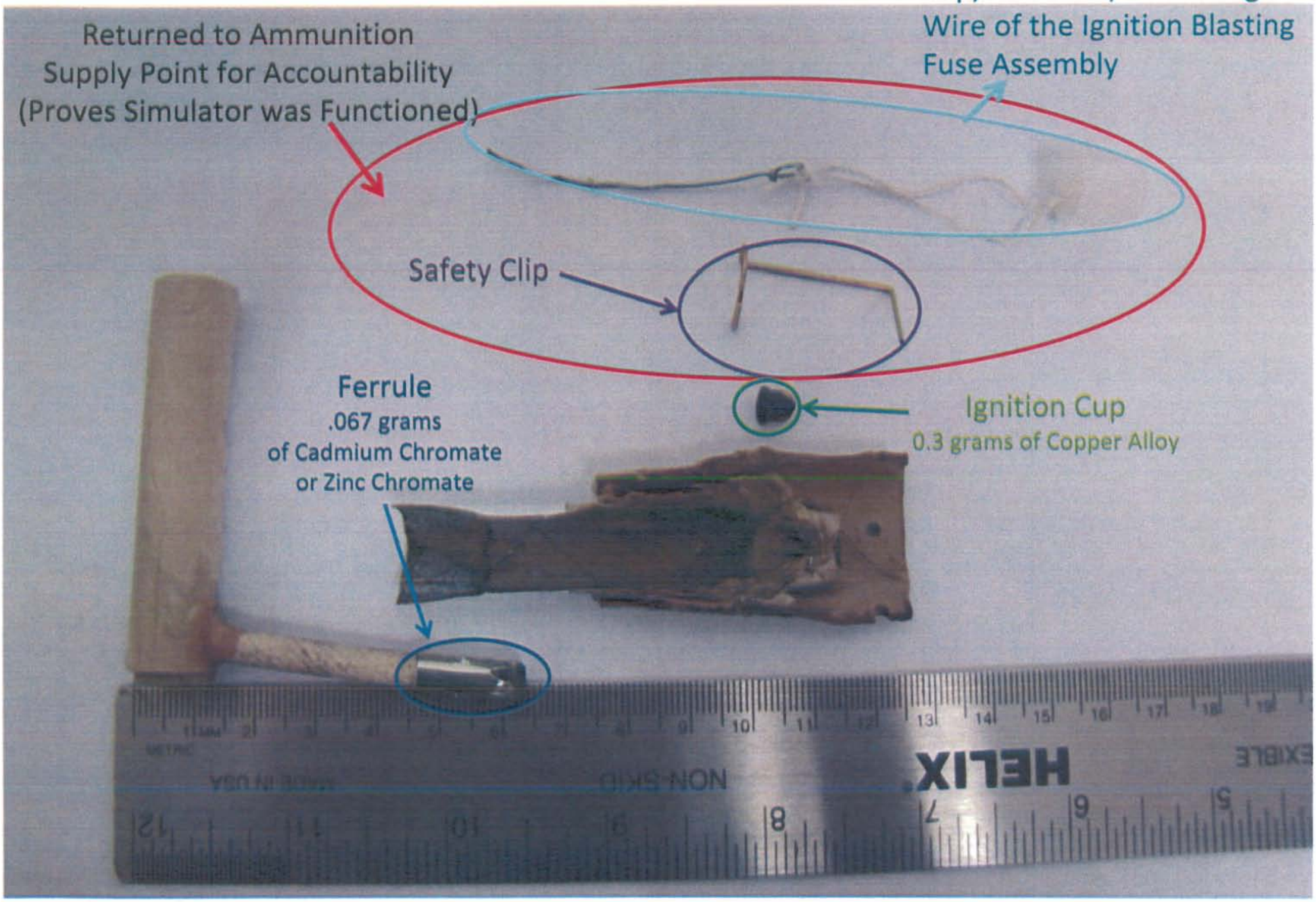

DEPARTMENT OF THE ARMY
MASSACHUSETTS ARMY NATIONAL GUARD TRAINING SITE
CAMP EDWARDS, MASSACHUSETTS 02542-5003

CPED-PTD-OIC

22 September 2009

MEMORANDUM To Deputy Director Environmental Readiness Center (E&RC) Dr. Michael Ciaranca, Building 1204 West Inner Road, Camp Edwards, MA 02542-5003

SUBJECT: Use of Pyrotechnic Simulator on Camp Edwards, Massachusetts Army National Guard Training Site.

1. The MAARNG proposes to use the M116A1 hand grenade pyrotechnic simulator at Camp Edwards. The goal of utilizing this pyrotechnic simulator is to increase the battle focus of our Soldiers preparing for combat operations. Army Warrior Task and Battle Drill training requires a high level of authenticity and realism in order to teach the skills necessary to function in the "fog of war". The use of these environmentally appropriate simulators serves a key role in this endeavor and the use of this device is necessary and suitable as outlined below:

2. Many of the tasks that our Soldiers are required to train on prior to deployment concentrate on reacting to contact. This contact normally takes the form of an explosion from either indirect artillery fire or improvised explosive devices. Without the use of these new simulators, our troops are forced to imagine the sights and sounds of an explosion, versus actually reacting to an event. If the realism is not present in the training event, the battle focus can be lost.

3. Camp Edwards' mission is to support the training needs of the Massachusetts Army National Guard. To meet that mission we need to take into account the future of the training areas and the reserve. This proposed environmentally appropriate simulator meets both of these criteria. It allows for the proper training of our Soldiers, while preserving our highly valued training area, and the Upper Cape Water Supply.

4. Point of contact for this matter is the Chief, Plans and Training Division, Camp Edwards, MA. Please feel free to contact me at Michael.koski@us.army.mil or by phone at (508)968-5888.

MICHAEL J. KOSKI
MAJ, LG
Plans and Training Officer