

Blue Grass Chemical Agent Destruction Pilot Plant

Clean Air Act

Air Permit Application



Submitted To:

**The Kentucky Department for Environmental Protection,
Division for Air Quality
803 Schenkel Lane
Frankfort, Kentucky 40601**

Submitted By:

**Blue Grass Army Depot
2091 Kingston Highway
Richmond, Kentucky 40475-5060**

Prepared By:

**Bechtel Parsons Blue Grass
301 Highland Park Drive
Richmond, Kentucky 40475**



September 2004



DEPARTMENT OF THE ARMY
BLUE GRASS ARMY DEPOT
2091 KINGSTON HIGHWAY
RICHMOND, KENTUCKY 40475-5060

REPLY TO
ATTENTION OF

September 20, 2004

Environmental Office

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PERMIT REVIEW BRANCH
DIVISION FOR AIR QUALITY

Mr. Jim Morse
Commonwealth of Kentucky
Department for Environmental Protection
Division for Air Quality
Permit Review Branch, Permit Support Section
803 Schenkel Lane
Frankfort, KY 40601

RE: Blue Grass Chemical Agent-Destruction Pilot Plant
Air Permit Application for Addition of New Facilities
Blue Grass Army Depot ID # 21-151-00013

Dear Mr. Morse:

The Blue Grass Army Depot (BGAD) is submitting the enclosed air permit application for the addition of new facilities located in Richmond, Kentucky. The facilities are associated with the chemical agent-destruction pilot plant which is referred to as the Blue Grass Chemical Agent-Destruction Pilot Plant (BGCAPP). We are making specific requests regarding the processing of our BGCAPP air permit application and respectfully request your consideration in this matter.

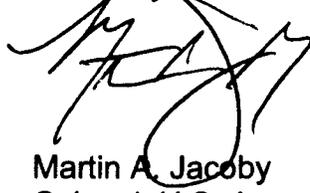
Although the proposed BGCAPP facilities will be constructed at the Blue Grass Army Depot, they will be operated by Bechtel Parsons Blue Grass as a separate entity within the depot. We are requesting a separate stand-alone construction and Clean Air Act (CAA), Title V operating permit for BGCAPP. The stand-alone permit will enable more effective management of the monitoring, recordkeeping, and reporting activities for the BGCAPP air emission sources. In addition, when the BGCAPP operations are concluded and subsequently discontinued, and its Title V permit rescinded, the permit for BGAD would not be affected or require modification. We recognize that any regulatory applicability determinations for BGAD will be based on total emissions from the existing BGAD operations and the proposed BGCAPP operations. Basis for issuance of a separate Title V permit is provided in the U.S. Environmental Protection Agency Title V guidance memorandum, "Major.

Source Definition for Military Installations under the Air Toxics, New Source Review, and Title V Operating Permit Programs of the Clean Air Act," dated August 2, 1996.

We have completed the individual application forms to the best of our ability. In some limited instances, the data elements required for individual forms will not be available until engineering details have been finalized or equipment purchasing decisions have been made. Examples of the missing data elements are egress point information and equipment-specific data required on Form DEP7007N. We have entered "NA" or "to be determined" on the forms for these elements. Please note that the missing data elements do not relate to pollutant emissions and our emission data are complete. We will provide the missing data in an expeditious manner as it is obtained from the equipment supplier and the design team.

We would like to meet with the Division staff to discuss our application. We believe that such a meeting will be helpful in discussing the project scope and pertinent details that are not part of the application document. We will contact you in about two weeks to discuss the possibility and date for the proposed meeting. In the meantime, please call Mr. Joe Elliott at (859) 779-6021 or Mr. Todd Williams at (859) 779-6280 if you have any questions about our submittal. Thank you in advance for your cooperation.

Sincerely,



Martin A. Jacoby
Colonel, U.S. Army
Commanding Officer

Enclosures

Copies furnished without Enclosures:

Mr. Jim Richmond, ACWA

Mr. Chris Midgett, Bechtel Parsons Blue Grass

RECEIVED

SEP 17 2004

PERMIT REVIEW BRANCH
DIVISION FOR AIR QUALITY

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Commonwealth of Kentucky
Natural Resources & Environmental Protection Cabinet
Department for Environmental Protection

Division for Air Quality
803 Schenkel Lane
Frankfort, Kentucky 40601

DEP7007AI

Administrative
Information

Enter if known
AFS Plant ID# 021-151-00013

Agency Use Only

Date Received

Log#

Permit#

PERMIT APPLICATION

The completion of this form is required under Regulations 401 KAR 52:020, 52:030, and 52:040 pursuant to KRS 224. Applications are incomplete unless accompanied by copies of all plans, specifications, and drawings requested herein. Failure to supply information required or deemed necessary by the division to enable it to act upon the application shall result in denial of the permit and ensuing administrative and legal action. Applications shall be submitted in triplicate.

1) APPLICATION INFORMATION

Note: The applicant must be the owner or operator. (The owner/operator may be individual(s) or a corporation.)

Name: U. S. Department of the Army

Title: Phone: (859) 779-6246

(If applicant is an individual)
Mailing Address: Blue Grass Army Depot
Company

Street or P.O. Box: 2091 Kingston Highway

City: Richmond State: KY Zip Code: 40475-5060

Is the applicant (check one): Owner Operator Owner & Operator Corporation/LLC* LP**

* If the applicant is a Corporation or a Limited Liability Corporation, submit a copy of the current Certificate of Authority from the Kentucky Secretary of State.

** If the applicant is a Limited Partnership, submit a copy of the current Certificate of Limited Partnership from the Kentucky Secretary of State.

Person to contact for technical information relating to application:

Name: Todd G. Williams

Title: Environmental Coordinator Phone: (859) 779-6280

2) OPERATOR INFORMATION

Note: The applicant must be the owner or operator. (The owner/operator may be individual(s) or a corporation.)

Name: Bechtel Parsons Blue Grass

Title: Phone: (859) 625-1665

Mailing Address: Bechtel Parsons Blue Grass
Company

Street or P.O. Box: 301 Highland Park Drive

City: Richmond State: KY Zip Code: 40475-3488

3)

TYPE OF PERMIT APPLICATION

For new sources that currently *do not* hold any air quality permits in Kentucky and are required to obtain a permit prior to construction pursuant to 401 KAR 52:020, 52:030, or 52:040.

Initial Operating Permit (the permit will authorize both construction and operation of the new source)

Type of Source (Check all that apply): Major Conditional Major Synthetic Minor Minor

For existing sources that do not have a source-wide Operating Permit required by 401 KAR 52:020, 52:030, or 52:040.

Type of Source (Check all that apply): Major Conditional Major Synthetic Minor Minor

(Check one only)

- Initial Source-wide Operating Permit Construction of New Facilities at Existing Plant
 Construction of New Facilities at Existing Plant Modification of Existing Facilities at Existing Plant
 Other (explain) _____

For existing sources that currently have a source-wide Operating Permit.

Type of Source (Check all that apply): Major Conditional Major Synthetic Minor Minor

Current Operating Permit # O-86-12, S-99-46 (Note: S-99-46 is currently expired)

- Administrative Revision (describe type of revision requested, e.g. name change): _____
 Permit Renewal Significant Revision Minor Revision
 Addition of New Facilities Modification of Existing Facilities

For all construction and modification requiring a permit pursuant to 401 KAR 52:020, 52:030, or 52:040.

Proposed Date for Start of Construction or Modification: July 2005 Proposed date for Operation Start-up: January 2007

4)

SOURCE INFORMATION

Source Name: Blue Grass Chemical Agent-Destruction Pilot Plant

Source Street Address: 2091 Kingston Highway

City: Richmond Zip Code: 40475-5060 County: Madison

Primary Standard Industrial Classification (SIC) Category: National Security (U.S. Army) Primary SIC #: 9711

Property Area (Acres or Square Feet): 14,596 Acres Number of Employees 1,450 (approx.)

Description of Area Surrounding Source (check one):

Commercial Area Residential Area Industrial Area Industrial Park Rural Area Urban Area

Approximate Distance to Nearest

Residence or Commercial Property: At Property Line

UTM or Standard Location Coordinates: (Include topographical map showing property boundaries)

UTM Coordinates: Zone 16 Horizontal (km) 744.324E Vertical (km) 4175.932N

Standard Coordinates: Latitude 37 Degrees 41 Minutes 53 Seconds

Longitude 84 Degrees 13 Minutes 44 Seconds

4) SOURCE INFORMATION (CONTINUED)

Is any part of the source located on federal land? Yes No

What other environmental permits or registrations does this source currently hold in Kentucky?
 NPDES/KPDES – KY0020737; KDEP Air Permits: O-86-12, S-99-046 (expired)
 RCRA – KY8-213-820-105; Water Withdrawal Permit # 1013

What other environmental permits or registrations does this source need to obtain in Kentucky?
 Part A - Hazardous Waste Permit, Clean Air Act Title V operation permit.

5) OTHER REQUIRED INFORMATION

Indicate the type(s) and number of forms attached as part of this application.

<u>10</u> DEP7007A Indirect Heat Exchanger, Turbine, Internal Combustion Engine	<input type="checkbox"/> DEP7007R Emission Reduction Credit
<u>1</u> DEP7007B Manufacturing or Processing Operations	<input type="checkbox"/> DEP7007S Service Stations
<input type="checkbox"/> DEP7007C Incinerators & Waste Burners	<input type="checkbox"/> DEP7007T Metal Plating & Surface Treatment Operations
<input type="checkbox"/> DEP7007F Episode Standby Plan	<u>1</u> DEP7007V Applicable Requirements & Compliance Activities
<input type="checkbox"/> DEP7007J Volatile Liquid Storage	<input type="checkbox"/> DEP7007Y Good Engineering Practice (GEP) Stack Height Determination
<input type="checkbox"/> DEP7007K Surface Coating or Printing Operations	<input type="checkbox"/> DEP7007AA Compliance Schedule for Noncomplying Emission Units
<input type="checkbox"/> DEP7007L Concrete, Asphalt, Coal, Aggregate, Feed, Corn, Flour, Grain, & Fertilizer	<input type="checkbox"/> DEP7007BB Certified Progress Report
<input type="checkbox"/> DEP7007M Metal Cleaning Degreasers	<u>1</u> DEP7007CC Compliance Certification
<u>1</u> DEP7007N Emissions, Stacks, and Controls Information	<u>1</u> DEP7007DD Insignificant Activities
<input type="checkbox"/> DEP7007P Perchloroethylene Dry Cleaning Systems	

Check other attachments that are part of this application.

<u>Required Data</u>	<u>Supplemental Data</u>
<input checked="" type="checkbox"/> Map or Drawing Showing Location	<input type="checkbox"/> Stack Test Report
<input checked="" type="checkbox"/> Process Flow Diagram and Description	<input type="checkbox"/> Certificate of Authority from the Secretary of State (for Corporations and Limited Liability Companies)
<input checked="" type="checkbox"/> Site Plan Showing Stack Data and Locations	<input type="checkbox"/> Certificate of Limited Partnership from the Secretary of State (for Limited Partnerships)
<input checked="" type="checkbox"/> Emission Calculation Sheets	<input type="checkbox"/> Claim of Confidentiality (See 400 KAR 1:060)
<input checked="" type="checkbox"/> Material Safety Data Sheets (MSDS)	<input checked="" type="checkbox"/> Other (Specify) <u>Supporting Document with calculations</u>

Indicate if you expect to emit, in any amount, hazardous or toxic materials or compounds or such materials into the atmosphere from any operation or process at this location.

<input type="checkbox"/> Pollutants regulated under 401 KAR 57:002 (NESHAP)	<input checked="" type="checkbox"/> Pollutants listed in 401 KAR 63:060 (HAPS)
<input type="checkbox"/> Pollutants listed in 40 CFR 68 Subpart F [112(r) pollutants]	<input checked="" type="checkbox"/> Other (Chemical Agents VX, GB, H)

Has your company filed an emergency response plan with local and/or state and federal officials outlining the measures that would be implemented to mitigate an emergency release?

Yes No

Check whether your company is seeking coverage under a permit shield. If "Yes" is checked, applicable requirements must be identified on Form DEP7007V. Identify any non-applicable requirements for which you are seeking permit shield coverage on a separate attachment to the application.

Yes No A list of non-applicable requirements is attached

Commonwealth of Kentucky
 Natural Resources & Environmental Protection Cabinet
 Department for Environmental Protection

DEP7007A
**INDIRECT HEAT EXCHANGER,
 TURBINE, INTERNAL
 COMBUSTION ENGINE**

DIVISION FOR AIR QUALITY

(Submit copies of this form for each individual unit.
 Make additional copies as needed)

Emission Point # PB1
 Emission Unit # PB1

1) Type of Unit (Make, Model, Etc.): Natural Gas Boiler with No. 2 Fuel Oil Backup (Clever Brooks - or equivalent)

Date Installed: May 2006 Cost of Unit: N/A
 (Date unit was installed, modified or reconstructed, whichever is later.)

Where more than one unit is present, identify with Company's identification or code for this unit:
BGCAPP Process Boiler #1

- 2a) Kind of Unit (Check one):
1. Indirect Heat Exchanger X
 2. Gas Turbine for Electricity Generation _____
 3. Pipe Line Compressor Engines:
 - ____ Gas Turbine
 - ____ Reciprocating engines
 - (a) 2-cycle lean burn _____
 - (b) 4-cycle lean burn _____
 - (c) 4-cycle rich burn _____
 4. Industrial Engine _____

- 2b) Rated Capacity: (Refer to manufacturer's specifications)
1. Fuel input (mmBTU/hr): 34.50
 2. Power output (hp): N/A
 Power output (MW): N/A

SECTION 1. FUEL

- 3) Type of Primary Fuel (Check):
- _____ A. Coal _____ B. Fuel Oil # (Check one) _____ 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6
- X C. Natural Gas _____ D. Propane _____ E. Butane _____ F. Wood _____ G. Gasoline
- _____ H. Diesel _____ I. Other (specify) _____

4) Secondary Fuel (if any, specify type): No. 2 Fuel Oil

5) Fuel Composition

Type	Percent Ash ^a	Percent Sulfur ^b	Heat Content Corresponding to: ^{c, d}	
	Maximum	Maximum	Maximum Ash	Maximum Sulfur
Primary			1000 Btu/cuft	1000 Btu/cuft
Secondary		0.4 Percent		137,030 Btu/gallon

- a. As received basis. Proximate Analysis for Ash. (May use values in your fuel contract)
- b. As received basis. Ultimate Analysis for Sulfur. (May use values in your fuel contract)
- c. Higher Heating Value, BTU/Unit. (May use values in your fuel contract)
- d. Suggested units are: Pounds for solid fuel, gallon for liquid fuels, and cu. Ft. for gaseous fuels. If other units are used, please specify.

6) Maximum Annual Fuel Usage Rate (please specify units)*: The boiler will burn No. 2 fuel oil only during periods of gas curtailment or gas supply emergencies. The No. 2 fuel oil consumption for the 4 facility boilers (PB1, PB2, SB1, and SB2) is estimated not to exceed 917,000 gal/yr, based on No. 2 fuel oil heat input of no more than 10% of the annual capacity.

7) Fuel Source or supplier: Local Suppliers

*Should be entered only if applicant requests operating restriction through federally enforceable limitations.

15) Combustion Air Draft: _____ Natural _____ Induced
Forced Pressure X lbs/sq. in.
Percent excess air (air supplied in excess of theoretical air) _____ % N/A

SECTION III

16) **Additional Stack Data**

- A. Are sampling ports provided? Yes No
- B. If yes, are they located in accordance with 40 CFR 60*? Yes No
- C. List other units vented to this stack _____

17) **Attach manufacturer's specifications and guaranteed performance data for the indirect heat exchanger. Include information concerning fuel input, burners and combustion chamber dimensions.**

18) **Describe fuel transport, storage methods and related dust control measures, including ash disposal and control.**

No. 2 fuel oil will be delivered to the site and stored in 2 aboveground storage tanks, each with a capacity of 24,620 gallons.

*Applicant assumes responsibility for proper location of sampling ports if the Division for Air Quality requires a compliance demonstration stack test.

15) Combustion Air Draft: _____ Natural _____ Induced
Forced Pressure X lbs/sq. in.
Percent excess air (air supplied in excess of theoretical air) _____ % N/A

SECTION III

16) **Additional Stack Data**

- A. Are sampling ports provided? Yes No
- B. If yes, are they located in accordance with 40 CFR 60*? Yes No
- C. List other units vented to this stack _____

17) **Attach manufacturer's specifications and guaranteed performance data for the indirect heat exchanger. Include information concerning fuel input, burners and combustion chamber dimensions.**

18) **Describe fuel transport, storage methods and related dust control measures, including ash disposal and control.**

No. 2 fuel oil will be delivered to the site and stored in 2 aboveground storage tanks, each with a capacity of 24,620 gallons.

*Applicant assumes responsibility for proper location of sampling ports if the Division for Air Quality requires a compliance demonstration stack test.

Commonwealth of Kentucky
 Natural Resources & Environmental Protection Cabinet
 Department for Environmental Protection

DEP7007A
**INDIRECT HEAT EXCHANGER,
 TURBINE, INTERNAL
 COMBUSTION ENGINE**

DIVISION FOR AIR QUALITY

(Submit copies of this form for each individual unit.
 Make additional copies as needed)

Emission Point # SB1
 Emission Unit # SB1

1) **Type of Unit (Make, Model, Etc.):** Natural Gas Boiler with No. 2 Fuel Oil Backup (Clever Brooks - or equivalent)

Date Installed: May 2006 **Cost of Unit:** N/A
 (Date unit was installed, modified or reconstructed, whichever is later.)

Where more than one unit is present, identify with Company's identification or code for this unit:
BGCAPP Space Heat Boiler #1

2a) **Kind of Unit (Check one):**
 1. Indirect Heat Exchanger X
 2. Gas Turbine for Electricity Generation _____
 3. Pipe Line Compressor Engines:
 Gas Turbine
 Reciprocating engines
 (a) 2-cycle lean burn _____
 (b) 4-cycle lean burn _____
 (c) 4-cycle rich burn _____
 4. Industrial Engine _____

2b) **Rated Capacity: (Refer to manufacturer's specifications)**
 1. Fuel input (mmBTU/hr): 37.26
 2. Power output (hp): N/A
 Power output (MW): N/A

SECTION 1. FUEL

3) **Type of Primary Fuel (Check):**

 A. Coal B. Fuel Oil # (Check one) 1 2 3 4 5 6
 X C. Natural Gas D. Propane E. Butane F. Wood G. Gasoline
 H. Diesel I. Other (specify) _____

4) **Secondary Fuel (if any, specify type):** No. 2 Fuel Oil

5) **Fuel Composition**

Type	Percent Ash ^a	Percent Sulfur ^b	Heat Content Corresponding to: ^{c, d}	
	Maximum	Maximum	Maximum Ash	Maximum Sulfur
Primary			1000 Btu/cuft	1000 Btu/cuft
Secondary		0.4 Percent		137,030 Btu/gallon

- a. As received basis. Proximate Analysis for Ash. (May use values in your fuel contract)
- b. As received basis. Ultimate Analysis for Sulfur. (May use values in your fuel contract)
- c. Higher Heating Value, BTU/Unit. (May use values in your fuel contract)
- d. Suggested units are: Pounds for solid fuel, gallon for liquid fuels, and cu. Ft. for gaseous fuels. If other units are used, please specify.

6) **Maximum Annual Fuel Usage Rate (please specify units)*:** The boiler will burn No. 2 fuel oil only during periods of gas curtailment or gas supply emergencies. The No. 2 fuel oil consumption for the 4 facility boilers (PB1, PB2, SB1, and SB2) is estimated not to exceed 917,000 gal/yr, based on No. 2 fuel oil heat input of no more than 10% of the annual capacity.

7) **Fuel Source or supplier:** Local Suppliers

*Should be entered only if applicant requests operating restriction through federally enforceable limitations.

15) Combustion Air Draft: _____ Natural _____ Induced
Forced Pressure X lbs/sq. in.
Percent excess air (air supplied in excess of theoretical air) _____ % N/A

SECTION III

16) **Additional Stack Data**

- A. Are sampling ports provided? Yes No
- B. If yes, are they located in accordance with 40 CFR 60*? Yes No
- C. List other units vented to this stack _____

17) **Attach manufacturer's specifications and guaranteed performance data for the indirect heat exchanger. Include information concerning fuel input, burners and combustion chamber dimensions.**

18) **Describe fuel transport, storage methods and related dust control measures, including ash disposal and control.**

No. 2 fuel oil will be delivered to the site and stored in 2 aboveground storage tanks, each with a capacity of 24,620 gallons.

*Applicant assumes responsibility for proper location of sampling ports if the Division for Air Quality requires a compliance demonstration stack test.

Commonwealth of Kentucky
 Natural Resources & Environmental Protection Cabinet
 Department for Environmental Protection

DEP7007A
**INDIRECT HEAT EXCHANGER,
 TURBINE, INTERNAL
 COMBUSTION ENGINE**

DIVISION FOR AIR QUALITY

(Submit copies of this form for each individual unit.
 Make additional copies as needed)

Emission Point # SB2
 Emission Unit # SB2

1) Type of Unit (Make, Model, Etc.): Natural Gas Boiler with No. 2 Fuel Oil Backup (Clever Brooks - or equivalent)

Date Installed: May 2006 Cost of Unit: N/A
 (Date unit was installed, modified or reconstructed, whichever is later.)

Where more than one unit is present, identify with Company's identification or code for this unit:
BGCAPP Space Heat Boiler #2

2a) Kind of Unit (Check one):
 1. Indirect Heat Exchanger X
 2. Gas Turbine for Electricity Generation _____
 3. Pipe Line Compressor Engines:
 Gas Turbine
 Reciprocating engines
 (a) 2-cycle lean burn _____
 (b) 4-cycle lean burn _____
 (c) 4-cycle rich burn _____
 4. Industrial Engine _____

2b) Rated Capacity: (Refer to manufacturer's specifications)
 1. Fuel input (mmBTU/hr): 37.26
 2. Power output (hp): N/A
 Power output (MW): N/A

SECTION 1. FUEL

3) Type of Primary Fuel (Check):
 _____ A. Coal _____ B. Fuel Oil # (Check one) _____ 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6
 X C. Natural Gas _____ D. Propane _____ E. Butane _____ F. Wood _____ G. Gasoline
 _____ H. Diesel _____ I. Other (specify) _____

4) Secondary Fuel (if any, specify type): No. 2 Fuel Oil

5) Fuel Composition

Type	Percent Ash ^a	Percent Sulfur ^b	Heat Content Corresponding to: ^{c, d}	
	Maximum	Maximum	Maximum Ash	Maximum Sulfur
Primary			1000 Btu/cuft	1000 Btu/cuft
Secondary		0.4 Percent		137,030 Btu/gallon

- a. As received basis. Proximate Analysis for Ash. (May use values in your fuel contract)
- b. As received basis. Ultimate Analysis for Sulfur. (May use values in your fuel contract)
- c. Higher Heating Value, BTU/Unit. (May use values in your fuel contract)
- d. Suggested units are: Pounds for solid fuel, gallon for liquid fuels, and cu. Ft. for gaseous fuels. If other units are used, please specify.

6) Maximum Annual Fuel Usage Rate (please specify units)*: The boiler will burn No. 2 fuel oil only during periods of gas curtailment or gas supply emergencies. The No. 2 fuel oil consumption for the 4 facility boilers (PB1, PB2, SB1, and SB2) is estimated not to exceed 917,000 gal/yr, based on No. 2 fuel oil heat input of no more than 10% of the annual capacity.

7) Fuel Source or supplier: Local Suppliers

*Should be entered only if applicant requests operating restriction through federally enforceable limitations.

15) Combustion Air Draft: _____ Natural _____ Induced
Forced Pressure X lbs/sq. in.
Percent excess air (air supplied in excess of theoretical air) _____ % N/A

SECTION III

16) **Additional Stack Data**

- A. Are sampling ports provided? Yes No
- B. If yes, are they located in accordance with 40 CFR 60*? Yes No
- C. List other units vented to this stack _____

17) **Attach manufacturer's specifications and guaranteed performance data for the indirect heat exchanger. Include information concerning fuel input, burners and combustion chamber dimensions.**

18) **Describe fuel transport, storage methods and related dust control measures, including ash disposal and control.**

No. 2 fuel oil will be delivered to the site and stored in 2 aboveground storage tanks, each with a capacity of 24,620 gallons.

*Applicant assumes responsibility for proper location of sampling ports if the Division for Air Quality requires a compliance demonstration stack test.

8) MAXIMUM OPERATING SCHEDULE FOR THIS UNIT*
 Emergency Generator: Total combined operating hours for 4 Main Emergency IC engines (EG1, EG2, EG3, and EG4) will be limited to a maximum of 2000 hours per year.
 _____ hours/day _____ days/week _____ weeks/year

9) If this unit is multipurpose, describe percent in each use category:
 Space Heat _____% Process Heat _____% Power 100 %

10) Control options for turbine/IC engine (Check)
 ___ (1) Water Injection ___ (2) Steam Injection
X (3) Selective Catalytic Reduction (SCR) ___ (3) Non-Selective Catalytic Reduction (NSCR)
 ___ (5) Combustion Modification ___ (5) Other (Specify)

IMPORTANT: Form DEP7007N must also be completed for this unit.

SECTION II COMPLETE ONLY FOR INDIRECT HEAT EXCHANGERS

11) Coal-Fired Units

_____ Pulverized Coal Fired: ___ Dry Bottom ___ Wall Fired ___ Wet Bottom ___ Tangentially Fired _____ Cyclone Furnace _____ Overfeed Stoker _____ Fluidized Bed Combustor: _____ Circulating Bed _____ Bubbling Bed	Fly Ash Rejection: <input type="checkbox"/> Yes <input type="checkbox"/> No _____ Spreader Stoker _____ Underfeed Stoker _____ Hand-fed _____ Other (specify) _____
---	--

12) Oil-Fired Unit

_____ Tangentially (Corner) Fired _____ Horizontally Opposed (Normal) Fired

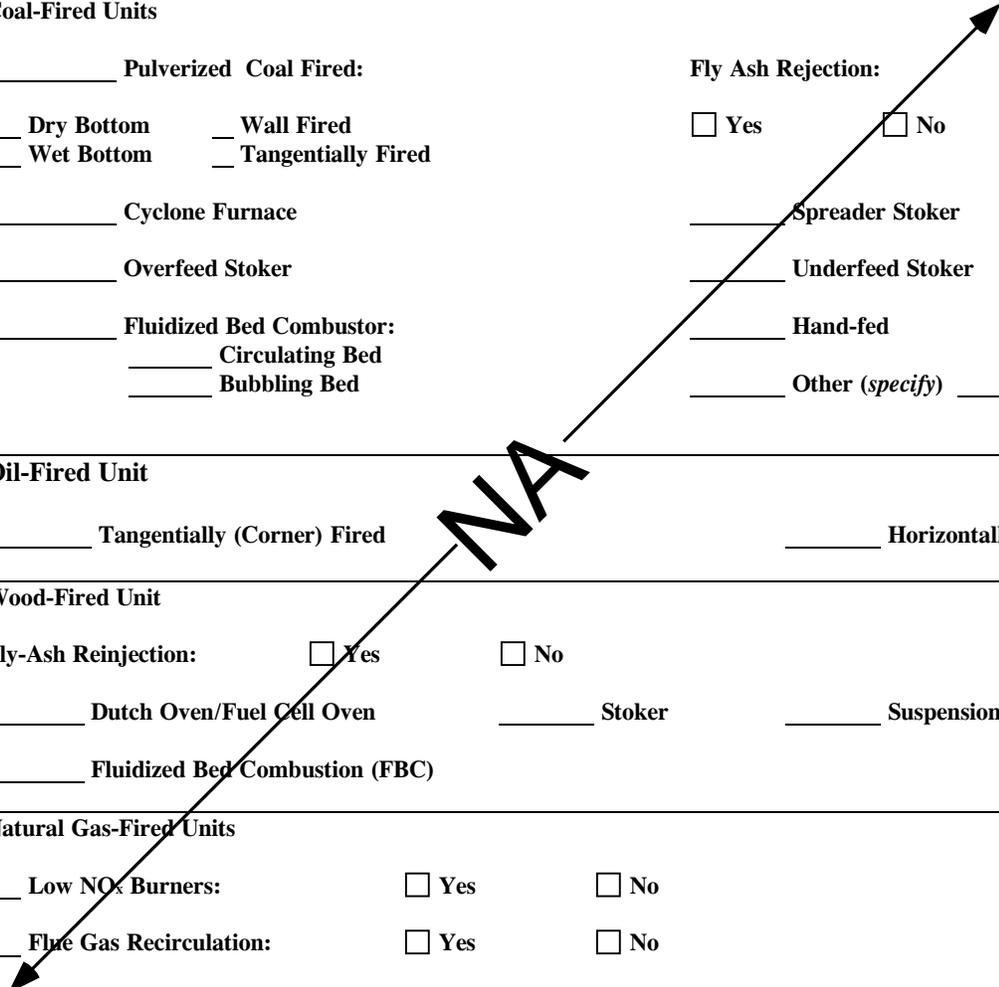
13) Wood-Fired Unit

Fly-Ash Rejection: Yes No

_____ Dutch Oven/Fuel Cell Oven _____ Stoker _____ Suspension Firing
 _____ Fluidized Bed Combustion (FBC)

14) Natural Gas-Fired Units

___ Low NO_x Burners: Yes No
 ___ Flue Gas Recirculation: Yes No



*Should be entered only if applicant requests operating restriction through federally enforceable limitations.

Commonwealth of Kentucky
 Natural Resources & Environmental Protection Cabinet
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DEP7007A
**INDIRECT HEAT EXCHANGER,
 TURBINE, INTERNAL
 COMBUSTION ENGINE**

DIVISION FOR AIR QUALITY

(Submit copies of this form for each individual unit.
 Make additional copies as needed)

Emission Point # EG4
 Emission Unit # EG4

1) Type of Unit (Make, Model, Etc.): Caterpillar Model D3612 (or equivalent)

Date Installed: May 2006 Cost of Unit: \$ 1,700,000
 (Date unit was installed, modified or reconstructed, whichever is later.)

Where more than one unit is present, identify with Company's identification or code for this unit:
IC Engine for Emergency Generator #4

2a) Kind of Unit (Check one):
 1. Indirect Heat Exchanger _____
 2. Gas Turbine for Electricity Generation _____
 3. Pipe Line Compressor Engines:
 ___ Gas Turbine
 ___ Reciprocating engines
 (a) 2-cycle lean burn _____
 (b) 4-cycle lean burn _____
 (c) 4-cycle rich burn _____
 4. Industrial Engine X

2b) Rated Capacity: (Refer to manufacturer's specifications)
 1. Fuel input (mmBTU/hr): 29.5
 2. Power output (hp): 4,640
 Power output (MW): 3.3

SECTION 1. FUEL

3) Type of Primary Fuel (Check):

___ A. Coal X B. Fuel Oil # (Check one) ___ 1 X 2 ___ 3 ___ 4 ___ 5 ___ 6

___ C. Natural Gas ___ D. Propane ___ E. Butane ___ F. Wood ___ G. Gasoline

___ H. Diesel ___ I. Other (specify) _____

4) Secondary Fuel (if any, specify type): _____

5) Fuel Composition

Type	Percent Ash ^a	Percent Sulfur ^b	Heat Content Corresponding to: ^{c, d}	
	Maximum	Maximum	Maximum Ash	Maximum Sulfur
Primary	N/A	0.4	N/A	137,030 Btu/gal
Secondary				

- a. As received basis. Proximate Analysis for Ash. (May use values in your fuel contract)
- b. As received basis. Ultimate Analysis for Sulfur. (May use values in your fuel contract)
- c. Higher Heating Value, BTU/Unit. (May use values in your fuel contract)
- d. Suggested units are: Pounds for solid fuel, gallon for liquid fuels, and cu. Ft. for gaseous fuels. If other units are used, please specify.

6) Maximum Annual Fuel Usage Rate (please specify units)*: Total combined No. 2 fuel oil consumption for 4 Main Emergency IC engines (EG1, EG2, EG3, and EG4) will be limited to a maximum of 430,563 gallons per year.

7) Fuel Source or supplier: Local Suppliers

*Should be entered only if applicant requests operating restriction through federally enforceable limitations.

Commonwealth of Kentucky
 Natural Resources & Environmental Protection Cabinet
 Department for Environmental Protection

DEP7007A
**INDIRECT HEAT EXCHANGER,
 TURBINE, INTERNAL
 COMBUSTION ENGINE**

DIVISION FOR AIR QUALITY

(Submit copies of this form for each individual unit.
 Make additional copies as needed)

Emission Point # EG5
 Emission Unit # EG5

1) Type of Unit (Make, Model, Etc.): Caterpillar or Equivalent

Date Installed: May 2006 Cost of Unit: N/A
 (Date unit was installed, modified or reconstructed, whichever is later.)

Where more than one unit is present, identify with Company's identification or code for this unit:
IC Engine for Secondary Power Back-up (Manual Start) Emergency Generator for MDB HVAC Filter System

2a) Kind of Unit (Check one):
 1. Indirect Heat Exchanger _____
 2. Gas Turbine for Electricity Generation _____
 3. Pipe Line Compressor Engines:
 ___ Gas Turbine
 ___ Reciprocating engines
 (a) 2-cycle lean burn _____
 (b) 4-cycle lean burn _____
 (c) 4-cycle rich burn _____
 4. Industrial Engine X

2b) Rated Capacity: (Refer to manufacturer's specifications)
 1. Fuel input (mmBTU/hr): 6.7
 2. Power output (hp): 1055
 Power output (MW): 0.75

SECTION 1. FUEL

3) Type of Primary Fuel (Check):
 ___ A. Coal X B. Fuel Oil # (Check one) ___ 1 X 2 ___ 3 ___ 4 ___ 5 ___ 6
 ___ C. Natural Gas ___ D. Propane ___ E. Butane ___ F. Wood ___ G. Gasoline
 ___ H. Diesel ___ I. Other (specify) _____

4) Secondary Fuel (if any, specify type): _____

5) Fuel Composition

Type	Percent Ash ^a	Percent Sulfur ^b	Heat Content Corresponding to: ^{c, d}	
	Maximum	Maximum	Maximum Ash	Maximum Sulfur
Primary	N/A	0.4	N/A	137,030 Btu/gal
Secondary				

- a. As received basis. Proximate Analysis for Ash. (May use values in your fuel contract)
- b. As received basis. Ultimate Analysis for Sulfur. (May use values in your fuel contract)
- c. Higher Heating Value, BTU/Unit. (May use values in your fuel contract)
- d. Suggested units are: Pounds for solid fuel, gallon for liquid fuels, and cu. Ft. for gaseous fuels. If other units are used, please specify.

6) Maximum Annual Fuel Usage Rate (please specify units)*: 24,432 gallons/yr

7) Fuel Source or supplier: Local Suppliers

*Should be entered only if applicant requests operating restriction through federally enforceable limitations.

8) MAXIMUM OPERATING SCHEDULE FOR THIS UNIT*
 Emergency Generator: Operation will be limited to no more than 500 hrs/yr.
 _____ hours/day _____ days/week _____ weeks/year

9) If this unit is multipurpose, describe percent in each use category:
 Space Heat _____% Process Heat _____% Power 100 %

10) Control options for turbine/IC engine (Check)
 ___ (1) Water Injection ___ (2) Steam Injection
 ___ (3) Selective Catalytic Reduction (SCR) ___ (3) Non-Selective Catalytic Reduction (NSCR)
 ___ (5) Combustion Modification (5) Other (Specify) Good combustion design and operation

IMPORTANT: Form DEP7007N must also be completed for this unit.

SECTION II COMPLETE ONLY FOR INDIRECT HEAT EXCHANGERS

11) Coal-Fired Units

_____ Pulverized Coal Fired: ___ Dry Bottom ___ Wall Fired ___ Wet Bottom ___ Tangentially Fired _____ Cyclone Furnace _____ Overfeed Stoker _____ Fluidized Bed Combustor: _____ Circulating Bed _____ Bubbling Bed	Fly Ash Rejection: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No _____ Spreader Stoker _____ Underfeed Stoker _____ Hand-fed _____ Other (specify) _____
---	---

12) Oil-Fired Unit

_____ Tangentially (Corner) Fired _____ Horizontally Opposed (Normal) Fired

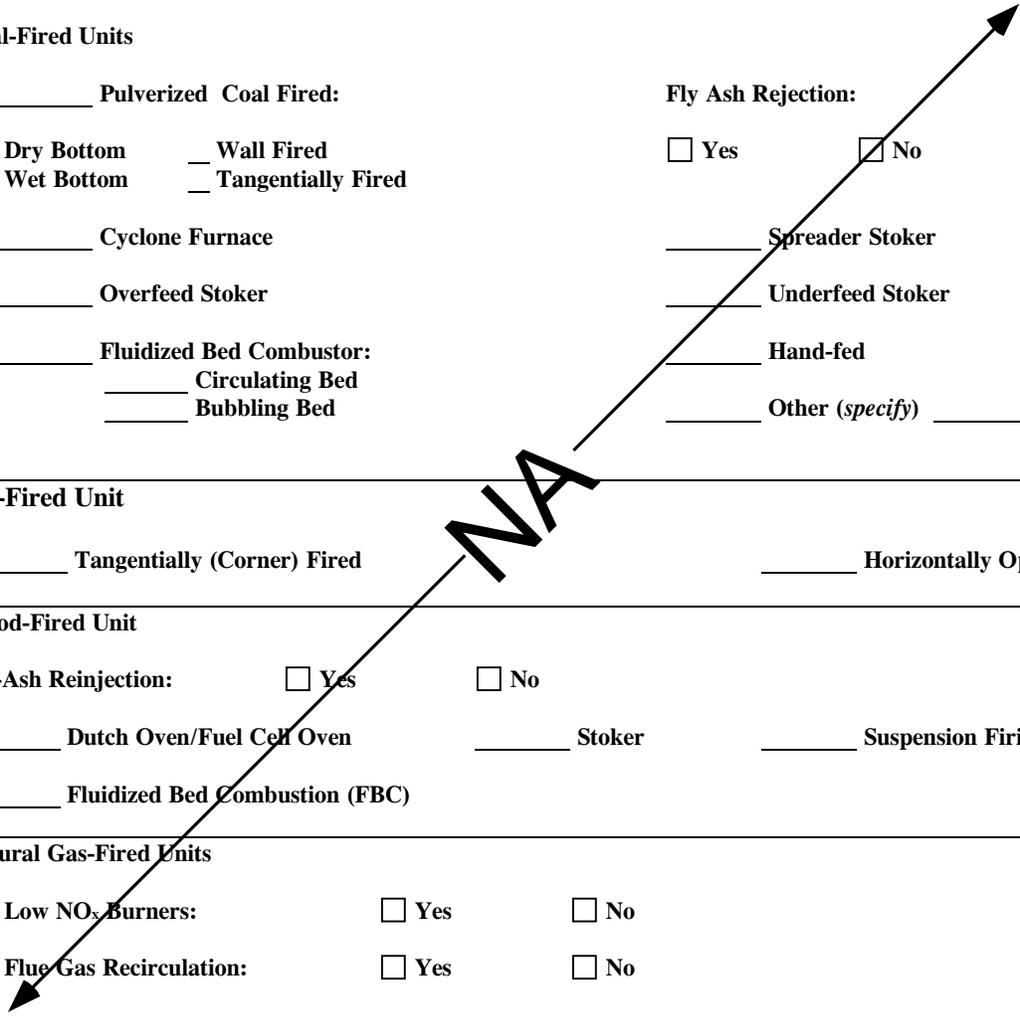
13) Wood-Fired Unit

Fly-Ash Rejection: Yes No

_____ Dutch Oven/Fuel Cell Oven _____ Stoker _____ Suspension Firing
 _____ Fluidized Bed Combustion (FBC)

14) Natural Gas-Fired Units

___ Low NO_x Burners: Yes No
 ___ Flue Gas Recirculation: Yes No



*Should be entered only if applicant requests operating restriction through federally enforceable limitations.

Commonwealth of Kentucky
 Natural Resources & Environmental Protection Cabinet
 Department for Environmental Protection

DEP7007A
**INDIRECT HEAT EXCHANGER,
 TURBINE, INTERNAL
 COMBUSTION ENGINE**

DIVISION FOR AIR QUALITY

(Submit copies of this form for each individual unit.
 Make additional copies as needed)

Emission Point # EG6
 Emission Unit # EG6

1) Type of Unit (Make, Model, Etc.): Caterpillar or Equivalent

Date Installed: May 2006 Cost of Unit: N/A
 (Date unit was installed, modified or reconstructed, whichever is later.)

Where more than one unit is present, identify with Company's identification or code for this unit:
IC Engine for Emergency Water and Firewater Pump

- 2a) Kind of Unit (Check one):
1. Indirect Heat Exchanger _____
 2. Gas Turbine for Electricity Generation _____
 3. Pipe Line Compressor Engines:
 - ____ Gas Turbine
 - ____ Reciprocating engines
 - (a) 2-cycle lean burn _____
 - (b) 4-cycle lean burn _____
 - (c) 4-cycle rich burn _____
 4. Industrial Engine X

- 2b) Rated Capacity: (Refer to manufacturer's specifications)
1. Fuel input (mmBTU/hr): 6.7
 2. Power output (hp): 1055
 Power output (MW): 0.75

SECTION 1. FUEL

- 3) Type of Primary Fuel (Check):
- _____ A. Coal X B. Fuel Oil # (Check one) _____ 1 X 2 _____ 3 _____ 4 _____ 5 _____ 6
- _____ C. Natural Gas _____ D. Propane _____ E. Butane _____ F. Wood _____ G. Gasoline
- _____ H. Diesel _____ I. Other (specify) _____

4) Secondary Fuel (if any, specify type): _____

5) Fuel Composition

Type	Percent Ash ^a	Percent Sulfur ^b	Heat Content Corresponding to: ^{c, d}	
	Maximum	Maximum	Maximum Ash	Maximum Sulfur
Primary	N/A	0.4	N/A	137,030 Btu/gal
Secondary				

- a. As received basis. Proximate Analysis for Ash. (May use values in your fuel contract)
- b. As received basis. Ultimate Analysis for Sulfur. (May use values in your fuel contract)
- c. Higher Heating Value, BTU/Unit. (May use values in your fuel contract)
- d. Suggested units are: Pounds for solid fuel, gallon for liquid fuels, and cu. Ft. for gaseous fuels. If other units are used, please specify.

6) Maximum Annual Fuel Usage Rate (please specify units)*: 24,432 gallons/yr

7) Fuel Source or supplier: Local Suppliers

*Should be entered only if applicant requests operating restriction through federally enforceable limitations.

Commonwealth of Kentucky
 Natural Resources & Environmental Protection Cabinet
 Department for Environmental Protection

DIVISION FOR AIR QUALITY

DEP7007B

MANUFACTURING OR
PROCESSING OPERATIONS

(Please read instructions before completing this form)

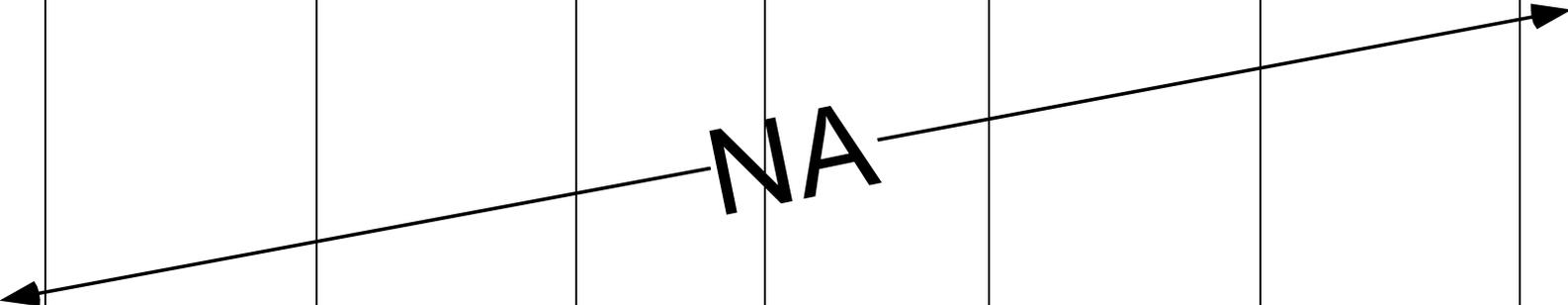
Emission Point # (1)	Process Description (2)	Continuous or Batch (3)	Maximum Operating Schedule (Hours/Day, Days/Week, Weeks/Year) (4)	Process Equipment (Make, Model, Etc.) (5)	Date Installed (6)
MDB	Munitions Demilitarization Building (MDB) Operations	C	24, 7, 52	See Supporting Documentation Section 4	May 2006

Emission Point # (1)	List Raw Material(s) Used (7)	Maximum Quantity Input Of <u>Each</u> Raw Material (Specify Units/Hour) (8) See Item 18	Type of Products (9) See Item 18	Quantity Output* (Specify Units)	
				Maximum Hourly Rated Capacity (Specify Units) (10a)	Maximum Annual (Specify Units) (10b)
MDB	Rockets	2,750 lb/hr	Liquid Waste (hydrolysate)	30,852 lb/hr	
	Projectiles	2,509 lb/hr	Metal (MPT Residue)		
	Dunnage	336 lb/hr	Rocket Parts (HDC Residue)		
	Reagent	25,257 lb/hr			
	Total	30,852 lb/hr			

***(10a)** Rated Capacity of Equipment

(10b) Should be entered only if applicant requests operating restrictions through federally enforceable limitations

IMPORTANT: Form DEP7007N, Emission, Stacks, and Controls Information must be completed for each emission unit listed below.

Emission Point # (1)	Fuel Type for Process Heat (11)	Rated Burner Capacity (BTU/Hour) (12)	Fuel Composition		Fuel Usage Rates		Note: If the combustion products are emitted along with the process emissions, indicate so in this column by writing "combined." (15)
			% Sulfur (13a)	% Ash (13b)	Maximum Hourly (14a)	Maximum Annual* (14b)	
							

16) Make a complete list of all wastes generated by each process (e.g. wastewater, scrap, rejects, cleanup waste, etc.). List the hourly (or daily) and annual quantities of each waste and the method of final disposal. (Use a separate sheet of paper, if necessary)

Brine Reduction System (BRS) Filter Cake: sent to hazardous waste landfill; BGCAPP facility lifetime total waste quantity of 15,700,000 pounds with maximum annual quantity of 7,300,000 pounds

Aluminum Filtration System (AFS) Filter Cake: sent to hazardous waste landfill; BGCAPP facility lifetime total waste quantity of 11,400,000 pounds with maximum annual quantity of 7,200,000 pounds

Heated Discharge Conveyor (HDC) Residue – sent to hazardous waste/TSCA landfill; BGCAPP facility lifetime total waste quantity of 10,300,000 pounds with maximum annual quantity of 7,200,000 pounds

Metal Parts Treater (MPT) Residue – recycled or other means of off-site disposal; BGCAPP facility lifetime total waste quantity of 28,300,000 pounds with maximum annual quantity of 14,500,000 pounds

17) IMPORTANT: Submit a process flow diagram. Label all materials, equipment and emission point numbers.

18) Material Safety Data Sheets with complete chemical compositions are required for each process.

*** (14b) Should be entered only if applicant requests operating restrictions through federally enforceable permit conditions.**

Commonwealth of Kentucky
 Natural Resources & Environmental Protection Cabinet
 Department for Environmental Protection

DEP7007N

Emissions, Stacks, and
 Controls Information

DIVISION FOR AIR QUALITY

Applicant Name: U. S. Department of the Army, BGAD Log # _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
MDB	Emission Unit Name: Munitions Demilitarization Building Operations Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		8,760			
MDB	Emission Point Name: MDB HVAC Filter System Source ID: MDB HVAC Filter System SCC Code: Not Available SCC Units: tons KyEIS Stack #: MDB1, MDB2 Fuel Ash Content: NA Fuel Sulfur Content: NA Fuel Heat Content Ratio: NA Applicable Regulations: See DEP7007V	15.43 tons/hr	8,760			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)												
KyEIS ID #	Emission Factors			Control Equipment			Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	
MDB	PT	14.22	Engineering Judgment	1st control device KyEIS Control ID #: Collection efficiency:	MDBF1, MDBF2	99+%	219.43	2.19	19.58	961.10	9.61	85.19
	PM	14.22	Engineering Judgment	1st control device KyEIS Control ID #: Collection efficiency:	MDBF1, MDBF2	99+%	219.43	2.19	N/A	961.00	9.61	N/A
	CO	0.43	Engineering Judgment	1st control device KyEIS Control ID #: Collection efficiency:		None	6.68	6.68	N/A	29.26	29.26	N/A
	NOx	0.0060	Engineering Judgment	1st control device KyEIS Control ID #: Collection efficiency:		None	0.0930	0.0930	N/A	0.41	0.41	N/A
	TOC	0.77	Engineering Judgment	1st control device KyEIS Control ID #: Collection efficiency:	MDBF1, MDBF2	99.9999%	11.91	1.19E-05	N/A	52.12	5.22E-05	N/A

Commonwealth of Kentucky
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DEP7007N
Emissions, Stacks, and Controls Information

DIVISION FOR AIR QUALITY

Applicant Name: U. S. Department of the Army, BGAD Log # _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
Not Applicable											

Commonwealth of Kentucky
 Natural Resources & Environmental Protection Cabinet
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DEP7007N
Emissions, Stacks, and Controls Information

DIVISION FOR AIR QUALITY

Applicant Name: U. S. Department of the Army, BGAD Log # _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
PB1	Emission Unit Name: BGCAPP Process Boiler #1 - 34.5 mmBTU/hr Heat Input Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		8,760			
PB1	Emission Point Name: BGCAPP Process Boiler #1 Source ID: BGCAPP Process Boiler #1 SCC Code: 1-02-006-02 SCC Units: Million Cubic Feet Burned KyEIS Stack #: PB1 Fuel Ash Content: NA Fuel Sulfur Content: NA Fuel Heat Content Ratio: 1 Applicable Regulations: See DEP7007V	0.035	8,760			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
PB1	CO	84.0	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	2.90	2.90	NA	12.69	12.69	NA
	NOx	100.0	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	3.45	3.45	NA	15.11	15.11	NA
	PT/PM	7.6	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.26	0.26	10.35	1.15	1.15	45.33
	SO2	0.60	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.02	0.02	17.25	0.09	0.09	75.56
	TOC	11.000	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.38	0.38	NA	1.66	1.66	NA
	VOC	5.5	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.19	0.19	NA	0.83	0.83	NA

Commonwealth of Kentucky
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DEP7007N
Emissions, Stacks, and Controls Information

DIVISION FOR AIR QUALITY

Applicant Name: U. S. Department of the Army, BGAD Log # _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
Not Applicable											

Commonwealth of Kentucky
 Natural Resources & Environmental Protection Cabinet
 Department for Environmental Protection

DEP7007N
Emissions, Stacks, and Controls Information

DIVISION FOR AIR QUALITY

Applicant Name: U. S. Department of the Army, BGAD Log # _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
PB1	Emission Unit Name: BGCAPP Process Boiler #1 - 34.5 mmBTU/hr Heat Input Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		876			
PB1	Emission Point Name: BGCAPP Process Boiler #1 Source ID: BGCAPP Process Boiler #1 SCC Code: 1-02-005-02 SCC Units: 1000 Gallons Burned KyEIS Stack #: PB1 Fuel Ash Content: NA Fuel Sulfur Content: 0.4 Fuel Heat Content Ratio: 1 Applicable Regulations: See DEP7007V	0.252	876			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
PB1	CO	5	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	1.26	1.26	NA	0.55	0.55	NA
	NOx	20	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	5.04	5.04	NA	2.21	2.21	NA
	PT	3.30	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.83	0.83	10.35	0.36	0.36	45.33
	PM	1.65	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.42	0.42	NA	0.18	0.18	NA
	SO2	56.80	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	14.31	14.31	17.25	6.27	6.27	75.56
	TOC	0.25	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.06	0.06	NA	0.03	0.03	NA
	VOC	0.20	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.05	0.05	NA	0.02	0.02	NA

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Emissions, Stacks, and Controls Information

DIVISION FOR AIR QUALITY

Applicant Name: U. S. Department of the Army, BGAD Log # _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
Not Applicable											

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Emissions, Stacks, and Controls Information

DIVISION FOR AIR QUALITY

Applicant Name: U. S. Department of the Army, BGAD Log # _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
PB2	Emission Unit Name: BGCAPP Process Boiler #2 - 34.5 mmBTU/hr Heat Input Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		8,760			
PB2	Emission Point Name: BGCAPP Process Boiler #2 Source ID: BGCAPP Process Boiler #2 SCC Code: 1-02-006-02 SCC Units: Million Cubic Feet Burned KyEIS Stack #: PB2 Fuel Ash Content: NA Fuel Sulfur Content: NA Fuel Heat Content Ratio: 1 Applicable Regulations: See DEP7007V	0.035	8,760			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
PB2	CO	84.0	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	2.90	2.90	NA	12.69	12.69	NA
	NOx	100.0	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	3.45	3.45	NA	15.11	15.11	NA
	PT/PM	7.6	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.26	0.26	10.35	1.15	1.15	45.33
	SO2	0.60	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.02	0.02	17.25	0.09	0.09	75.56
	TOC	11.000	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.38	0.38	NA	1.66	1.66	NA
	VOC	5.5	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.19	0.19	NA	0.83	0.83	NA

Commonwealth of Kentucky
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DEP7007N
Emissions, Stacks, and Controls Information

DIVISION FOR AIR QUALITY

Applicant Name: U. S. Department of the Army, BGAD Log # _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
Not Applicable											

Commonwealth of Kentucky
 Natural Resources & Environmental Protection Cabinet
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DEP7007N
Emissions, Stacks, and Controls Information

DIVISION FOR AIR QUALITY

Applicant Name: U. S. Department of the Army, BGAD Log # _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
PB2	Emission Unit Name: BGCAPP Process Boiler #2 - 34.5 mmBTU/hr Heat Input Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		876			
PB2	Emission Point Name: BGCAPP Process Boiler #2 Source ID: BGCAPP Process Boiler #2 SCC Code: 1-02-005-02 SCC Units: 1000 Gallons Burned KyEIS Stack #: PB2 Fuel Ash Content: NA Fuel Sulfur Content: 0.4 Fuel Heat Content Ratio: 1 Applicable Regulations: See DEP7007V	0.252	876			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
PB2	CO	5	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	1.26	1.26	NA	0.55	0.55	NA
	NOx	20	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	5.04	5.04	NA	2.21	2.21	NA
	PT	3.30	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.83	0.83	10.35	0.36	0.36	45.33
	PM	1.65	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.42	0.42	NA	0.18	0.18	NA
	SO2	56.80	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	14.31	14.31	17.25	6.27	6.27	75.56
	TOC	0.25	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.06	0.06	NA	0.03	0.03	NA
	VOC	0.20	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.05	0.05	NA	0.02	0.02	NA

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DEP7007N
Emissions, Stacks, and Controls Information

DIVISION FOR AIR QUALITY

Applicant Name: U. S. Department of the Army, BGAD Log # _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
Not Applicable											

Commonwealth of Kentucky
 Natural Resources & Environmental Protection Cabinet
 Department for Environmental Protection

DEP7007N
Emissions, Stacks, and Controls Information

DIVISION FOR AIR QUALITY

Applicant Name: U. S. Department of the Army, BGAD Log # _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
SB1	Emission Unit Name: BGCAPP Space Heat Boiler #1 - 37.26 mmBTU/hr Heat Input Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		8,760			
SB1	Emission Point Name: BGCAPP Space Heat Boiler #1 Source ID: BGCAPP Space Heat Boiler #1 SCC Code: 1-02-006-02 SCC Units: Million Cubic Feet Burned KyEIS Stack #: SB1 Fuel Ash Content: NA Fuel Sulfur Content: NA Fuel Heat Content Ratio: 1 Applicable Regulations: See DEP7007V	0.037	8,760			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
SB1	CO	84.0	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	3.13	3.13	NA	13.71	13.71	NA
	NOx	100.0	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	3.73	3.73	NA	16.32	16.32	NA
	PT/PM	7.6	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.28	0.28	10.35	1.24	1.24	45.33
	SO2	0.60	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.02	0.02	17.25	0.10	0.10	75.56
	TOC	11.000	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.41	0.41	NA	1.80	1.80	NA
	VOC	5.5	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.20	0.20	NA	0.90	0.90	NA

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SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
Not Applicable											

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DIVISION FOR AIR QUALITY

Applicant Name: U. S. Department of the Army, BGAD Log # _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
SB1	Emission Unit Name: BGCAPP Space Heat Boiler #1 - 37.26 mmBTU/hr Heat Input Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		876			
SB1	Emission Point Name: BGCAPP Space Heat Boiler #1 Source ID: BGCAPP Space Heat Boiler #1 SCC Code: 1-02-005-02 SCC Units: 1000 Gallons Burned KyEIS Stack #: SB1 Fuel Ash Content: NA Fuel Sulfur Content: 0.4 Fuel Heat Content Ratio: 1 Applicable Regulations: See DEP7007V	0.272	876			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
SB1	CO	5	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	1.36	1.36	NA	0.60	0.60	NA
	NOx	20	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	5.44	5.44	NA	2.38	2.38	NA
	PT	3.30	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.90	0.90	10.35	0.39	0.39	45.33
	PM	1.65	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.45	0.45	NA	0.20	0.20	NA
	SO2	56.80	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	15.45	15.45	17.25	6.77	6.77	75.56
	TOC	0.25	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.07	0.07	NA	0.03	0.03	NA
	VOC	0.20	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.05	0.05	NA	0.02	0.02	NA

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SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
Not Applicable											

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SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
SB2	Emission Unit Name: BGCAPP Space Heat Boiler #2 - 37.26 mmBTU/hr Heat Input Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		8,760			
SB2	Emission Point Name: BGCAPP Space Heat Boiler #2 Source ID: BGCAPP Space Heat Boiler #2 SCC Code: 1-02-006-02 SCC Units: Million Cubic Feet Burned KyEIS Stack #: SB2 Fuel Ash Content: NA Fuel Sulfur Content: NA Fuel Heat Content Ratio: 1 Applicable Regulations: See DEP7007V	0.037	8,760			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
SB2	CO	84.0	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	3.13	3.13	NA	13.71	13.71	NA
	NOx	100.0	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	3.73	3.73	NA	16.32	16.32	NA
	PT/PM	7.6	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	0.28	0.28	10.35	1.24	1.24	45.33
	SO2	0.60	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	0.02	0.02	17.25	0.10	0.10	75.56
	TOC	11.000	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	0.41	0.41	NA	1.80	1.80	NA
	VOC	5.5	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	0.20	0.20	NA	0.90	0.90	NA

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SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
Not Applicable											

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SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
SB2	Emission Unit Name: BGCAPP Space Heat Boiler #2 - 37.26 mmBTU/hr Heat Input Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		876			
SB2	Emission Point Name: BGCAPP Space Heat Boiler #2 Source ID: BGCAPP Space Heat Boiler #2 SCC Code: 1-02-005-02 SCC Units: 1000 Gallons Burned KyEIS Stack #: SB2 Fuel Ash Content: NA Fuel Sulfur Content: 0.4 Fuel Heat Content Ratio: 1 Applicable Regulations: See DEP7007V	0.272	876			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
SB2	CO	5	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	1.36	1.36	NA	0.60	0.60	NA
	NOx	20	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	5.44	5.44	NA	2.38	2.38	NA
	PT	3.30	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	0.90	0.90	10.35	0.39	0.39	45.33
	PM	1.65	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	0.45	0.45	NA	0.20	0.20	NA
	SO2	56.80	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	15.45	15.45	17.25	6.77	6.77	75.56
	TOC	0.25	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	0.07	0.07	NA	0.03	0.03	NA
	VOC	0.20	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	0.05	0.05	NA	0.02	0.02	NA

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SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
Not Applicable											

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SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
EG1	Emission Unit Name: IC Engine for Main Emergency Generator #1 - 3.3 MW Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		500			
EG1	Emission Point Name: IC Engine for Main Emergency Generator #1 Source ID: IC Engine for Main Emergency Generator #1 SCC Code: 2-02-004-01 SCC Units: 1000 Gallons Burned KyEIS Stack #: EG1 Fuel Ash Content: NA Fuel Sulfur Content: 0.4 Fuel Heat Content Ratio: 1 Applicable Regulations: See DEP7007V	0.215	500			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
EG1	CO	21.98	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	4.73	1.42	NA	1.18	0.35	NA
	NOx	618.53	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	90%	132.98	13.30	NA	33.25	3.32	NA
	PT	9.99	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	2.15	0.64	NA	0.54	0.16	NA
	PM	5.70	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	1.23	0.37	NA	0.31	0.09	NA
	SO2	55.36	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	11.90	11.90	NA	2.98	2.98	NA
	TOC	6.66	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	1.43	0.43	NA	0.36	0.11	NA
	VOC	6.06	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	1.30	0.39	NA	0.33	0.10	NA

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SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
	Not Applicable										

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SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
EG2	Emission Unit Name: IC Engine for Main Emergency Generator #2 - 3.3 MW Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		500			
EG2	Emission Point Name: IC Engine for Main Emergency Generator #2 Source ID: IC Engine for Main Emergency Generator #2 SCC Code: 2-02-004-01 SCC Units: 1000 Gallons Burned KyEIS Stack #: EG2 Fuel Ash Content: NA Fuel Sulfur Content: 0.4 Fuel Heat Content Ratio: 1 Applicable Regulations: See DEP7007V	0.215	500			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
EG2	CO	21.98	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	4.73	1.42	NA	1.18	0.35	NA
	NOx	618.53	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	90%	132.98	13.30	NA	33.25	3.32	NA
	PT	9.99	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	2.15	0.64	NA	0.54	0.16	NA
	PM	5.70	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	1.23	0.37	NA	0.31	0.09	NA
	SO2	55.36	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	11.90	11.90	NA	2.98	2.98	NA
	TOC	6.66	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	1.43	0.43	NA	0.36	0.11	NA
	VOC	6.06	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	1.30	0.39	NA	0.33	0.10	NA

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SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
Not Applicable											

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SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
EG3	Emission Unit Name: IC Engine for Main Emergency Generator #3 - 3.3 MW Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		500			
EG3	Emission Point Name: IC Engine for Main Emergency Generator #3 Source ID: IC Engine for Main Emergency Generator #3 SCC Code: 2-02-004-01 SCC Units: 1000 Gallons Burned KyEIS Stack #: EG3 Fuel Ash Content: NA Fuel Sulfur Content: 0.4 Fuel Heat Content Ratio: 1 Applicable Regulations: See DEP7007V	0.215	500			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
EG3	CO	21.98	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	4.73	1.42	NA	1.18	0.35	NA
	NOx	618.53	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	90%	132.98	13.30	NA	33.25	3.32	NA
	PT	9.99	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	2.15	0.64	NA	0.54	0.16	NA
	PM	5.70	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	1.23	0.37	NA	0.31	0.09	NA
	SO2	55.36	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	11.90	11.90	NA	2.98	2.98	NA
	TOC	6.66	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	1.43	0.43	NA	0.36	0.11	NA
	VOC	6.06	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	1.30	0.39	NA	0.33	0.10	NA

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SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
Not Applicable											

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SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
EG4	Emission Unit Name: IC Engine for Main Emergency Generator #4 - 3.3 MW Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		500			
EG4	Emission Point Name: IC Engine for Main Emergency Generator #4 Source ID: IC Engine for Main Emergency Generator #4 SCC Code: 2-02-004-01 SCC Units: 1000 Gallons Burned KyEIS Stack #: EG4 Fuel Ash Content: NA Fuel Sulfur Content: 0.4 Fuel Heat Content Ratio: 1 Applicable Regulations: See DEP7007V	0.215	500			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
EG4	CO	21.98	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	4.73	1.42	NA	1.18	0.35	NA
	NOx	618.53	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	90%	132.98	13.30	NA	33.25	3.32	NA
	PT	9.99	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	2.15	0.64	NA	0.54	0.16	NA
	PM	5.70	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	1.23	0.37	NA	0.31	0.09	NA
	SO2	55.36	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	11.90	11.90	NA	2.98	2.98	NA
	TOC	6.66	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	1.43	0.43	NA	0.36	0.11	NA
	VOC	6.06	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	70%	1.30	0.39	NA	0.33	0.10	NA

DIVISION FOR AIR QUALITY

Applicant U. S. Department of the Army, BGAD Log _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
Not Applicable											

DIVISION FOR AIR QUALITY

Applicant U. S. Department of the Army, BGAD Log _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
EG5	Emission Unit Name: IC Engine for Emergency Generator for MDB Filter System - 0.75 MW Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		500			
EG5	Emission Point Name: IC Engine for Emergency Generator for MDB Filter System Source ID: IC Engine for Emergency Generator for MDB Filter System SCC Code: 2-02-004-01 SCC Units: 1000 Gallons Burned KyEIS Stack #: EG5 Fuel Ash Content: NA Fuel Sulfur Content: 0.4 Fuel Heat Content Ratio: 1 Applicable Regulations: See DEP7007V	0.049	500			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
EG5	CO	116.48	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	5.71	5.71	NA	1.43	1.43	NA
	NOx	438.50	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	21.49	21.49	NA	5.37	5.37	NA
	PT	13.70	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.67	0.67	NA	0.17	0.17	NA
	PM	7.85	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.38	0.38	NA	0.10	0.10	NA
	SO2	55.36	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	2.71	2.71	NA	0.68	0.68	NA
	TOC	12.33	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.60	0.60	NA	0.15	0.15	NA
	VOC	11.22	AP-42	<u>1st control device</u> KyEIS Control ID #: Collection efficiency:	None	0.55	0.55	NA	0.14	0.14	NA

DIVISION FOR AIR QUALITY

Applicant U. S. Department of the Army, BGAD Log _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
Not Applicable											

DIVISION FOR AIR QUALITY

Applicant U. S. Department of the Army, BGAD Log _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
EG6	Emission Unit Name: IC Engine for Emergency Water and Firewater Pump - 0.75 MW Date Constructed: May, 2006 HAPs present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		500			
EG6	Emission Point Name: IC Engine for Emergency Water and Firewater Pump Source ID: IC Engine for Emergency Water and Firewater Pump SCC Code: 2-02-004-01 SCC Units: 1000 Gallons Burned KyEIS Stack #: EG6 Fuel Ash Content: NA Fuel Sulfur Content: 0.4 Fuel Heat Content Ratio: 1 Applicable Regulations: See DEP7007V	0.049	500			
	Emission Point Name: Source ID: SCC Code: SCC Units: KyEIS Stack #: Fuel Ash Content: Fuel Sulfur Content: Fuel Heat Content Ratio: Applicable Regulations:					

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
EG6	CO	116.48	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	5.71	5.71	NA	1.43	0.95	NA
	NOx	438.50	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	21.49	21.49	NA	5.37	5.37	NA
	PT	13.70	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	0.67	0.67	NA	0.17	0.17	NA
	PM	7.85	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	0.38	0.38	NA	0.10	0.10	NA
	SO2	55.36	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	2.71	2.71	NA	0.68	0.68	NA
	TOC	12.33	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	0.60	0.60	NA	0.15	0.15	NA
	VOC	11.22	AP-42	1st control device KyEIS Control ID #: Collection efficiency:	None	0.55	0.55	NA	0.14	0.14	NA

DIVISION FOR AIR QUALITY

Applicant U. S. Department of the Army, BGAD Log _____

SECTION I. Emissions Unit and Emission Point Information						
KyEIS ID #	Emissions Unit and Emission Point Descriptions	Maximum Operating Parameters		Permitted Operating Parameters		
		Hourly Operating Rate (SCC Units/hr)	Annual Operating Hours (hrs/yr)	Hourly Operating Rate (SCC Units/hr)	Annual Operating Rate (SCC Units/yr)	Annual Operating Hours (hrs/yr)
Not Applicable						

SECTION I. Emission Units and Emission Point Information (continued)											
KyEIS ID #	Emission Factors			Control Equipment		Hourly (lb/hr) Emissions			Annual (tons/yr) Emissions		
	Pollutant	Emission Factor (lb/SCC Units)	Emission Factor Basis	Control Equipment Association	Pollutant Overall Efficiency (%)	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable	Uncontrolled Unlimited Potential	Controlled Limited Potential	Allowable
Not Applicable											

SECTION II. Stack Information										
KyEIS Stack ID #	Stack Description	Stack Physical Data			Stack Geographic Data			Stack Gas Stream Data		
		Height (ft)	Diameter (ft)	Vent Height (ft)	Vertical Coordinate	Horizontal Coordinate	Coordinate Collection Method Code	Flowrate (acfm)	Temperature (°F)	Exit Velocity (ft/sec)
MDB1	MDB Filter Unit Stack 1 of 2	100	7.5	100	4175.932 km (UTM Zone 16)	744.324 km	TIGER	128,000	Ambient	48.29
MDB2	MDB Filter Unit Stack 2 of 2	100	7.5	100	4175.932 km (UTM Zone 16)	744.324 km	TIGER	128,000	Ambient	48.29
PB1	Process Boiler # 1 Stack	Details to be determined								
PB2	Process Boiler # 2 Stack	Details to be determined								
SB1	Space Heat Boiler # 1 Stack	Details to be determined								
SB2	Space Heat Boiler # 2 Stack	Details to be determined								
EG1	Emergency Generator IC Engine 1 Stack	Details to be determined								
EG2	Emergency Generator IC Engine 2 Stack	Details to be determined								
EG3	Emergency Generator IC Engine 3 Stack	Details to be determined								
EG4	Emergency Generator IC Engine 4 Stack	Details to be determined								
EG5	MDB Emergency Generator IC Engine 5 Stack	Details to be determined								
EG6	Water and Firewater Pump Emergency Generator IC Engine 6 Stack	Details to be determined								

SECTION III. Control Equipment Information for Other Type of Control Equipment

KyEIS Control ID #	Control Equipment Description	Manufacturer	Model Name and Number	Date Installed	Cost
SCR3	Selective Catalytic Reduction System for IC Engine for Emergency Generator #3 (EG3)	Caterpillar or Equivalent	To be determined	May 2006	\$312,900

Inlet Gas Stream Data

Temperature:	Flowrate (scfm at 68°F):	Gas density (lb/ft ³):	Particle density (lb/ft ³) or Specific Gravity:	Average particle diameter (µm): <i>(or attach a particle size distribution table)</i>
← _____ ° F _____ ° C		To be determined		→

Equipment Physical Data

The control equipment manufacturer's equipment specifications and recommended operating procedures may be submitted in place of this information.

