Blue Grass Chemical Agent-Destruction Pilot Plant

Resource Conservation and Recovery Act

Research, Development and Demonstration Permit Application

Submitted To:
The Kentucky Department for Environmental Protection,
Division of Waste Management
14 Reilly Road
Frankfort, Kentucky 40601

Submitted By:
Blue Grass Army Depot
2091 Kingston Highway
Richmond, Kentucky 40475-5001

Prepared By:
Bechtel Parsons Blue Grass
301 Highland Park Drive
Richmond, Kentucky 40475

November 2004
Revision 2

Volume I

VOLUME I

Contents

Application

Attachments

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

RECEIVED

2004 MAR 11 P 3:44

DIVISION OF WASTE MGMT
HAZARDOUS WASTE BRANCH

REPLY TO
ATTENTION OF

March 1, 2004

Environmental Office

Mr. Michael V. Welch, PE
Commonwealth of Kentucky
Department for Environmental Protection
Division of Waste Management
Hazardous Waste Branch
14 Reilly Road
Frankfort, Kentucky 40601

Subject: Research, Development and Demonstration Permit Application
Blue Grass Army Depot
EPA ID # KY8-213-820-105
Blue Grass Chemical Agent-Demilitarization Pilot Plant
(BGCAPP)

Dear Mr. Welch:

The Blue Grass Army Depot (BGAD) hereby submits for your review and approval the accompanying Research, Development and Demonstration (RD&D) Permit Application. As instructed by personnel from the Hazardous Waste Branch, the application follows the format of DEP Form 7094B. Additional details are provided in accordance with EPA's "Guidance Manual for Research, Development, and Demonstration Permits Under 40 CFR Section 270.65," OSWER Policy Directive # 9527.00-1A, 1986. Prior to submittal of this application, Bechtel Parsons Blue Grass held a pre-application meeting at Eastern Kentucky University. The notes from this meeting are included with this application as Appendix F. Also, a Part A Application is included that describes all the potentially regulated units with their associated capacities or throughput rates.

The treatment process described in this application will utilize proven unit processes in an innovative hazardous waste treatment facility that neutralizes and treats the chemical munitions stored at BGAD. The research objective is to develop and demonstrate the integrated chemical treatment process for the specific and unique mix of chemical weapons that are stored at BGAD in Richmond, Madison County, Kentucky. The BGCAPP utilizes individual processes, which have been fully demonstrated, consistent with KRS 224.50-130. The research is being performed to address the needs identified by the National Research Council that the process integration must be evaluated to assess the interaction between the proven individual units.

The RD&D program described in the permit application will be conducted interactively with the design of the facility. As data are obtained from both ongoing equipment design and testing programs, they will be fed back to the design team so that the information can be used to improve and validate the process. Process, equipment and operating procedure modifications that are made under the RD&D program, and that result in performance that meets or exceeds the RD&D goals and objectives will not require modification to the RD&D permit.

In addition to regulatory requirements, there are a number of statutory requirements for construction of any new hazardous waste treatment, storage and/or disposal facility (TSDF). These requirements have been met through a rigorous process conducted by the Department of Defense, Program Manager for Chemical Demilitarization. The results of this process are reported in the document "Destruction of Chemical Munitions at Blue Grass Army Depot, Kentucky - Final Environmental Impact Statement." The findings in this report fulfill the requirements of KRS 224.46-520(1).

The Blue Grass Army Depot recognizes that, if issued, this permit would authorize the construction and up to one (1) year of operation (365 days of actual operation with hazardous waste) to conduct the RD&D program and that an additional three (3) one (1) year renewals are possible. An operating day is any day or part thereof in which hazardous waste is treated in a regulated unit. BGAD further understands that this RD&D Permit can be terminated immediately if the Cabinet deems it necessary to protect human health or the environment.

If you have any questions concerning this matter, please contact Joe Elliott at (859) 625-6021.

Sincerely,

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

Enclosure

Copies Furnished with Enclosure:
Mr. Craig Brown, EPA Region 4
Mr. Hugh Hazen, EPA Region 4

Copies Furnished without Enclosure:
Mr. Ralph Collins, KDEP
Mr. Tony Hatton, KDEP-DWM
Mr. Chris Midget, BPBG
Mr. Jim Richmond, ACWA
Ms. April Webb, KDEP-DWM Hazardous Waste Branch

Please type or print clearly in ink (Do not use pencil) DEP-7058A (July 1997)

Kentucky Natural Resources and Environmental Protection Cabinet
Department for Environmental Protection
Division of Waste Management
14 Reilly Road - Frankfort, Kentucky 40601

DO NOT WRITE IN THIS SPACE

Part A of the Kentucky Hazardous Waste Permit Application

Facility's EPA ID No.	K	Y	8	2	1	3	8	2	0	1	0	5

FIRST SUBMITTAL *(see INSTRUCTIONS)* XX REVISION

RENEWAL

1. Name of Facility: Blue Grass Chemical Agent-Destruction Pilot Plant
2. Location of Facility: 2091 Kingston Highway

   City: Richmond State: KY Zip Code: 40475-5001

3. County: Madison *See INSTRUCTIONS:* Latitude: 37º 42' 00" N Longitude: 84º 12' 30" W

4. Name of Land Owner: *See INSTRUCTIONS:* U.S. Department of the Army

   Legal status of Land Owner: XX Federal (F) State (S) County (C) Indian (I)

   Municipal (M) District (D) Private (P)

   Other (O) specify: ______

   Land Owner's Mailing Address: Blue Grass Army Depot, 2091 Kingston Highway

   City: Richmond State: KY Zip Code: 40475-5001

   Facility Land Owner's Telephone Number: (859) 779-6246

5. Existing Facilities, provide the date operation began or construction commenced: 1941
   (Month, Day, Year)

   New Facilities, provide the date operation is expected to begin: ______
   (Month, Day, Year)

6. Facility Mailing Address: Blue Grass Army Depot, 2091 Kingston Highway

   City: Richmond State: KY Zip Code: 40475-5001

7. Facility Contact Person: Todd G. Williams

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

   Facility Contact Person may be reached at Mailing Address XX Location Address Other Specify: ______

   Street Address: ______

   City: ______ State: ______ Zip Code: ______

Facility's EPA ID Number

K	Y	8	2	1	3	8	2	0	1	0	5

8. Name of Facility Operator: *See INSTRUCTIONS:* Bechtel Parsons Blue Grass

Type of Owner: XX Federal (F) State (S) County (C) Indian (I)

Municipal (M) District (D) XX Private (P)

Other (O) specify: ______

Operator's Mailing Address: 301 Highland Park Drive

City: Richmond State: KY Zip Code: 40475

Facility Operator's Telephone Number: (859) 625-1665

New Operator Assumed Responsibility for Facility on this Date: See Notes, Page 10
(Month, Day, Year)

9. Name of Facility Owner: *See INSTRUCTIONS:* U.S. Department of the Army

Legal status of Land Owner: XX Federal (F) State (S) County (C) Indian (I)

Municipal (M) District (D) Private (P)

Other (O) specify: ______

Owner's Mailing Address: 2091 Kingston Highway

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

Facility Owner's Telephone Number: (859) 779-6246

New Operator Assumed Responsibility for Facility on this Date: 1941
(Month, Day, Year)

10. SIC Codes: (1) 9711 (1) ______ (1) ______ (1) ______

Briefly describe the type of business conducted at this site: National Security (U.S. Army)

Facility's EPA ID Number											
K	Y	8	2	1	3	8	2	0	1	0	5

11. PROCESS DESCRIPTION. *See Instructions*

Commercial Indicator	Unique Unit or Group Name	Legal Status Code	Process Codes	Process Design Capacity Of All Units Listed Under This Name	Unit of Measure	Number of Individual Units In This Process	Operating Status Code	Description Of Process
4	Container Handling Building (CHB)	PR	S01	6500.00	G	1	BC	Store waste chemical munitions prior to movement to the Munitions Demilitarization Building for treatment.
4	Unpack Area (UPA)	PR	S01	1000.00	G	1	BC	Store waste chemical munitions prior to movement to the Munitions Demilitarization Building for treatment.
4	Explosive Containment Vestibule (ECV)	PR	S01	600.00	G	1	BC	Store waste chemical munitions prior to movement to the Munitions Demilitarization Building for treatment.
4	Explosive Containment Room (ECR)	PR	S01	30.00	G	2	BC	Store waste chemical munitions and chemical warfare agent contaminated equipment.
4	Toxic Maintenance Area	PR	S01	5500.00	G	1	BC	Store EONCs, munitions that may be leaking and secondary wastes
4	Dunnage Storage Area	PR	S01	24000.00	G	1	BC	Store dunnage prior to treatment and disposal
4	MDB Residue Handling Area	PR	S01	24000.00	G	2	BC	Store various hazardous wastes prior to final treatment or disposal
4	Spent Decon Storage	PR	S01	500.00	G	1	BC	Store spent decon solution prior to treatment or disposal

Facility's EPA ID Number

K	Y	8	2	1	3	8	2	0	1	0	5

11. PROCESS DESCRIPTION. *See Instructions*

Commercial Indicator	Unique Unit or Group Name	Legal Status Code	Process Codes	Process Design Capacity Of All Units Listed Under This Name	Unit of Measure	Number of Individual Units In This Process	Operating Status Code	Description Of Process
4	Laboratory Waste Handling Area	PR	S01	2200.00	G	1	BC	Store hazardous waste generated during operation of the facility laboratory
4	DSH Residue Handling Area	PR	S01	5500.00	G	2	BC	Store various hazardous wastes prior to final treatment or disposal
4	Agent Collection/Toxic Storage Tanks	PR	S02	3600.00	G	3	BC	Store agent prior to treatment
4	Spent Decon Storage	PR	S02	20000.00	G	2	BC	Store spent decon solution prior to treatment or disposal
4	Hydrolysate Sampling Tanks	PR	S02	160000.00	G	4	BC	Store agent hydrolysate for sampling prior to release
4	Brine Storage Tank	PR	S02	152000.00	G	2	BC	Store brine generated during hydrolysate treatment
4	Recovered/Process Water Storage Tanks	PR	S02	228000.00	G	3	BC	Store water after treatment through the water recovery system
4	Hydrolysate Storage Tanks	PR	S02	3210000.00	G	9	BC	Store hydrolysate prior to treatment in SCWO

Facility's EPA ID Number: K Y 8 2 1 3 8 2 0 1 0 5

11. PROCESS DESCRIPTION. *See Instructions*

Commercial Indicator	Unique Unit or Group Name	Legal Status Code	Process Codes	Process Design Capacity Of All Units Listed Under This Name	Unit of Measure	Number of Individual Units In This Process	Operating Status Code	Description Of Process
4	Laboratory Chemical Waste Tank	PR	S02	1600.00	G	1	BC	Store lab generated hazardous wastes
4	Rocket Shear Machine System (RSM)	PR	X02	1661.00	J	2	BC	Mechanically disassemble M55 rockets and M56 warheads for treatment. Lbs/hr
4	Projectile/Mortar Dissasembly System (PMD)	PR	X02	315.00	J	1	BC	Mechanically disassemble projectiles for treatment.Lbs/hr
4	Energetics Batch Hydrolyzer (EBH)	PR	X99	846.00	E	18	BC	Treatment of waste energetics. gallons/hour
4	Heated Discharge Conveyor (HDC)	PR	X03	1485.00	J	2	BC	Treat solids associated with weapons treatment lbs/hr
4	Energetics Neutralization System	PR	T01	3200.00	E	6	BC	Neutralize waste energetics in tanks. Peak design rate process.
4	Aluminum Removal System	PR	X99	20000.00	J	1	BC	Precipitate and filter aluminum from hydrolysate
4	Munition Washout System (MWS)	PR	X02	871.00	J	3	BC	Drain and washout chemical warfare agent from projectiles.

Facility's EPA ID Number											
K	Y	8	2	1	3	8	2	0	1	0	5

11. PROCESS DESCRIPTION. *See Instructions*

Commercial Indicator	Unique Unit or Group Name	Legal Status Code	Process Codes	Process Design Capacity Of All Units Listed Under This Name	Unit of Measure	Number of Individual Units In This Process	Operating Status Code	Description Of Process
4	Metal Parts Treater (MPT)	PR	X03	6998.00	J	2	BC	Treat potentially contaminated metal parts.lbs/hr
4	Nose Closure Removal System (NCRS)	PR	X02	581.00	J	2	BC	Remove nose closures from projectiles.
4	Agent Neutralization System (ANS)	PR	T01	4321.00	J	4	BC	Neutralize agent. Lbs/hour
4	Wood Shredder	PR	X02	340.00	J	1	BC	Mechanically shred agent contaminated wood pallets
4	Micronizer	PR	X02	340.00	J	1	BC	Reduce shredded solids to flour consistency
4	Plastic Shredder	PR	X02	7.50	J	2	BC	Mechanically shred agent contaminated plastic items
4	Carbon Grinder	PR	X02	160.00	J	1	BC	Grind agent contaminated carbon prior to slurrying in hydropulper
4	Hydropulper	PR	X02	4200.00	E	2	BC	Slurry size reduced dunnage prior to treatment in SCWO

PAGE 7 OF 10

Facility's EPA ID Number

K	Y	8	2	1	3	8	2	0	1	0	5

11. PROCESS DESCRIPTION. *See Instructions*

Commercial Indicator	Unique Unit or Group Name	Legal Status Code	Process Codes	Process Design Capacity Of All Units Listed Under This Name	Unit of Measure	Number of Individual Units In This Process	Operating Status Code	Description Of Process
4	Super Critical Water Oxidizer	PR	X99	8000.00	J	8	BC	Treat hydrolysate and dunnage slurries by oxidation lbs/hour
4	Brine Concentrator	PR	X99	3000.00	E	2	BC	Concentrate brine prior to shipment offsite for final disposal
4	Water Recovery System	PR	X03	21600.00	U	1	BC	System recovers water from treated hydrolysate

Facility's EPA ID Number											
K	Y	8	2	1	3	8	2	0	1	0	5

12. WASTE STREAM DESCRIPTION. ***See Instructions.***

WASTE STREAM NUMBER	ESTIMATE ANNUAL WASTE AMOUNT	UNIT OF MEASURE	EPA WASTE NUMBERS	PROCESS CODE ASSOCIATED WITH THIS WASTE
1	1210.00	**TONS**	D003, D004, D005, D006, D007, D008, D009, D010, D011, D022, D024, D029, D037, N001, N002 and/or N003	S01, S02, T01, X02, X03, X99 MPT Residues
2	660.00	**TONS**	D003, D004, D005, D006, D007, D008, D009, D010, D011, D022, D024, D029, D037, N001, N002 and/or N003	S01, S02, T01, X02, X03, X99 EBH/HDC Residues
3	1330.00	**TONS**	D003, D004, D005, D006, D007, D008, D009, D010, D011, D022, D024, D029, D037, N001, N002 and/or N003	S01, S02, T01, X02, X03, X99 AFS Precipitate
4	3950.00	**TONS**	D003, D004, D005, D006, D007, D008, D009, D010, D011, D022, D024, D029, D037, N001, N002 and/or N003	S01, S02, T01, X02, X03, X99 Water Recovery Salts
5	0.50	**TONS**	F001, F002, F003, F004 & F005	S01 & S02
6	2500.00	**TONS**	D003, D004, D005, D006, D007, D008, D009, D010, D011, D022, D024, D029, D037, N001, N002 and/or N003	S01, S02, T01, X02, X03, X99 Closure Waste
		TONS		
		TONS		
		TONS		
		TONS		

Facility's EPA ID Number

K	Y	8	2	1	3	8	2	0	1	0	5

13 **Existing Environmental Permits:**

Inter-State Regional Program [A]: ___
Single Well (FURS) [B]: ___
County Program [C]: ___
DOE Program [D]: ___
Other EPA Program [E]: ___ specify: ___
EPA 404 (dredge or fill program) [F]: ___
USGS Program [G]: ___
Area Wells (FURS) [H]: ___
NOTIS [J]: ___
Superfund (CERCLIS) [K]: ___
FATES [L]: ___
Municipal (city, town, etc.) Program [M]: ___
NPDES/KPDES (discharges to surface water) [N]: KY0020737
PSD (prevention of significant deterioration - Clean Air Act) [P]: KY 0-86-12, 8-99-046
CDS [Q]: ___
RCRA (hazardous wastes) [R]: KY8-213-820-105
State Program [S]: ___
DOT Program [T]: ___
UIC (underground injection of fluids) [U]: ___
Intra-State Regional Program [W]: ___
Other Federal Program [X]: ___ specify: ___
CICIS (OTS Chemicals in Commerce Information System) [Y]: ___
Other Non Federal Programs [Z]: Water Withdrawal Permit #1013

14 **FACILITY STATUS:**

[X] Waste is NOT received from off-site

[ ] Accepts waste from any off-site source(s) [A]

[ ] Accepts waste from only a restricted group of off-site sources(s) [R]:
Specify: ___

15 **PHOTOGRAPHS, DRAWING AND MAP** - ***See INSTRUCTIONS***

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment or disposal areas; and sites of future treatment, storage or disposal areas. All existing facilities must include a drawing showing the general layout of the facility and a topographic map. The photographs, drawing and map must be attached to this form.

16 If the facility owner is also the facility operator, please skip this section and complete item 17 below.

Owner Certification - I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME (PRINT OR TYPE) SIGNATURE DATE SIGNED

Martin A. Jacoby, Colonel, U.S. Army, Commanding Officer	[signature]	23 Nov 04
NAME (PRINT OR TYPE)	SIGNATURE	DATE SIGNED

17 **17. Operator Certification** - I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME (PRINT OR TYPE) SIGNATURE DATE SIGNED

J. Christopher Midgett, General Manager, BPBG	Christopher Midgett	11/22/04
NAME (PRINT OR TYPE)	SIGNATURE	DATE SIGNED

18 **Land Owner Certification** - I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Martin A. Jacoby, Colonel, U.S. Army, Commanding Officer	[signature]	23 Nov 04
NAME (PRINT OR TYPE)	SIGNATURE	DATE SIGNED

NOTES

I. Waste streams listed on page 8 are further described below.

1. Waste stream number 1 is the residues coming out of the Metal Parts Treaters (MPTs). Annual waste amount represents the highest annual waste amount processed during the life of the facility.
2. Waste stream number 2 is the residues coming out of the Energetics Batch Hydrolyzers/Heated Discharge Conveyors (EBHs/HDCs). Annual waste amount represents the highest annual waste amount processed during the life of the facility.
3. Waste stream number 3 is the solid residues coming out of the Aluminum Filtration System (AFS). Annual waste amount represents the highest annual waste amount processed during the life of the facility.
4. Waste stream number 4 is the solid residues (salts) coming out of the Water Recovery System (WRS). Annual waste amount represents the highest annual waste amount processed during the life of the facility.
5. Waste stream number 5 is the secondary waste generated annually in the treatment of the stockpile including but not limited too PPE, contaminated wood pallets, etc. These wastes will be characterized and disposed in appropriate disposal facilities.
6. Waste stream number 6 is the estimated amount of waste generated during closure of the facility. Annual waste amount represents the highest annual waste amount generated during the closure of the facility.

II. This Part A permit application is submitted as part of the Blue Grass Chemical Agent-Destruction Pilot Plant's application for a Research, Development and Demonstration permit.

