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LETTER DISCUSSING THE DEMILITARIZATION FURNACE NWS EARLE NJ
2/27/1995
NAVFAC NORTHERN



DEPARTMENT OF THE NAVY

NAVAL SEA SYSTEMS COMMAND
WASHINGTON, DC 20362-5101

REPLY REFER TO
1570
Ser 6423/5100

EARLE FILES
BOX #

A

27 FEB 1985

New Jersey Department of Environmental
Division of Waste Management
32 East Hanover Street
Trenton, NJ 08625

Gentlemen:

The Navy has in operation at the Naval Weapons Station (WPNSTA) Earle, Colts Neck, New Jersey a Rotary Demilitarization Furnace Facility. The facility consists of a 4-section rotary furnace and an emission control system which includes a cyclone separator, a baghouse particulate collector, and an induction fan. The facility is a specially designed system for recovering metals from ammunition items by the thermal destruction of the explosive contained in the ammunition. A description of the furnace and emission control system are included as enclosure (1). A list of the ammunition items which are processed through the furnace, including the chemical makeup of explosive ingredients, is forwarded as enclosure (2).

The WPNSTA Earle furnace was installed in 1977 to accomplish the required demilitarization of articles designated as Arms, Ammunition and Implements of War mandated by Federal Regulation (22 CFR 121) through a safe and environmentally acceptable process facilitating recovery of the valuable metals. The furnace was specifically developed for processing small arms ammunition, fuses, cartridge actuated devices, etc., destroying the small quantity of explosives while reclaiming the bulk volume of recyclable metals. While the explosives and propellents contained in these items are recyclable, the small quantity negates economic recovery. Although a limited number of reactive (Class A and B) explosive items can be safely processed through the furnace, small arms ammunition and other Class C explosive items are the major workload for the furnace.

In the past, ammunition demilitarization facilities, such as this furnace, have not been considered hazardous waste treatment or disposal facilities since the bulk of the volume processed is recovered for recycling. The Military Departments Joint Conventional Ammunition Panel (JCAP) has forwarded, to the Office of Solid Waste, U.S. Environmental Protection Agency, comments relative to the regulations proposed in the 4 April 1983 Federal Register. In general, the comments advised that items are transferred to the demilitarization inventory from active stocks as a result of their being excess to current requirements, unserviceability or for a variety of other reasons. Requirements as well as technology are constantly

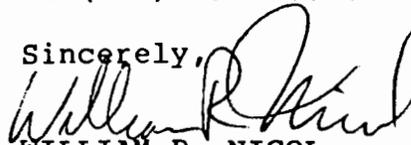
changing resulting in frequent recall of items from the demilitarization inventory to active stocks for use as originally intended and for modification, conversion, component reclamation or for test purposes. For this reason the ammunition in the demilitarization inventory should not be classified as hazardous waste until demilitarization actually occurs, and then only where the demilitarization process results in destruction of the volume rather than reclamation of the volume. The comments also state that the military demilitarization furnaces should not be classified as hazardous waste incinerators, but be included under the definition of "Industrial Furnaces". The JCAP position is that the demilitarization furnaces qualify as industrial furnaces for the following reasons: (1) They are integral components of the manufacturing processes as part of the overall process control; (2) They use flame combustion and elevated temperature to accomplish recovery of materials; and (3) The primary objective is not disposal, but demilitarization of articles designated as Arms, Ammunition and Implements of War, in accordance with Federal Regulation (22 CFR 121), through a process permitting recovery and recycling of the bulk of the material processed.

The demilitarization furnace is regulated by Department of Defense, Navy and WPNSTA Earle instructions and constraints which provide numerous safeguards to protect the public health, welfare and environment. All of the furnace operations are controlled by Depot Maintenance Work Requirements and Standard Operating Procedures which establish the required handling and processing parameters for each type of ammunition authorized for furnace processing. Accompanying these regulations is an Approved Items Data List which identifies each specific ammunition item approved for processing through the furnace. Items are included on the Approved Item Data List after tests and analysis are conducted on specific types of items to establish safe and environmentally acceptable processing controls which include temperature, dwell time and feed rates for each item. The furnace complies with State of New Jersey air emission regulations for a process furnace as per Subchapter 6, Chapter 27, Title 7 of the New Jersey Administrative Code, New Jersey Department of Health.