Type of control equipment (give descriptions and a sketch with dimensions):

Urea selective catalytic reduction

Equipment Operational Data

Pressure drop across unit (inches water gauge):	Pollutants collected/controlled:	Pollutant removal/destruction efficiency (%):
N/A	CO, NO _x , PT/PM, TOC/VOC	CO: 70% NO _x : 90%
		PT/PM: 70% TOC/VOC: 70%

Commonwealth of Kentucky
Natural Resources & Environmental Protection Cabinet
Department for Environmental Protection

DEP7007V

**Applicable Requirements
& Compliance Activities**

DIVISION FOR AIR QUALITY

APPLICANT NAME: U. S. Department of the Army, Blue Grass Army Depot

SECTION I. EMISSION AND OPERATING STANDARD(S) AND LIMITATION(S)

KYEIS No.(1)	Emission Unit Description(2)	Contaminant(3)	Origin of Requirement or Standard(4)	Applicable Requirement, Standard, Restriction, Limitation, or Exemption(5)	Method of Determining Compliance with the Emission and Operating Requirement(s)(6)
MDB	Munitions Demilitarization Building Operations	Particulate Matter	401 KAR 59:010 Section 3(1)	Opacity < 20% *	If requested by KDAQ, use of USEPA Method 9, Kentucky Method 150 (F-1), or comparable method selected by BGAD and approved by KDAQ. Continuous operation of emission control system when process is in operation. If requested by KDAQ, USEPA Method 5.
			401 KAR 59:010 Section 3(2)	Mass Emission Rate for Particulate Matter < 19.45 lbs/hr PWR = 15.26 tons/hr	
PB1	BGCAPP Process Boiler #1	Particulate Matter	401 KAR 59:015 Section 4(1)	Mass Emission Rate for Particulate Matter ≤ 0.30 lb/MMBtu	USEPA Publication AP-42. If requested by KDAQ, USEPA Method 5. If requested by KDAQ, use of USEPA Method 9, Kentucky Method 150 (F-1), or comparable method selected by BGAD and approved by KDAQ.
			401 KAR 59:015 Section 4(2)	Opacity ≤ 20%	
		SO2	401 KAR 59:015 Section 5(1)	SO2 ≤ 1.00 lb/MMBtu	USEPA Publication AP-42. If requested by KDAQ, USEPA Method 6. No. 2 fuel oil sulfur content monitoring. Certificates of No. 2 fuel oil sulfur content analysis from the vendor will be kept on record and available for inspection. If requested by KDAQ, USEPA Method 6.
		SO2	40 CFR 60.42c(d)	SO2 ≤ 0.5 lbs/MMBtu or sulfur content ≤ 0.5 % by weight.	
PB2	BGCAPP Process Boiler #2	Particulate Matter	401 KAR 59:015 Section 4(1)	Mass Emission Rate for Particulate Matter ≤ 0.30 lb/MMBtu	USEPA Publication AP-42. If requested by KDAQ, USEPA Method 5. If requested by KDAQ, use of USEPA Method 9, Kentucky Method 150 (F-1), or comparable method selected by BGAD and approved by KDAQ.
			401 KAR 59:015 Section 4(2)	Opacity ≤ 20%	
		SO2	401 KAR 59:015 Section 5(1)	SO2 ≤ 1.00 lb/MMBtu	USEPA Publication AP-42. If requested by KDAQ, USEPA Method 6. No. 2 fuel oil sulfur content monitoring. Certificates of No. 2 fuel oil sulfur content analysis from the vendor will be kept on record and available for inspection. If requested by KDAQ, USEPA Method 6.
		SO2	40 CFR 60.42c(d)	SO2 ≤ 0.5 lbs/MMBtu or sulfur content ≤ 0.5 % by weight.	
SB1	BGCAPP Space Heat Boiler #1	Particulate Matter	401 KAR 59:015 Section 4(1)	Mass Emission Rate for Particulate Matter ≤ 0.30 lb/MMBtu	USEPA Publication AP-42. If requested by KDAQ, USEPA Method 5. If requested by KDAQ, use of USEPA Method 9, Kentucky Method 150 (F-1), or comparable method selected by BGAD and approved by KDAQ.
			401 KAR 59:015 Section 4(2)	Opacity ≤ 20%	
		SO2	401 KAR 59:015 Section 5(1)	SO2 ≤ 1.00 lb/MMBtu	USEPA Publication AP-42. If requested by KDAQ, USEPA Method 6. No. 2 fuel oil sulfur content monitoring. Certificates of No. 2 fuel oil sulfur content analysis from the vendor will be kept on record and available for inspection. If requested by KDAQ, USEPA Method 6.
		SO2	40 CFR 60.42c(d)	SO2 < 0.5 lbs/MMBtu or sulfur content ≤ 0.5 % by weight.	
SB2	BGCAPP Space Heat Boiler #2	Particulate Matter	401 KAR 59:015 Section 4(1) 401 KAR 59:015 Section 4(2)	Mass Emission Rate for Particulate Matter ≤ 0.30 lb/MMBtu Opacity ≤ 20%	USEPA Publication AP-42. If requested by KDAQ, USEPA Method 5. If requested by KDAQ, use of USEPA Method 9, Kentucky Method 150 (F-1), or comparable method selected by BGAD and approved by KDAQ.

* Emissions exhaust through 2 stacks.

Commonwealth of Kentucky
Natural Resources & Environmental Protection Cabinet
Department for Environmental Protection

DEP7007V

**Applicable Requirements
& Compliance Activities**

DIVISION FOR AIR QUALITY

APPLICANT NAME: U. S. Department of the Army, Blue Grass Army Depot

SECTION I. EMISSION AND OPERATING STANDARD(S) AND LIMITATION(S)

KYEIS No.(1)	Emission Unit Description(2)	Contaminant(3)	Origin of Requirement or Standard(4)	Applicable Requirement, Standard, Restriction, Limitation, or Exemption(5)	Method of Determining Compliance with the Emission and Operating Requirement(s)(6)
		SO2	401 KAR 59:015 Section 5(1)	SO2 ≤ 1.00 lb/MMBtu	USEPA Publication AP-42. If requested by KDAQ, USEPA Method 6.
		SO2	40 CFR 60.42c(d)	SO2 ≤ 0.5 lbs/MMBtu or sulfur content ≤ 0.5 % by weight.	No. 2 fuel oil sulfur content monitoring. Certificates of No. 2 fuel oil sulfur content analysis from the vendor will be kept on record and available for inspection. If requested by KDAQ, USEPA Method 6.
EG1	IC Engine for Emergency Generator #1	Particulate Matter	401 KAR 59:010 Section 3(1)	Opacity < 20%	If requested by KDAQ, use of USEPA Method 9, Kentucky Method 150 (F-1), or comparable method selected by BGAD and approved by KDAQ.
EG2	IC Engine for Emergency Generator #2	Particulate Matter	401 KAR 59:010 Section 3(1)	Opacity < 20%	If requested by KDAQ, use of USEPA Method 9, Kentucky Method 150 (F-1), or comparable method selected by BGAD and approved by KDAQ.
EG3	IC Engine for Emergency Generator #3	Particulate Matter	401 KAR 59:010 Section 3(1)	Opacity < 20%	If requested by KDAQ, use of USEPA Method 9, Kentucky Method 150 (F-1), or comparable method selected by BGAD and approved by KDAQ.
EG4	IC Engine for Emergency Generator #4	Particulate Matter	401 KAR 59:010 Section 3(1)	Opacity < 20%	If requested by KDAQ, use of USEPA Method 9, Kentucky Method 150 (F-1), or comparable method selected by BGAD and approved by KDAQ.
EG5	IC Engine for Secondary Power Back-up (Manual Start) Emergency Generator for MDB HVAC Filter System	Particulate Matter	401 KAR 59:010 Section 3(1)	Opacity < 20%	If requested by KDAQ, use of USEPA Method 9, Kentucky Method 150 (F-1), or comparable method selected by BGAD and approved by KDAQ.
EG6	IC Engine for Emergency Water and Firewater Pump	Particulate Matter	401 KAR 59:010 Section 3(1)	Opacity < 20%	If requested by KDAQ, use of USEPA Method 9, Kentucky Method 150 (F-1), or comparable method selected by BGAD and approved by KDAQ.

* Emissions exhaust through 2 stacks.

APPLICANT NAME: U. S. Department of the Army, Blue Grass Army Depot

SECTION II. MONITORING REQUIREMENTS

KYEIS No. ⁽¹⁾	Emission Unit Description ⁽²⁾	Contaminant ⁽³⁾	Origin of Requirement or Standard ⁽⁴⁾	Parameter Monitored ⁽⁷⁾	Description of Monitoring ⁽⁸⁾
MDB	Munitions Demilitarization Building Operations	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
			401 KAR 59:010 Section 3(2)	None	None required by the underlying applicable requirements.
PB1	BGCAPP Process Boiler #1	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements.
		SO2	401 KAR 59:015 Section 4(2) 401 KAR 59:015 Section 5(1) 40 CFR 60.42 c(d)	None None No. 2 fuel oil content by weight	None required by the underlying applicable requirements. None required by the underlying applicable requirements. Certification of No. 2 fuel oil sulfur content for each shipment from supplier.
PB2	BGCAPP Process Boiler #2	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements.
		SO2	401 KAR 59:015 Section 4(2) 401 KAR 59:015 Section 5(1) 40 CFR 60.42 c(d)	None None No. 2 fuel oil content by weight	None required by the underlying applicable requirements. None required by the underlying applicable requirements. Certification of No. 2 fuel oil sulfur content for each shipment from supplier.
SB1	BGCAPP Space Heat Boiler #1	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements.
		SO2	401 KAR 59:015 Section 4(2) 401 KAR 59:015 Section 5(1) 40 CFR 60.42 c(d)	None None No. 2 fuel oil content by weight	None required by the underlying applicable requirements. None required by the underlying applicable requirements. Certification of No. 2 fuel oil sulfur content for each shipment from supplier.
SB2	BGCAPP Space Heat Boiler #2	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements.
		SO2	401 KAR 59:015 Section 4(2) 401 KAR 59:015 Section 5(1) 40 CFR 60.42 c(d)	None None No. 2 fuel oil content by weight	None required by the underlying applicable requirements. None required by the underlying applicable requirements. Certification of No. 2 fuel oil sulfur content for each shipment from supplier.
EG1	IC Engine for Emergency Generator #1	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
EG2	IC Engine for Emergency Generator #2	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
EG3	IC Engine for Emergency Generator #3	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
EG4	IC Engine for Emergency Generator #4	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.

APPLICANT NAME: U. S. Department of the Army, Blue Grass Army Depot

SECTION II. MONITORING REQUIREMENTS

KYEIS No. ⁽¹⁾	Emission Unit Description ⁽²⁾	Contaminant ⁽³⁾	Origin of Requirement or Standard ⁽⁴⁾	Parameter Monitored ⁽⁷⁾	Description of Monitoring ⁽⁸⁾
EG5	IC Engine for Secondary Power Backup (Manual Start) Emergency Generator for MDB HVAC Filter System	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
EG6	IC Engine for Emergency Water and Firewater Pump	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.

APPLICANT NAME: U. S. Department of the Army, Blue Grass Army Depot

SECTION III. RECORDKEEPING REQUIREMENTS

KYEIS No. ⁽¹⁾	Emission Unit Description ⁽²⁾	Contaminant ⁽³⁾	Origin of Requirement or Standard ⁽⁴⁾	Parameter Recorded ⁽⁹⁾	Description of Recordkeeping ⁽¹⁰⁾
MDB	Munitions Demilitarization Building Operations	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
			401 KAR 59:010 Section 3(2)	None	None required by the underlying applicable requirements.
PB1	BGCAPP Process Boiler #1	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements.
			401 KAR 59:015 Section 4(2)	None	None required by the underlying applicable requirements.
		SO2	401 KAR 59:015 Section 5(1)	None	None required by the underlying applicable requirements.
			40 CFR 60.42c(d)	No. 2 fuel oil sulfur content by weight	Records of No. 2 fuel oil sulfur content and supplier certifications monitored for 5 years per 40 CFR 60.48c(e)(11) requirements.
PB2	BGCAPP Process Boiler #2	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements.
			401 KAR 59:015 Section 4(2)	None	None required by the underlying applicable requirements.
		SO2	401 KAR 59:015 Section 5(1)	None	None required by the underlying applicable requirements.
			40 CFR 60.42c(d)	No. 2 fuel oil sulfur content by weight	Records of No. 2 fuel oil sulfur content and supplier certifications monitored for 5 years per 40 CFR 60.48c(e)(11) requirements.
SB1	BGCAPP Space Heat Boiler #1	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements.
			401 KAR 59:015 Section 4(2)	None	None required by the underlying applicable requirements.
		SO2	401 KAR 59:015 Section 5(1)	None	None required by the underlying applicable requirements.
			40 CFR 60.42c(d)	No. 2 fuel oil sulfur content by weight	Records of No. 2 fuel oil sulfur content and supplier certifications monitored for 5 years per 40 CFR 60.48c(e)(11) requirements.
SB2	BGCAPP Space Heat Boiler #2	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements.
			401 KAR 59:015 Section 4(2)	None	None required by the underlying applicable requirements.
		SO2	401 KAR 59:015 Section 5(1)	None	None required by the underlying applicable requirements.
			40 CFR 60.42c(d)	No. 2 fuel oil sulfur content by weight	Records of No. 2 fuel oil sulfur content and supplier certifications monitored for 5 years per 40 CFR 60.48c(e)(11) requirements.
EG1	IC Engine for Emergency Generator #1	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
EG2	IC Engine for Emergency Generator #2	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
EG3	IC Engine for Emergency Generator #3	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
EG4	IC Engine for Emergency Generator #4	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.

APPLICANT NAME: U. S. Department of the Army, Blue Grass Army Depot

SECTION III. RECORDKEEPING REQUIREMENTS

KYEIS No. ⁽¹⁾	Emission Unit Description ⁽²⁾	Contaminant ⁽³⁾	Origin of Requirement or Standard ⁽⁴⁾	Parameter Recorded ⁽⁹⁾	Description of Recordkeeping ⁽¹⁰⁾
EG5	IC Engine for Secondary Power Back-up (Manual Start) Emergency Generator for MDB HVAC Filter System	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
EG6	IC Engine for Emergency Water and Firewater Pump	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.

APPLICANT NAME: U. S. Department of the Army, Blue Grass Army Depot

SECTION IV. REPORTING REQUIREMENTS

KYEIS No. ⁽¹⁾	Emission Unit Description ⁽²⁾	Contaminant ⁽³⁾	Origin of Requirement or Standard ⁽⁴⁾	Parameter Reported ⁽¹¹⁾	Description of Reporting ⁽¹²⁾
MDB	Munitions Demilitarization Building Operations	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
			401 KAR 59:010 Section 3(2)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
PB1	BGCAPP Process Boiler #1	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
			401 KAR 59:015 Section 4(2)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
		SO2	401 KAR 59:015 Section 5(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
			40 CFR 60.42c(d)	No. 2 fuel oil sulfur content by weight	No. 2 fuel oil sulfur content by weight records including all fuel supplier certification for the reporting period per 40 CFR 60.48c(d) and 40 CFR 60.48c(e)(11) requirements.
PB2	BGCAPP Process Boiler #2	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
			401 KAR 59:015 Section 4(2)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
		SO2	401 KAR 59:015 Section 5(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
			40 CFR 60.42c(d)	No. 2 fuel oil sulfur content by weight	No. 2 fuel oil sulfur content by weight records including all fuel supplier certification for the reporting period per 40 CFR 60.48c(d) and 40 CFR 60.48c(e)(11) requirements.
SB1	BGCAPP Space Heat Boiler #1	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
			401 KAR 59:015 Section 4(2)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
		SO2	401 KAR 59:015 Section 5(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
			40 CFR 60.42c(d)	No. 2 fuel oil sulfur content by weight	No. 2 fuel oil sulfur content by weight records including all fuel supplier certification for the reporting period per 40 CFR 60.48c(d) and 40 CFR 60.48c(e)(11) requirements.
SB2	BGCAPP Space Heat Boiler #2	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
			401 KAR 59:015 Section 4(2)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ

APPLICANT NAME: U. S. Department of the Army, Blue Grass Army Depot

SECTION IV. REPORTING REQUIREMENTS

KYEIS No. ⁽¹⁾	Emission Unit Description ⁽²⁾	Contaminant ⁽³⁾	Origin of Requirement or Standard ⁽⁴⁾	Parameter Reported ⁽¹¹⁾	Description of Reporting ⁽¹²⁾
		SO2	401 KAR 59:015 Section 5(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
			40 CFR 60.42c(d)	No. 2 fuel oil sulfur content by weight	No. 2 fuel oil sulfur content by weight records including all fuel supplier certification for the reporting period per 40 CFR 60.48c(d) and 40 CFR 60.48c(e)(11) requirements.
EG1	IC Engine for Emergency Generator #1	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
EG2	IC Engine for Emergency Generator #2	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
EG3	IC Engine for Emergency Generator #3	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
EG4	IC Engine for Emergency Generator #4	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
EG5	IC Engine for Secondary Power Back-up (Manual Start) Emergency Generator for MDB HVAC Filter System	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ
EG6	IC Engine for Emergency Water and Firewater Pump	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements. Annual certification of compliance with Title V permit requirements per 401 KAR 52:020 Section 3(e) upon issuance of the final Title V permit by KDAQ

APPLICANT NAME: U. S. Department of the Army, Blue Grass Army Depot

SECTION V. TESTING REQUIREMENTS

KYEIS No. ⁽¹⁾	Emission Unit Description ⁽²⁾	Contaminant ⁽³⁾	Origin of Requirement or Standard ⁽⁴⁾	Parameter Tested ⁽¹³⁾	Description of Testing ⁽¹⁴⁾
MDB	Munitions Demilitarization Building Operations	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
			401 KAR 59:010 Section 3(2)	None	None required by the underlying applicable requirements.
PB1	BGCAPP Process Boiler #1	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements.
			401 KAR 59:015 Section 4(2)	None	None required by the underlying applicable requirements.
		SO2	401 KAR 59:015 Section 5(1) 40 CFR 60.42c(d)	None No. 2 fuel oil sulfur content by weight	None required by the underlying applicable requirements. Certification of each shipment No. 2 fuel oil sulfur content by supplier per 40 CFR 60.44c(h) requirements.
PB2	BGCAPP Process Boiler #2	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements.
			401 KAR 59:015 Section 4(2)	None	None required by the underlying applicable requirements.
		SO2	401 KAR 59:015 Section 5(1) 40 CFR 60.42c(d)	None No. 2 fuel oil sulfur content by weight	None required by the underlying applicable requirements. Certification of each shipment No. 2 fuel oil sulfur content by supplier per 40 CFR 60.44c(h) requirements.
SB1	BGCAPP Space Heat Boiler #1	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements.
			401 KAR 59:015 Section 4(2)	None	None required by the underlying applicable requirements.
		SO2	401 KAR 59:015 Section 5(1) 40 CFR 60.42c(d)	None No. 2 fuel oil sulfur content by weight	None required by the underlying applicable requirements. Certification of each shipment No. 2 fuel oil sulfur content by supplier per 40 CFR 60.44c(h) requirements.
SB2	BGCAPP Space Heat Boiler #2	Particulate Matter	401 KAR 59:015 Section 4(1)	None	None required by the underlying applicable requirements.
			401 KAR 59:015 Section 4(2)	None	None required by the underlying applicable requirements.
		SO2	401 KAR 59:015 Section 5(1) 40 CFR 60.42c(d)	None No. 2 fuel oil sulfur content by weight	None required by the underlying applicable requirements. Certification of each shipment No. 2 fuel oil sulfur content by supplier per 40 CFR 60.44c(h) requirements.
EG1	IC Engine for Emergency Generator #1	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
EG2	IC Engine for Emergency Generator #2	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
EG3	IC Engine for Emergency Generator #3	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
EG4	IC Engine for Emergency Generator #4	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.
EG5	IC Engine for Secondary Power Back-up (Manual Start) Emergency Generator for MDB HVAC Filter System	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.

APPLICANT NAME: U. S. Department of the Army, Blue Grass Army Depot**SECTION V. TESTING REQUIREMENTS**

KYEIS No. ⁽¹⁾	Emission Unit Description ⁽²⁾	Contaminant ⁽³⁾	Origin of Requirement or Standard ⁽⁴⁾	Parameter Tested ⁽¹³⁾	Description of Testing ⁽¹⁴⁾
EG6	IC Engine for Emergency Water and Firewater Pump	Particulate Matter	401 KAR 59:010 Section 3(1)	None	None required by the underlying applicable requirements.

DIVISION FOR AIR QUALITY

Division Use Only
ID#
Permit #
Received Date

An application for a permit must contain a certification of compliance signed by a responsible official.
This form must be submitted with the original application as well as each annual report.
This form does not have to be completed for sources applying to construct with original application.

1) Source Name U. S. Department of the Army, Blue Grass Army Depot		
2) Source Street Address 2091 Kingston Highway		
3) City Richmond	4) Date Form Prepared 09/09/04	5) Source ID # (If known) AFS Plant ID #: 021-151-00013
6) Permit Number(s) (If known)		
7) Submittal Information Is this the first submittal of this form? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No What is the reporting period? to mm / dd / yy mm / dd / yy		

8) IDENTIFICATION OF EMISSION UNITS

8a)(1) Emission Units in Compliance. The following emission units are in compliance with applicable requirements such as emission standards, emission control requirements, emission testing, court requirements, work practices, or enhanced monitoring, based on the compliance methods specified below and will continue to comply. *If additional space is needed, attach and label as exhibit DEP7007CC 8a)(1)*

Emission Point ID#	Emission Unit ID#	Permit Condition or Applicable Regulation	Emission Unit Description	Permit Limit	Actual Emissions	Method used for Determining Compliance & whether continuous or intermittent <i>(such as test methods, monitoring procedures, recordkeeping and reporting)</i>
			<p>This facility will be a new installation at the existing Blue Grass Army Depot. All BGCAPP emission sources will be in compliance with applicable State and Federal regulations upon startup. A Title V application including the compliance certification has been submitted separately BGAD.</p>			

8) IDENTIFICATION OF EMISSION UNITS (continued)

8a)(2) Emission Units in Compliance but Subject to Future Compliance Dates. The following emission units, which are currently in compliance with all applicable requirements, will achieve compliance on a timely basis and maintain compliance with future compliance dates as they become applicable during the permit term. *If additional space is needed, attach and label as exhibit DEP7007CC 8a)(2)*

Emission Point ID#	Emission Unit ID#	Future Compliance Schedule	Emission Unit Description	Reason for Future Compliance Date

8) IDENTIFICATION OF EMISSION UNITS (continued)

8b)(1) Emission Units Not in Compliance. The following emission units were not in compliance with applicable requirements such as emission standards, emission control requirements, emission testing, court requirements, work practices, or enhanced monitoring, based on the compliance methods specified below.
If additional space is needed, attach and label as exhibit DEP7007CC 8b)(1)

Emission Point ID#	Emission Unit ID#	Permit Condition or Applicable Regulation	Emission Unit Description	Permit Limit	Actual Emissions	Method used for Determining Compliance <i>(such as test methods, monitoring procedures, recordkeeping and reporting)</i>

8) IDENTIFICATION OF EMISSION UNITS (continued)

8b)(2) Emission Units Not in Compliance. For the above listed emission units that were not in continuous compliance since the last reporting period, state the reasons for noncompliance. *If additional space is needed, attach and label as exhibit DEP7007CC 8b)(2)*

Emission Point ID#	Emission Unit ID#	Reason's) for NonCompliance

ID #

9) SIGNATURE BLOCK

I, THE UNDERSIGNED, HEREBY CERTIFY UNDER PENALTY OF LAW, THAT I AM A RESPONSIBLE OFFICIAL, AND THAT I HAVE PERSONALLY EXAMINED, AND AM FAMILIAR WITH, THE INFORMATION SUBMITTED IN THIS DOCUMENT AND ALL ITS ATTACHMENTS. BASED ON MY INQUIRY OF THOSE INDIVIDUALS WITH PRIMARY RESPONSIBILITY FOR OBTAINING THE INFORMATION, I CERTIFY THAT THE INFORMATION IS ON KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE OR INCOMPLETE INFORMATION, INCLUDING THE POSSIBILITY OF FINE OR IMPRISONMENT.

BY:



AUTHORIZED SIGNATURE

Martin A. Jacoby

TYPED OR PRINTED NAME OF SIGNATORY

20 Sep 04

DATE

Colonel, U.S. Army, Commanding Officer
TITLE OF SIGNATORY

DIVISION FOR AIR QUALITY

DEP7007DD

**INSIGNIFICANT
ACTIVITIES**

INSIGNIFICANT ACTIVITY CRITERIA

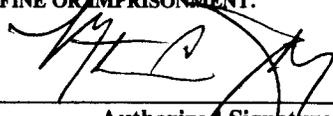
1. Emissions from insignificant activities shall be counted toward the source's potential to emit;
2. Emissions from the activity shall not be subject to a federally enforceable requirement other than generally applicable requirements that apply to all activities and affected facilities such as 401 KAR 59:010, 61:020, 63:010, and others deemed generally applicable by the Cabinet;
3. The potential to emit a regulated air pollutant from the activity or affected facility shall not exceed 5 tons/yr.
4. The potential to emit of a hazardous air pollutant from the activity or affected facility shall not exceed 1,000 pounds/yr., or the de minimis level established under Section 112(g) of the Act, whichever is less;
5. The activity shall be included in the permit application, identifying generally applicable and state origin requirements.

Description of Activity Including Rated Capacity	Generally Applicable Regulations Or State Origin Requirements	Does the Activity meet the Insignificant Activity Criteria Listed Above?
IC Engine (211 HP) for Emergency Generator (EG7) for Entry Control Facility (ECF)	401 KAR 59:010 Section 3(1)	Yes
2 Agent Hydrolysate 245,000 Gallon Storage Tanks	None	Yes
Agent Hydrolysate 60,000 Gallon Storage Tank	None	Yes
4 Energetics Hydrolysate 475,000 Gallon Storage Tanks	None	Yes
Aluminum Precipitation and Filtration Building H VAC Filters System Exhaust	None	Yes
Supercritical Water Oxidation Process Building (SPB) H VAC Filter System Exhaust	401 KAR 59:010 Section 3(1)	Yes
MPT Residual Cooldown Conveyor	None	Yes
Laboratory H VAC Filter Stack	None	Yes
HCl (37%) 8,500 Gallon and 1,125 Gallon Storage Tanks	None	Yes
Isopropyl Alcohol (IPA) 39,500 Gallon Storage Tank	None	Yes
Sulfuric Acid 4,500 Gallon Storage Tank	None	Yes
2 No. 2 Fuel Oil 24,620 Gallon Storage Tanks	None	Yes

Description of Activity Including Rated Capacity	Generally Applicable Regulations Or State Origin Requirements	Does the Activity meet the Insignificant Activity Criteria Listed Above?
2 Sodium Hydroxide (50%) 50,000 Gallon Storage Tanks	None	Yes
Sodium Hydroxide (18%) 6,000 Gallon Storage Tank	None	Yes
Sodium Hydroxide (1%) 3,100 Gallon Storage Tank	None	Yes
Sodium Hypochlorite/Sodium Hydroxide (1%) 10,500 Gallon Storage Tank	None	Yes
Personnel Maintenance Building HVAC Filter Stack Clinic Decon Room	None	Yes
<p>Note: Please see Table 4.2, Air Permit Support Data for capacities, throughputs, and number of units of each insignificant activity.</p>		

SIGNATURE BLOCK

I, THE UNDERSIGNED, HEREBY CERTIFY UNDER PENALTY OF LAW, THAT I AM A RESPONSIBLE OFFICIAL, AND THAT I HAVE PERSONALLY EXAMINED, AND AM FAMILIAR WITH, THE INFORMATION SUBMITTED IN THIS DOCUMENT AND ALL ITS ATTACHMENTS. BASED ON MY INQUIRY OF THOSE INDIVIDUALS WITH PRIMARY RESPONSIBILITY FOR OBTAINING THE INFORMATION, I CERTIFY THAT THE INFORMATION IS ON KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE OR INCOMPLETE INFORMATION, INCLUDING THE POSSIBILITY OF FINE OR IMPRISONMENT.

BY  _____
 Authorized Signature

09, 20, 04
 Date

Martin A. Jaeb
 Typed or Printed Name of Signatory

Colonel, U.S. Army, Commanding Officer
 Title of Signatory

Section 8
Air Permit Application
Support Data

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1 **Acronyms**

Acronym	Definition
ACB	access control building
ACWA	Assembled Chemical Weapons Alternatives
AFB	aluminum filtration building
AFS	aluminum filtration system
ANCDF	Anniston Chemical Weapons Disposal Facility
ANR	agent neutralization reactor
ANS	agent neutralization system
APR	aluminum precipitation reactor
APS	aluminum precipitation system
BC	brine concentrator
BGAD	Blue Grass Army Depot
BGCAPP	Blue Grass Chemical Agent Pilot Plant
CA	chemical agent
CHB	container handling building
CO	carbon monoxide
DA	Department of the Army
DA-PAM	Department of the Army Pamphlet
decon	decontamination
DOT	Department of Transportation
dscm	dry cubic meter
DSH	dunnage shredding and handling
EBH	energetics batch hydrolyzer
EC	evaporator/crystallizer
ECF	entry control facility
ENR	energetics neutralization reactor
ENS	energetics neutralization system
EONC	enhanced onsite container
EPA	Environmental Protection Agency
GB	nerve agent sarin, isopropyl methyl phosphonofluoridate (C ₄ H ₁₀ FO ₂ P)
H	blister agent mustard made by the Levinstein process, bis(2-chloroethyl) sulfide or 2,2'-dichlorodiethyl sulfide (C ₄ H ₈ Cl ₂ S _{1.5})
HAP	hazardous air pollutant
HDC	heated discharge conveyor
HEPA	high-efficiency particulate air (filter)
HP	high-pressure
HSA	hydrolysate storage area
HVAC	heating, ventilating, and air conditioning
IC	internal combustion
IPA	isopropyl alcohol
KAR	Kentucky Administrative Regulation
KDAQ	Kentucky Department of Environmental Protection, Division for Air Quality
KDEP	Kentucky Department of Environmental Protection

Acronym	Definition
MDB	munitions demilitarization building
MPT	metal parts treater
MWS	munitions washout station
Na ₂ SO ₄	sodium sulfate
NaCl	sodium chloride
NaF	sodium fluoride
NaH ₂ PO ₄	sodium monophosphate
NaOH	sodium hydroxide
NCRS	nose closure removal station
NOx	nitrous oxides
OTS	offgas treatment system
PAH	polycyclic aromatic hydrocarbon
PFD	process flow diagram
PHS	projectile handling system
PM	particulate matter
PM ₁₀	particulate matter of less than 10 microns in diameter
PMD	projectile mortar disassembly
POM	particulate organic matter
PPE	personnel protective clothing
PTE	potential to emit
RO	reverse osmosis
RSM	rocket shear machine
SCWO	supercritical water oxidation
SDG	standby diesel generator
SDS	spent decontamination solution
SO ₂	sulfur dioxide
SPB	SCWO process building
THC	total hydrocarbon
TOC	total organic carbon
TOCDF	Tooele Chemical Agent Disposal Facility
TSDf	treatment, storage, and disposal facility
TSP	total suspended particulates
UPA	unpack area
VOC	volatile organic compound
VX	nerve agent, O-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate (C ₁₁ H ₂₆ NO ₂ PS)
WRS	water recovery system

1 Introduction

The Blue Grass Army Depot (BGAD) is submitting an air permit application to the Kentucky Department of Environmental Protection (KDEP), Division for Air Quality (KDAQ) for construction and operation of the Blue Grass Chemical Agent Destruction Pilot Plant (BGCAPP) in Richmond, Kentucky. This report documents the basis for estimating emissions for the proposed BGCAPP facility and provides other relevant supporting data to facilitate KDEP/DAQ's processing of the BGCAPP air permit application. This supporting document constitutes a part of BGAD's air permit application for the BGCAPP. This document consists of the following sections:

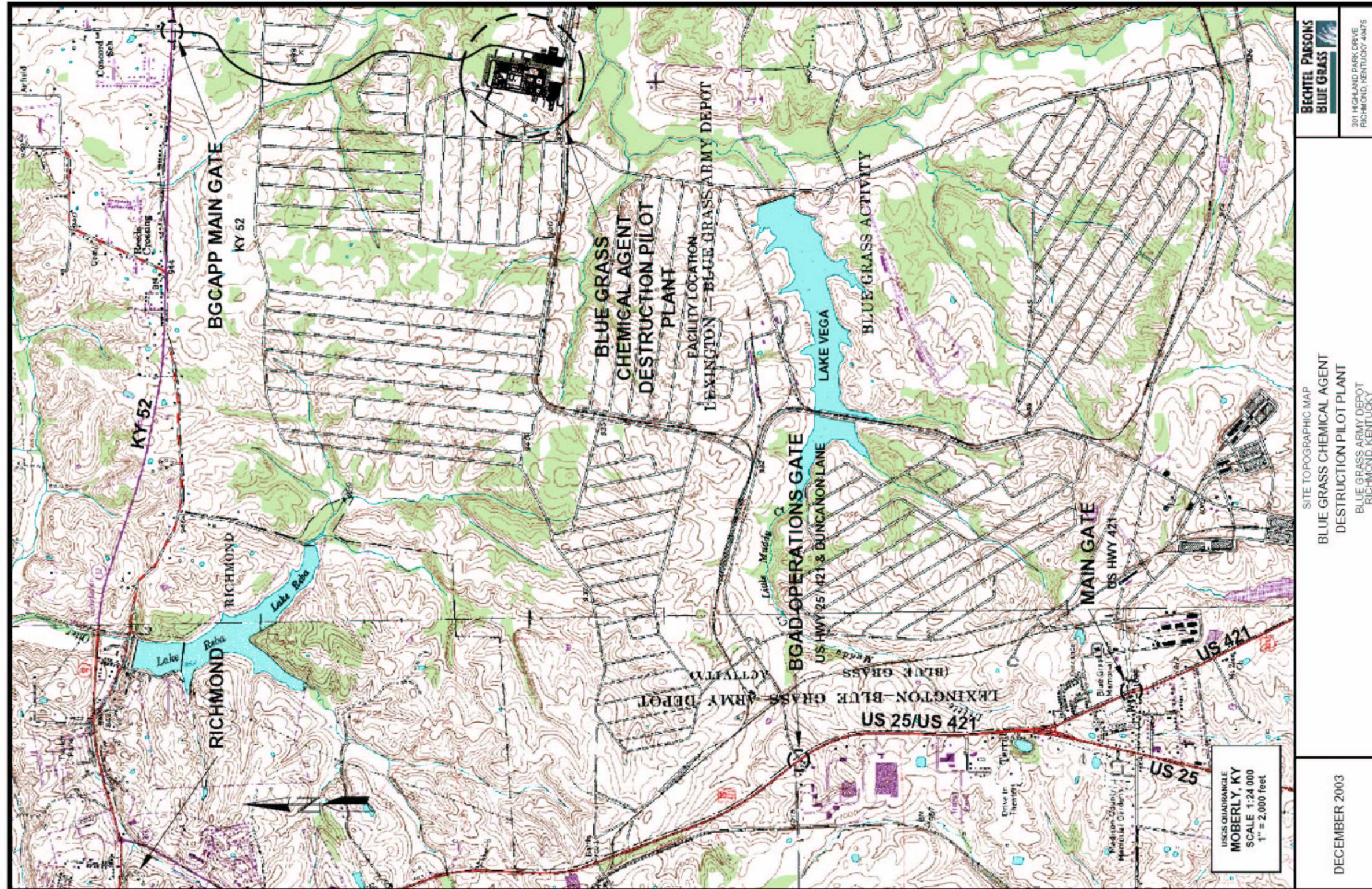
1. Introduction
2. Site Location and Facility Layout
3. Process Description
4. Air Emission Sources and Controls
5. References for Emission Factor Estimates

2 Site Location and Facility Layout

The BGAD site location address is 2091 Kingston Highway, Richmond, Kentucky. The site is approximately 5 miles southeast of Richmond, Kentucky, in Madison County. The BGAD occupies approximately 14,596 acres of the area bounded by Kingston Highway/State Route 421 on the west, State Route 52 on the north, Speedwell Road/State Route 374 on the east, and Crooksville Road on the south. Figure 2-1 shows the BGAD site area on the topographical map. The BGCAPP facility will be located in the northeast portion of the BGAD site.

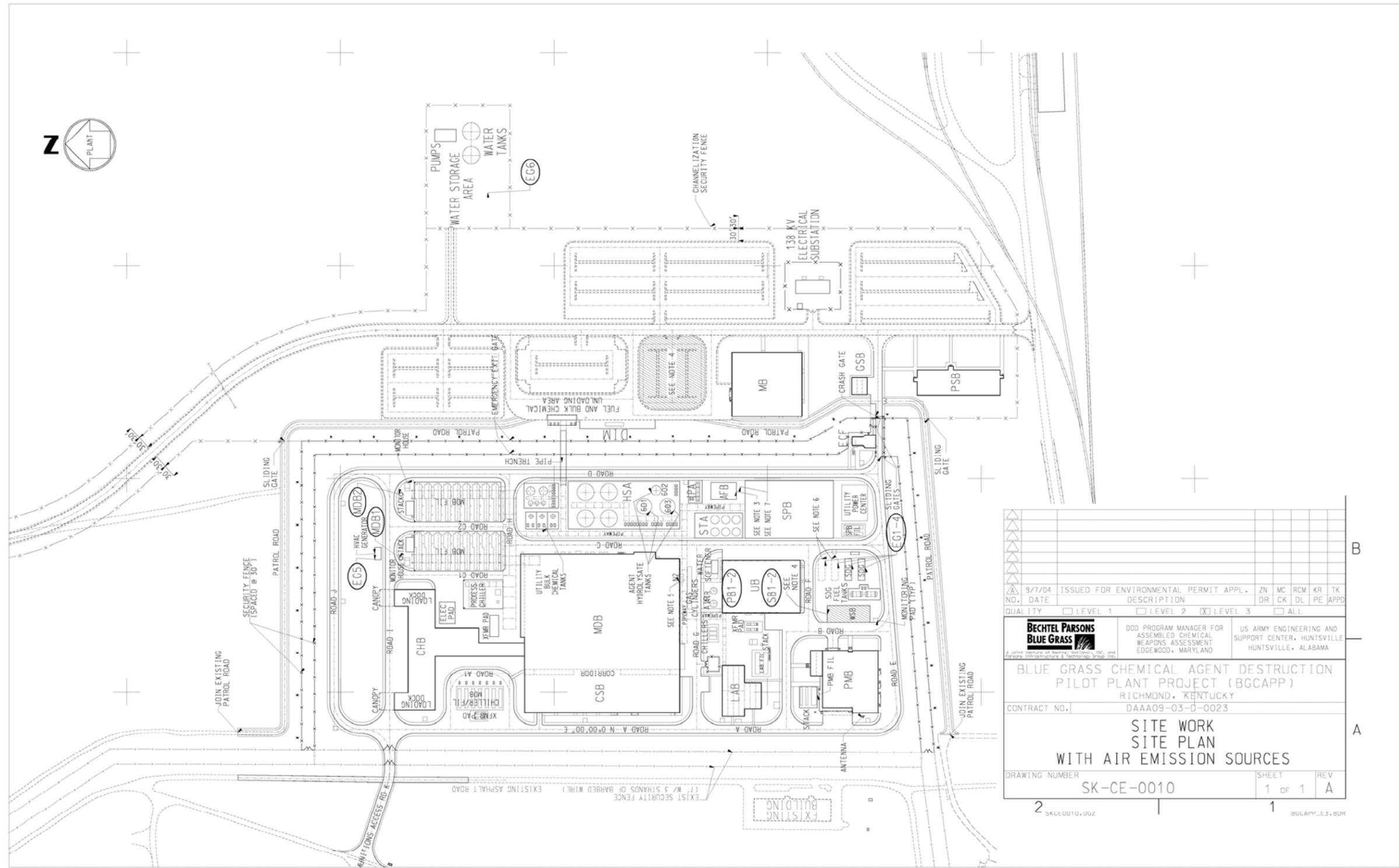
The BGAD has approximately 850 employees on site. At its peak (during systemization and startup), the BGCAPP is expected to employ 600 people on site and at nearby offices facilities, thus raising the peak number of employees to approximately 1,450.

Figure 2-2 shows the general layout of BGCAPP and indicates the main process area, auxiliary operational areas, and facility support areas, and emission points.



1
2

Figure 2-1—BGCAPP Site Location



BECHTEL PARSONS BLUE GRASS		DOD PROGRAM MANAGER FOR ASSEMBLED CHEMICAL WEAPONS ASSESSMENT EDGEWOOD, MARYLAND		US ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE HUNTSVILLE, ALABAMA	
BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP) RICHMOND, KENTUCKY					
CONTRACT NO.		DAAA09-03-D-0023			
SITE WORK SITE PLAN WITH AIR EMISSION SOURCES					
DRAWING NUMBER SK-CE-0010				SHEET 1 OF 1 REV A	
2		1		BGCAPP-E.S.-BUR	

1
2

Figure 2-2—Facility Layout

3 Process Description

The BGAD is an active depot with existing emission sources such as boilers and paint spray booths, as well as other processes that are normally found in a heavy equipment refurbishing and repair operation. The BGCAPP is located wholly within the BGAD's boundary. It is built and operated for the sole function of destroying the chemical weapons stockpile stored at the BGAD. All chemical weapons and chemical agent (CA)-contaminated materials will be processed and all CA will be neutralized in the munitions demilitarization building (MDB). The products of CA neutralization (hydrolysate) are stored in the hydrolysate storage area (HSA) tanks and then treated in the supercritical water oxidation (SCWO) process building (SPB), where it is converted into an inorganic filter cake and high purity water that will be reused in the plant. Waste treatment residues are shipped offsite for disposal or recycling.

The BGCAPP has the following significant air emission sources:

1. In the MDB, all emissions pass through the MDB heating, ventilating, and air conditioning (HVAC) filter system and are released through two stacks (MDB1 and MDB2).
2. Two gas-fired process boilers (PB1 and PB2) and two space-heat boilers (SB1 and SB2). All four boilers use No. 2 fuel oil as a backup fuel if the natural gas supply is interrupted.
3. Six emergency generators (EG1 through EG6) with diesel-cycle internal combustion (IC) engines operate on No. 2 fuel oil. They are used only to maintain critical operations and safety systems during a power failure. A seventh emergency generator with IC engine is an insignificant activity.

The remaining air emission sources are all insignificant activities as described in 401 KAR 52:020 Section 6(1).

3.1 Wastes Treated

The wastes to be treated at BGCAPP consist primarily of M55 rockets, M56 warheads, and projectiles (8 in. and 155 mm). CA-contaminated secondary waste (including contaminated wooden pallets, metal banding, used personnel safety gear, and replaced process parts) is also treated at the plant. Table 3-1 lists the types and quantities of the munitions in the BGAD stockpile.

Table 3-1—Stored Munitions Data

Munition	Agent Type	Type	Caliber
M55	GB	Rocket	115 mm
M56	GB	Warhead	115 mm
M426	GB	Projectile	8 in.
Ton container	GB	Nonstockpile	NA
M55	VX	Rocket	115 mm
M56	VX	Warhead	115 mm
M121A1	VX	Projectile	155 mm
M110	H	Projectile	155 mm
DOT ^a bottle	H	Nonstockpile	NA
DOT bottle	VX	Nonstockpile	NA

^aDOT = Department of Transportation

3.1.1 Projectiles

Projectiles are CA-containing shells that are fired from guns or cannons. They have a roughly cylindrical steel body with a tapered nose and a hollow cylindrical tube (known as the burster well) running down the center of the shell. This tube holds the burster, an explosive charge that disperses the CA on detonation. The liquid agent is contained in the annular region between the burster well and the shell wall. The 155-mm H projectiles contain energetic material (composed of tetrytol) in the burster well (see Figure 3-1). The 8-in GB projectiles (designated as M426) and the 155-mm VX projectiles (designated as M121A1) do not have a burster.

3.1.2 M55 Rockets

A rocket is an airborne weapon propelled by a mixture of a fuel and an oxidizer. The only rocket type in the chemical stockpile is the 115-mm-diameter M55 rocket. This rocket is 1.98 m long and has a mass of about 26 kg (see Figure 3-2). It consists of two sections:

1. An aluminum-alloy warhead section, which contains the CA, two bursters, and the fuze
2. A steel motor section, which contains the propellant grain, the igniter assembly, and the nozzle and fins

Both GB and VX M55 rockets are part of the BGAD chemical weapons stockpile. The bursters contain Composition B (Comp B) explosive. The propellant is double base M28 (nitroglycerin/nitrocellulose). The rockets are stored in individual shipping and firing tubes (SFTs) made of fiberglass-reinforced resin. M56 warheads are similar to the M55 rockets except that they do not include the motor section (item 2 in the above list); thus, M56 warheads do not contain M28 propellant or igniter assemblies.

3.1.3 Nonstockpile Items

Four nonstockpile items are stored at BGAD and will be processed at BGCAPP:

1. One GB ton container
2. One VX Department of Transportation (DOT) bottle
3. Two H DOT bottles

3.1.4 Secondary Wastes

Six major types of secondary waste will be treated at BGCAPP:

1. Contaminated wood pallets, which are associated with leaking munitions
2. CA-contaminated plastic and personnel protective equipment (PPE)
3. Miscellaneous CA-contaminated metal parts
4. CA-contaminated spent activated carbon
5. Spent decontamination (decon) solution (SDS)
6. Closure wastes

3.2 Waste Treatment Processes

The process destroys the agent stored at the BGAD by neutralization via hydrolysis, whereby the agent or CA-contaminated material is mixed in an enclosed vessel with hot water or hot caustic (i.e., sodium hydroxide ([NaOH])). The chemical reaction destroys the agent. Hydrolysis has been shown to achieve the required performance for agent destruction.

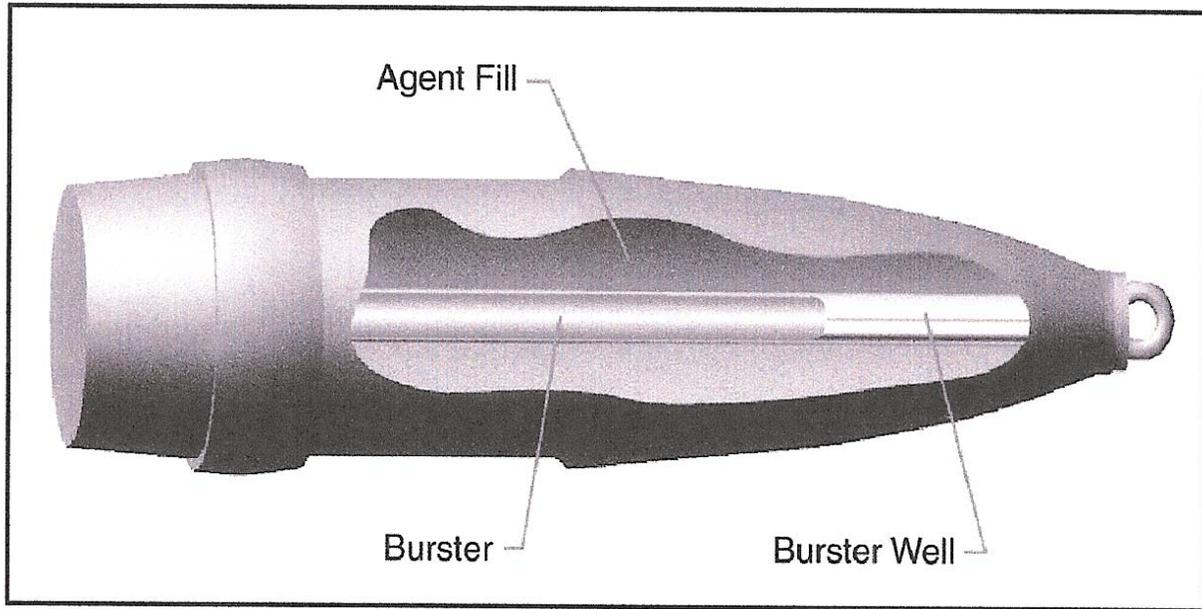


Figure 3-1—155-mm Projectile

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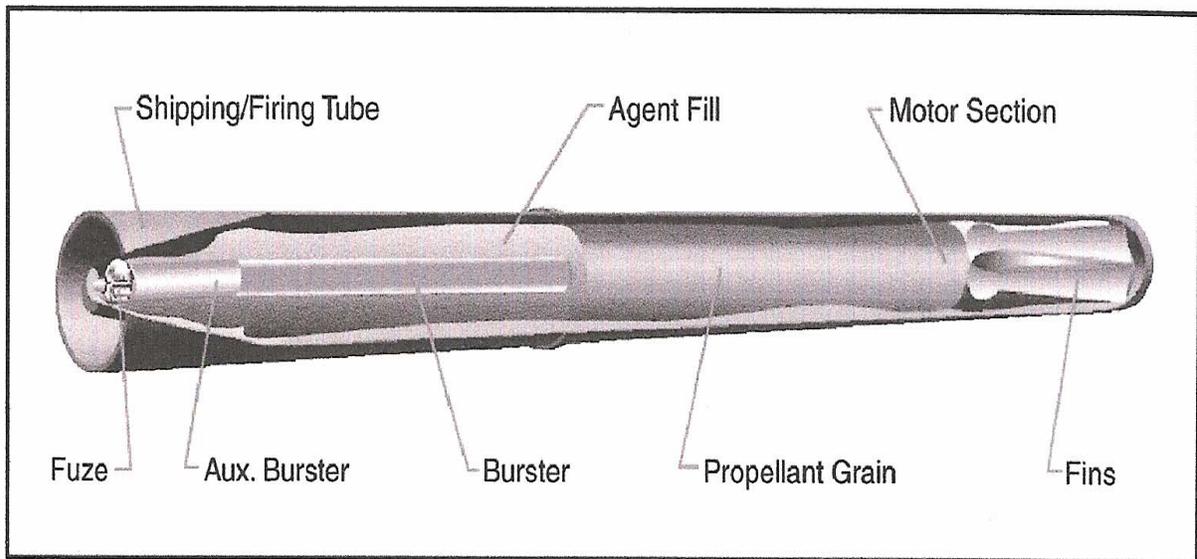


Figure 3-2—M55 Rocket

5
6

1 Water is recycled via a water recovery system (WRS) that produces water of a quality suitable
2 to recycle back into the process. Excess water is released to the atmosphere as steam in the
3 WRS.

4 **3.2.1 Processing Sequence**

5 Drawing 24915-00-HK-00-00003¹ is a process block flow diagram for the hazardous waste
6 processing units. The figure shows the flow of munitions from the container handling building
7 (CHB) through the various systems, the regulated processes discussed in Section 3, and the air
8 emission points discussed in Section 4.

9 Palletized munitions are stored in igloos. Munitions are transported from the igloos to the
10 BGCAPP via enhanced onsite containers (EONCs) to the CHB. The EONCs are airtight vessels
11 that are specifically designed to contain munitions during transport from the BGAD storage
12 igloos to the CHB. The EONC is a well-established design that is currently used safely at both
13 the Tooele Chemical Agent Disposal Facility (TOCDF) in Utah and the Anniston Chemical Agent
14 Disposal Facility (ANCDF) in Alabama.

15 The EONC is received in the CHB, where it is stored until its contents are to be treated. At that
16 time, it is transferred via a conveyor to the unpack area (UPA) and the air in the sealed EONC is
17 monitored for CA vapors. If CA is detected (indicating a leaking munition), the EONC is moved
18 to an area of the MDB where the ventilation system is designed to handle agent vapors. The
19 EONC is opened by personnel wearing appropriate PPE, and the munitions are removed and
20 placed on the appropriate processing line for that munition. All pallets and metal straps from the
21 contaminated EONC are assumed to be contaminated and are transferred to the appropriate
22 waste handling system for treatment. The EONC is then decontaminated and released for
23 further use.

24 If CA monitoring indicates that the EONC does not contain leaking munitions, the EONC is
25 opened in the UPA, and the munitions are unpacked and placed on conveyors that take them
26 through the treatment process for that particular munition.

27 The CA, propellants, and explosives are destroyed within the MDB. All treatment processes
28 located in the MDB vent to the MDB's HVAC system. All munition treatment steps in the MDB
29 are performed by remotely controlled systems.

30 Chemical demilitarization of the BGAD stockpile has the following major processing steps, all of
31 which occur in the MDB, the aluminum filtration building (AFB) and SCWO process building
32 (SPB). These steps are detailed in the following sections.

33 **3.2.1.1 Agent and Energetics Access (mechanical)**

- 34 1. **PMD Machine** (Dwg. 24915-07-M5-PHS-0001). The PMD machine removes the nose
35 closures and bursters from the 155-mm H projectiles. After the nose closure and
36 burster are removed, the projectile is conveyed out of the explosive containment room
37 (ECR), loaded onto a munition tray, and conveyed to the munitions washout station
38 (MWS).

39 The PMD processes the 155-mm H projectiles by first unscrewing the nose closure
40 and removing the burster and miscellaneous components. The nose closures and
41 miscellaneous components are conveyed out of the ECR with the projectile and are
42 placed on a munition tray for processing through the metal parts treater (MPT). The
43 bursters are transferred to the EBH for deactivation by hydrolysis.

¹ The drawing numbers refer to the Process Flow Diagrams (PFDs), which have been submitted as part of this application. Note that design calculations associated with each PFD are on the subsequent pages of the drawing, which are not submitted to KDAQ.

- 1 2. **Nose Closure Removal Station (NCRS)** (Dwg. 24915-07-M5-NCR-0001). The NCRS
2 removes the nose closures from the unburstered projectiles (GB and VX) by
3 unscrewing them from the nose of the projectile. After the nose closures have been
4 removed from all the projectiles on the munition tray, the tray is moved to the MWS for
5 further processing. The removed nose closures are processed through the MPT.
- 6 3. **MWS** (Dwg. 24915-07-M5-MWS-00001). The projectile is moved to the MWS, where
7 the agent cavity is accessed, free liquid agent is drained, and the agent cavity washed
8 out with high-pressure water. After the cavity is flushed, the projectile is placed back on
9 the munition tray upright (nose up) and transferred to the MPT.
- 10 4. **RSM** (Dwg. 24915-07-M5-RHS-00001). Rockets are processed in the RSM, which
11 disassembles the rocket warhead, accesses the agent cavity, and drains and washes it
12 in a manner similar to the projectile handling system (PHS) and MWS. The rocket's
13 solid propellant section is then cut into small sections for treatment in the energetics
14 hydrolysis treatment system.

15 **3.2.1.2 Agent Neutralization (Dwg. 24915-07-M5-ACS-00001 and -ANS-00001)**

16 The collected CA and CA-contaminated washwater from the MWS and RSM are neutralized by
17 hydrolysis in the ANRs. Hydrolysis is a liquid-phase process, operated at 90° to 95°C (near but
18 below the boiling point of the solution) whereby the CA or CA-contaminated material is mixed in
19 an enclosed vessel with hot water or hot caustic (NaOH). The chemical reaction destroys the
20 CA. The reaction products are tested for CA; if the concentration is below the target release
21 level, the hydrolysate is transferred to the hydrolysate storage tanks (Drawing 24915-11-M5-
22 HSS-00001). If not, the hydrolysate is further treated until the CA concentration is below the
23 target release level.