Acronym	Definition
A/G	aboveground
AAE	Army Acquisition Executive
ABCDF	Aberdeen Chemical Agent Disposal Facility
ACAMS	automatic, continuous air monitoring system
ACANF	Aberdeen Chemical Agent Neutralization Facility
ACB	access control building
ACO	Administrative Contracting Officer
ACWA	Assembled Chemical Weapons Alternatives
ACWP	actual cost of work performed
ADA	Americans with Disabilities Act
AEL	airborne exposure limit
AFB	**aluminum filtration building**
AFS	**aluminum filtration system**
AHA	activity hazards analysis
AISC	American Institute of Steel Construction
AMC	Army Materiel Command
AMS	agent monitoring system
AMSAA	Army Materiel Systems Analysis Activity
ANCDF	Anniston Chemical Agent Disposal Facility
ANS	agent neutralization system
APE	area project engineer
APP	accident prevention plan
APS	**aluminum precipitation system**
AQS	agent quantification system
AR	Army Regulation
ASB	access security building
ASF	administrative support facility
ASME	American Society of Mechanical Engineers
AWS	American Welding Society
BC	brine concentrator
BCC	Bechtel Construction Company
BCD	bulk chemical distribution
BCOI	Bechtel Construction Operations Inc.
BCS	bulk chemical storage
BCWP	budgeted cost of work performed
BCWS	budgeted cost of work scheduled
BEA	bid, evaluate, and award
BETK	Bechtel Estimating Tool Kit
BG	Blue Grass
BGAD	Blue Grass Army Depot
BGCA	Blue Grass Chemical Activity
BGCAPP	Blue Grass Chemical Agent Destruction Pilot Plant
BMPT	batch metal parts treater

Acronym	Definition
BNI	Bechtel National Inc.
BOD	basis of design
BPBG	Bechtel Parsons Blue Grass
BPBGT	Bechtel Parsons Blue Grass Team
BPS	Bechtel Procurement System
BRS	brine recovery system
BRS	burster removal station
BSII	Bechtel Systems and Infrastructure, Inc.
C&S	civil and structural
CA	chemical agent
CAA	Clean Air Act
CAC	Citizens Advisory Committee
CAD	computer-aided design
CADD	computer-aided design and drafting
CAE	computer-aided engineering
CAM	cavity access machine
CAM	cost account manager
CAMDS	chemical agent munitions disposal system
CAR	corrective action report
CASARM	chemical agent standard analytical reference material
CatOx	catalytic oxidation
CCB	Change Control Board
CCTV	closed-circuit television
CD	compact disk
CDB	chemical demilitarization building
CDCAB	Chemical Destruction Community Advisory Board
CDP	construction data package
CDRL	contract data requirements list
CDTF	Chemical Demilitarization Training Facility
CEMS	continuous emissions monitoring system
CFR	Code of Federal Regulations
CHB	container handling building
chem demil	chemical demilitarization
CHP	chemical hygiene plan
CI	configuration item
CIE	computer-integrated engineering
CLA	chemical limited area
CM	configuration management
CMA	Chemical Materials Agency
CMP	configuration management plan
CMU	concrete masonry unit
CN	change notice
CO_2	carbon dioxide

Acronym	Definition
COCO	cost and commitment
COPQ	cost of poor quality
COTS	commercial off-the-shelf
CPM	critical path method
CPR	cost performance report
CPRP	Chemical Personnel Reliability Program
CPSR	contract purchasing systems review
CQCM	construction quality control manager
CRO	control room operator
CRS	controller reporting system
CSB	control and support building
CSDP	Chemical Stockpile Disposal Program
CSEPP	Chemical Stockpile Emergency Preparedness Program
CSMP	Chemical Surety Management Plan
CST	continuous steam treater
CWA	Clean Water Act
CWBS	contract work breakdown structure
CWC	Chemical Weapons Convention (treaty)
CWP	construction work package
CWWG	Chemical Weapons Working Group
DA	Department of the Army
DA PAM	Department of the Army Pamphlet
DBM	Design-Build Manager
DBP	Design-Build Plan
DCAA	Defense Contract Audit Agency
DCD	Deseret Chemical Depot
DCHCDI	dicyclohexylcarbodiimide
DCN	design change notice
DCS	distributed control system
DDESB	Department of Defense Explosives Safety Board
decon	decontamination (solution)
DEMP	diethylmethylphosphonate
DFARS	Defense Federal Acquisition Regulation Supplement
DH	direct hire
DIA	design integration assessment
DICDI	diisopropylcarbodiimide
DIMP	diisopropyl methyl phosphonate
DIU	diisopropyl urea
DMCS	document and material control system
DoD	Department of Defense
DOT	Department of Transportation
DPE	demilitarization protective ensemble
DR	deficiency report
DrChecks	Design Review and Checking System

Acronym	Definition
DRE	destruction and removal efficiency
DRL	data requirements list
DRMO	Defense Reutilization and Marketing Office
DRN	design review notice
DSA	demilitarization protective ensemble (DPE) support area
DSH	dunnage shredding and handling
DVD	digital video disk
EA	environmental assessment
EA 2192	S-(2-diisopropylaminoethyl) methyl phosphonithioic acid
EAC	estimate at completion
EBH	energetics batch hydrolyzer
EC	evaporator/crystallizer
ECD	electron capture detector
ECF	entry control facility
ECP	engineering change proposal
ECR	explosive containment room
ECV	explosive containment vestibule
EDE	execution and delivery environment
EDI	electronic data interchange
EDM	electronic distance measuring
EDMS	electronic data management system
EDP	[Bechtel] Engineering Department Procedure
EDPI	[Bechtel] Engineering Department Project Instruction
EDS	Engineering design study
EG&G	Edgerton, Germeshausen & Grier
EIS	environmental impact statement
EKU	Eastern Kentucky University
ENR	energetics neutralization reactor
ENS	energetics neutralization system
ENVIROP	environmental/operability
EO	Executive Order
EONC	enhanced onsite container
EPA	Environmental Protection Agency
EPC	engineering, procurement, and construction
EPPR	engineering progress and performance report
ERH	energetic rotary hydrolyzer
ES&H	environmental safety and health
ETAP	Electrical Transient and Analysis Program
ETC	estimate to complete
*e*TRACK	timekeeping software
EVMS	earned value management system
FAR	Federal Acquisition Regulation
FCC	Facilities construction certification

Acronym	Definition
FCN	field change notice
FCR	field change request
FCS	facility control system
FDM	Facilities Design Manager
FDP	final design package
FIL	filter area
FMEA	failure mode and effects analysis
FMECA	failure mode, effect, and criticality analysis
FMP	forestry management plan
FOAK	first-of-a-kind
FOCIS	FOCIS Associates, a Geo-Centers, Inc., Company
FPDA	fire protection design analysis
FPS	facility protection system
FTA	fault tree analysis
FWC	fuze well cup
FY	fiscal year
GA	general arrangement
GATS	General Atomics Total Solution
GB	nerve agent sarin, isopropyl methyl phosphonofluoridate ($C_4H_{10}FO_2P$)
GC	gas chromatograph
gCMIS	Global Contract Management Information System
GCS	gimbal cam socket
GFE	government-furnished equipment
GLS	gas/liquid separator
GMB	gas mask storage building
GP	General Physics
GPA	Government Property Administration
gpd	gallon per day
GSA	Government Services Administration
H	blister agent mustard made by the Levinstein process, bis(2-chloroethyl) sulfide or 2,2'-dichlorodiethyl sulfide ($C_4H_8Cl_2S$)
HAZMAT	hazardous material
HAZOP	hazard and operability (analysis)
HD	mustard agent, bis(2-chloroethyl) sulfide or 2,2'-dichlorodiethyl sulfide
HDC	heated discharge conveyor
HEPA	high-efficiency particulate air (filter)
HP	high pressure
HPGLSS	high-pressure gas/liquid/solid separator
HPSLS	high-pressure solid/liquid separator
HSA	hydrolysate storage area
HTRR	hazard tracking and risk resolution
HVAC	heating, ventilating, and air conditioning
I&C	instrumentation and control
I/O	input/output

Acronym	Definition
IBR	integrated baseline review
ICD	interface control document
ICP	inductively coupled plasma
ICS	integrated process and facilities control system
ID	identification
IDLH	immediately dangerous to life and health
IDS	intrusion detection system
IFA	issued for approval
IFC	issued for construction
IFD	issued for design
IFF	issued for fabrication
IFR	issued for (external) review
IMP	integrated management plan
IMS	integrated master schedule
IPT	integrated product team
IS	information systems
IS&T	information systems and technology
IT	information technology
JACADS	Johnston Atoll Chemical Agent Disposal System
JMC	Joint Munitions Command
JTA	job task analysis
JV	joint venture
KAR	Kentucky Administrative Regulation
KDEP	Kentucky Department for Environmental Protection
KHW	Kentucky Hazardous Waste
KK	bis(2-diisopropylaminoethyl)sulfide
KM	bis(2-diisopropylaminoethyl)disulfide (or EA 4196)
KPDES	Kentucky Pollutant Discharge Elimination System
KRS	Kentucky Revised Statute
LAB	laboratory building
LBCDF	Lexington Bluegrass Chemical Agent Destruction Facility
LCCE	life cycle cost estimate
LCHP	laboratory chemical hygiene plan
LDT	line designation table
LEL	lower explosive limit
LFA	laboratory building (LAB) filter area
LOP	laboratory operating procedure
LPMD	linear projectile/mortar disassembly
LWCR	lost workday case rate
M&EB	material and energy balance
MAS	material assignment schedule
MB	maintenance building
MCA	Military Construction Allowance

Acronym	Definition
MCC	motor control center
MCD	Military Construction Defense
MDB	munitions demilitarization building
MDL	method detection limit
MEL	master equipment list
MFCR	minimum functional control report
MILCON	Military Construction
MIL-HDBK	Military Handbook
MIL-STD	Military Standard
MIP	Medical implementation plan
MLA	modular laboratory area
MOP	maintenance operating procedure
MPR	monthly progress report
MPRS	miscellaneous parts removal system
MPT	metal parts treater
MR	material requisition
MS	mass spectrometer
MS	mass spectroscopy
MSB	munition storage building
MSDS	material safety data sheet
MTBF	mean time between failures
MTO	material takeoff
MTTR	mean time to repair
MWR	material withdrawal request
MWS	munitions washout system
N_2O	nitrous oxide
Na_2SO_4	sodium sulfate
NaCl	sodium chloride
NaF	sodium fluoride
NaH_2PO_4	sodium monophosphate
NaOCl	sodium hypochlorite
NaOH	sodium hydroxide
NCA	National Construction Agreement
NCR	nose closure removal
NCRS	nose closure removal station
NDE	nondestructive examination
NECDF	Newport Chemical Agent Disposal Facility
NEPA	National Environmental Policy Act
NGO	nongovernment organization
NIOSH	National Institute for Occupational Safety and Health
NOD	notice of deficiency
NOI	notice of intent
NOV	notice of violation

Acronym	Definition
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council
NTP	notice to proceed
O&M	operations and maintenance
O&SHA	operating and support hazard analysis
OBS	organizational breakdown structure
OHHP	occupational health and hygiene plan
OPSEC	operations security
ORR	operational readiness review
OSHA	Occupational Safety and Health Administration
OTS	offgas treatment system
P&A	precision and accuracy
P&ID	piping and instrumentation diagram
P.E.	Professional Engineer
P2	pollution prevention
P3	Primavera Project Planner
PA	public address
PAB	process auxiliary building
PBCDF	Pine Bluff Chemical Agent Disposal Facility
PCA	physical configuration unit
PCAPP	Pueblo Chemical Agent Destruction Pilot Plant
PCB	polychlorinated biphenyl
PCD	Pueblo Chemical Depot
PDCC	Project Document Control Center
PDM	Process Design Manager
PDS	plant design system
PE	project engineer
PEBH	propellant energetics batch hydrolyzer
PEDMS	Parsons Engineering Data/Document Management System
PESC	project engineering systems coordinator
PFCI	Parsons Fabricators and Constructors
PFD	process flow diagram
PFE	project field engineer
PFS	project field superintendent
PHA	preliminary hazard analysis
PHL	preliminary hazard list
PI&T	Parsons Infrastructure & Technology
PIL	priority items list
PIP	process improvement project
PLC	programmable logic controller
PMACWA	Program Manager, Assembled Chemical Weapons Alternatives
PMATA	Program Manager for Alternative Technologies and Approaches
PMB	process and maintenance building

Acronym	Definition
PMCD	Program Manager for Chemical Demilitarization
PMD	projectile/mortar disassembly
PMECW	Program Manager for the Elimination of Chemical Weapons
PMS	plant monitoring system
PO	purchase order
PPE	personnel protective equipment
PPM	Project Procurement Manager
PRP	personnel reliability program
PSA	protective equipment support area
PSB	personnel support building
PSD	prevention of significant deterioration
QA	quality assurance
QC	quality control
QD	quantity-distance
QMP	quality management plan
QRA	quantitative risk assessment
QRS	quantity reporting system
QURR	quantity unit rate report
QV	quantity verification
R&D	research and development
RAC	risk assessment code
RAM	reliability, availability, and maintainability
RCRA	Resource Conservation and Recovery Act
RD&D	research, development, and demonstration
RDM	rocket demilitarization machine
RDT&E	research, development, test, and evaluation
RDX	cyclonite
RE	resident engineering
RFA	RCRA Facility Assessment
RFI	request for information
RFP	request for proposal
RIR	recordable injury rate
RO	reverse osmosis
ROM	rough order of magnitude
RSM	rocket shear machine
RTS	RTW Wright Industries
RX	reactor
SC	systems contractor
SCA	subcontracts administrator
SCM	site construction manager
SCWO	supercritical water oxidation
SDD	system design description
SDDR	supplier document deviation request

Acronym	Definition
SDG	standby diesel generator
SDN	standard document number
SDRM	safety design requirements manual
SDS	spent decon system
SETH	simulated equipment training hardware
SHA	system hazard analysis
SME	subject matter expert
SOP	standard operating procedure
SOW	scope of work
SP	site preparation
SPB	supercritical water oxidation (SCWO) processing building
SPI	schedule performance index
SR	service requisition
SS	substation
SSHA	subsystem hazard analysis
SSLD	system symbolic logic diagram
SSPP	system safety program plan
STA	supercritical water oxidation (SCWO) tank area
STARRT	safety task analysis risk reduction talk
STDP	system technical data package
STR	subcontract technical representative
SUB	substation
SUPLECAM	Surveillance Program, Lethal Chemical Agents and Munitions
SVOC	semivolatile organic compound
SWPP	standard work process procedure
TAA	throughput and availability analysis
TBA	tertiary butyl alcohol
TBD	to be determined
TC	ton container
TCC	temporary configuration change
TDP	technical data package
TEAD	Tooele Army Depot, Utah
TF	total float
TM	technical manager
TMA	toxic maintenance area
TNT	trinitrotoluene
TOC	total organic carbon
TOCDF	Tooele Chemical Agent Disposal Facility
TPIL	technical risk reduction project (TRRP) priority items list
TRA	technical risk assessment
TRIS	test requirements and impact specification
TRRP	technical risk reduction project
TSCA	Toxic Substances Control Act
TSDD	technical risk reduction project (TRRP) system design description

Acronym	Definition
TSDF	treatment, storage, and disposal facility
TWA	time-weighted average
U/G	underground
UB	utility building
UMCDF	Umatilla Chemical Agent Disposal Facility
UPA	unpack area
UPS	uninterruptible power supply
USACE	U.S. Army Corps of Engineers
USAESCH	U.S. Army Engineering and Support Center, Huntsville
USATCES	U.S. Army Technical Center for Explosives Safety
UV	ultraviolet
UXO	unexploded ordnance
VE	value engineering
VECP	value engineering change proposal
VOC	volatile organic compound
VX	nerve agent, O-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate
WBS	work breakdown structure
WDC	Washington Demilitarization Company
WEBH	warhead energetics batch hydrolyzer
WHEAT	water hydrolysis of energetic and agent technologies
WIPT	working integrated product team
WRS	water recovery system
WSB	waste storage building
ZFF	zero free float

Attachment 1 Contents

PERMIT/APPLICATION NO.____________

DATE______________________________

PART A

PAST PERFORMANCE INFORMATION FOR APPLICANT

1. Bechtel Parsons Blue Grass Joint Venture
Applicant's Complete Name

FEIN 61-1450836 / Kentucky
Social Security Number/State of Incorporation or Registration

301 Highland Park Drive, Richmond, KY 40475
Business Address (Do not use P.O. Box Number)

301 Highland Park Drive, Richmond, KY 40475
Mailing Address

2. List the names of all "Key Personnel" as defined by KRS 224.010(44), and their positions and titles. (Attach additional sheets if necessary and label as Attachment 1.)

	Name	Title/Position
a.	Joe Christopher Midgett	General Manager
b.	Thomas Oliver McCabe	Deputy General Manager
c.		
d.		
e.		
f.		
g.		

FOR EACH "KEY PERSONNEL" LISTED, A COMPLETED PART B SHALL BE ATTACHED TO THIS FORM.

THE NUMBER OF KEY PERSONNEL PART B's ATTACHED TO THIS FORM IS________________________.

3. Have any civil or administrative complaints been brought or filed against the APPLICANT for the violation of any state or federal environmental protection law which resulted in a fine or penalty greater than one thousand dollars ($1,000) within five (5) year period immediately preceding the submission date of the APPLICANT'S permit application?

YES ____________ NO X__________

If yes, describe each civil or administrative complaint which resulted in the fine or penalty. Include in the description the style of the complaint; the case, file or other identifying number; the identity of all parties named in the complaint; the forum in which the complaint was filed; the identity of each state or federal agency involved with or named in the complaint; the amount of the fine(s) or penalty(s); whether the fine or penalty has been paid; the identity and a description of each law or regulation violated or alleged to have been violated and upon which the fine(s) or penalty(s) is/are based; and state whether the fine was a result of a settlement or agreed order, an administrative order, or a court judgement. If litigation is ongoing, describe any orders or judgements entered and describe the current status of the litigation. Attach additional sheets if necessary and label as **Attachment 2**.

None

4. Have any civil administrative complaints been brought or filed against the APPLICANT which allege that an act or omission that constitutes a violation of a state or federal environmental protection law or regulation presented a substantial endangerment to public health or to the environment?

YES ____________ NO X____________

If yes, describe each civil or administrative complaint containing the allegation of the act or omission presenting a substantial endangerment to public health or to the environment. Each description shall include at a minimum the following: the style of the complaint; the case, file or other identifying number; the identity of each party to the complaint; the forum in which the complaint was filed; the identity of each state or federal agency involved with or named in the complaint; an explanation of the alleged act or omission; the identity and a description of the environmental protection law or regulation violated or alleged to have been violated; an explanation of all corrective action measures performed to correct or mitigate the alleged violation(s); a description of the alleged endangerment to public health or to the environment; and state whether the issues raised in the complaint have been resolved, and if so, whether the resolution was the result of a settlement or agreement, an administrative order or a court order or judgement. If litigation on the allegation(s) is ongoing, describe any orders or judgements entered and describe the present status of the litigation. Attach additional sheets if necessary and label as **Attachment 3**.

None

5. Describe all pending criminal complaints which allege the APPLICANT'S violation of a state or federal environmental protection law or regulation. If none, write **NONE**. Each description must include at a minimum the style of the case and the identifying case number, the date the complaint was filed, the forum in which the complaint is pending, the identity of the law or regulation allegedly violated and a narrative description of the law or regulation, whether the alleged violation(s) is a misdemeanor or a felony, and all actions and pleadings which have occurred or been filed in association with the complaint. Criminal complaints filed more than five years prior to the date of submission of the APPLICANT'S permit application need not be listed. Attach additional sheets if necessary and label as **Attachment 4**.

None

IN RESPONSE TO ITEMS 6 AND 7, EACH DESCRIPTION GIVEN MUST INCLUDE AT A MINIMUM THE FOLLOWING: STYLE, CASE NUMBER; FORUM IN WHICH CONVICTION ENTERED; DATE OF JUDGEMENT;SENTENCE IMPOSED; THE IDENTITY AND DESCRIPTION OF EACH LAW APPLICANT WAS CONVICTED OF VIOLATING; WHETHER THE CONVICTION WAS THE RESULT OF A PLEA AGREEMENT OR A TRIAL; AND, IF CURRENTLY ON APPEAL, THE STATUS OF THE APPEAL. ATTACH ADDITIONAL SHHETS IF NECESSARY AND LABEL AS **ATTACHMENTS 5 AND 6**.

6. Describe all judgements of criminal conviction entered against the APPLICANT for the violation of any state or federal environmental protection law or regulation. Convictions entered more than five (5) years before the submission date of the APPLICANT'S permit application need not be listed.

None

7. Describe all judgements of criminal conviction of a felony under the laws of any state or of the United States that have been entered against the APPLICANT within the five (5) year period preceding the date of submission of the APPLICANT'S application.

None

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted in, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for such violations."

Joe Christopher Midgett — 2/19/04

Original Signature of Responsible Official — Date

Joe Christopher Midgett — General Manager

Typed Name or Responsible Official — Title

Bechtel Parsons Blue Grass

Name of Applicant, i.e. Corporation or Unit of Government

Subscribed and sworn to before me by Kevin M. Regan

this the 19th day of February ~~19~~ 2004

Notary Public Signature ______

My Commission Expires: 14 November 2004.

Notary Public's Name and Address: Kevin M. Regan / 400 Chinoe Road / Lexington, KY 40502

ATTACHMENT NO.____________

PERMIT/APPLICATION NO.____________

DATE____________

PART B

PAST PERFORMANCE INFORMATION FOR KEY PERSONNEL

1. Joe Christopher Midgett
Complete Name

301 Highland Park Drive
Business Address (Do not use P.O. Box Number)

Richmond, Kentucky 40475
Mailing Address

Manager
Type of Person (KRS 224.01-010 (17))

2. Describe the relationship between the applicant and the person completing this Part B attachment that establishes the person as a key personnel of the applicant.

General Manager, Bechtel Parsons Blue Grass Joint Venture

3. Have any civil administrative complaints been brought or filed against you that alleges that an act or omission that constitutes a violation of a state or federal environmental protection law or regulation presented a substantial endangerment to public health or to the environment?

YES __________ NO X

If yes, describe each civil or administrative complaint containing the allegation of the act or omission presenting a substantial endangerment to public health or the environment. Each description shall include at a minimum the following: the style of the complaint; the case, file or other identifying number; the identities of each party to the complaint; the forum in which the complaint was brought; the identity of each state or federal agency involved with or named in the complaint; an explanation of the alleged act or omission; the identity and a description of the environmental protection law or regulation alleged to have been violated; an explanation of all corrective action measures performed to correct or mitigated the alleged violation(s); a description of the alleged endangerment to public health or to the environment; and state whether the issues raised in the complaint have been resolved, and if so, whether the resolution was the result of a settlement or agreement, an administrative order or a court order or judgement. If litigating on the allegation(s) is ongoing, describe any orders or judgements entered and describe the present status of the litigation. Attach additional sheets if necessary and label as **Attachment B-1**.