Upon review of the WPNSTA Earle Rotary Demilitarization Furnace Facility by your office it is requested that an official classification of the facility be provided the Navy. For the forementioned reasons, the Navy feels the furnace qualifies for a variance or exemption from the Hazardous Waste Permit requirements. It is requested that your response be forwarded to the Naval Sea Systems Command, Attn: SEA 6423, Washington, DC 20362-5101 with a copy to the Weapons Quality Engineering Center, Naval Weapons Support Center, Attn: Code 3025, Crane, In 47522.

Any questions relative to information provided herein or requirements for additional information should be directed to the Navy Sea Systems Command, Attn: SEA 6423, Washington, DC 20362-5101, telephone (202) 692-0870.

Sincerely,



WILLIAM R. NICOL
Division Director (Acting)
Ammunition Management Division
By direction of the Commander

Encl:

- (1) Description of Rotary Demilitarization Furnace
- (2) List of Ammunition Items

Copy to:

NAVWPNSUPPCEN, Crane IN (Codes 3025 and 9052)
WPNSTA Earle, Colts Neck, NJ (Code ~~204~~ and 204D)
NORTHNAVFACENGCOM (Code 114) *0921B*
Region II, U.S. Environmental Protection Agency (Attn: Les Nagel)

ROTARY DEMILITARIZATION FURNACE

1. Description

a. The Naval Weapons Station Earle Rotary Demilitarization Furnace, figure 1, consists of a rotating retort furnace, a cyclone, a baghouse and an induction fan. The demilitarization furnace is a specially designed furnace for the thermal processing of munitions and munition components. The primary objective of the furnace is not disposal but demilitarization and recovery of valuable metal components. Department of Defense instructions require demilitarization of munition list items prior to release to the private sector. Demilitarization is the act of removing the military offensive or defensive advantages inherent in certain types of equipment or material. The term encompasses mutilation, cutting, crushing, scrapping, melting, burning, or alteration designed to prevent the further use of this equipment and material for its originally intended military or lethal purpose. Demilitarization is a part of the munitions of munitions components life cycle.

The explosive content of items processed through the furnace are a small percentage of the total weight of the item. Items are processed through the furnace which contain no explosive but require demilitarization because of a classified configuration or component. Several tons of valuable metals will be generated annually by the demilitarization furnace.

b. Deactivation Furnace. The furnace consists of feed and discharge conveyors, a four section cast-steel retort, a fuel-oil burner, a combustion air blower, an exhaust stack, and control panels. The furnace provides a means of demilitarizing ammunition, explosives, and other dangerous articles (AEDA) in a safe and environmentally acceptable manner.

(1) The furnace is operated within a steel and concrete barricade which provides protection for the furnace operating personnel. Ammunition items are manually placed upon the feed conveyor outside the barricade enclosure at a feed rate that assures maximum safety to personnel and minimum possibility of damage to equipment in event of an incident. The feed conveyor carries the ammunition to a point above the furnace and drops the items down a chute into the furnace. The ammunition is advanced through the retort toward the flame at the burner end by means of spiral flights which are an integral part of the retort casting. As the items approach the flame and become heated they either detonate or burn freely, depending upon the munition configuration and characteristics. High order detonations are contained by the thick cast steel retort walls. The spiral flights provide physical separation of the ammunition or groups of ammunition, discouraging sympathetic propagation of detonations and defeating fragments generated by detonations. The metal part components of the ammunition are then discharged from the furnace.

(2) The capability of the furnace ranges from demilitarization of small arms ammunition (.30 cal., .50 cal., 7.62mm, 20mm, etc.), to fuzes, primers, cartridge actuated devices, and illuminating signals. The rated capacity of the furnace to withstand detonations is 39 grams of explosive. The explosive weight is a small percentage of the total weight of the item, 10% of less for most items. The metal reclaimed from the cases include steel, brass, aluminum and lead.

(3) Item feed rates, residence time within the furnace (determined by speed of revolution of the retort), and operating temperatures will be established for each item prior to production operations by controlled testing.

(4) The furnace is operated with Number 2 fuel oil, consumed at rates of 6 GPH at low-fire to 23 GPH at high-fire. The optimum operating temperature has been established for each type of ammunition. The temperature is maintained by the Temperature Recorder/Controller in the Main Control Panel. Two thermocouples continuously record furnace temperatures. One thermocouple is located immediately above the flame, the other at the base of the exhaust stack. They provide a reference to the Temperature Recorder/Controller to maintain the desired furnace operating temperature to assure complete demilitarization. The Recorder/Controller is set to control stack temperature from 350 to 450°F, depending on the items to be burned.