24 **3.2.1.3 Energetics Neutralization (Dwg. 24915-07-M5-EBH-00001, -ENS-00001 and 25 -OE-00001)**

26 The energetics (explosives and pieces of rocket propellant) are processed in the Energetic
27 Batch Hydrolyzers (EBH) where the energetics and any residual agent that may be present are
28 treated by caustic hydrolysis. After treatment in the EBHs, the solid components of the rockets
29 (fiberglass and steel) are sent to a heated discharge conveyor. The liquid goes to the Energetics
30 Neutralization Reactors (ENRs) for further treatment. If the agent concentration is below the
31 target release level, the hydrolysate is transferred to the hydrolysate storage tanks (Drawing
32 24915-11-M5-HSS-00002). If not, it is further treated until the agent concentration is below the
33 target release level.

34 **3.2.1.4 MPT (Dwg. 24915-07-M5-MPT-00001, -MPTC-00001 and -OTM-00001)**

35 Metal projectile parts and other miscellaneous contaminated metal solids (e.g., banding from
36 pallets that were exposed to agent) are decontaminated by being heated to a minimum of
37 1,000°F for 15 minutes in the electrically heated MPTs. This process has been demonstrated to
38 be sufficient to destroy any residual CA that may be present. The decontaminated metal
39 components are shipped off site for either recycling or proper disposal.

40 **3.2.1.5 HDC (Dwg. 24915-07-M5-EBH-00001)**

41 Solid rocket residues are treated in one of the two HDCs, which are electrically heated
42 conveyors that bring the material to a minimum of 1,000°F for 15 minutes to ensure that the
43 residual agent has been destroyed. The decontaminated rocket components are shipped off site
44 for proper disposal.

3.2.1.6 Aluminum Precipitation System (APS)

The energetics hydrolysate is further processed by adjusting the pH to precipitate the aluminum hydroxide² in the APS (Dwg. 24915-21-M5-APS-00001) and is then filtered in the aluminum filtration system (AFS) (Dwg. 24915-21-M5-AFS-00001). The filter cake is disposed of off site at a permitted hazardous waste disposal facility. The process takes place in the AFB. Aluminum precipitation and filtration are insignificant activities as described in 401 KAR 52:020 Section 6(1). However, as a precaution, the design incorporates activated carbon filtration on the AFB vent.

3.2.1.7 SCWO

The energetics hydrolysate from the AFS and agent hydrolysate from the HSA are transferred to holding tanks where they are blended before they are transferred to the SCWO reactors. SCWO is an enclosed oxidation process that destroys organic constituents in an aqueous stream. SCWO processing is an insignificant activity as described in 401 KAR 52:020 Section 6(1).

The SCWO process is based on the unique properties of water at conditions above its thermodynamic critical point of 374°C (705°F) and 3,206 psia. At these supercritical conditions, organic materials and oxidant gases are generally completely miscible in water and the elevated pressure increases the mixture density in the reactor, thus allowing rapid and complete oxidation reactions.

The material to be reacted is pumped with air through the feed nozzle at the top of the reactor. The feed material is supplemented with additional organic feed (supplemental fuel) to increase its heating value as required to maintain an autogenous chemical reaction. Isopropyl alcohol (IPA) is the supplemental fuel of choice at the BGCAPP.

The effluent from the SCWO reactor has a very low concentration of organics. It is pumped to a WRS consisting of the following components:

1. Reverse osmosis (RO) system (Dwg. 24915-10-HK-TWR-0001)
2. Evaporator/crystallizer (EC) (Dwg. 24915-10-HK-TNBE-00001)
3. Brine concentrator (BC) (Dwg. 24915-10-HK-TNBC-00001)

All components vent into a common duct that vents into the SPB HVAC system (see Section 4.2.5). To the maximum extent possible, the water from the WRS is recycled and reused in the facility. Excess water is released to the atmosphere as steam in the WRS.

3.2.1.8 CA-Contaminated Secondary Wastes

CA-contaminated secondary wastes (e.g., agent contaminated pallets, PPE, and spent activated carbon) are treated in the dunnage shredding and handling (DSH) system (Drawings 24915-07-M5-DWS-00001, -DCS-00001, -DPS-00001) followed by SCWO; some secondary wastes (e.g., miscellaneous metal parts, metal reinforced hoses, piping, valves, and tools) may be processed through the MPT or the HDC. Secondary wastes that are not CA-contaminated are not processed in the BGCAPP; they will be managed by appropriate means to minimize waste.

² Aluminum components of the rockets react with the caustic to form soluble aluminum salts. pH adjustment precipitates the aluminum hydroxide.

4 Air Emission Sources and Controls

The process block flow diagram (Dwg. 24915-00-HK-00-00003) identifies the air emission sources associated with BGCAPP and includes the following primary sources:

1. Treatment processes inside the MDB³, which vent completely through the MDB HVAC filter system.
2. Agent and energetics hydrolysate storage tank vents, which are insignificant activities as specified in 401 KAR 52:020, Section 6(1); as a precaution, however, the vents will be controlled by activated carbon adsorption units.
3. SCWO system and WRS vents, which are insignificant activities as described in 401 KAR 52:020, Section 6(1), vent to the SPB HVAC filter system described in Section 4.2.5.
4. Steam boilers.
5. Emergency electrical generators driven by diesel IC engines.

Table 4-1 presents the identification number for each regulated air emission point and emission source. The insignificant activities do not have identification numbers; however, their emissions are included in the potential to emit (PTE) calculations presented in Table 4-2.

Table 4-1—Emission Point and Emission Source IDs for Air Permit

Emission Point ID	Emission Unit ID	Emission Stack ID	Source Name
MDB	MDB	MDB1 MDB2	MDB HVAC filter stacks (twin stacks, flows shown as total)
PB1 PB2	PB1 PB2	PB1 PB2	Process boilers
SB1 SB2	SB1 SB2	SB1 SB2	Space heat boilers
EG1	EG1	EG1	Diesel engine for main emergency diesel generator No. 1
EG2	EG2	EG2	Diesel engine for main emergency diesel generator No. 2
EG3	EG3	EG3	Diesel engine for main emergency diesel generator No. 3
EG4	EG4	EG4	Diesel engine for main emergency diesel generator No. 4
EG5	EG5	EG5	Diesel engine for backup (manual start) emergency diesel generator for MDB filter system
EG6	EG6	EG6	Diesel engine for emergency water and firewater pumps
EG7	EG7	EG7	Diesel engine for emergency diesel generator for ECF

The following sections discuss BGCAPP's emissions sources and their associated controls, as well as the pollutants and their emission rates.

Table 4-2 summarizes the results of the PTE calculations for the BGCAPP. The supporting information for these results are presented in the subsequent subsections and tables. Table 4-3 summarizes the results of the PTE calculations for the combustion sources (i.e., boilers and emergency generators).

³ Because all processes within the MDB vent directly to the MDB HVAC filter system, the processing units in the MDB are considered as one emission source for this application.

Table 4-2—Summary of BGCAPP Air Emission Sources

Emission Source & Point ID	Source Name	Number of Emission Sources		Process Throughput Rate per unit, lb/hr	Process Throughput Rate Stream #	Capacity Per Tank, gal	Gas Flow Rate, acfm	Gas Flow Rate, scfm	Gas Flow Rate Stream #	CO, lb/hr	NOx, lb/hr	Total Suspended Particulates (TSP), lb/hr	Particulate Matter <10µ (PM10), lb/hr	SO2, lb/hr	Total Organic Compounds, lb/hr	Total HAPs, lb/hr	Operation, hr/yr	CO, ton/yr	NOx, ton/yr	TSP, ton/yr	PM10, ton/yr	Total Organic Compounds, ton/yr	SO2, ton/yr	Total HAPs, ton/yr
MDB	MDB HVAC filter stacks (twin stacks, flows shown as total)	1	2	30,519	MDB		256,000	256,000		6.68	0.37	8.84	8.84	0.00	1.191E-05	1.19E-05	8,760	29.26	1.64	38.73	38.73	5.22E-05	0.00	5.22E-05
PB1, PB2, SB1, SB2, EG1-7	Total combustion sources (see Table 4-3)	13	13															57.39	91.24	6.90	5.72	7.77	39.75	1.28
Total significant activities																		86.65	92.88	45.63	44.45	7.77	39.75	1.28
Total insignificant activities																		0.54	0.00	0.40	0.40	1.16	0.00	0.57
Total BGCAPP sources																		87.18	92.88	46.03	44.86	8.92	39.75	1.85
INSIGNIFICANT ACTIVITIES																								
	APB and AFB HVAC filter		0	4,093	550					0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	APS, MV-APS-0101/-0102	2	0		600		7.81	6.90	#549	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	AFS, MV-APF-1040/-2040	2	0	2,047	600		0	0		0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	SPB HVAC filter		1							0.12	0.00	0.09	0.09	0.00	0.13	0.13	8,760	5.35E-01	0.00E+00	4.04E-01	4.04E-01	5.74E-01	0.00E+00	5.74E-01
	SCWO vents to SPB HVAC filter	6	0	10,499	17		1,408	717		0.12	0.00	0.09	0.09	0.00	0.13	0.13	8,760	5.35E-01	0.00E+00	4.04E-01	4.04E-01	5.74E-01	0.00E+00	5.74E-01
	WRS, total water recovery mode Vents to SPB HVAC filter	2	0	9,410	33					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	WRS vents to SPB HVAC filter	2	0	9,410	33					0.00	0.00			0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	6.73E-03	6.73E-03	0.00E+00	0.00E+00	0.00E+00
	MPT residue cooldown conveyor	2	1	5,261	42					0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00
	Agent hydrolysate storage tanks MT-HSS-0105/-0106	2	2			245,000				0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Agent hydrolysate storage tank MT-HSS-0104	1	1			60,000				0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Energetics hydrolysate storage tanks MT-H55-0604/-0605/-0606/-0607	4	4			475,000				0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Hydrochloric acid (HCl) storage tank MT-HCL-0107	1	1			8,500				0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	HCl day tank	1	1			2,500				0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	IPA storage tank (pressurized vessel: filling losses only; no breathing losses)	1	1			36,500				0.00	0.00	0.00	0.00	0.00		0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.76E-01	0.00E+00	0.00E+00
	Sulfuric acid storage tank MT-SAS-0104	1	1			4,500				0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	No. 2 diesel fuel storage tank	2	2			24,620				0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.59E-03	0.00E+00	0.00E+00
	NaOH 50% storage tanks MT-NAHH-0101/-0201	2	2			50,000				0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	NaOH 18% storage tank MT-NAHM-0102	1	1			6,000				0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sodium hypochlorite (NaOCl)(VX campaign) or NaOH 1% (GB, H campaign) storage tank MT-NAHL-0205	1	1			10,500				0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	NaOCl 1% storage tanks MT-NAHL-0105	1	1			3,100				0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Laboratory HVAC filter stack		1							0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Personnel maintenance building HVAC filter stack clinic decon room		1							0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,760	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 4-3—PTE Summary Combustion Sources

	Process Boilers	Space-Heat Boilers	Main Standby	MDB	Water and Firewater Pump	Entry Control Facility	Total BGCAPP
Emission point	PB1, PB2	SB1, SB2	EG1-4	EG5	EG6	Insignificant	
Emission source	PB1, PB2	SB1, SB2	EG1-4	EG5	EG6		
kW, each			3,300	750	750	150	
MMBTU/hr, each	34.50	37.26	30.10	7.26	7.26	1.45	
hrs operation/yr	8,760	8,760	500	500	500	500	
Number	2	2	4	1	1	1	
Annual oil consumption (all units) MM gal/yr	0.441	0.476	0.4300	0.0244	0.0244	0.0049	1.4008
Annual gas consumption(all units) MM cu ft/yr	604	653	0.00	0.00	0.00	0.00	1,257
Estimated emissions, tons/yr							
Carbon monoxide (CO)	25.39	27.42	1.42	1.42	1.42	0.32	57.39
Nitrogen oxides (NO _x)	31.61	34.14	13.30	5.36	5.36	1.48	91.24
Total suspended particulate (TSP)	2.80	3.02	0.64	0.17	0.17	0.10	6.90
Particulate matter <10 μm (PM ₁₀)	2.43	2.63	0.37	0.10	0.10	0.10	5.72
Sulfur dioxide (SO ₂)	12.69	13.71	11.90	0.68	0.68	0.10	39.75
Total organic compounds (TOCs)/VOCs	3.32	3.59	0.43	0.15	0.15	0.12	7.77

4.1 MDB and MDB HVAC Filter System

The MDB is equipped with high-efficiency control systems that meet the stringent specifications of the U.S. Department of Army. These Army specifications and requirements result in extremely low air emissions from the munition and waste treatment operations inside the MDB and the hydrolysate and water recovery system operations.

The following treatment processes are located in the MDB:

1. Munitions disassembly, energetics access and removal, and agent access and draining in the remotely controlled PMD machine, MWS, and RSM
2. Washout of agent from the munitions cavity with high-pressure (HP) water in the projectile and rocket washout stations
3. Dissolution and hydrolysis of explosive components removed from the munitions in the EBHs (16 identical EBHs in two parallel trains)
4. Heat treatment of metal parts from munitions and other potentially contaminated parts in the MPTs (two identical units)
5. Heat treatment of rocket components exiting the EBHs in the HDCs (two identical units)
6. Chemical reaction of energetics hydrolysis in the ENR (four identical reactors)
7. Chemical decomposition (neutralization) of the drained and washed out agent in the ANR (four identical reactors)
8. Transfer of tested hydrolysate to the hydrolysate storage area (HSA) tanks outside the MDB
9. Shredding, grinding, and slurring of contaminated wood in the DSH system for direct processing in the SCWO systems
10. Grinding and slurring of contaminated plastic, other secondary wastes, and spent activated carbon in the DSH for direct processing in the SCWO systems

1 All processing equipment of the EBH, ENR, and HDC, as well as their ancillary equipment, vent
2 to the EBH/ENR offgas treatment systems (OTSs). The ANR and the MPT vent to the MPT
3 OTS. The shredder, grinders, micronizer, hydropulper, and other processing equipment
4 associated with the DSH vent to the baghouse. The offgases from the EBH/ENR OTS, MPT
5 OTS, and the baghouse vent to the MDB HVAC filter system before they are released to the
6 atmosphere, as does all of the ventilating air in the MDB. The MDB HVAC filter system serves a
7 fourfold purpose:

- 8 1. Capture and contain agent vapor from the mechanical processing, and washing of the
9 munitions (which includes accessing, draining, and washing the agent cavity of the
10 rockets and projectiles) by maintaining a negative pressure environment in the MDB.
- 11 2. Control agent contamination by maintaining the flow of air from areas of low
12 contamination probability to areas of higher contamination probability.
- 13 3. Remove agent vapors from the exhaust before it is discharged to the atmosphere.
- 14 4. Provide a controlled environment for human comfort and equipment performance.

15 The release or spread of contamination is prevented by cascaded pressure control. This
16 arrangement ensures a flow of air from the areas with the least agent contamination to the
17 areas with the most contamination⁴ in the MDB and ensures containment within the MDB.

18 To minimize the spread of contamination and maintain the toxic boundaries, the number of air
19 changes per room is higher for areas likely to be contaminated. Airflow is controlled by the
20 following means:

- 21 1. Modulating the supply air into the building
- 22 2. Modulating the exhaust flow of air out of the building
- 23 3. Setting weighted dampers throughout the building

24 The MDB HVAC filter system consists of 16 modules operating in parallel with a combined
25 design airflow of 256,000 acfm (16,000 acfm per filter unit). In addition, two units are maintained
26 on standby in case one unit must be removed from service for maintenance. Dampers are
27 provided to isolate any unit for maintenance. These dampers are designed to maintain draft
28 within the isolated unit through the other operating filters to prevent the release of contaminants
29 during maintenance. Drawing 24915-08-M5-HVAC-00001 shows the PFD for one bank of nine
30 filter units (8 operating and one spare) of the HVAC filter system. The HVAC filter system
31 consists of two such banks of nine filter units each for a total of 18 filter units (16 operating and
32 2 standby).

33 Each filter unit has its own independently operating fan. To maintain negative pressure in the
34 MDB, up to four primary standby diesel generators (SDGs) maintain power to the MDB HVAC
35 filter fans during commercial power outages as described in Section 4.4. A fifth secondary SDG
36 will be installed to maintain negative pressure in the MDB if the primary SDGs do not start or if a
37 problem arises in the power distribution system. This level of redundancy provides a high level
38 of protection to prevent the release of CA and other air emissions from the MDB.

39 Each MDB HVAC filter unit consists of the following components (see Dwg. 24915-08-M5-
40 HVAC-00001):

- 41 1. One particulate prefilter (HIGH)
- 42 2. One high-efficiency particulate air (HEPA) filter
- 43 3. Six carbon filter banks in series (CHAR)
- 44 4. One final HEPA filter

⁴ Hence the term "Cascade Ventilating System."

1 The prefilter and HEPA filter provide extremely effective removal of particulates. The six banks
2 of carbon filters provide better than 99.9999% removal efficiency for hydrocarbons and other
3 gaseous contaminants (see discussion below for the basis of this estimate).

4 The particulate matter (PM) emission rate for the MDB filter system is based on an assumed
5 outlet grain loading of 0.001 grain/acf. This assumption is based on the fact that all air has
6 passed through multiple air pollution control devices, including two layers of HEPA filters. This
7 assumption results in a PM emission rate of 2.19 lb/hr and a maximum annual emission of
8 9.6 tons/yr based on an operating schedule of 24 hr/day, 365 days/yr. Table 4-4 shows the
9 emissions estimates for PM for the MDB. The particulate matter with a diameter of less than
10 10 μ m (PM₁₀) emission rate for the MDB HVAC filter stacks is assumed (as a worst-case) to be
11 the same as the PM emission rate. Table 4-4 also presents the process input rates for the MDB.

12 The total hydrocarbon (THC) emission rate from the MDB filter system is based on an assumed
13 worst-case inlet loading of 10 ppm THC into the MDB HVAC filters. This assumption is a worst-
14 case scenario based on the following characteristics of the design:

- 15 1. All sources of THC are controlled by one of the OTSs.
- 16 2. The DSH is a mechanical size reduction and slurring system and does not produce
17 THC.
- 18 3. The majority of the gas processed through the MDB HVAC system consists of ambient
19 air from the MDB. No processes in the MDB release THC directly to the air.

20 The air flows through six activated carbon units, each of which corresponds to an adsorber. The
21 adsorption efficiency of the carbon adsorption units is calculated based on the Environmental
22 Protection Agency's (EPA's) report *Preferred and Alternative Methods for Estimating Air
23 Emissions From Surface Coating Operations*.⁵ Table 7.2.2 of this document specifies that the
24 minimum hydrocarbon adsorption efficiency for carbon adsorbers be 90%. At this minimum
25 removal efficiency for each adsorber, the six adsorbers in series result in a removal efficiency of
26 100% (90% to 100%), which equates to a 99.9999% removal efficiency. Table 4-4 shows the
27 THC emission rate for the MDB calculated on this basis. For the emission inventory, the
28 hazardous air pollutant (HAP) emission rate is assumed to be equal to the THC emission rate.

29 The MPT is the only source of carbon monoxide (CO) in the MDB; its CO emission rate is
30 estimated by calculations using Aspen modeling. Assuming 90% destruction of CO in the
31 catalytic oxidizer system of the OTS, results of the estimated CO emission rate are shown in
32 Table 4-4. Table 7.2.2 of *Preferred and Alternative Methods for Estimating Air Emissions From
33 Surface Coating Operations* shows a 95% removal efficiency for catalytic oxidizers. The CO
34 emission rate for the MDB calculated on this basis is given in Table 4-4.

35 The NO_x emission rate from the MPT is estimated by calculations using Aspen modeling;
36 Table 4-4 shows the results.

37 The MDB filter system is an integral part of the demilitarization process; the filter system will
38 always be in operation during the life of the facility.

39 4.2 Process/Storage Vents

40 The BGCAPP emissions sources include process/storage vents associated with liquid treatment
41 areas. These sources include agent hydrolysate storage, energetics hydrolysate storage, APS
42 and AFS, SCWO system, and WRS. These vents are breathing vents only: the air emissions
43 from these vents are insignificant as described in 401 KAR 52:020 Section 6(1): the liquid
44 streams being processed/stored have negligible volatile organic compounds (VOCs).

⁵ This report was prepared for EPA under the Emission Inventory Improvement Program. It is available from the U.S. EPA Air Chief Website at http://www.epa.gov/ttnchie1/eiip/techreport/volume02/ii07_july2001.pdf.

1
2

Table 4-4—Summary of Criteria Pollutant and Process Input Rates for MDB

NOx Release Rate (lb/hr)	
MPT OTS	0.013
EBH/ENR OTS	0.08
DSH	0
Total NOx from MDB (lb/hr)	0.093
Total NOx from MDB (ton/yr)	0.398
CO Release Rate (lb/hr)	
Uncontrolled MPT	66.81
OTS Efficiency	95%
MPT OTS per unit	3.3405
Number of MPTs	2
Total CO from all MPTs (lb/hr)	6.681
Total CO from all MPTs (ton/yr)	28.59
Total Particulate Emission Estimate	
CFM	256,000
Particulate concentration, gr/scf	0.001
Total TSP from MDB (BGCAPP1) (lb/hr)	2.19
Total TSP from MDB (BGCAPP1) (tons/yr)	8.84
Total Hydrocarbon Emission Estimate	
CFM	256,000
THC Conc. ppm (assumed)	10
THC Release Rate (cu ft/hr)	153.6
THC Release Rate (mol/hr)	0.396899225
Total Uncontrolled Hydrocarbons from MDB (lb/hr) (calculated as ethane)	11.91
HC Removal Efficiency of 1 Stage of HVAC Filter	90.00%
Number of Stages in each HVAC filter unit	6
Total THC removal efficiency of HVAC filter unit	99.999900%
Total THC from MDB	1.1907E-05
Process Input Rate for MDB	
Input Stream	
M55 Rockets (VX) munitions per hour	48
lb per M55 Rocket	57.3
Total lb M55 rockets per hour	2,750
155 Projectiles (VX)	26
lb per 155 Projectile	96.5
Total lb projectiles per hour	2,509
Dunnage (lbs/hr)	336
EBH Reagent (50% NaOH solution) (lb/hr)	24,584
VX-ANR Reagent (50% NaOH solution) (lb/hr)	673
Total reagent feed rate	25,257
Total MDB processing rate (munitions + reagent)	30,852
Total MDB processing rate (ton/yr)	15.43

3

4.2.1 Hydrolysate Storage Area (HSA)

The agent and energetics hydrolysate leaving the MDB are stored in tanks in the HSA. All hydrolysates going from the MDB to the HSA are verified to be below the target release level for agent. Based on this release criterion, agent monitoring is not required in the hydrolysate storage tank vents; therefore, the SCWO and downstream operations do not vent through the MDB HVAC system. The hydrolysate is an aqueous solution of organic compounds with negligible levels of VOCs. Table 4-2 lists the numbers and sizes of the HSA tanks. As shown in Table 4-2, no measurable emissions are expected from the HSA tanks. To minimize odors, the exhaust from each agent and energetics hydrolysate storage tank is vented through a carbon adsorber system before it is discharged to the atmosphere. The tanks in the HSA are an insignificant activity as described in 401 KAR 52:020 Section 6(1).

4.2.2 Aluminum Precipitation and Filtration

The aluminum precipitation reactor (APR) and the aluminum filtration equipment are located in the AFB. To control odor, the air in the AFB and all equipment are vented to an AFB HVAC filter system. Table 4-2 presents the process operating rates for the APS and AFS. As shown in Table 4-2, no measurable emissions of regulated substances are expected from the processes in the AFB.

The aluminum SFTs and other aluminum components of the rockets react with caustic in the EBH to form soluble aluminum salts in the energetics hydrolysates. Before the hydrolysates are treated by SCWO, these salts must be removed in the aluminum precipitation and filtration system in the AFB. Aluminum precipitation is the first step in the aluminum removal process.

The energetics hydrolysate from the storage tanks in the HSA is fed to the APR, where the pH is adjusted to near neutral by adding hydrochloric acid (HCl) and sulfuric acid (H₂SO₄). The APR is a stirred tank reactor that vents to the atmosphere through a carbon canister. At this lower pH, the aluminum salts form an aluminum hydroxide precipitate. The pH-adjusted hydrolysate and aluminum hydroxide precipitate are transferred from the APR to a filter that removes the aluminum hydroxide as a filter cake. The filter cake is sent to an offsite hazardous waste treatment, storage, and disposal facility (TSDF). The filtrate is pumped to the SCWO system for treatment. This type of wet processing in enclosed equipment does not produce emissions of any regulated pollutants. These processes are, therefore, insignificant activities as described in 401 KAR 52:020 Section 6(1).

4.2.3 SCWO Reactors

The SCWO reactor systems and the WRSs (Section 4.2.4) are located in the SPB. To control odor, the air in the SPB and all equipment vents to an SPB HVAC filter system.

Testing has shown that the SCWO system has very low emissions. The gas streams exiting the SCWO unit were very low in THC (<20 ppm). The CO concentrations were consistently less than 20 ppm; particulates were less than 0.015 grains/dry standard cubic foot (dscf). SCWO produces small quantities of nitrous oxide (N₂O), which is not regulated as a criteria pollutant in accordance with 401 KAR 51:001, "Definitions for 401 KAR Chapter 51." The gas streams are an insignificant source of air emissions.

The concentrations identified above were measured during the small-scale system demonstration programs. To date, the data demonstrates that the system is safe and protective of the environment. Table 4-2 presents the number of SCWO units, the total gas flow rate from each SCWO unit and the estimated emissions based on the above concentrations and flow rates.

The SCWO reactors produce insignificant emissions as described in 401 KAR 52:020 Section 6(1); however, as a precaution, all SCWO reactor vents are ducted to the SPB HVAC filter

1 system before release to the atmosphere. The potential to emit (PTE) calculation does not
2 include the emission reduction by the SPB HVAC filter system.

3 **4.2.4 WRS**

4 The WRS is located in the SPB. The WRS receives the liquid effluent from the SCWO system
5 and water treatment systems and then separates the water from the salts for recycling or
6 disposal. The WRS comprises a reverse osmosis (RO) unit, a brine concentrator (BC), an
7 evaporator/crystallizer (EC), and two solid separation units. The SCWO effluent is a salt solution
8 comprised primarily of sodium sulfate (Na_2SO_4), sodium chloride (NaCl), sodium fluoride (NaF),
9 and monosodium phosphate (NaH_2PO_4). The WRS package is designed to concentrate the
10 salts into a solid phase that will be characterized and shipped to a permitted disposal facility.

11 Reverse osmosis recovers a portion of the water that supplies the SCWO quench requirement.
12 The brine rejected from the RO and the water that is surplus to the quench water requirement is
13 treated by the BC and EC. The high-quality water is recycled to the plant as process water and
14 is used in the process systems and as makeup water for the water cooling system. This water
15 can also be evaporated to the atmosphere.

16 The only air emissions that may result from the WRS are particulates from the evaporator.
17 Based on the material balance calculations, these emissions are expected to be very low: when
18 the water is fully recycled, the BC and EC vent gases are completely condensed and essentially
19 do not flow to the atmosphere. During periods of changeover from one type of agent to another
20 when recycled water might not be needed, the steam can be discharged directly to the
21 atmosphere.

22 As shown in the PFDs (Dwg. 24915-10-HK-TWR-00001, -TNBE-00001, and -TNBC-00001), all
23 process modules are combined through a condenser into stream 1056. Table 4-2 shows that
24 the total wet gas flow rates through this stream are exceptionally low. As a result, the
25 uncontrolled emissions from the WRS qualify as an insignificant activity as specified in 401 KAR
26 52:020 Section 6(1); however, as a precaution, the entire WRS process is vented to the SPB
27 HVAC filter system. Table 4-2 provides the PTE estimates for the WRS before further treatment
28 by the SPB HVAC filter system.

29 **4.2.5 SPB HVAC Filters**

30 The SCWO reactors and the WRSs are all insignificant activities as described in 401 KAR
31 52:020 Section 6(1); however, as a precaution, the SPB (in which the processes are contained)
32 is equipped with a negative pressure HVAC system that incorporates two HVAC filter units
33 similar to the MDB HVAC filter units described in Section 4.1.

34 **4.2.6 MPT Cooldown Conveyor**

35 The MPT cooldown conveyor accepts the metal projectile parts that have been heat treated in
36 the MPT. Air is blown past the conveyor to cool the parts. The hot air is exhausted through the
37 MPT cooldown conveyor vent. The material being treated consists of the following large metal
38 pieces that have been previously cleaned:

- 39 1. Empty projectile bodies
- 40 2. Metal banding from munitions pallets
- 41 3. Metal fittings that have been cut from PPE
- 42 4. Pump and other equipment parts that have been removed from agent service
- 43 5. Miscellaneous metal pieces that require decontamination in the MPT

44 Because the MPT cooldown conveyor receives only cleaned metal parts, no regulated (both
45 criteria and HAPs) pollutants are expected to be produced or released from the vent. Therefore,
46 it is an insignificant activity as described in 401 KAR 52:020 Section 6(1).

4.3 Boilers

The BGCAPP scope includes installation of four natural gas boilers: two for process and two for space heat. The boilers use No. 2 fuel oil as a backup fuel if natural gas is not available. The PTE estimates are based on the assumption that No. 2 fuel oil comprises 10% of the total heat input capacity. Tables 4-5 and 4-6 show the operating parameters and the results of the PTE estimates for criteria pollutants for the process and space heat boilers, respectively. Table 4-7 shows the total hazardous air pollutants (HAPs) for the process and space heat boilers.

The sulfur content of the fuel oil is based on information provided by BGAD's current vendor. The fuel oil vendor for the BGCAPP will be selected by a procedure that is consistent with U.S. Government procurement requirements. The sulfur content and environmental performance will be equivalent or superior to that specified herein.

The emission estimates for PB1, PB2, SB1, and SB2 are based on the information provided by the vendor for the model specified. Note that the vendor and model number in this application are given solely for the purpose of design. The manufacturer and model that will ultimately be installed will be selected by a procedure that is consistent with U.S. Government procurement requirements. Its environmental performance will be equivalent or superior to the model that is specified herein.

4.4 Standby Diesel Generators (SDGs)

The plant is equipped with seven IC-engine-driven standby diesel generator (SDG) sets that provide emergency backup power during a power outage. The four primary SDG sets (EG1, EG2, EG3, and EG4) supply electricity to critical operations and safety equipment when the power supply to the facility is interrupted. Each of the four primary SDGs produces 3,300 kW. Table 4-8 presents the generator specifications as provided by the manufacturer. Each is equipped with emission reduction and air impeachment to reduce NO_x and CO emissions. The generators are sized so that two of the four can meet the plant's environmental protection and safety requirements. The following is the sequence of operation and anticipated operation for SDGs EG1 through EG4:

1. All four units start on loss of utility power.
2. Three units operate in parallel, sharing the 6,500-kW essential load; the fourth unit shuts down after 15 minutes.
3. If one of the three units shuts down because of a malfunction, the other two units on line continue to supply the 6,500-kW load.

EG5 is installed next to the MDB HVAC filter system. It provides an additional level of redundancy to maintain draft in the MDB if the primary SDGs do not start or if a problem arises in the power distribution system.

EG6 is installed near the water storage tanks. If power is interrupted, it provides backup power to critical process water pumps and for emergency firefighting water.

EG7 is installed next to the entry control facility (ECF) and provides emergency power to the security systems. The ECF provides security at the entrance to the BGCAPP's chemical limited area.

The emission estimates for EG1, EG2, EG3, and EG4 are based on the information provided by the vendor for the model specified. Note that the vendor and model number in this application are given solely for the purpose of design. The manufacturer and model that will ultimately be installed will be selected by a procedure that is consistent with U.S. Government procurement requirements. Its environmental performance will be equivalent or superior to the model that is specified herein.

Table 4-5—Process Boiler Criteria Pollutant Emission Data

Number of boilers	2	
Heat input rating for each boiler, MMBtu/hr	34.50	
Total heat input rating, MMBtu/hr	69.00	
Primary fuel	Natural Gas	
Secondary/backup fuel	No. 2 Oil	
Natural gas heating value, Btu/scf	1,000	
No. 2 Oil heating value, Btu/gal	137,030	
Fuel oil sulfur content, %	0.40	
Hourly gas consumption, cf/hr	34,500	
Hourly oil consumption, gal/hr	252	
Hours of operation, hr/yr	8,760	
Maximum annual gas consumption, MMcf/yr	604	
Maximum annual oil consumption, gal/yr	441,000	
Natural gas emission factors, lb/MMscf	CO	84.00
	NO _x	100.00
	TSP	7.60
	PM ₁₀	7.60
	SO ₂	0.60
	TOC	11.00
	VOC	5.50
Natural gas emission rate, lb/MMBtu	CO	0.0840
	NO _x	0.1000
	TSP	0.0076
	PM ₁₀	0.0076
	SO ₂	0.0006
	TOC	0.0110
	VOC	0.0055
No. 2 oil emission factors, lb/MMBtu	CO	0.0365
	NO _x	0.1460
	TSP	0.0241
	PM ₁₀	0.0120
	SO ₂	0.4145
	TOC	0.0018
	VOC	0.0015
Natural Gas Per Unit Emission Rates, lb/hr	CO	2.8980
	NO _x	3.4500
	TSP	0.2622
	PM ₁₀	0.2622
	SO ₂	0.0207
	TOC	0.3795
	VOC	0.1898

Table 4-5 (Contd)

No. 2 oil per unit emission rates, lb/hr	CO	1.2588
	NOx	5.0354
	TSP	0.8308
	PM ₁₀	0.4154
	SO ₂	14.3005
	TOC	0.0634
	VOC	0.0504
Natural gas per unit emission rates, tons/yr	CO	12.69
	NOx	15.11
	TSP	1.15
	PM ₁₀	1.15
	SO ₂	0.09
	TOC	1.66
	VOC	0.83
No. 2 oil per unit emission rates, tons/yr	CO	0.55
	NOx	2.21
	TSP	0.36
	PM ₁₀	0.18
	SO ₂	6.26
	TOC	0.03
	VOC	0.02
Maximum total emission rates, tons/yr	CO	25.39
	NOx	31.61
	TSP	2.80
	PM ₁₀	2.43
	SO ₂	12.69
	TOC	3.32
	VOC	1.66

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Table 4-6—Space Heat Boiler Criteria Pollutant Emission Data

Number of boilers		2
Heat input rating for each boiler, MMBtu/hr		37.26
Total heat input rating, MMBtu/hr		74.52
Primary fuel		Natural gas
Secondary/backup fuel		No. 2 oil
Natural gas heating value, Btu/scf		1,000
No. 2 oil heating value, Btu/gal		137,030
Fuel oil sulfur content, %		0.40
Hourly gas consumption, cf/hr		37,260
Hourly oil consumption, gal/hr		272
Hours of operation, hr/yr		8,760
Maximum annual gas consumption, MMcf/yr		653
Maximum annual oil consumption, gal/yr		476,000
Natural gas emission factors, lb/MMscf	CO	84.00
	NO _x	100.00
	TSP	7.60
	PM ₁₀	7.60
	SO ₂	0.60
	TOC	11.00
	VOC	5.50
Natural gas emission rate, lb/MMBtu	CO	0.0840
	NO _x	0.1000
	TSP	0.0076
	PM ₁₀	0.0076
	SO ₂	0.0006
	TOC	0.0110
	VOC	0.0055
No. 2 Oil emission factors, lb/MMBtu	CO	0.0365
	NO _x	0.1460
	TSP	0.0241
	PM ₁₀	0.0120
	SO ₂	0.4145
	TOC	0.0018
	VOC	0.0015
Natural gas per unit emission rates, lb/hr	CO	3.1298
	NO _x	3.7260
	TSP	0.2832
	PM ₁₀	0.2832
	SO ₂	0.0224
	TOC	0.4099
	VOC	0.2049

Table 4-6 (Contd)

No. 2 oil per unit emission rates, lb/hr	CO	1.3596
	NOx	5.4382
	TSP	0.8973
	PM ₁₀	0.4487
	SO ₂	15.4446
	TOC	0.0685
	VOC	0.0544
Natural gas per unit emission rates, tons/yr	CO	13.71
	NOx	16.32
	TSP	1.24
	PM ₁₀	1.24
	SO ₂	0.10
	TOC	1.80
	VOC	0.90
No. 2 oil per unit emission rates, tons/yr	CO	0.60
	NOx	2.38
	TSP	0.39
	PM ₁₀	0.20
	SO ₂	6.76
	TOC	0.03
	VOC	0.02
Maximum total emission rates, tons/yr	CO	27.42
	NOx	34.14
	TSP	3.02
	PM ₁₀	2.63
	SO ₂	13.71
	TOC	3.59
	VOC	1.80

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Table 4-7—Boiler HAP Emission Data

	Gas				Oil					Maximum tons/yr
	lb/MMscf	lb/MMBtu	lb/hr	tons/yr	lb/1000 gal	lb/10 ¹² Btu	lb/MMBtu	lb/hr	tons/yr	
1,1,1-Trichloroethane				0.00E+00	2.36E-04		1.72E-06	2.47E-04	1.08E-04	1.08E-04
2-Methylnaphthalene	2.40E-05	2.40E-08	3.44E-06	1.51E-05					0.00E+00	1.51E-05
3-Methylchloranthrene	1.80E-06	1.80E-09	2.58E-07	1.13E-06					0.00E+00	1.13E-06
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.60E-08	2.30E-06	1.01E-05					0.00E+00	1.01E-05
Acenaphthene	1.80E-06	1.80E-09	2.58E-07	1.13E-06	2.11E-05		1.54E-07	2.21E-05	9.68E-06	1.07E-05
Acenaphthylene	1.80E-06	1.80E-09	2.58E-07	1.13E-06	2.53E-07		1.85E-09	2.65E-07	1.16E-07	1.13E-06
Anthracene	2.40E-06	2.40E-09	3.44E-07	1.51E-06	1.22E-06		8.90E-09	1.28E-06	5.60E-07	1.92E-06
Arsenic	2.00E-04	2.00E-07	2.87E-05	1.26E-04		4.00E+00	4.00E-06	5.74E-04	2.51E-04	3.65E-04
Benz(a)anthracene	1.80E-06	1.80E-09	2.58E-07	1.13E-06	4.01E-06		2.93E-08	4.20E-06	1.84E-06	2.86E-06
Benzene	2.10E-03	2.10E-06	3.01E-04	1.32E-03	2.14E-04		1.56E-06	2.24E-04	9.82E-05	1.32E-03
Benzo(a)pyrene	1.20E-06	1.20E-09	1.72E-07	7.54E-07					0.00E+00	7.54E-07
Benzo(b)fluoranthene	1.80E-06	1.80E-09	2.58E-07	1.13E-06					0.00E+00	1.13E-06
Benzo(b,k)fluoranthene				0.00E+00	1.48E-06		1.08E-08	1.55E-06	6.79E-07	6.79E-07
Benzo(g,h,i)perylene	1.20E-06	1.20E-09	1.72E-07	7.54E-07	2.26E-06		1.65E-08	2.37E-06	1.04E-06	1.72E-06
Benzo(k)fluoranthene	1.80E-06	1.80E-09	2.58E-07	1.13E-06					0.00E+00	1.13E-06
Beryllium	1.20E-05	1.20E-08	1.72E-06	7.54E-06		3.00E+00	3.00E-06	4.31E-04	1.89E-04	1.95E-04
Cadmium	1.10E-03	1.10E-06	1.58E-04	6.91E-04		3.00E+00	3.00E-06	4.31E-04	1.89E-04	8.11E-04
Chromium	1.40E-03	1.40E-06	2.01E-04	8.80E-04		3.00E+00	3.00E-06	4.31E-04	1.89E-04	9.81E-04
Chrysene	1.80E-06	1.80E-09	2.58E-07	1.13E-06	2.38E-06		1.74E-08	2.49E-06	1.09E-06	2.11E-06
Cobalt	8.40E-05	8.40E-08	1.21E-05	5.28E-05					0.00E+00	5.28E-05
Dibenzo(a,h)anthracene	1.20E-06	1.20E-09	1.72E-07	7.54E-07	1.67E-06		1.22E-08	1.75E-06	7.66E-07	1.45E-06
Dichlorobenzene	1.20E-03	1.20E-06	1.72E-04	7.54E-04					0.00E+00	7.54E-04

it Support Data

Section 4

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Table 4-7 (Contd)

	Gas				Oil					Maximum tons/yr
	lb/MMscf	lb/MMBtu	lb/hr	tons/yr	lb/1000 gal	lb/10 ¹² Btu	lb/MMBtu	lb/hr	tons/yr	
Ethylbenzene				0.00E+00	6.36E-05		4.64E-07	6.66E-05	2.92E-05	2.92E-05
Fluoranthene	3.00E-06	3.00E-09	4.31E-07	1.89E-06	4.84E-06		3.53E-08	5.07E-06	2.22E-06	3.92E-06
Fluorene	2.80E-06	2.80E-09	4.02E-07	1.76E-06	4.47E-06		3.26E-08	4.68E-06	2.05E-06	3.63E-06
Formaldehyde	7.50E-02	7.50E-05	1.08E-02	4.71E-02	6.10E-02		4.45E-04	6.39E-02	2.80E-02	7.04E-02
Hexane	1.80E+00	1.80E-03	2.58E-01	1.13E+00					0.00E+00	1.13E+00
Indeno(1,2,3-cd)pyrene	1.80E-06	1.80E-09	2.58E-07	1.13E-06	2.14E-06		1.56E-08	2.24E-06	9.82E-07	2.00E-06
Lead	5.00E-03	5.00E-06	7.18E-04	3.14E-03		9.00E+00	9.00E-06	1.29E-03	5.66E-04	3.39E-03
Manganese	3.80E-04	3.80E-07	5.45E-05	2.39E-04		6.00E+00	6.00E-06	8.61E-04	3.77E-04	5.92E-04
Mercury	2.60E-04	2.60E-07	3.73E-05	1.63E-04		3.00E+00	3.00E-06	4.31E-04	1.89E-04	3.36E-04
Naphthalene	6.10E-04	6.10E-07	8.75E-05	3.83E-04	1.13E-03		8.25E-06	1.18E-03	5.18E-04	8.63E-04
Nickel	2.10E-03	2.10E-06	3.01E-04	1.32E-03		3.00E+00	3.00E-06	4.31E-04	1.89E-04	1.38E-03
OCDD				0.00E+00	3.10E-09		2.26E-11	3.25E-09	1.42E-09	1.42E-09
o-Xylene				0.00E+00	1.09E-04		7.95E-07	1.14E-04	5.00E-05	5.00E-05
Phenanthrene	1.70E-05	1.70E-08	2.44E-06	1.07E-05	1.05E-05		7.66E-08	1.10E-05	4.82E-06	1.44E-05
Polycyclic Organic Matter (POM)	8.82E-05	8.82E-08	1.27E-05	5.54E-05	3.30E-03		2.41E-05	3.46E-03	1.51E-03	1.56E-03
Pyrene	5.00E-06	5.00E-09	7.18E-07	3.14E-06	4.25E-06		3.10E-08	4.45E-06	1.95E-06	4.78E-06
Selenium	2.40E-05	2.40E-08	3.44E-06	1.51E-05		1.50E+01	1.50E-05	2.15E-03	9.43E-04	9.57E-04
Toluene	3.40E-03	3.40E-06	4.88E-04	2.14E-03	6.20E-03		4.52E-05	6.49E-03	2.84E-03	4.77E-03
Xylene				0.00E+00	1.90E-04		1.39E-06	1.99E-04	8.72E-05	8.72E-05
Total			2.72E-01	1.19E+00				8.29E-02	3.63E-02	1.22E+00

Table 4-8—Vendor Specifications for Standby Generators

Description	Caterpillar D3612
Fuel used	Diesel
Rating at 950 ft, 93°F	3,300 eKW
Break horsepower / unit	4,640.00
Enclosure requirements for each unit	
Type of enclosure	Self Contained
Size of enclosure	50'L X 20'W X 12'H Ea
Radiator mounting	Remote
Time to start	10 Sec
Time to assume full load	90 Sec Loading
Fuel rate / generator @ full load	215 Gallons / Hour
Exhaust emissions / unit	
NOx	13.0 g/bhp-hr
CO	0.462 g/bhp-hr
HC	0.140 g/bhp-hr
PM	0.21g/bhp-hr
Exhaust emissions after-treatment / unit	
Type of reduction	Urea SCR
NOx reduction %	90% or 1.30 g/bhp-hr
CO reduction %	70% or 0.14 g/bhp-hr
HC reduction %	70% or 0.04 g/bhp-hr
PM Reduction %	70% or 0.06 g/bhp-hr

The sulfur content of the fuel oil is based on information provided by BGAD's current vendor. The fuel oil vendor for the BGCAPP will be selected by a procedure that is consistent with U.S. Government procurement requirements. The sulfur content and environmental performance will be equivalent or superior to that specified herein.

In accordance with EPA AP-42⁶, all of the SDGs' operating hours were assumed to be 500 hr/yr to calculate the PTE. Table 4-9 summarizes the operating data and emission rates for the SDG IC engines.

Table 4-10 summarizes the HAP emissions from the IC engines associated with the SDGs. The emission estimates for EG5 and EG6 are based on AP-42, Table 3.4.1, Section 3.4.

⁶EPA AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I: *Stationary Point and Area Sources*
<http://www.epa.gov/ttn/chief/ap42/ch03/final/c03s03.pdf>.

Table 4-9—Criteria Pollutant Emissions from IC Engines

Emergency Generator Duty	Main Standby	MDB	Water and Firewater Pump	ECF	Total/Weighted Average	
Permit ID	EG1–EG4	EG5	EG6	Insignificant		
Vendor, model number	Caterpillar D3612	TBD	TBD	TBD		
Number of generators	4	1	1	1	7	
Fuel	No. 2 Fuel Oil					
Engine power output/unit, kW	3,300	750	750	150	14,850	
Maximum engine power/unit, hp	4,640	1,055	1,055	211	20,880	
Engine fuel input, MMBtu/unit-hr	29.5	6.7	6.7	1.3	133	
Engine fuel input, MMBtu/unit-yr	14,731	3,348	3,348	670	66,288	
No. 2 fuel oil heating value, Btu/gal	137,030					
Fuel oil sulfur content, %	0.40					
Operating hours/unit-yr	500	500	500	500	3,500	
Fuel rate/unit-hr, gal	215.0	48.9	48.9	9.8		
Fuel rate/unit-yr, gal	107,500	24,432	24,432	4,886		
Total emergency generator fuel rate/yr, gal	430,000	24,432	24,432	4,886	483,750	
Emission factor basis		Manufacturer g/BHP-Hr	AP-42 lb/MMBtu	AP-42 lb/MMBtu	AP-42 lb/MMBtu	
	CO	0.139	0.850	0.850	0.950	
	NO _x	1.300	3.200	3.200	4.410	
	TSP	0.063	0.100	0.100	0.310	
	PM ₁₀	NA	0.057	0.057	0.310	
	SO ₂	NA	0.404	0.404	0.290	
	TOC	0.042	0.090	0.090	0.360	
	VOC	NA	0.082	0.082	0.360	
Emission Rate, lb/MMBtu	CO	0.048	0.850	0.850	0.950	0.138
	NO _x	0.451	3.200	3.200	4.410	0.769
	TSP	0.022	0.100	0.100	0.310	0.033
	PM ₁₀	0.012	0.057	0.057	0.310	0.020
	SO ₂	0.404	0.404	0.404	0.290	0.403
	TOC	0.015	0.090	0.090	0.360	0.026
	VOC	0.013	0.082	0.082	0.360	0.024
Per Unit Emission Rates, lb/hr	CO	1.42	5.69	5.69	1.27	
	NO _x	13.30	21.43	21.43	5.91	
	TSP	0.64	0.67	0.67	0.42	
	PM ₁₀	0.37	0.38	0.38	0.42	
	SO ₂	11.90	2.71	2.71	0.39	
	TOC	0.43	0.60	0.60	0.48	
	VOC	0.39	0.55	0.55	0.48	

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Table 4-9 (Contd)

		Manufacturer g/BHP-hr	AP-42 lb/MMBtu	AP-42 lb/MMBtu	AP-42 lb/MMBtu	Total/ Weighted Average
Per unit emission rates, tons/yr	CO	0.35	1.42	1.42	0.32	
	NO _x	3.32	5.36	5.36	1.48	
	TSP	0.16	0.17	0.17	0.10	
	PM ₁₀	0.09	0.10	0.10	0.10	
	SO ₂	2.98	0.68	0.68	0.10	
	TOC	0.11	0.15	0.15	0.12	
	VOC	0.10	0.14	0.14	0.12	
Total emission rates, tons/yr	CO	1.42	1.42	1.42	0.32	4.58
	NO _x	13.30	5.36	5.36	1.48	25.49
	TSP	0.64	0.17	0.17	0.10	1.08
	PM ₁₀	0.37	0.10	0.10	0.10	0.66
	SO ₂	11.90	0.68	0.68	0.10	13.35
	TOC	0.43	0.15	0.15	0.12	0.85
	VOC	0.39	0.14	0.14	0.12	0.79

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Table 4-10—HAP Emissions from IC Engines

	AP-42 Factor, lb/MMBtu		Emission Rate, lb/hr					Emission Rate, tons/yr				
	Large Engines (EG1–EG6)	Small Engines	Main Standby (EG1–EG4)	MDB (EG5)	Water and Firewater Pump (EG6)	ECF	Total	Main Standby	MDB	Water and Firewater Pump	ECF	Total
1,3-Butadiene	NA	3.91E-05	0.00E+00	0.00E+00	0.00E+00	5.24E-05	5.24E-05	0.00E+00	0.00E+00	0.00E+00	1.31E-05	1.31E-05
Acetaldehyde	2.52E-05	7.67E-04	2.97E-03	1.69E-04	1.69E-04	1.03E-03	4.33E-03	7.42E-04	4.22E-05	4.22E-05	2.57E-04	1.08E-03
Acrolein	7.88E-06	9.25E-05	9.29E-04	5.28E-05	5.28E-05	1.24E-04	1.16E-03	2.32E-04	1.32E-05	1.32E-05	3.10E-05	2.90E-04
Benzene	7.76E-04	9.33E-04	9.14E-02	5.20E-03	5.20E-03	1.25E-03	1.03E-01	2.29E-02	1.30E-03	1.30E-03	3.12E-04	2.58E-02
Formaldehyde	7.89E-05	1.18E-03	9.30E-03	5.28E-04	5.28E-04	1.58E-03	1.19E-02	2.32E-03	1.32E-04	1.32E-04	3.95E-04	2.98E-03
Naphthalene	1.30E-04	8.48E-05	1.53E-02	8.70E-04	8.70E-04	1.14E-04	1.72E-02	3.83E-03	2.18E-04	2.18E-04	2.84E-05	4.29E-03
Total PAH	2.12E-04	1.68E-04	2.50E-02	1.42E-03	1.42E-03	2.25E-04	2.80E-02	6.25E-03	3.55E-04	3.55E-04	5.62E-05	7.01E-03
Toluene	2.81E-04	4.09E-04	3.31E-02	1.88E-03	1.88E-03	5.48E-04	3.74E-02	8.28E-03	4.70E-04	4.70E-04	1.37E-04	9.36E-03
Xylenes	1.93E-04	2.85E-04	2.27E-02	1.29E-03	1.29E-03	3.82E-04	2.57E-02	5.69E-03	3.23E-04	3.23E-04	9.54E-05	6.43E-03
Total HAPs			2.01E-01	1.14E-02	1.14E-02	5.30E-03	2.29E-01	5.02E-02	2.85E-03	2.85E-03	1.33E-03	5.72E-02

4.5 Miscellaneous Tanks and Vents

Table 4-2 lists the miscellaneous bulk chemicals storage tanks and vents of the BGCAPP. All tanks (except those for No. 2 fuel oil and IPA) contain aqueous mineral acids and caustics that do not release any regulated substances (Drawing 24915-13-M5-BCS-00001). The IPA tank (Drawing 24915-10-M6-IPA-00001) vent is maintained under 14.9 psig of pressure; therefore, its losses are restricted to filling (working) losses and are vented through the SPB HVAC filters. Appendix A, Tables A-1, A-2, and A-3 present the results of the TANKS calculation for the IPA tank, the No. 2 Fuel oil tanks and the HCl tank, respectively. TANKS is based on the emission estimation procedures in EPA AP-42⁷.

4.6 HAP Emission Summary

Tables 4-5 and 4-8 present the air toxic and HAP emission rates for the boilers and IC engines, respectively. The remaining HAP emission sources are extremely small and do not contribute measurably to the overall HAP emission load produced by the BGCAPP.

⁷ EPA AP-42, Chapter 7, <http://www.epa.gov/ttn/chief/ap42/index.html>.

5 References for Emission Factor Estimates

1. Boiler Natural Gas, CO, and NO_x: AP-42, 5th Edition, Table 1.4-1 (2/98).
2. Boiler Natural Gas PM/ PM₁₀, SO₂, TOC, and VOC: AP-42, 5th Edition, Table 1.4-2 (7/98).
3. Boiler Natural Gas Organic HAPs: AP-42, 5th Edition, Table 1.4-3 (7/98).
4. Boiler Natural Gas Metal HAPs (except lead): AP-42, 5th Edition, Table 1.4-4 (7/98).
5. Boiler Natural Gas Metal HAPs (lead only): AP-42, 5th Edition, Table 1.4-2 (7/98).
6. Boiler Distillate Oil CO, NO_x, and SO₂: AP-42, 5th Edition, Table 1.3-1 (9/98).
7. Boiler Distillate Oil PM: AP-42, 5th Edition, Tables 1.3-1 and 1-3.2 (sum of filterable and condensable PM) (9/98).
8. Boiler Distillate Oil PM₁₀: AP-42, 5th Edition, Table 1.3-6 (PM₁₀ fraction 0.5)(9/98).
9. Boiler Distillate Oil TOC & VOC: AP-42, 5th Edition, Table 1.3-3 (9/98).
10. Boiler Distillate Oil Organic HAPs (all except formaldehyde and particulate organic matter [POM]): AP-42, 5th Edition, Table 1.3-9 (9/98).
11. Boiler Distillate Oil Organic HAPs (formaldehyde and POM only): AP-42, 5th Edition, Table 1.3-8 (9/98).
12. Boiler Distillate Oil Metal HAPs: AP-42, 5th Edition, Table 1.3-10 (9/98).
13. Large IC Engine (EG1–EG4) Distillate Oil CO, NO_x, PM, and TOC: Manufacturer data.
14. Large IC Engine (EG1–EG4) Distillate Oil SO₂ and VOC: AP-42, 5th Edition, Table 3.4-1 (10/96).
15. Large IC Engine (EG5 and EG6 only) Distillate Oil CO, NO_x, PM, SO₂, TOC, and VOC: AP-42, 5th Edition, Table 3.4-1 (10/96).
16. Large IC Engine (EG1–EG6) Distillate Oil PM₁₀: AP-42, 5th Edition, Table 3.4-2 (10/96).
17. Large IC Engine (EG1–EG6) Distillate Oil HAPs (except naphthalene and total polycyclic aromatic hydrocarbons [PAHs]): AP-42, 5th Edition, Table 3.4-3 (10/96).
18. Large IC Engine (EG1–EG6) Distillate Oil HAPs (naphthalene and total PAHs only): AP-42, 5th Edition, Table 3.4-3 (10/96).
19. Small IC Engine (ECF generator only) Distillate Oil CO, NO_x, PM/ PM₁₀, SO₂, and TOC/VOC: AP-42, 5th Edition, Table 3.3-1 (10/96).
20. Small IC Engine (EG7 only) Distillate Oil HAPs: AP-42, 5th Edition, Table 3.3-2 (10/96).