None

4. Describe all pending criminal complaints that allege that your violation of a state or federal environmental protection law or regulation. If none, write **NONE**. Each description must include at a minimum the style of the case and the identifying case number, the date the complaint was filed, the forum in which the complaint is pending, the identity of the law or regulation allegedly violated and a narrative description of the law or regulation, whether the alleged violation(s) is a misdemeanor or a felony, and all actions and pleadings which have occurred or been filed in association with the complaint. Criminal complaints filed more than five (5) years prior to the date of submission of the Applicant's permit application need not be listed. Attach additional sheets if necessary and label as **Attachment B-2**.

None

IN RESPONSE TO ITEMS 5 AND 6, EACH DESCRIPTION GIVEN MUST INCLUDE AT A MINIMUM THE FOLLOWING: STYLE, CASE NUMBER; FORUM IN WHICH CONVICTION ENTERED; DATE OF JUDGEMENT;SENTENCE IMPOSED; THE IDENTITY AND DESCRIPTION OF EACH LAW APPLICANT WAS CONVICTED OF VIOLATING; WHETHER THE CONVICTION WAS THE RESULT OF A PLEA AGREEMENT OR A TRIAL; AND, IF CURRENTLY ON APPEAL, THE STATUS OF THE APPEAL. ATTACH ADDITIONAL SHHETS IF NECESSARY AND LABEL AS **ATTACHMENT B-3 AND B-4**.

5. Describe all judgements of criminal conviction entered against you for the violation of any state or federal environmental protection law or regulation. Convictions entered more than five (5) years before the submission date of the Applicant's permit application need not be listed.

N/A

6. Describe all judgements of criminal conviction of a felony under the laws of any state or of the United States that have been entered against the you within the five (5) year period preceding the date of submission of the Applicant's application.

N/A

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted in. Based on my inquiry of the person or persons directly responsible for gathering the information submitted in, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for such violations."

Joe Christopher Midgett
Original Signature of Responsible Official

12/24/03
Date

Joe Christopher Midgett
Typed Name or Responsible Official

General Manager
Title

Bechtel Parsons Blue Grass Joint Venture
Name of Applicant, i.e. Corporation or Unit of Government

LAWAUNA KUNZ NOTARY PUBLIC STATE OF IDAHO

Subscribed and sworn to before me by Lawauna Kunz

this the 24th day of December, 2003

Notary Public Signature Lawauna Kunz

My Commission Expires: 11-04-04

Notary Public's Name and Address: Lawauna Kunz / 1800 Channing Way / Idaho Falls, ID 83404

ATTACHMENT NO.______________

PERMIT/APPLICATION NO.__________

DATE____________________

PART B

PAST PERFORMANCE INFORMATION FOR KEY PERSONNEL

1. Thomas Oliver McCabe
   Complete Name

   301 Highland Park Drive, Richmond, KY 40475
   Business Address (Do not use P.O. Box Number)

   Mailing Address

   Manager
   Type of Person (KRS 224.01-010 (17))

2. Describe the relationship between the applicant and the person completing this Part B attachment that establishes the person as a key personnel of the applicant.

   Deputy General Manager, Bechtel/Parsons Blue Grass Joint Venture

3. Have any civil administrative complaints been brought or filed against you that alleges that an act or omission that constitutes a violation of a state or federal environmental protection law or regulation presented a substantial endangerment to public health or to the environment?

   YES ________ NO X

If yes, describe each civil or administrative complaint containing the allegation of the act or omission presenting a substantial endangerment to public health or the environment. Each description shall include at a minimum the following: the style of the complaint; the case, file or other identifying number; the identities of each party to the complaint; the forum in which the complaint was brought; the identity of each state or federal agency involved with or named in the complaint; an explanation of the alleged act or omission; the identity and a description of the environmental protection law or regulation alleged to have been violated; an explanation of all corrective action measures performed to correct or mitigated the alleged violation(s); a description of the alleged endangerment to public health or to the environment; and state whether the issues raised in the complaint have been resolved, and if so, whether the resolution was the result of a settlement or agreement, an administrative order or a court order or judgement. If litigating on the allegation(s) is ongoing, describe any orders or judgements entered and describe the present status of the litigation. Attach additional sheets if necessary and label as **Attachment B-1**.

4. Describe all pending criminal complaints that allege that your violation of a state or federal environmental protection law or regulation. If none, write **NONE**. Each description must include at a minimum the style of the case and the identifying case number, the date the complaint was filed, the forum in which the complaint is pending, the identity of the law or regulation allegedly violated and a narrative description of the law or regulation, whether the alleged violation(s) is a misdemeanor or a felony, and all actions and pleadings which have occurred or been filed in association with the complaint. Criminal complaints filed more than five (5) years prior to the date of submission of the Applicant's permit application need not be listed. Attach additional sheets if necessary and label as **Attachment B-2**.

None.

IN RESPONSE TO ITEMS 5 AND 6, EACH DESCRIPTION GIVEN MUST INCLUDE AT A MINIMUM THE FOLLOWING: STYLE, CASE NUMBER; FORUM IN WHICH CONVICTION ENTERED; DATE OF JUDGEMENT;SENTENCE IMPOSED; THE IDENTITY AND DESCRIPTION OF EACH LAW APPLICANT WAS CONVICTED OF VIOLATING; WHETHER THE CONVICTION WAS THE RESULT OF A PLEA AGREEMENT OR A TRIAL; AND, IF CURRENTLY ON APPEAL, THE STATUS OF THE APPEAL. ATTACH ADDITIONAL SHHETS IF NECESSARY AND LABEL AS **ATTACHMENT B-3 AND B-4**.

5. Describe all judgements of criminal conviction entered against you for the violation of any state or federal environmental protection law or regulation. Convictions entered more than five (5) years before the submission date of the Applicant's permit application need not be listed.

None.

6. Describe all judgements of criminal conviction of a felony under the laws of any state or of the United States that have been entered against the you within the five (5) year period preceding the date of submission of the Applicant's application.

None.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted in. Based on my inquiry of the person or persons directly responsible for gathering the information submitted in, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for such violations."

Thomas Oliver McCabe
Original Signature of Responsible Official

18 AUG 2004
Date

Thomas Oliver McCabe
Typed Name or Responsible Official

Deputy General Manager
Title

Bechtel Parsons Blue Grass Joint Venture
Name of Applicant, i.e. Corporation or Unit of Government

Subscribed and sworn to before me by THOMAS OLIVER MCCABE

this the 18th day of AUGUST, ~~19~~ 2004.

Notary Public Signature Mary Quintero

My Commission Expires: 10/13/04.

Notary Public's Name and Address: MARY QUINTERO, 100 W. WALNUT PASADENA, CA 91124

MARY QUINTERO
Commission # 1280229
Notary Public - California
Los Angeles County
My Comm. Expires Oct 13, 2004

Attachment 2 Contents

Tables

Attachment 2 Laboratory Analysis of Waste to be Processed

Limited analytical data is available regarding the agent stored at the Blue Grass Army Depot (BGAD). Some of the GB 8-inch projectiles were sampled and analyzed during operations conducted in 1979. No other munition types have been sampled or analyzed. However, laboratory analytical data is available from other chemical agent disposal facilities. Material safety data sheets (MSDSs) for GB and VX nerve agent and for H blister agent are provided in Appendix D. The source of the available data for each munition type is provided below.

2.1 GB 115-mm Rockets

Table 2-1[1] provides the laboratory analytical data from sampling that was performed at the Tooele Chemical Agent Disposal Facility (TOCDF). Although the analytical data from the other chemical disposal facilities is not from the munitions stored by Blue Grass Chemical Activity (BGCA) at BGAD, it is representative of the nerve agent stored at BGAD.

2.2 GB 8-Inch Projectiles

Table 2-2 provides the data from sampling and laboratory analysis that was performed on the GB 8-inch projectiles in storage at BGAD in 1979.

2.3 VX 115-mm Rockets

Table 2-3 provides the laboratory analytical data from the sampling that was performed at the TOCDF. Although the analytical data from the other chemical disposal facilities is not from the munitions stored by BGCA at BGAD, it is representative of the nerve agent stored at BGAD.

2.4 VX 155-mm Projectiles

Laboratory analytical data is currently not available; however, data from TOCDF will be available in the future. Although the analytical data from the other chemical disposal facilities is not from the munitions stored by BGCA at BGAD, it is representative of the nerve agent stored at BGAD.

2.5 H 155-mm Projectiles

Samples were taken of the agent in the 155-mm projectiles during the testing of the munitions washout system (MWS) at Chemical Agent Munitions Disposal System (CAMDS) in 2003 for the Assembled Chemical Weapons Alternatives (ACWA). Analyses are still being completed on these samples. Data will be available in the future.

2.6 Nonstockpile Items

2.6.1 GB Ton Container

No analytical data is available for this ton container (TC).

2.6.2 DOT Bottles

No analytical data is available on the VX and H Department of Transportation (DOT) bottles.

[1] Tables are presented at the end of this attachment.

2.7 Energetics/Propellants

Energetic and propellant materials that are part of the munitions in storage at BGAD consist of the explosive compounds described in the following sections. No waste analyses are provided for these compounds; however, the MSDSs for these compounds are provided in Appendix D.

2.7.1 Rocket Energetics

Rocket energetics consist of the following components:

1. Fuze composed of RDX
2. Detonator composed of lead azide and RDX
3. Burster composed of Comp B, which is a 60:40 mixture of RDX and trinitrotoluene (TNT)

2.7.2 Rocket Propellant

The rocket propellant consists of M-28, which is a mixture of the following components:

1. 60% nitrocellulose
2. 23.8% nitroglycerin
3. 9.9% triacetin
4. 2.6% diethylphthlate
5. 2% lead stearate
6. 1.7% 2-nitrodiphenylamine

2.7.3 Projectile Energetics

The projectile energetics consist of tetrytol, which is a 70:30 mixture of tetryl and TNT.

Table 2-1—Laboratory Analytical Data for GB 115-mm Rockets

Compound (wt%)	Average	Maximum	Minimum
Agent GB	85.1	97.0	44.8
DIMP	4.5	10.8	2.7
TBA	5.6	5.9	5.5
DIU	0.9	2.4	0.4
DICDI	0.4	1.1	0.0
Metals (mg/kg)			
Aluminum	628.3	3205.0	10.0
Antimony	26.3	154.0	0.2
Arsenic	7.0	34.0	3.5
Barium	4.7	40.0	0.1
Beryllium	0.1	0.6	.0.0
Boron	1135.8	4585.0	4.1
Cadmium	3.2	12.0	1.1
Chromium	3.2	12.0	1.1
Cobalt	2.5	8.9	0.1
Copper	13.4	120.0	1.7
Lead	9.8	46.0	0.6
Manganese	2.7	18.2	0.6
Mercury	0.1	0.2	0.0
Nickel	7.2	31.0	2.1
Selenium	16.3	92.0	0.4
Silver	1.2	6.2	0.1
Thallium	26.3	154.0	0.1
Tin	53.3	308.0	1.1
Vanadium	1.4	6.2	0.7
Zinc	28.8	172.0	5.4

Source: Tooele Chemical Agent Destruction Facility, 1996–1998

Key:
- DICDI = Diisopropylcarbodiimide (stabilizer)
- DIU = Diisopropyl urea
- DIMP = Diisopropyl methyl phosphonate
- TBA = Tributylamine

Analytical Methods:
- Agent: TE-LOP-584 (agent and degradation products)
- Metals: Method 7470, SW-846 (mercury)
- Method 6020, SW-846 (all other metals)

Table 2-2—Laboratory Analytical Data for GB 8-Inch Projectiles

Agent Lot No.	1034-54-1005	1034-62-1330
% GB	89.59	86.53
Metals, ppm		
Iron	102.34	521.27
Copper	<0.010	<0.008
Nickel	<0.019	<0.015
Aluminum	34.61	28.49
Source: Surveillance Program, Lethal Chemical Agents and Munitions (SUPLECAM) Report, 1979 Analytical Methods Mil-C-10758D (MU), 2 September 1969		

Table 2-3—Laboratory Analytical Data for VX 115-mm Rockets

Compound (wt%)	Average	Maximum	Minimum
Agent VX	90.0	93.2	86.5
DICDI	<0.6	<0.6	<0.6
DEMP	0.7	0.95	<0.6
DCHCDI	0.9	1.6	0.7
KK	0.5	<0.5	<0.3
KM	1.5	2.4	<0.6
EA2192	0.3	0.55	0.21
Metals (mg/L)			
Aluminum	1,273.5	7,391	<46
Antimony	3.3	<10	<1.8
Arsenic	3.3	<10	<1.8
Barium	1.7	<5.0	<0.91
Beryllium	1.7	<5.0	<0.91
Boron	<83.7	<252	<46
Cadmium	1.7	<5.0	<0.9
Chromium	3.4	<10	<1.9
Cobalt	1.7	<5.0	<0.9
Copper	<4.2	<10	<1.9
Lead	3.2	13.6	<1.0
Manganese	<1.0	<1.1	<0.9
Mercury	0.3	1.31	<0.078
Nickel	<3.3	<10	<1.8
Selenium	3.3	<10	<1.8
Silver	<1.7	<5.0	<0.9
Thallium	<1.7	<5.0	<0.9
Tin	<16.7	<50	<9.1
Vanadium	<16.7	<50	<9.1
Zinc	13.7	< 41.60	<4.9

Source: Tooele Chemical Agent Disposal Facility, 2003

Key:
- Agent VX = O-ethyl-S-(2-diisopropylaminoethyl) methyl phosphonothiolate
- DICDI = Diisopropylcarbodiimide (stabilizer)
- DEMP = Diethylmethylphosphonate
- DCHCDI = Dicyclohexylcarbodiimide
- KK = Bis(2-diisopropylaminoethyl)sulfide
- KM = Bis(2-diisopropylaminoethyl)disulfide or EA 4196
- EA 2192 = S-(2-diisopropylaminoethyl) methyl phosphonothioic acid

Analytical Methods:
- Agent : TE-LOP-584 (agent and degradation products)
- Metals: Method 7470, SW-846 (Mercury)
  Method 6020, SW-846 (all other metals)

Attachment 3 Contents

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Attachment 3 Waste Description

3.1 Waste Description

The wastes that the Blue Grass Chemical Agent Destruction Pilot Plant (BGCAPP) will eventually treat consist primarily of M55 rockets and M56 warheads and projectiles (8 inch and 155 mm). Under the proposed research, development, and demonstration (RD&D) permit, the GB munitions and GB ton container (TC) will be used to demonstrate the effectiveness of the treatment process.

Although not all of the munition types and nonstockpile items stored at Blue Grass Army Depot (BGAD) will be used during the RD&D process, the Bechtel Parsons Blue Grass Team (BPBGT) has included descriptions of all of these items to provide KDEP a complete list of munitions and times in storage at Blue Grass Army Depot (BGAD). The assembled munitions stored at BGAD contain both chemical agent (CA) and energetic materials (i.e., propellant and/or explosive charges). Two basic classes of assembled chemical weapons are stored at BGAD: projectiles and rockets.

Each waste class is described below in greater detail. The waste codes associated with each waste stream are provided in Part A of this permit application.

3.1.1 Projectiles

Projectiles are shells that are fired from guns or cannons. They have roughly cylindrical steel bodies with tapered noses 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 upon detonation. The liquid agent itself is contained in the annular region between the burster well and the shell wall. All projectiles stored at BGAD have nose closures installed in place of fuzes.

3.1.1.1 155-mm Projectiles

The BGAD stockpile contains both VX and H 155-mm projectiles. The VX 155-mm projectiles are designated as M121A1; the H 155-projectiles are designated as M110 (see Figure 3-1[1]).

Only the H 155-mm projectiles contain energetic material (composed of tetrytol) in the burster well.

3.1.1.2 8-Inch Projectiles

The 8-inch (20.32-cm) projectile, designated as M426, has a mass of more than 90 kg and contains GB chemical agent. These projectiles are stored without a burster.

3.1.1.3 Overpacked Leaker Projectiles

Currently, 66 H 155-mm projectiles have been overpacked at BGAD. They will be processed in the same manner as regular (nonleaker) projectiles after they are removed from the overpack container.

[1] Figures and tables are presented at the end of this attachment.

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 nearly 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 stockpile. The bursters are composed of Composition B (Comp B) explosive. The propellant is double base M28 (nitroglycerin/nitrocellulose). The rocket is stored in a shipping and firing tube made of fiberglass-reinforced resin that could contain polychlorinated biphenyls (PCBs). An indexing ring on the outside of the tube near the front (fuze) end of the rocket identifies the front of the rocket in the shipping and firing tube. Aluminum caps seal the ends of the tube.

PCB concentrations could range from under 50 to more than 2,000 parts per million (ppm). These PCBs are integral to the structure of the rockets' shipping and firing tubes and are regulated under the Toxic Substances Control Act (TSCA) regulations subject disposal requirements of 40 CFR 761.62(c). This information is based on a study conducted by the U.S. Army Environmental Hygiene Agency, Hazardous Waste Study No. 37-26-1345-86 and -87 which sampled and analyzed shipping and firing tubes in the Tooele Army Depot (now called the Deseret Chemical Depot) to determine the PCB concentration. This information has been used by the Environmental Protection Agency (EPA) as the basis for issuing the nationwide approval for incineration of PCBs at the four continental United States Chemical Demilitarization Incineration Facilities. The PCB aspects of the project are subject to regulation by the EPA Region 4. A separate permit request will be submitted to EPA Region 4 to address the processing of the PCB-contaminated shipping and firing tubes.

3.1.2.1 M56 Warheads

M56 warheads are similar to the M55 rockets except that the motor section has been removed; thus, M56 warheads do not contain M28 propellant.

3.1.2.2 Overpacked Leaker M55 Rockets

Currently, 91 leaker GB 115-mm M55 rockets have been overpacked at the BGAD. They will be processed in the same manner as regular (nonleaker) rockets after they are removed from the overpack container.

3.1.3 Nonstockpile Items

Four nonstockpile items are stored at BGAD and will be processed at BGCAPP: one GB TC, one VX Department of Transportation (DOT) bottle, and two H DOT bottles. These items are listed in Table 3-1.

3.1.4 Types and Quantities of Munitions

Table 3-1 lists the types and quantities of the munitions in the BGAD stockpile.

3.1.5 Secondary Wastes

Six major types of secondary waste will be generated at BGCAPP; these wastes are described below.

3.1.5.1 Wood Pallets

All munitions are stored on wood pallets in the igloos. As munitions are shipped to BGCAPP, wood pallets and metal straps that are not contaminated with agent as determined by enhanced onsite container (EONC) monitoring prior to opening, will be shipped off site for disposal by appropriate methods to promote waste minimization without any treatment at BGCAPP. All wood pallets and other dunnage associated with leaking munitions will be treated as agent-contaminated dunnage and will be transferred to the appropriate waste handling system as described in Attachment 4, Section 4.3.

3.1.5.2 Agent-Contaminated Plastic and Personnel Protective Equipment (PPE)

Plastic materials and PPE that are not contaminated with agent will be shipped off site for disposal by appropriate methods to promote waste minimization without any treatment at BGCAPP. Plastic and PPE (plastic and rubber) are assumed to be contaminated if they have been exposed to agent; they will be transferred to the appropriate waste handling system as described in Attachment 4, Section 4.3.

3.1.5.3 Miscellaneous Agent-Contaminated Metal Parts

Miscellaneous agent-contaminated metal parts generated during the RD&D program are sent directly to the metal parts treater (MPT) or heated discharge conveyor (HDC) for **thermal** treatment **(a minimum of 1,000˚F for a minimum of 15 minutes)** before they are shipped off site for disposal by appropriate methods to minimize waste.

3.1.5.4 Agent-Contaminated Spent Activated Carbon

Agent-contaminated spent activated carbon from the heating, ventilating, and air conditioning (HVAC) filters and gas mask carbon filters that is generated during the RD&D program will be processed through the appropriate waste handling system as described in Attachment 4, Section 4.3.

3.1.5.5 Spent Decontamination Solution (SDS)

SDS that is generated during the decontamination of personnel and equipment will be processed through the appropriate waste handling system as described in Attachment 4, Section 4.3.

3.1.5.6 Dewatered Salts

The supercritical water oxidation (SCWO) effluent is a brine solution comprised primarily of sodium sulfate (Na_2SO_4), sodium chloride (NaCl), sodium fluoride (NaF), and sodium monophosphate (NaH_2PO_4). The water recovery system (WRS) package is designed to produce dewatered salts that will be characterized and shipped to a permitted disposal facility.

3.1.5.7 Other Secondary Wastes

During the RD&D program, other secondary wastes may be generated at BGCAPP. As these waste streams are identified, they will be characterized prior to treatment. If they are contaminated with agent, they will be processed at BGCAPP through the appropriate waste handling system or, if the waste is not contaminated with agent, the secondary waste will be shipped off site for disposal by appropriate methods to minimize waste.

3.2 Daily Design Capacity

The initial daily design capacity of the plant is based on data developed during Program Manager for Chemical Demilitarization (PMCD) and Program Manager, Assembled Chemical Weapons Alternatives (PMACWA) testing programs and on the actual Johnston Atoll Chemical Agent Disposal System (JACADS) and Tooele Chemical Agent Disposal Facility (TOCDF) operating data. The BGCAPP process has three distinct critical paths:

1. GB and VX M55 rockets/M56 warheads with a limiting step of the rocket shear machine (RSM) to the warhead energetic batch hydrolyzer/heated discharge conveyor/energetic neutralization system (WEBH/HDC/ENS) and the propellant energetic batch hydrolyzer (PEBH)/HDC/ENS equipment trains.