(5) A low-pressure draft induction fan draws combustion air through the metal-parts discharge opening and an annular opening where the retort enters the discharge housing. The air flow created by the draft induction fan, is maintained uniform by operation of dampers. This compensates for increases or decreases in combustion air as the furnace goes from low to high fire. During low fire periods, more air is drawn through the damper openings.

c. Cyclone. The cyclone, removes the larger heavier particles from the exhaust gas stream. The cyclone imparts a vortex-like flow to the gas stream causing an inertial separation of the heavier particles. A slide-gate valve is located at the bottom where these dust particles are removed. The cyclone serves a dual purpose in that it also acts as a flame/spark arrestor.

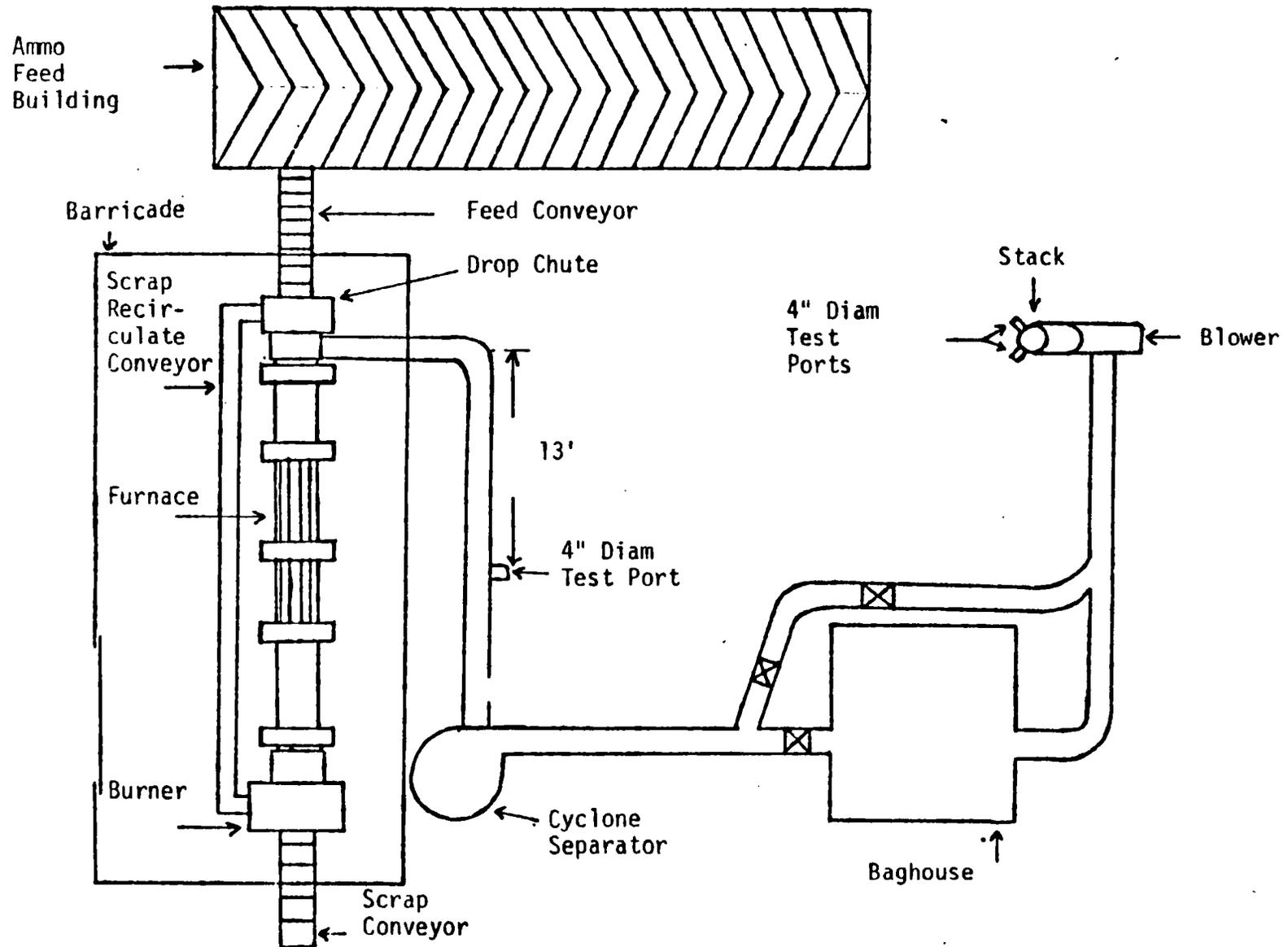
d. Baghouse. The Continental Air Products baghouse, is a dust-tight compartment containing 144 filter bags fitted over wire retainers and clamped to collars attached to a tube sheet. Venturi shaped nozzles extend into the filter bags. The baghouse is designed for a maximum capacity of 4500 ACFM at 400°F.