Appendix A TANKS Calculations

Table A-1—IPA Tank

Vertical Fixed Roof Tank
Richmond, Kentucky

TANKS 4.0 Emissions Report - Detail Format Tank Identification and Physical Characteristics

Identification

User Identification: BGCAPP 3
City: Richmond
State: Kentucky
Company: BGCAPP
Type of Tank: Vertical Fixed Roof Tank
Description: 39500 GAL TANK

Tank Dimensions

Shell Height (ft): 17.00
Diameter (ft): 20.00
Liquid Height (ft): 16.81
Avg. Liquid Height (ft): 16.81
Volume (gallons): 39,500.00
Turnovers: 25.32
Net Throughput (gal/yr): 1,000,000.00
Is Tank Heated (y/n): N

Paint Characteristics

Shell Color/Shade: Gray/Medium
Shell Condition: Good
Roof Color/Shade: Gray/Medium
Roof Condition: Good

Roof Characteristics

Type: Cone
Height (ft): 0.00
Slope (ft/ft) (Cone Roof): 0.06

Breather Vent Settings

Vacuum Settings (psig): -0.03
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Louisville, Kentucky (Avg Atmospheric Pressure = 14.5 psia)

Table A-1 (Contd)

Vertical Fixed Roof Tank
Richmond, Kentucky

TANKS 4.0
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg	Min	Max		Avg	Min	Max					
Isopropyl alcohol	All	64.76	54.95	74.58	59.11	0.5706	0.3985	0.8040	60.0900			60.09	Option 2: A=8.1177, B=1580.92, C=219.61

Table A-1 (Contd)

Vertical Fixed Roof Tank
Richmond, KentuckyTANKS 4.0
Emissions Report - Detail Format
Detail Calculations (AP-42)

Annual Emission Calculations	
Standing Losses (lb):	27.3968
Vapor Space Volume (cu ft):	125.1401
Vapor Density (lb/cu ft):	0.0061
Vapor Space Expansion Factor:	0.0996
Vented Vapor Saturation Factor:	0.9881
Tank Vapor Space Volume	
Vapor Space Volume (cu ft):	125.1401
Tank Diameter (ft):	20.0000
Vapor Space Outage (ft):	0.3983
Tank Shell Height (ft):	17.0000
Average Liquid Height (ft):	16.8100
Roof Outage (ft):	0.2083
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.2083
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0825
Shell Radius (ft):	10.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0061
Vapor Molecular Weight (lb/lb-mole):	60.0900
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.5706
Daily Avg. Liquid Surface Temp. (deg. R):	524.4346
Daily Average Ambient Temp. (deg. F):	58.0292
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	518.7792
Tank Paint Solar Absorptance (Shell):	0.6800
Tank Paint Solar Absorptance (Roof):	0.6800
Daily Total Solar Insulation Factor (Btu/sqft day):	1,305.0373
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0996
Daily Vapor Temperature Range (deg. R):	39.2419
Daily Vapor Pressure Range (psia):	0.4056
Breather Vent Press. Setting Range (psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.5706
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.3985
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.8040
Daily Avg. Liquid Surface Temp. (deg R):	524.4346
Daily Min. Liquid Surface Temp. (deg R):	514.6241
Daily Max. Liquid Surface Temp. (deg R):	534.2451
Daily Ambient Temp. Range (deg. R):	19.9917
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9881
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.5706
Vapor Space Outage (ft):	0.3983
Working Losses (lb)	
Vapor Molecular Weight (lb/lb-mole):	60.0900
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.5706

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Table A-1 (Contd)

Vertical Fixed Roof Tank
Richmond, Kentucky

**TANKS 4.0
Emissions Report - Detail Format
Detail Calculations (AP-42)- (Continued)**

Annual Net Throughput (gal/yr.):	1,000,000.000
	0
Annual Turnovers:	25.3165
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	39,500.0000
Maximum Liquid Height (ft):	16.8100
Tank Diameter (ft):	20.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	843.7577

Table A-1 (Contd)

Vertical Fixed Roof Tank
Richmond, Kentucky

**TANKS 4.0
Emissions Report - Detail Format
Individual Tank Emission Totals**

Annual Emissions Report

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Isopropyl alcohol	816.36	27.40	843.76

Table A-2—No. 2 Fuel Oil

Vertical Fixed Roof Tank
Richmond, Kentucky

TANKS 4.0
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification

User Identification: BGCAPP Diesel tank
City: Richmond
State: Kentucky
Company: BGCAPP
Type of Tank: Vertical Fixed Roof Tank
Description: 24,620 gal No.2 Fuel Oil Tank

Tank Dimensions

Shell Height (ft): 34.63
Diameter (ft): 11.00
Liquid Height (ft): 34.00
Avg. Liquid Height (ft): 33.00
Volume (gallons): 24,620.00
Turnovers: 28.45
Net Throughput (gal/yr): 700,375.00
Is Tank Heated (y/n): N

Paint Characteristics

Shell Color/Shade: Gray/Medium
Shell Condition: Good
Roof Color/Shade: Gray/Medium
Roof Condition: Good

Roof Characteristics

Type: Cone
Height (ft): 0.00
Slope (ft/ft) (Cone Roof): 0.06

Breather Vent Settings

Vacuum Settings (psig): -0.03
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Louisville, Kentucky (Avg Atmospheric Pressure = 14.5 psia)

Table A-2 (Contd)

Vertical Fixed Roof Tank
Richmond, Kentucky

**TANKS 4.0
Emissions Report - Detail Format
Liquid Contents of Storage Tank**

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	64.78	54.95	74.58	59.11	0.0078	0.0055	0.0103	130.0000			188.00	Option 5: A=12.101, B=8907

Table A-2 (Contd)

Vertical Fixed Roof Tank
Richmond, KentuckyTANKS 4.0
Emissions Report - Detail Format
Detail Calculations (AP-42)

Annual Emission Calculations	
Standing Losses (lb):	0.7524
Vapor Space Volume (cu ft):	165.9988
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0710
Vented Vapor Saturation Factor:	0.9993
Tank Vapor Space Volume	
Vapor Space Volume (cu ft):	165.9988
Tank Diameter (ft):	11.0000
Vapor Space Outage (ft):	1.7467
Tank Shell Height (ft):	34.6322
Average Liquid Height (ft):	33.0000
Roof Outage (ft):	0.1146
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.1146
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	5.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0076
Daily Avg. Liquid Surface Temp. (deg. R):	524.4346
Daily Average Ambient Temp. (deg. F):	56.0292
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	518.7792
Tank Paint Solar Absorptance (Shell):	0.6800
Tank Paint Solar Absorptance (Roof):	0.6800
Daily Total Solar Insulation Factor (Btu/sqft day):	1,305.0373
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0710
Daily Vapor Temperature Range (deg. R):	39.2419
Daily Vapor Pressure Range (psia):	0.0049
Breather Vent Press. Setting Range (psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0076
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0055
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0103
Daily Avg. Liquid Surface Temp. (deg R):	524.4346
Daily Min. Liquid Surface Temp. (deg R):	514.6241
Daily Max. Liquid Surface Temp. (deg R):	534.2451
Daily Ambient Temp. Range (deg. R):	19.9917
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9993
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0076
Vapor Space Outage (ft):	1.7467

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Page 3

Table A-2 (Contd)

Vertical Fixed Roof Tank
Richmond, Kentucky

**TANKS 4.0
Emissions Report - Detail Format
Detail Calculations (AP-42)- (Continued)**

Working Losses (lb):	16.4198
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0078
Annual Net Throughput (gal/yr.):	700,375.0000
Annual Turnovers:	28.4474
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	24,620.0000
Maximum Liquid Height (ft):	34.0000
Tank Diameter (ft):	11.0000
Working Loss Product Factor:	1.0000
 Total Losses (lb):	 17.1720

Table A-2 (Contd)

Vertical Fixed Roof Tank
Richmond, Kentucky

TANKS 4.0 Emissions Report - Detail Format Individual Tank Emission Totals

Annual Emissions Report

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Distillate fuel oil no. 2	16.42	0.75	17.17

Table A-3—Hydrochloric Acid Tank

Vertical Fixed Roof Tank
Richmond, Kentucky

TANKS 4.0 Emissions Report - Detail Format Tank Identification and Physical Characteristics

Identification

User Identification: BGCAPP 1
City: Richmond
State: Kentucky
Company: BGCAPP
Type of Tank: Vertical Fixed Roof Tank
Description: 8500 GAL TANK

Tank Dimensions

Shell Height (ft): 15.00
Diameter (ft): 10.00
Liquid Height (ft): 14.47
Avg. Liquid Height (ft): 14.47
Volume (gallons): 8,500.00
Turnovers: 25.98
Net Throughput (gal/yr): 220,794.00
Is Tank Heated (y/n): N

Paint Characteristics

Shell Color/Shade: Gray/Medium
Shell Condition: Good
Roof Color/Shade: Gray/Medium
Roof Condition: Good

Roof Characteristics

Type: Cone
Height (ft): 0.00
Slope (ft/ft) (Cone Roof): 0.06

Breather Vent Settings

Vacuum Settings (psig): -0.03
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Louisville, Kentucky (Avg Atmospheric Pressure = 14.5 psia)

Table A-3 (Contd)

Vertical Fixed Roof Tank
Richmond, Kentucky

TANKS 4.0
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
HCL AND WATER Hydrochloric Acid WATER	All	64.76	54.95	74.58	59.11	0.8693 2.8205 0.3030	0.6417 2.1175 0.2135	1.1881 3.8218 0.4237	31.4770 36.4900 18.0160	0.3700 0.6300	0.8454 0.1546	22.16 36.45 18.02	Option 1: VP60 = 2.396 VP70 = 3.287 Option 2: A=8.10765, B=1750.286, C=235

Table A-3 (Contd)

Vertical Fixed Roof Tank
Richmond, KentuckyTANKS 4.0
Emissions Report - Detail Format
Detail Calculations (AP-42)

Annual Emission Calculations	
Standing Losses (lb):	9.5254
Vapor Space Volume (cu ft):	49.9975
Vapor Density (lb/cu ft):	0.0049
Vapor Space Expansion Factor:	0.1105
Vented Vapor Saturation Factor:	0.9715
Tank Vapor Space Volume	
Vapor Space Volume (cu ft):	49.9975
Tank Diameter (ft):	10.0000
Vapor Space Outage (ft):	0.6366
Tank Shell Height (ft):	15.0000
Average Liquid Height (ft):	14.4676
Roof Outage (ft):	0.1042
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.1042
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0049
Vapor Molecular Weight (lb/lb-mole):	31.4770
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.8693
Daily Avg. Liquid Surface Temp. (deg. R):	524.4346
Daily Average Ambient Temp. (deg. F):	59.0292
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	518.7792
Tank Paint Solar Absorptance (Shell):	0.6800
Tank Paint Solar Absorptance (Roof):	0.6800
Daily Total Solar Insulation Factor (Btu/sqft day):	1,305.0373
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1105
Daily Vapor Temperature Range (deg. R):	39.2419
Daily Vapor Pressure Range (psia):	0.5463
Breather Vent Press. Setting Range (psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.8693
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.6417
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	1.1881
Daily Avg. Liquid Surface Temp. (deg R):	524.4346
Daily Min. Liquid Surface Temp. (deg R):	514.6241
Daily Max. Liquid Surface Temp. (deg R):	534.2451
Daily Ambient Temp. Range (deg. R):	19.9917
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9715
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.8693
Vapor Space Outage (ft):	0.6366
Working Losses (lb):	
Working Losses (lb):	143.8413
Vapor Molecular Weight (lb/lb-mole):	31.4770
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.8693
Annual Net Throughput (gal/yr.):	220,794.0000

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Page 3

Table A-3 (Contd)

Vertical Fixed Roof Tank
Richmond, Kentucky

**TANKS 4.0
Emissions Report - Detail Format
Detail Calculations (AP-42)- (Continued)**

Annual Turnovers:	25.9758
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	8,500.0000
Maximum Liquid Height (ft):	14.4676
Tank Diameter (ft):	10.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	153.3668

Table A-3 (Contd)

TANKS 4.0
Emissions Report - Detail Format
Individual Tank Emission TotalsVertical Fixed Roof Tank
Richmond, Kentucky

Annual Emissions Report

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
HCL AND WATER	143.84	9.53	153.37
Hydrochloric Acid	121.60	8.05	129.65
WATER	22.24	1.47	23.72

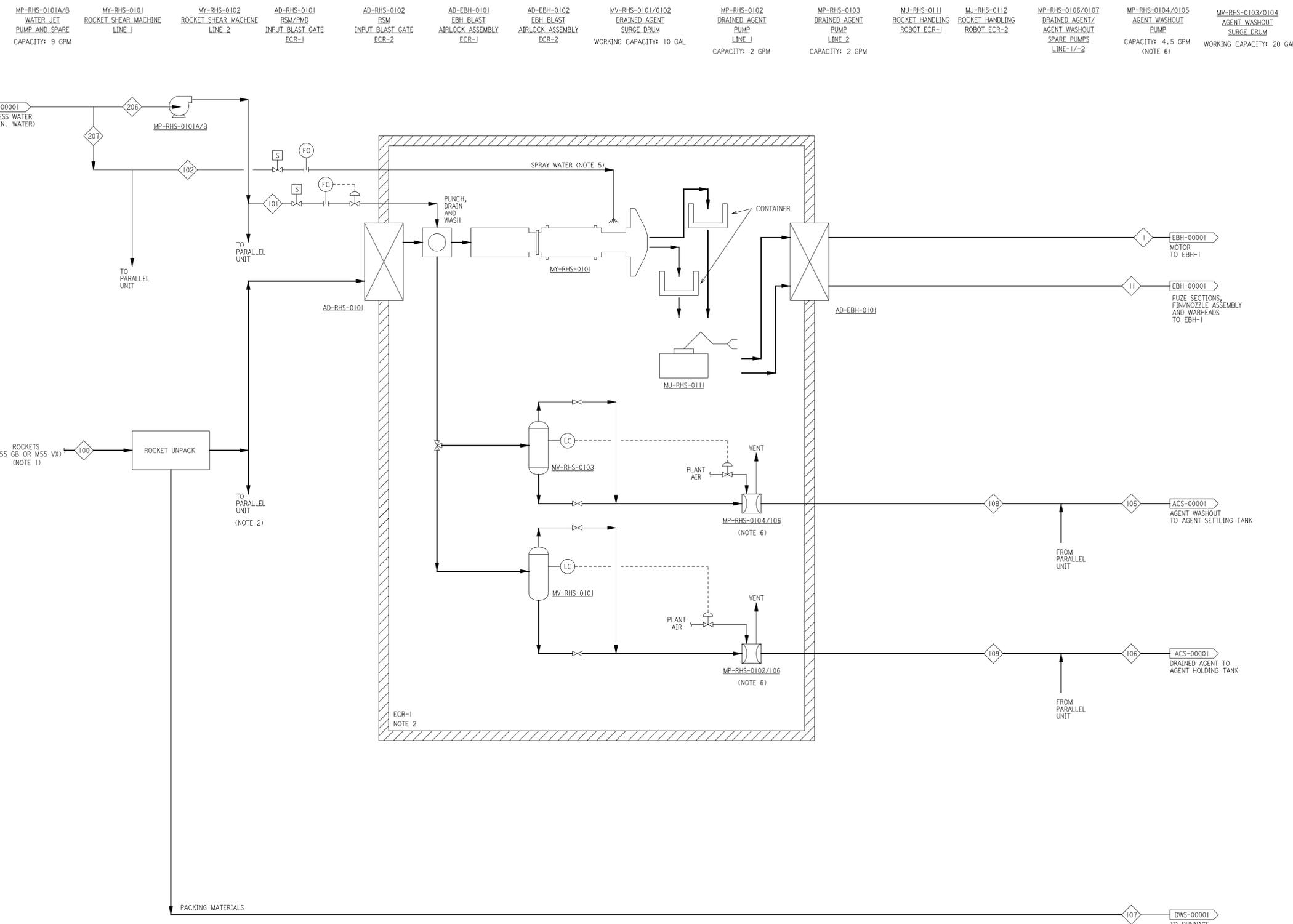
Section 9

Process Flow Diagrams

Air Permit Drawing List		
	PFD/SDN	TITLE
1	24915-00-M5-00-00002	Legend and Symbols for PFD
2	24915-00-HK-00-00003	Block Flow Diagram
3	24915-07-M5-RHS-00001	MDB Rocket Shear Machine PFD
4	24915-07-M5-PHS-00001	MDB Projectile Demilitarization PFD
5	24915-07-M5-NCR-00001	MDB Nose Closure Removal System PFD
6	24915-07-M5-MWS-00001	MDB Munitions Washout System PFD
7	24915-07-M5-ACS-00001	MDB Agent Collection/Toxic Storage PFD
8	24915-07-M5-ANS-00001	MDB Agent Neutralization PFD
9	24915-07-M5-SDS-00001	MDB Spent Decontamination System PFD
10	24915-07-M5-MPT-00001	MDB Metal Parts Treatment PFD
11	24915-07-M5-MPTC-00001	MDB MPT Condensate System PFD
12	24915-07-M5-OTM-00001	MDB Offgas Treatment MPT PFD
13	24915-07-M5-EBH-00001	MDB Energetics Batch Hydrolyzer PFD
14	24915-07-M5-ENS-00001	MDB Energetics Neutralization PFD
15	24915-07-M5-OTE-00001	MDB Offgas Treatment EBH/ENR PFD
16	24915-08-M5-HVAC-00001	Filter Area Cascade System Filter Units HVAC Air Flow Diagram
17	24915-21-M5-APS-00001	AFB Aluminum Precipitation PFD
18	24915-21-M5-AFS-00001	AFB Aluminum Filtration PFD
19	24915-10-M5-SCWO-00001 Sheet 1	SPB SCWO PFD
20	24915-10-M5-SCWO-00001 Sheet 2	SPB SCWO PFD
21	24915-10-HK-TWR-00001	SPB Water Recovery – R.O. Unit PFD
22	24915-10-HK-TNBE-00001	SPB BRP Evaporator/Crystallizer PFD
23	24915-10-HK-TNBC-00001	SPB BRP Brine Concentrator PFD
24	24915-07-M5-DWS-00001	MDB DSH Wood Processing Train PFD, Fig 1
25	24915-07-M5-DCS-00001	MDB DSH Carbon Processing Train PFD, Fig 2
26	24915-07-M5-DPS-00001	MDB DSH Plastic Processing Train PFD, Fig 3
27	24915-11-M5-HSS-00001	HSA Agent Hydrolysate PFD
28	24915-11-M5-HSS-00002	HSA Energetics Hydrolysate PFD
29	24915-13-M5-BCS-00001	UB Bulk Chemical Storage PFD
30	24915-10-M6-IPA-00001	IPA Unloading & Distribution

8 7 6 5 4 3 2 1

H
G
F
E
D
C
B
A



- NOTES:
1. THERE ARE TWO TYPES OF ROCKETS AT THE BLUEGRASS FACILITY: M55 GB AND M55 VX. EACH TYPE OF ROCKET WILL BE DEMILITARIZED IN A SEPARATE CAMPAIGN.
 2. MUNITIONS DEMILITARIZATION EQUIPMENT IS LOCATED WITHIN AN EXPLOSION CONTAINMENT ROOM (ECR). ECR-1 AND -2 EACH CONTAIN ONE RSM.
 3. FOR SYMBOL DEFINITION SEE DRAWING 24915-00-M5-00-00002.
 4. DELETED
 5. WATER SPRAY WILL BE ON AT 3.5 GPM DURING ROCKET MOTOR CUTTING.
 6. MP-RHS-0106 IS THE COMMON SPARE FOR DRAINED AGENT PUMP AND AGENT WASHOUT PUMP IN LINE 1. MP-RHS-0107 IS THE COMMON SPARE FOR LINE 2.

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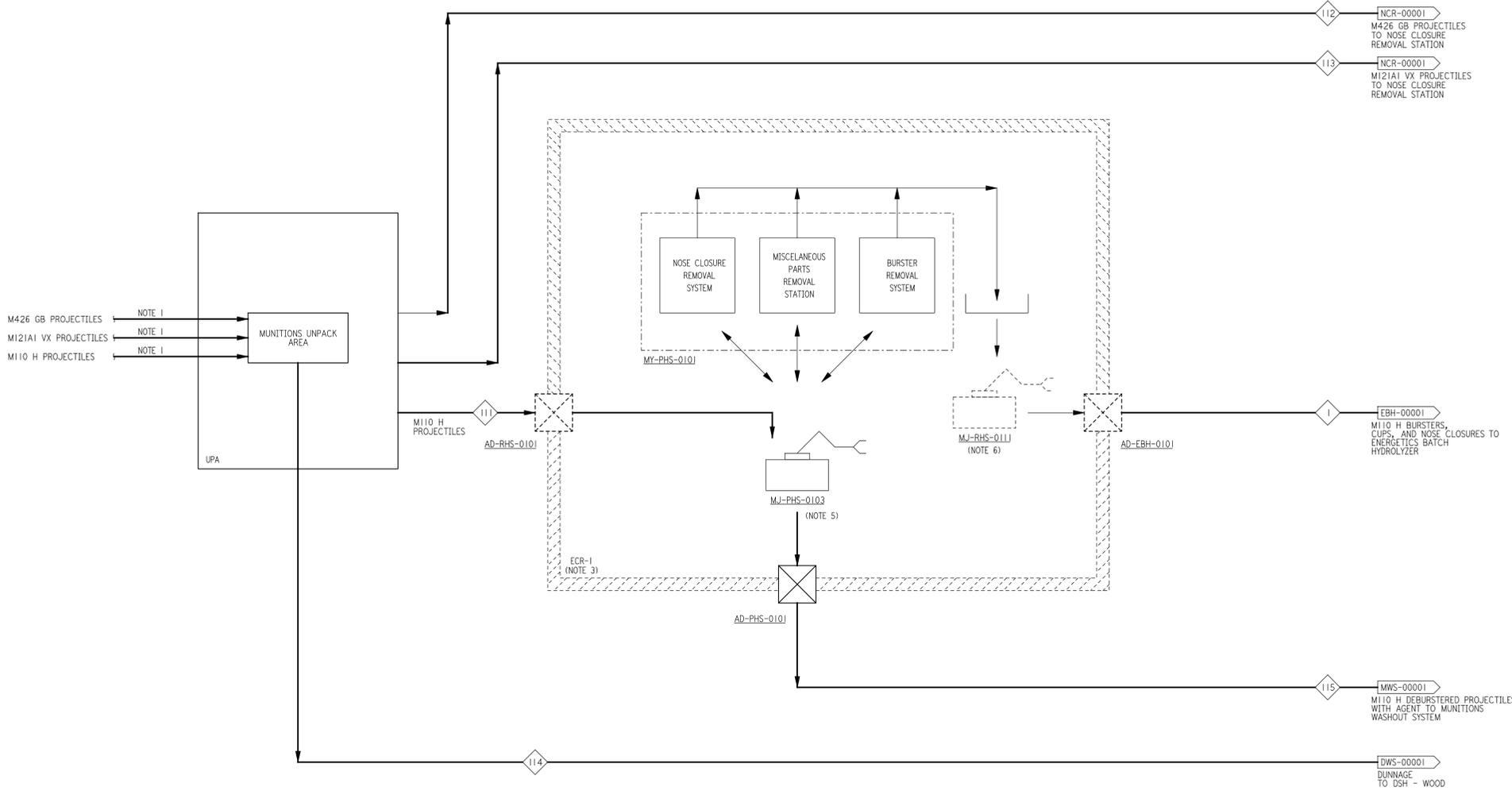
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BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP) RICHMOND, KENTUCKY CONTRACT NO. DAAA09-03-D-0023							
MUNITIONS DEMILITARIZATION BUILDING ROCKET SHEAR MACHINE PROCESS FLOW DIAGRAM							
DRAWING NUMBER						SHEET	REV
24915-07-M5-RHS-00001						1 OF 2	0

PROFESSIONAL STAMP

8 7 6 5 4 3 2 1

AD-RHS-010] RSM/PMD INPUT BLAST GATE, ECR-I
 AD-EBH-010] EBH BLAST AIRLOCK ASSEMBLY, ECR-I
 AD-PHS-010] PROJECTILE DISCHARGE BLAST GATE
 MY-PHS-010] PMD MACHINE
 MJ-PHS-0103 PMD PROJECTILE TRANSFER ROBOT
 MJ-RHS-011] ROCKET HANDLING ROBOT ECR-I (NOTE 6)

- NOTES:
1. THERE ARE THREE TYPES OF PROJECTILES AT THE BLUEGRASS FACILITY: M110 H BURSTERED PROJECTILES, M426 GB DEBURSTERED PROJECTILES AND M121A1 VX DEBURSTERED PROJECTILES. EACH TYPE OF PROJECTILE WILL BE DEMILITARIZED IN A SEPARATE CAMPAIGN.
 2. PROJECTILE DEMILITARIZATION MACHINE IS LOCATED WITHIN AN EXPLOSION CONTAINMENT ROOM (ECR).
 3. ECR-I WILL BE MODIFIED AND WILL HOUSE ONE PMD MACHINE FOR 'H' CAMPAIGN ONLY.
 4. FOR SYMBOL DEFINITION SEE DRAWING 24915-00-M5-00-00002.
 5. PROJECTILE TRANSFER ROBOT WILL TRANSFER THE M110 H PROJECTILES TO NOSE CLOSURE REMOVAL SYSTEM, MISCELLANEOUS PARTS REMOVAL SYSTEM AND BURSTER REMOVAL SYSTEM IN SEQUENCE. NOSE CLOSURES, CUPS AND BURSTERS WILL BE COLLECTED, PUT IN A BUCKET AND TRANSFERRED TO THE ENERGETICS BATCH HYDROLYZER.
 6. ROCKET HANDLING ROBOT WILL BE REPROGRAMMED TO TRANSFER THE BUCKET, WHICH CONTAINS NOSE CLOSURES, CUPS AND BURSTERS, TO THE ECR BLAST AIRLOCK.



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BECTEL PARSONS BLUE GRASS
 A JOINT VENTURE OF BECTEL CORPORATION, INC. AND PARSONS BRINCKERHOFF & TERRY, INC.
 DOD PROGRAM MANAGER FOR ASSEMBLED CHEMICAL WEAPONS ASSESSMENT EDGEWOOD, MARYLAND
 US ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE HUNTSVILLE, ALABAMA

BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP)
 RICHMOND, KENTUCKY
 CONTRACT NO. DAAA09-03-D-0023

MUNITIONS DEMILITARIZATION BUILDING PROJECTILE DEMILITARIZATION PROCESS FLOW DIAGRAM

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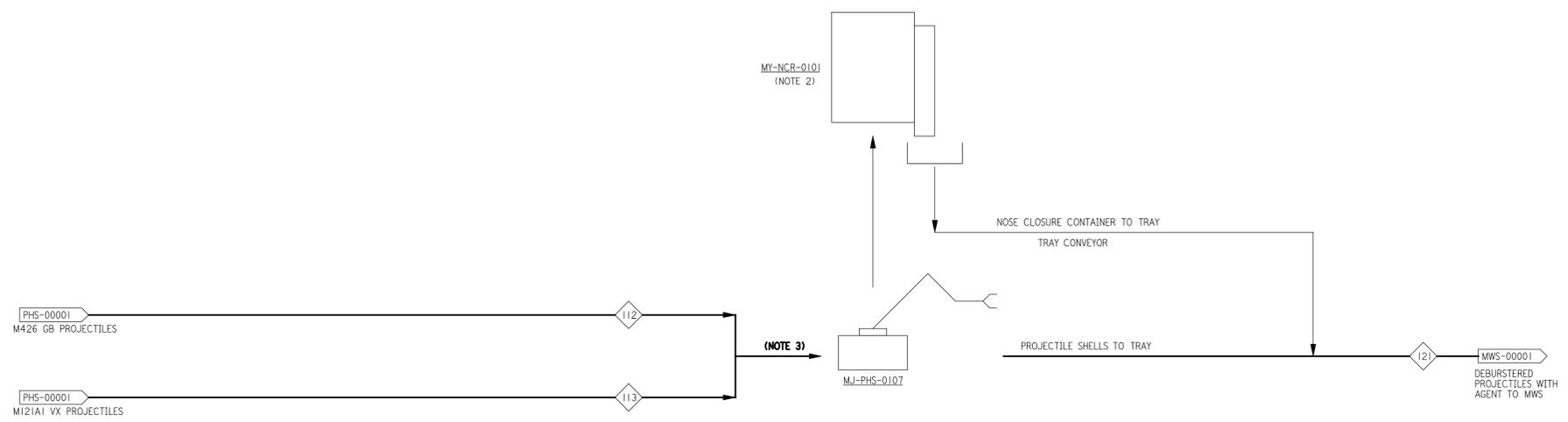
B

A

MY-NCR-0101
NOSE CLOSURE
REMOVAL STATION

MJ-PHS-0107
NCR PROJECTILE
TRANSFER ROBOT

- NOTES:
1. FOR SYMBOL DEFINITION SEE DRAWING 24915-00-M5-00-00002.
 2. THE NCR STATION WILL REQUIRE MINOR RETOOLING BETWEEN GB AND VX CAMPAIGNS.
 3. EACH TYPE OF PROJECTILE WILL BE DEMILITARIZED IN A SEPARATE CAMPAIGN.



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BECHTEL PARSONS
BLUE GRASS

DOD PROGRAM MANAGER FOR
ASSEMBLED CHEMICAL
WEAPONS ASSESSMENT
EDGEWOOD, MARYLAND

US ARMY ENGINEERING AND
SUPPORT CENTER, HUNTSVILLE
HUNTSVILLE, ALABAMA

BLUE GRASS CHEMICAL AGENT DESTRUCTION
PILOT PLANT PROJECT (BGCAPP)
RICHMOND, KENTUCKY

CONTRACT NO. DAAA09-03-D-0023

MUNITIONS DEMILITARIZATION BUILDING
NOSE CLOSURE REMOVAL SYSTEM
PROCESS FLOW DIAGRAM

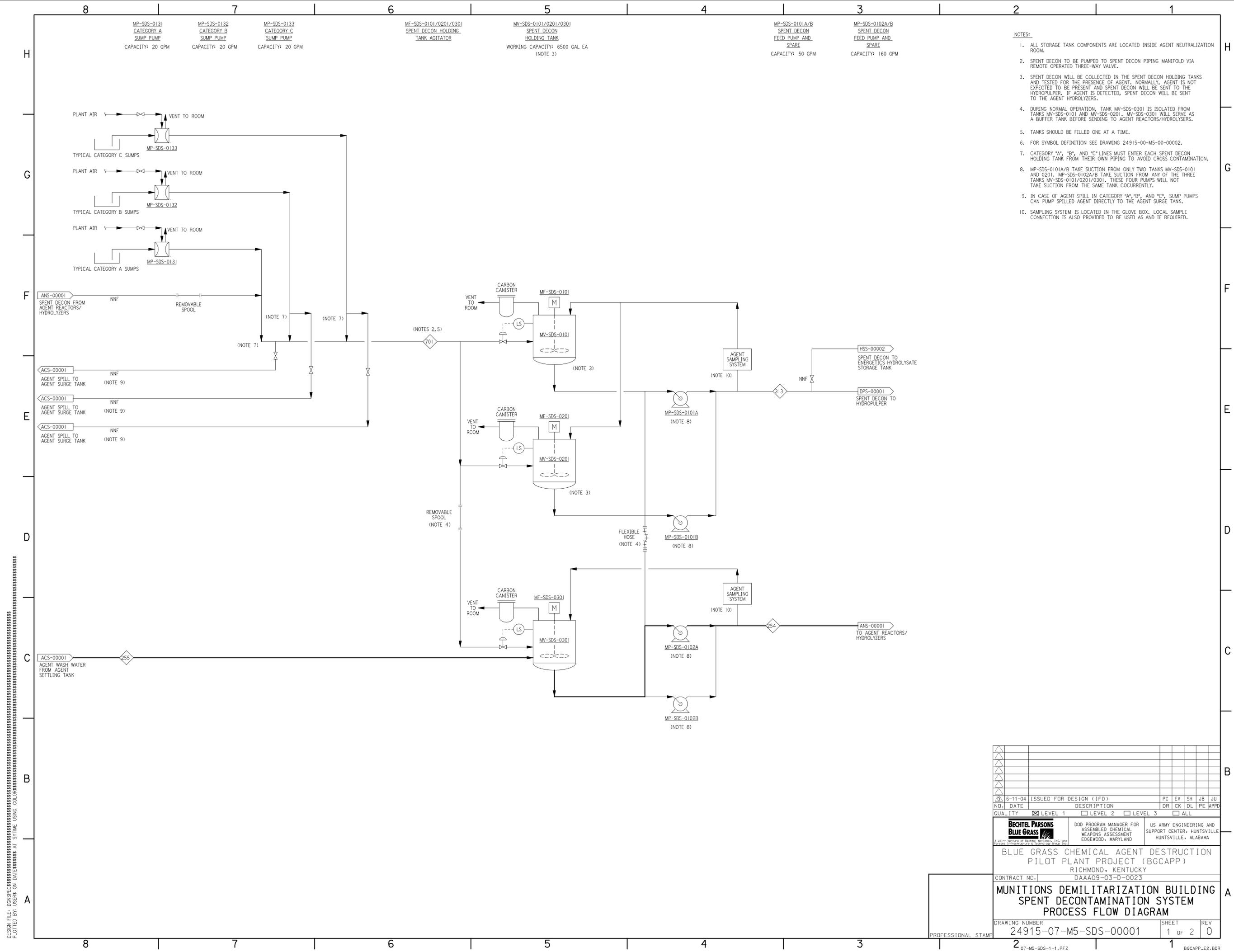
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- NOTES:
1. ALL STORAGE TANK COMPONENTS ARE LOCATED INSIDE AGENT NEUTRALIZATION ROOM.
 2. SPENT DECON TO BE PUMPED TO SPENT DECON PIPING MANIFOLD VIA REMOTE OPERATED THREE-WAY VALVE.
 3. SPENT DECON WILL BE COLLECTED IN THE SPENT DECON HOLDING TANKS AND TESTED FOR THE PRESENCE OF AGENT. NORMALLY, AGENT IS NOT EXPECTED TO BE PRESENT AND SPENT DECON WILL BE SENT TO THE HYDROPULPER, IF AGENT IS DETECTED, SPENT DECON WILL BE SENT TO THE AGENT HYDROLYZERS.
 4. DURING NORMAL OPERATION, TANK MV-SDS-0301 IS ISOLATED FROM TANKS MV-SDS-0101 AND MV-SDS-0201. MV-SDS-0301 WILL SERVE AS A BUFFER TANK BEFORE SENDING TO AGENT REACTORS/HYDROLYZERS.
 5. TANKS SHOULD BE FILLED ONE AT A TIME.
 6. FOR SYMBOL DEFINITION SEE DRAWING 24915-00-M5-00-00002.
 7. CATEGORY "A", "B", AND "C" LINES MUST ENTER EACH SPENT DECON HOLDING TANK FROM THEIR OWN PIPING TO AVOID CROSS CONTAMINATION.
 8. MP-SDS-0101A/B TAKE SUCTION FROM ONLY TWO TANKS MV-SDS-0101 AND 0201. MP-SDS-0102A/B TAKE SUCTION FROM ANY OF THE THREE TANKS MV-SDS-0101/0201/0301. THESE FOUR PUMPS WILL NOT TAKE SUCTION FROM THE SAME TANK OCCURENTLY.
 9. IN CASE OF AGENT SPILL IN CATEGORY "A", "B", AND "C", SUMP PUMPS CAN PUMP SPILLED AGENT DIRECTLY TO THE AGENT SURGE TANK.
 10. SAMPLING SYSTEM IS LOCATED IN THE GLOVE BOX. LOCAL SAMPLE CONNECTION IS ALSO PROVIDED TO BE USED AS AND IF REQUIRED.

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BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP) RICHMOND, KENTUCKY							
CONTRACT NO. DAAA09-03-D-0023							
MUNITIONS DEMILITARIZATION BUILDING SPENT DECONTAMINATION SYSTEM PROCESS FLOW DIAGRAM							
DRAWING NUMBER		SHEET		REV			
24915-07-M5-SDS-00001		1 OF 2		0			

PROFESSIONAL STAMP

8 7 6 5 4 3 2 1

MJ-THS-0114/0115
MPT INLET AIRLOCK/CONVEYOR
W 6'-6"
H 8'-6"
L 10'-10"

MJ-THS-0116/0117
MPT OUTLET AIRLOCK/CONVEYOR
W 6'-6"
H 8'-6"
L 10'-10"

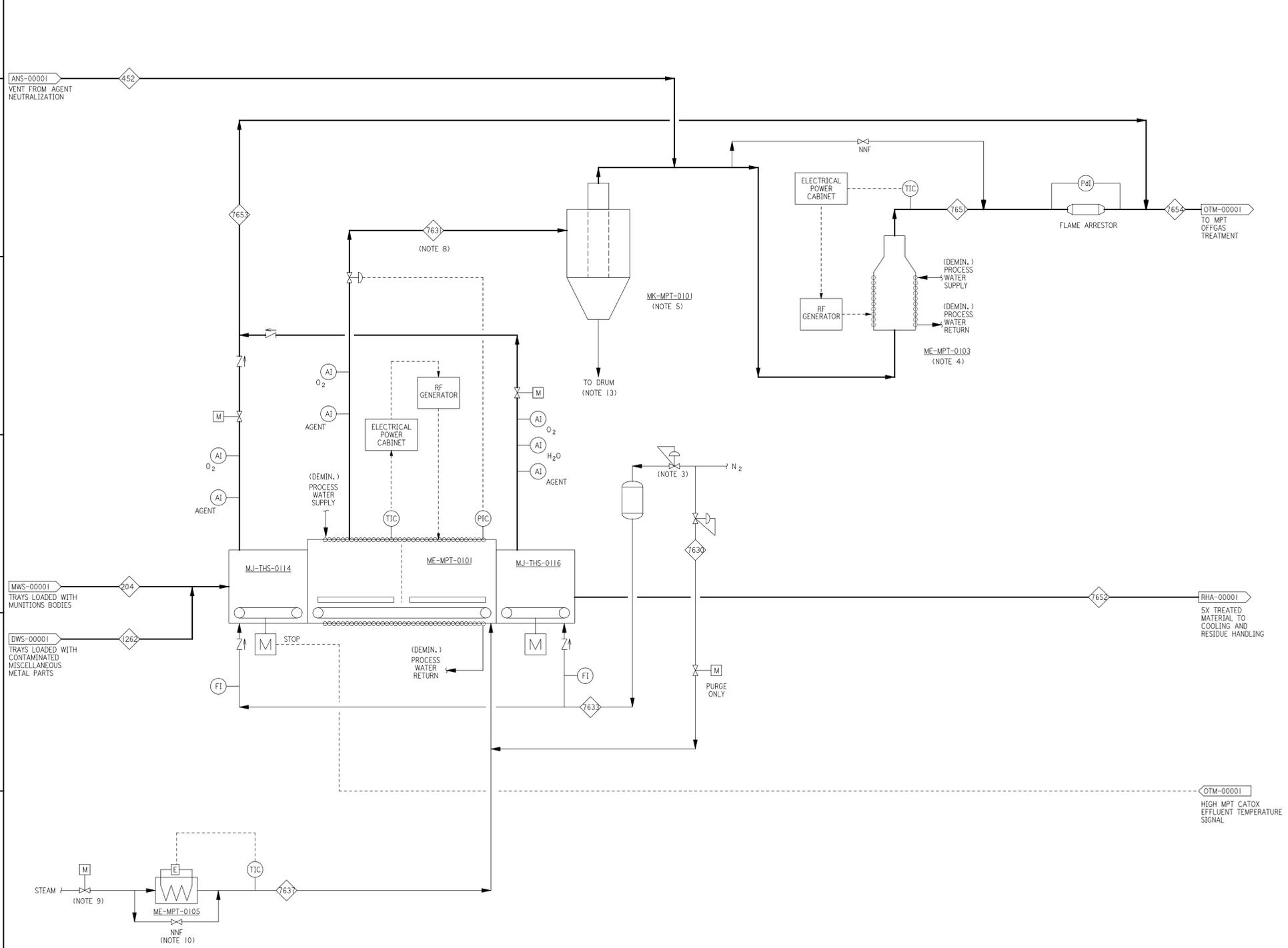
ME-MPT-0101/0201
METAL PARTS TREATER
6'-6" ID X 18'-4" L
(NOTES 1, 2, 12)

ME-MPT-0105/0205
MPT STEAM SUPERHEATER
88 MBTU/HR
(RESISTANCE)
(NOTE 11)

ME-MPT-0103/0203
MPT EFFLUENT HEATER
31 MBTU/HR
(NOTE 11)

MK-MPT-0101/0201
MPT CYCLONE
16" OD X 66" H

- NOTES:
- MUNITIONS AND MISCELLANEOUS METAL PARTS TEMPERATURE TO BE VERIFIED WITH OPTICAL PYROMETER AND INTERLOCKED WITH DISCHARGE DOOR OF MPT SO THAT TIME AND TEMPERATURE REQUIREMENTS ARE SATISFIED BEFORE DISCHARGING MUNITIONS TRAY.
 - METAL PARTS TREATER RECEIVES MATERIALS PLACED IN ONE MUNITIONS TRAY PER BATCH. BATCH CYCLE TIME IS 120 MINUTES.
 - PURGE AIRLOCK WITH NITROGEN AT THE END OF HEATING CYCLE, PRIOR TO MONITORING FOR AGENT PRESENCE.
 - RESIDENCE TIME FOR THE MPT EFFLUENT HEATER IS 0.5 SECONDS. THE MPT EFFLUENT HEATER TEMPERATURE IS TO BE HIGH ENOUGH TO ENSURE TOTAL DESTRUCTION OF AGENT PRESENT IN THE METAL PARTS TREATER VENT GAS.
 - CYCLONE IS ALSO REQUIRED FOR CLOSURE ACTIVITIES.
 - FOR SYMBOL DEFINITION SEE DRAWING 24915-00-M5-00-00002.
 - STEAM SUPERHEATER IS SIZED TO SUPPLY BOTH MPT'S.
 - ASPEN EQUILIBRIUM CALCULATIONS INDICATE NEGLIGIBLE AMOUNTS OF TDS. LAB DATA IS NOT AVAILABLE TO VERIFY THE ASPEN CALCULATIONS.
 - FOR EMERGENCY USE ONLY TO ISOLATE THE STEAM SYSTEM.
 - FOR SHUTDOWN ONLY.
 - MBTU/HR = 1,000 BTU/HR
 - DELETED
 - CYCLONE ASH WILL BE SAMPLED AND SHIPPED OFF TO HAZARDOUS WASTE DISPOSAL SYSTEM IF IT IS CLEAN, OTHERWISE, CYCLONE ASH WILL RUN THROUGH MPT.

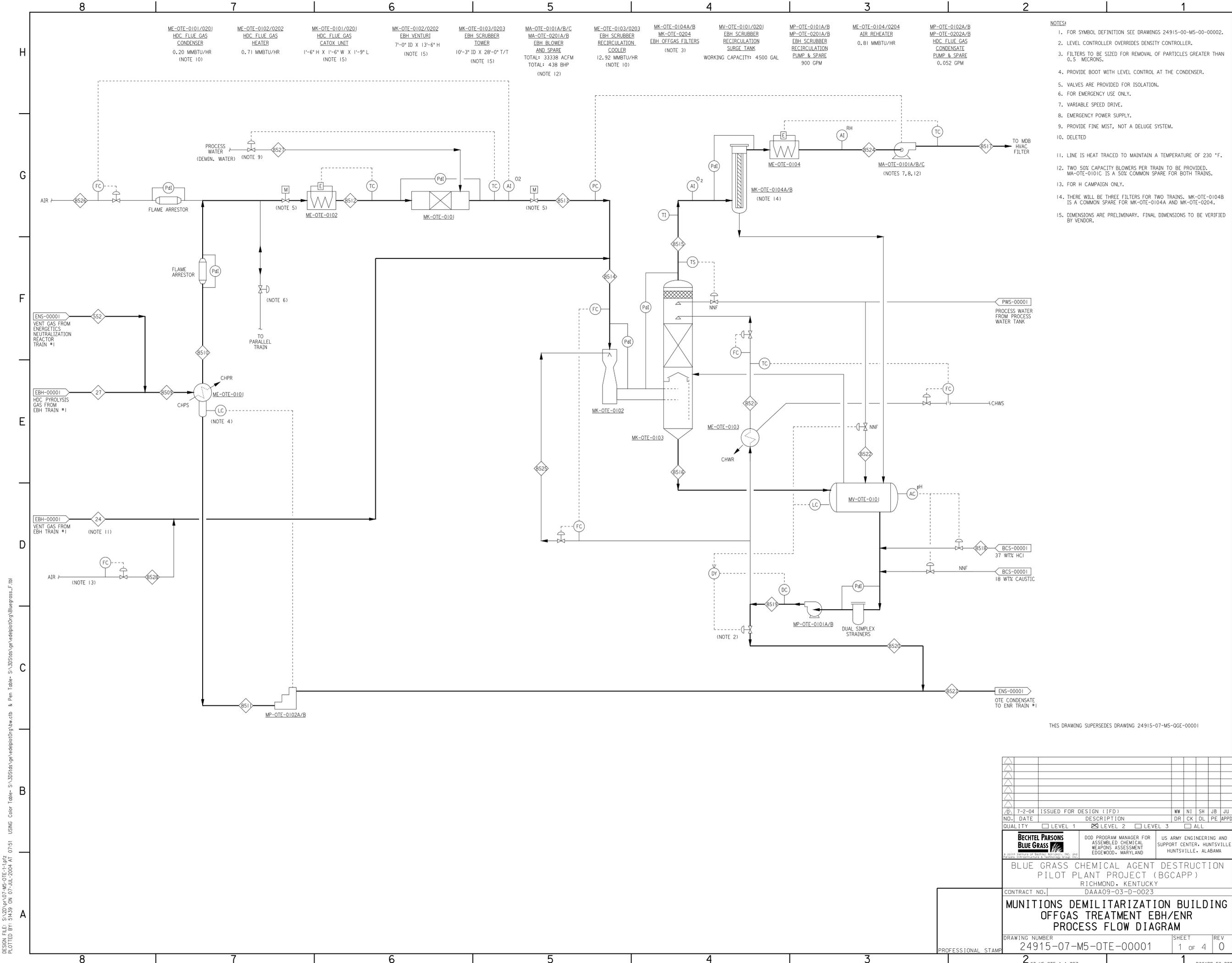


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BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP) RICHMOND, KENTUCKY							
CONTRACT NO. DAAA09-03-D-0023							
MUNITIONS DEMILITARIZATION BUILDING METAL PARTS TREATMENT PROCESS FLOW DIAGRAM							
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- NOTES:**
1. FOR SYMBOL DEFINITION SEE DRAWINGS 24915-00-M5-00-00002.
 2. LEVEL CONTROLLER OVERRIDES DENSITY CONTROLLER.
 3. FILTERS TO BE SIZED FOR REMOVAL OF PARTICLES GREATER THAN 0.5 MICRONS.
 4. PROVIDE BOOT WITH LEVEL CONTROL AT THE CONDENSER.
 5. VALVES ARE PROVIDED FOR ISOLATION.
 6. FOR EMERGENCY USE ONLY.
 7. VARIABLE SPEED DRIVE.
 8. EMERGENCY POWER SUPPLY.
 9. PROVIDE FINE MIST, NOT A DELUGE SYSTEM.
 10. DELETED
 11. LINE IS HEAT TRACED TO MAINTAIN A TEMPERATURE OF 230 °F.
 12. TWO 50% CAPACITY BLOWERS PER TRAIN TO BE PROVIDED. MA-OTE-0101C IS A 50% COMMON SPARE FOR BOTH TRAINS.
 13. FOR H CAMPAIGN ONLY.
 14. THERE WILL BE THREE FILTERS FOR TWO TRAINS. MK-OTE-0104B IS A COMMON SPARE FOR MK-OTE-0104A AND MK-OTE-0204.
 15. DIMENSIONS ARE PRELIMINARY. FINAL DIMENSIONS TO BE VERIFIED BY VENDOR.

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THIS DRAWING SUPERSEDES DRAWING 24915-07-M5-OGE-00001

NO.	DATE	ISSUED FOR DESIGN (IFD)	DR	CK	DL	PE	APPD
7-2-04							
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BECHTEL PARSONS BLUE GRASS		DOD PROGRAM MANAGER FOR ASSEMBLED CHEMICAL WEAPONS ASSESSMENT EDGEWOOD, MARYLAND		US ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE HUNTSVILLE, ALABAMA	
BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP) RICHMOND, KENTUCKY					
CONTRACT NO.		DAAA09-03-D-0023			
MUNITIONS DEMILITARIZATION BUILDING OFFGAS TREATMENT EBH/ENR PROCESS FLOW DIAGRAM					
DRAWING NUMBER		24915-07-M5-OTE-00001		SHEET	
PROFESSIONAL STAMP				1 OF 4	
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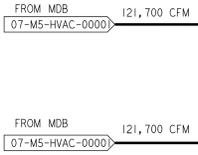
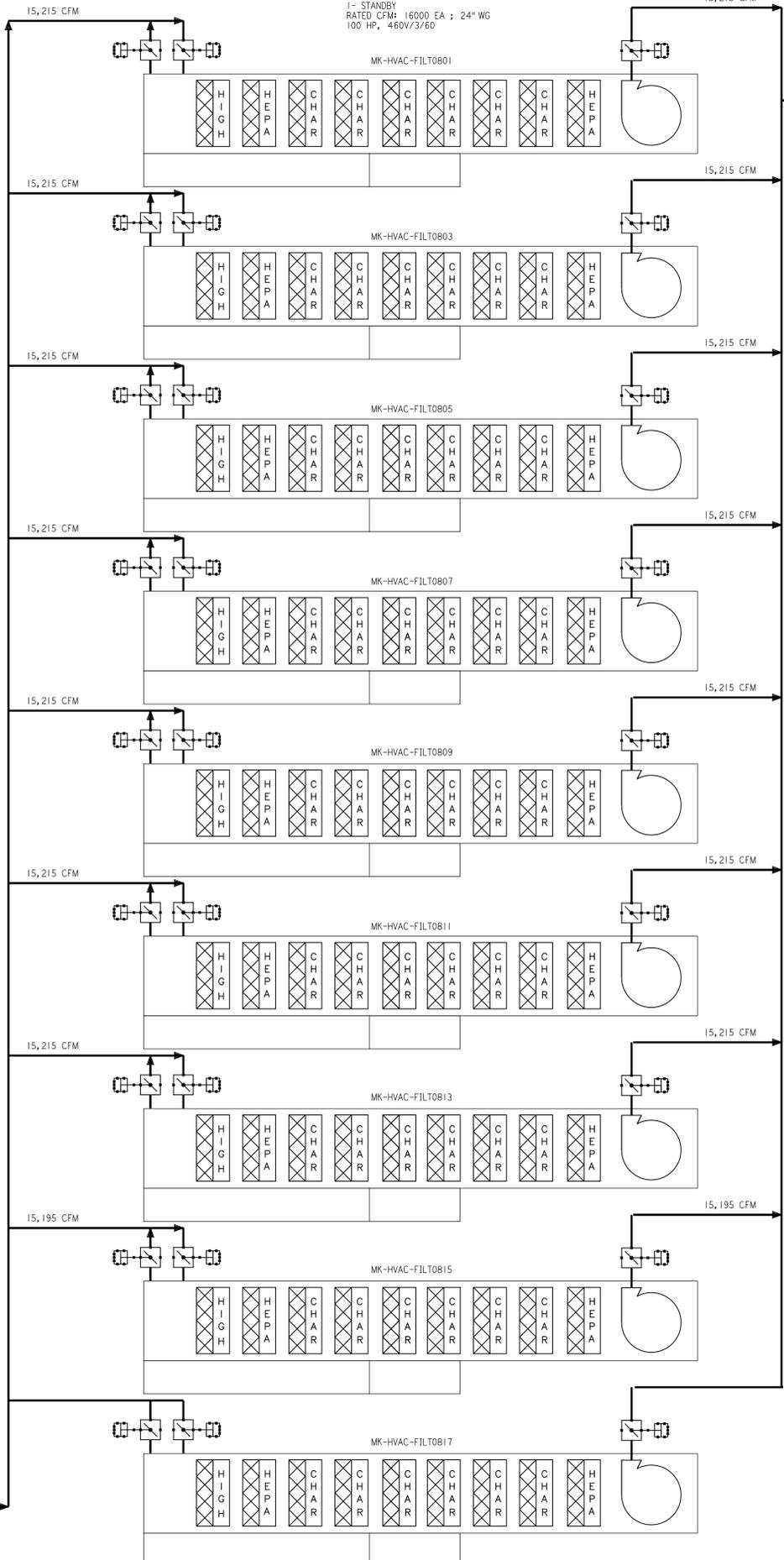
8 7 6 5 4 3 2 1

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MK-HVAC-FILT0801, 03, 05, 07, 09, 11, 13, 15 & 17
EXHAUST AIR FILTER UNITS
B- OPERATING
I- STANDBY
RATED CFM: 16000 EA ; 24" WG
100 HP, 460V/3/60

MB-STK0801
EXHAUST AIR STACK
00'-00"DIA X 00'-00" HIGH
121,700 CFM

- NOTES:
1. FOR SYMBOLS AND LEGEND, SEE DRAWINGS 24915-00-M07-HVAC-00001 AND 00002.
 2. DRAWING NUMBERS IN CONTINUATION FLAGS ARE TRUNCATED BY NOT SHOWING PROJECT NUMBER "24915".
 3. ALL EQUIPMENT NUMBERS ARE PREFIXED "07" UNLESS OTHERWISE NOTED.
 4. FOR CASCADING VENTILATION SYSTEM AIR FLOW DIAGRAMS GENERAL NOTES SEE DRAWING 24915-07-M5-HVAC-00001.

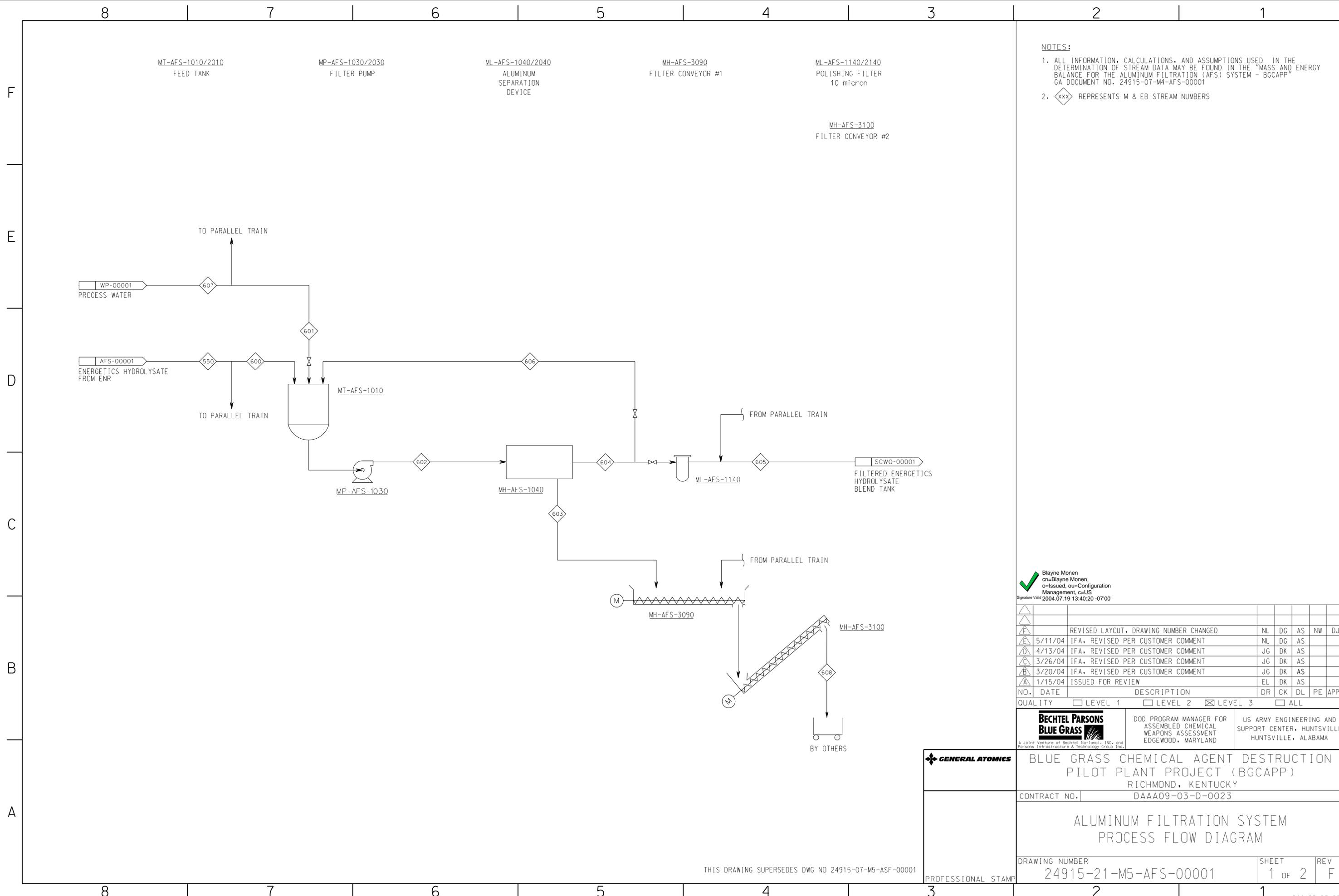


TO MK-HVAC-FILT0802, 04, 06, 08, 10, 12, 14, 16 & 18
121,700 CFM
08-M5-HVAC-00002

DESIGN FILE: S:\3D\m\08-m5-hv-01.fzd
PLOTTED BY: 56313 ON 20-JUL-2004 AT 10:31 USING Color Table: S:\3D\m\08-m5-hv-01.fzd & Pen Table: S:\3D\m\08-m5-hv-01.fzd\Bluegrass.F.tbl

NO.	DATE	DESCRIPTION	DR	CK	DL	PE	APPD
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			DOD PROGRAM MANAGER FOR ASSEMBLED CHEMICAL WEAPONS ASSESSMENT EDGEWOOD, MARYLAND		US ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE HUNTSVILLE, ALABAMA		
BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP) RICHMOND, KENTUCKY CONTRACT NO. DAAA09-03-D-0023							
FILTER AREA CASCADE SYSTEM FILTER UNITS HVAC AIR FLOW DIAGRAM							
DRAWING NUMBER						SHEET	REV
24915-08-M5-HVAC-00001						1 OF 1	B

PROFESSIONAL STAMP



NOTES:
 1. ALL INFORMATION, CALCULATIONS, AND ASSUMPTIONS USED IN THE DETERMINATION OF STREAM DATA MAY BE FOUND IN THE "MASS AND ENERGY BALANCE FOR THE ALUMINUM FILTRATION (AFS) SYSTEM - BGCAPP" GA DOCUMENT NO. 24915-07-M4-AFS-00001
 2. REPRESENTS M & EB STREAM NUMBERS

Blayne Monen
 cn=Blayne Monen,
 o=Issued, ou=Configuration
 Management, c=US
 Signature Valid 2004.07.19 13:40:20 -0700'

		REVISED LAYOUT, DRAWING NUMBER CHANGED	NL	DG	AS	NW	DJ
	5/11/04	IFA, REVISED PER CUSTOMER COMMENT	NL	DG	AS		
	4/13/04	IFA, REVISED PER CUSTOMER COMMENT	JG	DK	AS		
	3/26/04	IFA, REVISED PER CUSTOMER COMMENT	JG	DK	AS		
	3/20/04	IFA, REVISED PER CUSTOMER COMMENT	JG	DK	AS		
	1/15/04	ISSUED FOR REVIEW	EL	DK	AS		
NO.	DATE	DESCRIPTION	DR	CK	DL	PE	APPD
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	DOD PROGRAM MANAGER FOR ASSEMBLED CHEMICAL WEAPONS ASSESSMENT EDGEWOOD, MARYLAND	US ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE HUNTSVILLE, ALABAMA
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	BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP) RICHMOND, KENTUCKY	
CONTRACT NO.	DAAA09-03-D-0023	
ALUMINUM FILTRATION SYSTEM PROCESS FLOW DIAGRAM		
DRAWING NUMBER	SHEET	REV
24915-21-M5-AFS-00001	1 OF 2	F

THIS DRAWING SUPERSEDES DWG NO 24915-07-M5-ASF-00001

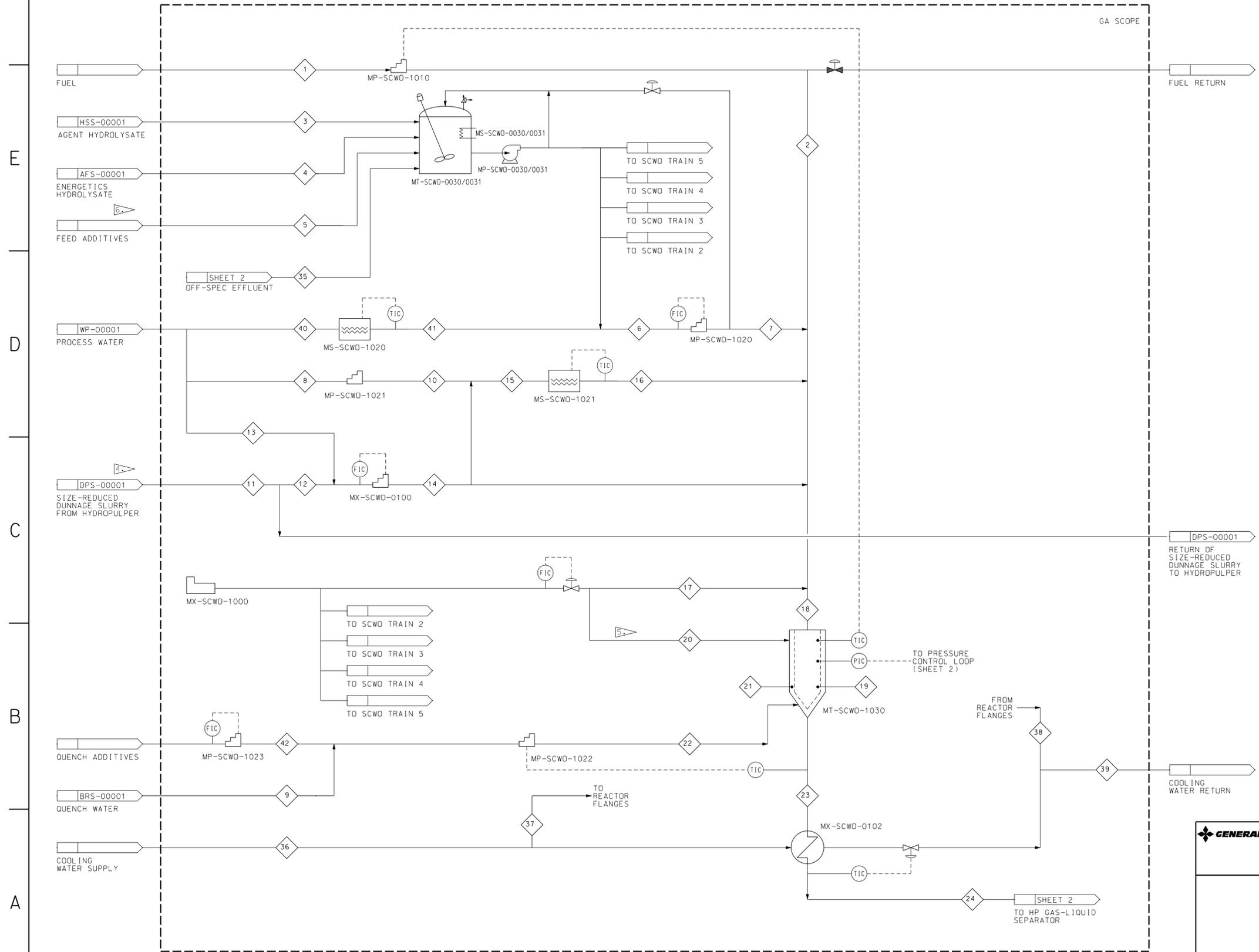
PROFESSIONAL STAMP

MT-SCWO-0030/0031 HYDROLYSATE BLEND TANK 1/2 2,624 GAL EACH	MP-SCWO-1020 HYDROLYSATE FEED PUMP 1000 LB/HR	MS-SCWO-1020 FLUSH WATER HEATER 0.08 MMBTU/HR	MS-SCWO-1021 FEED WATER PREHEATER 1.37 MMBTU/HR	MX-SCWO-1000 HIGH PRESSURE COMPRESSOR SYSTEM 17,734 LB/HR	MP-SCWO-1023 ACID/BASE DOSING PUMP 19.2 LB/HR	MT-SCWO-1030 SCWO REACTOR 7.5" PROCESS DIAMETER 120" PROCESS LENGTH
MP-SCWO-0030/0031 HP FUEL BLEND PUMP 1/2 20,000 LB/HR EACH	MP-SCWO-1010 HP FUEL PUMP 318 LB/HR	MP-SCWO-1021 FEED WATER PUMP 1000 LB/HR	MX-SCWO-0100 DUNNAGE SLURRY FEED SYSTEM 1000 LB/HR	MS-SCWO-0030/0031 HYDROLYSATE BLEND TANK 1/2 HEATER 0.76 MMBTU/HR EACH	MP-SCWO-1022 QUENCH WATER PUMP 8,157 LB/HR	MX-SCWO-0102 SCWO EFFLUENT COOLING 2.81 MMBTU/HR

NOTES:

- DRAWING REPRESENTS A SINGLE SCWO TRAIN. FIVE SCWO TRAINS ARE PROVIDED.
- XX REPRESENTS M&E B STREAM NUMBERS.
- ALL COMPONENTS ROUTINELY SUBJECTED TO HIGH TEMPERATURE AND/OR HIGH PRESSURE ARE CONSIDERED QUALITY LEVEL 2. ALL OTHER COMPONENTS ARE CONSIDERED QUALITY LEVEL 3. PLEASE REFERENCE THE SCWO P&ID FOR EQUIPMENT SPECIFIC QUALITY DESIGNATIONS.
- SIZE-REDUCED DUNNAGE IS PLANNED TO BE PROCESSED SEPARATELY FROM BLENDED AGENT/ENERGETICS HYDROLYSATE (ONE SCWO UNIT IS CURRENTLY ALLOCATED FOR DUNNAGE PROCESSING), ALTHOUGH TESTING MAY BE PERFORMED TO DETERMINE THE EFFICACY OF CO-PROCESSING.
- AIR SUPPLY FOR REACTOR LINER PURGE.
- THE FEED ADDITIVES STREAM REPRESENTS MULTIPLE, DEDICATED LINES FOR ALL REQUIRED FEED ADDITIVES.
- THE FOLLOWING EQUIPMENT ON THIS SHEET SERVES THE SCWO SYSTEM IN IT'S ENTIRETY AND WILL NOT BE PROVIDED ON A PER TRAIN BASIS:

MT-SCWO-0030/0031
MP-SCWO-0030/0031
MS-SCWO-0030/0031
MX-SCWO-1000
- EQUIPMENT SPECIFICATIONS ARE BASED ON MAXIMUM INSTANTANEOUS FLOW RATES GIVEN IN THE SCWO M&E B AND INCLUDE NO MARGIN.