2. Unburstered GB 8-inch and VX 155-mm projectiles with a limiting step of the nose closure removal station (NCRS) to the munition washout system/agent neutralization system (MWS/ANS).

3. Burstered H 155-mm projectiles with a limiting step of the projectile/mortar disassembly machine (PMD) to the WEBH/HDC/ENS and MWS/ANS.

Table 3-2 summarizes the peak hourly rates and the daily design capacity of the major equipment trains.

The throughput rate is based on the peak processing rates of the RSM, NCRS, PMD, and SCWO. The RSM rate is based on JACADS operations verification testing (OVT) and the PMD rate is based on operating experience at JACADS and TOCDF. The other equipment in the process train is sized based on the peak processing rate of the limiting step. A major portion of the RD&D program will involve verifying and determining the optimal throughput rates. The SCWO processing rate is based on the throughput requirements for BGCAPP based on the material balance.

All of these design throughput rates will be verified and may be modified during the RD&D program after a thorough evaluation of data collected.

3.3 Total Estimated Quantity of Waste to be Disposed of per Year

Table 3-3 summarizes the estimated quantity of waste generated annually. The waste streams will come from four primary sources:

1. **EBH/HDC Residues:** This waste stream will consist of rocket pieces consisting of steel and fiberglass.

2. **Filtered Aluminum Precipitate:** This waste stream will consist of the aluminum residue generated from the treatment of rockets.

3. **Water Recovery System Salts:** The treated hydrolysate from the SCWO units will be processed through the water recovery system to recycle as much water as possible back into the process. Appendix C provides the process flow diagrams (PFDs) of this system. The resulting salt solids will be disposed of offsite at a permitted disposal

facility (TSDF). The water will be recycled back into the **process** in lieu of makeup water**, vented to the atmosphere** or shipped offsite to a permitted TSDF.

4. **Metal Parts Treater (MPT) Solid Discharge:** This waste stream consists of the projectile bodies after processing through the MPT, as well as any miscellaneous metal parts that are generated during the treatment processes.

Table 3-3 identifies the quantity of each waste stream listed above by munition campaign. It is important to note that the water recovery system greatly reduces the amount of waste that will be generated for off-site disposal from BGCAPP during the life of the project and will be an integral part of BGCAPP's waste minimization program.

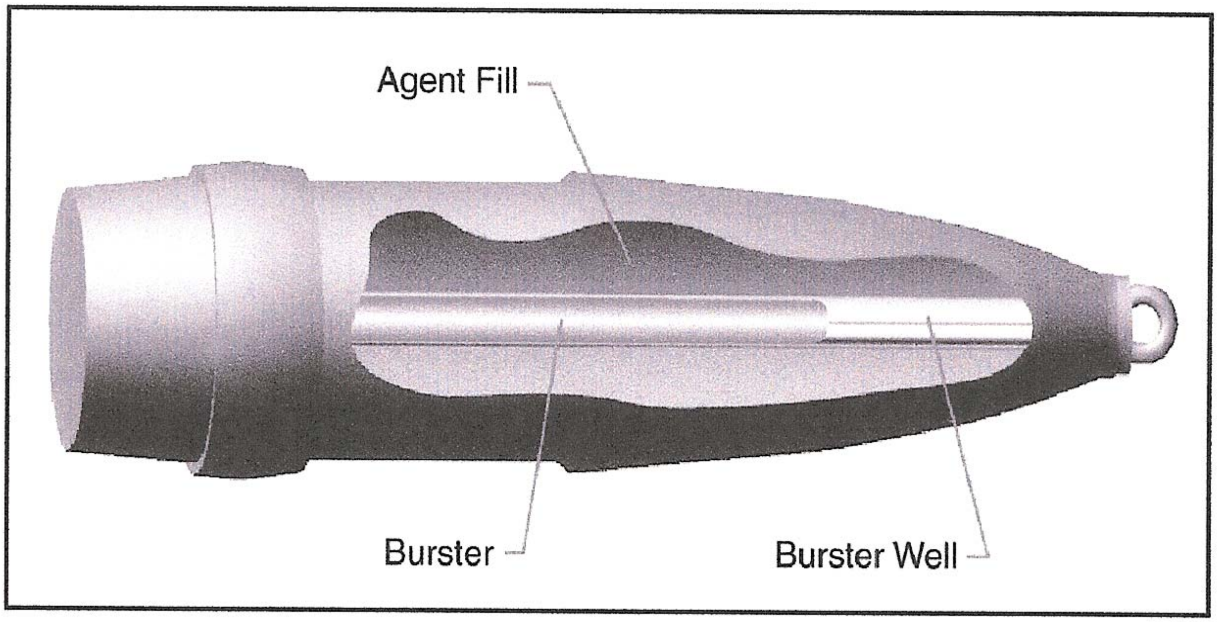

Figure 3-1—155-mm Projectile

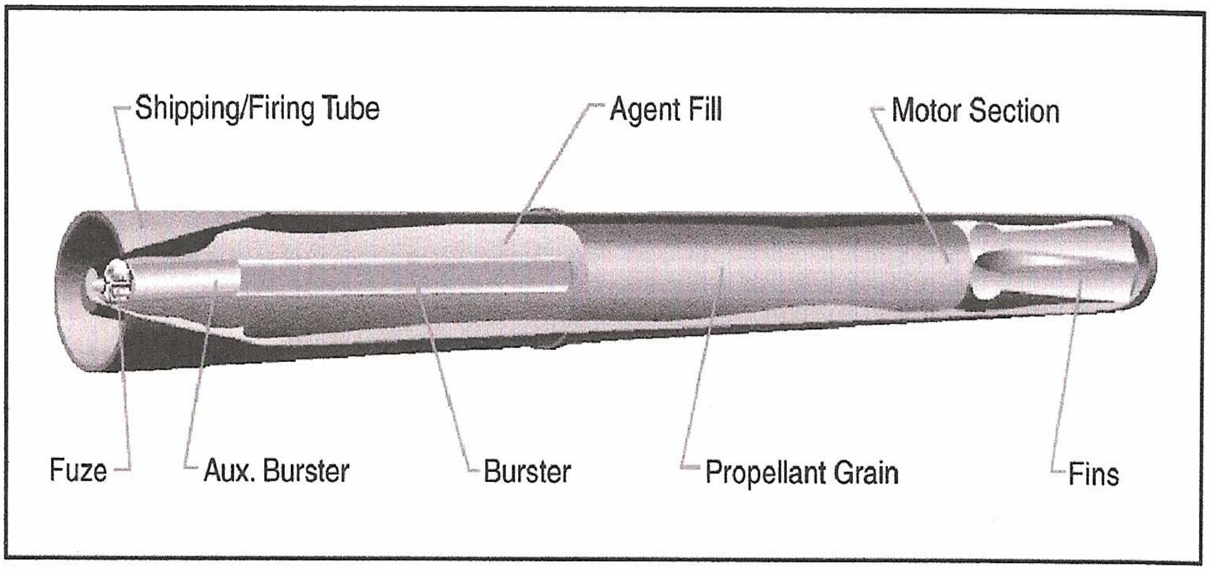

Figure 3-2—155-mm Rocket

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 inch
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 bottle	H	Nonstockpile	NA
DOT bottle	VX	Nonstockpile	NA

Note: 1. All GB will be processed during the RD&D Program. Attachment 6, Table 6-1 presents the planned Processing rates during the RD&D Program.
2. The following overpacked munitions are included in the above numbers:
a. 91 GB M55 rockets (leakers)
b. 24 GB M56 warheads
c. 26 GB 8-inch projectiles
d. 66 H 155-mm projectiles (leakers)

Table 3-2—Daily Design Capacity

Equipment/System	Munition Type	Peak Rate per hr	Daily Design Rate
Rocket shear machine (RSM)	M55 rockets / M56 warheads	50 rockets	1,200 rockets
Projectile/mortar demilitarization (PMD) machine	155-mm H projectiles	26 projectiles	624 projectiles
Nose closure removal (NCR) station	8-inch GB projectiles 155-mm VX projectiles	40 projectiles 40 projectiles	960 projectiles
Energetics batch hydrolyzer (EBH)	M55 rockets	50 rockets	1,200 rockets
Agent neutralization system (ANS)	All	150 gal	3,600 gal
Energetics neutralization system (EN!	All	50 rockets	1,200 rockets
Supercritical water oxidation (SCWO)	All	8,000 lb	192,000 lb
Munition washout system (MWS)	Projectiles	40 projectiles	960 projectiles
Metal parts treater (MPT)	Projectiles	40 projectiles	960 projectiles
Dunnage, wood/metal	All	340 lb	8,160 lb

Table 3-3—Estimated Quantity of Waste by Year

Waste Type	First Year GB Campaign (lb)	Second Year VX Campaign H Campaign (lb)	Third Year (lb)	Total (lb)
MPT Residues	688,816	2,414,271	0	3,103,087
EBH/HDC Residues	1,300,142	479,370	0	1,779,511
AFS Precipitate	2,652,428	2,332,158	157,242	5,141,828
Water Recovery Salts	6,268,389	7,880,712	1,606,904	15,756,005
Total Solid Wastes	10,909,775	13,106,510	1,764,146	25,780,431

Note: These numbers do not include secondary waste that will be processed through the MPT and closure wastes.

Attachment 4 Contents

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Attachment 4 Description of Proposed Research, Development, and Demonstration Process

This attachment describes the overall process that will be used to perform the research, development and demonstration (RD&D) program that is covered under this permit application and presents the justification for this research. Attachment 5 explains how the process satisfies the requirements of Kentucky Revised Statute (KRS) 224.50-130 and how this process will meet environmental protection standards in accordance with 401 KAR 34[1].

The proposed facility is a full-scale pilot plant that will be used to validate the National Research Council's (NRC's) stated requirement for research on process integration that is discussed in Section 4.1. Although some integration research of the BGCAPP can and will be conducted using surrogates and simulants, testing with live agents and agent-containing munitions is necessary to verify that the design will perform properly for the Blue Grass Army Depot's (BGAD's) inventory of munitions. The overriding criterion that drives this design is that the facility be capable of performing the RD&D in a manner that is safe and protective of health and the environment.

To this end, the Blue Grass Chemical Agent Destruction Pilot Plant (BGCAPP) will be built to the same standards as a full-scale treatment facility. For example, the blast-resistant containments, the highly filtered heating, ventilating, and air conditioning (HVAC) exhausts, and the numerous other protective systems that are necessary for a fully functional system are also necessary to ensure safety and environmental protection during the RD&D program. Because of this requirement, and because it is very difficult to add equipment after the treatment areas are contaminated with agent, the full facility must be built to support the RD&D program and then tested as one unit. As a result, the description of the BGCAPP is that of the full-scale facility. In spite of this similarity, it is important to emphasize that this RD&D permit application is only intended for the RD&D program.

The technology that is intended to be used by the BGCAPP was chosen to meet the requirement of KRS 224.50-130 (3a) and (4): that it exists in an operational facility or it has been demonstrated in a disposal program at a comparable scale and that it creates less risk of release, acute or chronic health effect, or adverse environmental effect. This determination was made through an extensive testing, evaluation, and selection process that was documented and critiqued by internal Department of Defense (DoD) groups and independently reviewed by many NRC panels. Table 4-1[2] lists the major reports in which the NRC panels chronicled and critiqued the progress of the evaluation and selection process.

The evaluation process first examined numerous alternative technologies (NRC 1993) and in NRC 2002 and NRC 2002a identified two technologies that were subsequently demonstrated under the Assembled Chemical Weapons Alternatives (ACWA) program. It identified the General Atomics Total Solution (GATS) process, on which the BGCAPP design is based, as the one with lower hydrocarbon and carbon monoxide emissions. The Final Environmental Impact Statement (EIS) for BGCAPP (December 2002) also discusses alternate technologies and draws the same conclusion.

The ultimate ability of the facility to destroy the chemical weapons stockpile will be assessed during the RD&D program. A Kentucky Hazardous Waste (KHW) Part B Permit application will

[1] The RD&D Guidance document references 401 KAR 30:031, which applies to landfarming of special wastes. This is not an appropriate criterion for the subject process, which is a treatment process. We have, therefore, substituted the citation as shown.

[2] All tables and figures are presented at the end of this attachment.

be submitted prior to completion of the RD&D program to allow the Kentucky Department for Environmental Protection (KDEP) and other regulators to fully evaluate the process' safety and environmental compliance.

The process flow diagrams (PFDs) referenced throughout this attachment are presented in Appendix C**. PFDs not related to hazardous waste management units may be referenced on the applicable PFDs included in Appendix C.** The applicable PFDs are cited in the headings of Sections 4.4 through 4.14.

4.1 Justification for Research

It is fully recognized that the BGCAPP will ultimately be used to destroy all chemical weapons at BGAD. Maximum safety and environmental protection will be achieved during the destruction of the chemical weapons at BGAD by incorporating the lessons learned from the RD&D program into the final design. To date, a large amount of work has been conducted to evaluate alternative technologies for destroying the BGAD's chemical weapons stockpile. This work was carefully monitored and assessed by many groups, including a number of independent panels assembled for this purpose by the NRC. The NRC panels reviewed the results in a series of reports listed in Table 4-1 and, in its last report[3], identified a process termed General Atomics Total Solution (GATS) as the most mature alternative process for use at BGAD. The report suggested improvements in the design, but most critically, it indicated that although all of the individual processes are acceptable for application at BGAD, RD&D must be performed to refine and demonstrate the integrated process before going to full operation. The BGCAPP design incorporates the design improvements identified by the NRC, and the BGCAPP RD&D program incorporates this integration research. Also, the treatment system units proposed for BGCAPP are roughly the same size as the units tested and proven during the ACWA engineering design studies. The final stage of development is the testing and evaluation of the integrated process under a carefully developed RD&D program that is the purpose of this application. The RD&D program that will be conducted at BGCAPP includes the following goals:

The RD&D program to be conducted at BGCAPP includes the following goals:

1. **Conduct a thorough program of system integration including the conveyance of munitions and munition segments from one part of the treatment train to the next up to and including the release of the munition parts from the MDB.**
2. **Demonstrate that 99.9999% destruction efficiency of GB agent can be achieved in the agent neutralization reactors (ANRs) as required by KRS 224.50-130.**
3. **Demonstrate that the rocket energetics can be treated in the energetics batch hydrolyzers (EBHs) and the energetics neutralization system (ENS).**
4. **Demonstrate that the metal parts treater (MPT) will destroy the residual chemical agent in the projectile bodies.**
5. **Demonstrate that the heated discharge conveyor (HDC) will destroy the residual chemical in the rocket pieces.**
6. **Demonstrate the performance of the SCWO reactor system.**
7. **Characterize and quantify the emissions from the water recovery system (WRS).**

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[3] *Analysis of Engineering Design Studies for Demilitarization of Assembled Chemical Weapons at Blue Grass Army Depot,* 2002. National Academy Press, Washington, D.C. Available for purchase or download at www.nap.edu.

The RD&D program described herein is being conducted interactively with the design of the facility. As data are obtained from both ongoing equipment design and testing programs, they are fed back to the design team so that the information can be used to improve and validate the process. Process, equipment, and operating procedure modifications that are made under the RD&D program, and that result in performance that meets or exceeds the RD&D goals and objectives as outlined herein and in Attachment 10, will not require modification to the RD&D permit. No changes will be made that could increase risk or environmental releases. In fact, the likely outcome of the RD&D program will be further reductions in risk.

The present permit application only requests that approval be granted for the BGCAPP to be built and operated as a pilot plant to conduct RD&D on the process. Much of the RD&D program will not involve hazardous wastes; the initial tests will be performed using simulants and surrogate materials. After the overall plant's performance, safety, environmental acceptability, and reliability have been established, the RD&D program will progress to include small amounts of agent initially; after demonstrated performance, increasingly larger amounts of agent and chemical munitions will be processed. At the conclusion of the research, the facility will have demonstrated that it is capable of operating at full capacity and the remainder of the stockpile will be processed under the Part B permit.

The information that is proposed to be included in the compliance schedule (presented in Attachment 12, Section 12.3) is equivalent to the information that would be required by a Part B permit application for a hazardous waste treatment facility. Therefore, the compliance schedule corresponds to the submission of the components that constitute the Part B permit application.

The RD&D permit is expected to be issued for the BGCAPP with a permit condition that compliance with 99.9999% destruction efficiency as required by 401 KAR 34:350 will be demonstrated on the first batches of agent processed by the ANRs.

Attachment 6, Section 6.5, presents a comprehensive draft schedule for the activities that will be performed under the RD&D permit. As shown in Attachment 6, Table 6-1, the performance test constitutes the transition from operation under the RD&D permit to operation under the full Resource Conservation and Recovery Act (RCRA) Kentucky Hazardous Waste (KHW) Part B permit. All activities prior to and including the performance test take place under the RD&D permit.

The RD&D program will include the processing of only the GB munitions in the BGAD stockpile. The VX and H munitions, as well as any GB munitions not required under the RD&D program, will be processed under the Part B permit. The Material Balances for the VX and H campaigns are included in Appendix C for completeness; however, they are not part of the RD&D program.

4.2 Process Description

This section presents the overall processing sequence of the BGCAPP. The subsequent sections describe the individual process units.

The BGCAPP design will safely destroy the BGAD's chemical munitions stockpile by combining proven, low-risk, Army-approved, NRC-recommended neutralization and supercritical water oxidation (SCWO) technologies that have been successfully demonstrated for the Program Manager, Assembled Chemical Weapons Alternatives (PMACWA) into an integrated plant that will be tested during the RD&D program that is the subject of this permit.

Chemical demilitarization of the BGAD stockpile has six major processing steps, all of which occur in the munitions demilitarization building (MDB) and SCWO process building (SPB).

Attachment 6 describes the buildings and the high level of added safety and environmental protection that it offers. The BGCAPP design is built around six integrated systems that will be used to destroy the agent and energetics by following a safe, environmentally acceptable six-step procedure:

1. Agent and energetics access (mechanical).
2. Energetics removal and deactivation by hydrolysis.
3. Metal and other solids decontamination by heating to a minimum of 1,000°F for 15 minutes in the inductively heated MPTs or HDCs.
4. Agent neutralization by hydrolysis.
5. Post-treatment of agent/energetic hydrolysates using commercial-scale, solid-wall supercritical water oxidation (SCWO) units.
6. Some secondary wastes [e.g., agent contaminated pallets, personnel protective equipment (PPE), and spent activated carbon] may be treated using an ACWA-demonstrated dunnage shredding and handling (DSH) system followed by SCWO. Some secondary wastes (e.g., miscellaneous metal parts, metal reinforced hoses, piping, valves, and tools) may also be processed through the MPT or the HDC.

   Secondary wastes that are not agent-contaminated will not be processed through the BGCAPP; they will be managed by appropriate means to promote waste minimization.

The process achieves the required 99.9999%[4] (as a minimum) destruction of agent stored at the BGAD by neutralization via hydrolysis, whereby the agent or agent-contaminated **liquid** 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 this required performance for agent destruction. Table 4-2 lists the types of hydrolysis to be used.

The munition bodies and other metallic components of the munitions are washed using high-pressure water (in enclosures that will minimize overspray) and then thermally heat-treated **at a minimum of** 1,000°F for **a minimum of** 15 minutes). At this point, they will be released from the containment system.

The facility has been designed to safely treat all chemical weapons, chemical warfare agent, and ancillary materials.[5] **However, certain ancillary (secondary) wastes may be decontaminated with sodium hydroxide (NaOH), sodium hypochlorite (NaOCl), or other appropriate decontamination (decon) solutions. These wastes, PPE, and other plastic/rubber items, will be decontaminated to the Army decontamination standard and then shipped off site to a permitted treatment, storage, and disposal facility (TSDF).**

To the maximum extent possible, process liquid streams are recycled to conserve water and to prevent discharge to ground or surface water. Water is recycled via a water recovery system that produces water of a quality suitable to recycle back into the process during the pilot testing and operations phases. One goal of the RD&D program is to identify areas in which water

[4] KRS 224-50-130 (3) (b) states that "…(m)onitoring data from an operational facility or alternative disposal program as described in paragraph (a) of this subsection reflects that the emissions from treatment and destruction facilities or fugitive sources, including, but not limited to, the emissions of the compounds identified in subsection (2) of this section and products of combustion, incomplete combustion, and other processes alone or in combination present no more than a minimal risk of acute or chronic human health effect, as demonstrated by sufficient and applicable toxicological data, or adverse environmental effect…"

[5] For example, metal, agent contaminated wooden pallets, agent-contaminated PPE, and any other agent-contaminated secondary waste streams generated from these activities.

consumption can be reduced further to minimize water makeup. Excess water will be released to the atmosphere as steam in the water recovery system, which is described in Section 4.14.

Figure 4-1[6] is a process block flow diagram for the hazardous waste processing units. The figure shows the flow of munitions and other streams from the container handling building (CHB) through the various systems.

Palletized munitions are stored in "igloos" and are currently regulated under Interim Status at BGAD[7]. The location of each type of munition is fully documented so that the specific munition type required for a particular test can be transferred with minimum disturbance of the overall stockpile of munitions[8]. Any munitions selected for testing will be transported via enhanced onsite containers (EONCs) from the storage igloos to the CHB.

The EONCs are airtight vessels that are specifically designed to contain munitions during transport from the BGAD storage igloos to the CHB. Figure 4-2 is a photograph of an EONC. The EONC is a well-established design that is currently used safely at both the Tooele Chemical Agent Disposal Facility (TOCDF)[9] and the Anniston Chemical Agent Disposal Facility (ANCDF).