(1) Filter Bags - There are 144 - 6" diameter x 10' long Nomex felt/glass fiber filter bags with a total of 2260 ft² for an air cloth ratio of 1.95 SCFM/sq.ft.

(2) Hopper - The hopper provides an inlet for the flue gases and an outlet for the collected dust. The hopper outlet is equipped with slide-gate valve to discharge the dust particles.

(3) Bag Cleaning Mechanism - Surges of high pressure air, discharged through the filter bags from the clean air side, remove collected particles from the bag. The high pressure air is discharged through an orifice into one row of bags by opening a valve and permitting the air to flow through a blowtube. A timing mechanism mounted inside the main control panel, controls the operation sequence of the air valves by actuating a normally closed solenoid valve. Opening the solenoid valve causes momentary actuation of an associated diaphragm valve to let air into the blowtube.

(4) Manometer - A manometer mounted on the baghouse registers pressure differential across the bags and indicates the condition of the filter bags.



NWS EARLE DEMIL FURNACE AND POLLUTION CONTROL EQUIPMENT LOCATION DIAGRAM (OVERHEAD VIEW)

FURNACE ITEMS

1. Maximum explosive weights for the furnace have been tentatively established as:

a. EXPLOSIVE (Class 7) .086 lb

TETRYL (2, 4, 6 - Trinitrophenylmethyl nitramine)
TNT (2, 4, 6 - Trinitrotoluene)
RDX (Cyclotrimethylenetrinitramine)
COMPOSITION B (TNT/RDX/Wax)
PETN (Pentaerythrite Tetranitrate)
BLACK POWDER (Potassium Nitrate/Sulfur/Charcoal)
LEAD AZIDE Normally present in very small quantities
LEAD STYPHNATE as primer or initiators
CH-6 (RDX/calcium stearate/graphite/polyisobutylene)

b. PROPELLANT (Smokeless Powder)-.15 lb

SINGLE BASE (Nitrocellulose/diphenylamine/dinitrotoluenen coating)
DOUBLE BASE (Nitrocellulose/nitroglycerin/diphenylamine)

c. PYROTECHNIC - .70 lb

METAL POWDER/OXIDIZER/BINDER

2. The following types of items, not exceeding the established explosive weights, will be processed through the furnace.

a. SMALL ARMS AMMUNITION (.22 cal. through 20mm)

SMOKELESS POWDER (Single Base)
INCENDIARY (Aluminum/perchlorate or chlorate)
TRACER MIX (Magnesium or aluminum/nitrates)
PRIMERS (Lead azide or lead styphnate)

b. FUZES

BOOSTER (Tetryl/Composition B/TNT/RDX/Black Powder)
DETONATORS (Lead azide or lead styphnate)
DELAYS (Black Powder or boron/lead oxide or manganese/iron oxide/
diatomaceous earth)
PRIMERS (Lead azide or lead styphnate)

c. DETONATORS

LEAD AZIDE
LEAD STYPHNATE

d. CARTRIDGE ACTUATED DEVICES

SMOKELESS POWDER (Single Base)

e. SIGNALS

ILLUMINATING COMPOSITION

METALS (Aluminum or magnesium)
OXIDIZERS (Nitrates, chlorates, perchlorates)
BINDERS (Laminac or epoxy or teflon, etc.)

f. IGNITERS

BLACK POWDER

g. BLASTING CAPS

PETN
RDX

h. HAND GRENADES (practice)

BLACK POWDER

i. SAFE-ARMING DEVICES

LEAD AZIDE
PETN/CH-6
RDX
CH-6

j. TRACERS

ILLUMINATING COMPOSITION

Magnesium or Aluminum
Nitrate or Perchlorates
Wax or Linseed Oil

STARTER MIX

Barium Peroxide
Aluminum or Magnesium

k. PRIMERS

BLACK POWDER