Blayne Monen
 cn=Blayne Monen,
 o=Issued, ou=Configuration
 Management, c=US
 2004.07.12 17:12:20 -0700'

Signature Valid

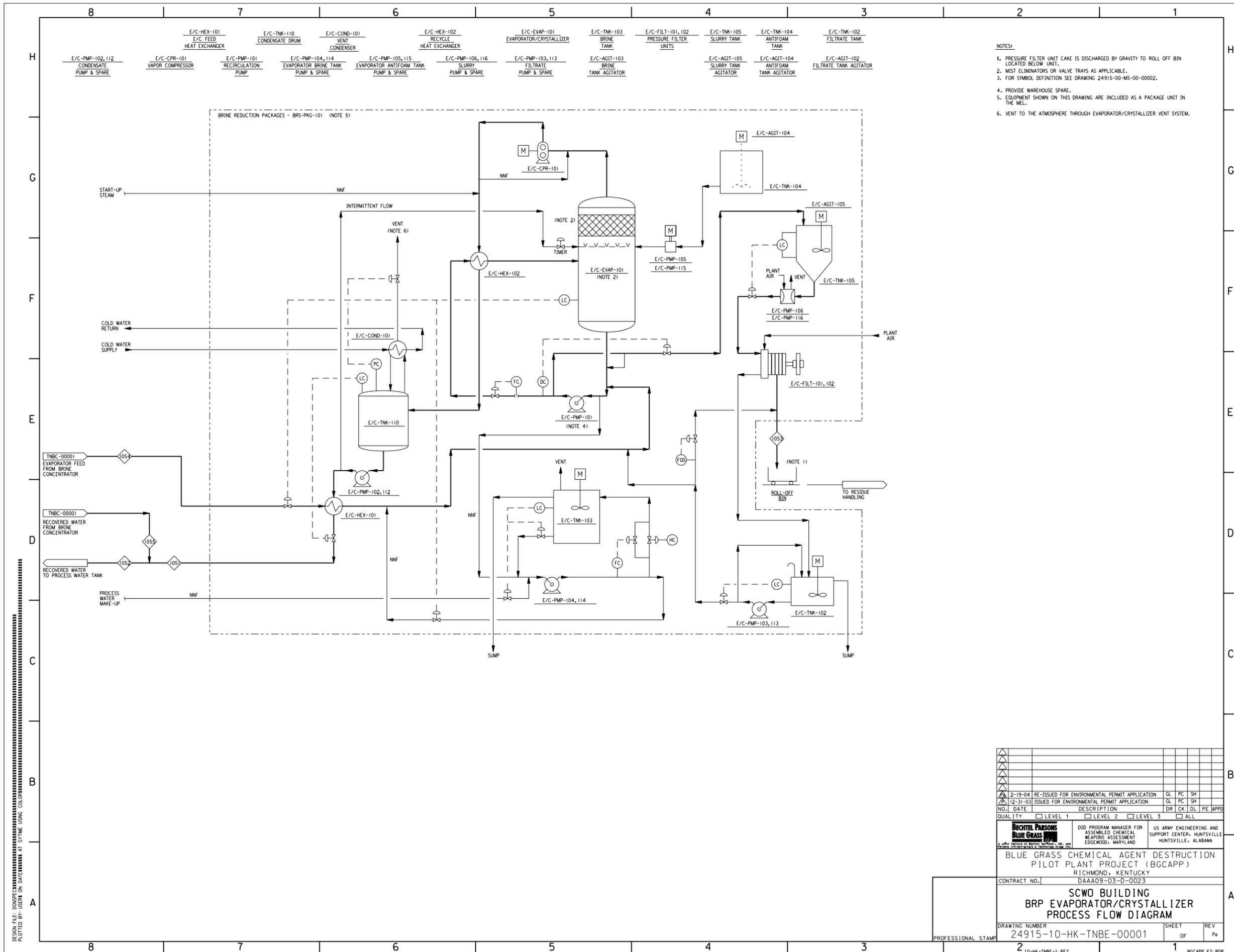
NO.	DATE	DESCRIPTION	DR	CK	DL	PE	APPD
7-12-04	IFD - UPDATED CASE 3		JG	SV	KD	NW	DJ
6-30-04	IFD - INCORPORATED COMMENTS, ADDED EQUIP SPECS		JG	SV	KD	NW	DJ
5-7-04	IFD - UPDATED W/ CURRENT M&E B DATA		JG	SV	KD	NW	DJ

QUALITY LEVEL 1 LEVEL 2 LEVEL 3 ALL

BECHTEL PARSONS BLUE GRASS	DOD PROGRAM MANAGER FOR ASSEMBLED CHEMICAL WEAPONS ASSESSMENT EDGEWOOD, MARYLAND	US ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE HUNTSVILLE, ALABAMA
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GENERAL ATOMICS	BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP) RICHMOND, KENTUCKY	
CONTRACT NO.	DAAA09-03-D-0023	
SCWO PROCESS FLOW DIAGRAM		
DRAWING NUMBER	SHEET	REV
24915-10-M5-SCWO-00001	1 OF 8	2

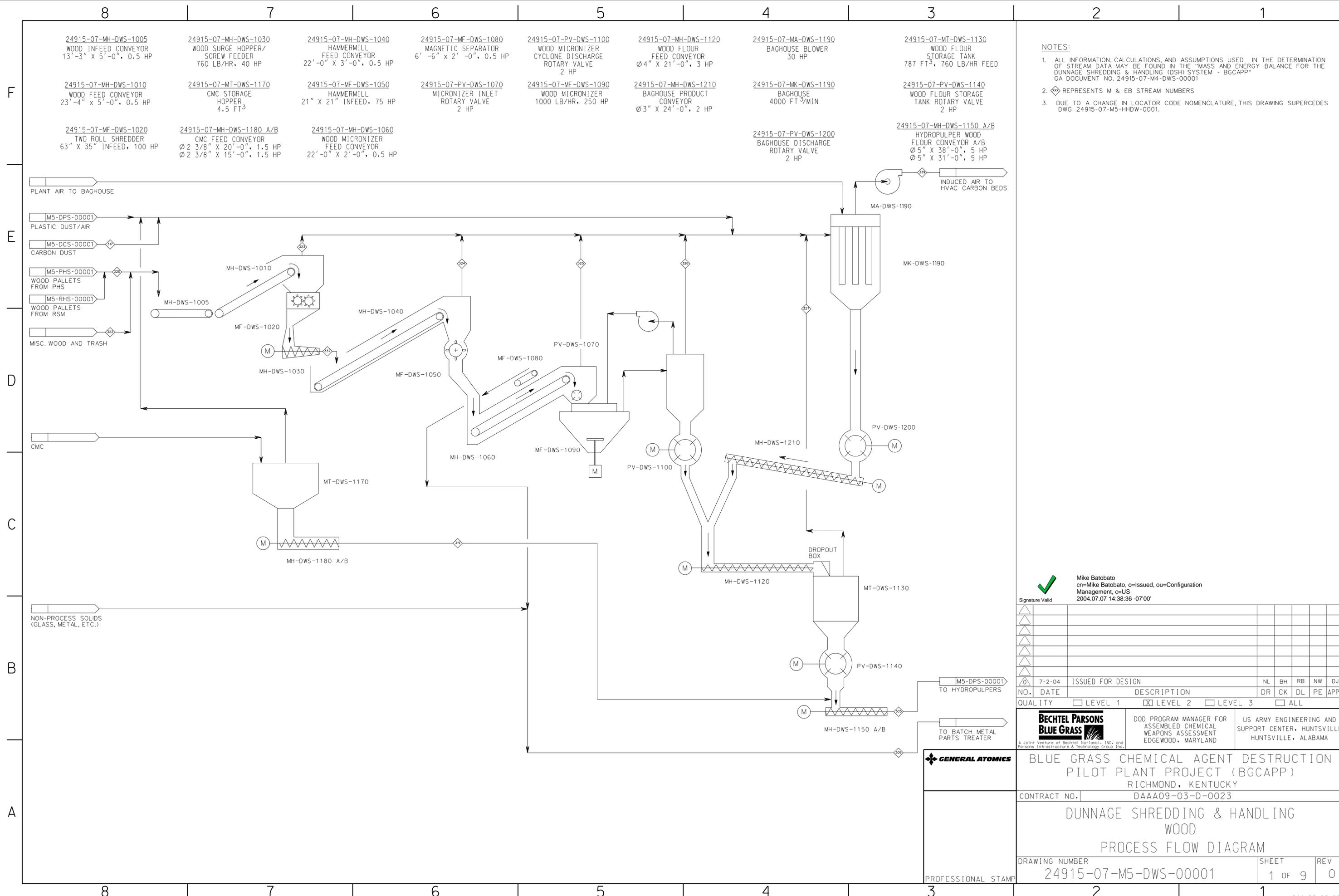
PROFESSIONAL STAMP



- NOTES:
1. PRESSURE FILTER UNIT CAKE IS DISCHARGED BY GRAVITY TO ROLL OFF BIN LOCATED BELOW UNIT.
 2. MIST ELIMINATORS OR VALVE TRAYS AS APPLICABLE.
 3. FOR SYMBOL DEFINITION SEE DRAWING 24915-00-M5-00-00002.
 4. PROVIDE WAREHOUSE SPARE.
 5. EQUIPMENT SHOWN ON THIS DRAWING ARE INCLUDED AS A PACKAGE UNIT IN THE MEL.
 6. VENT TO THE ATMOSPHERE THROUGH EVAPORATOR/CRYSTALLIZER VENT SYSTEM.

DESIGN: E.L. BOWEN
 PLOTTED BY: USER ON DATE 02/23/04 AT 5:17 PM USING CALCOMP 24915-00-M5-00-00002

2-19-04	RE-ISSUED FOR ENVIRONMENTAL PERMIT APPLICATION	GL	PC	SH		
12-31-03	ISSUED FOR ENVIRONMENTAL PERMIT APPLICATION	GL	PC	SH		
NO. DATE	DESCRIPTION	DR	CK	DL	PE	APPO
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		DOD PROGRAM MANAGER FOR ASSEMBLED CHEMICAL WEAPONS ASSESSMENT EDGEWOOD, MARYLAND		US ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE HUNTSVILLE, ALABAMA		
BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP) RICHMOND, KENTUCKY						
CONTRACT NO. DAAA09-03-D-0023						
SCWO BUILDING BRP EVAPORATOR/CRYSTALLIZER PROCESS FLOW DIAGRAM						
DRAWING NUMBER		24915-10-HK-TNBE-00001		SHEET	REV	
PROFESSIONAL STAMP				OF	Pa	



- NOTES:
1. ALL INFORMATION, CALCULATIONS, AND ASSUMPTIONS USED IN THE DETERMINATION OF STREAM DATA MAY BE FOUND IN THE "MASS AND ENERGY BALANCE FOR THE DUNNAGE SHREDDING & HANDLING (DSH) SYSTEM - BGCAPP" GA DOCUMENT NO. 24915-07-M4-DWS-00001
 2. REPRESENTS M & EB STREAM NUMBERS
 3. DUE TO A CHANGE IN LOCATOR CODE NOMENCLATURE, THIS DRAWING SUPERCEDES DWG 24915-07-M5-HHDW-0001.

Mike Batobato
 cn=Mike Batobato, o=Issued, ou=Configuration
 Management, c=US
 2004.07.07 14:38:36 -07'00'

NO.	DATE	DESCRIPTION	DR	CK	DL	PE	APPD
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 <small>A Joint Venture of Bechtel National, Inc. and Parsons Infrastructure & Technology Group, Inc.</small>	DOD PROGRAM MANAGER FOR ASSEMBLED CHEMICAL WEAPONS ASSESSMENT EDGEWOOD, MARYLAND	US ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE HUNTSVILLE, ALABAMA
	BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP) RICHMOND, KENTUCKY	

CONTRACT NO. DAAA09-03-D-0023

DUNNAGE SHREDDING & HANDLING
 WOOD
 PROCESS FLOW DIAGRAM

DRAWING NUMBER 24915-07-M5-DWS-00001 SHEET 1 OF 9 REV 0

PROFESSIONAL STAMP

24915-07-MT-DCS-3030
SPENT CARBON
STORAGE BIN
24.4 FT³

24915-07-MH-DCS-3040
SPENT CARBON
SCREW FEEDER
ø 3" X 8'-0", 2 HP

24915-07-MT-DCS-3050
SPENT CARBON SUSPENSION
FEED TANK
43 FT³

24915-07-MP-DCS-3065
SPENT CARBON SUSPENSION
TANK DISCHARGE AUGER
20 HP

24915-07-MF-DCS-3070
SPENT CARBON
GRINDER
1,000 LB/HR, 50 HP

24915-07-MT-DCS-3080
SPENT CARBON
SLURRY TANK
43 FT³

24915-07-MP-DCS-3100
SPENT CARBON SLURRY
TANK DISCHARGE PUMP
5 HP

24915-07-MF-DCS-3060
SPENT CARBON SUSPENSION
FEED TANK MIXER
1.5 HP

24915-07-MF-DCS-3090
SPENT CARBON
SLURRY TANK MIXER
1.5 HP

NOTES:

1. ALL INFORMATION, CALCULATIONS, AND ASSUMPTIONS USED IN THE DETERMINATION OF STREAM DATA MAY BE FOUND IN THE "MASS AND ENERGY BALANCE FOR THE DUNNAGE SHREDDING & HANDLING (DSH) SYSTEM - BGCAPP" GA DOCUMENT NO. 24915-07-M4-DWS-00001
2. REPRESENTS M&E STREAM NUMBERS.
3. DUE TO A CHANGE IN LOCATOR CODE NOMENCLATURE, THIS DRAWING SUPERCEDES DWG 24915-07-M5-HHDC-0001.

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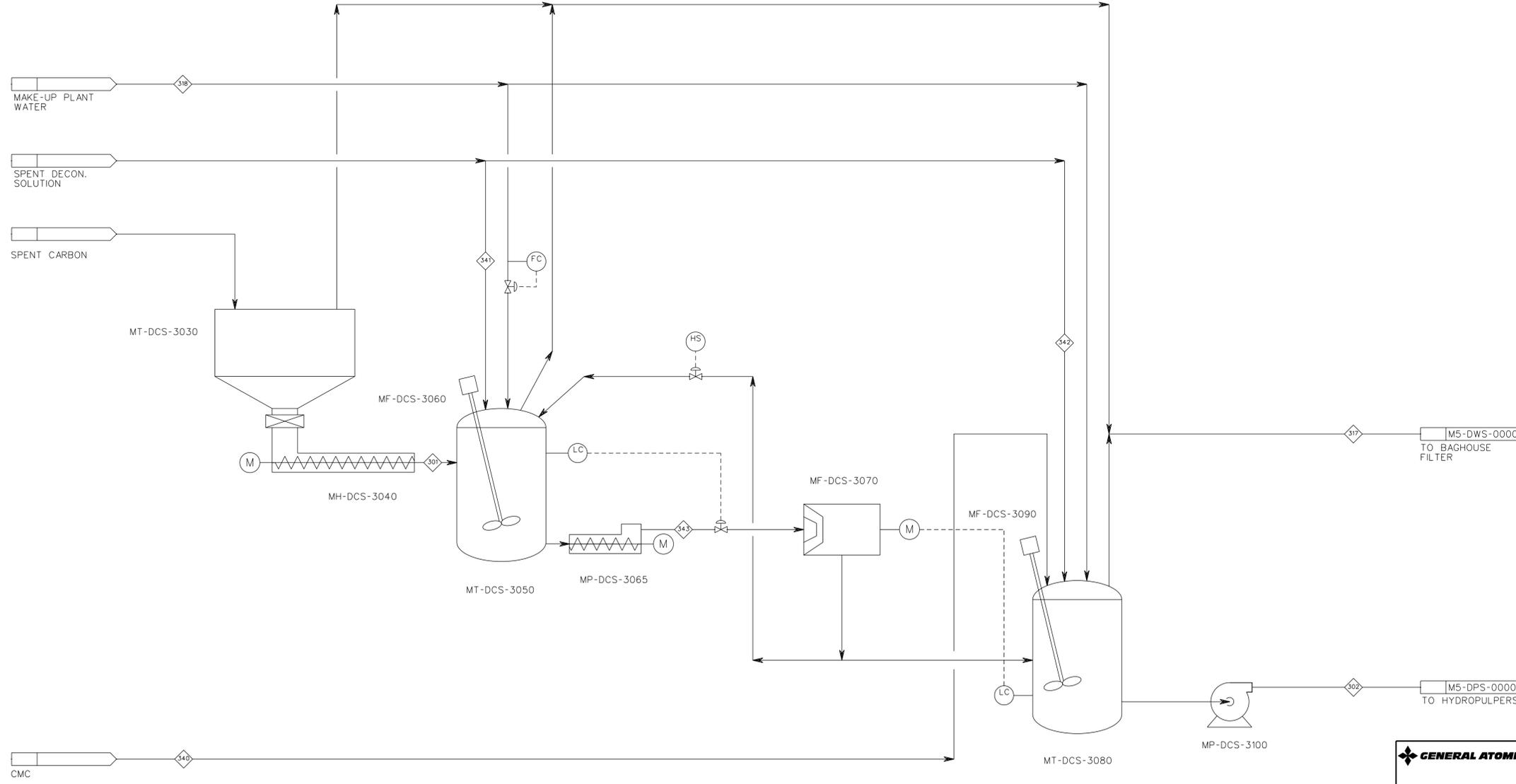
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Blayne Monen
cn=Blayne Monen,
o=Issued,
ou=Configuration
Management, c=US
2004.07.07 13:08:33 -07'00'

Signature Valid

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	DOD PROGRAM MANAGER FOR ASSEMBLED CHEMICAL WEAPONS ASSESSMENT EDGEWOOD, MARYLAND	US ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE HUNTSVILLE, ALABAMA
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	BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP) RICHMOND, KENTUCKY	
CONTRACT NO.	DAAA09-03-D-0023	
DUNNAGE SHREDDING & HANDLING CARBON PROCESS FLOW DIAGRAM		
DRAWING NUMBER	SHEET	REV
24915-07-M5-DCS-00001	1 OF 2	0

PROFESSIONAL STAMP

24915-07-MH-DPS-2020
PLASTIC/RUBBER
GRANULATOR
FEED CONVEYOR
12'-9" X 2'-0", 0.5 HP

24915-07-MF-DPS-2030
PLASTIC/RUBBER
GRANULATOR
600 LB/HR, 3'-7" X 3'-5", 75 HP

24915-07-MT-DPS-2040
GRANULATED
PLASTIC/RUBBER
CYCLONE/SURGE HOPPER
8'-6" X 4'-9" X 4'-9", 3 HP

24915-07-MH-DPS-2050
PLASTIC/RUBBER
CRYOCOOLER
SCREW CONVEYOR
70 LB/HR, 7'-0" X 6", 0.5 HP

24915-07-MF-DPS-2060
PLASTIC/RUBBER
CRYO HAMMER MILL
180 LB/HR, 25 HP

24915-07-MH-DPS-2080
PLASTICS FINE STORAGE
FEED CONVEYOR
Ø 3" X 16'-0", 2 HP

24915-07-MT-DPS-2090
PLASTIC/RUBBER FINES
STORAGE BIN
52 FT³

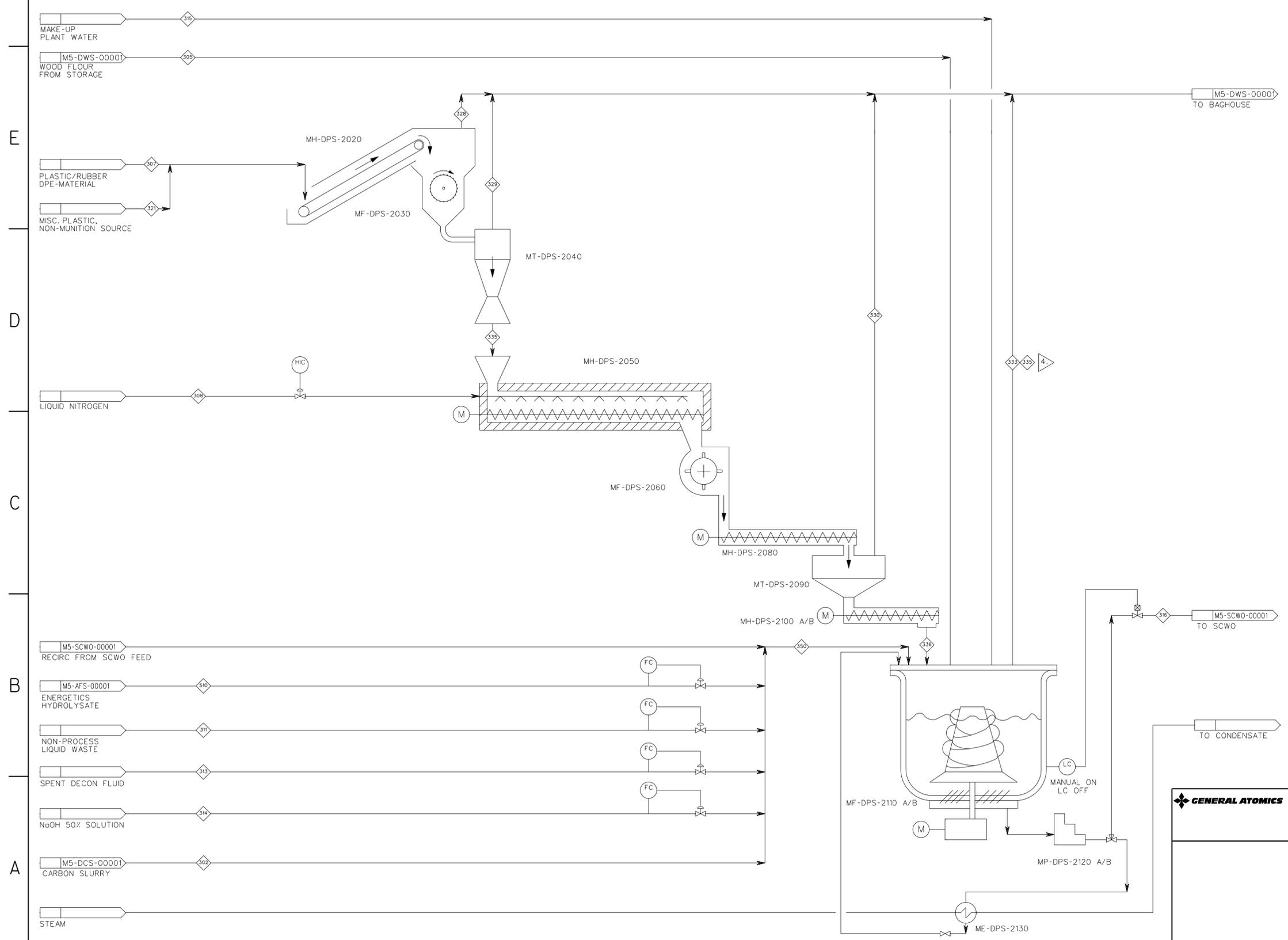
24915-07-MH-DPS-2100 A/B
PLASTIC HYDROPULPER
FEED CONVEYOR A/B
Ø 3" X 19'-0", 2 HP
Ø 3" X 25'-0", 2 HP

24915-07-MF-DPS-2110 A/B
HYDROPULPER A/B
200 FT³, 75 HP

24915-07-ME-DPS-2130
STEAM HEAT EXCHANGER
350,000 BTU/HR

24915-07-MP-DPS-2120 A/B
HYDROPULPER
TRANSFER PUMP A/B
1,000 LB/HR, 10 HP

- NOTES:
- ALL INFORMATION, CALCULATIONS, AND ASSUMPTIONS USED IN THE DETERMINATION OF STREAM DATA MAY BE FOUND IN THE "MASS AND ENERGY BALANCE FOR THE DUNNAGE SHREDDING & HANDLING (DSH) SYSTEM - BGCAPP" GA DOCUMENT NO. 24915-07-M4-DWS-00001
 - ◇ REPRESENTS M&E STREAM NUMBERS.
 - DUE TO A CHANGE IN LOCATOR CODE NOMENCLATURE, THIS DRAWING SUPERCEDES DWG 24915-07-M5-HHDP-0001.
 - ▶ VENT STREAM 333 IS FOR HYDROPULPER A AND VENT STREAM 338 IS FOR HYDROPULPER B.



 Sally Wright
cn=Sally Wright, o=Configuration
Management, ou=Issued, c=US
Signature Valid 2004.07.07 14:38:44 -07'00'

NO.	DATE	DESCRIPTION	DR	CK	DL	PE	APPD
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	DOD PROGRAM MANAGER FOR ASSEMBLED CHEMICAL WEAPONS ASSESSMENT EDGEWOOD, MARYLAND	US ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE, ALABAMA
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 BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP) RICHMOND, KENTUCKY

CONTRACT NO. DAAA09-03-D-0023

DUNNAGE SHREDDING & HANDLING PLASTIC PROCESS FLOW DIAGRAM

DRAWING NUMBER 24915-07-M5-DPS-00001 SHEET 1 of 9 REV 0

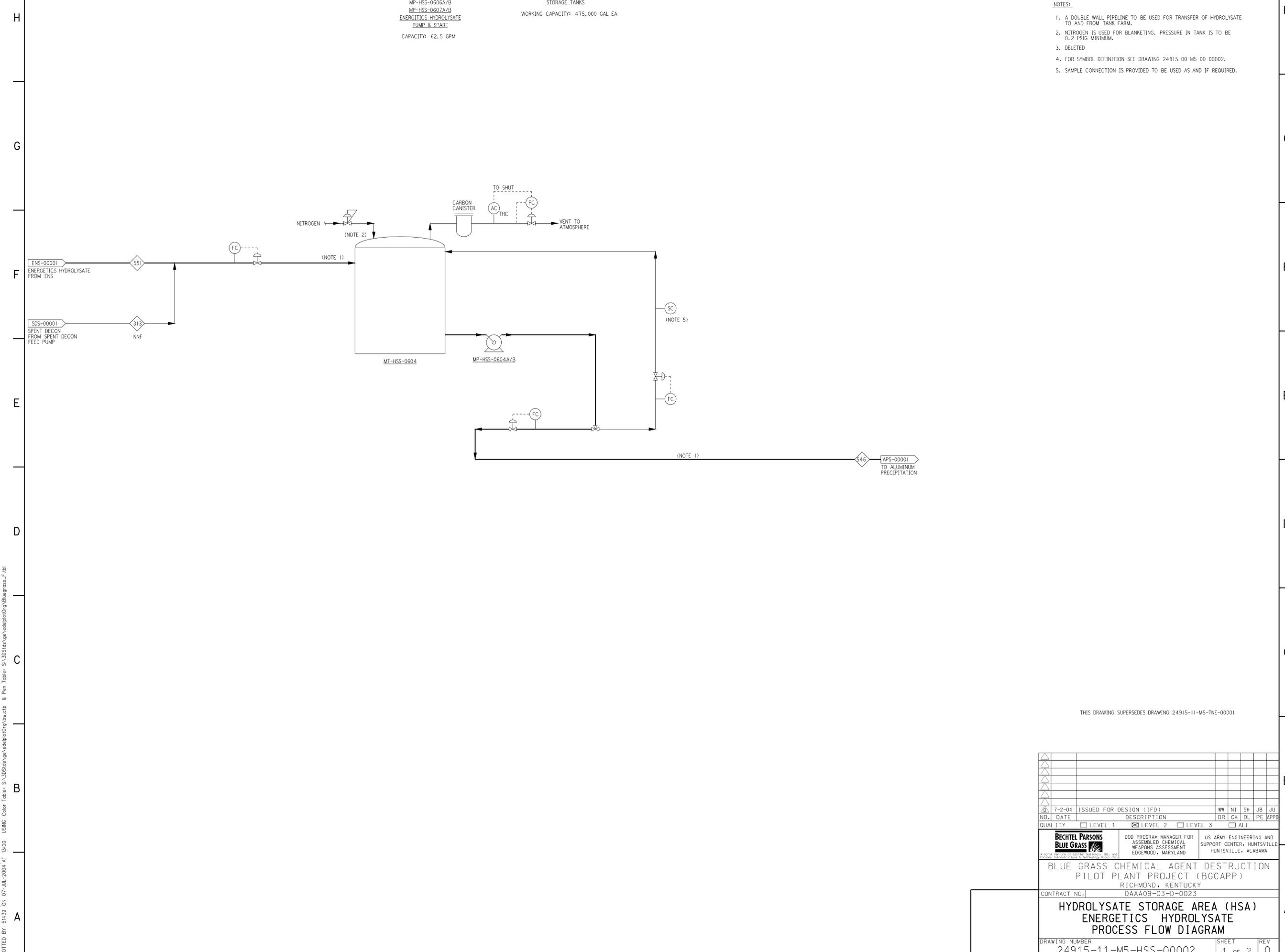
PROFESSIONAL STAMP

8 7 6 5 4 3 2 1

MP-HSS-0604A/B
MP-HSS-0605A/B
MP-HSS-0606A/B
MP-HSS-0607A/B
ENERGETICS HYDROLYSATE
PUMP & SPARE
CAPACITY: 62.5 GPM

MT-HSS-0604/0605/0606/0607
ENERGETICS HYDROLYSATE
STORAGE TANKS
WORKING CAPACITY: 475,000 GAL EA

- NOTES:
1. A DOUBLE WALL PIPELINE TO BE USED FOR TRANSFER OF HYDROLYSATE TO AND FROM TANK FARM.
 2. NITROGEN IS USED FOR BLANKETING. PRESSURE IN TANK IS TO BE 0.2 PSIG MINIMUM.
 3. DELETED
 4. FOR SYMBOL DEFINITION SEE DRAWING 24915-00-M5-00-00002.
 5. SAMPLE CONNECTION IS PROVIDED TO BE USED AS AND IF REQUIRED.



DESIGN FILE: S:\2004\11-M5-HSS-2-1-02
PLOTTED BY: 51439 ON 07-JUL-2004 AT 13:00
USING Color Table- S:\3051ds\gs\edploc10r\vw.ctb & Pen Table- S:\3051ds\gs\edploc10r\Bluegrass_F.tbl

THIS DRAWING SUPERSEDES DRAWING 24915-11-M5-TNE-00001

NO.	DATE	DESCRIPTION	DR	CK	DL	PE	APPD
7-2-04		ISSUED FOR DESIGN (IFD)					
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BECHTEL PARSONS
BLUE GRASS

DOD PROGRAM MANAGER FOR ASSEMBLED CHEMICAL WEAPONS ASSESSMENT EDGWOOD, MARYLAND

US ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE HUNTSVILLE, ALABAMA

BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP)
RICHMOND, KENTUCKY

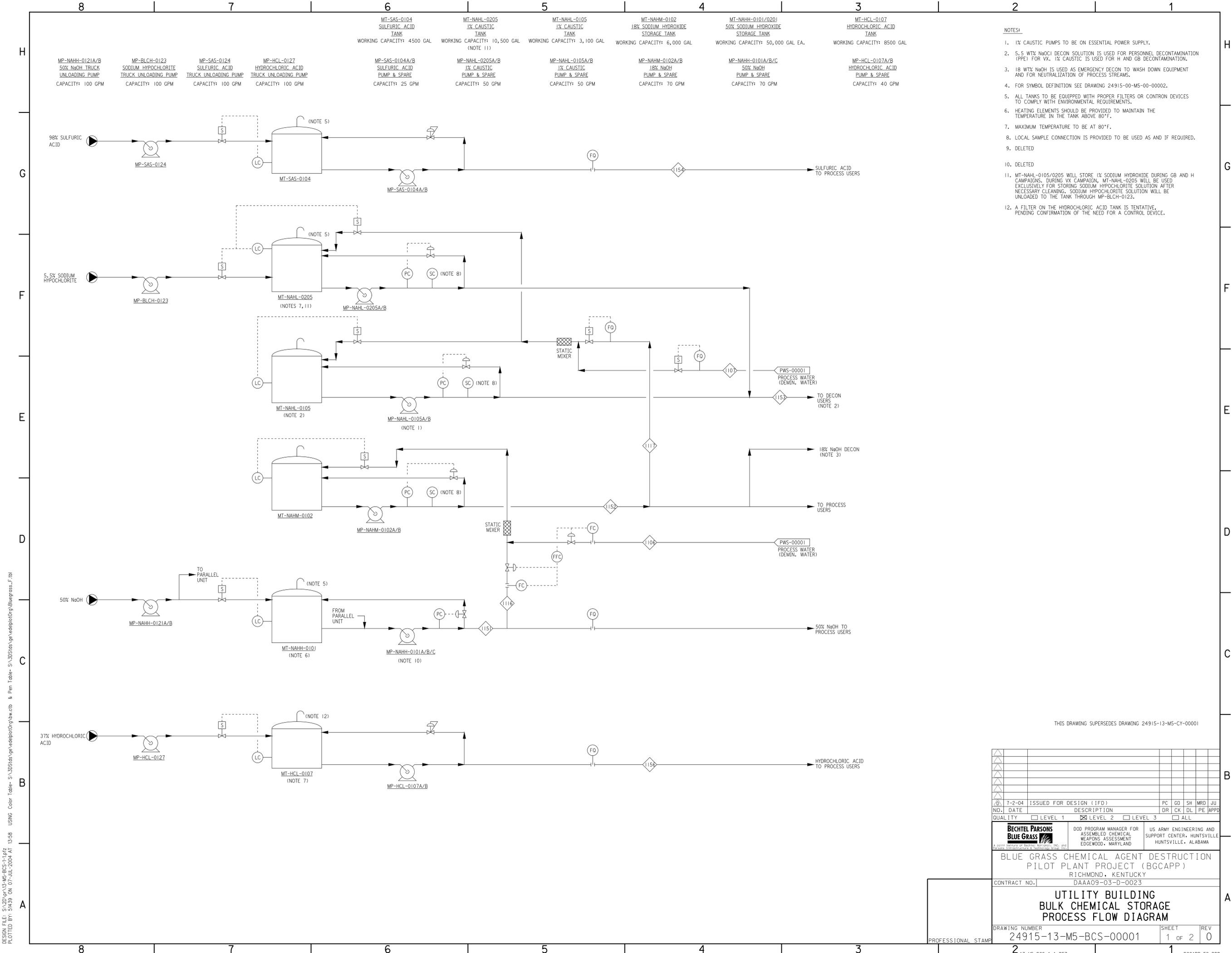
CONTRACT NO. DAAA09-03-D-0023

**HYDROLYSATE STORAGE AREA (HSA)
ENERGETICS HYDROLYSATE
PROCESS FLOW DIAGRAM**

DRAWING NUMBER 24915-11-M5-HSS-00002 SHEET 1 OF 2 REV 0

PROFESSIONAL STAMP

8 7 6 5 4 3 2 1



- NOTES:
- 1% CAUSTIC PUMPS TO BE ON ESSENTIAL POWER SUPPLY.
 - 5.5 WT% NaOCl DECON SOLUTION IS USED FOR PERSONNEL DECONTAMINATION (PPE) FOR VX. 1% CAUSTIC IS USED FOR H AND GB DECONTAMINATION.
 - 18 WT% NaOH IS USED AS EMERGENCY DECON TO WASH DOWN EQUIPMENT AND FOR NEUTRALIZATION OF PROCESS STREAMS.
 - FOR SYMBOL DEFINITION SEE DRAWING 24915-00-M5-00-00002.
 - ALL TANKS TO BE EQUIPPED WITH PROPER FILTERS OR CONTRON DEVICES TO COMPLY WITH ENVIRONMENTAL REQUIREMENTS.
 - HEATING ELEMENTS SHOULD BE PROVIDED TO MAINTAIN THE TEMPERATURE IN THE TANK ABOVE 80°F.
 - MAXIMUM TEMPERATURE TO BE AT 80°F.
 - LOCAL SAMPLE CONNECTION IS PROVIDED TO BE USED AS AND IF REQUIRED.
 - DELETED
 - DELETED
 - MT-NAHL-0105/0205 WILL STORE 1% SODIUM HYDROXIDE DURING GB AND H CAMPAIGNS. DURING VX CAMPAIGN, MT-NAHL-0205 WILL BE USED EXCLUSIVELY FOR STORING SODIUM HYPOCHLORITE SOLUTION AFTER NECESSARY CLEANING. SODIUM HYPOCHLORITE SOLUTION WILL BE UNLOADED TO THE TANK THROUGH MP-BLCH-0123.
 - A FILTER ON THE HYDROCHLORIC ACID TANK IS TENTATIVE, PENDING CONFIRMATION OF THE NEED FOR A CONTROL DEVICE.

DESIGN FILE: S:\20\13-M5-BCS-1-1-1\F PLOTTED BY: 51439 ON 07-JUL-2004 AT 13:58 USING Color Table: S:\3051d4s\g\vedipol10r\vw.ctb & Pen Table: S:\3051d4s\g\vedipol10r\Bluegrass_F.tbl

THIS DRAWING SUPERSEDES DRAWING 24915-13-M5-CY-00001

NO.	7-2-04	ISSUED FOR DESIGN (IFD)	PC	GO	SH	MRO	JU
DATE	DESCRIPTION		DR	CK	DL	PE	APPD
QUALITY	<input type="checkbox"/> LEVEL 1	<input checked="" type="checkbox"/> LEVEL 2	<input type="checkbox"/> LEVEL 3	<input type="checkbox"/> ALL			

BECHTEL PARSONS
BLUE GRASS
A joint venture of Bechtel Corporation, Inc. and Parsons Corporation, 2224 Fairway Drive, Richmond, KY 40506

DOD PROGRAM MANAGER FOR ASSEMBLED CHEMICAL WEAPONS ASSESSMENT EDGWOOD, MARYLAND
 US ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE HUNTSVILLE, ALABAMA

BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT PROJECT (BGCAPP)
 RICHMOND, KENTUCKY
 CONTRACT NO. DAAA09-03-D-0023

UTILITY BUILDING BULK CHEMICAL STORAGE PROCESS FLOW DIAGRAM

DRAWING NUMBER	24915-13-M5-BCS-00001	SHEET	1 OF 2	REV	0
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PROFESSIONAL STAMP

Section 10
Material Safety Data Sheets

1 **List of Material Safety Data Sheets**

2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

1. Blister Agent H/HD (Mustard)
2. Lethal Nerve Agent VX
3. Lethal Nerve Agent GB
4. RDX (Cyclonitrile)
5. trinitrotoluene (TNT)
6. tetryl
7. nitroglycerin
8. nitrocellulose
9. diethylphthlate
10. Glycerine Triacetate - triacetin
11. lead azide
12. lead stearate
13. 2-nitrodiphenylamine
14. Sulfuric Acid
15. Hydrochloric Acid
16. Isopropyl Alcohol
17. Sodium Hypochlorite
18. Sodium Hydroxide

Material Safety Data Sheet

Distilled Mustard (HD)

Date: 22 September 1988
Revised: 01 October 2003

In the event of an emergency
Telephone the RDECOM Operations
Center's 24-hour emergency
Number: 410-436-2148

Section I - General Information

Manufacturer's Address:

U.S. Army Research Development Engineering Command (RDECOM)
Edgewood Chemical Biological Center (ECBC)
ATTN: AMSRD-ECB-CB-CR
Aberdeen Proving Ground, MD 21010-5424

Chemical Name: Bis- (2-chloroethyl) sulfide

Trade name and synonyms:

H; HD; HS
Mustard Gas
Sulfur mustard; Sulphur mustard gas
Sulfide, bis (2-chloroethyl)
Bis (beta-chloroethyl) sulfide
1,1'-thiobis(2-chloroethane)
1-chloro-2 (beta-chloroethylthio) ethane
Beta, beta'-dichlorodiethyl sulfide
2,2'dichlorodiethyl sulfide
Di-2-chloroethyl sulfideBeta, beta'-dichloroethyl sulfide
2,2'-dichloroethyl sulfide
EA 1033
Iprit
Kampstoff "Lost"; Lost
S-Lost; S-yperite; Schewefel-lost
Senfgas
Yellow Cross Liquid
Yperite;Y

Chemical Family: Chlorinated sulfur compound

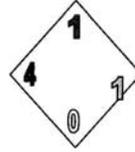
Formula/Chemical Structure:

C₄ H₈ C₁₂ S

C1CH₂CH₂SCH₂CH₂Cl

NFPA 704 Signal:

Health - 4
Flammability - 1
Reactivity - 1
Special - 0



Section II - Ingredients

Ingredients/Name: Sulfur Mustard
Percentage by Weight: 100%
Threshold Limit Value (TLV): 0.003mg/m³

Section III - Physical Data

Boiling Point °F (°C): Calculated 423.5 °F (217.5 °C) (decomposed)

Vapor Pressure (mm Hg): 0.069 @ 20 °C
0.11 @ 25 °C

Vapor Density (Air=1): 5.4

Solubility (g/100g solvent): Negligible in water (0.92 @ 22 °C). Soluble in fats and oils, gasoline, kerosene, acetone, carbon tetrachloride, alcohol, tetrachloroethane, ethylbenzoate, and ether. Miscible with the organophosphorus nerve agents.

Specific Gravity (H₂O=1): 1.27 @ 25 °C

Freezing/Melting Point (°C): 13.88

Liquid Density (g/mL): 1.274 g/mL @ 20 °C
1.268 g/mL @ 25 °C

Volatility (mg/m³): 600 @ 20 °C
910 @ 25 °C

Viscosity (Centipoise): 5.175 @ 20 °C

Molecular Weight (g/mol): 159.08

Appearance and Odor: Normally amber to black colored liquid with garlic or horseradish odor. Water clear if pure. The odor threshold for HD is 0.6 mg/m³ (0.0006 mg/L).

Section IV - Fire and Explosion Data

Flashpoint: 105 °C (Can be ignited by large explosive charges)

Flammability Limits (% by volume): Unknown

Extinguishing Media: Water, fog, and foam, CO₂. Avoid use of extinguishing methods that will cause splashing or

spreading of HD.

Special Fire Fighting Procedures: All persons not engaged in extinguishing the fire should be immediately evacuated from the area. Fires involving HD should be contained to prevent contamination to uncontrolled areas. When responding to a fire alarm in buildings or areas containing agents, fire-fighting personnel should wear full firefighter protective clothing (flame resistant) during chemical agent fire-fighting and fire rescue operations. Respiratory protection is required. Positive pressure, full facepiece, NIOSH-approved self-contained breathing apparatus (SCBA) will be worn where there is danger of oxygen deficiency and when directed by the fire chief or chemical accident/incident (CAI) operations officer. In cases where fire fighters are responding to a chemical accident/incident for rescue/reconnaissance purposes they will wear appropriate levels of protective clothing (See Section VIII).

Do not breathe fumes. Skin contact with agent must be avoided at all times. Although the fire may destroy most of the agent, care must still be taken to assure the agent or contaminated liquids do not further contaminate other areas or sewers. Contact with the agent liquid or vapor can be fatal.

Section V - Health Hazard Data

Airborne Exposure Limit (AEL): The AEL for HD is 0.003 mg/m^3 , as found in "DA Pam 40-173, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT". To date, the Occupational Safety and Health Administration (OSHA) have not promulgated a permissible exposure concentration for HD.

Effects Of Overexposure: HD is a vesicant (causing blisters) and alkylating agent producing cytotoxic action on the hematopoietic (blood-forming) tissues, which are especially sensitive. The rate of detoxification of HD in the body is very slow and repeated exposures produce a cumulative effect. HD is a human carcinogen as cited by the International Agency for Research on Cancer (IARC).

Median doses of HD in man are:

LD50 (skin, liquid) = 100 mg/kg
ICt50 (skin, vapor) = 2000 mg-min/m^3 at 70 - 80 °F (humid environment)
= 1000 mg-min/m^3 at 90 °F (dry environment)
ICt50 (eyes, vapor) = 200 mg-min/m^3
LCt50 (inhalation) = 1500 mg-min/m^3
LCt50 (skin, vapor) = $10,000 \text{ mg-min/m}^3$
LD50 (oral) = 0.7 mg/kg

Acute Physiological Action of HD is classified as Local and Systemic.

Local Actions: HD affects both the eyes and the skin. Eye absorption results in injuries ranging from mild conjunctivitis to corneal necrosis and opacification (blindness). Infection of the ocular lesions is common. Skin absorption results initially in capillary hyperemia and dermal edema, usually followed by vesication. Being lipid soluble, HD can be absorbed into all organs. Skin penetration is rapid without skin irritation. Swelling (blisters) and reddening (erythema) of the skin occurs after a latency period of 4-24 hours following the exposure, depending on degree of exposure and individual sensitivity. Tender skin, mucous membrane and perspiration-covered skin is more sensitive to the effects of HD. The skin healing process is very slow. The skin effects of mustard agent are dependent on the concentration of the agent and the environmental conditions: a hot, humid atmosphere promotes the most severe skin reaction.

Systemic Actions: Effects can occur after any exposure with much individual variation. Like other alkylating agents, systemic absorption results in injury to the bone marrow, lymph nodes, and spleen producing leukopenia and thrombocytopenia. Other systemic effects include: fever; CNS depression; bradycardia or cardiac irregularities; hemoconcentration; and shock.

Chronic Exposure: HD can cause sensitization, chronic lung impairment, (cough, shortness of breath, chest pain), cancer of the mouth, throat, respiratory tract and skin, and leukemia. HD has also been shown to be mutagenic and

carcinogenic in animals. Prolonged human exposure has been associated with cancer of the tongue, paranasal sinus, larynx, bronchus, lung, and mediastinum (cavity between the right and left lung). Tumors observed have been of squamous (scale like) or undifferentiated (altered) cell types. Consider the possibility of skin cancer because of the frequency of this lesion in animal studies. Since sulfur mustard (HQ) agent is similar in its effects to nitrogen mustard, which has been associated with human leukemia, this disease might also be expected to occur in humans chronically exposed to mustard.

Emergency And First Aid Procedures:

Inhalation: Hold breath until respiratory protective mask is donned. Immediately remove from the HD source. Seek medical attention immediately. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Mouth-to-mouth resuscitation should be used when approved mask-bag or oxygen delivery systems are not available. Do not use mouth-to-mouth resuscitation when facial contamination is present.

Eye Contact: Speed in decontaminating the eyes is absolutely essential. Remove the person from the liquid source immediately; flush the eyes immediately with sterile saline or water for at least 15 minutes by tilting the head to the side, pulling the eyelids apart with the fingers and pouring water slowly into the eyes. Do not cover eyes with bandages but, if necessary, protect eyes by means of dark or opaque goggles. Transfer the patient to a medical facility.

Skin Contact: Don respiratory protective mask. Remove the victim from agent sources immediately. Seek medical attention immediately. Immediately remove all contaminated clothing in a clean air environment as quickly as possible. Flush contaminated skin area with warm or hot water, using liquid soap, and copious amounts of the water, apply mild to moderate friction with a single-use sponge or washcloth in the first and second wash (do not use a brush, it may enhance absorption into the skin). Shampoo can be used to wash the hair to prevent vapor off gassing. The final decontamination should be rinses with copious amounts of warm or hot water.

Ingestion: If ingested, directly or from liquid contaminated food or drink, necrosis, diarrhea, GI hemorrhage, nausea and vomiting will be present. DO NOT induce vomiting. Give victim milk to drink. Seek medical attention immediately.

Section VI - Reactivity Data

Stability: Stable at ambient temperatures. Decomposition temperature is 300-351 ° F (149 -177 ° C). Mustard is a persistent agent depending on pH and moisture, and has been known to remain active for up to three years in soil.

Incompatibility: Rapidly corrosive to brass at 65 °C. Will corrode steel at a rate of .0001 in. of steel per month at 65 ° C.

Hazardous Decomposition: Mustard will hydrolyze to form HCl and thiodiglycol.

Hazardous Polymerization: Does not occur.

Section VII - Spill, Leak, And Disposal Procedures

Steps To Be Taken In Case Material Is Released Or Spilled: Only personnel in full protective clothing (See Section VIII) will be allowed in an area where HD is spilled. See Section V for emergency and first aid instructions.

Recommended Field Procedures: The HD should be contained using vermiculite, diatomaceous earth, clay or fine sand and neutralized as soon as possible using copious amounts of 5.25% sodium hypochlorite solution. Scoop up all material and place in an approved DOT container. Cover the contents with decontaminating solution as above. The exterior of the container will be decontaminated and labeled according to EPA and DOT regulations. All leaking containers will be over packed with sorbent (e.g. vermiculite) placed between the interior and exterior

containers. Decontaminate and label according to EPA and DOT regulations. Dispose of the material in accordance with waste disposal methods provided below. Conduct general area monitoring with an approved monitor to confirm that the atmospheric concentrations do not exceed the airborne exposure limits (See Sections II and VIII).

If 5.25% sodium hypochlorite solution is not available then the following decontaminants may be used instead and are listed in the order of preference: **Calcium Hypochlorite, Decontamination Agent (DS2), and Super Tropical Bleach Slurry (STB).

****Warning:** DO NOT USE PURE SOLID, UNDILUTED CALCIUM HYPOCHLORITE (HTH); it will BURN UPON CONTACT to liquid mustard.

Recommended Laboratory Procedures: Use a minimum of 65 grams of decontamination solution for each gram of HD. Allow 24 hours for decontamination to take place. Agitate solution at least one hour. Agitation is not necessary after the first hour. Test for presence of active chlorine by use of acidic potassium iodide solution to give free iodine color. Adjust the resulting solution pH to between 10 and 11.

Place three milliliters (ml) of decontaminated solution in a test tube. Add several crystals of potassium iodine and swirl to dissolve. Add 3 ml of 50 wt.% sulfuric acid: water and swirl. **Immediate** iodine color shows the presence of active chlorine. If negative, add additional decontaminant to the decontaminated solution, wait two hours and test again for active chlorine. This works for either 5.5% sodium hypochlorite or 10% calcium hypochlorite decontamination solutions. Scoop up all materials and clothing and place in an approved DOT container. The exterior of the container will be decontaminated and labeled according to EPA and DOT regulations. All leaking containers will be over packed with sorbent (e.g. vermiculite) placed between the interior and exterior containers. Decontaminate and label according to EPA and DOT regulations. Dispose of contents according to Federal, state and local regulations. Conduct general area monitoring with an approved monitor to confirm that the atmospheric concentrations do not exceed the airborne exposure limits (See Section VIII).

Note: Surfaces contaminated with HD, then rinsed and decontaminated may evolve sufficient HD vapor to produce a physiological response. HD on laboratory glassware may be oxidized by its vigorous reaction with concentrated nitric acid.

Waste Disposal Method: Open pit burning or burying of HD or items containing or contaminated with HD in any quantity is prohibited. Decontamination of waste or excess material shall be accomplished according to the procedures outlined above and can be destroyed by incineration in EPA approved incinerators according to appropriate provisions of Federal, State and local Resource Conservation Recovery Act (RCRA) regulations.

Note: Some decontaminant solutions are hazardous wastes according to RCRA regulations and must be disposed of according to those regulations.

Section VIII - Special Protection Information

Respiratory Protection:

Concentration
< 0.003 mg/m³

Respiratory Protective Equipment
M40 protective mask and other air purifying respirator approved by ODAS for chemical agent operations.

>= 0.003 mg/m³
At an 8-hr TWA

NIOSH/MSHA approved self-contained breathing apparatus or combination airline respirator with an auxiliary self-contained

breathing apparatus worn with encapsulating ensembles other than the DPE.

Ventilation

Local Exhaust: Mandatory. Must be filtered or scrubbed. Air emissions shall meet local, state and federal regulations.

Special: Chemical laboratory hoods will have an average inward face velocity of 100 linear feet per minute (lfpm) +/- 20% with the velocity at any point not deviating from the average face velocity by more than 20%. Existing laboratory hoods will have an inward face velocity of 150 lfpm +/- 20%. Laboratory hoods will be located such that cross drafts do not exceed 20% of the inward face velocity. A visual performance test using smoke producing devices will be performed in assessing the ability of the hood to contain agent HD.

Other: Recirculation of exhaust air from agent areas is prohibited. No connection between agent area and other areas through the ventilation system is permitted. Emergency backup power is necessary. Hoods should be tested semiannually or after modification or maintenance operations. Operations should be performed 20 centimeters inside hoods.

Protective Gloves: Butyl Rubber gloves M3 and M4
Norton, Chemical Protective Glove Set

Eye Protection: As a minimum, chemical goggles will be worn. For splash hazards use goggles and face shield.

Other Protective Equipment: For laboratory operations, wear lab coats, gloves and have mask readily accessible. In addition, daily clean smocks, foot covers, and head covers will be required when handling contaminated lab animals.

Monitoring: Available monitoring equipment for agent HD is the M8/M9 detector paper, blue band tube, M256/M256A1 kits, bubbler, Depot Area Air Monitoring System (DAAMS), Automated Continuous Air Monitoring System (ACAMS), CAM-M1, Hydrogen Flame Photometric Emission Detector (HYFED), the Miniature Chemical Agent Monitor (MINICAM), and Real Time Analytical Platform (RTAP). Real-time, low-level monitors (with alarm) are required for HD operations. In their absence, an Immediately Dangerous to Life and Health (IDLH) atmosphere must be presumed. Laboratory operations conducted in appropriately maintained and alarmed engineering controls require only periodic low-level monitoring.

Section IX - Special Precautions

Precautions To Be Taken In Handling and Storing: When handling agents, the buddy system will be incorporated. No smoking, eating, or drinking in areas containing agents is permitted. Containers should be periodically inspected for leaks, (either visually or using a detector kit). Stringent control over all personnel practices must be exercised. Decontaminating equipment will be conveniently located. Exits must be designed to permit rapid evacuation. Chemical showers, eyewash stations, and personal cleanliness facilities must be provided. Wash hands before meals and shower thoroughly with special attention given to hair, face, neck, and hands using plenty of soap and water before leaving at the end of the workday.

Other Precautions: HD should be stored in containers made of glass for Research, Development, Test and Evaluation (RDTE) quantities or one-ton steel containers for large quantities. Agent containers will be stored in a single containment system with in a laboratory hood or in double containment system.

For additional information see "AR 385-61, The Army Toxic Chemical Agent Safety Program," "DA Pam 385-61, Toxic Chemical Agent Safety Standards," and "DA Pam 40-173, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT."

Section X - Transportation Data

Note: Forbidden for transport other than via military (Technical Escort Unit) transport according to 49 CFR 172

Proper Shipping Name: Toxic liquids, n.o.s.

Dot Hazard Class: 6.1, Packing Group I, Hazard Zone B

Dot Label: Poison

Dot Marking: Toxic liquids, n.o.s. Bis- (2-chloroethyl) sulfide UN 2810, Inhalation Hazard

Dot Placard: Poison

Emergency Accident Precautions and Procedures: See Sections IV, VII and VIII.

Precautions To Be Taken In Transportation: Motor vehicles will be placarded regardless of quantity. Drivers will be given full information regarding shipment and conditions in case of an emergency. AR 50-6 deals specifically with the shipment of chemical agents. Shipment of agents will be escorted in accordance with AR 740-32.

The Edgewood Chemical Biological Center (ECBC), Department of the Army believes that the data contained herein are actual and are the results of the tests conducted by ECBC experts. The data are not to be taken as a warranty or representation for which the Department of the Army or ECBC assumes legal responsibility. They are offered solely for consideration. Any use of this data and information contained in this MSDS must be determined by the user to be in accordance with applicable Federal, State, and local laws and regulations.

Addendum A

Additional Information For Thickened HD

Trade Name And Synonyms: Thickened HD, THD

Trade Name and Synonyms for Thickener:

Acrylic acid butyl ester
Polymer with styrene
Butyl acrylate-styrene polymer
Butyl acrylate-styrene copolymer
N-Butyl acrylate-styrene polymer
Polymer with styrene acrylic acid butyl ester
2-Propenoic acid
Butyl ester
Polymer with ethenylbenzene
Styrene -butyl acrylate polymer
Acronal 4D
Acronal 290D
Acronal 295D
Acronal 320D
Mowilith DM60
Sokrate LX 75
OSH22097

Hazardous Ingredients: Styrene-butyl acrylate copolymer is used to thicken HD and is not known to be hazardous

except in a finely-divided, powder form.

Physical Data: Essentially the same as HD.

Fire And Explosion Data: Same as HD. Thickener is a slight fire hazard when exposed to heat or flame.

Health Hazard Data: Same as HD except for skin contact. For skin contact, don respiratory protective mask and remove contaminated clothing **Immediately**. **Immediately** scrape the HD from the skin surface, and then wash the contaminated surface with acetone. Seek medical attention **Immediately**.

Spill, Leak, and Disposal Procedures: If spills or leaks of HD occur, follow the same procedures as those for HD, but dissolve THD in acetone before introducing any decontaminating solution. Containment of THD is generally not necessary. Spilled THD can be carefully scraped off the contaminated surface and placed in a fully removable head drum with a high density, polyethylene lining. THD can then be decontaminated, after it has been dissolved in acetone, using the same procedures used for HD. Contaminated surfaces should be treated with acetone, then decontaminated using the same procedures as those used for HD.

Note: Surfaces contaminated with THD and then rinsed-decontaminated may evolve sufficient HD vapor to produce a physiological response.

Special Protection Information: Same as HD.

Special Precautions: Same as HD with the following addition. Handling the THD requires careful observation of the "stringers" (elastic, thread like attachments) formed when the agents are transferred or dispensed. These stringers must be broken cleanly before moving the contaminating device or dispensing device to another location, or unwanted contamination of a working surface will result. Avoid contact with strong oxidizers, excessive heat, sparks, or open flame.

Transportation Data: Same as HD.

Material Safety Data Sheet

Lethal Nerve Agent (VX)

Date: 14 September 1988

Revised: 13 August 2003

In the event of an emergency
Telephone the RDECOM Operations
Center's 24-hour emergency
Number: 410-436-2148

Section I - General Information

Manufacturer's Address:

U.S. Army Research Development Engineering Command (RDECOM)
Edgewood Chemical Biological Center (ECBC)
ATTN: AMSRD-ECB-CB-CR
Aberdeen Proving Ground, MD 21010-5424

CAS Registry Numbers:

50782-69-9, 51848-47-6, 53800-40-1, 70938-84-0

Chemical Name:

O-ethyl S- [2-(diisopropylamino) ethyl] methylphosphonothiolate

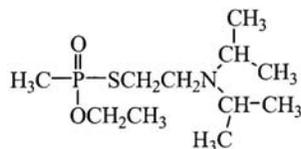
Trade Name And Synonyms:

Phosphonothioic acid, methyl-, S- (2-bis (1-methylethylamino) ethyl) O-ethyl ester
O-ethyl S- (2-diisopropylaminoethyl) methylphosphonothiolate
S-2-Diisopropylaminoethyl O-ethyl methylphosphonothioate
S-2 ((2-Diisopropylamino) ethyl) O-ethyl methylphosphonothiolate
O-ethyl S- (2-diisopropylaminoethyl) methylphosphonothioate
O-ethyl S- (2-diisopropylaminoethyl) methylthiolphosphonoate
S- (2-diisopropylaminoethyl) o-ethyl methyl phosphonothiolate
Ethyl-S-dimethylaminoethyl methylphosphonothiolate
VX
EA 1701
TX60

Chemical Family: Sulfonated organophosphorous compound

Formula/Chemical Structure:

$C_{11}H_{26}N_2O_2PS$



NFPA 704 Signal:

Health - 4
 Flammability - 1
 Reactivity - 1
 Special - 0



Section II - Ingredients

Ingredients/Name: VX
 Percentage by Weight: 100%
 Threshold Limit Value (TLV): 0.00001mg/m³

Section III - Physical Data

Boiling Point @ 760 mm Hg: 568 °F (298 °C)
Vapor Pressure: 0.00063 mm Hg @ 25 °C
Vapor Density (Air = 1 STP): 9.2 @ 25 °C
Solubility (g/100g solvent): 5.0 @ 21.5°C and 3.0 @ 25 °C in water. Soluble in organic solvents.
Specific Gravity (H₂O=1g/mL): 1.0113 @ 25 °C
Freezing/Melting Point (°C): -50 °C
Liquid Density (g/mL): 1.0083 @ 25 °C
Volatility (mg/m³): 8.9 @ 25 °C
Viscosity (CENTISTOKES): 9.958 @ 25 °C
Appearance and Odor: Colorless to straw colored liquid and odorless, similar in appearance to motor oil.

Section IV - Fire and Explosion Data

Flashpoint: 159 °C (McCutchan - Young)

Flammability Limits (% By Volume): Not Available

Lower Explosive Limit: Not Applicable

Upper Explosive Limit: Not Applicable

Extinguishing Media: Water mist, fog, foam, CO₂. Avoid using extinguishing methods that will cause splashing or spreading of the VX.

Special Fire Fighting Procedures: All persons not engaged in extinguishing the fire should be immediately evacuated from the area. Fires involving VX should be contained to prevent contamination to uncontrolled areas. When responding to a fire alarm in buildings or areas containing VX, fire-fighting personnel should wear full firefighter protective clothing during chemical agent fire-fighting and fire rescue operations. Respiratory protection is required. Positive pressure, full-face piece, NIOSH-approved self-contained breathing apparatus (SCBA) will be worn where there is danger of oxygen deficiency and when directed by the fire chief or chemical accident/incident (CAI) operations officer. In cases where firefighters are responding to a chemical accident/incident for rescue/reconnaissance purposes they will wear appropriate levels of protective clothing (See Section VIII).

Do not breathe fumes. Skin contact with nerve agents must be avoided at all times. Although the fire may destroy most of the agent, care must still be taken to assure the agent or contaminated liquids do not further contaminate other areas or sewers. Contact with liquid VX or vapors can be fatal.

Unusual Fire And Explosion Hazards: None known.

Section V - Health Hazard Data

Airborne Exposure Limits (AEL): The permissible airborne exposure concentration for VX for an 8-hour workday of a 40-hour workweek is an 8-hour time weighted average (TWA) of 0.00001 mg/m³. This value can be found in "DA Pam 40-8, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX." To date, however, the Occupational Safety and Health Administration (OSHA) have not promulgated a permissible exposure concentration for VX.

VX is not listed by the International Agency for Research on Cancer (IARC), American Conference of Governmental Industrial Hygienists (ACGIH), Occupational Safety and Health Administration (OSHA), or National Toxicology Program (NTP) as a carcinogen.

Effects Of Overexposure: VX is a lethal cholinesterase inhibitor. Doses which are potentially life threatening may be only slightly larger than those producing least effects. Death usually occurs within 15 minutes after absorption of a fatal dosage.

VX Route	Form	Effect	Type	*Dosage
ocular	vapor	miosis	EC150	0.09 mg-min/m ³
inhalation	vapor	runny nose	EC150	0.09 mg-min/m ³
inhalation (15 l/min)	vapor	severe incapacitation	IC150	25 mg-min/m ³
inhalation (15 l/min)	vapor	death	LC150	30 mg-min/m ³
percutaneous	liquid	death	LD50	10 mg/70 kg man

*Effective dosages for vapor are estimated for exposure durations of 2-10 minutes.

Symptoms of overexposure may occur within minutes or hours, depending upon the dose. Early, mild signs and symptoms of vapor exposure might include: miosis (constriction of pupils) and visual effects (pain behind the eyes, dimness of vision, and/or blurred vision), runny nose and nasal congestion, excessive salivation, and tightness in the chest, with minimal bronchorrhoea. Moderate nerve agent intoxication may include signs and symptoms of mild exposure, plus an increase in shortness of breath, with coughing, wheezing, or voluminous bronchorrhoea, nausea, vomiting or diarrhoea. Severe nerve agent intoxication may include the central nervous system and multiple organ systems. Severe nerve agent intoxication may include the signs and symptoms of moderate exposure, plus generalized weakness or fasciculation's/twitching, loss of consciousness (within seconds), convulsions (within minutes), severe respiratory distress, flaccid paralysis and apnea.

Exposures to liquid percutaneous nerve agents, such as with VX, are slower to develop and slower to reach their peak, compared to vapor exposures of the eyes or respiratory tract. This is because nerve agent uptake across the skin is slower than via inhalation, and continued absorption of agent through the various skin layers can occur, even hours after the skin surface has been decontaminated. Mild signs or symptoms of liquid nerve agent, such as VX, may include localized sweating at the site of exposure, along with fine muscle fasciculation's. (NOTE: Pinpoint pupils (miosis) are not an early sign of liquid skin exposure and may not be present at all in a mild or moderate liquid percutaneous exposure.) Moderate signs and symptoms may include those of mild vapor exposure, plus nausea, vomiting and/or diarrhoea; headache; and a feeling of generalized weakness, but no respiratory signs or symptoms. Severe signs and symptoms of liquid nerve agent may include miosis, generalized fasciculation's and twitching, respiratory secretions, unconsciousness, convulsions, flaccid muscle paralysis and apnea.

Emergency And First Aid Procedures:

Inhalation: Leave area of contamination as quickly as possible. Hold breath until respiratory protective mask is donned. Remove clothing in a clean air environment and shampoo or rinse hair to prevent vapor off gassing. If severe signs of agent exposure appear (signs and symptoms of moderate exposure, plus generalized weakness or fasciculation's/twitching, loss of consciousness (within seconds), convulsions (within minutes), severe respiratory distress, flaccid paralysis and apnea), immediately administer, in rapid succession, all three sets of the Nerve Agent Antidote Kit ((Mark I) kit contains 2mg atropine and 600mg pralidoxime chloride (2 PAM C1) auto-injectors). If experiencing most or all of the MILD symptoms of nerve agent poisoning, administer one set of the Nerve Agent Antidote Kit, (Mark I); if signs and symptoms are progressing, up to three sets of injections may be administered at 5 to 20 minute intervals; No more than three (3) injector sets will be given unless directed by medical personnel. In addition, a record will be maintained of all injections given. If breathing has stopped, give artificial respiration. Mouth-to-mouth resuscitation should be used when mask-bag or oxygen delivery systems are not available. Do not use mouth-to-mouth resuscitation when facial contamination exists. If breathing is difficult, administer oxygen. Seek medical attention **Immediately**.

Eye Contact: **Immediately** leave area of contamination and begin flushing eyes with sterile saline or water for 10-15 minutes, then don respiratory protective mask. Although miosis (pinpointing of the pupils) may be an early sign of agent exposure, an injection will not be administered when miosis is the only sign present. Instead, the individual will be taken **Immediately** to a medical treatment facility for observation.