The EONC will be received in the CHB, where it is stored until its contents are to be treated. At that time it is transferred via a conveyor to the unpack area (UPA), which is under "Engineering Controls", [10] and the air in the sealed EONC is monitored for agent. If agent is detected (indicating a leaking munition), the EONC is moved to an area under a higher level of Engineering Control, where it is opened and the munitions are processed by personnel wearing appropriate protective clothing. The munitions are removed from the EONC and placed on the appropriate processing line for the particular munition. All pallets and metal straps from the contaminated EONC are assumed to be contaminated and are transferred to the appropriate waste handling system for treatment. The EONC is then decontaminated and released for further use.

If agent monitoring indicates that the EONC does not contain any leaking munitions, the EONC is opened, and the munitions are unpacked and placed on conveyors that take them through the treatment process for that particular munition.

The treatment procedures are performed by remote control systems on three lines:

1. Rocket input subsystem
2. Projectiles input subsystem
3. Dunnage treatment subsystem

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[6] Figures are presented at the end of this attachment.

[7] A hazardous waste storage permit application has been submitted and is under review by KDEP.

[8] SB 162 Amended KRS 224.50-130 requires that handling and movement of munitions for nonemergency situations be subject to a plan that is submitted and approved by the cabinet. Such a plan will be submitted to the cabinet in sufficient time to allow full review, including time for public notice and opportunity to be heard before munitions are handled or moved.

[9] An older version of the design, termed an "ONC", is used at TOCDF. The difference between the ONC and EONC is the type of closure locks used on the main hatch. The ONC uses bolts that require manual tightening to fasten the main hatch. The EONC uses a hydraulic locking mechanism that ensures a more uniform seal around the perimeter.

[10] The higher the level of engineering control, the lower the air pressure maintained in the area by the cascading ventilation system. See Attachment 6, Section 6.1.3, for a detailed description of the HVAC system.

The specific treatment sequences for each type of munition and the operation of each unit within the system are discussed below. Briefly, the munitions are separated into the following components for treatment:

1. Liquid agent and agent-contaminated wash water.
2. Agent-contaminated wood/fiberglass/cardboard
3. Agent-contaminated metal
4. Explosive components (e.g., bursters and fuzes)
5. Sections of rocket propellant

The design also includes a residue handling system that receives burster tubes, solid munitions bodies, and solid residue decontaminated during the above operations that will be shipped off site to a disposal facility.

KDEP approval is not being sought to process agent for any purpose other than for RD&D. Processing agent under the RD&D program is the basis for assessing the system's performance and developing the engineering information that is the objective of the RD&D program.

The munitions processing is conducted in the MDB, which contains the systems that provide the following functions:

1. Remove energetic components and disassemble the munitions.
2. Drain the agent from the agent cavities.
3. Neutralize the agent by either hot water (H) or caustic (GB and VX) hydrolysis to a minimum of 99.9999% destruction efficiency.
4. Destroy the energetics by hydrolysis to meet the 40 CFR 268 treatment standard for D003 waste streams (deactivation).
5. Treat the agent-contaminated dunnage and **most** other agent-contaminated ancillary wastes **either** by shredding and slurrying with energetics hydrolysate and processing in the SCWO units or by **thermal** treatment through the MPT. **PPE and other plastic/rubber wastes may be decontaminated using NaOH, NaOCl, or other appropriate decon solution to the Army Decontamination Standard and shipped offsite to a permitted TSDF.**
6. **Thermally t**reat agent-contaminated metal parts and other solids through either the MPT or the HDC.
7. Some solid secondary waste may be disposed of at a permitted TSDF after decontamination **to the Army Decontamination Standard**.

Prior to transferring hydrolysate from the MDB to the hydrolysate storage tank area (HSA), the hydrolysate will be analyzed for residual agent concentration. If the agent concentration is above the target release level, the batch will be pumped into an agent hydrolysis reactor for further treatment. Agent-contaminated solid waste streams will be treated **at a minimum of 1,000°F for a minimum of 15 minutes**, which destroys residual agent and energetics, if present, or they will be shipped off site **after being decontaminated to the Army Decontamination Standard**. All gas streams (including all ventilating air) are filtered through multiple banks of both particulate (HEPA) filters and activated carbon and are monitored for agent. The combination of liquid phase processing, batch operation with analysis of the contents prior to release and air stream filtering systems minimizes risk to human health and the environment.

Hydrolysate is transferred to the HSA before treatment by the **aluminum precipitation system (APS), aluminum filtration system (AFS), and the** SCWO system. Only material that has been verified to be below the target release level for agent is transferred to the HSA. The **APS and AFS are located in the aluminum filtration building (AFB) and the** SCWO system **is located in the SCWO processing building (SPB); these buildings are separate** from the MDB. The**se** building**s** only receive material that has been verified to be below the target release level for agent and, therefore, **they are** not considered to be an agent treatment unit**s**.

4.3 Waste Processing Sequences

The following sections provide the processing sequence for each waste. Each unit operation is described in greater detail in subsequent subsections.

4.3.1 GB Nerve Agent Munitions

4.3.1.1 GB 8-Inch Projectile (no energetics are associated with this munition)

1. Remove the pallet of projectiles from the EONC.
2. Load the projectiles into a tray.
3. Convey the tray into the nose closure removal (NCR) station and remove the lifting plug from the nose.
4. Convey the tray to the munitions washout station (MWS).
5. Individually remove munitions from the tray and load into the MWS module, nose-down.
6. Hydraulically collapse the burster well into the projectile's agent cavity.
7. Gravity-drain the agent through the nose of the projectile.
8. Wash out the agent cavity using high-pressure water.
9. Send the drained agent and washout water to storage tanks in the agent neutralization room.
10. Replace each washed munitions body into its tray.
11. Convey the tray of washed projectiles to the MPT for **thermal** treatment.
12. Pump the stored agent and washout water to the agent neutralization system (ANS), which consists of stirred tank reactors that use water and/or caustic to convert agent to hydrolysate.
13. Transfer the agent hydrolysate to the hydrolysate batch holding tanks where the hydrolysate is sampled and analyzed to verify that it is below the target release level for agent.
14. After the hydrolysate is verified to be below the target release level for agent, pump the hydrolysate to the HSA before SCWO treatment.

4.3.1.2 GB M55 Rockets

1. Remove the pallet of rockets from the EONC (UPA).
2. Place each rocket individually onto the rocket metering machine in the UPA.
3. Convey the rocket to the punch-and-drain station of the rocket shear machine (RSM) in the explosive containment room (ECR).

4. Punch holes in the agent cavity in the top and bottom of the rocket agent cavity with the punch-and-drain station.
5. Drain the agent through the lower clamp. Send the drained agent into an agent storage tank in the agent neutralization room (see Section 4.10 for a discussion of the ANS).
6. Introduce high-pressure water. Flush the agent cavity (the optimum flush duration, pressure and flow rate will be the subjects of simulant, surrogate, and agent testing during the RD&D program), maintaining suction at a slightly higher flow rate than the inflow.
7. Pump the stored agent and washout water to the ANS, which consists of stirred tank reactors that use water and/or caustic to convert agent to hydrolysate.
8. Transfer the agent hydrolysate to the hydrolysate batch holding tanks where the hydrolysate is sampled and analyzed to verify that it is below the target release level for agent.
9. After the hydrolysate is verified to be below the target release level for agent, pump it to the HSA before SCWO treatment.
10. Move the rocket to the shear station for cutting.
11. Cut the warhead portion into segments. The warhead includes the fuze, the burster, and the washed agent cavity.
12. Send the warhead segments to the warhead energetics batch hydrolyzer (EBH).
13. Cut the motor portion into segments.
14. Send the motor segments to the propellant EBH.
15. Send the energetics hydrolysate to the energetics neutralization system (ENS) for caustic hydrolysis, as required.
16. Sample and analyze the energetics hydrolysate to verify that it no longer exhibits the characteristic of reactivity and that the agent concentration is below the target release level for agent, before **transfer to the HSA**.
17. **Transfer the energetics hydrolysate from the HSA to the AFB.**
18. Chemically precipitate the aluminum and then remove the precipitate by filtration. The aluminum precipitate is characterized and sent offsite to a permitted disposal facility. **Send the filtrate to the SCWO for further treatment.**
19. Send solid material (rocket sections and pieces) from the EBHs through the HDC for **thermal** treatment **at a minimum of 1,000°F for a minimum of 15 minutes**.

4.3.1.3 GB M56 Warheads

The GB M56 warheads will be processed and treated following the steps outlined in Section 4.3.1.2, except that (because they have no rocket motors) it will not be necessary to cut and hydrolyze the propellant.

4.3.1.4 GB Ton Container

The method for treating the single GB ton container (TC) will be established on the basis of ongoing experience in handling and accessing ton containers at other chemical demilitarization sites[11] and experience gained on GB munitions during the earlier stages of the RD&D program.

4.3.2 VX Nerve Agent Munitions

4.3.2.1 VX 155-mm Projectiles (no energetics are associated with this munition)

The VX 155-mm projectiles will not be treated under this RD&D permit. The treatment procedure for VX 155-mm projectiles will be similar to the procedure for GB 8-inch projectiles.

4.3.2.2 VX M55 Rockets

The VX M55 rockets will not be treated under this RD&D permit. The treatment procedure for VX M55 rockets will be similar to the procedure for GB M55 rockets.

4.3.2.3 VX M56 Warheads

The VX M56 rocket warheads will not be treated under this RD&D permit. The treatment procedure for VX M56 rocket warheads will be similar to the procedure for GB M56 warheads.

4.3.2.4 VX Department of Transportation (DOT) Bottle

The DOT bottle will not be treated under this RD&D Permit. The method for treating the DOT bottle will be established on the basis of experience gained on other munitions during the earlier stages of the RD&D program.

4.3.3 H (Mustard) Blister Munitions

4.3.3.1 H 155-mm Projectiles with Explosives

The H 155-mm projectiles will not be treated under this RD&D permit. The treatment procedure for H 155-mm projectiles is expected to be similar to the procedure for GB 8-inch projectiles with additional steps for treating tetrytol bursters that are only included in the H projectiles.

4.3.3.2 H DOT Bottles

The H DOT bottles will not be treated under this RD&D permit. The method for treating the DOT bottles will be established on the basis of experience gained on other munitions during the earlier stages of the RD&D program.

4.3.4 Wood Pallets

Wood pallets that have not been exposed to a leaking munition will not be processed through the DSH and will be managed by appropriate methods to promote waste minimization. All pallets and other dunnage associated with leaking munitions will be treated as agent contaminated dunnage. The quantity of agent-contaminated wood pallets cannot be determined at this time. Agent-contaminated wood pallets will be processed as follows:

1. Transfer the pallet from the UPA to the feed hopper of the DSH in the MDB.
2. Progressively feed the material through the first-stage shredder into a surge hopper and then into the second-stage shredder.

[11] ABCDF and NECDF

3. Pass the products from the second-stage shredder through a magnetic head pulley to remove metal pieces.
4. Send the metal pieces to the MPT for **thermal** treatment followed by disposal by appropriate methods to promote waste minimization.
5. Feed the wood from the second-stage shredder into the micronizer, which creates a fine “wood flour,” and then feed it to the wood-flour hopper.
6. Feed the wood flour to a hydropulper, which may mix it with the plastics and carbon slurries (depending on the availability of these materials at the time) and with spent decon solution and/or with energetics hydrolysate to both create a more pumpable material and to destroy the agent that might be present.
7. Sample and analyze the slurry to verify that it is below the target release level for agent.
8. Send the slurry to SCWO.

4.3.5 Agent-Contaminated Plastic and PPE

Plastic materials that are not contaminated with agent will be managed by appropriate methods to promote waste minimization without any further treatment at BGCAPP. Plastic and PPE are assumed to be contaminated if they have been exposed to agent. Agent-contaminated plastic material (e.g., personnel protective ensembles, aprons, and gloves) that is generated during the RD&D program will be processed as follows:

1. First, cut out metal parts from the equipment. This is done immediately after the person wearing PPE leaves the controlled (agent-contaminated) area.
2. Send the metal parts to the MPT for **thermal** treatment before they are managed by appropriate methods to promote waste minimization.
3. Send the plastic portion of the equipment to the plastics-rubber granulator where it is shredded.
4. Send the shredded plastics/rubber to a cryocooler, where it is cooled by contact with liquid nitrogen to embrittle it and then to a plastics/rubber shredder, where it is further size-reduced to a “plastics fine.”
5. Feed the plastics fine to a hydropulper, which may mix it with the wood and carbon slurries (depending on these materials’ availability) and with the spent decon solution and/or with energetics hydrolysate to both create a more pumpable material and to destroy the agent that might be present. A 50% sodium hydroxide (NaOH) solution is also available to be used for agent destruction, if required.
6. Sample and analyze the slurry to verify that it is below the target release level for agent.
7. Send the slurry to SCWO.

4.3.6 Miscellaneous Agent-Contaminated Metal Parts (e.g., banding, pumps, and pipe)

The materials that are generated during the RD&D program are sent directly to the MPT or HDC for **thermal** treatment before they are managed by appropriate methods to promote waste minimization.

4.3.7 Agent-Contaminated Spent Activated Carbon

Agent-contaminated spent activated carbon that is generated during the RD&D program will be processed as follows:

1. **At the end of each agent campaign, remove** the spent carbon **filter trays** from the HVAC filter units **and** containerize and transport **them** to **either** a specially built glovebox in the MDB or to **the DSH room or the TMA for transfer into containers for processing**.
2. **Decontaminate t**he empty filter **trays to the Army decontamination standard before they are** return**ed** to service **or process them through the MPT for thermal treatment before they are managed by appropriate methods to promote waste minimization.**
3. Transfer the granular carbon from the filter frames into the feed hopper of the spent carbon storage bin, either manually from inside the glovebox (if used) or via vacuum from inside the handling room (if used).
4. Feed the carbon from the storage bin into a mixing tank, where it is slurried with water.
5. Pass the slurry through the spent carbon wet grinder for size reduction.
6. Feed the fine slurry to the hydropulper, which may mix it with the wood and plastics slurries (depending on the availability of these materials) and with spent decon solution (or caustic) and/or with energetics hydrolysate to both create a more pumpable material and to destroy the agent that might be present.
7. Sample and analyze the slurry to verify that it is below the target release level for agent. If the residual agent concentration is above this value, further reaction time and processing in the MDB will be required.
8. Send the slurry to SCWO.

4.3.8 Spent Decontamination Solution (SDS)

SDS that is generated during the RD&D program will be processed as follows:

1. Pump the SDS from sumps at the personnel decontamination stations to the SDS storage tanks.
2. Sample and analyze the SDS to verify that it is below the target release level for agent. If the agent has not been sufficiently destroyed, the batch will be pumped into an agent hydrolysis reactor for further treatment.
   a. Send the SDS to the DSH hydropulper if the agent concentration is below the target release level for agent.
   b. If the residual agent concentration is above this value, send the SDS to the agent hydrolysis system for further treatment.

The following discussion describes each process component shown in Figure 4-1. Attachment 6 describes the overall facility, including the building HVAC systems, which incorporate the final air stream treatment systems and are designed to prevent a release of hazardous materials (specifically agents) from operations within the MDB[12].

[12] Evaluation of process integration will require the operation and testing of all of the equipment identified in Sections 4.4 through 4.14 with the exception of Section 4.5.1.

4.4 Munitions Unpacking (Drawing 24915-07-M5-PHS-00001)

EONCs containing munitions are conveyed from the CHB to the UPA of the MDB for processing. Before the EONC is opened (in the UPA) to access the munitions, the air in the sealed EONC is monitored for agent. If agent is detected, the EONC will not be opened until it is transported to the toxic maintenance area (TMA), which is designed to handle the opening of the container as described in Section 4.2. If no agent is detected, the EONC will be opened in the UPA and the munitions will be unloaded for processing. Unburstered projectiles are loaded onto a munition tray; the tray is placed on a conveyor and moved to the NCR station. Rockets are loaded onto the rocket metering machine and conveyed through the explosive containment vestibule (ECV) to the ECR. The burstered H 155-mm projectiles are loaded onto the projectile feed conveyor and conveyed to the ECR.

The ECV is a buffer between the UPA and the ECRs. In the ECV, the overpacked leaking rockets and overpacked leaking projectiles are removed from the overpacks and placed on the conveyor to transfer them into the ECR for processing as described in Sections 4.3.1.2 and 4.3.1.1, respectively. Leaking unburstered projectiles are loaded onto a munition tray for processing through the nose closure removal station (NCRS) as described in Section 4.3.1.1.

4.4.1 Projectile Input Subsystem

The burstered H 155-mm projectiles are unpacked on the receiving table in the UPA, placed onto the projectile feed conveyor, and transferred through the ECV and into the ECR for reverse assembly by the PMD.

The projectile feed conveyor is a combination of a roller-type conveyor and an airlock assembly with a series of doors. The doors provide for an airlock into the ECV and provide the negative pressure to prevent the air in the ECV from flowing into the UPA.

4.4.2 Rocket Input Subsystem

M55 rockets are unpacked on the receiving table in the UPA, placed onto the rocket metering machine, and conveyed through the ECV and a munition access blast gate into the ECR for processing through the RSM. The plant has two RSMs: each has its own rocket input system, and one RSM is located in each ECR.

4.4.3 Dunnage/Secondary Waste Input

The main component of the dunnage is the wood pallets on which the munitions were stored and transported. Pallets that are contaminated with agent will be processed through the DSH. The metal nails and banding from these pallets will be processed through the MPT or HDC. The wood pallets that are not agent-contaminated will not be processed through the DSH and will be managed by appropriate methods to promote waste minimization.

Other agent-contaminated (or potentially agent-contaminated) secondary waste, such as PPE and plastic, will be **managed by one of the following methods:**

1. **Treated in the DSH, SCWO**, **and WRS**
2. **Treated in the MPT or the HDC to a minimum of 1,000˚F for minimum of 15 minutes**
3. **Decontaminated to the Army decontamination standard**

The waste residuals will then be managed by appropriate means to promote waste minimization.

4.5 Projectile/Mortar Disassembly Machine/Nose Closure Removal (Drawing 24915-07-M5-PHS-00001 and NCR-00001)

All H 155-mm projectiles are processed in the PMD to be installed in an ECR. Unburstered projectiles (GB and VX) require processing by a single NCRS located in the NCR room.

4.5.1 Projectile/Mortar Disassembly Machine

The PMD machine will remove the nose closures and the bursters from the H155-mm projectiles. After the nose closure and the burster are removed, the projectile will be conveyed out of the ECR, loaded onto a munition tray, and conveyed to the MWS.

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

At any point in time, the number of projectiles in the ECR is limited by the explosive force of the aggregate number of projectiles present. The system is designed so that the total explosive limit is consistent with the design to be submitted to the Department of Defense Explosives Safety Board (DDESB).

4.5.2 Nose Closure Removal Station

The NCRS removes the nose closures from the unburstered projectiles (GB and VX) by unscrewing them from the nose of the projectile. After the nose closures have been removed from all the projectiles on the munition tray, the tray is moved to the MWS for further processing. The removed nose closures are processed through the MPT.

4.6 Munition Washout System (Drawing 24915-07-M5-MWS-00001)

At the MWS, the projectile is inverted, placed into one of the MWS modules that contain a cavity access machine. A ram is hydraulically forced into the projectile, collapsing the burster well into the agent cavity as shown in Figure 4-3. The agent drains by gravity and is fed to the agent storage tank in the ANS. The washout nozzle array (consisting of high-pressure nozzles in a configuration that aims the water jets) is integral with the shaft of the burster well ram, and high-pressure water is sprayed to flush the cavity. After flushing the cavity, the projectile is placed back on the munition tray upright (nose up) and eventually transferred to the MPT.

4.7 Rocket Shear Machine (Drawing 24915-07-M5-RHS-00001)

The RSM demilitarizes the M55 rockets and M56 warheads containing GB and VX agents. The RSM extracts agent from rockets in a punch, drain, and **wash** station, and then shears them into segments to access the energetics for neutralization in the EBH. Drained agent extracted at the RSM is pumped directly into the agent storage tanks; all agent washout water is pumped to the **spent decontamination solution (SDS) storage tanks**. From the storage tanks, the agent and flush material are pumped to the ANS where the agent is neutralized. The rockets are processed without being removed from their fiberglass shipping and firing tubes. The RSM used at the BGCAPP is similar to the RSM used at baseline operations, but it is modified to include a high-pressure flushing step that washes residual agent from the agent cavity and removes any gelled agent. A fully automated, hydraulically powered RSM is installed in each ECR.

4.7.1 Punch/Drain and Wash Station

The punch/drain and wash station clamps the rocket while the rocket is punched, drained, and washed out. To reduce residual agent in the rocket warhead cavity, and therefore minimize the amount of agent processed in the EBH, the baseline RSM punch-and-drain station has been modified to include a pressurized water spray system.

The sprays remove the residual agent and dissolve solidified material that does not drain during the punch-and-drain cycle. The high-pressure water flush system improves cleaning of the rocket warhead while minimizing changes to the baseline RSM system.

The flush rate is maintained at less than the drain rate capacity, assisted by vacuum, to avoid pressurizing the warhead. The spray pattern and spray duration needed to achieve an effective flush will be validated during the **Technical Risk Reduction Program (TRRP)** .