Skin Contact: Don respiratory protective mask and remove contaminated clothing. Immediately wash contaminated skin with copious amounts of liquid soap and warm to hot water. The last wash should be a rinse with copious amounts of warm or hot water. Shampoo can be used to wash the hair. Administer nerve agent antidote kit, Mark I, only if local sweating and muscular twitching symptoms are observed. Seek medical attention **Immediately**.

Ingestion: Do not induce vomiting. First symptoms are likely to be gastrointestinal. **Immediately** administer Nerve Agent Antidote Kit, Mark I. Seek medical attention **Immediately**. **Do not handle vomited material to avoid further contamination.**

Section VI - Reactivity Data

Stability: Relatively stable at room temperature. Unstabilized VX of 95% purity decomposes at a rate of 5% a month at 71 °C.

Incompatibility: Negligible on brass, steel, and aluminum.

Hazardous Decomposition Products: During a basic hydrolysis of VX up to 10% of the agent is converted to diisopropylaminoethyl methylphosphonothioic acid (EA2192). Based on the concentration of EA2192 expected to be formed during hydrolysis and its toxicity (1.4 mg/kg dermal in rabbit at 24 hours in a 10/90 wt.% ethanol/water solution), a Class B poison would result. The large-scale decontamination procedure, which uses both HTH and NaOH, destroys VX by oxidation and hydrolysis. Typically the large-scale product contains 0.2 - 0.4 wt.% EA2192 at 24 hours. At pH 12, the EA2192 in the large-scale product has a half-life of about 14 days. Thus, the 90-day holding period at pH 12 results in about a 64-fold reduction of EA2192 (six half-lives). This holding period is sufficient to reduce the toxicity of the product below that of a Class B poison. Other less toxic products are ethyl methylphosphonic acid, methylphosphinic acid, diisopropylaminoethyl mercaptan, diethyl methylphosphonate, and ethanol. The small-scale decontamination procedure uses sufficient HTH to oxidize all VX thus no EA2192 is formed.

Hazardous Polymerization: Does not occur.

Section VII - Spill, Leak, And Disposal Procedures

Steps To Be Taken In Case Material Is Released Or Spilled: If leaks or spills of VX occur, only personnel in full protective clothing will remain in the area (See Section VIII). In case of personnel contamination see Section V for emergency and first aid instructions.

Recommended Field Procedures (For Quantities Greater Than 50 Grams):

NOTE: These procedures can only be used with the approval of the Risk Manager or qualified safety professionals. Spills must be contained by covering with vermiculite, diatomaceous earth, clay or fine sand. An alcoholic HTH mixture is prepared by adding 100 milliliters of denatured ethanol to a 900-milliliter slurry of 10% HTH in water. This mixture should be made just before use since the HTH can react with the ethanol. Fourteen grams of alcoholic HTH solution are used for each gram of VX. Agitate the decontamination mixture as the VX is added. Continue the agitation for a minimum of one hour. This reaction is reasonably exothermic and evolves substantial off gassing. The evolved reaction gases should be routed through a decontaminate filled scrubber before release through filtration systems. After completion of the one-hour minimum agitation, 10% sodium hydroxide is added in a quantity equal to that necessary to assure that a pH of 12.5 is maintained for a period not less than 24 hours. Hold the material at a pH between 10 and 12 for a period not less than 90 days to ensure that a hazardous intermediate material is not formed (See Section VI). Scoop up all material and place in a DOT approved container. Cover the contents with decontaminating solution consisting of an alcoholic HTH mixture of 100 milliliters of denatured ethanol to a 900 milliliter slurry of 10% HTH in water. After sealing, decontaminate the exterior container and labeled according to EPA and DOT regulations. All leaking containers will be over packed with sorbent (e.g. vermiculite) placed between the interior and exterior containers and labeled according to EPA and DOT regulations. Dispose of decontaminate according to Federal, state, and local laws. Conduct general area monitoring to confirm that the atmospheric concentrations do not exceed the airborne exposure limits (See Sections II and VIII).

If the alcoholic HTH mixture is not available then the following decontaminants may be used instead and are listed in the order of preference: Decontaminating Agent (DS2), Supertropical Bleach Slurry (STB), and Sodium Hypochlorite.

Recommended Laboratory Procedures (For Quantities Less Than 50 Grams): If the active chlorine of the Calcium Hypochlorite (HTH) is at least 55%, then 80 grams of a 10% slurry are required for each gram of VX. Proportionally more HTH is required if the chlorine activity of the HTH is lower than 55%. The mixture is agitated as the VX is added and the agitation is maintained for a minimum of one hour. If phasing of the VX/decon solution continues after 5 minutes, an amount of denatured ethanol equal to a 10 wt.% of the total agent/decon will be added to help miscibility. Place all material in a DOT approved container and cover the contents with additional

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decontaminating solution. After sealing, decontaminate the exterior of the container and label according to EPA and DOT regulations. All leaking containers will be over packed with sorbent placed between the interior and exterior containers and label according to EPA and DOT regulations. Dispose of according to Federal, State, and local laws. Conduct general area monitoring to confirm that the atmospheric concentrations do not exceed the airborne exposure limits (See Sections II and VIII).

Note: Ethanol Should Be Reduced To Prevent The Formation Of A Hazardous Waste.

Upon completion of the one hour agitation the decon mixture will be adjusted to a pH between 10 and 11. Conduct general area monitoring to confirm that the atmospheric concentrations do not exceed the airborne exposure limits (See Sections II and VIII).

Waste Disposal Method: Open pit burning or burying of VX or items containing or contaminated with VX in any quantity is prohibited. The detoxified VX (using procedures above) can be thermally destroyed by in an EPA approved incinerator according to appropriate provisions of Federal, State and/or local Resource Conservation and Recovery Act (RCRA) regulations.

Note: Some decontaminate solutions are hazardous waste according to RCRA regulations and must be disposed of according to those regulations.

Section VIII - Special Protection Information

<u>Concentration</u>	<u>Respiratory Protective Equipment</u>
<0.00001 mg/m ³	A full face piece, chemical canister air-purifying protective mask will be on hand for escape. M40-series masks are acceptable for this purpose. Other masks certified as equivalent may be used.
>0.00001 or = 0.02 mg/m ³	A NIOSH/MSHA approved pressure demand full face piece SCBA or supplied air respirators with escape air cylinder may be used. Alternatively, a full-face piece, chemical canister air-purifying protective mask is acceptable for this purpose (See DA Pam 385-61 for determination of appropriate level)
>0.02 mg/m ³	NIOSH/MSHA approved pressure demand full face piece SCBA or supplied air respirators with escape air cylinder suitable for use in high agent concentrations with protective ensemble. (See DA Pam 385-61 for examples)

Ventilation:

Local exhaust: Mandatory. Must be filtered or scrubbed to limit exit concentrations to < 0.00001 mg/m³. Air emissions will meet local, state and federal regulations.

Special: Chemical laboratory hoods will have an average inward face velocity of 100 linear feet per minute (lfpm) +/- 20% with the velocity at any point not deviating from the average face velocity by more than 20%. Existing laboratory hoods will have an inward face velocity of 150 lfpm +/- 20%. Laboratory hoods will be located such that cross-drafts do not exceed 20% of the inward face velocity. A visual performance test using smoke-producing

devices will be performed in assessing the ability of the hood to contain agent VX.

Other: Recirculation or exhaust air from chemical areas is prohibited. No connection between chemical areas and other areas through ventilation system is permitted. Emergency backup power is necessary. Hoods should be tested at least semiannually or after modification or maintenance operations. Operations should be performed 20 centimeters inside hood face.

Protective Gloves: Butyl Rubber Glove M3 and M4
Norton, Chemical Protective Glove Set

Eye Protection: At a minimum chemical goggles will be worn. For splash hazards use goggles and face shield.

Other Protective Equipment: For laboratory operations, wear lab coats, gloves and have mask readily accessible. In addition, daily clean smocks, foot covers, and head covers will be required when handling contaminated lab animals.

Monitoring: Available monitoring equipment for agent VX is the M8/M9 detector paper, detector ticket, M256/M256A1 kits, bubbler, Depot Area Air Monitoring System (DAAMS), Automated Continuous Air Monitoring System (ACAMS), Real-Time Monitor (RTM), Demilitarization Chemical Agent Concentrator (DCAC), M8/M43, M8A1/M43A1, CAM-M1, Hydrogen Flame Photometric Emission Detector (HYFED), the Miniature Chemical Agent Monitor (MINICAM), and the Real Time Analytical Platform (RTAP).

Real-time, low-level monitors (with alarm) are required for VX operations. In their absence, an Immediately Dangerous to Life and Health (IDLH) atmosphere must be presumed. Laboratory operations conducted in appropriately maintained and alarmed engineering controls require only periodic low-level monitoring.

Section IX - Special Precautions

Precautions To Be Taken In Handling and Storing: When handling agents, the buddy system will be incorporated. No smoking, eating, or drinking in areas containing agents is permitted. Containers should be periodically inspected for leaks, (either visually or using a detector kit). Stringent control over all personnel practices must be exercised. Decontaminating equipment will be conveniently located. Exits must be designed to permit rapid evacuation. Chemical showers, eyewash stations, and personal cleanliness facilities must be provided. Wash hands before meals and shower thoroughly before leaving at the end of the workday with special attention given to hair, face, neck, and hands using plenty of soap and water.

Other Precautions: Agent containers will be stored in a double containment system within a laboratory hood.

For additional information see "AR 385-61, The Army Toxic Chemical Agent Safety Program," "DA Pam 385-61, Toxic Chemical Agent Safety Standards," and "DA Pam 40-8, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX."

Section X - Transportation Data

Note: Forbidden for transport other than via military (Technical Escort Unit) transport according to 49 CFR 172

Proper Shipping Name: Toxic liquids, organic, n.o.s.

Dot Hazard Class: 6.1, Packing Group I, Hazard Zone A

Dot Label: Poison

Dot Marking:
Toxic liquids, organic, n.o.s. (O-ethyl-S-(2-diisopropylaminoethyl) methyl phosphonothiolate) UN 2810, Inhalation

Hazard

Dot Placard: Poison

Emergency Accident Precautions And Procedures: See Sections IV, VII and VIII.

Precautions To Be Taken In Transportation: Motor vehicles will be placarded regardless of quantity. Drivers will be given full information regarding shipment and conditions in case of an emergency. AR 50-6 deals specifically with the shipment of chemical agents. Shipment of agents will be escorted in accordance with AR 740-32.

The Edgewood Chemical Biological Center (ECBC), Department of the Army believes that the data contained herein are actual and are the results of the tests conducted by ECBC experts. The data is not to be taken as a warranty or representation for which the Department of the Army or ECBC assumes legal responsibility. This information is offered solely for consideration. Any use of this data and information contained in this MSDS must be determined by the user to be in accordance with applicable Federal, State, and local laws and regulations.

Material Safety Data Sheet

Lethal Nerve Agent (GB)

Date: 14 September 1988
Revised: 13 August 2003

In the event of an emergency
Telephone the RDECOM Operations
Center's 24-hour emergency
Number: 410-436-2148

Section I - General Information

Manufacturer's Address:

U.S. Army Research Development Engineering Command (RDECOM)
Edgewood Chemical Biological Center (ECBC)
ATTN: AMSRD-ECB-CB-CR
Aberdeen Proving Ground, MD 21010-5424

CAS Registry Numbers:

107-44-8, 50642-23-4

Chemical Name:

Isopropyl methylphosphonofluoridate

Alternate Chemical Names:

O-Isopropyl Methylphosphonofluoridate
Phosphonofluoridic acid, methyl-, isopropyl ester
Phosphonofluoridic acid, methyl-, 1-methylethyl ester

Trade Name and Synonyms:

Isopropyl ester of methylphosphonofluoridic acid
Methylisopropoxyfluorophosphine oxide
Isopropyl Methylfluorophosphonate
O-Isopropyl Methylisopropoxyfluorophosphine oxide
Methylfluorophosphonic acid, isopropyl ester
Isopropoxymethylphosphonyl fluoride
Isopropyl methylfluorophosphate
Isopropoxymethylphosphoryl fluoride
GB
Sarin
Sarin

Chemical Family: Fluorinated organophosphorous compound

Formula/Chemical Structure:

C₄H₁₀F O₂P

spreading of the GB.

Special Fire Fighting Procedures: All persons not engaged in extinguishing the fire should be immediately evacuated from the area. Fires involving GB should be contained to prevent contamination to uncontrolled areas. GB will react with steam or water to produce toxic and corrosive vapors. When responding to a fire alarm in buildings or areas containing GB, fire-fighting personnel should wear full firefighter protective clothing during chemical agent firefighting and fire rescue operations. Respiratory protection is required. Positive pressure, full-face piece, NIOSH-approved self-contained breathing apparatus (SCBA) will be worn where there is danger of oxygen deficiency and when directed by the fire chief or chemical accident/incident (CAI) operations officer. In cases where firefighters are responding to a chemical accident/incident for rescue/reconnaissance purposes they will wear appropriate levels of protective clothing (See Section VIII).

Do not breathe fumes. Skin contact with nerve agents must be avoided at all times. Although the fire may destroy most of the agent, care must still be taken to assure the agent or contaminated liquids do not further contaminate other areas or sewers. Contact with liquid GB or vapors can be fatal.

Unusual Fire and Explosion Hazards: Hydrogen may be present.

Section V - Health Hazard Data

Airborne Exposure Limits (AEL): The permissible airborne exposure concentration for GB for an 8-hour workday of a 40-hour workweek is an 8-hour time weighted average (TWA) of 0.0001 mg/m³. This value can be found in "DA Pam 40-8, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX." To date, however, the Occupational Safety and Health Administration (OSHA) have not promulgated a permissible exposure concentration for GB.

GB is not listed by the International Agency for Research on Cancer (IARC), American Conference of Governmental Industrial Hygienists (ACGIH), Occupational Safety and Health Administration (OSHA), or National Toxicology Program (NTP) as a carcinogen.

Effects of Overexposure: GB is a lethal cholinesterase inhibitor. Doses which are potentially life threatening may be only slightly larger than those producing least effects.

GB Route	Form	Effect	Type	*Dosage
ocular	vapor	miosis	ECt50	<2 mg-min/m ³
inhalation (15 l/min)	vapor	severe incapacitation	ICt50	35 mg-min/m ³
inhalation (15 l/min)	vapor	death	LCt50	70 mg-min/m ³
percutaneous	liquid	death	LD50	1700 mg/70 kg man

*Effective dosages for vapor are estimated for exposure durations of 2-10 minutes.

Symptoms of overexposure may occur within minutes or hours, depending upon the dose. Early, mild signs and symptoms of vapor exposure might include: miosis (constriction of pupils) and visual effects (pain behind the eyes, dimness of vision, and/or blurred vision), runny nose and nasal congestion, excessive salivation, and tightness in the chest, with minimal bronchorrhea. Moderate nerve agent intoxication may include signs and symptoms of mild exposure, plus an increase in shortness of breath, with coughing, wheezing, or voluminous bronchorrhea, nausea, vomiting or diarrhea. Severe nerve agent intoxication may include the signs and symptoms of moderate exposure,

plus generalized weakness or fasciculation's/twitching, loss of consciousness (within seconds), convulsions (within minutes), severe respiratory distress, flaccid paralysis and apnea.

Exposures to liquid percutaneous nerve agents, such as with VX, are slower to develop and slower to reach their peak, compared to vapor exposures of the eyes or respiratory tract. This is because nerve agent uptake across the skin is slower than via inhalation, and continued absorption of agent through the various skin layers can occur, even hours after the skin surface has been decontaminated. Mild signs or symptoms of liquid nerve agent, such as VX, may include localized sweating at the site of exposure, along with fine muscle fasciculation's. (NOTE: Pinpoint pupils (miosis) are not an early sign of liquid skin exposure and may not be present at all in a mild or moderate liquid percutaneous exposure.) Moderate signs and symptoms may include those of mild vapor exposure, plus nausea, vomiting and/or diarrhea; headache; and a feeling of generalized weakness, but no respiratory signs or symptoms. Severe signs and symptoms of liquid nerve agent may include miosis, generalized fasciculation's and twitching, respiratory secretions, unconsciousness, convulsions, flaccid muscle paralysis and apnea.

Emergency and First Aid Procedures:

Inhalation:

Leave area of contamination as quickly as possible. Hold breath until respiratory protective mask is donned. Remove clothing in a clean air environment and shampoo or rinse hair to prevent vapor off gassing. If severe signs of agent exposure appear (signs and symptoms of moderate exposure, plus generalized weakness or fasciculation's/twitching, loss of consciousness (within seconds), convulsions (within minutes), severe respiratory distress, flaccid paralysis and apnea), immediately administer, in rapid succession, all three sets of the Nerve Agent Antidote Kit ((Mark 1) kit contains 2mg atropine and 600mg pralidoxime chloride (2 PAM C1) auto-injectors). If experiencing most or all of the MILD symptoms of nerve agent poisoning, administer one set of the Nerve Agent Antidote Kit, (Mark I); if signs and symptoms are progressing, up to three sets of injections may be administered at 5 to 20 minute intervals; no more than three (3) injector sets will be given unless directed by medical personnel. In addition, a record will be maintained of all injections given. If breathing has stopped, give artificial respiration. Mouth-to-mouth resuscitation should be used when mask-bag or oxygen delivery systems are not available. Do not use mouth-to-mouth resuscitation when facial contamination exists. If breathing is difficult, administer oxygen. Seek medical attention **Immediately**.

Eye Contact: **Immediately** leave area of contamination and begin flushing eyes with sterile saline or water for 10-15 minutes, then don respiratory protective mask. Although miosis (pinpointing of the pupils) may be an early sign of agent exposure, an injection will not be administered when miosis is the only sign present. Instead, the individual will be taken **Immediately** to a medical treatment facility for observation.

Skin Contact: Don respiratory protective mask and remove contaminated clothing. Immediately wash contaminated skin with copious amounts of liquid soap and warm to hot water. The last wash should be a rinse with copious amounts of warm or hot water. Shampoo can be used to wash the hair. Administer nerve agent antidote kit, Mark I, only if local sweating and muscular twitching symptoms are observed. Seek medical attention **Immediately**.

Ingestion: Do not induce vomiting. First symptoms are likely to be gastrointestinal. **Immediately** administer Nerve Agent Antidote Kit, Mark I. Seek medical attention **Immediately**. **Do not handle vomited material to avoid further contamination**

Section VI - Reactivity Data

Stability: Stable when pure. Plant grade material stabilized with tri-n-butylamine can be stored in steel containers for long periods of time at temperatures up to 70 °C, but unstabilized material tends to build-up pressure within a few weeks.

Incompatibility: Attacks tin, magnesium, cadmium-plated steel, and some aluminum. Slightly attacks copper, brass, and lead; practically no attack on 1020 steels, Inconel & K-monel.

Hazardous Decomposition Products: Hydrolyzes to form HF under acid conditions and isopropyl alcohol and polymers under basic conditions.

Hazardous Polymerization: Does not occur.

Section VII - Spill, Leak, And Disposal Procedures

Steps To Be Taken In Case Material Is Released Or Spilled: If leaks or spills of GB occur, only personnel in full protective clothing will remain in the area (See Section VIII). In case of personnel contamination see Section V for emergency and first aid instructions.

Recommended Field Procedures: NOTE: These procedures can only be used with the approval of the Risk Manager or qualified safety professionals. Spills must be contained by covering with vermiculite, diatomaceous earth, clay, fine sand, sponges, and paper or cloth towels. Decontaminate with copious amounts of aqueous sodium hydroxide solution (a minimum 10 wt.%). Scoop up all material and place in a DOT approved container. Cover the contents with decontaminating solution consisting of aqueous sodium hydroxide solution (a minimum 10 wt.%). After sealing, decontaminate the exterior container and labeled according to EPA and DOT regulations. All leaking containers will be over packed with sorbent (e.g. vermiculite) placed between the interior and exterior containers. Decontaminate and label according to EPA and DOT regulations. Dispose of decontaminate according to Federal, state, and local laws. Conduct general area monitoring to confirm that the atmospheric concentrations do not exceed the airborne exposure limits (See Sections II and VIII).

If 10 wt.% aqueous sodium hydroxide is not available then the following decontaminants may be used instead and are listed in the order of preference: Decontaminating Agent (DS2), Sodium Carbonate, and Super tropical Bleach Slurry (STB)

Recommended Laboratory Procedures: A minimum of 56 grams of decon solution is required for each gram of GB. Decontaminant and agent solution is allowed to agitate for a minimum of one hour. Agitation is not necessary following the first hour. At the end of one hour, the resulting solution should be adjusted to a pH greater than 11.5. If the pH is below 11.5 NaOH should be added until a pH above 11.5 can be maintained for 60 minutes. An alternate solution for the decontamination of GB is 10 wt.% sodium carbonate in place of the 10% sodium hydroxide solution above. Continue with 56 grams of decon for each gram of agent. Agitate for one hour but allow three hours for the reaction. The final pH should be adjusted to above zero. It is also permitted to substitute 5.25% sodium hypochlorite or 25 wt.% Monoethylamine (MEA) for the 10% sodium hydroxide solution. MEA must be completely dissolved in water before addition of the agent. Continue with 56 grams of decon for each gram of GB and provide agitation for one hour. Continue with same ratios and time stipulations. Scoop up all material and clothing. Place all material in a DOT approved container. Cover the contents with decontaminating solution as above. After sealing, decontaminate the exterior of the container and label according to EPA and DOT regulations. All leaking containers will be over packed with sorbent placed between the interior and exterior containers. Decontaminate and label according to EPA and DOT regulations. Dispose of decontaminate according to Federal, State, and local laws. Conduct general area monitoring to confirm that the atmospheric concentrations do not exceed the airborne exposure limits (See Sections II and VIII).

Waste Disposal Method: Open pit burning or burying of GB or items containing or contaminated with GB in any quantity is prohibited. The detoxified GB (using procedures above) can be thermally destroyed by incineration in EPA approved incinerators according to appropriate provisions of Federal, state and local Resource Conservation and Recovery Act (RCRA) Regulations.

Note: Some decontaminate solutions are hazardous wastes according to RCRA regulations and must be disposed of according to those regulations.

Section VIII - Special Protection Information

<u>Concentration</u>	<u>Respiratory Protective Equipment</u>
<0.0001 mg/m ³	A full face piece, chemical canister air-purifying protective mask will be on hand for escape. M40-series masks are acceptable for this purpose. Other masks certified as equivalent may be used.
>0.0001 or = 0.2 mg/m ³	A NIOSH/MSHA approved pressure demand full face piece SCBA or supplied air respirators with escape air cylinder may be used. Alternatively, a full-face piece, chemical canister air-purifying protective mask is acceptable for this purpose. (See DA Pam 385-61 for determination of appropriate level.)
>0.2 mg/m ³	NIOSH/MSHA approved pressure demand full face piece SCBA or supplied air respirators with escape air cylinder suitable for use in high agent concentrations. (See DA Pam 385-61 for examples)

Ventilation:

Local exhaust: Mandatory. Must be filtered or scrubbed to limit exit concentrations to < 0.0001 mg/m³. Air emissions will meet local, state and federal regulations.

Special: Chemical laboratory hoods will have an average inward face velocity of 100 linear feet per minute (lfpm) +/- 20% with the velocity at any point not deviating from the average face velocity by more than 20%. Existing laboratory hoods will have an inward face velocity of 150 lfpm +/- 20%. Laboratory hoods will be located such that cross-drafts do not exceed 20% of the inward face velocity. A visual performance test using smoke-producing devices will be performed in assessing the ability of the hood to contain agent GB.

Other: Recirculation or exhaust air from chemical areas is prohibited. No connection between chemical areas and other areas through ventilation system is permitted. Emergency backup power is necessary. Hoods should be tested at least semiannually or after modification or maintenance operations. Operations should be performed 20 centimeters inside hood face.

Protective Gloves: Butyl Rubber Glove M3 and M4
Norton, Chemical Protective Glove Set

Eye Protection: At a minimum chemical goggles will be worn. For splash hazards use goggles and face shield.

Other Protective Equipment: For laboratory operations, wear lab coats, gloves and have mask readily accessible. In addition, daily clean smocks, foot covers, and head covers will be required when handling contaminated lab animals.

Monitoring: Available monitoring equipment for agent GB is the M8/M9 detector paper, detector ticket, M256/M256A1 kits, bubbler, Depot Area Air Monitoring System (DAAMS), Automated Continuous Air Monitoring System (ACAMS), Real-Time Monitor (RTM), Demilitarization Chemical Agent Concentrator (DCAC), M8/M43, M8A1/M43A1, CAM-M1, Hydrogen Flame Photometric Emission Detector (HYFED), the Miniature Chemical Agent Monitor (MINICAM), and the Real Time Analytical Platform (RTAP).

Real-time, low-level monitors (with alarm) are required for GB operations. In their absence, an Immediately Dangerous to Life and Health (IDLH) atmosphere must be presumed. Laboratory operations conducted in appropriately maintained and alarmed engineering controls require only periodic low-level monitoring.

Section IX - Special Precautions

Precautions To Be Taken In Handling And Storing: When handling agents, the buddy system will be incorporated. No smoking, eating, or drinking in areas containing agents is permitted. Containers should be periodically inspected for leaks, (either visually or using a detector kit). Stringent control over all personnel practices must be exercised. Decontaminating equipment will be conveniently located. Exits must be designed to permit rapid evacuation. Chemical showers, eyewash stations, and personal cleanliness facilities must be provided. Wash hands before meals and shower thoroughly with special attention given to hair, face, neck, and hands using plenty of soap and water before leaving at the end of the workday.

Other Precautions: Agent containers will be stored in a single containment system within a laboratory hood or in a double containment system.

For additional information see "AR 385-61, The Army Toxic Chemical Agent Safety Program," "DA Pam 385-61, Toxic Chemical Agent Safety Standards," and "DA Pam 40-173, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX."

Section X - Transportation Data

Note: Forbidden for transport other than via military (Technical Escort Unit) transport according to 49 CFR 172

Proper Shipping Name: Toxic liquids, organic, n.o.s.

Dot Hazard Class: 6.1, Packing Group I, Hazard Zone A

Dot Label: Poison

Dot Marking:

Toxic liquids, organic, n.o.s. (Isopropyl methylphosphonofluoridate) UN 2810, Inhalation Hazard

Dot Placard: Poison

Emergency Accident Precautions And Procedures: See Sections IV, VII and VIII.

Precautions To Be Taken In Transportation: Motor vehicles will be placarded regardless of quantity. Drivers will be given full information regarding shipment and conditions in case of an emergency. AR 50-6 deals specifically with the shipment of chemical agents. Shipment of agents will be escorted in accordance with AR 740-32.

The Edgewood Chemical Biological Center (ECBC), Department of the Army believes that the data contained herein are actual and are the results of the tests conducted by ECBC experts. The data are not to be taken as a warranty or representation for which the Department of the Army or ECBC assumes legal responsibility. They are offered solely for consideration. Any use of this data and information contained in this MSDS must be determined by the user to be in accordance with applicable Federal, State, and local laws and regulations.


**Material Safety
Data Sheets**

Division of Facilities Services

**DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only**
RDX(CYCLONITE)

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Composition/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

The information in this document is compiled from information maintained by the United States Department of Defense (DOD). Anyone using this information is solely responsible for the accuracy and applicability of this information to a particular use or situation. Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

**Section 1 - Product and Company Identification
RDX(CYCLONITE)**

Product Identification: RDX(CYCLONITE)
Date of MSDS: 01/01/1985 **Technical Review Date:** 01/05/1982
FSC: 6850 **NIIN:** LIIN: 00D000069
Submitter: D DG
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: CONSOLIDATED CONTROLS CORP.
Manufacturer's Address1:
Manufacturer's Address2: N/P, NK 00000
Manufacturer's Country: NK
General Information Telephone:
Emergency Telephone: 213-772-5301
Emergency Telephone: 213-772-5301
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 09790
Special Project Code: N

Contractor Information

Contractor's Name: CONSOLIDATED CONTROLS CORPORATION
Contractor's Address1: UNKNOWN
Contractor's Address2: UNKNOWN, NK 00000
Contractor's Telephone: UNKNOWN
Contractor's CAGE: 09790

Section 2 - Compositon/Information on Ingredients
RDX(CYCLONITE)

Ingredient Name: CYCLONITE
Ingredient CAS Number: 121-82-4 **Ingredient CAS Code:** M
RTECS Number: XY9450000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 100.
% Enviromental Weight:
Other REC Limits: N/P
OSHA PEL: S, 1.5 MG/M3 **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**
ACGIH TLV: S, 1.5MG/M3; 9192 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

**Section 3 - Hazards Identification, Including Emergency Overview
RDX(CYCLONITE)**

Health Hazards Acute & Chronic: N/P

Signs & Symptoms of Overexposure:
N/A

Medical Conditions Aggravated by Exposure:
N/P

LD50 LC50 Mixture: N/P

Route of Entry Indicators:
Inhalation: N/P
Skin: N/P
Ingestion: N/P

Carcinogenicity Indicators
NTP: N/P
IARC: N/P
OSHA: N/P

Carcinogenicity Explanation: N/P

**Section 4 - First Aid Measures
RDX(CYCLONITE)**

First Aid:
N/A

**Section 5 - Fire Fighting Measures
RDX(CYCLONITE)**

Fire Fighting Procedures:
ISOLATION
Unusual Fire or Explosion Hazard:
N/A
Extinguishing Media:
N/A
Flash Point: Flash Point Text: N/A

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): 400F
Upper Limit(s): N/A

**Section 6 - Accidental Release Measures
RDX(CYCLONITE)**

Spill Release Procedures:
NO

**Section 7 - Handling and Storage
RDX(CYCLONITE)**

Handling and Storage Precautions:

Other Precautions:

**Section 8 - Exposure Controls & Personal Protection
RDX(CYCLONITE)**

Respiratory Protection:

N/A

Ventilation:

N/P

Protective Gloves:

N/P

Eye Protection: N/P

Other Protective Equipment: N/P

Work Hygienic Practices: N/P

Supplemental Health & Safety Information: ITEM IS A 1.5 GRAM EXPLOSIVE IS CONTAINED IN AN ASSEMBLY P/N 200WSS-6

**Section 9 - Physical & Chemical Properties
RDX(CYCLONITE)**

HCC: E2

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: N/A

Melting/Freezing Point: Melting/Freezing Text: N/A

Decomposition Point: Decomposition Text: N/A

Vapor Pressure: N Vapor Density: N/A

Percent Volatile Organic Content:

Specific Gravity: N/A

Volatile Organic Content Pounds per Gallon:

pH: N/P

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: N/A

Solubility in Water: N/A

Appearance and Odor: SOLID 1.5 GM EXPLOSIVE

Percent Volatiles by Volume: N/A

Corrosion Rate: N/P

**Section 10 - Stability & Reactivity Data
RDX(CYCLONITE)**

Stability Indicator: YES

Materials to Avoid:

N/A

Stability Condition to Avoid:

UNIT CAN ONLY BE IGNITED BY APPLICATION OF 4 AMPS DC TO CIRS

Hazardous Decomposition Products:

N/A

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

NONE

**Section 11 - Toxicological Information
RDX(CYCLONITE)**

Toxicological Information:

N/P

**Section 12 - Ecological Information
RDX(CYCLONITE)**

Ecological Information:

N/P

**Section 13 - Disposal Considerations
RDX(CYCLONITE)**

Waste Disposal Methods:

N/A

**Section 14 - MSDS Transport Information
RDX(CYCLONITE)**

Transport Information:

N/P

**Section 15 - Regulatory Information
RDX(CYCLONITE)**

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

**Section 16 - Other Information
RDX(CYCLONITE)**

Other Information:

N/P

HMIS Transportation Information

Product Identification: RDX(CYCLONITE)

Transportation ID Number: 435
Responsible Party CAGE: 09790
Date MSDS Prepared: 01/01/1985
Date MSDS Reviewed: 01/05/1982
MFN: 01/05/1982
Submitter: D DG
Status Code: C

Container Information

Unit of Issue: NK
Container Quantity: NK
Type of Container:
Net Unit Weight:

Article without MSDS: N
Technical Entry NOS Shipping Number: NOT ACCEPTABLE FOR SHIPMENT
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:

Department of Transportation Information

DOT Proper Shipping Name: CYCLOTRIMETHYLENETRINITRAMINE, WETTED OR CYCLONITE, WETTED OR HEXOGEN, WETTED OR RDX, WETTED
DOT PSN Code: EET
Symbols:
DOT PSN Modifier: WITH NOT LESS THAN 15 PER CENT WATER BY MASS.
Hazard Class: 1.1D
UN ID Number: UN0072
DOT Packaging Group: II
Label: EXPLOSIVE 1.1D
Special Provision(s):
Packaging Exception:
Non Bulk Packaging: 62
Bulk Packaging: NONE
Maximum Quantity in Passenger Area: FORBIDDEN
Maximum Quantity in Cargo Area: FORBIDDEN
Stow in Vessel Requirements: B
Requirements Water/Sp/Other: 1E,5E

IMO Detail Information

IMO Proper Shipping Name: CYCLONITE, WETTED

IMO PSN Code: EYX
IMO PSN Modifier: WITH NOT LESS THAN 15% WATER, BY MASS
IMDG Page Number: 1106
UN Number: 0072
UN Hazard Class: 1.1 D
IMO Packaging Group: -
Subsidiary Risk Label: -
EMS Number: 1-01
Medical First Aid Guide Number: 235

IATA Detail Information

IATA Proper Shipping Name: FORBIDDEN BY THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZY
IATA PSN Modifier:
IATA UN Id Number: N/R
IATA UN Class: N/R
Subsidiary Risk Class: N/R
UN Packaging Group: N/R
IATA Label: N/R
Packaging Note for Passengers: N/R
Maximum Quantity for Passengers: N/R
Packaging Note for Cargo: N/R
Maximum Quantity for Cargo: N/R
Exceptions: N/R

AFI Detail Information

AFI Proper Shipping Name: CYCLOTTRIMETHYLENETRINITRAMINE, CYCLONITE, HEXOGEN, RDX, WETTED
AFI Symbols:
AFI PSN Code: IBK
AFI PSN Modifier: , WITH NOT LESS THAN 15% WATER, BY MASS
AFI UN Id Number: UN0072
AFI Hazard Class: 1.1D
AFI Packing Group: II
AFI Label:
Special Provisions: P4
Back Pack Reference: A5.37

HAZCOM Label Information

Product Identification: RDX(CYCLONITE)
CAGE: 09790
Assigned Individual: N
Company Name: CONSOLIDATED CONTROLS CORPORATION
Company PO Box:
Company Street Address1: UNKNOWN
Company Street Address2: UNKNOWN, NK 00000 NK
Health Emergency Telephone: 213-772-5301
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: G

Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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**Material Safety
Data Sheets**

Division of Facilities Services

**DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only**
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Composition/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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**Section 1 - Product and Company Identification
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM**
Product Identification: TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Date of MSDS: 07/02/1991 **Technical Review Date:** 09/10/1991

FSC: 1376 **NIIN:** LIIN: 00N018210

Submitter: N EN

Status Code: C

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: HERCULES INCORPORATED
Manufacturer's Address1: RADFORD ARMY AMMUNITION PLANT
Manufacturer's Address2: RADFORD, VA 24141
Manufacturer's Country: US
General Information Telephone: 703-639-7294
Emergency Telephone: 703-639-7294
Emergency Telephone: 703-639-7294
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 2D295
Special Project Code: N

Contractor Information

Contractor's Name: HERCULES INC
Contractor's Address1: RADFORD ARMY AMMUNITION PLANT
Contractor's Address2: RADFORD, VA 24141
Contractor's Telephone: 703-639-7294
Contractor's CAGE: 2D881

Contractor Information

Contractor's Name: HERCULES INCORPORATED
Post Office Box: N/K
Contractor's Address1: 84 5TH AVE
Contractor's Address2: NEW YORK, NY 10011-7603
Contractor's Telephone: UNKNOWN
Contractor's CAGE: 2D295

Section 2 - Compositon/Information on Ingredients
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Ingredient Name: 2,4,6-TRINITROTOLUENE (TNT)
Ingredient CAS Number: 118-96-7 **Ingredient CAS Code:** M
RTECS Number: XU0175000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 99
% Enviromental Weight:

Other REC Limits: N/K
OSHA PEL: S, 1.5 MG/M3 **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**
ACGIH TLV: S, 0.5 MG/M3; 9293 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Health Hazards Acute & Chronic: ALLERGENIC, CAN CAUSE DERMATITIS. DISCOLOR SKIN AND HAIR PALE YELLOW. CAUSES NAUSEA, VOMITING AND ANOREXIA ALSO LIVER AND BLOOD DAMAGE, AND APLASTIC ANEMIA.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:

Inhalation: YES
Skin: NO
Ingestion: NO

Carcinogenicity Indicators

NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT.

Section 4 - First Aid Measures
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

First Aid:

EYE:IMMEDIATELY FLUSH THOROUGHLY WITH LARGE AMOUNTS OF LOW PRESSURE WATER FOR AT LEAST 25 MINUTES. REMOVE CONTACT LENSES TO ASSURE THOROUGH FLUSHING. CALL MD. SKIN:WASH WITH TNT INDICATOR SOAP AND RUNNING WATER. INHAL:REMOVE TO FRESH AIR. TREAT ANY IRRITATION SYMPTOMATICALLY. CALL MD. INGEST:CALL MD IMMEDIATELY (FP N).

Section 5 - Fire Fighting Measures
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Fire Fighting Procedures:

WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
EVACUATE THE AREA.

Unusual Fire or Explosion Hazard:

HIGHLY DANGEROUS-SHOCK WILL EXPLODE IT. WILL DETONATE IF CONFINED AND EXPOSED TO EXTRME HEAT.

Extinguishing Media:

DELUGE WITH WATER-USE LARGE QUANTITIES.

Flash Point: **Flash Point Text:** EXPLODES

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/A

Upper Limit(s): N/A

Section 6 - Accidental Release Measures
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Spill Release Procedures:

CLEAN UP SPILL IMMEDIATELY USING A SOFT BRISTLE BRUSH AND A CONDUCTIVE RUBBER OR PLASTIC SHOVEL.

Section 7 - Handling and Storage
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Respiratory Protection:

NIOSH/MSHA APPROVED RESPIRATOR FOR DUSTS.

Ventilation:

MECHANICAL (GENERAL) VENTILATION.

Protective Gloves:

COTTON OR LEATHER GLOVES.

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: FLAME-PROOF COVERALLS AND CONDUCTIVE SHOES.

Work Hygenic Practices: NONE SPECIFIED BY MANUFACTURER.

Supplemental Health & Safety Information: NONE SPECIFIED BY MANUFACTURER.

Section 9 - Physical & Chemical Properties
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

HCC: E1

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: **Boiling Point Text:** 464F,240C

Melting/Freezing Point: **Melting/Freezing Text:** N/K

Decomposition Point: Decomposition Text: N/K
Vapor Pressure: N/K **Vapor Density:** N/A
Percent Volatile Organic Content:
Specific Gravity: 1.5-1.6
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: NOT APPLICABLE
Solubility in Water: 0.01% @ 25C
Appearance and Odor: FLAKES, PALE YELLOW IN COLOR.
Percent Volatiles by Volume: <0.1
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Stability Indicator: YES
Materials to Avoid:
SODIUM HYDROXIDE, POTASSIUM HYDROXIDE AND OTHER HIGHLY ALKALINE MATERIALS.
Stability Condition to Avoid:
AVOID CONTACT WITH ALKALINE MATERIALS. WILL DETONATE IF CONFINED AND EXPOSED TO EXTREME HEAT.
Hazardous Decomposition Products:
NOX.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT.

Section 11 - Toxicological Information
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Toxicological Information:
N/P

Section 12 - Ecological Information
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Ecological Information:
N/P

Section 13 - Disposal Considerations
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Waste Disposal Methods:
BURN ON OPEN BURNING GROUND IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. MAY ALSO BE BURNED IN AN INCINERATOR APPROVED FOR EXPLOSIVES. DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS (FP N).

Section 14 - MSDS Transport Information

TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Transport Information:

N/P

Section 15 - Regulatory Information
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Other Information:

N/P

HMS Transportation Information

Product Identification: TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

Transportation ID Number: 22878

Responsible Party CAGE: 2D295

Date MSDS Prepared: 07/02/1991

Date MSDS Reviewed: 10/21/1991

MFN: 10/21/1991

Submitter: N TN

Status Code: C

Container Information

Unit of Issue: NK

Container Quantity: NK

Type of Container:

Net Unit Weight:

Article without MSDS: N

Technical Entry NOS Shipping Number:

Radioactivity:

Form:

Net Explosive Weight:

Coast Guard Ammunition Code:

Magnetism: N/P

AF MMAC Code:

DOD Exemption Number:

Limited Quantity Indicator:

Multiple Kit Number: 0

Kit Indicator: N

Kit Part Indicator: N

Review Indicator: Y

Additional Data:

Department of Transportation Information

DOT Proper Shipping Name: CYCLOTETRAMETHYLENETETRAMINE, WETTED OR HMX, WETTED OR OCTOGEN, WETTED

DOT PSN Code: EEL

Symbols:

DOT PSN Modifier: WITH NOT LESS THAN 15 PER CENT WATER, BY MASS

Hazard Class: 1.1D

UN ID Number: UN0226

DOT Packaging Group: II

Label: EXPLOSIVE 1.1D

Special Provision(s):

Packaging Exception:

Non Bulk Packaging: 62

Bulk Packaging: NONE

Maximum Quantity in Passenger Area: FORBIDDEN

Maximum Quantity in Cargo Area: FORBIDDEN

Stow in Vessel Requirements: B

Requirements Water/Sp/Other: 1E,5E

IMO Detail Information

IMO Proper Shipping Name: TRINITROTOLUENE

IMO PSN Code: PBV

IMO PSN Modifier: ,DRY OR WETTED WITH LESS THAN 30% WATER, BY MASS

IMDG Page Number: 1144

UN Number: 0209

UN Hazard Class: 1.1 D

IMO Packaging Group: -

Subsidiary Risk Label: -

EMS Number: 1-01

Medical First Aid Guide Number: *

IATA Detail Information

IATA Proper Shipping Name: N/A

IATA PSN Code: YYG

IATA PSN Modifier: TRINITROTOLUENE, DRY OR WETTED WITH LESS THAN 30% WATER, BY WEIGHT

IATA UN Id Number: 0209

IATA UN Class: 1.1D

Subsidiary Risk Class:

UN Packaging Group:

IATA Label:

Packaging Note for Passengers: FORB

Maximum Quantity for Passengers: FORB

Packaging Note for Cargo: FORB

Maximum Quantity for Cargo: FORB

Exceptions:

AFI Detail Information

AFI Proper Shipping Name: TETRAHYDROFURAN

AFI Symbols:

AFI PSN Code: XSI

AFI PSN Modifier:

AFI UN Id Number: UN2056
AFI Hazard Class: 3
AFI Packing Group: II
AFI Label:
Special Provisions: P5
Back Pack Reference: A7.3

HAZCOM Label Information

Product Identification: TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM
CAGE: 2D295
Assigned Individual: N
Company Name: HERCULES INCORPORATED
Company PO Box: N/K
Company Street Address1: 84 5TH AVE
Company Street Address2: NEW YORK, NY 10011-7603 US
Health Emergency Telephone: 703-639-7294
Label Required Indicator: Y
Date Label Reviewed: 09/10/1991
Status Code: C
Manufacturer's Label Number:
Date of Label: 09/10/1991
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: Y
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: DANGER
Health Hazard: Slight
Contact Hazard: Slight
Fire Hazard: Severe
Reactivity Hazard: Severe

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**Material Safety
Data Sheets**

Division of Facilities Services

**DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only**
TETRYL

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Composition/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
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**Section 1 - Product and Company Identification
TETRYL**

Product Identification: TETRYL
Date of MSDS: 04/30/1991 **Technical Review Date:** 02/14/1992
FSC: 1375 **NIIN:** LIIN: 00N026374
Submitter: N EN
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: ENSIGN-BICKFORD CO
Manufacturer's Address1: 660 HOPMEADOW ST
Manufacturer's Address2: SIMSBURY, CT 06070
Manufacturer's Country: US
General Information Telephone: 203-658-4411;203-843-2276
Emergency Telephone: 203-658-4411;203-843-2276
Emergency Telephone: 203-658-4411;203-843-2276
MSDS Preparer's Name: T.A. SHREVE
Proprietary: N
Reviewed: N
Published: Y
CAGE: 0B1W4
Special Project Code: N

Contractor Information

Contractor's Name: ENSIGN-BICKFORD CO
Contractor's Address1: 660 HOPMEADOW ST
Contractor's Address2: SIMSBURY, CT 06070
Contractor's Telephone: (203) 658-4411 OR (203) 843-22
Contractor's CAGE: 0B1W4

Contractor Information

Contractor's Name: THE ENSIGN-BICKFORD CO
Contractor's Address1: 660 HOPMEADOW ST
Contractor's Address2: SIMSBURY, CT 06070
Contractor's Telephone: (203) 658-4411
Contractor's CAGE: 0B2N1

Section 2 - Composition/Information on Ingredients
TETRYL

Ingredient Name: ANILINE, N-METHYL-N,2,4,6-TETRANITRO-; (TRINITRO-2,4,6-PHENYLMETHYLMITRAMINE)
Ingredient CAS Number: 479-45-8 **Ingredient CAS Code:** M
RTECS Number: BY6300000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 100
% Environmental Weight:

Other REC Limits: N/K
OSHA PEL: S, 1.5 MG/M3 **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**
ACGIH TLV: 1.5 MG/M3; 9293 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Ingredient Name: ING 3:SENSITIVE TO DETONATION. IF POSS, SEPARATE ANY MATL THAT APPEARS TO BE UNCONTAMD FROM MATL THAT APPEARS TO (ING 5)

Ingredient CAS Number: **Ingredient CAS Code:** X
RTECS Number: 999999ZZ **RTECS Code:** M

=WT: **=WT Code:**
=Volume: **=Volume Code:**
>WT: **>WT Code:**
>Volume: **>Volume Code:**
<WT: **<WT Code:**
<Volume: **<Volume Code:**
% Low WT: **% Low WT Code:**
% High WT: **% High WT Code:**
% Low Volume: **% Low Volume Code:**
% High Volume: **% High Volume Code:**
% Text: N/K

% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: NOT APPLICABLE **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**
ACGIH TLV: NOT APPLICABLE **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Ingredient Name: ING 4:BE GRIT CONTAMD. STORE COLLECTED MATL FOR PROPER DISP.

Ingredient CAS Number: **Ingredient CAS Code:** X
RTECS Number: 999999ZZ **RTECS Code:** M

=WT: **=WT Code:**
=Volume: **=Volume Code:**
>WT: **>WT Code:**
>Volume: **>Volume Code:**
<WT: **<WT Code:**
<Volume: **<Volume Code:**
% Low WT: **% Low WT Code:**
% High WT: **% High WT Code:**
% Low Volume: **% Low Volume Code:**
% High Volume: **% High Volume Code:**
% Text: N/K

% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: NOT APPLICABLE **OSHA PEL Code:** M

OSHA STEL: OSHA STEL Code:
ACGIH TLV: NOT APPLICABLE ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Ingredient Name: ING 6:RECOM MET OF DISP OF WASTE EXPLO IS BY OPEN BURN/OPEN DETONATION. TETRYL MAY BE DESTROYED BY BOIL IN SOLN (ING 8)

Ingredient CAS Number: Ingredient CAS Code: X

RTECS Number: 999999ZZ RTECS Code: M

=WT: =WT Code:

=Volume: =Volume Code:

>WT: >WT Code:

>Volume: >Volume Code:

<WT: <WT Code:

<Volume: <Volume Code:

% Low WT: % Low WT Code:

% High WT: % High WT Code:

% Low Volume: % Low Volume Code:

% High Volume: % High Volume Code:

% Text: N/K

% Enviromental Weight:

Other REC Limits: N/K

OSHA PEL: NOT APPLICABLE OSHA PEL Code: M

OSHA STEL: OSHA STEL Code:

ACGIH TLV: NOT APPLICABLE ACGIH TLV Code: M

ACGIH STEL: N/P ACGIH STEL Code:

EPA Reporting Quantity:

DOT Reporting Quantity:

Ozone Depleting Chemical:

Ingredient Name: ING 7:OF SODIUM CARBONATE. BY-PROD & SPECIFICS OF RXN ARE NOT AVAILABLE.

Ingredient CAS Number: Ingredient CAS Code: X

RTECS Number: 999999ZZ RTECS Code: M

=WT: =WT Code:

=Volume: =Volume Code:

>WT: >WT Code:

>Volume: >Volume Code:

<WT: <WT Code:

<Volume: <Volume Code:

% Low WT: % Low WT Code:

% High WT: % High WT Code:

% Low Volume: % Low Volume Code:

% High Volume: % High Volume Code:

% Text: N/K

% Enviromental Weight:

Other REC Limits: N/K

OSHA PEL: NOT APPLICABLE OSHA PEL Code: M

OSHA STEL: OSHA STEL Code:

ACGIH TLV: NOT APPLICABLE **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Ingredient Name: SPILL PROC: FRICTION/IMPACT. PLACE MATL IN VELOSTAT BAG.
CONTAM OF MATL W/SAND/DIRT/OTHER GRIT WILL RENDER IT MORE(ING 4)

Ingredient CAS Number: Ingredient CAS Code: X
RTECS Number: 999999ZZ **RTECS Code:** M

=WT: =WT Code:

=Volume: =Volume Code:

>WT: >WT Code:

>Volume: >Volume Code:

<WT: <WT Code:

<Volume: <Volume Code:

% Low WT: % Low WT Code:

% High WT: % High WT Code:

% Low Volume: % Low Volume Code:

% High Volume: % High Volume Code:

% Text: N/K

% Environmental Weight:

Other REC Limits: N/K

OSHA PEL: NOT APPLICABLE **OSHA PEL Code:** M

OSHA STEL: OSHA STEL Code:

ACGIH TLV: NOT APPLICABLE **ACGIH TLV Code:** M

ACGIH STEL: N/P ACGIH STEL Code:

EPA Reporting Quantity:

DOT Reporting Quantity:

Ozone Depleting Chemical:

Ingredient Name: SUPP DATA: IT DOES NOT DETONATE, IT WILL BURN
VIGOROUSLY. DEFLAGRATION TEMPERATURE IS 185C (365F).

Ingredient CAS Number: Ingredient CAS Code: X

RTECS Number: 999999ZZ **RTECS Code:** M

=WT: =WT Code:

=Volume: =Volume Code:

>WT: >WT Code:

>Volume: >Volume Code:

<WT: <WT Code:

<Volume: <Volume Code:

% Low WT: % Low WT Code:

% High WT: % High WT Code:

% Low Volume: % Low Volume Code:

% High Volume: % High Volume Code:

% Text: N/K

% Environmental Weight:

Other REC Limits: N/K

OSHA PEL: NOT APPLICABLE **OSHA PEL Code:** M

OSHA STEL: OSHA STEL Code:

ACGIH TLV: NOT APPLICABLE **ACGIH TLV Code:** M

ACGIH STEL: N/P ACGIH STEL Code:

EPA Reporting Quantity:

DOT Reporting Quantity:

Ozone Depleting Chemical:

Ingredient Name: VENT:STRONGLY RECOMMENDED TO MINIMIZE EMPLOYEE EXPOSURE.

Ingredient CAS Number: Ingredient CAS Code: X

RTECS Number: 999999ZZ RTECS Code: M

=WT: =WT Code:

=Volume: =Volume Code:

>WT: >WT Code:

>Volume: >Volume Code:

<WT: <WT Code:

<Volume: <Volume Code:

% Low WT: % Low WT Code:

% High WT: % High WT Code:

% Low Volume: % Low Volume Code:

% High Volume: % High Volume Code:

% Text: N/K

% Environmental Weight:

Other REC Limits: N/K

OSHA PEL: NOT APPLICABLE OSHA PEL Code: M

OSHA STEL: OSHA STEL Code:

ACGIH TLV: NOT APPLICABLE ACGIH TLV Code: M

ACGIH STEL: N/P ACGIH STEL Code:

EPA Reporting Quantity:

DOT Reporting Quantity:

Ozone Depleting Chemical:

Ingredient Name: WASTE DISP METH:LBLG/PACKAGING/STOR & TRANSPORTATION) MUST BE PERFORMED I/A/W ALL APPLIC LOC/ST/FED LAWS & REGS. (ING 7)

Ingredient CAS Number: Ingredient CAS Code: X

RTECS Number: 999999ZZ RTECS Code: M

=WT: =WT Code:

=Volume: =Volume Code:

>WT: >WT Code:

>Volume: >Volume Code:

<WT: <WT Code:

<Volume: <Volume Code:

% Low WT: % Low WT Code:

% High WT: % High WT Code:

% Low Volume: % Low Volume Code:

% High Volume: % High Volume Code:

% Text: N/K

% Environmental Weight:

Other REC Limits: N/K

OSHA PEL: NOT APPLICABLE OSHA PEL Code: M

OSHA STEL: OSHA STEL Code:

ACGIH TLV: NOT APPLICABLE ACGIH TLV Code: M

ACGIH STEL: N/P ACGIH STEL Code:

EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Section 3 - Hazards Identification, Including Emergency Overview
TETRYL

Health Hazards Acute & Chronic: EYE:MAY CAUSE IRRITATION, POSSIBLE EYE DAMAGE. SKIN:SKIN MAY TURN YELLOW & DERMATITIS MAY DEVELOP. INHAL:IRRITATION TO UPPER RESPIRATORY TRACT & POSSIBLE DEATH. INGEST:POISONING IS ACCOMPANIED BY FOLLOWING SYMPTOMS:LACK OF APPETITE, INSOMNIA, & GIDDINESS. SYMPTOMS USUALLY BEGIN AFTER 2-3 WEEKS OF BEING EXPOS TO TETRYL.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:

Inhalation: YES
Skin: NO
Ingestion: YES

Carcinogenicity Indicators

NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT.

Section 4 - First Aid Measures
TETRYL

First Aid:

EYE:FLUSH IMMEDIATELY UNDER RUNNING WATER FOR AT LEAST 15 MIN, SEEK MEDICAL ATTENTION IMMEDIATELY. SKIN:FLUSH IMMEDIATELY UNDER RUNNING WATER FOR AT LEAST 15 MIN, SEEK MEDICAL ATTENTION IMMEDIATELY. INHAL:GET VICTIM TO FRESH AIR. GIVE ARTIFICIAL RESPIRATION IF BREATHING HAS STOPPED. SEEK MEDICAL ATTENTION IMMEDIATELY. INGEST:INDUCE VOMIT IMMEDIATELY BY STICKING FINGER DOWN THROAT. SEEK MEDICAL ATTENTION IMMEDIATELY.

Section 5 - Fire Fighting Measures
TETRYL

Fire Fighting Procedures:

NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FULL PROTECTIVE EQUIPMENT). DO NOT FIGHT FIRES INVOLVING TETRYL! PRODUCT IS PRIMARY (INITIATING) EXPLOSIVE & MAY DETONATE WHEN EXPOSED TO (SUPPORT DATA)

Unusual Fire or Explosion Hazard:

TETRYL IS PRIMARY (INITIATING) EXPLO. PROD IS LIKELY TO DETONATE WHEN EXPOS TO SHOCK/HEAT/IMPACT/SPARKS/FRICTION. PROD SHOULD BE HNDLD ONLY BY (SUPP DATA)

Extinguishing Media:

MEDIA SUITABLE FOR SURROUNDING FIRE (FP N).

Flash Point: Flash Point Text: N/K

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/K

Upper Limit(s): N/K

Section 6 - Accidental Release Measures**TETRYL**

Spill Release Procedures:

ISOLATE SPILL AREA, KEEP ALL SOURCES OF IGNIT AWAY FROM SPILL & EVACUATE ALL NONESSENTIAL PERS TO SAFE DISTANT LOCATION. REMOVE ALL EXPLO THAT WERE NOT INVOLVED IN SPILL FROM SPILL AREA. CAREFULLY COLLECT SPILLED MATL, AVOID ANY EXCESS (ING 3)

Section 7 - Handling and Storage**TETRYL**

Handling and Storage Precautions:**Other Precautions:**

Section 8 - Exposure Controls & Personal Protection**TETRYL**

Respiratory Protection:

NIOSH/MSHA APPROVED DUST RESPIRATOR SHOULD BE WORN WHEN HANDLING TETRYL.

Ventilation:

LOC EXHAUST:STRONGLY RECOM TO MINIMIZE EMPLOYEE EXPOS. SPECIAL:TETRYL DUST IS POISONOUS. MECH:EXHAUST VENT (ING 9)

Protective Gloves:

BUTYL RUBBER GLOVES.

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: COTTON COVERALLS (ANTISTATIC) WHICH WILL PROTECT AGAINST POWDER SPLASHES; SHOULD BE REPLACED WHEN CONTAMINATED.

Work Hygenic Practices: NONE SPECIFIED BY MANUFACTURER.

Supplemental Health & Safety Information: FIRE FIGHT PROC:HEAT/FLAMES.DO NOT ATTEMPT TO FIGHT TETRYL FIRES!!ISOLATE AFFECTED AREA & EVACUATE ALL PERS TO DISTANT,SAFE AREA.EXPLO HAZ:QUALIFIED INDIVIDUALS WHO ARE THORO FAMILIAR W/PROPER EXPLO HN DLG PROC.HAZ GASES (NITROGEN OXIDES, NO*X'S) MAY BE REL WHEN TETRYL BURNS/DETONATES.IF TETRYL IS EXPOS TO FIRE & (ING 2)

Section 9 - Physical & Chemical Properties
TETRYL

HCC: E2
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: N/A
Melting/Freezing Point: Melting/Freezing Text: 265F,129C
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: N/A **Vapor Density:** N/A
Percent Volatile Organic Content:
Specific Gravity: N/K
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: NOT APPLICABLE
Solubility in Water: INSOLUBLE
Appearance and Odor: LIGHT YELLOW CRYSTALS.
Percent Volatiles by Volume: 100%
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
TETRYL

Stability Indicator: YES
Materials to Avoid:
CARBON STEEL IS EASILY CORRODE BY TETRYL A SLIGHT CORROSION IS FOUND WITH ZINC AND ZINC PLATED STEEL.
Stability Condition to Avoid:
EXPOSURE TO SHOCK, SPARKS, PRESSURE, OR IMPACT MAY RESULT IN DETONATION.
Hazardous Decomposition Products:
THERMAL DECOMPOSITION MAY PRODUCE OXIDES OF CARBON & NITROGEN.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT.

Section 11 - Toxicological Information
TETRYL

Toxicological Information:
N/P

Section 12 - Ecological Information
TETRYL

Ecological Information:
N/P

Section 13 - Disposal Considerations
TETRYL

Waste Disposal Methods:

WASTE TETRYL IS HAZ WASTE AS DEFINED UNDER RESOURCE CONSERVATION & RECOVERY ACT (RCRA) REGS, & MUST BE DISP OF @ PROPERLY PERMITTED TRTMT/STOR/DISP FACILITY (TSD). WASTE TETRYL DISP & ALL RELATED, REG ULATED ACTIVITIES (INCL BUT NOT LIM TO (ING 6)

Section 14 - MSDS Transport Information
TETRYL**Transport Information:**

N/P

Section 15 - Regulatory Information
TETRYL**SARA Title III Information:**

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
TETRYL**Other Information:**

N/P

HMIS Transportation Information**Product Identification:** TETRYL**Transportation ID Number:** 31002**Responsible Party CAGE:** 0B1W4**Date MSDS Prepared:** 04/30/1991**Date MSDS Reviewed:** 05/13/1992**MFN:** 05/13/1992**Submitter:** N TN**Status Code:** C**Container Information****Unit of Issue:** NK**Container Quantity:** NK**Type of Container:****Net Unit Weight:****Article without MSDS:** N**Technical Entry NOS Shipping Number:****Radioactivity:****Form:****Net Explosive Weight:****Coast Guard Ammunition Code:****Magnetism:** N/P

AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:

Department of Transportation Information

DOT Proper Shipping Name: CYCLOTETRAMETHYLENETETRANITRAMINE, WETTED OR HMX, WETTED OR OCTOGEN, WETTED

DOT PSN Code: EEL

Symbols:

DOT PSN Modifier: WITH NOT LESS THAN 15 PER CENT WATER, BY MASS

Hazard Class: 1.1D

UN ID Number: UN0226

DOT Packaging Group: II

Label: EXPLOSIVE 1.1D

Special Provision(s):

Packaging Exception:

Non Bulk Packaging: 62

Bulk Packaging: NONE

Maximum Quantity in Passenger Area: FORBIDDEN

Maximum Quantity in Cargo Area: FORBIDDEN

Stow in Vessel Requirements: B

Requirements Water/Sp/Other: 1E,5E

IMO Detail Information

IMO Proper Shipping Name: TETRYL

IMO PSN Code: ONJ

IMO PSN Modifier:

IMDG Page Number: 1112

UN Number: 0208

UN Hazard Class: 1.1 D

IMO Packaging Group: -

Subsidiary Risk Label: -

EMS Number: 1-01

Medical First Aid Guide Number: T

IATA Detail Information

IATA Proper Shipping Name: N/A

IATA PSN Code: YXR

IATA PSN Modifier: TRINITROPHENYLMETHYLNITRAMINE

IATA UN Id Number: 0208

IATA UN Class: 1.1D

Subsidiary Risk Class:

UN Packaging Group:

IATA Label:

Packaging Note for Passengers: FORB

Maximum Quantity for Passengers: FORB

Packaging Note for Cargo: FORB

Maximum Quantity for Cargo: FORB
Exceptions:

AFI Detail Information

AFI Proper Shipping Name: TRINITROPHENYLMETHYLNITRAMINE OR TETRYL
AFI Symbols:
AFI PSN Code: YXR
AFI PSN Modifier:
AFI UN Id Number: UN0208
AFI Hazard Class: 1.1D
AFI Packing Group: II
AFI Label:
Special Provisions: P4
Back Pack Reference: A5.47

HAZCOM Label Information

Product Identification: TETRYL
CAGE: 0B1W4
Assigned Individual: N
Company Name: ENSIGN-BICKFORD CO
Company PO Box:
Company Street Address1: 660 HOPMEADOW ST
Company Street Address2: SIMSBURY, CT 06070 US
Health Emergency Telephone: 203-658-4411;203-843-2276
Label Required Indicator: Y
Date Label Reviewed: 02/14/1992
Status Code: C
Manufacturer's Label Number:
Date of Label: 02/14/1992
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: DANGER
Health Hazard: Moderate
Contact Hazard: Moderate
Fire Hazard: None
Reactivity Hazard: Severe

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MATERIAL SAFETY DATA SHEET (MSDS)

Serial No. 5801

(Assigned by Code 04)

Identity (As Used on Label)	Other Names	
Nitroglycerin	NG, nitrate ester	
Section I. General		
Manufacturer Indian Head Division Naval Surface Warfare Center 101 Strauss Avenue Indian Head, MD 20640-5035	Emergency Telephone Number	301-744-4438
	Telephone Number for Information	301-744-4924
	Date Prepared	29 July 03
Section II. Summary of Hazards		
<p>The first symptoms of exposure to nitroglycerin are usually a headache, nausea or vomiting. Nitroglycerin is an irritant through inhalation, skin contact and eye contact. Exposure to nitroglycerin effects central nervous system depressant and methemoglobin formation. Persons at greatest risk when exposed include those with hypotension, anemia, hyperthyroidism and cardiovascular disease.</p> <p>This document is the MSDS for <u>Nitroglycerin</u>.</p>		
Section III. Emergency and First Aid		
Inhalation	Remove to fresh air immediately. If breathing has stopped, give artificial respiration. Seek medical attention.	
Eye Contact	Wash eyes immediately with large amounts of water or saline solution, occasionally lifting upper and lower lids, for at least 15 minutes. Seek medical attention.	
Skin Contact	Remove contaminated clothing immediately. Wash affected area with soap and water for at least 15 minutes. Seek medical attention if irritation persists.	
Ingestion	DO NOT INDUCE VOMITING. Qualified medical personnel should remove chemical by gastric lavage or catharsis. Activated charcoal is useful. Seek medical attention.	
Emergency Medical Treatment Procedures	Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation.	

Identity	Nitroglycerin	
Section IV. Health Hazards/Symptoms of Exposure		
Summary of Acute Hazards	Symptoms include headache, nausea, vomiting and skin irritation.	
ROUTE OF EXPOSURE	SIGNS AND SYMPTOMS	PRIMARY ROUTE OF ENTRY
Inhalation:	Headache, conjunctivitis, nausea, vomiting, visual disturbances and mental confusion.	<input checked="" type="checkbox"/>
Eye Contact:	Local irritation, decreased visual acuity, systematic effects of headache, nausea, vomiting and other symptoms of narcosis.	<input type="checkbox"/>
Skin Contact:	Local irritation and systematic effects of headache, nausea, vomiting and other symptoms of narcosis.	<input checked="" type="checkbox"/>
Ingestion:	Ingestion may cause numbness of extremities, tingling sensation, excitement, headache, hypotension, nausea, vomiting, abdominal cramps, gastroenteric irritation and respiratory difficulty.	<input type="checkbox"/>
Chronic Hazards (Long Term)	Symptoms include headache, nausea, vomiting, hallucinations, hypotension, mental confusion, skin rashes, conjunctivitis and numbness. Long term exposure may result in acclimatization to discomforts produced by acute effects. Exposure also targets the skin, blood and cardiovascular system. NG is not a suspected carcinogen.	
Section V. Protective Equipment and Control Measures		
Respiratory:	Organic vapor respirator/supplied air respirator is required if exposed to levels above OSHA limits.	
Eye:	Chemical splash goggles and face shield are recommended when handling.	
Skin:	Nitrile Buna-rubber gloves and flame-resistant powder uniform are recommended when handling.	
Engineering Controls:	Use general or local exhaust ventilation to satisfy exposure limits. Ventilation equipment must be explosion-proof.	
Other Hygienic and Work Practices:	Wear flame-resistant powder uniform, flame-resistant soft cap, and conductive-soled shoes. Have an eyewash and safety shower nearby. There should be no smoking or eating in the workplace.	

Identity		Nitroglycerin	
Section VI. Fire and Explosion			
Flash Point (method): Explodes	Autoignition Temp (method) 518 °F (270 °C)	Flammable Limits (% vol in air) Lower Unknown Upper Unknown	
Fire And Explosion Hazards: Dangerously explosive. Moderate fire hazard when exposed to heat or flame.			
Extinguishing Media: Water sprinkler/deluge system recommended.			
Special Fire Fighting Procedures:	Do not attempt to manually extinguish fires. Burning explosives may accelerate to a detonation at any time when subjected to confinement, shock or other sufficient initiation source. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighter's protective clothing will provide limited protection. Withdraw from area and let fire burn. Promptly isolate the scene by removing all persons from the vicinity of the scene and away from windows.		
Section VII. Spill and Disposal			
Large Spill:	Shut off all sources of ignition. Do not touch spilled material. Smoking and open flames are strictly prohibited in the area. Evacuate area to a distance of 2500-feet in all directions. Control access to area and remove sources of friction, impact, heat, low level electrical current, electrostatic or RF energy. Review FIRE AND EXPLOSION HAZARDS and SAFETY PRECAUTIONS before proceeding with clean up. Keep unnecessary people away.		
Small Spill:	Wipe up spill with an acetone-dampened sponge. Use conductive containers and ground all containers before transferring explosives between containers. Avoid metal-to-metal contact, impact, friction or other situations, which may initiate the explosive. Avoid sand, glass, grit and metal fragments which may sensitize the material to impact or friction.		
Waste Disposal Methods:	Store and handle waste as a Class A explosive. Transport in accordance with Department of Transportation regulations for Class A explosives. Obtain approval from appropriate agencies prior to disposal. Consult manufacturer for recommended methods of destroying explosive materials. Comply with all Federal, State and local regulations. NG solutions must be disposed of as a hazardous waste per 40 CFR 262.		
Section VIII. Handling and Storage			
General Handling Procedures:	Avoid contact with heat, sparks, flames or other sources of ignition. Avoid friction, shock and impact. Use all required personal protective equipment. Explosives must be tested for compatibility with any materials which they contact. Wash thoroughly after handling. Wash contaminated clothing before use. Avoid pinching material, metal-to-metal contact, impact, friction, shock or other mechanical stimuli.		
Storage Requirements:	Storage must be performed in accordance with appropriate safety regulations concerning quantity distance, barricading, personnel exposure and handling equipment. Storage containers should be grounded. Observe all federal, state and local regulations.		

Identity		Nitroglycerin	
Section IX. Stability and Reactivity			
Stable Conditions	Yes	No	Conditions To Avoid: Avoid heat, sparks, open flame and other sources of ignition. Avoid impact, shock, friction and electrostatic discharge. High explosives will detonate when exposed to sufficient mechanical and thermal stimuli.
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Incompatibility (Materials to avoid): Acids, oxidizers and ozone.			
Hazardous Decomposition By-Products: Carbon monoxide, carbon dioxide, oxides of nitrogen			
Hazardous Polymerization	Yes	No	Conditions To Avoid: Not applicable
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Impact Sensitivity (mm)	8.4 mm for 50% height (NOS)		Other
Friction Sensitivity (psig)	Unknown		Other
ESD Sensitivity (joules)	≥12.5		Other
Section X. Hazardous Ingredients/Identity Information			
Hazardous Components	OSHA PEL	ACGIH TLV	Other Limits
Nitroglycerin (CAS# 55-63-0)	2.0 mg/m ³	0.5 mg/m ³	

Identity		Nitroglycerin	
Section XI. Physical and Chemical Data			
Boiling Point (indicate °F or °C)	424 °F (218 °C)	Specific Gravity (water = 1)	1.6
Vapor Pressure (mm Hg)	0.0015 @ 20 °C	Melting Point (indicate °F or °C)	55 °F (13 °C)
Vapor Density (Air = 1)	7.8	Evaporation Rate (Butyl Acetate = 1)	Unknown
Solubility in Water:	0.125%		
Appearance and Odor:	Colorless to pale yellow slightly viscous liquid with a sweet burning taste.		
Section XII. Other Information			
Health (blue)		2	Hazardous Material Warning Label (for Naval Surface Warfare Center, Indian Head Division use only) 0 = no significant hazard 1 = slight hazard 2 = moderate hazard 3 = severe hazard 1.3 = mass fire explosive 1.1 = mass detonating explosive ND = hazard has not yet been determined
Contact (white)		2	
Fire (red)		3	
Reactivity (yellow)		1.1	
Shipping Name: Explosive A			
UN or North American Identification Number	Explosive A	Hazard Class and Packing Group	Class 1 Division 1.1 Explosives
TSCA Status	All components are listed in the TSCA chemical inventory.		
CERCLA/SARA:	Report spills per 40 CFR 302.6 and 40 CFR 372.30.		
RCRA:	Discarded Nitroglycerin solution is a D003 (reactive) RCRA hazardous waste. Dispose of according to federal, state and local regulations.		
State Regulatory Information:	This material contains nitroglycerin and is thus a P081 (reactive) COMAR hazardous waste.		

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BOFORS

SAFETY DATA SHEET

Prepared by, Department, Telephone Birgitta Pettersson, XM3, 83535	Date 1999-03-29	Edition number 1	Document number 1(7)
Product denomination Nitrocellulose NSC 830			

1 Identification of the substance and of the company/undertaking

Product name	Nitrocellulose
Chemical name	Nitrocellulose, NSC 830
Company/Manufacturer	NEXPLO BOFORS AB
Company address	S-691 86 KARLSKOGA, SWEDEN
Telephone number	46-586-830 50
Telefax number	46-586-853 10
Emergency telephone number	46-586-832 00, ERC + m 46-0(8)-33 70 43
Contact person	Birgitta Pettersson/XM 3
Dangerous Goods, documentation	Birgitta Pettersson

2 Composition/Information on ingredients

Identification of product	Substances	CAS-number	%	Risk phrases
Nitrocellulose, N-content < 12.6 %	NC, wetted	9004-70-0	100	11

3 Hazard Identification

Health hazard	-
Inhalation	May irritate respiratory organs and lungs. May cause headache.
Skin contact	May irritate.
Eye contact	May irritate.
Ingestion	May irritate and cause headache.
Fire and explosion hazards	HIGHLY FLAMMABLE.

NOTE ! Risk that fire continues into explosion. Nitrocellulose is in dry or slightly wetted condition a heavy explosive. It can easily be ignited or explode by shock, friction, sparks or contact with hot surfaces. In disadvantageous cases dust or dry NC can be ignited by sweeping with a hard brush, for example. Dry NC may self-ignite, for example exposed in sunshine. NC develops toxic smoke at heating/combustion.

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SAFETY DATA SHEET

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Prepared by: Department, Telephone	Date	Revision number	Docuform number
Birgitta Pettersson, XM3, 83535	1999-03-29	1	
Product Name/Artikelnummer Nitrocellulose NSC 830			

Environmental hazards

Waste of wetted nitrocellulose must immediately be taken care of. Dry product must be wetted before it can be taken care of. Product in the nature may cause overfeeding through Nitrogen-addition.

4 First-aid measures

After inhalation:

Inhalation of gases from fire: Fresh air, warmth and rest, in half-sitting position. Avoid strain - increased risk for affection on the lungs. Use octogen, go to hospital even by small troubles.

After skin contact

Take off contaminated clothes/shoes. Wash with soap and water.

After eye contact

Rinse with water.

After ingestion

No harmful effects known.

5 Fire-fighting measures

Extinguishing media

- Suitable extinguishing media

Use copious volumes of water, sprinkler.

- Extinguishing media not to be used

NOT fire - extinction powder.

Special exposure causing hazard

Nitrous gases.

Special protective equipment for fire-fighters

Full protection including compressed air mask.

6 Accidental release measures

Personal precautions

Flame-protection treated clothes, protecting against direct contact, and gloves.

Environmental precautions

Production as far as possible in closed systems. Containers must be kept well closed. Working place and methods must be planned in such a way that direct contact with NC is prevented and potential wastage from leaking production kettles can be taken care of before product is getting dry and contaminating the sewage system. Special explosive separators must exist in resp. room. Rooms and equipment must regularly be rinsed with water for removal of wastage.

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BOFORS

SAFETY DATA SHEET 3 (7)

Drawn by: Department, Telephone Birgitta Pettersson, XM3, 83535	Date 1999-03-29	Edition number 1	Document number
Product description Nitrocellulose NSC 830			

Methods for cleaning up Product, wetted with water, shall be collected and put into special and marked containers. Waste shall be burned in open air and set to fire from a protected place. Destruction shall be carried out by experts. Contact fire-brigade.

7 Handling and storage

Handling Product must be kept wet. Containers keeps wetted and must continuously be tested concerning moisture content. Explosive classified electric equipment must be used. Equipment well earthed.

Storage Must always be stored wetted with water in tight closing containers, only in places approved for explosives. Keep protected from warmth. By intermediate storing, for example in production stores, the water-content must be checked every week, especially by sunshine and hot weather.

8 Personal protection/Exposure controls

Engineering measures Must only be handled in rooms where water pouring is possible. Keep containers well closed. Working place and methods must be planned in such a way that direct contact with NC is avoided. No smoking, fire, sparks or welding. Prevent sparks caused by static electricity. Use explosion protected el-equipment.

Personal protection equipment

Respiratory protection Inhalation protection with dust-filter P2 is recommended at cleaning of rooms, machine equipment, transportators etc., which are swept by brushes, before pouring with water.

Hand protection Tightly lined gloves, of plastic or plastic gloves with cotton inside glove.

Eye protection Face screen or glasses with side-protection is recommended by cleaning.

Skin protection Flame-protection treated clothes, as close-fitted as possible, when direct contact is risked.

Specific hygienic measures

Further information Because of the explosion risk must the product be kept wetted.

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BOFORS

SAFETY DATA SHEET

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Issued by, Department, Telephone Birgitta Pettersson, XM3, 83535	Date 1999-03-29	Edison number 1	Document number
Product denomination Nitrocellulose NSC 830			

9 Physical and chemical properties

Appearance	Fibres
Colour	White
Odour	-
Decomposition point (°C)	Heated NC during a longer period of time decomposition can happen with a temperature > 100 °C.
Melting point/range (°C)	-
Flash point (°C)	-
Autoignition temperature (°C)	185 - 190 (Explosive temp.)
Explosion properties	Explosive
Boiling point/range (°C)	-
Relative density (kg/m ³)	~1160
Solubility in water	Insoluble
Solubility in other solvents	Ketones and esters.
Partition coefficient n-octanol/water	-
Other data	-

10 Stability and reactivity

Conditions to avoid	Risk for fire. Shock, friction, sparks, electrostatic electricity must be avoided. Must not be stored in temperatures higher than normal room temperature. Must be protected against getting dry.
Materials to avoid	Alkaline substances and strong acids.
Hazardous decomposition products	Nitrous gases.
Other information	

11 Toxicological information

LD ₅₀ oral rat	> 2000 mg/kg
Hazardous ingredients	No harmful effects known from available literature.

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BOFORS**SAFETY DATA SHEET**

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Issued by, Department, Telephone	Date	Revision number	Document number
Birgitta Pettersson, XM3, 83535	1999-03-29	1	
Product description			
Nitrocellulose NSC 830			

Immediate health effects	-
Delayed health effects	Not known
Acute toxicity	Not known
Chronic toxicity (long-term)	Not known
Carcinogenicity	-
Mutagenicity	-
Reproductive toxicity	-
Inhalation	Irritates the respiratory organs.
Skin	Irritates
Eye	Irritates
Ingestion	May cause headache.
Hygienic standards and recommendations	Swedish limit value not existing.

12 Ecological information

Microtox (mg/ml, LC ₅₀)/(mg/ml, EC ₅₀)	96-HR LC50, Brachydanio Rerio(Zebrafish) > 10000 mg/l
Mobility	-
Persistence degradability	28 days = 10 % at 10 mg/l, COD 0.463 g/g
Bioaccumulative potential	-
Aquatic toxicity and other data	-
Marine pollutant (IMDG Code)	-

13 Disposal considerations

Disposal of waste materials	Wastage, wetted with water, shall be collected and put in special container. At destruction experts shall be called upon. Contact fire-brigade.
Contaminated packaging	Must be disposed of in a safe way.

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BOFORS

SAFETY DATA SHEET

7 (7)

Issued by: <small>Department, Telephone</small> Birgitta Pettersson, XM3, 83535	Date 1999-03-29	Revision number 1	Document number
Product description Nitrocellulose NSC 830			

Symbols F, Extremely flammable.

Risk phrases R11, Highly flammable.

Safety phrases S16, Keep away from sources of ignition - No smoking.
S33, Take precautionary measures against static electricity.
S37, Wear suitable gloves.
S39, Wear eye/face protection.

16 Other information

References SAX'S DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS.
Arbetsarkyddsstyrelsens författningssamling 1993:9


**Material Safety
Data Sheets**

Division of Facilities Services

**DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only**
DIETHYL PHTHALATE, H944

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Composition/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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**Section 1 - Product and Company Identification
DIETHYL PHTHALATE, H944**

Product Identification: DIETHYL PHTHALATE, H944
Date of MSDS: 08/15/1996 **Technical Review Date:** 12/22/1997
FSC: 6810 **NIIN:** LIIN: 00N062225
Submitter: N EN
Status Code: C
MFN: 02
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: J.T. BAKER INC
Manufacturer's Address1: 222 RED SCHOOL LANE
Manufacturer's Address2: PHILLIPSBURG, NJ 08885-2219
Manufacturer's Country: US
General Information Telephone: 908-859-2151
Emergency Telephone: 800-424-6802;800-424-9300(CHEMTREC)
Emergency Telephone: 800-424-6802;800-424-9300(CHEMTREC)
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: JO091
Special Project Code: N

Contractor Information

Contractor's Name: J.T. BAKER INC
Contractor's Address1: 222 RED SCHOOL LANE
Contractor's Address2: PHILLIPSBURG, NJ 08885-2219
Contractor's Telephone: 908-859-2151
Contractor's CAGE: JO091

Contractor Information

Contractor's Name: MALLINCKRODT BAKER, INC. (FORMERLY J.T. BAKER INC)
Contractor's Address1: 222 RED SCHOOL LANE
Contractor's Address2: PHILLIPSBURG, NJ 08865-2219
Contractor's Telephone: 800-582-2537
Contractor's CAGE: 70829

Section 2 - Composition/Information on Ingredients
DIETHYL PHTHALATE, H944

Ingredient Name: PHTHALIC ACID, DIETHYL ESTER; (DIETHYL PHTHALATE) (SARA 313)
(CERCLA). LD50:(ORAL,RAT) 8600 MG/KG.
Ingredient CAS Number: 84-66-2 **Ingredient CAS Code:** M
RTECS Number: TI1050000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 99-100
% Environmental Weight:

Other REC Limits: N/K
OSHA PEL: 5 MG/M3 **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**
ACGIH TLV: 5 MG/M3 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1000 LBS
DOT Reporting Quantity: 1000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview DIETHYL PHTHALATE, H944

Health Hazards Acute & Chronic: ACUTE:INHALATION:IRRITATION OF MUCOUS MEMBRANES, COUGHING, DIFFICULT BREATHING, MAY CAUSE NARCOSIS. SKIN/EYE CONTACT:IRRITATION. SKIN ABSORPTION:NONE IDENTIFIED. INGESTION:IRRITATION OF MUCOUS MEMBRANES, HEADACHE, NAUSEA, VOMITING, DIZZINESS, GASTROINTESTINAL IRRITATION, CENTRAL NERVOUS SYSTEM DEPRESS.(EFTS OF OVEREXP)

Signs & Symptoms of Overexposure:
HLTH HAZ:CHRONIC:SOME REPORTS HAVE INDICATED THAT THIS SUBSTANCE MAY BE TERATOGENIC.

Medical Conditions Aggravated by Exposure:
NONE IDENTIFIED.

LD50 LC50 Mixture: SEE INGREDIENT 1.

Route of Entry Indicators:

Inhalation: YES

Skin: YES

Ingestion: YES

Carcinogenicity Indicators

NTP: NO

IARC: NO

OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures DIETHYL PHTHALATE, H944

First Aid:

INGEST:IF CONSCIOUS, IMMEDIATELY INDUCE VOMITING. INHAL:IF PERSON BREATHES IN LARGE AMOUNTS, MOVE EXPOSED PERSON TO FRESH AIR. SKIN:IMMEDIATELY WASH W/PLENTY OF SOAP & WATER FOR AT LEAST 15 MINUTES. E YES:IMMEDIATELY FLUSH W/PLENTY OF WATERFOR AT LEAST 15 MINUTES.

Section 5 - Fire Fighting Measures

DIETHYL PHTHALATE, H944

Fire Fighting Procedures:

USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N). MOVE CNTNRS FROM FIRE AREA IF IT CAN BE DONE W/OUT RISK. USE WATER TO KEEP FIRE-EXPOS CNTNRS COOL.

Unusual Fire or Explosion Hazard:

CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE.

Extinguishing Media:

USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

Flash Point: Flash Point Text: 322F,160C

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): 0.07%

Upper Limit(s): N/A

Section 6 - Accidental Release Measures
DIETHYL PHTHALATE, H944

Spill Release Procedures:

WEAR SUITABLE PROTECTIVE CLOTHING. TAKE UP W/SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL & PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH SPILL AREA W/WATER. REPORTABLE QUANTITY:1000 LBS.

Section 7 - Handling and Storage
DIETHYL PHTHALATE, H944

Handling and Storage Precautions:**Other Precautions:**

Section 8 - Exposure Controls & Personal Protection
DIETHYL PHTHALATE, H944

Respiratory Protection:

NIOSH APPROVED RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 25 PPM, A NIOSH APPROVED HIGH-EFFICIENCY PARTICULATE RESPIRATOR IS REC. ABOVE THIS LEVEL, A NIOSH APPROVED SCBA IS ADVISED.

Ventilation:

USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

Protective Gloves:

NEOPRENE GLOVES.

Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).

Other Protective Equipment: ANSI APPRVD EYE WASH FOUNTAIN & DELUGE SHOWER (FP N). UNIFORM & APRON ARE REC. LAB COAT. NOTE:WHEN HNDLG LIQ (SUPP DATA)

Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.

Supplemental Health & Safety Information: OTHER PROT EQUIP:PRODUCTS, SECONDARY

PROTECTIVE CONTAINERS MUST BE USED FOR CARRYING.

Section 9 - Physical & Chemical Properties
DIETHYL PHTHALATE, H944

HCC:

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: 568F,298C

Melting/Freezing Point: Melting/Freezing Text: -40F,-40C

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: <1 @ 20C **Vapor Density:** 7.6

Percent Volatile Organic Content:

Specific Gravity: 1.12 (H*2O=1)

Volatile Organic Content Pounds per Gallon:

pH: N/A

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: NOT APPLICABLE

Solubility in Water: NEGLIGIBLE (<0.1%)

Appearance and Odor: COLORLESS VISCOUS LIQUID; ODORLESS.

Percent Volatiles by Volume: 100

Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
DIETHYL PHTHALATE, H944

Stability Indicator: YES

Materials to Avoid:

STRONG OXIDIZING AGENTS, STRONG ACIDS, NITRIC ACID, STRONG BASES.

Stability Condition to Avoid:

HEAT, FLAME, OTHER SOURCES OF IGNITION.

Hazardous Decomposition Products:

CARBON MONOXIDE, CARBON DIOXIDE.

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

NOT RELEVANT

Section 11 - Toxicological Information
DIETHYL PHTHALATE, H944

Toxicological Information:

N/P

Section 12 - Ecological Information
DIETHYL PHTHALATE, H944

Ecological Information:

N/P

Section 13 - Disposal Considerations
DIETHYL PHTHALATE, H944

Waste Disposal Methods:

DISPOSE I/A/W ALL APPLICABLE FEDERAL, STATE & LOCAL ENVIRONMENTAL REGULATIONS. EPA HAZARDOUS WASTE NUMBER:U088 (TOXIC WASTE).

**Section 14 - MSDS Transport Information
DIETHYL PHTHALATE, H944**

Transport Information:N/P

**Section 15 - Regulatory Information
DIETHYL PHTHALATE, H944**

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:N/P

**Section 16 - Other Information
DIETHYL PHTHALATE, H944**

Other Information:

N/P

HAZCOM Label Information**Product Identification:** DIETHYL PHTHALATE, H944**CAGE:** JO091**Assigned Individual:** Y**Company Name:** J.T. BAKER INC**Company PO Box:****Company Street Address1:** 222 RED SCHOOL LANE**Company Street Address2:** PHILLIPSBURG, NJ 08885-2219 US**Health Emergency Telephone:** 800-424-6802;800-424-9300(CHEMTREC)**Label Required Indicator:** Y**Date Label Reviewed:** 12/22/1997**Status Code:** C**Manufacturer's Label Number:****Date of Label:** 12/22/1997**Year Procured:** N/K**Organization Code:** G**Chronic Hazard Indicator:** Y**Eye Protection Indicator:** YES**Skin Protection Indicator:** YES**Respiratory Protection Indicator:** YES**Signal Word:** WARNING**Health Hazard:** Moderate**Contact Hazard:** Moderate**Fire Hazard:** Slight**Reactivity Hazard:** None

DIETHYL PHTHALATE, H944

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**Material Safety
Data Sheets**

Division of Facilities Services

**DOD Hazardous Material Information (ANSI Format)
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104 0724 TRIACETIN

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
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**Section 1 - Product and Company Identification
104 0724 TRIACETIN**

Product Identification: 104 0724 TRIACETIN
Date of MSDS: 05/14/1986 **Technical Review Date:** 08/11/1998
FSC: 6810 **NIIN:** LIIN: 00F014969
Submitter: F BT
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: EASTMAN KODAK CO
Post Office Box: N/K
Manufacturer's Address1: 343 STATE ST
Manufacturer's Address2: ROCHESTER, NY 14650-1115
Manufacturer's Country: US
General Information Telephone: 716-724-6481/716-722-5151
Emergency Telephone: 716-722-5151/716-724-4501
Emergency Telephone: 716-722-5151/716-724-4501
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 19139
Special Project Code: N

Preparer Information

Preparer's Name: EASTMAN KODAK CO GOVERNMENT MARKETS CONTRACTS
Preparer's Address1: 343 STATE ST
Preparer's Address2: ROCHESTER, NY 14650-1115
Preparer's CAGE: 19139
Assigned Individual: N

Contractor Information

Contractor's Name: EASTMAN KODAK CO GOVERNMENT MARKETS CONTRACTS
Contractor's Address1: 343 STATE ST
Contractor's Address2: ROCHESTER, NY 14650-1115
Contractor's Telephone: 716-722-5151/(800) 242-2424
Contractor's CAGE: 19139

Section 2 - Composition/Information on Ingredients
104 0724 TRIACETIN

Ingredient Name: TRIACETIN *98-2*
Ingredient CAS Number: 102-76-1 **Ingredient CAS Code:** M
RTECS Number: AK3675000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 100
% Environmental Weight:

Other REC Limits: N/K
OSHA PEL: N/K **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**
ACGIH TLV: N/K **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
104 0724 TRIACETIN

Health Hazards Acute & Chronic: EYES: TRANSIENT IRRITATION.
INHALATION/INGESTION/SKIN: LOW HAZARD.

Signs & Symptoms of Overexposure:
IRRITATION

Medical Conditions Aggravated by Exposure:
N/K

LD50 LC50 Mixture: N/K

Route of Entry Indicators:
Inhalation: NO
Skin: NO
Ingestion: NO

Carcinogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NONE

Section 4 - First Aid Measures
104 0724 TRIACETIN

First Aid:
EYES: FLUSH W/PLENTY OF WATER. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Section 5 - Fire Fighting Measures
104 0724 TRIACETIN

Fire Fighting Procedures:
N/K
Unusual Fire or Explosion Hazard:
N/K
Extinguishing Media:
WATER SPRAY, DRY CHEMICAL, CO2, & ALCOHOL FOAM.

Flash Point: Flash Point Text: 308F

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/K

Upper Limit(s): N/K

Section 6 - Accidental Release Measures
104 0724 TRIACETIN

Spill Release Procedures:

ABSORB MATERIAL IN VERMICULITE/OTHER SUITABLE ABSORBENT & PLACE IN IMPERVIOUS CONTAINER.

Section 7 - Handling and Storage
104 0724 TRIACETIN

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
104 0724 TRIACETIN

Respiratory Protection:

N/K

Ventilation:

GOOD VENTILATION SHOULD BE SUFFICIENT.

Protective Gloves:

N/K

Eye Protection: SAFETY GLASSES

Other Protective Equipment: N/K

Work Hygenic Practices: N/K

Supplemental Health & Safety Information: N/K

Section 9 - Physical & Chemical Properties
104 0724 TRIACETIN

HCC:

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: 496F

Melting/Freezing Point: Melting/Freezing Text: N/K

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: 1 Vapor Density: N/K

Percent Volatile Organic Content:

Specific Gravity: 1.16

Volatile Organic Content Pounds per Gallon:

pH: N/K

Volatile Organic Content Grams per Liter:

Viscosity: N/P
Evaporation Weight and Reference: (N-BU AC = 1): <0.1
Solubility in Water: 1-10%
Appearance and Odor: COLORLESS LIQUID
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
104 0724 TRIACETIN

Stability Indicator: YES
Materials to Avoid:
STRONG OXIDIZERS
Stability Condition to Avoid:
N/K
Hazardous Decomposition Products:
CO₂ & CO.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
N/K

Section 11 - Toxicological Information
104 0724 TRIACETIN

Toxicological Information:
N/P

Section 12 - Ecological Information
104 0724 TRIACETIN

Ecological Information:
N/P

Section 13 - Disposal Considerations
104 0724 TRIACETIN

Waste Disposal Methods:
DISPOSE BY INCINERATION/CONTRACT W/LICENSED CHEMICAL WASTE DISPOSAL AGENCY. DISCHARGE, TREATMENT/DISPOSAL SHOULD BE IAW/LOCAL, STATE & FEDERAL REGULATIONS.

Section 14 - MSDS Transport Information
104 0724 TRIACETIN

Transport Information:
N/P

Section 15 - Regulatory Information
104 0724 TRIACETIN

SARA Title III Information:
N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
104 0724 TRIACETIN

Other Information:

N/P

HAZCOM Label Information

Product Identification: 104 0724 TRIACETIN

CAGE: 19139

Assigned Individual: N

Company Name: EASTMAN KODAK CO GOVERNMENT MARKETS CONTRACTS

Company PO Box:

Company Street Address1: 343 STATE ST

Company Street Address2: ROCHESTER, NY 14650-1115 US

Health Emergency Telephone: (716) 722-5151

Label Required Indicator: Y

Date Label Reviewed: 12/16/1998

Status Code: C

Manufacturer's Label Number:

Date of Label: 12/16/1998

Year Procured: N/K

Organization Code: G

Chronic Hazard Indicator: N/P

Eye Protection Indicator: N/P

Skin Protection Indicator: N/P

Respiratory Protection Indicator: N/P

Signal Word: N/P

Health Hazard:

Contact Hazard:

Fire Hazard:

Reactivity Hazard:

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ENSIGN-BICKFORD CO -- LEAD DIAZIDE

MSDS Safety Information

MSDS Date: 03/12/1993
MSDS Num: CKLHH
Product ID: LEAD DIAZIDE
MFN: 01
Responsible Party
Cage: 96336
Name: ENSIGN-BICKFORD CO
Address: 660 HOPMEADOW STREET
Box: 483
City: SIMSBURY CT 06070-0483
Info Phone Number: 203-843-2276
Emergency Phone Number: 203-658-441
Preparer's Name: T A SHREVE
Review Ind: Y
Published: Y

Contractor Summary

Cage: 96336
Name: ENSIGN-BICKFORD CO
Address: 660 HOPMEADOW STREET
Box: 483
City: SIMSBURY CT 06070-0483
Phone: 1-801-798-8613

Ingredients

Cas: 13424-46-9
RTECS #: OF8650000
Name: LEAD AZIDE (PB(N3)2)
Percent by Wt: 91.5
OSHA PEL: 50 MG/M3 (PB)
ACGIH TLV: 0.15 MG/M3 (PB)

Health Hazards Data

Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: YES
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO

Effects of Exposure: EYE CONTACT: MAY CAUSE IRRITATION, POSSIBLE CORNEAL INJURY. SKIN CONTACT: EXPOSURE MAY CAUSE IRRITATION & DERMATITIS. INHALATION: MAY CAUSE NASAL & RESPIRATORY IRRITATION. INGESTION: MAY BE FATAL OR CAUSE POISONING IF INGESTED. TOXICITY OF LEAD AZIDE HAS BEEN LINKED TO AZOMIDE RADICAL AS WELL AS PRESENCE OF LEAD. MAJOR SYMPTOMS OF AZIDE POISONING ARE SEVERE HYPOTENSION & PARALYSIS. SYMPTOMS OF LEAD POISONING INCLUDE LOSS OF APPETITE, ANEMIA, SLEEP DISORDERS, & FATIGUE. CHRONIC: LEAD AZIDE APPEARS ON NAVY LISTING OF OCCUPATIONAL CHEMICAL REPRODUCTIVE HAZARDS. SEEK CONSULTATION FROM APPROPRIATE HEALTH (EFTS OF OVEREXP)

Explanation Of Carcinogenicity: LEAD OXIDE IS NOT LISTED AS A POTENTIAL CARCINOGEN BY (NTP) (IARC) (OSHA).

Signs And Symptoms Of Overexposure: HLTH HAZ: PROFESSIONALS CONCERNING LATEST HAZARD LIST INFORMATION AND SAFE HANDLING AND EXPOSURE INFORMATION (FP N). THRESHOLD LIMIT VALUE: 0.15 MG/M3 AS LEAD (PB) (ACGIH).

First Aid: EYE CONTACT: FLUSH IMMEDIATELY UNDER RUNNING WATER FOR AT LEAST FIFTEEN MINUTES, SEEK MEDICAL ATTENTION. SKIN CONTACT: FLUSH IMMEDIATELY UNDER RUNNING WATER FOR AT LEAST FIFTEEN MINUTES. IF SKIN IRRITATION OCCURS, SEEK MEDICAL ATTENTION. INHALATION: MOVE VICTIM TO FRESH AIR. GIVE ARTIFICIAL RESPIRATION IF BREATHING HAS STOPPED. SEEK MEDICAL ATTENTION IMMEDIATELY. INGESTION: IF INGESTED, INDUCE VOMITING IMMEDIATELY BY STICKING FINGER DOWN VICTIM'S THROAT! SEEK MEDICAL ATTENTION IMMEDIATELY.

Handling and Disposal

Spill Release Procedures: ISOLATE SPILL AREA, KEEP ALL SOURCES OF IGNITION AWAY FROM SPILL, & EVACUATE ALL NON-ESSENTIAL PERS TO SAFE DISTANT LOCATION.

REMOVE ALL EXPLOSIVES THAT WERE NOT INVOLVED IN SPILL FROM SPILL AREA. LEAD AZIDE IS EXTREMELY SENSITIVE EXPLOSIVE. IT IS POSSIBLE TO STEP ON LEAD AZIDE & HAVE IT DETONATE. DO NOT MOVE UNLESS THERE IS CLEAR PATH AWAY FROM SPILL AREA. SPILLED LEAD AZIDE SHOULD BE (SUPDAT) Waste Disposal Methods: WASTE LEAD AZIDE SHOULD BE CHEMICALLY DESTROYED USING 20% CERRIC AMMONIUM NITRATE & H*2O KILLING SOLN. THOROUGHLY POUR LIBERAL AMTS OF KILLING SOLN OVER EXCESS LEAD AZIDE. RSLTG CHEM RXN WILL LIBERATE HYDRAZOIC ACID (HN*3). USE NIOSH APPRVD SCBA/USE WELL VENT AREA TO PVNT INHAL OF FUMES. ALTHOUGH RS LTG SOLN IS NOT EXPLOSIVE IT SHOUD BE (OTHER INFO)
Handling And Storage Precautions: HANDLE AND STORE IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS AND INDUSTRY PRACTICES GOVERNING CLASS A PRIMARY (INITIATING)/HAZARD CLASS 1.1A EXPLOSIVE (SEE REACTIVITY DATA SECTION).
Other Precautions: LEAD AZIDE WILL ALWAYS BE SHIPPED WET WITH A MINIMUM OF 20% AQUEOUS ETHANOL (CAS 64-17-5) DENATURED WITH METHANOL (CAS 67-56-1). REFER TO THE ENCLOSED MATERIAL DATA SHEETS FOR THE PROPERTIES OF THESE MATERIALS IF APPLICABLE.

Fire and Explosion Hazard Information

Autoignition Temp: =275.C, 527.F
Extinguishing Media: MEDIA SUITABLE FOR SURROUNDING FIRE (FP N). AUTO IGNITION
TEMP: 275C (527F) MINIMUM TEMPERATURE FOR IGNTION IN 5 SECONDS FOR DEXTRINATED LEAD AZIDE. U S ARMY REFERENCE.
Fire Fighting Procedures: USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N). DO NOT FIGHT FIRES INVOLVING LEAD AZIDE!
PRODUCT IS A PRIMARY (INITIATING) EXPLOSIVE AND MAY DETONATE WHEN EXPOSED TO HEAT OR FLAMES. ISOLAT E THE AFFECTED AREA AND EVACUATE ALL PERSONNEL TO A DISTANT,

SAFE AREA.

Unusual Fire/Explosion Hazard: LEAD AZIDE IS PRIMARY (INITIATING) EXPLO.
THIS

PROD IS LIKELY TO DETONATE WHEN EXPOSED TO SHOCK, HEAT,
IMPACT, ELECTROSTATIC
DISCHARGE (SPARKS)/FRICTION. PROD SHOULD BE HANDLED ONLY BY
QUALIFIED INDIV
IDUALS WHO ARE THOROUGHLY FAMILIAR W/PROPER PRIMARY
EXPLOSIVES HANDLING
PROCS. HAZ GASES (LEAD VAP, HYDRAZOIC (TOX INFO))

Control Measures

Respiratory Protection: NIOSH APROVED DUST RESPIRATOR SHOULD BE WORN
WHEN

HANDLING DRY LEAD AZIDE. NIOSH APPROVED ORGANIC VAPOR
RESPIRATOR SHOULD BE
USED WHEN HANDLING WET LEAD AZIDE.

Ventilation: LOCAL EXHAUST: NONE REC DUE TO EXPLOSION HAZ. SPECIAL:
FOR

ADDITIONAL INFO ON LEAD SEE 29 CFR 1910.1025. MECH: EXHAUST VENT
REC TO MIN
EMPLOYEE EXPOSURE.

Protective Gloves: BUTYL RUBBER GLOVES.

Eye Protection: ANSI APPROVED CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: EYE WASH & DELUGE SHWR MTG ANSI DESIGN
CRITERIA (FP

N). COTTON COVERALLS TO PROTECT AGAINST EMPLOYEE CONT WLEAD
AZIDE; SHOULD BE

REPLACED WHEN CONTAM. CONDUCTIVE FOOTWEAR & FLOORING IS
ALSO RECOMMENDED.

Work Hygienic Practices: PHYSICAL DATA: DENSITY: 4.38 GM/CM3.

Supplemental Safety and Health: SPILL PROC: CAREFULLY WIPED UP
LIBERALLY USING

SOPON & H*2O SOLN/KILLED W/KILLING SOLN OF 1 PART CERRIC
AMMONIUM NITRATE

& 6 PARTS H*2O (APPROX 20%). DISPOSE OF SOPON/H*2O SOLN BY
ADDING ABOVE

REFEREN CED KILLING SOLN. TREAT ALL MATL TREATED W/KILLING
SOLN AS LEAD (PB)

WASTE. ALWAYS KILL LEAD AZIDE IN (OTHER INFO)

Physical/Chemical Properties

Melt/Freeze Pt: >275.C, 527.F

M.P/F.P Text: EXPLODES

Spec Gravity: 4.38
Solubility in Water: SLIGHT (0.02% @ 18C (64F)
Appearance and Odor: WHITE TO LIGHT BUFF CRYSTALS, ODORLESS.

Reactivity Data

Stability Indicator: YES
Stability Condition To Avoid: DO NOT STORE AT TEMP >66C (150F). ALWAYS SHIP & STORE BULK LEAD AZIDE WET W/ALCOHOL TO PVNT FREEZING. EXPOS TO SHOCK, HEAT, SPKS, PRESS/IMPACT MAY RSLT IN (ECOLOGICAL INFO)
Materials To Avoid: COPPER AND COPPER ALLOYS, SILVER, MERCURY, CADMIUM NICKEL, ACIDS, AND OXIDANTS.
Hazardous Decomposition Products: IN PRESENCE OF MOISURE (H*2O), LEAD AZIDE REACTS W/COPPER (CU) & COPPER BEARING ALLOYS TO FORM UNSTABLE BY-PRODUCTS.
LEAD AZIDE SHOULD NOT BE MFRD, STORED/LOADED IN COPPER/COPPER ALLOY (TOX INFO)
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: WILL NOT OCCUR.

Toxicological Information

Toxicological Information: N/P. HAZ DECOMP PROD: CONTAINERS (I.E. BRASS OR BRONZE). HAZARADOUS DECOMPOSITION GASES ARE LEAD VAPOR AND HYPRAZOIC ACID (HN*3). EXPLO HAZ: ACID, & NITROGEN OXIDES (NO*X'S) MAY BE RELEASED WHEN LEAD AZIDE BURNS OR DETONATES. IF LEAD AZIDE IS EXPOSED TO FIRE AND IT DOES NOT DETONATE, IT WILL BURN VIGOROUSLY.

Ecological Information

Ecological: N/P. DETONATION. (ENERGY VALUES AS LOW AS 2X10 JOULES HAVE BEEN SHOWN TO INITIATE LEAD AZIDE W/METAL TO METAL CNTCT IN LAB EXPERIMENTS).

MSDS Transport Information

Transport Information: SHIPPING INFORMATION: SHIPPING NAME: LEAD AZIDE. HAZARD CLASS: 1.14. UN NO.: 0129. LABEL: EXPLOSIVE. SPECIAL: LEAD AZIDE, WETTED, FORBIDDEN.

Regulatory Information

Sara Title III Information: SARA 313 NOTIFICATION: "THIS PRODUCT CONTAINS LEAD & LEAD COMPOUNDS THAT ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 TITLE III OF THE SUPERFUND AMENDMENT AND REAUTHORIZATION ACT OF 1986 4 0 CR PART 372."

State Regulatory Information: CALIFORNIA PROPOSITION 65 NOTIFICATION: "LEAD & LEAD COMPOUNDS ARE LISTED ON CALIFORNIA SAFE DRINKING WATER & TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) AS A CHEMICAL KNOWN TO THE STATE TO CAUSE CANCER. LEAD IS LISTED AS A CHEMICAL KNOWN TO THE STATE TO CAUSE REPRODUCTIVE TOXICITY."

Other Information

Other Information: CHEM NAME: LEAD AZIDE. CHEM FAMILY: METAL SALT OF INORGANIC ACID. FORMULA: $Pb(N_3)_2$. SUPDAT: WELL VENT AREA/USE NIOSH APPROVED SCBA TO PREVENT INHALATION OF HYDRAZOIC ACID (HN_3) FUMES. WASTE DISPOSAL METHOD: TREATED AS LEAD (Pb) WASTE. LEAD WASTE IS HAZARDOUS WASTE AS DEFINED UNDER RCRA REGULATIONS, & MUST BE DISPOSED OF AT PROPERLY PERMITTED TREATMENT/STORAGE/DISPOSAL FACILITY (TSD). LEAD AZIDE DISPOSAL & ALL RELATED, REGULATED ACTIVITIES, (INCLUDING BUT NOT LIMITED TO HANDLING, LABELING, PACKAGING, STORAGE, AND TRANSPORTATION MUST BE PERFORMED IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL LAWS & REGULATIONS.

HAZCOM Label

Product ID: LEAD DIAZIDE
Cage: 96336
Company Name: ENSIGN-BICKFORD CO
Street: 660 HOPMEADOW STREET
PO Box: 483
City: SIMSBURY CT
Zipcode: 06070-0483
Health Emergency Phone: 203-658-441
Label Required IND: Y
Date Of Label Review: 05/11/2000
Status Code: A
Origination Code: F
Chronic Hazard IND: Y
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: DANGER
Respiratory Protection IND: YES
Health Hazard: Moderate
Contact Hazard: Moderate
Fire Hazard: Slight
Reactivity Hazard: Severe
Hazard And Precautions: EXPLOSIVE! ACUTE: EYE CONTACT: MAY CAUSE IRRITATION,
POSSIBLE CORNEAL INJURY. SKIN CONTACT: EXPOSURE MAY CAUSE IRRITATION &
DERMATITIS. INHALATION: MAY CAUSE NASAL & RESPIRATORY IRRITATION.
INGESTION: MAY BE FATAL OR CAUSE POISONING IF INGESTED.
TOXICITY OF LEAD
AZIDE HAS BEEN LINKED TO AZOMIDE RADICAL AS WELL AS PRESENCE OF LEAD. MAJOR
SYMPTOMS OF AZIDE POISONING ARE SEVERE HYPOTENSION & PARALYSIS . SYMPTOMS
OF LEAD POISONING INCLUDE LOSS OF APPETITE, ANEMIA, SLEEP DISORDERS,&
FATIGUE. CHRONIC: LEAD AZIDE APPEARS ON NAVY LISTING OF OCCUPATIONAL CHEMICAL
REPRODUCTIVE HAZARDS (FP N).

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States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

SPRAYLAT CORP

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MSDS Safety Information
=====

FSC: 8030
MSDS Date: 01/12/1993
MSDS Num: BWZBJ
LIIN: 00N057955
Product ID: SC-1073 BLUE
MFN: 01
Responsible Party
Cage: 87354
Name: SPRAYLAT CORP
Address: 716 SOUTH COLUMBUS AVE
City: MT VERNON NY 10550
Info Phone Number: 914-699-3030
Emergency Phone Number: 800-424-9300 (CHEMTREC)
Preparer's Name: MICHAEL A SPATH
Published: Y

=====
Contractor Summary
=====

Cage: 87354
Name: SPRAYLAT CORPORATION
Address: 716 SOUTH COLUMBUS AVENUE
City: MT. VERNON NY 10550
Phone: 914-699-3030;310-559-2335

=====
Ingredients
=====

Cas: 56189-09-4
Name: LEAD STEARATE (SARA 313) (CERCLA)
% WT: <10
OSHA PEL: SEE 1910.1025
ACGIH TLV: 0.15 MG(PB)/M3

Cas: 1317-80-2
RTECS #: VM2940000
Name: RUTILE; (TITANIUM DIOXIDE)
% WT: <10
OSHA PEL: 10 MG/M3 TDUST Z1A
ACGIH TLV: 10 MG/M3 8990

Name: HLTH HAZ: CONSULT FROM APPROP HLTH PROFESSIONALS CONCERNING LATEST HAZ LIST INFO & SAFE HNDLG & EXPOS INFO (FP N).

Name: FIRST AID: BY A PHYSICIAN. CONTACT A PHYSICIAN IMMEDIATELY.

Name: RESP PROT: APPRVD) DURING & AFTER APPLICATN UNLESS AIR MONITORING DEMONSTRATES VAP/MIST LEVELS ARE BELOW

Name: RESP PROT: APPLICABLE LIMITS. FOLLOW RESP MFR DIRECTIONS FOR USE.

Name: PROT GLOVES: CONT. WEAR RESIST GLOVES SUCH AS NATRL RUB, NEOPRENE, BUNA N/NITRILE.

Name: VENT: NIOSH/MSHA APPROVED RESP TO PREVENT OVEREXPOS. FOR ING 1, SEE OSHA STD. 29 CFR 1910-1025.

Name: SPILL PROC: NOTIFY LOCAL HEALTH & POLLUTION CONTROL AGENCIES. CALL SPILL RESPONSE TEAMS IF SPILL IS LARGE.

Name: SPILL PROC: DO NOT FLUSH TO SEWER, WATERSHED OR WATERWAY.

lead stearate.txt

Name: FIRE FIGHT PROC: SAFE DISTANCE OR A PROTECTED LOCATION.
=====

Health Hazards Data
=====

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route Of Entry Inds - Inhalation: YES

Skin: YES

Ingestion: YES

Carcinogenicity Inds - NTP: NO

IARC: NO

OSHA: NO

Effects of Exposure: ING 1: CHRONIC OVEREXP OR INGEST MAY CAUSE POSS KIDNEY DMG, CNS DEPRESS/DISORDER, DELAYED EFTS INVOLVING BLOOD, GI, NERV & REPRO SYS, HDCH, NAUS, VOMIT, DIZZ/LOSS OF CONSCIOUSNESS, REPROD SYS DMG IN SOME LAB ANIMALS, TESTICULAR INJURY. MAYCAUSE APPETITE LOSS. INGEST/EXCESSIVE INHAL MAY BE FATAL.

Explanation of Carcinogenicity: NOT RELEVANT.

Signs And Symptoms Of Overexposure: MAY RESULT IN TOXIC LEAD LEVELS IN BODY. SEE OSHA STD 29 CFR 1910.1025. MAY CAUSE NOSE, THROAT & UPPER RESP TRACT IRRIT. SPRAY MIST/VAPS OF SPRAY PAINTS MAY CAUSE IRRIT TO THE EYES, NOSE, THROAT, UPPER RESP TRACT, MUCOUS MEMBRANES & SKIN. INGEST WILL AT FIRST ACT AS A STIMULANT, FOLLOWED BY SYMP OF MENTAL (SUP DAT)

Medical Cond Aggravated By Exposure: NONE SPECIFIED BY MANUFACTURER.

First Aid: EYES: FLUSH W/LUKE WARM WATER FOR AT LEAST 15 MIN. SEEK MD IMMED. SKIN: FLUSH W/COPIOUS AMTS OF LUKE WARM WATER. REMOVE CONTAM CLTH PROMPTLY. CONT MD IMMED. INHAL: REMOVE EXPOS PERS TO FRESH AIR. REST OR BRTHG IF REQUIRED. CONT MD IMMED. INGEST: RINSE MOUTH IMMED. GIVE EXPOS PERS 6 TO 8 OUNCES OF LIQUID. (NEVER GIVE ANYTHING BY MOUTH TO UNCONSCIOUS PERS). DO NOT INDUCE VOMIT UNLESS ADVISED

Handling and Disposal
=====

Spill Release Procedures: STAY UPWIND & AWAY FROM SPILL UNLESS WEARING APPROPRIATE PROT EQUIP. STOP &/CONTAIN DISCHARGE IF IT MAY BE DONE SAFELY. KEEP ALL IGNITION SOURCES AWAY. VENT AREA OF SPILL. KEEP OUT OF DRAINS, SEWERS/WATERWAYS. CONT FIRE AUTH.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Methods: DISPOSE OF PRODUCT IN ACCORDANCE WITH APPLICABLE LOCAL, COUNTY, STATE AND FEDERAL REGULATIONS.

Handling And Storage Precautions: KEEP PROD CONTRS COOL & DRY. USE & STORE THIS PROD W/ADEQUATE VENT. DO NOT SMOKE IN STOR AREAS. KEEP CONTRS TIGHTLY CLOSED WHEN NOT IN USE.

Other Precautions: PERS SHOULD AVOID INHAL OF VAPS/MIST. PERS CONT W/PROD SHOULD BE AVOIDED. CONTRS OF THIS MATL MAY BE HAZ WHEN EMPTIED. EMPTIED CONTRS RETAIN PROD RESIDUES (VAP, LIQUID, &/SOLID), OBSERVE ALL HAZARD PRECAUTIONS.

Fire and Explosion Hazard Information
=====

Extinguishing Media: CARBON DIOXIDE, DRY CHEMICALS, FOAM OR WATER FOG.

Fire Fighting Procedures: WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP (FPN). CLEAR FIRE AREA OF UNPROT PERS. DO NOT ENTER CONFINED SPACE WITHOUT PERMISSION. FIGHT FIRE FROM A

Unusual Fire/Explosion Hazard: NONE SPECIFIED BY MANUFACTURER.
=====

Control Measures
=====

Respiratory Protection: USE NIOSH/MSHA APPRVD DUST MASK/RESPIRATOR IF CONC IS HIGH. BASED ON ING 1, SEE OSHA STD. 29 CFR 1910.1025 FOR APPROP RESP & OTHER PROT EQUIP. DO NOT BRTH MIST/VAPS OF ANY SPRAY PAINT. WEAR APPROP, PROPERLY FITTED RESP (NIOSH/MSHA)

Ventilation: USE AS REQUIRED TO CONTROL VAP/DUST/MIST CONC. AVOID

Lead stearate.txt

PRLNG/REPEATED BRTH OF VAPS. IF EXPOS EXCEEDS TLV USE A
Protective Gloves: REQUIRED FOR PROLONGED/REPEATED
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGLES (FP N).
Other Protective Equipment: EYEWASH STATIONS & SAFETY SHOWERS SHOULD BE READILY
AVAILABLE IN USE & HANDLING AREAS. WEAR APRON TO AVOID SKIN CONT.
Work Hygienic Practices: WASH HANDS THORO BEFORE EATING & USING WASHROOM.
REMOVE CONTAMD CLTHG IMMED & DO NOT REUSE UNTIL PROPERLY LAUNDERED.
Supplemental Safety and Health: HLTH HAZ: EXCITEMENT, DEPRESS, DROW, IMPAIRED
VISION, ATAXIA, & STUPOR AS INTAKE LEVEL IS INCR. LGE DOSES CAN AFFECT GI
TRACT & CNS. ING 2: MAY CAUSE LUNG INJURY, IRRIT, DRYING, CRACKING/DERM
ON PRLNG EXPOS TO SKIN. NOTE: LEAD APPEARS ON THE NAVY LISTING OF
OCCUPATIONAL CHEMICAL REPRODUCTIVE HAZARDS. SEEK

=====
Physical/Chemical Properties
=====

B.P. Text: >200F,>93C
Spec Gravity: 1.04 (FPN)
Solubility in Water: SOLUBLE
Appearance and Odor: BLUE LIQUID WITH MILD ODOR.
=====

Reactivity Data
=====

Stability Indicator: YES
Stability Condition To Avoid: AVOID EXPOSURE TO SPARKS, OPEN FLAME, HOT
SURFACES, & ALL SOURCES OF HEAT & IGNITION.
Materials To Avoid: BASED ON INGREDIENT 2 THIS PRODUCT IS INCOMPATIBLE WITH
STRONG OXIDIZERS. MAY CAUSE FIRE OR EXPLOSION ON CONTACT.
Hazardous Decomposition Products: IN PRESENCE OF AIR MAY YIELD CO &/CO*2. BASED
ON INGRED 1 MAY FORM LEAD/CHROMIUM OXIDES.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NOT RELEVANT.
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Toxicological Information
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Ecological Information
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MSDS Transport Information
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Regulatory Information
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Other Information
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HAZCOM Label
=====

Product ID: SC-1073 BLUE
Cage: 87354
Company Name: SPRAYLAT CORPORATION
Street: 716 SOUTH COLUMBUS AVENUE
City: MT. VERNON NY
Zipcode: 10550
Health Emergency Phone: 800-424-9300 (CHEMTREC)
Label Required IND: Y
Date of Label Review: 03/10/1995
Status Code: C
Label Date: 03/10/1995
Origination Code: G
Chronic Hazard IND: Y
Eye Protection IND: YES

Lead stearate.txt

Skin Protection IND: YES

Signal Word: WARNING

Respiratory Protection IND: YES

Health Hazard: Moderate

Contact Hazard: Slight

Fire Hazard: None

Reactivity Hazard: None

Hazard And Precautions: ACUTE: LOSS OF APPETITE, CNS DEPRESSION, LUNG INJURY, IRRITATION OF EYES, NOSE, THROAT, UPPER RESP TRACT, MUCOUS MEMBRANES & SKIN. INGEST: CAN BE FATAL. CHRONIC: LEAD APPEARS ON THE NAVY OCCUPATION CHEMICAL REPRODUCTIVE HAZARDS LIST (FP N). INGEST: KIDNEY DAMAGE, CNS DEPRESSION/DISORDER. OVEREXPOSURE MAY CAUSE BLOOD & GI EFFECTS, HEADACHE, NAUSEA, VOMITING, DIZZINESS/LOSS OF CONSCIOUSNESS.

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**Material Safety
Data Sheets**

Division of Facilities Services

**DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only**

2-NITRODIPHENYLAMINE, 98%, 157171

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Composition/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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**Section 1 - Product and Company Identification
2-NITRODIPHENYLAMINE, 98%, 157171**

Product Identification: 2-NITRODIPHENYLAMINE, 98%, 157171

Date of MSDS: 09/07/1993 **Technical Review Date:** 07/07/1994

FSC: 6810 **NIIN:** LIIN: 00N050296

Submitter: N EN

Status Code: C

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: ALDRICH CHEMICAL CO INC
Post Office Box: 355
Manufacturer's Address1:
Manufacturer's Address2: MILWAUKEE, WI 53201
Manufacturer's Country: US
General Information Telephone: 414-273-3850
Emergency Telephone: 414-273-3850
Emergency Telephone: 414-273-3850
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 60928
Special Project Code: N

Contractor Information

Contractor's Name: ALDRICH CHEMICAL CO INC
Post Office Box: 355
Contractor's Address1: 1001 WEST ST PAUL AVE
Contractor's Address2: MILWAUKEE, WI 53233
Contractor's Telephone: 414-273-3850
Contractor's CAGE: 60928

Section 2 - Compositon/Information on Ingredients
2-NITRODIPHENYLAMINE, 98%, 157171

Ingredient Name: 2-NITRODIPHENYLAMINE
Ingredient CAS Number: 119-75-5 **Ingredient CAS Code:** M
RTECS Number: RTECS Code: X
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 98
% Environmental Weight:
Other REC Limits: N/K
OSHA PEL: N/K (FP N) **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**
ACGIH TLV: N/K (FP N) **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:

Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
2-NITRODIPHENYLAMINE, 98%, 157171

Health Hazards Acute & Chronic: ACUTE:MAY BE HARMFUL BY INHALATION, INGESTION OR SKIN ABSORPTION. CAUSES EYE & SKIN IRRITATION. MATERIAL IS IRRITATING TO MUCOUS MEMBRANES & UPPER RESPIRATORY TRACT. TO THE BEST OF MFR'S KNOWLEDGE, THE CHEMICAL, PHYSICAL & TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:

Inhalation: YES
Skin: YES
Ingestion: YES

Carcinogenicity Indicators

NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures
2-NITRODIPHENYLAMINE, 98%, 157171

First Aid:

EYES:IMMEDIATELY FLUSH W/COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SKIN:IMMEDIATELY WASH W/SOAP & COPIOUS AMOUNTS OF WATER. WASH CONTAMINATED CLOTHING BEFORE REUSE. INHAL:REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. INGEST:WASH OUT MOUTH W/WATER PROVIDED PERSON IS CONSCIOUS. CALL MD.

Section 5 - Fire Fighting Measures
2-NITRODIPHENYLAMINE, 98%, 157171

Fire Fighting Procedures:

USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire or Explosion Hazard:

EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

Extinguishing Media:

WATER SPRAY, CARBON DIOXIDE, DRY CHEMICAL POWDER OR APPROPRIATE FOAM.
Flash Point: **Flash Point Text:** N/K

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): N/K
Upper Limit(s): N/K

Section 6 - Accidental Release Measures
2-NITRODIPHENYLAMINE, 98%, 157171

Spill Release Procedures:
WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS & HEAVY RUBBER GLOVES.
SWEEP UP, PLACE IN A BAG & HOLD FOR WASTE DISPOSAL. AVOID RAISING DUST.
VENTILATE AREA & WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

Section 7 - Handling and Storage
2-NITRODIPHENYLAMINE, 98%, 157171

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
2-NITRODIPHENYLAMINE, 98%, 157171

Respiratory Protection:
NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation:
MECHANICAL EXHAUST REQUIRED.
Protective Gloves:
RUBBER GLOVES.
Eye Protection: ANSI APPROVD CHEM WORKER GOGGLES (FP N).
Other Protective Equipment: EMERGENCY EYE WASH AND DELUGE SHOWER WHICH MEET ANSI DESIGN CRITERIA (FP N).
Work Hygenic Practices: WASH THOROUGHLY AFTER HANDLING.
Supplemental Health & Safety Information: NONE SPECIFIED BY MANUFACTURER.

Section 9 - Physical & Chemical Properties
2-NITRODIPHENYLAMINE, 98%, 157171

HCC:
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: **Boiling Point Text:** N/K
Melting/Freezing Point: **Melting/Freezing Text:** >165F,>74C
Decomposition Point: **Decomposition Text:** N/K
Vapor Pressure: N/K **Vapor Density:** 10.7
Percent Volatile Organic Content:
Specific Gravity: N/K

Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/K
Solubility in Water: N/K
Appearance and Odor: RED-ORANGE CRYSTALS.
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
2-NITRODIPHENYLAMINE, 98%, 157171

Stability Indicator: YES
Materials to Avoid:
STRONG OXIDIZING AGENTS, STRONG ACIDS, STRONG BASES.
Stability Condition to Avoid:
NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:
TOXIC FUMES OF: CARBON MONOXIDE, CARBON DIOXIDE, NITROGEN OXIDES.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT

Section 11 - Toxicological Information
2-NITRODIPHENYLAMINE, 98%, 157171

Toxicological Information:
N/P

Section 12 - Ecological Information
2-NITRODIPHENYLAMINE, 98%, 157171

Ecological Information:
N/P

Section 13 - Disposal Considerations
2-NITRODIPHENYLAMINE, 98%, 157171

Waste Disposal Methods:
DISSOLVE OR MIX THE MATERIAL W/COMBUSTIBLE SOLVENT & BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AFTERBURNER & SCRUBBER. OBSERVE ALL FEDERAL, STATE & LOCAL ENVIRONMENTAL REGULATIONS.

Section 14 - MSDS Transport Information
2-NITRODIPHENYLAMINE, 98%, 157171

Transport Information:
N/P

Section 15 - Regulatory Information
2-NITRODIPHENYLAMINE, 98%, 157171

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
2-NITRODIPHENYLAMINE, 98%, 157171

Other Information:

N/P

HAZCOM Label Information

Product Identification: 2-NITRODIPHENYLAMINE, 98%, 157171

CAGE: 60928

Assigned Individual: N

Company Name: ALDRICH CHEMICAL CO INC

Company PO Box: 355

Company Street Address1: 1001 WEST ST PAUL AVE

Company Street Address2: MILWAUKEE, WI 53233 US

Health Emergency Telephone: RUBBER GLOVES.