Upon completion of the wash cycle, the rear and front clamps are opened and the rocket is rotated approximately 90° to orient the holes horizontally to minimize dripping of liquid during transportation to the shear machine.

4.7.2 Rocket Shear Station

The rocket, with the agent cavity drained and washed, is conveyed from the punch/drain and wash station to the rocket shear station. Shearing is necessary to segregate the metal parts, including the drained and washed agent cavity from the energetics, open the interior of the agent cavity for improved decontamination, and to cut the rocket into smaller sections that can be safely placed into the EBHs. Cutting the propellant and the burster into smaller pieces also exposes more surface area to the hot caustic in the EBH, increasing the rate of hydrolysis.

The rocket shear station is equipped with an optical sensor that reads the position of a pusher arm that moves the rocket forward for shearing. The sensor output identifies the location of each cut that the blade will make on the rocket. The rocket is progressively positioned under the blade, which shears the warhead and motor components into smaller segments in a predefined pattern.

The precise number of resulting propellant segments will be the subject of the RD&D program.

The solid material from the rocket shear station is transferred to the EBH for further processing.

4.8 Dunnage Treatment (Drawing 24915-07-M5-DWS-00001, -DCS-00001, and -DPS-00001)

The DSH process uses separate process equipment to size-reduce wood from contaminated munitions pallets, PPE, plastics, spent carbon from the HVAC system, and other contaminated secondary wastes. These wastes are size-reduced using commercial off-the-shelf shredding and granulating equipment. Carbon is size-reduced in commercial grinding equipment. Agent-contaminated wood is size-reduced in a multistage process that uses a first stage rough shredder, a second stage shredder, and micronizer. **Surge hoppers are provided at the discharge point of the shredders and the micronizer. Conveyors transfer the shredded material to the next step in the process.** The equipment and conveyors are enclosed and ventilated to the dust collection system. The dust from the dust collection system is recycled to the hydropulper for treatment. Agent-contaminated plastic and rubber are size-reduced in a two-step process that uses a granulator and cryo-micronizer. Conveyors are also provided to connect the processing equipment and surge hoppers. The equipment and conveyors are ventilated to the dust collection system. Agent-contaminated carbon is size-reduced in a one-step process that uses a wet grinder. Carbon slurry surge capacity is provided. The dry carbon handling equipment is ventilated to the dust collection system. Carbon collected from HVAC filter media will be stored, and processed through the DSH system. Metal parts from the PPE and nails and banding from the contaminated wood pallets are separated and transferred to the MPT system for thermal decontamination.

The DSH vents to a baghouse and then to the MDB HVAC system. The size-reduced wood, PPE, plastics, and possibly carbon are blended with SDS (or caustic), energetics hydrolysate or blended agent/energetics hydrolysate in commercial hydropulpers[13]. Spent water-based hydraulic fluids and nonprocess liquid wastes are also blended in the hydropulpers, as required. A suspension agent or thickener is added as required to suspend the solids and to ensure that the slurry can be reliably pumped to and processed in the SCWO. The resultant slurry is treated with caustic and sampled and analyzed to verify that the hydrolysate is below the target release level for agent, before it is transferred to the SCWO system for additional treatment.

The hydropulpers are operated as a batch process: one batch of hydrolysate/dunnage is prepared and sampled while the other is pumped to the SCWO process.

4.9 Energetics Treatment (Drawing 24915-07-M5-EBH-00001, -ENS-00001, -OTE-00001, and 24915-11-M5-HSS-00002)

4.9.1 Energetics Batch Hydrolyzer

Explosives and propellants contained in the rockets and explosives contained in the 155-mm H projectiles are treated in EBHs as shown in the PFD for the EBH system.

After the M55 rockets and M56 warheads are drained of agent and sheared in the RSM, the rocket segments are placed in the EBHs for processing. Projectile bursters from 155-mm H projectiles are removed by the PMD and are also processed in the EBHs. An EBH is a large steam-heated **inclined** drum **similar in shape to a traditional cement mixer**. The drum is partially filled with hot NaOH solution. During rocket processing, **sheared rocket segments are placed in the rotating drum where the energetics are dissolved and hydrolyzed. Rocket propellant segments and warhead segments (containing aluminum) are fed separately to EBH units. Aluminum in the rocket segments is also hydrolyzed. Steel-cased rocket motor segments are placed in an EBH and the propellant is allowed to hydrolyze. The rocket motor solid residues are then removed from the EBH and the aluminum rocket warhead segments are placed in the EBH with the propellant hydrolysate. The explosives in the warhead are hydrolyzed in the surplus amounts of caustic (NaOH) remaining in the rocket motor hydrolysate. The rocket propellant is kept separate from the warhead burster explosives and warhead aluminum.**

Hydrogen gas generated by the reaction of aluminum with sodium hydroxide is monitored, and an air or nitrogen purge is provided to ensure that hydrogen levels are maintained below the **25% of the** lower **flammability** limit (L**F**L). **The EBH room is designed as an explosion containment room (ECR).**

The EBH system uses multiple batch hydrolyzers for each of two completely separate but parallel energetics hydrolysis trains. Eight EBHs are planned for each energetics hydrolysis train. After the EBH charging step is completed, the second, third, etc., hydrolyzers are used as required for receipt of energetics. The first EBH then completes the treatment of the energetics. The solid residues are **then** separated from the liquid hydrolysate and **transferred to the HDC for** thermal decontaminat**ion**. **The h**ydrolysate is transferred to the energetics neutralization reactors (ENRs) for final energetics destruction.

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[13] Energetics hydrolysate and/or agent hydrolysate may also be added to improve plant throughput.

Samples are taken to verify that the hydrolysate is below the target release level for agent **and then transferred to the energetic hydrolysate storage tanks in the HSA. If the residual agent concentration is above the target release level, additional reaction time will be required in the ENRs before transfer to the HSA.**

Gases from the EBHs, HDCs, and ENRs are sent to a dedicated EBH/HDC Offgas Treatment System (OTE). After treatment in the OTE, the gases are released to the MDB HVAC filter system.

4.9.2 Heated Discharge Conveyors

Solid residues from the EBHs (e.g.,steel rocket casings, rubber seals, and fiberglass rocket shipping and firing tubes) are transferred to the HDC where they are electrically heated to **a minimum of** 1,000°F for **a minimum of** 15 minutes.

The EBH and HDC **will be** configured to transport **rocket segments** based on the results of a **TRRP to** be conducted **in 2005.**

The HDC is nitrogen purged and sealed to restrict airflow into the HDC. **It is operated under negative pressure to draw the vapors from the HDC into the EBH/HDC OTE.**

4.9.3 Energetics Neutralization System

The energetics hydrolysate is not released from the MDB until it has been tested for agent and verified to have met all requirements for release from engineering controls. **The hydrolysate is transferred to the energetic hydrolysate storage tanks in the HSA. If the residual agent concentration is above the target release level, additional reaction time will be required in the ENRs before transfer to the HSA.**

4.9.4 EBH/HDC Offgas Treatment System (OTE)

The offgases from the EBHs and the HDCs will be vented through the OTE.

4.10 Aluminum Filtration System (Drawings 24915-07-M5-APS-00001 and -AFS-00001)

The energetic hydrolysate is transferred from the HSA to the AFS, where the hydrolysate is neutralized and filtered to remove the precipitated aluminum hydroxide ($Al(OH)_3$) compounds from the hydrolysate before it is transferred to the SCWO feed tanks. The filter cake is removed and disposed of in a permitted TSDF.

After the aluminum is precipitated, some hydrolysate may be transferred to the DSH system, where it is mixed with size-reduced dunnage in the hydropulper and pumped to the SCWO process.

4.11 Agent Neutralization by Hydrolysis (Drawing 24915-07-M5-ACS-00001, -ANS-00001, and 24915-11-M5-HSS-00001)

The agent drained from the munitions, as well as the wash liquid from the drain-and-wash operation, is hydrolyzed in the ANS reactors. Hot water will be used to neutralize H; hot NaOH solution will be used to neutralize VX and GB.

In the neutralization process, the agent will be destroyed to at least 99.9999% on a mass basis (i.e., the mass of agent entering the ANS versus mass of agent leaving the hydrolysis system). Attachment 10, Section 10.1, discusses how the destruction efficiency is determined.

SDS will either be transferred to the DSH or the agent hydrolysis reactors. The agent hydrolysis reactors are kept under a nitrogen purge and the reactors' vent gas is treated **in the MPT Offgas Treatment System (OTM) (as described in Section 4.12)** before it is released to the MDB HVAC **filter** system.

Before the hydrolysate is discharged from the agent reactors, it is sampled and analyzed to ensure that it is below the target release level for agent. Only after this criterion has been met is the hydrolysate released from the reactor and pumped to the HSA prior to further treatment by the SCWO treatment process.

4.12 Batch Metal Parts Treater and Offgas Treatment System (Drawing 24915-07-M5-MPT-00001, -MPTC-00001 and -OTM-00001)

Washed munition bodies from MWS, trays, metal components, and secondary wastes are thermally decontaminated in the MPT units. Trays of washed metal munitions from the MWS are placed in the MPT; the chamber is sealed, purged with nitrogen gas, and electrically heated until all metal components have been **thermally treated** to a minimum of 1,000°F for a minimum of 15 minutes. The offgases from each MPT go to **the OTM** where they are treated before they are released to the MDB HVAC filter system.

4.13 Decon Solution Supply and Spent Decon Solution Capture/Storage System (Drawing 24915-07-M5-SDS-00001)

Decon solution is used in the following activities:

1. Wash down any spills of agent that may have occurred.
2. Decontaminate equipment.
3. Decontaminate PPE that may have been contaminated during toxic area entries.[14]

Decon solution is used by applying it to an area of contamination, allowing sufficient contact time, and then rinsing the area with water. The wash water drains to sumps in the MDB.

The decon solution is based on either NaOH, NaOCl, or other decon solutions. Other possible decon solutions will be evaluated and used if their overall performance and environmental health impacts prove to be equal to or better than current decon solutions.

4.14 SCWO Units (Drawing 24915-10-M5-SCWO-00001)

The SCWO units are used to treat the agent and energetics hydrolysates, spent decontamination fluid, and slurries of shredded and micronized dunnage. The various waste streams may be processed through the SCWO units either individually or as blends. With minor modifications, all SCWO reactors are essentially interchangeable. The principal difference between them is whether they are fitted with the dedicated pumping system required to feed the thick DSH slurry. All materials that are fed to the SCWO units have been previously verified to be below the target release level for agent; therefore, the SCWO and downstream operations do not require engineering controls. Prior to storage, the energetics hydrolysate is adjusted for the correct ratio of caustic and salt transport additive before it is transferred to the HSA. Previous and ongoing SCWO tests on agent hydrolysates, energetics hydrolysates, and blended hydrolysates will provide data on the appropriate ratios of caustic and salt transport additives.

[14] To prevent agent from being carried out of the agent-contaminated areas of the MDB, PPE is washed down with decon solution and water. Agent monitoring is performed prior to exiting the area through the airlocks.

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 SCWO reactor is a vertical down-flow high-pressure cylindrical vessel. Its general configuration is shown in Figure 4-4. A replaceable annular liner is fitted into the vessel as shown. A small flow of air or nitrogen is maintained in the annulus between the liner and the pressure vessel to inhibit the ingress of process fluid into the annulus.

The material to be reacted (hydrolysate, spent decontamination solution, or DSH slurry) along with air is pumped through the feed-nozzle at the top of the reactor. The feed material will be supplemented with additional organic feed (supplemental fuel) in order to increase its heating value, as required to maintain an autogenous[15] reaction. **I**sopropyl alcohol (IPA)**, fuel oil, or kerosene may be used as** supplemental fuel**s** at the BGCAPP.

In the SCWO reactor, the organic constituents of the waste are converted to carbon dioxide (CO_2), water (H_2O), nitrogen (N_2), or nitrous oxide (N_2O), and sulfates and phosphates (if sulfur or phosphorus is present in the feed). Halogens are converted to their respective acids. The acids react with the caustic to form sodium salts such as sodium chloride (NaCl), sodium fluoride (NaF), monosodium phosphate (NaH_2PO_4), and sodium sulfate (Na_2SO_4), depending on the agent being processed. The salts are not soluble in the supercritical fluid and they are carried through the reaction zone (from the injector to the quench region) as solids or as slurries. At the bottom of the reactor, quench water is introduced, lowering the temperature below the critical point and converting the supercritical fluid to a liquid into which the salts dissolve. All of the reaction products flow out of the bottom of the SCWO reactor.

During system startup, an electric feed preheater is used to heat the SCWO reactor to the fuel initiation temperature at the nominal operating pressure of about 3,400 psi. DSH/energetic hydrolysate slurries may also be preheated before they are introduced into the SCWO units to aid in destruction. At this point, flows of oxidant and fuel are begun, and reaction is initiated. Oxidation of the fuel brings the SCWO system to the full operating temperature before the hydrolysate is introduced. After the hydrolysate flow is initiated, fuel flow is reduced to accommodate the heat released by hydrolysate oxidation. As the hydrolysate feed rate is ramped up to the target throughput, the fuel, water, and air flow rates are adjusted as required to maintain the desired operating conditions.

The quenched reactor effluent is passed through a series of heat exchangers to cool it to near-ambient temperature, passed through a high-pressure gas/liquid separator (GLS), and then passed through pressure reduction control valves. The gas stream and the liquid stream are depressurized separately. The liquid stream goes to a second GLS to further remove gases that were soluble at high pressure, principally residual CO_2. The gas is combined with the main gas stream exiting the high-pressure GLS. The SCWO aqueous effluent exits the bottom of the low-pressure gas/liquid separator and is pumped to the water recovery system (WRS).

4.15 Water Recovery System (Drawing 24915-10-HK-TWR-00001, -TNBE-00001, and -TNBC-00001)

The WRS receives the effluent from the SCWO system and the blowdown from the cooling tower and water treatment and then separates the water from the salts for recycling or disposal.

[15] Autogenous refers to the ability of a chemical reaction to maintain a sufficiently high temperature to sustain itself without the need to add additional heat to the reactor vessel.

The WRS comprises a reverse osmosis (RO) unit, a brine concentrator (BC), an evaporator/crystallizer (EC), and two solid separation units. The SCWO effluent is a salt solution comprised primarily of sodium sulfate (Na_2SO_4), sodium chloride (NaCl), sodium fluoride (NaF), and monosodium phosphate (NaH_2PO_4). The WRS package is designed to produce solid salts that will be characterized and shipped to a permitted disposal facility.

RO recovers a portion of the water. This water is suitable for and will be used to supply the SCWO quench requirement. The brine rejected from the RO and the water that is surplus to the quench water requirement will be treated by the BC and EC. The high-quality water is recycled to the plant as process water and is used in the process systems and as makeup water for the water cooling system. The water may also be shipped off site for disposal at a permitted disposal facility.

The only air emissions that may result from the WRS will be particulates from the evaporator; based on the material balance calculations, these emissions are expected to be very low. As a result, the WRS emissions will be discharged directly to the atmosphere with no further treatment. The emissions will, however, be tested **for compliance with 401 KAR 59:010** as part of the RD&D program**.**

The major components of the WR**S** are described in the following sections.

4.15.1 Reverse Osmosis (Drawing 24915-10-HK-TWR-00001)

The RO unit processes the effluents from the SCWO units. SCWO effluents are first fed to the feed preparation subsystem to remove contaminants. The feed preparation subsystem consists of a clarifier for removing suspended solids, a multimedia filter, and a cartridge filter. The clean water from the preparation stage is then fed to an RO unit for brine concentration. All residues from the clarifier and the filters are injected into the RO reject stream. Reject from the RO unit combines with blow down from processing units and is fed to the BC.

4.15.2 Brine Concentrator (Drawing 24915-10-HK-TNBC-00001)

The RO unit reject stream and the blow downs from various process units (cooling tower and water treatment) are stored in the EC feed tank and will be used as the feed to the brine concentrator unit. The BC unit is designed to recover the majority of the water available in the feed. The BC consists of two portions: the upper portion is a condenser and the lower portion is an evaporator flash drum. The evaporator’s overhead vapor is condensed and recovered as condensate. The bottom portion of the evaporator, the concentrated brine, is fed to the EC for further water recovery.

The feed to the unit is pH adjusted, then heated to approximately 210°F by the feed preheater and fed to the evaporator.

Heat is supplied to the evaporator by superheated steam made by compressing and recycling the water vapor leaving the evaporator. The compressed water vapor exchanges heat with a recycling stream of brine and makes more water vapor. The compressed water vapor loses heat to the brine, condenses, and is removed. A falling film condenser is located at the top of the evaporator to provide a heat transfer surface to exchange heat between the evaporator recycling brine and the compressed water vapor.

During startup and cleaning, steam is supplied from the facility steam utility for evaporating when no internal steam is available from the evaporator to heat the recycle stream. The facility boiler provides the capacity for this requirement.

The BC shares a brine tank with the EC unit for boil out and purging. The brine tank holds the contents of the evaporator and provides an equal volume of dilution water during the cleaning cycle.

4.15.3 Evaporator/Crystallizer (Drawing 24915-10-HK-TNBE-00001)

The concentrated brine from the BC is fed to the EC to recover the remaining water in the brine and to crystallize the solids for dewatering.

Feed to the EC is pumped through a feed product heat exchanger to the evaporator. The evaporator is an atmospheric flash tank used to separate the water vapor from the brine slurry. The water vapor exits from the top of the evaporator after passing through a mist eliminator that prevents salt carryover. The water vapor is compressed by a rotary lobe-type compressor and becomes superheated steam. This superheated water vapor exchanges heat with a brine recycle stream from the evaporator in a forced recirculation heat exchanger. In this exchanger, the steam loses its heat and becomes condensate. The recycle stream absorbs heat and transfers it to the evaporator for steam generation. The brine slurry leaves the evaporator and is fed to the solid separation system for solids removal. The EC exhaust, consisting of water vapor, is vented to the atmosphere.

Condensate from the evaporator is collected in a condensate drum. A condenser on the condensate drum vent condenses most of the water vapor and allows the non-condensable gases to discharge to atmosphere. The high quality condensate from the EC is combined with the water recovered from the BC and is used as SCWO feed water and process water to various process units. It can also be used as SCWO quench water if necessary.

The EC shares a brine tank with the BC to boil out the evaporator column and to store brine surge. The brine tank holds the contents of the evaporator and an equal volume of dilution water during the cleaning cycle or during emergency. Antifoam reagent is provided for the BC and the EC to prevent foaming in the evaporator.

4.15.4 Solids Separation System

The solids separation system consists of a slurry tank, a solids dewatering unit, an agitated filtrate tank, filtrate pumps, and a solid cake conveyor.

The solids dewatering unit is a package unit capable of dewatering solids (primarily Na_2SO_4, Na_2HPO_4, NaCl, and NaF), including the bound water of hydration in the filtered cake. By the time the filter cake cools to ambient temperature, all the water in the cake is bound with the solids. The solids dewatering unit is an automatic pressure filter (an Oberlin filter or equivalent) that is commonly used to separate solids in water treatment facilities.

Slurry is pumped from the slurry tank to the solids separator filter chamber. A pneumatic airbag lowers the filter platen against the filter chamber. The platen seals on the perimeter of the compartments form a liquid-tight seal around the filter media. Solids-bearing liquid is pumped into the platen and forced by the pump pressure through the filter media. The filtered liquid is collected in the lower compartment and drains out to the filtrate tank and is returned to the evaporator column. Solid filter cake is conveyed to a bin by a conveyor belt. The bins are then transported off site to a permitted disposal facility.

Table 4-1— Major NRC Reports Relevant to Destruction of Weapons at BGAD

NRC 1993	*Alternative Technologies for the Destruction of Chemical Agents and Munitions*
NRC 1995	*Review of Alternative Chemical Disposal Technologies*
NRC 1999	*Review and Evaluation of Alternative Technologies for Demilitarization of Assembled Chemical Weapons*
NRC 2000	*Evaluation of Demonstration Test Results of Alternative Technologies for Demilitarization of Assembled Chemical Weapons, a Supplemental Review for Demonstration II*
NRC 2000a	*Integrated Design of Alternative Technologies for Bulk-Only Chemical Agent Disposal Facilities*
NRC 2001	*Analysis of Engineering Design Studies for Demilitarization of Assembled Chemical Weapons at Pueblo Chemical Depot*
NRC 2001a	*Disposal of Neutralent Wastes*
NRC 2002	*Analysis of Engineering Design Studies for Demilitarization of Assembled Chemical Weapons at Blue Grass Army Depot, 2002*
NRC 2002a	*Update Engineering Design Studies for Demilitarization of Assembled Chemical Weapons at Blue Grass Army Depot*
All NRC reports are available for purchase or download at www.nap.edu.	

Table 4-2—Hydrolysis Types to be Used at BGCAPP

Hydrolysis Type	Agent
Hot water	H, blister agent mustard[a]: bis(2-chloroethyl) sulfide or ,2'-dichlorodiethyl sulfide ($C_4H_8Cl_2S$)
Hot sodium hydroxide	GB [nerve agent sarin: isopropyl methyl phosphonofluoridate ($C_4H_{10}FO_2P$)]
	VX [nerve agent: O-ethyl S-(2-diisopropyl-aminoethyl) methylphosphonothiolate ($C_{11}H_{26}NO_2PS$)]
	Energetic materials (explosives and rocket propellants)
[a]Levinstein mustard.	