Label Required Indicator: Y

Date Label Reviewed: 07/07/1994

Status Code: C

Manufacturer's Label Number:

Date of Label: 07/07/1994

Year Procured: N/K

Organization Code: G

Chronic Hazard Indicator: N

Eye Protection Indicator: N/P

Skin Protection Indicator: N/P

Respiratory Protection Indicator: N/P

Signal Word: CAUTION

Health Hazard: Slight

Contact Hazard: Slight

Fire Hazard: None

Reactivity Hazard: None

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Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

H2SO4

Section 1 - Product and Company Identification Section 9 - Physical & Chemical Properties
Section 2 - Composition/Information on Ingredients Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview Section 11 - Toxicological Information
Section 4 - First Aid Measures Section 12 - Ecological Information
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Section 6 - Accidental Release Measures Section 14 - MSDS Transport Information
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Section 1 - Product and Company Identification

H2SO4

Product Identification: H2SO4
Date of MSDS: 01/01/1987 Technical Review Date: 08/12/1986
FSC: 6810 NIIN: 00-551-5231
Submitter: F BT
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: NATIONAL ZINC CO
Manufacturer's Address1:
Manufacturer's Address2: BARTLESVILLE, OK 74003
Manufacturer's Country: NK
General Information Telephone: 918-336-7100
Emergency Telephone: 918-336-7100
Emergency Telephone: 918-336-7100
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 91963
Special Project Code: N

Item Description

1 Item Name: SULFURIC ACID,ELECTROLYTE
2 Item Manager: S9G
3 Specification Number: O-S-801
4 Type/Grade/Class: 1 CL
5 Unit of Issue: DR Quantitative Expression: 10000000065GL
6 Unit of Issue Quantity: 1
7 Type of Container: DRUM

8
9 Contractor Information

10 Contractor's Name: NATIONAL ZINC CO
11 Contractor's Address1: UNKNOWN
12 Contractor's Address2: BARTLESVILLE, OK 74003
13 Contractor's Telephone: 918-336-7100
14 Contractor's CAGE: 91963

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18 Section 2 - Compositon/Information on Ingredients

19 H2SO4

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21 -----

22 Ingredient Name: SULFURIC ACID (SARA III)
23 Ingredient CAS Number: 7664-93-9 Ingredient CAS Code: M
24 RTECS Number: WS5600000 RTECS Code: M
25 =WT: =WT Code:
26 =Volume: =Volume Code:
27 >WT: >WT Code:
28 >Volume: >Volume Code:
29 <WT: <WT Code:
30 <Volume: <Volume Code:

1 % Low WT: % Low WT Code:
2 % High WT: % High WT Code:
3 % Low Volume: % Low Volume Code:
4 % High Volume: % High Volume Code:
5 % Text: 93.2
6 % Enviromental Weight:
7 Other REC Limits: N/P
8 OSHA PEL: 1 MG/M3 OSHA PEL Code: M
9 OSHA STEL: OSHA STEL Code:
10 ACGIH TLV: 1 MG/M3; 9192 ACGIH TLV Code: M
11 ACGIH STEL: N/P ACGIH STEL Code:
12 EPA Reporting Quantity: 1000 LBS
13 DOT Reporting Quantity: 1000 LBS
14 Ozone Depleting Chemical: N

15
16
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18 -----
19 Section 3 - Hazards Identification, Including Emergency Overview

20 H2SO4

21
22 -----

23 Health Hazards Acute & Chronic: N/P

24

25 Signs & Symptoms of Overexposure:

26 BURNS TO SKIN, EYES, NOSE, AND OTHER MEMBRANES. CHRONIC - FIBROSIS,
27 EMPHYSEMA, CONJUNCTIVITIS.

28

29 Medical Conditions Aggravated by Exposure:

30 N/P

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LD50 LC50 Mixture: UNKNOWN

Route of Entry Indicators:

Inhalation: YES

Skin: NO

Ingestion: NO

Carcinogenicity Indicators

NTP: NO

IARC: NO

OSHA: NO

Carcinogenicity Explanation: N/R

Section 4 - First Aid Measures

H2SO4

First Aid:

FLUSH EYES AND SKIN WITH WATER FOR AT LEAST 15 MINUTES. INHALATION:
REMOVE TO UNCONTAMINATED AREA. INGESTION: DRINK LARGE AMOUNTS OF
WATER. GET MEDICAL TREATMENT. ADMINISTRATION OF OXYGEN ADEQUATE BUT
SHOULD BE CONTROLLED BY ARTERIAL BLOODGAS VERIFICATION.

Section 5 - Fire Fighting Measures

H2SO4

1 Fire Fighting Procedures:

2 N/P

3 Unusual Fire or Explosion Hazard:

4 REACTS WITH SOME METALS TO RELEASE POTENTIALLY EXPLOSIVE HYDROGEN
5 GAS. IGNITES ORGANIC MATERIALS.

6 Extinguishing Media:

7 USE MEDIA SUITABLE FOR SURROUNDING FIRE.

8 Flash Point: Flash Point Text: NONE

9

10 Autoignition Temperature:

11 Autoignition Temperature Text: N/A

12 Lower Limit(s): N/R

13 Upper Limit(s): N/R

14

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16 Section 6 - Accidental Release Measures

17 H2SO4

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20 Spill Release Procedures:

21 NEUTRALIZE THE ACID. WASH DOWN WITH COPIOUS AMOUNTS OF WATER. ZONE OFF
22 AREA. VENTILATE THOROUGHLY. CAN BE NEUTRALIZED CAREFULLY WITH SODIUM
23 CARBONATE (SODA ASH) WASHING SODA.

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27 Section 7 - Handling and Storage

28 H2SO4

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31 Handling and Storage Precautions:

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Other Precautions:

Section 8 - Exposure Controls & Personal Protection

H2SO4

Respiratory Protection:

NIOSH APPROVED SUPPLIED AIR, SELF CONTAINED OR ACID MIST CARTRIDGE

Ventilation:

LOCAL EXHAUST, ENCLOSURE, SURFACE ACTIVE AGENTS OR CHIPS

Protective Gloves:

RUBBER

Eye Protection: FACE SHIELD, GOGGLES

Other Protective Equipment: IMPERVIOUS CLOTHING, SAFETY SHOWERS, EYE WASH

Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.

Supplemental Health & Safety Information: N/P

Section 9 - Physical & Chemical Properties

H2SO4

HCC: C1

NRC/State License Number: N/R

Net Property Weight for Ammo: N/R

1 Boiling Point: Boiling Point Text: 538F,281C
2 Melting/Freezing Point: Melting/Freezing Text: UNKNOWN
3 Decomposition Point: Decomposition Text: UNKNOWN
4 Vapor Pressure: UNKNOWN Vapor Density: UNKNOWN
5 Percent Volatile Organic Content:
6 Specific Gravity: 1.8354
7 Volatile Organic Content Pounds per Gallon:
8 pH: N/K
9 Volatile Organic Content Grams per Liter:
10 Viscosity: UNKNOWN
11 Evaporation Weight and Reference: UNKNOWN
12 Solubility in Water: COMPLETE
13 Appearance and Odor: CLEAR, COLORLESS TO CLOUDY LIQUID. BITING ODOR.
14 Percent Volatiles by Volume: N/K
15 Corrosion Rate: UNKNOWN

16
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18 -----

19 Section 10 - Stability & Reactivity Data
20 H2SO4

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23 -----
23 Stability Indicator: YES
24 Materials to Avoid:
25 SEE SECTION IX
26 Stability Condition to Avoid:
27 HIGH HEAT, MOISTURE
28 Hazardous Decomposition Products:
29 OXIDES OF SULFUR, HYDROGEN SULFIDE, HYDROGEN GAS
30 Hazardous Polymerization Indicator: NO

1 Conditions to Avoid Polymerization:

2 N/R

3

4

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6 Section 11 - Toxicological Information

7 H₂SO₄

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10 Toxicological Information:

11 N/P

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14 -----

15 Section 12 - Ecological Information

16 H₂SO₄

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18 -----

19 Ecological Information:

20 N/P

21

22

23 -----

24 Section 13 - Disposal Considerations

25 H₂SO₄

26

27 -----

28 Waste Disposal Methods:

29 DISPOSE IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.
30 NEUTRALIZATION TO THE REQUIRED PH IS THE MOST FREQUENT PRACTICE PRIOR

1 TO DISPOSAL. HYDROGEN SULFIDE GAS IS FORMED WHEN ACID CONTACTS S
2 ULFIDES IN SEWERS.

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6 Section 14 - MSDS Transport Information

7 H2SO4
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10 Transport Information:

11 N/P
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14 -----
15 Section 15 - Regulatory Information

16 H2SO4
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19 SARA Title III Information:

20 N/P

21 Federal Regulatory Information:

22 N/P

23 State Regulatory Information:

24 N/P
25
26

27 -----
28 Section 16 - Other Information

29 H2SO4
30

1 -----

2 Other Information:

3 N/P

4

5 HMIS Transportation Information

6 Product Identification: H2SO4

7 Transportation ID Number: 76491

8 Responsible Party CAGE: 91963

9 Date MSDS Prepared: 01/01/1987

10 Date MSDS Reviewed: 10/06/1982

11 MFN: 10/06/1982

12 Submitter: F KT

13 Status Code: C

14

15 Container Information

16 Unit of Issue: DR

17 Container Quantity: 1

18 Type of Container: DRUM

19 Net Unit Weight: 99.71 LBS

20 Article without MSDS: N

21 Technical Entry NOS Shipping Number:

22 Radioactivity: N/R

23 Form:

24 Net Explosive Weight: N/R

25 Coast Guard Ammunition Code:

26 Magnetism: N/P

27 AF MMAC Code:

28 DOD Exemption Number:

29 Limited Quantity Indicator:

30 Multiple Kit Number: 0

1 Kit Indicator: N
2 Kit Part Indicator: N
3 Review Indicator: Y
4 Additional Data:
5 NOT ACCEPTABLE FOR AIR TRANSPORTATION DUE TO CONTAINER AND QUANTITY.
6
7
8 Department of Transportation Information
9 DOT Proper Shipping Name: SULFURIC ACID
10 DOT PSN Code: NUC
11 Symbols:
12 DOT PSN Modifier: WITH MORE THAN 51 PERCENT ACID
13 Hazard Class: 8
14 UN ID Number: UN1830
15 DOT Packaging Group: II
16 Label: CORROSIVE
17 Special Provision(s): A3,A7,B3,B83,B84,N34,T9,T27
18 Packaging Exception: 154
19 Non Bulk Packaging: 202
20 Bulk Packaging: 242
21 Maximum Quantity in Passenger Area: 1 L
22 Maximum Quantity in Cargo Area: 30 L
23 Stow in Vessel Requirements: C
24 Requirements Water/Sp/Other: 14
25
26 IMO Detail Information
27 IMO Proper Shipping Name: SULPHURIC ACID
28 IMO PSN Code: OFJ
29 IMO PSN Modifier: ,WITH MORE THAN 51% ACID
30 IMDG Page Number: 8230

1 UN Number: 1830
2 UN Hazard Class: 8
3 IMO Packaging Group: II
4 Subsidiary Risk Label: -
5 EMS Number: 8-06
6 Medical First Aid Guide Number: 700
7
8 IATA Detail Information
9 IATA Proper Shipping Name: FORBIDDEN BY THIS MODE OF TRANSPORTATION
10 IATA PSN Code: ZZY
11 IATA PSN Modifier:
12 IATA UN Id Number: N/R
13 IATA UN Class: N/R
14 Subsidiary Risk Class: N/R
15 UN Packaging Group: N/R
16 IATA Label: N/R
17 Packaging Note for Passengers: N/R
18 Maximum Quantity for Passengers: N/R
19 Packaging Note for Cargo: N/R
20 Maximum Quantity for Cargo: N/R
21 Exceptions: N/R
22
23 AFI Detail Information
24 AFI Proper Shipping Name: SULPHURIC ACID
25 AFI Symbols:
26 AFI PSN Code: XIX
27 AFI PSN Modifier: WITH MORE THAN 51% ACID
28 AFI UN Id Number: UN1830
29 AFI Hazard Class: 8
30 AFI Packing Group: II

1 AFI Label:
2 Special Provisions: P4, A3, A7, N34
3 Back Pack Reference: A12.3
4
5 HAZCOM Label Information
6 Product Identification: H2SO4
7 CAGE: 91963
8 Assigned Individual: N
9 Company Name: NATIONAL ZINC CO
10 Company PO Box:
11 Company Street Address1: UNKNOWN
12 Company Street Address2: BARTLESVILLE, OK 74003 NK
13 Health Emergency Telephone: 918-336-7100
14 Label Required Indicator: Y
15 Date Label Reviewed: 09/12/1990
16 Status Code: C
17 Manufacturer's Label Number: N/R
18 Date of Label: 09/12/1990
19 Year Procured: N/K
20 Organization Code: F
21 Chronic Hazard Indicator: N
22 Eye Protection Indicator: YES
23 Skin Protection Indicator: YES
24 Respiratory Protection Indicator: YES
25 Signal Word: DANGER
26 Health Hazard: Severe
27 Contact Hazard: Severe
28 Fire Hazard: Slight
29 Reactivity Hazard: Slight
30

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2 8/7/2002 11:22:10 PM



CORNELL

**Material Safety
Data Sheets**

[Division of Facilities Services](#)

**DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only**

MURIATIC ACID, 20 BE

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Composition/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification
MURIATIC ACID, 20 BE

Product Identification: MURIATIC ACID, 20 BE
Date of MSDS: 01/01/1987 **Technical Review Date:** 03/06/1996
FSC: 6810 **NIIN:** 00-823-8010
Submitter: D DG
Status Code: C
MFN: 01

1 **Article:** N
2 **Kit Part:** N

3 **Manufacturer's Information**

4 **Manufacturer's Name:** HOOKER CHEMICALS & PLASTICS CORP
5 **Manufacturer's Address1:** 75 RIVER RD
6 **Manufacturer's Address2:** NUTLEY, NJ 07110-3513
7 **Manufacturer's Country:** US
8 **General Information Telephone:**
9 **Emergency Telephone:** 800-424-9300(CHEMTREC)
10 **Emergency Telephone:** 800-424-9300(CHEMTREC)
11 **MSDS Preparer's Name:** UNKNOWN
12 **Proprietary:** N
13 **Reviewed:** Y
14 **Published:** Y
15 **CAGE:** 73675
16 **Special Project Code:** N

17 **Item Description**

18 **Item Name:** HYDROCHLORIC ACID,TECHNICAL
19 **Item Manager:** S9G
20 **Specification Number:** ASTM E 1146-92
21 **Type/Grade/Class:** GRADE 20 DEG BAUME
22 **Unit of Issue:** DR **Quantitative Expression:** 00000000015GL
23 **Unit of Issue Quantity:** 1
24 **Type of Container:** DRUM

25 **Contractor Information**

26 **Contractor's Name:** HOOKER CHEMICALS & PLASTICS CORP.,DUREZ DIVISION
27 **Post Office Box:** 728
28 **Contractor's Address1:** UNKNOWN
29 **Contractor's Address2:** UNKNOWN, NK 00000
30 **Contractor's Telephone:** UNKNOWN
31 **Contractor's CAGE:** 73675

32 **Contractor Information**

33 **Contractor's Name:** OMI INTERNATIONAL CORP
34 **Contractor's Address1:** 75 RIVER RD
35 **Contractor's Address2:** NUTLEY, NJ 07110-3513
36 **Contractor's Telephone:** UNKNOWN
37 **Contractor's CAGE:** 04767

38 **Section 2 - Compositon/Information on Ingredients** 39 **MURIATIC ACID, 20 BE**

41
42 **Ingredient Name:** HYDROGEN CHLORIDE (HYDROCHLORIC ACID) (SARA III)
43 **Ingredient CAS Number:** 7647-01-0 **Ingredient CAS Code:** M
44 **RTECS Number:** MW4025000 **RTECS Code:** M
45 **=WT: =WT Code:**
46 **=Volume: =Volume Code:**
47 **>WT: >WT Code:**
48 **>Volume: >Volume Code:**

1 <WT: <WT Code:
2 <Volume: <Volume Code:
3 % Low WT: % Low WT Code:
4 % High WT: % High WT Code:
5 % Low Volume: % Low Volume Code:
6 % High Volume: % High Volume Code:
7 % Text: 31.5
8 % Enviromental Weight:
9 Other REC Limits: N/P
10 OSHA PEL: C 5 PPM OSHA PEL Code: M
11 OSHA STEL: OSHA STEL Code:
12 ACGIH TLV: C 5 PPM; 9192 ACGIH TLV Code: M
13 ACGIH STEL: N/P ACGIH STEL Code:
14 EPA Reporting Quantity: 5000 LBS
15 DOT Reporting Quantity: 5000 LBS
16 Ozone Depleting Chemical: N

17
18 **Section 3 - Hazards Identification, Including Emergency Overview**
19 **MURIATIC ACID, 20 BE**

20
21 **Health Hazards Acute & Chronic:** **CORROSIVE** EYES:MAY CAUSE SEVERE
22 IRRITATION,BURNS AND POSSIBLE PERMANENT VISUAL IMPAIRMENT.SKIN:MAY
23 CAUSE SEVERE IRRITATION,BURNS AND ULCERATIONS.INGEST:MAY CAUSE SEVERE
24 GI TRACT IRRITATION.INHAL:M AY CAUSE SEVERE RESPIRATORY
25 IRRITATION.CHRONIC:MAY DAMAGE LUNGS AND TEETH AND CAUSE DERMATITIS.

26
27 **Signs & Symptoms of Overexposure:**
28 EYES/SKIN:CAUSE BURNS,IRRITN.DAMAGES EYE- BLINDNESS;INHAL:IRRIT RESP
29 TRACT;INGEST:IRRIT/BURNS GI

30
31 **Medical Conditions Aggravated by Exposure:**
32 PERSONS WITH PRE-EXISTING SKIN OR RESPIRATORY AILMENTS MAY BE AT
33 INCREASED RISK FROM EXPOSURE.

34
35 **LD50 LC50 Mixture:** LD50 ORAL RABBIT IS 900MG/KG

36 **Route of Entry Indicators:**

37 **Inhalation:** YES

38 **Skin:** YES

39 **Ingestion:** YES

40 **Carcenogenicity Indicators**

41 **NTP:** NO

42 **IARC:** NO

43 **OSHA:** NO

44 **Carcinogenicity Explanation:** HYDROCHLORIC ACID IS CLASSIFIED IARC-
45 3(INSUFFICIENT EVIDENCE-HUMAN).

46
47 **Section 4 - First Aid Measures**
48 **MURIATIC ACID, 20 BE**

1 **First Aid:**

2 SKIN:REMOVE CONTAMINATED CLOTHING;WASH WITH SOAP AND WATER.GET
3 MEDICAL ATTENTION.EYES:FLUSH WITH WATER FOR 15 MINUTES.GET MEDICAL
4 ATTENTION.INHAL:REMOVE TO FRESH AIR.GIVE OXYGEN OR ARTIFICIAL RESPIRAT
5 ION IF NEEDED.GET MEDICAL ATTENTION.INGEST:DO NOT INDUCE VOMITING.GET
6 PROMPT QUALIFIED MEDICAL ATTENTION.IF CONSCIOUS,GIVE WATER OR MILK OR
7 MAGNESIA.

8 **Section 5 - Fire Fighting Measures**
9 **MURIATIC ACID, 20 BE**

11 **Fire Fighting Procedures:**

12 USE A SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE
13 EQUIPMENT.COOL FIRE EXPOSED CONTAINERS WITH WATER FOG.

14 **Unusual Fire or Explosion Hazard:**

15 REACTS W/METALS TO EMIT H2 GAS WHICH MAY FORM EXPLOSIVE MIXTURES WITH
16 AIR.

17 **Extinguishing Media:**

18 EXTINGUISH WITH AGENT SUITABLE FOR SURROUNDING FIRE

19 **Flash Point: Flash Point Text:** NONE

20 **Autoignition Temperature:**

21 **Autoignition Temperature Text:** N/K

22 **Lower Limit(s):** N/R

23 **Upper Limit(s):** N/R

24 **Section 6 - Accidental Release Measures**
25 **MURIATIC ACID, 20 BE**

26 **Spill Release Procedures:**

27 ELIMINATE IGNITION SOURCES. STOP LEAK W/O RISK. EVACUATE AREA. SM
28 SPILL:ABSORB WITH INERT ABSORBENT,FLUSH AREA WITH WATER. LG
29 SPILL:NEUTRALIZE WITH SODA ASH. FLUSH NEUTRALIZED SOLUTION TO SEWER IN
30 ACC ORDANCE WITH INTERNATIONAL FED,STA, & LOCAL REGS.

31 **Section 7 - Handling and Storage**
32 **MURIATIC ACID, 20 BE**

33 **Handling and Storage Precautions:**

34 **Other Precautions:**

35 **Section 8 - Exposure Controls & Personal Protection**
36 **MURIATIC ACID, 20 BE**

37 **Repiratory Protection:**

38 WHERE ENVIRONMENTAL CONTROLS ARE LACKING OR IN ENCLOSED SPACES USE
39 EITHER A SELF-CONTAINED BREATHING APPARATUS OR A NIOSH/MSHA APPROVED
40 RESPIRATOR FOR ACID GAS,DEPENDING ON THE AIRBORN CONCENTRATION.

41 **Ventilation:**

42 LOCAL VENTILATION AT THE WORKSITE;MECHANICAL(GENERAL) VENTILATION TO

1 MAINTAIN TLV/PEL.

2 **Protective Gloves:**

3 RUBBER/NEOPRENE

4 **Eye Protection:** GOGGLES/FACE SHIELD

5 **Other Protective Equipment:** FULL PROTECTIVE CLOTHING,SAFETY SHOWER,EYE
6 WASH STATION

7 **Work Hygenic Practices:** WASH HANDS.SEPERATE WORK CLOTHES FROM STREET
8 CLOTHES.LAUNDER WORK CLOTHES BEFORE REUSE.KEEP FOOD OUT OF THE WORK
9 AREA.

10 **Supplemental Health & Safety Information:** MSDS FM MFR DATED:10/76; SPEC REF: O-H-
11 765C

12 **Section 9 - Physical & Chemical Properties**
13 **MURIATIC ACID, 20 BE**
14

15 **HCC:** C1

16 **NRC/State License Number:** N/R

17 **Net Property Weight for Ammo:** N/R

18 **Boiling Point: Boiling Point Text:** 230F,110C

19 **Melting/Freezing Point: Melting/Freezing Text:** UNKNOWN

20 **Decomposition Point: Decomposition Text:** UNKNOWN

21 **Vapor Pressure:** UNKNOWN **Vapor Density:** UNKNOWN

22 **Percent Volatile Organic Content:**

23 **Specific Gravity:** 1.160

24 **Volatile Organic Content Pounds per Gallon:**

25 **pH:** N/K

26 **Volatile Organic Content Grams per Liter:**

27 **Viscosity:** UNKNOWN

28 **Evaporation Weight and Reference:** UNKNOWN

29 **Solubility in Water:** COMPLETE

30 **Appearance and Odor:** CLEAR, COLORLESS TO FAINT YELLOW LIQUID WITH A
31 PUNGENT ODOR.

32 **Percent Volatiles by Volume:** 100

33 **Corrosion Rate:** UNKNOWN
34

35 **Section 10 - Stability & Reactivity Data**
36 **MURIATIC ACID, 20 BE**
37

38 **Stability Indicator:** YES

39 **Materials to Avoid:**

40 OXIDIZERS,FLAMM LIQUIDS,MOST METALS & STRONG ALKALIS, NH3

41 **Stability Condition to Avoid:**

42 AVOID CONTACT W/METALS & SULFIDES.

43 **Hazardous Decomposition Products:**

44 HCL GAS, H2 & CL2 GAS

45 **Hazardous Polymerization Indicator:** NO

46 **Conditions to Avoid Polymerization:**

47 N/R
48

49 **Section 11 - Toxicological Information**
50 **MURIATIC ACID, 20 BE**
51

1
2 **Toxicological Information:**
3 N/P

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5 **Section 12 - Ecological Information**
6 **MURIATIC ACID, 20 BE**

7
8 **Ecological Information:**
9 N/P

10
11 **Section 13 - Disposal Considerations**
12 **MURIATIC ACID, 20 BE**

13
14 **Waste Disposal Methods:**
15 KEEP IN COVERED DRUMS,PENDING DISPOSAL. HANDLE & DISPOSE IN FULL
16 COMPLIANCE WITH ALL APPLICABLE INTERNATIONAL,FEDERAL,STATE, & LOCAL
17 REGULATIONS.

18
19 **Section 14 - MSDS Transport Information**
20 **MURIATIC ACID, 20 BE**

21
22 **Transport Information:**
23 N/P

24
25 **Section 15 - Regulatory Information**
26 **MURIATIC ACID, 20 BE**

27
28 **SARA Title III Information:**
29 N/P

30 **Federal Regulatory Information:**
31 N/P

32 **State Regulatory Information:**
33 N/P

34
35 **Section 16 - Other Information**
36 **MURIATIC ACID, 20 BE**

37
38 **Other Information:**
39 N/P

40 **HMIS Transportation Information**

41 **Product Identification:** MURIATIC ACID, 20 BE

42 **Transportation ID Number:** 87173

43 **Responsible Party CAGE:** 73675

44 **Date MSDS Prepared:** 01/01/1987

45 **Date MSDS Reviewed:** 03/06/1996

46 **MFN:** 03/06/1996

47 **Submitter:** D DG

48 **Status Code:** C

49 **Container Information**

50 **Unit of Issue:** DR

51 **Container Quantity:** 1

1 IATA UN Id Number: 1789
2 IATA UN Class: 8
3 Subsidiary Risk Class:
4 UN Packaging Group: II
5 IATA Label: CORROSIVE
6 Packaging Note for Passengers: 809
7 Maximum Quantity for Passengers: 1L
8 Packaging Note for Cargo: 813
9 Maximum Quantity for Cargo: 30L
10 Exceptions: A3

AFI Detail Information

11 AFI Proper Shipping Name: HYDROCHLORIC ACID, SOLUTION
12 AFI Symbols:
13 AFI PSN Code: NPG
14 AFI PSN Modifier:
15 AFI UN Id Number: UN1789
16 AFI Hazard Class: 8
17 AFI Packing Group: II
18 AFI Label:
19 Special Provisions: P4, A3, A6, N41
20 Back Pack Reference: A12.3

HAZCOM Label Information

21 Product Identification: MURIATIC ACID, 20 BE
22 CAGE: 73675
23 Assigned Individual: N
24 Company Name: HOOKER CHEMICALS & PLASTICS CORP.,DUREZ DIVISION
25 Company PO Box: 728
26 Company Street Address1: UNKNOWN
27 Company Street Address2: UNKNOWN, NK 00000 NK
28 Health Emergency Telephone: 800-424-9300(CHEMTREC)
29 Label Required Indicator: Y
30 Date Label Reviewed: 03/06/1996
31 Status Code: C
32 Manufacturer's Label Number: UNKNOWN
33 Date of Label: 03/06/1996
34 Year Procured: N/K
35 Organization Code: F
36 Chronic Hazard Indicator: N/P
37 Eye Protection Indicator: YES
38 Skin Protection Indicator: YES
39 Respiratory Protection Indicator: N/P
40 Signal Word: WARNING
41 Health Hazard: Moderate
42 Contact Hazard: Moderate
43 Fire Hazard: Slight
44 Reactivity Hazard: None

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ISOPROPANOL;ISOPROPYL ALCOHOL

- Section 1 - Product and Company Identification Section 9 - Physical & Chemical Properties
- Section 2 - Compositon/Information on Ingredients Section 10 - Stability & Reactivity Data
- Section 3 - Hazards Identification Including Emergency Overview Section 11 - Toxicological Information
- Section 4 - First Aid Measures Section 12 - Ecological Information
- Section 5 - Fire Fighting Measures Section 13 - Disposal Considerations
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Section 1 - Product and Company Identification

ISOPROPANOL;ISOPROPYL ALCOHOL

Product Identification: ISOPROPANOL;ISOPROPYL ALCOHOL

Date of MSDS: 01/01/1985 Technical Review Date: 05/25/1999

1 FSC: 6810 NIIN: 00-983-8551

2 Submitter: D DG

3 Status Code: C

4 MFN: 01

5 Article: N

6 Kit Part: N

7

8 Manufacturer's Information

9 Manufacturer's Name: UNION CARBIDE CORP, MFR - CHEM COMMOD AGY, DIST

10 Manufacturer's Address1: 39 OLD RIDGEBURY ROAD

11 Manufacturer's Address2: DANBURY, CT 06817-0001

12 Manufacturer's Country: US

13 General Information Telephone: 800-822-4357

14 Emergency Telephone: 800-822-4357

15 Emergency Telephone: 800-822-4357

16 MSDS Preparer's Name: N/P

17 Proprietary: N

18 Reviewed: Y

19 Published: Y

20 CAGE: 61637

21 Special Project Code: N

22

23 Item Description

24 Item Name: ISOPROPYL ALCOHOL, TECHNICAL

25 Item Manager: S9G

26 Specification Number: TT-I-735A

27 Type/Grade/Class: GRADE A

28 Unit of Issue: QT

29 Unit of Issue Quantity: G

30 Type of Container: CAN

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Contractor Information

Contractor's Name: UNION CARBIDE CORP INDUSTRIAL
Contractor's Address1: 39 OLD RIDGEBURY ROAD CHEMICALS DIV
Contractor's Address2: DANBURY, CT 06817-0001
Contractor's Telephone: 800-568-4000/732-563-5522 (MSDS)
Contractor's CAGE: 61637

Section 2 - Compositon/Information on Ingredients

ISOPROPANOL;ISOPROPYL ALCOHOL

Ingredient Name: ISOPROPYL ALCOHOL (SARA III)
Ingredient CAS Number: 67-63-0 Ingredient CAS Code: M
RTECS Number: NT8050000 RTECS Code: M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: >99
% Enviromental Weight:
Other REC Limits: N/P

1 OSHA PEL: 400 PPM/500 STEL OSHA PEL Code: M
2 OSHA STEL: OSHA STEL Code:
3 ACGIH TLV: 400 PPM/500STEL;9192 ACGIH TLV Code: M
4 ACGIH STEL: N/P ACGIH STEL Code:
5 EPA Reporting Quantity:
6 DOT Reporting Quantity:
7 Ozone Depleting Chemical: N

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12 Section 3 - Hazards Identification, Including Emergency Overview
13 ISOPROPANOL;ISOPROPYL ALCOHOL

14
15 -----

16 Health Hazards Acute & Chronic: N/P
17
18 Signs & Symptoms of Overexposure:
19 NONE EXPECTED EXCEPT FOR GIDDINESS

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21
22

21 Medical Conditions Aggravated by Exposure:
22 N/P

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24
25

24 LD50 LC50 Mixture: N/P

26 Route of Entry Indicators:
27 Inhalation: N/P
28 Skin: N/P
29 Ingestion: N/P

30 Carcenogenicity Indicators

1 NTP: N/P
2 IARC: N/P
3 OSHA: N/P
4 Carcinogenicity Explanation: N/P

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8 Section 4 - First Aid Measures

9 ISOPROPANOL;ISOPROPYL ALCOHOL

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12 First Aid:

13 INHALE:REMOVE TO FRESH AIR.INGESTED:INDUCE VOMITING,GET MEDICAL
14 ATTENTION.EYES/SKIN:FLUSH IMMEDIATELY WITH WATER.

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18 Section 5 - Fire Fighting Measures

19 ISOPROPANOL;ISOPROPYL ALCOHOL

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22 Fire Fighting Procedures:

23 DILUTION OF BURNING LIQ W/22-25 VOL H*2O WILL EXTINGUISH

24 Unusual Fire or Explosion Hazard:

25 MAY BE IGNITED BY SPARKS,FLAME.CONTAINER MAY EXPLODE IN FIRE.VAPOR IS
26 HAZARD.

27 Extinguishing Media:

28 CO*2, DRY CHEM FOR SM FIRES. ALCOHOL FOAM TYPE FOR LG.

29 Flash Point: Flash Point Text: 53F TCC

30

31 Autoignition Temperature:

1 Autoignition Temperature Text: N/A

2 Lower Limit(s): 2.0

3 Upper Limit(s): 12.0

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6 Section 6 - Accidental Release Measures

7 ISOPROPANOL;ISOPROPYL ALCOHOL

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10 Spill Release Procedures:

11 ELIMINATE ALL SOURCES OF IGNITION. SM SPILLS SHOULD BE FLUSHED W/LG QTY
12 WATER. LARGER SPILLS SHOULD BE COLLECTED FOR DISPOSAL.

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16 Section 7 - Handling and Storage

17 ISOPROPANOL;ISOPROPYL ALCOHOL

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20 Handling and Storage Precautions:

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22 Other Precautions:

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27 Section 8 - Exposure Controls & Personal Protection

28 ISOPROPANOL;ISOPROPYL ALCOHOL

29

30 -----

1 Respiratory Protection:
2 AIR-SUPP MASKS IN CONFINED AREAS
3 Ventilation:
4 LOCAL EXHST PREFERRED, MECH ACCEPTABLE
5 Protective Gloves:
6 RUBBER
7 Eye Protection: GOGGLES
8 Other Protective Equipment: EYEBATH/SAFETY SHOWER
9 Work Hygenic Practices: N/P
10 Supplemental Health & Safety Information: ITEM MEETS REQUIREMENTS FOR GRADE A
11 UNDER FED SPEC TT-I-735
12
13

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15 Section 9 - Physical & Chemical Properties
16 ISOPROPANOL;ISOPROPYL ALCOHOL
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18 -----

19 HCC: F2
20 NRC/State License Number:
21 Net Property Weight for Ammo:
22 Boiling Point: Boiling Point Text: 180F/82.3C
23 Melting/Freezing Point: Melting/Freezing Text: N/A
24 Decomposition Point: Decomposition Text: N/A
25 Vapor Pressure: 33 Vapor Density: 2.07
26 Percent Volatile Organic Content:
27 Specific Gravity: 0.786
28 Volatile Organic Content Pounds per Gallon:
29 pH: N/P
30 Volatile Organic Content Grams per Liter:

1 Viscosity: N/P
2 Evaporation Weight and Reference: (BUTYL AC=1)=2.3
3 Solubility in Water: COMPLETE
4 Appearance and Odor: CLEAR APPEARANCE, SHARP ODOR
5 Percent Volatiles by Volume: 100
6 Corrosion Rate: N/P

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10 Section 10 - Stability & Reactivity Data
11 ISOPROPANOL;ISOPROPYL ALCOHOL

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14 Stability Indicator: YES

15 Materials to Avoid:
16 N/P

17 Stability Condition to Avoid:
18 AVOID HEAT, SPARK, OPEN FLAMES

19 Hazardous Decomposition Products:
20 CARBON DIOXIDE,CARBON MONOXIDE GENERATED WHEN COMBUSTED

21 Hazardous Polymerization Indicator: NO

22 Conditions to Avoid Polymerization:
23 N/P

24
25
26 -----

27 Section 11 - Toxicological Information
28 ISOPROPANOL;ISOPROPYL ALCOHOL

29
30 -----

1 Toxicological Information:

2 N/P

3

4

5 -----

6 Section 12 - Ecological Information

7 ISOPROPANOL;ISOPROPYL ALCOHOL

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9 -----

10 Ecological Information:

11 N/P

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15 Section 13 - Disposal Considerations

16 ISOPROPANOL;ISOPROPYL ALCOHOL

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19 Waste Disposal Methods:

20 ATOMIZE INTO INCINERATOR WHERE PERMITTED UNDER APPROPRIATE FED, STATE,
21 LOCAL REG.

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25 Section 14 - MSDS Transport Information

26 ISOPROPANOL;ISOPROPYL ALCOHOL

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29 Transport Information:

30 N/P

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Section 15 - Regulatory Information

ISOPROPANOL;ISOPROPYL ALCOHOL

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information

ISOPROPANOL;ISOPROPYL ALCOHOL

Other Information:

N/P

HMIS Transportation Information

Product Identification: ISOPROPANOL;ISOPROPYL ALCOHOL

Transporation ID Number: 96332

Responsible Party CAGE: 61637

Date MSDS Prepared: 01/01/1985

Date MSDS Reviewed: 09/05/1986

MFN: 09/05/1986

1 Submitter: D DG

2 Status Code: C

3

4 Container Information

5 Unit of Issue: QT

6 Container Quantity: G

7 Type of Container: CAN

8 Net Unit Weight:

9 Article without MSDS: N

10 Technical Entry NOS Shipping Number:

11 Radioactivity:

12 Form:

13 Net Explosive Weight:

14 Coast Guard Ammunition Code:

15 Magnetism: N/P

16 AF MMAC Code:

17 DOD Exemption Number:

18 Limited Quantity Indicator:

19 Multiple Kit Number: 0

20 Kit Indicator: N

21 Kit Part Indicator: N

22 Review Indicator: Y

23 Additional Data:

24

25

26

27 Department of Transportation Information

28 DOT Proper Shipping Name: ISOPROPANOL OR ISOPROPYL ALCOHOL

29 DOT PSN Code: HWY

30 Symbols:

1 DOT PSN Modifier:
2 Hazard Class: 3
3 UN ID Number: UN1219
4 DOT Packaging Group: II
5 Label: FLAMMABLE LIQUID
6 Special Provision(s): T1
7 Packaging Exception: 150
8 Non Bulk Packaging: 202
9 Bulk Packaging: 242
10 Maximum Quantity in Passenger Area: 5 L
11 Maximum Quantity in Cargo Area: 60 L
12 Stow in Vessel Requirements: B
13 Requirements Water/Sp/Other:
14

15 IMO Detail Information

16 IMO Proper Shipping Name: ISOPROPANOL
17 IMO PSN Code: ITA
18 IMO PSN Modifier:
19 IMDG Page Number: 3244
20 UN Number: 1219
21 UN Hazard Class: 3.2
22 IMO Packaging Group: II
23 Subsidiary Risk Label: -
24 EMS Number: 3-06
25 Medical First Aid Guide Number: 305
26

27 IATA Detail Information

28 IATA Proper Shipping Name: ISOPROPANOL
29 IATA PSN Code: ONH
30 IATA PSN Modifier:

1 IATA UN Id Number: 1219
2 IATA UN Class: 3
3 Subsidiary Risk Class:
4 UN Packaging Group: II
5 IATA Label: FLAMMABLE LIQUID
6 Packaging Note for Passengers: 305
7 Maximum Quantity for Passengers: 5L
8 Packaging Note for Cargo: 307
9 Maximum Quantity for Cargo: 60L
10 Exceptions:
11
12 AFI Detail Information
13 AFI Proper Shipping Name: ISOPROPANOL
14 AFI Symbols:
15 AFI PSN Code: ONH
16 AFI PSN Modifier:
17 AFI UN Id Number: UN1219
18 AFI Hazard Class: 3
19 AFI Packing Group: II
20 AFI Label:
21 Special Provisions: P5
22 Back Pack Reference: A7.3
23
24 HAZCOM Label Information
25 Product Identification: ISOPROPANOL;ISOPROPYL ALCOHOL
26 CAGE: 61637
27 Assigned Individual: N
28 Company Name: UNION CARBIDE CORP INDUSTRIAL
29 Company PO Box:
30 Company Street Address1: 39 OLD RIDGEBURY ROAD CHEMICALS DIV

1 Company Street Address2: DANBURY, CT 06817-0001 US

2 Health Emergency Telephone: 800-822-4357

3 Label Required Indicator: Y

4 Date Label Reviewed: 12/16/1998

5 Status Code: C

6 Manufacturer's Label Number:

7 Date of Label: 12/16/1998

8 Year Procured: N/K

9 Organization Code: F

10 Chronic Hazard Indicator: N/P

11 Eye Protection Indicator: N/P

12 Skin Protection Indicator: N/P

13 Respiratory Protection Indicator: N/P

14 Signal Word: N/P

15 Health Hazard:

16 Contact Hazard:

17 Fire Hazard:

18 Reactivity Hazard:

19

20 -----

21 8/8/2002 1:31:21 AM

1 SULTAN CHEMISTS INC -- SODIUM HYPOCHLORITE - BLEACH
2 =====
3 MSDS Safety Information
4 =====
5 FSC: 6810
6 NIIN: 00-900-6276
7 MSDS Date: 05/01/1998
8 MSDS Num: CLLCD
9 Product ID: SODIUM HYPOCHLORITE - BLEACH
10 MFN: 01
11 Responsible Party
12 Cage: 63536
13 Name: SULTAN CHEMISTS INC
14 Address: 85 W FOREST AVE
15 City: ENGLEWOOD NJ 07631-4001
16 Info Phone Number: 201-871-1232
17 Emergency Phone Number: 800-535-5053
18 Review Ind: Y
19 Published: Y
20 =====
21 Contractor Summary
22 =====
23 Cage: 63536
24 Name: SULTAN CHEMISTS INC
25 Address: 85 W FOREST AVE
26 City: ENGLEWOOD NJ 07631-4001
27 Phone: 201-871-1232
28 =====
29 Item Description Information
30 =====
31 Item Manager: S9G
32 Item Name: SODIUM HYPOCHLORITE SOLUTION
33 Unit of Issue: CN
34 Quantitative Expression: 00000000005GL
35 UI Container Qty: 1
36 Type of Container: CAN
37 =====
38 Ingredients
39 =====
40 Cas: 7681-52-9
41 RTECS #: NH3486300
42 Name: SODIUM HYPOCHLORITE
43 < Wt: 6.
44 ACGIH TLV: 200MG/M3;8 HR
45 EPA Rpt Qty: 100 LBS
46 DOT Rpt Qty: 100 LBS
47 =====
48 Health Hazards Data
49 =====
50 Route Of Entry Inds - Inhalation: YES
51 Skin: YES
52 Ingestion: YES
53 Effects of Exposure: CAUSES CAUSTIC BURNS. MAY BE HARMFUL BY INHALATION,
54 INGESTION, OR SKIN ABSORPTION. CAUSES EYE AND SKIN IRRITANT. MATERIAL IS
55 IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.
56 Signs And Symptoms Of Overexposure: CAUSES CAUSTIC BURNS. MAY BE HARMFUL BY
57 INHALATION, INGESTION, OR SKIN ABSORPTION. CAUSES EYE AND SKIN IRRITANT.

1 MATERIAL IS IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.
2 First Aid: SKIN AND EYES: FLUSH WELL WITH WARM WATE FOR AT LEAST 15 MINUTES.
3 INGESTION: DO NOT INDUCE VOMITING. DILUTE EITH LARGE QUANTITIES OF MILK OR
4 WATER. INHALATION: REMOVE TO FRESH AIR. IF BREATHING IS DIF FICULT, GIVE
5 OXYGEN. GET MEDICAL ATTENTION.
6 =====
7 Handling and Disposal
8 =====
9 Spill Release Procedures: FLUSH SMALL AMOUNT TO DRAIN. ADJUST PH TO
10 NEUTRALIZE
11 WITH DILUTE ACIDS FOR LARGE SPILLS. COLLECT AND RETURN LARGE AMOUNTS TO
12 CONTAINER.
13 Waste Disposal Methods: ADJUST PH TO NEUTRAL. FLUSH THE AQUEOUS SOLUTION DOWN
14 THE DRAIN WITH PLENTY OF WATER. OBSERVE ALL FEDERAL, STATE AND LOCAL LAWS.
15 Handling And Storage Precautions: IRRITANT. KEEP TIGHTLY CLOSED. STORE IN A
16 COOL DRY PLACE. WASH THOROUGHLY AFTER HANDLING.
17 Other Precautions: DO NOT GET IN EYS, ON SKIN, ON CLOTHING.
18 =====
19 Fire and Explosion Hazard Information
20 =====
21 Flash Point Text: NON-FLAMMABLE
22 Lower Limits: 0
23 Upper Limits: 0
24 Extinguishing Media: NOT REQUIRED.
25 Fire Fighting Procedures: WEAR SELF-CONTAINED BREATHING APPARATUS AND
26 PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
27 Unusual Fire/Explosion Hazard: EMITS TOXIC FUMES UNDER FIRE CONDITIONS.
28 =====
29 Control Measures
30 =====
31 Respiratory Protection: WEAR NIOSH/MSHA-APPROVED RESPIRATOR.
32 Ventilation: LOCAL EXHAUST: FACE VELOCITY 60 FPM. CHEMICAL FUME HOOD. DO NOT
33 BREATHE DUST.
34 Protective Gloves: CHEMICAL RESISTANT
35 Eye Protection: CHEMICAL RESISTANT GOGGLES
36 Other Protective Equipment: SAFETY SHOWER AND EYE BATH.
37 Work Hygienic Practices: WASH THOROUGHLY AFTER USE.
38 =====
39 Physical/Chemical Properties
40 =====
41 HCC: B1
42 Boiling Point: =104.4C, 220.F
43 Melt/Freeze Pt: =-.8C, 30.5F
44 Vapor Pres: 23 MMHG/25C
45 Spec Gravity: 1.210/25C
46 PH: 11.5
47 Solubility in Water: MISCIBLE
48 Appearance and Odor: COLORLESS TO LIGHT YELLOW LIQUID ODOR OF CHLORINE
49 Percent Volatiles by Volume: 93
50 =====
51 Reactivity Data
52 =====
53 Stability Indicator: YES
54 Stability Condition To Avoid: CONTACT WITH ACIDS.
55 Materials To Avoid: ACIDS AND ACID SOLUTIONS.
56 Hazardous Decomposition Products: CHLORINE.
57 Hazardous Polymerization Indicator: NO

1 Conditions To Avoid Polymerization: WILL NOT OCCUR.
2 =====
3 Toxicological Information
4 =====
5 =====
6 Ecological Information
7 =====
8 =====
9 MSDS Transport Information
10 =====
11 Transport Information: PROPER SHIPPING NAME: SODIUM HYPOCHLORITE SOLUTION.
12 HAZARDOUS CLASSIFICATION: CORROSIVE LIQUID. IDENTIFICATION NUMBER:NONE.
13 ADDITIONAL LABELING: CORROSIVE LIQUID.
14 =====
15 Regulatory Information
16 =====
17 Sara Title III Information: THIS PRODUCT CONTAINS THE FOLLOWING TOXIC
18 CHEMICAL
19 SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF THE EMERGENCY
20 PLANNING AND COMMUNITY RIGHT-TO- KNOW ACT OF 1986 AND OF CFR 372, SODIUM
21 HYPOCH LORITE: CAS REG NO. 7681-52-9 LESS THAN 6.0%. IT CONTAINS NO OTHER
22 HAZARDOUS INGREDIENTS.
23 =====
24 Other Information
25 =====
26 Other Information: ALL CHEMICALS MAY POSE UNKNOWN HAZARDS AND SHOULD BE USED
27 WITH CAUTION. THIS MATERIAL SAFETY DATA SHEET (MSDS) APPLIES ONLY TO THE
28 MATERIAL AS PACKAGED. IF THIS PRODUCT IS COMBINED WITH OTHER MATERIAL S,
29 DETERIORATES, OR BECOMES CONTAMINATED, IT MAY POSE HAZARDS NOT MENTIONED IN
30 THIS MSDS
31 =====
32 Transportation Information
33 =====
34 Responsible Party Cage: 63536
35 Trans ID NO: 158729
36 Product ID: SODIUM HYPOCHLORITE - BLEACH
37 MSDS Prepared Date: 05/01/1998
38 Review Date: 09/06/2001
39 MFN: 1
40 Multiple KIT Number: 0
41 Unit Of Issue: CN
42 Container QTY: 1
43 Type Of Container: CAN
44 =====
45 Detail DOT Information
46 =====
47 DOT PSN Code: DWG
48 Symbols: G
49 DOT Proper Shipping Name: CORROSIVE LIQUIDS, N.O.S.
50 Hazard Class: 8
51 UN ID Num: UN1760
52 DOT Packaging Group: III
53 Label: CORROSIVE
54 Special Provision: T7
55 Non Bulk Pack: 203
56 Bulk Pack: 241
57 Max Qty Pass: 5 L

1 Max Qty Cargo: 60 L
2 Vessel Stow Req: A
3 Water/Ship/Other Req: 40
4 =====
5 Detail IMO Information
6 =====
7 IMO PSN Code: ESH
8 IMO Proper Shipping Name: CORROSIVE LIQUID, N.O.S. o
9 IMDG Page Number: 8147
10 UN Number: 1760
11 UN Hazard Class: 8
12 IMO Packaging Group: I/II/III
13 Subsidiary Risk Label: -
14 EMS Number: 8-15
15 MED First Aid Guide NUM: 760
16 =====
17 Detail IATA Information
18 =====
19 IATA PSN Code: HKW
20 IATA UN ID Num: 1760
21 IATA Proper Shipping Name: CORROSIVE LIQUID, N.O.S. *
22 IATA UN Class: 8
23 IATA Label: CORROSIVE
24 UN Packing Group: III
25 Packing Note Passenger: 818
26 Max Quant Pass: 5L
27 Max Quant Cargo: 60L
28 Packaging Note Cargo: 820
29 =====
30 Detail AFI Information
31 =====
32 AFI PSN Code: HKW
33 AFI Symbols: *
34 AFI Proper Shipping Name: CORROSIVE LIQUID, N.O.S.
35 AFI Hazard Class: 8
36 AFI UN ID NUM: UN1760
37 AFI Packing Group: III
38 Special Provisions: P5
39 Back Pack Reference: A12.3
40 =====
41 HAZCOM Label
42 =====
43 Product ID: SODIUM HYPOCHLORITE - BLEACH
44 Cage: 63536
45 Company Name: SULTAN CHEMISTS INC
46 Street: 85 W FOREST AVE
47 City: ENGLEWOOD NJ
48 Zipcode: 07631-4001
49 Health Emergency Phone: 800-535-5053
50 Label Required IND: Y
51 Date Of Label Review: 09/06/2001
52 Status Code: A
53 Origination Code: F
54 Eye Protection IND: YES
55 Skin Protection IND: YES
56 Signal Word: DANGER
57 Respiratory Protection IND: YES

1 Health Hazard: Severe
2 Contact Hazard: Severe
3 Fire Hazard: None
4 Reactivity Hazard: None
5 Hazard And Precautions: CAUSES CAUSTIC BURNS. MAY BE HARMFUL BY INHALATION,
6 INGESTION, OR SKIN ABSORPTION. CAUSES EYE AND SKIN IRRITANT. MATERIAL IS
7 IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.

8 =====
9 Disclaimer (provided with this information by the compiling agencies): This
10 information is formulated for use by elements of the Department of Defense.
11 The United States of America in no manner whatsoever expressly or implied
12 warrants, states, or intends said information to have any application, use
13 or
14 viability by or to any person or persons outside the Department of Defense
15 nor any person or persons contracting with any instrumentality of the
16 United
17 States of America and disclaims all liability for such use. Any person
18 utilizing this instruction who is not a military or civilian employee of
19 the
20 United States of America should seek competent professional advice to
21 verify
22 and assume responsibility for the suitability of this information to their
23 particular situation regardless of similarity to a corresponding Department
24 of Defense or other government situation.

1 ALDON CORPORATION -- SODIUM HYDROXIDE

2 =====

3 MSDS Safety Information

4 =====

5 MSDS Date: 06/10/1996

6 MSDS Num: CLFSZ

7 Product ID: SODIUM HYDROXIDE

8 MFN: 02

9 Responsible Party

10 Cage: 6V042

11 Name: ALDON CORPORATION

12 Address: 1533 W HENRIETTA RD

13 City: AVON NY 14414-9508

14 Info Phone Number: 716-226-6177

15 Emergency Phone Number: 716 226-6177 800-424-9300

16 Resp. Party Other MSDS No.: SS 550 KM00729M

17 Preparer's Name: MICHAEL RASZEJA

18 Chemtrec IND/Phone: (800)424-9300

19 Review Ind: Y

20 Published: Y

21 =====

22 Contractor Summary

23 =====

24 Cage: 6V042

25 Name: AL-DON CHEMICALS INC

26 Address: 1533 W HENRIETTA RD

27 City: AVON NY 14414-9508

28 Phone: 716-226-6177

29 Cage: 33089

30 Name: NASCO INTL INC., NASCO DIV

1 Address: 901 JANESVILL AVE
2 City: FORT ATKINSON WI 53538-0901
3 Phone: 920-563-2446

4 =====

5 Ingredients

6 =====

7 Cas: 1310-73-2
8 RTECS #: WB4900000
9 Name: SODIUM HYDROXIDE
10 % low Wt: 90.
11 % high Wt: 100.
12 OSHA PEL: 2 MG/M3
13 ACGIH TLV: NOT ESTABLISHED
14 ACGIH STEL: C2 MG/M3
15 EPA Rpt Qty: 1000 LBS
16 DOT Rpt Qty: 1000 LBS

17 =====

18 Health Hazards Data

19 =====

20 Effects of Exposure: INGESTION: MAY RESULT IN SEVERE INTESTINAL IRRITATION WITH
21 BURNS TO MOUTH, THROAT AND STOMACH WITH NAUSEA AND VOMITING. SKIN AND
22 EYES:

23 CONTACT WITH SKIN OR EYES MAY CAUSE SEVERE IRRITATION OR BURNS. I
24 NHALATION:

25 SEVERE IRRITATION TO RESPIRATORY SYSTEM WITH PULMONARY EDEMA, LUNG
26 INFLAMMATION.

27 Signs And Symptions Of Overexposure: INGESTION: MAY RESULT IN SEVERE INTESTINAL
28 IRRITATION WITH BURNS TO MOUTH, THROAT AND STOMACH WITH NAUSEA AND
29 VOMITING.

30 SKIN AND EYES: CONTACT WITH SKIN OR EYES MAY CAUSE SEVERE IRRITATION OR
31 BURNS. I NHALATION: SEVERE IRRITATION TO RESPIRATORY SYSTEM WITH
32 PULMONARY

1 EDEMA, LUNG INFLAMMATION.

2 First Aid: INGESTION: IF SWALLOWED, DO NOT INDUCE VOMITING. IF CONSCIOUS, GIVE

3 LARGE AMOUNTS OF WATER TO DRINK. FOLLOW WITH WHITE OF EGGS, BEATEN
4 WITH

5 WATER. CALL PHYSICIAN IMMEDIATELY. NEVER GIVE ANYTHING BY MOUTH TO AN

6 UNCONSCIOUS PERSON. EYES: IMMEDIATELY FLUSH WITH LARGE AMOUNTS OF
7 WATER FOR

8 15 MINUTES, LIFTING LOWER AND UPPER EYELIDS OCCASIONALLY. GET PROMPT
9 MEDICAL

10 ATTENTION. SKIN: FLOOD WITH WATER, THEN WASH WITH VINEGAR. INHALATION:

11 REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF

12 BREATHING IS DIFFICULT, GIVE OXYGEN. GET MEDICAL ATTENTION.

13 =====

14 Handling and Disposal

15 =====

16 Spill Release Procedures: CAREFULLY AND WEARING PROTECTIVE CLOTHING, SWEEP
17 UP

18 AND PLACE IN A SUITABLE CONTAINER. FLUSH SPILL AREA WITH WATER, FINISH
19 WITH

20 DILUTE ACID, PREFERABLY ACETIC, AND FINALLY WITH WATER.

21 Waste Disposal Methods: DISCHARGE, TREATMENT OR DISPOSAL MAY BE SUBJECT TO

22 FEDERAL, STATE, OR LOCAL LAWS. THESE DISPOSAL GUIDELINES ARE INTENDED
23 FOR THE

24 DISPOSAL OF CATALOG-SIZE QUANTITIES ONLY. AVOID BREATHING DUST OR MIST.
25 WEAR

26 FULL PROTECTIVE CLOTHING INCLUDING GOGGLES OR FACE SHIELD. (SEE SUPPL
27 DATA)

28 Handling And Storage Precautions: KEEP CONTAINER TIGHTLY CLOSED AND WHEN NOT
29 IN

30 USE. STORE IN A COOL, DRY, PLACE; PROTECT AGAINST MOISTURE AND WATER.

31 SEPARATE FROM ACIDS, METALS, EXPLOSIVES, ORGANIC PEROXIDES AND EASILY

32 IGNITIBLE MATERIALS. AVOID CONTACT WITH SKIN, EYES AND CLOTHING. WASH

33 THOROUGHLY AFTER HANDLING.

1 Other Precautions: PRODUCT IS DELIQUESCENT, ABSORBS WATER AND CARBON
2 DIOXIDE

3 FROM AIR. SODIUM HYDROXIDE AND TRICHLOROETHYLENE ESPECIALLY
4 HAZARDOUS SINCE

5 THEY REACT TO FORM SPONTANEOUSLY FLAMMABLE DICHLOROACETYLENE. WASH
6 CONTAMINATED CLOTHING PROMPTLY. LABORATORY USE ONLY. NOT FOR DRUG,
7 FOOD OR

8 HOUSEHOLD USE. KEEP OUT OF REACH OF CHILDREN

9 =====

10 Fire and Explosion Hazard Information

11 =====

12 Flash Point Text: NONCOMBUSTIBLE

13 Extinguishing Media: USE WATER SPRAY ON FIRE INVOLVING THIS MATERIAL.

14 Fire Fighting Procedures: IN FIRE CONDITIONS, WEAR A NIOSH/MSHA-APPROVED

15 SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. MUST
16 INCLUDE

17 COMPLETE EYE PROTECTION. FLOOD WITH WATER. USING CARE NOT TO SPLATTER
18 OR SP

19 LASH THIS MATERIAL. CONTACT WITH WATER PRODUCES INTENSE HEAT AND
20 HIGHLY

21 IRRITATING AND CORROSIVE MIST.

22 Unusual Fire/Explosion Hazard: NOT COMBUSTIBLE BUT SOLID FORM IN CONTACT WITH

23 MOISTURE OR WATER MAY GENERATE SUFFICIENT HEAT TO IGNITE COMBUSTIBLE

24 MATERIALS. CONTACT WITH MOST METALS CAN GENERATE HYDROGEN GAS. HOT
25 OR MOLTEN

26 MATERIA L WILL REACT VIOLENTLY WITH WATER LIBERATING HEAT AND CAUSING
27 SPLASHING. A SEVERE EYE HAZARD; SOLID OR CONCENTRATED SOL

28 =====

29 Control Measures

30 =====

31 Respiratory Protection: NONE REQUIRED IN NORMAL LABORATORY HANDLING. IF DUSTY
32 CONDITIONS PREVAIL, USE A HIGH EFFICIENCY PARTICULATE RESPIRATOR.

33 Ventilation: LOCAL EXHAUST/MECHANICAL (GENERAL) RECOMMENDED.

1 Protective Gloves: RUBBER.
2 Eye Protection: CHEMICAL SAFETY GOGGLES, OR FACE SHIELD WHERE APPROPRIATE.
3 Other Protective Equipment: GOGGLES, LAB COAT, APRON, VENTILATION HOOD,
4 PROPER
5 GLOVES, EYE WASH STATION.
6 Supplemental Safety and Health: CONTD FROM WASTE DISPOSAL METHOD: SLOWLY
7 DISSOLVE SPILL IN WATER. WHILE MAKING SOLUTION ADD SLOWLY TO SURFACE OF
8 STIRRED LIQUID TO AVOID VIOLENT SPLATTERING. NEUTRALIZE WITH SODIUM
9 BISULFATE
10 AND FLUS H TO SEWER WITH COPIOUS AMOUNTS OF WATER. NASCO P/N:
11 KM00729M.

12 =====

13 Physical/Chemical Properties

14 =====

15 HCC: B1
16 Boiling Point: =1390.C, 2534.F
17 Melt/Freeze Pt: =317.8C, 604.F
18 Vapor Pres: <20C (MM HG)
19 Spec Gravity: 2.130 AT 25C
20 Solubility in Water: 109 GRAMS IN 100ML WATER
21 Appearance and Odor: WHITE PELLETS, FLAKES, OR BEADS; NO ODOR.
22 Percent Volatiles by Volume: NEGLIGIBLE

23 =====

24 Reactivity Data

25 =====

26 Stability Indicator: YES
27 Stability Condition To Avoid: MOISTURE, ACIDS AND ACID FUMES.
28 Materials To Avoid: CAN REACT VIOLENTLY WITH ACIDS AND WITH MANY ORGANIC
29 COMPOUNDS. REACTS WITH MOST COMMON METALS (ZINC, ALUMINUM, TIN, LEAD,
30 ETC.)
31 LIBERATING FLAMMABLE HYDROGEN GAS.
32 Hazardous Decomposition Products: MAY FORM SODIUM MONOXIDE AND/OR SODIUM

1 PEROXIDE AT VERY HIGH TEMPERATURES.

2 Hazardous Polymerization Indicator: NO

3 =====

4 Toxicological Information

5 =====

6 =====

7 Ecological Information

8 =====

9 =====

10 MSDS Transport Information

11 =====

12 Transport Information: DOT PSN: SODIUM HYDROXIDE, SOLID, 8, UN1823, II.

13 =====

14 Regulatory Information

15 =====

16 =====

17 Other Information

18 =====

19 Other Information: NFPA RATINGS: HEALTH =3; FLAMMABILITY = 0; REACTIVITY = 1.

20 =====

21 Transportation Information

22 =====

23 Responsible Party Cage: 6V042

24 Trans ID NO: 157654

25 Product ID: SODIUM HYDROXIDE

26 MSDS Prepared Date: 06/10/1996

27 Review Date: 06/27/2001

28 MFN: 2

29 Multiple KIT Number: 0

30 Unit Of Issue: CY

1 Type Of Container: CYLINDER

2 Additional Data: PSN PER MSDS.

3 =====

4 Detail DOT Information

5 =====

6 DOT PSN Code: NGU

7 DOT Proper Shipping Name: SODIUM HYDROXIDE, SOLID

8 Hazard Class: 8

9 UN ID Num: UN1823

10 DOT Packaging Group: II

11 Label: CORROSIVE

12 Packaging Exception: 154

13 Non Bulk Pack: 212

14 Bulk Pack: 240

15 Max Qty Pass: 15 KG

16 Max Qty Cargo: 50 KG

17 Vessel Stow Req: A

18 =====

19 Detail IMO Information

20 =====

21 IMO PSN Code: NSX

22 IMO Proper Shipping Name: SODIUM HYDROXIDE, SOLID

23 IMDG Page Number: 8225-1

24 UN Number: 1823

25 UN Hazard Class: 8

26 IMO Packaging Group: II

27 Subsidiary Risk Label: -

28 EMS Number: 8-06

29 MED First Aid Guide NUM: 705

30 =====

1 Detail IATA Information

2 =====

3 IATA PSN Code: WSO

4 IATA UN ID Num: 1823

5 IATA Proper Shipping Name: SODIUM HYDROXIDE, SOLID

6 IATA UN Class: 8

7 IATA Label: CORROSIVE

8 UN Packing Group: II

9 Packing Note Passenger: 814

10 Max Quant Pass: 15KG

11 Max Quant Cargo: 50KG

12 Packaging Note Cargo: 816

13 =====

14 Detail AFI Information

15 =====

16 AFI PSN Code: WSO

17 AFI Proper Shipping Name: SODIUM HYDROXIDE, SOLID

18 AFI Hazard Class: 8

19 AFI UN ID NUM: UN1823

20 AFI Packing Group: II

21 Special Provisions: P5

22 Back Pack Reference: A12.4

23 =====

24 HAZCOM Label

25 =====

26 Product ID: SODIUM HYDROXIDE

27 Cage: 6V042

28 Company Name: AL-DON CHEMICALS INC

29 Street: 1533 W HENRIETTA RD

30 City: AVON NY

1 Zipcode: 14414-9508
2 Health Emergency Phone: 716 226-6177 800-424-9300
3 Label Required IND: Y
4 Date Of Label Review: 06/27/2001
5 Status Code: A
6 Origination Code: F
7 Eye Protection IND: YES
8 Skin Protection IND: YES
9 Signal Word: WARNING
10 Health Hazard: Moderate
11 Contact Hazard: Moderate
12 Fire Hazard: None
13 Reactivity Hazard: Slight
14 Hazard And Precautions: INGESTION: MAY RESULT IN SEVERE INTESTINAL IRRITATION
15 WITH BURNS TO MOUTH, THROAT& STOMACH WITH NAUSEA AND VOMITING. SKIN &
16 EYES: MAY CAUSE SEVERE IRRITATION OR BURNS. INHALATION: SEVERE
17 IRRITATION TO
18 RESPIRATORY SYSTEM WITH PULMONAY EDEMA AND LUNG INFLAMMATION.

19 =====

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