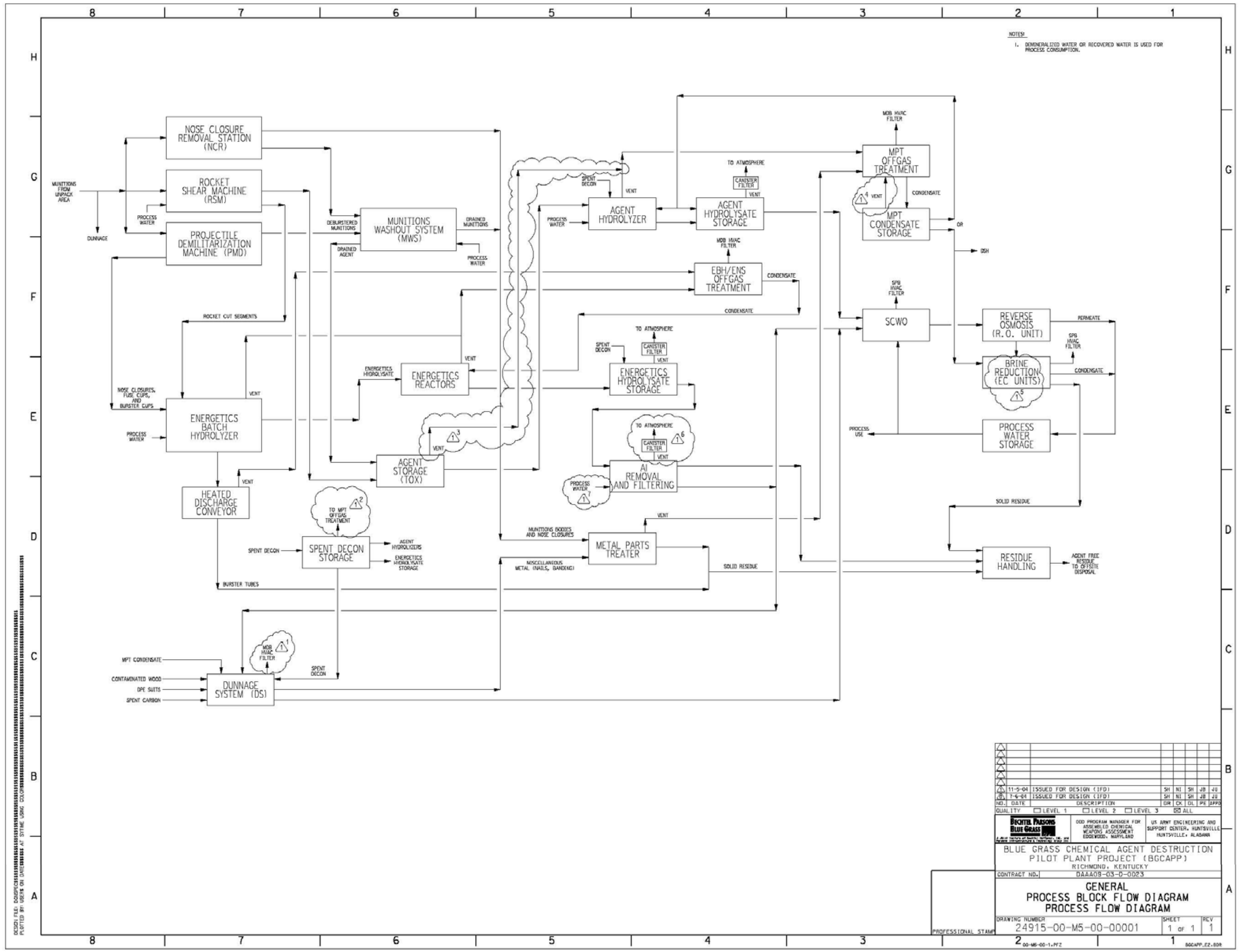

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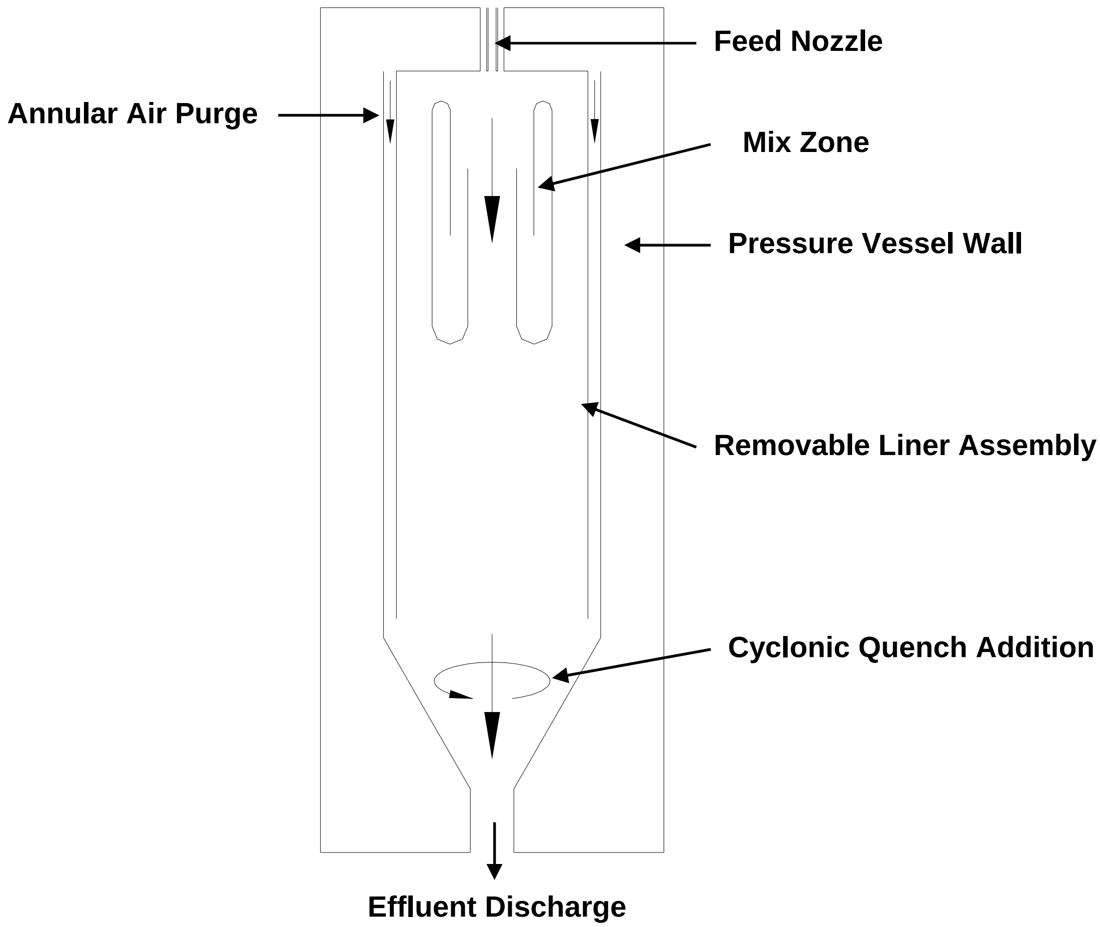
Figure 4-1—Process Block Flow Diagram

Figure 4-2—Enhanced Onsite Container (EONC)

Figure 4-3—Projectile with Crushed Burster Tube



Note: This figure is presented as general illustration of the functioning of a SCWO reactor. It is not necessarily an accurate representation of the interior details of the BGCAPP SCWO reactors.

Figure 4-4—Schematic of a SCWO Reactor

Attachment 5 Contents

Tables

Attachment 5 Method Used to Meet Environmental Protection Standards In Accordance with 401 KAR 30:031

The requirements of KAR 30:031 regulate the three vectors for contaminant release from a treatment, storage, and disposal facility (TSDF):

1. Discharge to surface water
2. Contamination of soil and groundwater
3. Release to the atmosphere

The Blue Grass Chemical Agent Destruction Pilot Plant (BGCAPP) is a completely enclosed facility with no discharges to surface water, ground, or groundwater. It does have the potential to release contaminants to the air. The following discussion addresses those aspects of KAR 30.031 that relate to the first two vectors for contaminant release. The discharges to the atmosphere and how these comply with and exceed all of the regulatory requirements are discussed in addressing the requirements of 401 KAR 30:031, Section 9.

KAR 30:031 Section 2: Floodplains

The BGCAPP is not located in a floodplain.

KAR 30:031 Section 3: Endangered Species

As discussed in the Destruction of Chemical Munitions at Blue Grass Army Depot (BGAD), Kentucky, Final Environmental Impact Statement (EIS) (December 2002), the area of construction has been surveyed and the BGCAPP will be sited so that it does not impact any endangered species. Final site determination will be analyzed in a National Environmental Protection Act (NEPA) document to be prepared in 2004.

KAR 30:031 Section 4: Surface Waters

The BGCAPP is a zero-discharge facility; it does not discharge to surface waters.

KAR 30:031 Section 5: Groundwater

The BGCAPP is totally enclosed. All hazardous waste storage tanks will be constructed to meet the requirements of 401 KAR 34:190 and are provided with secondary containment designed and operated to contain 100% of the capacity of the largest tank and the additional capacity to contain the precipitation from a 25-year, 24-hour storm (5.3 inches).

KAR 30:031 Section 6: Application to Land Use for the Production of Food Chain Crops

The BGCAPP does not apply waste to the land or dispose of any waste on the land.

KAR 30:031 Section 7: Land Disposal of Polychlorinated Biphenyls (PCBs)

The BGCAPP will send all PCB waste only to approved Toxic Substance Control Act (TSCA) disposal sites.

KAR 30:031 Section 8: Disease

The BGCAPP will not process pathogenic or other biological wastes.

KAR 30:031 Section 9: Air

1. **Open burning of wastes.**
   The BGCAPP will not perform open burning of any wastes.

2. **KRS Chapter 224, Air Pollution Regulations.**
   The BGCAPP will comply with all requirements of KRS [Kentucky Revised Statute] Chapter 224 or administrative regulations promulgated pursuant thereto. A modification to the existing Blue Grass Army Depot (BGAD) Air Permit (No. O-86-12) will be submitted in sufficient time to allow full statutory review prior to the start of construction of treatment facilities requiring the Air Permit approval. See Section 11.5, Attachment 11 for additional information on anticipated releases to the air.

KAR 30:031 Section 10: Safety

1. *Explosive gases.*
   Waste processing that may generate explosive gases is described in Attachment 4, Section 4.9.1. Additional information will be provided to KDEP in sufficient time before the start of construction of the affected treatment units.

2. *Fires.*
   No waste will be disposed of on land; therefore, the types of fires covered by this paragraph cannot occur.

3. *Access*.
   Access to all of the BGAD chemical limited area (CLA) is controlled and monitored by security. The BGAD is surrounded by a heavy chain link fence topped by barbed wire. The BGCAPP will be surrounded by a double fence topped with barbed wire. The BGCAPP can be accessed through the manned entry control facility (ECF).

KAR 30:031 Section 11: Public Nuisance

The BGCAPP is within the confines of the BGAD and is well away from any public view or contact. It poses no public nuisance.

KAR 30:031 Section 12: Wetlands

The BGCAPP is not located in a wetland.

KAR 30:031 Section 13: Karst

All operations will be performed in enclosed buildings with no runon or runoff.

KAR 30:031 Section 14: Compliance

BGCAPP will comply with the applicable requirements of KRS 224, 401 KAR, and the BGCAPP Permit. Regulated units within BGCAPP will be managed in accordance with 401 KAR Chapter 34 “Standards for Owners and Operators of Hazardous Waste Storage, Treatment and Disposal

Facilities." Each regulated area or unit is discussed below with the appropriate regulatory requirements from 401 KAR Chapter 34.

1. *Container Storage*
   This section describes the areas in which BGCAPP will manage containers of hazardous waste and some of the types of containers managed, and briefly describes the hazardous waste. Containers listed below and additional containers selected and used during systemization and the RD&D program at BGCAPP meet the definition and requirements of 401 KAR 38:005, 401 KAR 34:180, and 401 KAR 38:150.

2. *Hazardous Waste Containers*
   Several different containers will be used to manage, store, and transport hazardous waste within BGCAPP, in addition to the munitions themselves. Several of these containers are described below, but this listing is not all inclusive. As additional types of containers are identified, they will be incorporated into BGCAPP procedures in compliance with 401 KAR 34:180 and 401 KAR 38:150.

   a. *Single Round Container (SRC*
      M55 rockets that have been found to be leaking are containerized in a single round container (SRC). The SRC was specifically developed to contain the M-55 in a substantial steel shell, which has been subjected to a helium leak test as part of the acceptance process. Leaking M-55 rockets, which were containerized before the development of the SRC, are stored in a modified M-1 container. The modified M-1 is a heavy steel cylinder bolted on with a gasket seal with eight bolts. All munitions are stored on specialized pallets designed to store the overpacked unit securely.

   b. *M16 Series Overpack Container*
      The M16 series containers are cylindrical steel containers designed to be air tight, designated for the over-pack of projectiles. Over-packed 155mm projectiles are stored in wooden "egg crates" specifically designed to store the M16 overpack container.

   c. *M10 Series Overpack Container*
      The M10 series container is a cylindrical steel container that is designed to be airtight and is designated for use as an overpack container for leaking or deteriorated M16 containers and as an overpack container for 8-in. projectiles.

   d. *DOT Bottle*
      DOT bottles are cylindrical containers of steel. Each bottle contains approximately 3 gallons of chemical warfare agent.

   e. *One-Ton Container*
      The one-ton container holds an unserviceable mixture of GB agent and liquid from drill and transfer (DAT) operations and Surveillance Program, Lethal Chemical Agents and Munitions [SUPLECAM] operation. The one-ton container is a cylindrical steel container. All interior valves and pipes have been replaced with steel plugs.

   f. *ISO 55-Gallon Steel Drum*
      Some secondary waste generated during the RD&D process will be containerized in 55-gallon steel drums. The lids will be kept closed except during filling. Only compatible wastes will be containerized together. Each drum is

manufactured with 18-gauge cold rolled steel in accordance with 49 CFR 178.54. Maximum volume of each drum is 55 gallons and has an empty weight of approximately 38 pounds. All drums are approximately 35 inches tall with a diameter of 22½ in.

g. *Intermediate Bulk Containers (IBCs)*
IBCs may be used throughout the process to collect various liquid waste streams. Each IBC will have a capacity of 300 gallons with nominal dimensions of 42 by 48 by 41 in. (LxWxH). IBCs are manufactured from various materials including carbon steel, stainless steel and polymers in accordance with DOT regulations.

h. *Enhanced Onsite Container (EONC)*
The Department of the Army uses EONCs to store and transport the munitions and bulk containers for the time period immediately preceding demilitarization activities. The EONC is designed to provide vaportight containment of agent; all seals on the containers are impervious to agent and are able to withstand decontamination solutions. The EONC will provide secondary containment for the munitions or containers stored within. The EONCs and any components mounted on the surface will fit within an envelope that is 8.5 ft by 8.5 ft by 12 ft high. The combined weight of the EONC and munition holding trays will not exceed 26,000 lbs.

3. *Container Management*
Containers at BGCAPP will be managed in accordance with 401 KAR 38:005, 401 KAR 34:180 and 401 KAR 38:150[1]. Munitions destined for demilitarization are described in Attachment 3. The munitions are transported to the container handling building (CHB) for storage prior to processing during the RD&D program. The Blue Grass Chemical Activity (BGCA) is responsible for the safe storage and delivery to BGCAPP of these munitions, including, but not limited to:

a. Loading specified chemical munition types into EONCs.

b. Transporting the EONCs from the CLA to the CHB of BGCAPP.

c. Completing required record keeping for transfer of custody of munitions to BGCAPP.

d. Returning unloaded EONCs to the CLA.

This activity will be completed under a BGCA Work Plan approved by KDEP in accordance with the requirements of KRS 224.50.130 (Chemical Munitions).

Each truck used by BGCA can transport one EONC of munitions. The number of trucks per day and the loading configuration in the EONCs will differ with the specific goal of scheduled research. EONC movement from the CHB to the munitions demilitarization building (MDB) **will** continue **on a daily basis**.

When the truck enters the BGCAPP perimeter, it will move to an off-loading area at the CHB. A bridge crane or similar device will be used to unload the EONC. All containers present in the CHB will contain the same agent because the facility will process only

[1] Attachment 12 provides a list of specific regulatory waivers BGCAPP is requesting, along with justification for each request.

one lethal chemical agent at a time. In accordance with the Kentucky Hazardous Waste regulation 401 KAR 34:180 Section 5, the vapor space of the EONCs containing waste that remain in the CHB for more than 1 week will be monitored using an agent monitor port in the EONC on a weekly basis for agent vapor in lieu of visual inspections of the hazardous waste containers (munitions).

Wastes generated during the RD&D program and construction will be placed in containers whose materials of construction is compatible with the contents. The selection will be made on a case-by-case basis consistent with generator knowledge of the stream. In cases of uncertainty, the stream's pH or other relevant parameters will be evaluated and the container material selected on the basis of this analysis. All waste containers will always be kept closed during storage except when adding or removing waste.

All containers will be handled in a manner to avoid rupturing or leaking. All handling will be performed with drum dollies, forklifts, overhead cranes, or other means, as appropriate. One of the goals of the process integration RD&D will be to evaluate the safety and suitability of the handling procedures.

Development of container management will continue throughout systemization and the RD&D program.

4. *Hazardous Waste Container Storage Areas*

Several areas within BGCAPP will have permitted container storage areas. These areas will be designed, constructed and managed in accordance with all applicable standards of 401 KAR 38:005, 401 KAR 34:180, and 401 KAR 38:150. Table 5-1 summarizes the areas within BGCAPP to be permitted for container storage; more detailed descriptions follow.

a. *CHB*

The CHB is a steel-frame building with insulated metal roofing and insulated siding panels. The building will have an integrated material handling system to facilitate the movement of the EONCs.

The EONC storage area is sized to store 36 EONCs.

Munitions and the ton container will be stored in the UPA in the MDB. Permitted storage will be limited to the storage of containers inside of EONCs or on secondary containment pallets. The EONC meets secondary containment requirements of 401 KAR 34:180 Section 6 for the munitions contained within.

The floor of the CHB is constructed of reinforced concrete. The CHB-MDB transition structure is metal siding with a reinforced concrete floor. The number of construction and expansion joints will be kept to a minimum. All joints between floors and walls will be covered and sealed.

b. *MDB*

The MDB is the primary step in the chemical weapon destruction process.

Table 5-1—Container Management Regulatory Standards

Container Storage Areas	Container Management Regulatory Standards
Container Handling Building (CHB)	401 KAR 34:180 (Use and Management of Containers)
Areas within Munitions Demilitarization Building (MDB)	
Unpack Area (UPA)	401 KAR 34:180 (Use and Management of Containers)
Explosive Containment Vestibule (ECV)	401 KAR 34:180 (Use and Management of Containers)
Explosive Containment Room (ECR)	401 KAR 34:180 (Use and Management of Containers)
Toxic Maintenance Area (TMA)	401 KAR 34:180 (Use and Management of Containers)
Dunnage Storage Area	401 KAR 34:180 (Use and Management of Containers)
Residue Handling Area	401 KAR 34:180 (Use and Management of Containers)
Spent Decon Storage	401 KAR 34:180 (Use and Management of Containers)
Residue Handling Area	401 KAR 34:180 (Use and Management of Containers)
Laboratory Waste Handling Area	401 KAR 34:180 (Use and Management of Containers)

c. *Unpack Area (UPA)*

Containers and munitions will be brought from the CHB into the MDB via the UPA. The UPA is the transition area between the CHB and the hazardous waste processing in the MDB. Permitted storage will be limited to the storage of containers inside of EONCs or on secondary containment pallets. The EONC meets secondary containment requirements of 401 KAR 34:180 Section 6 for the munitions contained within. This area will also provide a means to monitor the EONCs for leakers, provides an unpack station, and provides a means to return empty EONCs to the CHB for temporary storage. The floor of the UPA is constructed of reinforced concrete. The number of construction and expansion joints will be kept to a minimum. All joints between floors and walls will be covered and sealed.

d. *Explosive Containment Vestibule (ECV)*

Munitions will be stored on the conveyors in this room and the munitions will also be stored on the reject systems located in this room. In addition, leaking or reject projectiles that have been placed in overpacks may be stored on the floor in this room. Storage of projectiles or rockets, in or out of EONCs, will not exceed the maximum number allowable determined by the net explosive weight. Secondary containment will be provided by a coated, reinforced concrete floor, sumps, and perimeter curbs/walls. The number of construction and expansion joints has been kept to a minimum in this area and the floor, sumps, and curbs have been coated.

e. *Explosive Containment Room (ECR)*

Munitions containing explosives (projectiles with bursters and rockets) are processed in ECRs. The number of projectiles in an explosive contaminant room at any time is limited by the explosive force contained in the aggregate projectiles as determined by the net explosive weight. Munitions will be stored on the conveyors in this room and the munitions will also be stored on the reject systems located in this room. In addition, leaking projectiles that have been placed in overpacks may be stored on the floor in this room. Secondary containment will be provided by a coated and reinforced concrete floor, sumps, and perimeter curbs/walls. The number of construction and expansion joints will be kept to a minimum in this area and the floor, sumps, and curbs have been coated.

f. *Toxic Maintenance Area (TMA)*

The TMA is located within the MDB and a portion of the Category A section of the TMA is designated as the TMA container storage area. This TMA container storage area is sized to store one hundred 55-gallon drums. The TMA airlock/decon area is sized to store one EONC. Secondary containment will be provided by a coated and reinforced concrete floor, sumps, and perimeter curbs/walls. The number of construction and expansion joints has been kept to a minimum in these areas and the floor, sumps, and curbs have been coated.

g. *Residue Handling Area (RHA)*

BGCAPP process residues consist of metal parts associated with the munitions from the metal parts treaters (MPTs), the treated waste solids from the heated discharge conveyors (HDCs), and various solids associated with the dunnage shredding and handling (DSH) system. Salts from the water recovery system may also be stored here.

h. *Dunnage Shredding and Handling (DSH) Area*

Dunnage scheduled to be processed through the DSH will be stored in the DSH container storage area. Typical containers include 55-gallon drums, rolloff boxes, and plastic bags used to hold contaminated personnel protective equipment (PPE) prior to treatment.

5. Hazardous Waste Tank Storage Areas

Several tank systems within BGCAPP will be permitted for storage of hazardous wastes. These areas are located outside, within the MDB, within the SCWO processing building (SPB), and at the laboratory building (LAB). These tank systems will be designed, constructed, and operated in accordance with all applicable standards of 401 KAR 38:005, 401 KAR 34:190 and 401 KAR 38:160. Table 5-2 shows areas within BGCAPP to be permitted for storage of hazardous wastes in tanks.

6. Hazardous Waste Treatment Units

Numerous hazardous waste treatment units will be used to destroy the chemical weapons stockpile at BGCAPP. All the units will be installed during the RD&D program, although the PMD machine will only be used to process the mustard 155-mm projectiles which are not the subject of this RD&D Permit Application. Each hazardous waste treatment unit will be designed, constructed, and operated in accordance with the applicable standards from 401 KAR Chapter 34 (Standards for Owners and Operators of Hazardous Waste Storage, Treatment and Disposal Facilities). Table 5-3 describes the hazardous waste treatment units as well as the applicable sections of Chapter 34.

Table 5-2—Tank Systems Regulatory Standards

Tank Storage	Tank System Regulatory Standard
Tank Systems within MDB	
Agent Collection/Toxic Storage	401 KAR 34:190 (Tanks)
Spent Decon Storage	401 KAR 34:190 (Tanks)
Hydrolysate Sampling Tank	401 KAR 34:190 (Tanks)
Brine Storage Tank	401 KAR 34:190 (Tanks)
Recovered Water Storage	401 KAR 34:190 (Tanks)
Process Water Storage	401 KAR 34:190 (Tanks)
Hydrolysate Storage Tanks	401 KAR 34:190 (Tanks)
Laboratory Chemical Waste	401 KAR 34:190 (Tanks)

Table 5-3—Treatment Unit Regulatory Standards

Hazardous Waste Treatment Unit	Applicable Standard
Munitions demilitarization building (MDB)	
Rocket shear machine (RSM) system	401 KAR 34:250 (Miscellaneous Units - Mechanical); applicable portions of 401 KAR 34:190 (Tanks)
Projectile/mortar disassembly (PMD) system	401 KAR 34:250 (Miscellaneous Units - Mechanical); applicable portions of 401 KAR 34:190 (Tanks)
Energetics batch hydrolyzer (EBH)	401 KAR 34:190 (Tanks)
Heated discharge conveyor (HDC)	401 KAR 34:250 (Miscellaneous Units - Thermal); applicable portions of 401 KAR 34:240 (Incinerators)
Energetics neutralization system	401 KAR 34:190 (Tanks)
Aluminum removal system	401 KAR 34:250 (Miscellaneous Units - Other); applicable portions of 401 KAR 34:190 (Tanks)
Munition washout system (MWS)	401 KAR 34:250 (Miscellaneous Units - Mechanical); applicable portions of 401 KAR 34:190 (Tanks)
Metal parts treater (MPT)	401 KAR 34:250 (Miscellaneous Units - Thermal); applicable portions of 401 KAR 34:190 (Tanks) & 401 KAR 34:240 (Incinerators)
Nose closure removal system (NCRS)	401 KAR 34:250 (Miscellaneous Units - Mechanical)
Agent neutralization system	401 KAR 34:250 (Miscellaneous Units - Other); applicable portions of 401 KAR 34:190 (Tanks)
Wood shredder	401 KAR 34:250 (Miscellaneous Units - Mechanical)
Micronizer	401 KAR 34:250 (Miscellaneous Units - Mechanical)

Table 5-3 (Contd)

Hazardous Waste Treatment Unit	Applicable Standard
Plastic shredder	401 KAR 34:250 (Miscellaneous Units - Mechanical)
Plastic mill	401 KAR 34:250 (Miscellaneous Units - Mechanical)
Carbon grinder	401 KAR 34:250 (Miscellaneous Units - Mechanical)
Hydropulper	401 KAR 34:250 (Miscellaneous Units - Mechanical)
SCWO processing building (SPB)	
Supercritical water oxidizer	401 KAR 34:250 (Miscellaneous Units - Other); applicable portions of 401 KAR 34:190 (Tanks)
Brine concentrator	401 KAR 34:250 (Miscellaneous Units - Other); applicable portions of 401 KAR 34:190 (Tanks)
Evaporator/crystallizer	401 KAR 34:250 (Miscellaneous Units - Thermal); applicable portions of 401 KAR 34:190 (Tanks) & 401 KAR 34:240 (Incinerators)
Reverse osmosis unit	401 KAR 34:250 (Miscellaneous Units - Other); applicable portions of 401 KAR 34:190 (Tanks)

See Attachment 4, DEP 7094D(5/92) for the process description of these treatment units. Materials of construction and dimensions of miscellaneous treatment units will be provided to KDEP in sufficient time before the start of construction of the miscellaneous treatment units to allow full evaluation of their adequacy.

401 KAR 38:230 Section 1 (4): Effectiveness of Treatment

See Attachment 4, Section 4.1, for a discussion of the National Research Council (NRC) Reports, which evaluated the various technologies and identified neutralization by hydrolysis to be an effective and safe method for treating the chemical agent and the energetics that are stored at BGAD. The NRC reports are prepared by committees selected for their experience and knowledge of the subject matter being evaluated. The reports are very heavily peer-reviewed prior to publication. All reports identified in Attachment 4, Table 4-1 (as well as numerous other reports), have identified neutralization followed by supercritical water oxidation (SCWO) as the appropriate treatment technology for BGCAPP.

In addition:

1. Mustard agent is being successfully treated by hot water hydrolysis (the process that will be used at BGCAPP) at the Aberdeen Chemical Agent Disposal Facility (ABCDF). ABCDF operation is scheduled to be concluded before the start of the BGCAPP RD&D program.

2. VX will be treated at the Newport Chemical Agent Disposal Facility (NECDF), which is scheduled to be on-line and have completed operation before the start of the BGCAPP RD&D program.

3. Mustard agent and energetics are scheduled to be treated at the Pueblo Chemical Agent Destruction Pilot Plant (PCAPP). The PCAPP is scheduled to start its research program to assess process integration for the mix of munitions that are stored the Pueblo Chemical Depot before the start of the BGCAPP RD&D program

401 KAR 38:230 Section 1 (5): Air Emissions, Additional Information

All sources of agent emissions are contained in the MDB and pass through the MDB HVAC filter system, which is described in Attachment 6, Section 6.1.3. As indicated, the MDB HVAC filter system is the same one that is used or planned at all of the chemical demilitarization facilities. It has performed satisfactorily at all active facilities.

401 KAR 34:190 and 401 KAR 38:160: Tank Systems

This section presents additional information on the tank systems. Part A of this application lists the tanks and their aggregate volumes. All tanks are maintained at essentially ambient pressure and temperature. All agent and agent-contaminated storage tanks are kept inside the MDB and are vented to the MDB HVAC filter system.

401 KAR 34:190 Section 3(1): Assessment of New Tank System's Integrity

The assessment of adequacy of the design will be submitted to KDEP before the start of construction of the tanks for their review. No underground storage tanks will be used for hazardous wastes. All tanks storing hazardous waste at the BGCAPP are located above ground.

401 KAR 34:190 Section 3: Description of Tank System Installation and Testing Plans and Procedures

An independent, qualified installation inspector or an independent, qualified registered professional engineer will inspect each new tank system prior to placing a new tank system in service. Inspection will include evaluation of the following items:

1. Welds to ensure the absence of breaks
2. Integrity to ensure the absence of punctures and cracks
3. Integrity of the protective coatings to ensure that it has not been scraped through or otherwise removed in locations
4. Lack of corrosion
5. Other structural damage or inadequate construction/installation.

All discrepancies will be repaired by appropriate methods. The tank will not be placed into service until it has passed all appropriate inspections.

All tanks and ancillary equipment will be tested for tightness to liquid and vapor as appropriate before being placed in use. All discrepancies will be repaired by appropriate methods. The tank will not be placed into service until it has passed all appropriate inspections.

Ancillary equipment will be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.

401 KAR 38:160 Section 2: Dimensions and Capacity of Each Tank

The capacity and number of tanks is specified in the Part A permit application. The tank dimensions will be submitted to KDEP as part of the Tank Assessment Report prior to the start of tank construction.

1. *Description of Feed Systems, Safety Cutoff, Bypass Systems, and Pressure Controls*
   This information will be provided to KDEP in sufficient time before the start of construction to allow full evaluation of their adequacy.

2. *Diagram of Piping, Instrumentation, and Process Flow*
   The P&IDs will be provided to KDEP in sufficient time before the start of construction to allow full evaluation of their adequacy.

401 KAR 34:190 Section 4: Containment and Detection of Releases

1. *Plans and Description of Design, Construction, and Operation of Secondary Containment System*
   This information will be provided in sufficient time to KDEP before the start of construction to allow full evaluation of their adequacy.

401 KAR 34:190 Section 4(4)&(5): Requirements for External Liner, Vault, Double-Walled Tank or Equivalent Device

1. *External liner system.*
   The external liner (secondary containment) system will be sized to contain as a minimum 100 percent of the capacity of the largest tank within its boundary. The containment will also be sufficient size to contain precipitation from a 25-year, 24-hour rainfall (5.3 in). The containment will be

   a. Free of cracks or gaps

   b. System surrounds the tank completely and covers all surrounding soil likely to come in contact with the wastes if they were released from the tank(s)

   The calculations will be provided in the Tank Assessment Report to KDEP in sufficient time before the start of construction to allow full evaluation of the containment's adequacy.

2. *Vault system.*
   Vaults are not used in the BGCAPP.

3. *Double-walled tank.*
   Double-walled tanks are not used in the BGCAPP.

401 KAR 34:190 Section 4(6): Secondary Containment and Leak Detection Requirements for Ancillary Equipment

All piping and fittings are either above ground and will be visually inspected for leaks daily or will be equipped with leak detection. All piping and fittings containing agent or agent-contaminated liquids are located in the MDB, which is subject to engineering control of liquids and monitored for agent vapor.

401 KAR 34:190 Sections 5 and 6: Controls and Practices to Prevent Spills and Overflows

This information will be provided to KDEP in sufficient time before the start of construction to allow full evaluation of the system's adequacy.

Attachment 6 Contents

Figures

Tables

Attachment 6 Facility Construction and Operation

This attachment describes the facility and how it is to be built. The equipment and its operation are described in Attachment 4. Section 6.1 describes the buildings and structures and the plant subsystems that constitute the complete facility. Section 6.2 describes the subsystems (e.g., the air pollution control systems) that capture contaminants that might be released from the processing equipment and from activities within the buildings. Comparatively few of the buildings, structures, and systems store or treat hazardous waste, and only those so identified are subject to regulation under this research, development, and demonstration (RD&D) permit. Sections 6.3 through 6.4 describe the construction required to build the facilities that will be used for the RD&D program. Section 6.5 describes the RD&D program itself.

6.1 Facility Description

Most of the buildings that constitute the Blue Grass Chemical Agent-Destruction Pilot Plant (BGCAPP) are support structures that do not handle or contain hazardous wastes and are not subject to regulation by the Kentucky Department for Environmental Protection (KDEP). The buildings that do store and/or treat hazardous waste are designed to provide maximum protection to human health and the environment. Figure 6-1[1] shows the BGCAPP building layout.

6.1.1 Building and Structure Definitions

6.1.1.1 Pre-engineered Metal Building

A metal building consisting of prefabricated steel columns and trusses will be erected at the site. This building is covered with composite sheet metal siding (insulation sandwiched between inner and outer sheet metal) and is prepainted to color and coating requirements. No architectural finishes, process, utility systems, or equipment are preinstalled.

6.1.1.2 Modular Buildings

These metal- and wood-framed buildings are of various lengths and widths that can be connected together on site. They are fabricated of sheet metal or aluminum siding for the exterior, and metal or wood studs with either gypsum board or paneling on the interior. To the maximum extent possible, all architectural finishes, process and utility systems, and some equipment will be preinstalled.

6.1.1.3 Field Fabrication

Various construction materials and pre-engineered bulk commodities are used to the maximum extent possible; however, some field fabrication is required. All architectural finishes, process, utility systems, and equipment are erected in place.

6.1.2 Buildings and Structures Potentially Subject to KHW Regulation

6.1.2.1 Container Handling Building (CHB)

1. **Description:** Permitted **CHB** used to store munitions received from storage igloos.
2. **Method of Construction:** Pre-engineered metal building.

[1] Figures and tables are presented at the end of this attachment.

3. **Major Equipment:**

   Enhanced onsite containers (EONCs)

6.1.2.2 Munitions Demilitarization Building (MDB)

1. **Description:** Pre-engineered building shell with an inner, **field-fabricated** reinforced concrete building that contains explosive containment rooms (ECRs).
2. **Method of Construction: Field Fabrication**
3. **Major Equipment:**
   a. Rocket shear machine (RSM)
   b. Metal parts treater (MPT)
   c. Energetics batch hydrolyzer (EBH)
   d. Heated discharge conveyors (HDCs)
   e. Agent neutralization system (ANS)
   f. Energetics neutralization system (ENS)
   g. Dunnage shredding and handling system (DSH)
   h. Projectile mortar disassembly machine (PMD)
   i. Munition washout system (MWS)
   j. Offgas treatment units
   k. Material handling systems and components
   l. Blast gates and doors
   m. Agent monitoring system

6.1.2.3 SCWO Processing Building (SPB)

1. **Description:** Pre-engineered building. SCWO chemical storage tanks.
2. **Method of Construction:** Pre-engineered metal building.
3. **Major Equipment:**
   a. SCWO units
   b. Water recovery system
   c. Chemical storage tanks
   d. Recycled water storage

6.1.2.4 Hydrolysate Storage Tanks and Tank Area

1. **Description:** Large carbon steel tanks and liquid transfer equipment for the agent and energetics hydrolysate from the MDB. Serves as buffer storage for processing hydrolysate feeds to the SCWO building.
2. **Method of Construction: Field Fabrication**
3. **Major Equipment:**
   a. Agent and energetic hydrolysate storage tanks
   b. Transfer pumps and ancillary piping systems

6.1.3 MDB Cascade HVAC System Description

The heating, ventilation, and air conditioning (HVAC) system of the MDB is one of the most important systems at the BGCAPP. Proper operation of the HVAC system is required to maintain the negative pressure within the MDB while providing heating and air conditioning for toxic and nontoxic areas.

The cascade HVAC system serves a fourfold purpose:

1. Maintain a negative pressure environment in the MDB.
2. Maintain the flow of air from areas of low contamination probability to areas of higher contamination probability.
3. Remove agent from the air prior to discharge to the atmosphere.
4. Provide for human comfort.

The primary means of preventing the release or spread of contamination is through the use of cascaded pressure control. The control room is maintained at a positive atmospheric pressure. Toxic areas are maintained at a negative atmospheric pressure. This arrangement ensures a flow of air from the areas with the least agent contamination to the areas with the most contamination in the MDB and ensures containment within the MDB.

The amount of air changed in each room is higher for areas likely to be contaminated. This minimizes the spread of contamination and maintains the toxic boundaries. Air flow is controlled by modulating the supply air into the building, by modulating the exhaust flow of air out of the building, and by setting weighted dampers throughout the building.

Each room in the MDB has a designated category rating of A, B, C, D, or E based on the potential for agent contamination:

Room Category	Description
A	Routinely contaminated by either agent liquid or vapor
B	High probability of agent vapor contamination resulting from routine operations
C	Low probability of agent vapor contamination
D	Very low probability of ever being contaminated by agent
E	Maintained at positive atmospheric pressure at all times to prevent contamination by agent

Only rooms with Category A, B, or C ratings are maintained under a continuous negative pressure by the HVAC system.

All process components that involve agent or agent-contaminated materials are contained in the MDB, which is vented into HVAC filters and processes all air drawn by the HVAC system. It is described here to support the assertion that the RD&D will be performed in a manner that is protective of human health and the environment.

The HVAC system controls any contaminants that might be released from the process whether as a point source or as a fugitive emission. Each filter unit consists of the following stages:

1. A row of prefilters, which remove the larger particulate matter
2. A row of high-efficiency particulate air (HEPA) filters, which remove very fine particulate matter
3. Six rows of carbon filters, which remove agent and other gaseous contaminants such as organic vapors
4. A final row of HEPA filters, which capture any particulate that may be released from the carbon filters

Figure 6-2 shows the typical configuration of a HVAC filter unit. **PFDs 24915-08-M5-HVAC-00001 and -00002 in Appendix C show the process flow of the HVAC Filter**

6.1.4 Buildings and Structures not Potentially Subject to KHW Regulation

6.1.4.1 Access Control Building (ACB)

The ACB is a freestanding building that will be located at the entrance of the Blue Grass Army Depot (BGAD) and will be used to control access to the BGAD.

1. **Description**: Facility size and shape will depend on outcome of security requirement talks with BGAD and recent code changes for installations.
2. **Method of Construction**: Modular or **field fabricated** (decision pending).
3. **Major Equipment**: Standby diesel generator (SDG).

6.1.4.2 Administrative Support Facility (ASF)

1. **Description**: Houses office personnel.
2. **Method of Construction**: Prefabricated modular building.
3. **Major Equipment:** None.

6.1.4.3 Control and Support Building (CSB) and Integrated Control System (ICS)

1. **Description:** Control room and ICS used to operate BGCAPP, some storage and change facility, hydraulic power units and breathing air auxiliary systems, and demilitarization protective ensemble (DPE) storage. The ICS includes all of the programming, graphics, wiring, and devices located throughout BGCAPP for the facility control system (FCS) and facility protection system (FPS).

2. **Method of Construction:** Pre-engineered metal building included as part of the MDB separated by an accessway.

3. **Major Equipment:** Control room, consoles, cabinets, hydraulic units.

6.1.4.4 Entry Control Facility (ECF)

1. **Description:** Provides access to the new BGCAPP chemical limited area (CLA).

2. **Method of Construction:** Modular.

3. **Major Equipment:** None.

6.1.4.5 Gas Mask Storage Building (GMB)

1. **Description:** Modular building with no major systems or equipment. Its only requirement is to store gas masks within their storage requirements. Lighting and lockers are the only other known requirements.

2. **Method of Construction:** Modular building.

3. **Major Equipment:** None.

6.1.4.6 Laboratory (LAB)

1. **Description:** Modular building used to house shift lab personnel and to conduct procedures to support the neutralization operations and documentation requirements.

2. **Method of Construction:** Modular building.

3. **Major Equipment:** Laboratory instrumentation.

6.1.4.7 LAB Filter Area (LFA)

1. **Description:** Activated carbon filters to control emissions from laboratory hoods.

2. **Method of Construction: Field Fabricated**

3. **Major Equipment:** HVAC filter system.

6.1.4.8 Maintenance Building (MB)

1. **Description:** Pre-engineered building with utility system. It is expected to house a shop area, tool crib, and a supply of operational material and spares. The maintenance shop has areas for welding, small metal fabrication, conduit bending, tool storage, and maintenance consumables and flammable material storage.

2. **Method of Construction:** Pre-engineered metal building.

3. **Major Equipment:** None.

6.1.4.9 Process and Maintenance Building (PMB)

1. **Description:** Baseline facility expected to be a pre-engineered building with only utility systems being supplied. It will house the medical facilities personnel and equipment required to support operations. It will also house Treaty inspectors.

2. **Method of Construction:** Pre-engineered metal building.
3. **Major Equipment:** None.

6.1.4.10 Personnel Support Building (PSB)

1. **Description:** Modular building with utility systems being supplied. Its primary purpose is to house operation, maintenance, and engineering employees that support the daily activities of the plant.
2. **Method of Construction:** Modular building.
3. **Major Equipment:** None.

6.1.4.11 Standby Diesel Generators (SDGs)[2]

1. **Description:** Diesel-fueled electrical power generators.
2. **Method of Construction:** Modular.
3. **Major Equipment:** SDGs.

6.1.4.12 Substation (SUB)

1. **Description:** An outdoor electrical switchyard constructed on the installation will furnish power to the site.
2. **Method of Construction:** Modular.
3. **Major Equipment:** Switchgear and transformers.

6.1.4.13 Utility Building (UB)

1. **Description:** Pre-engineered steel framed structure with composite siding and a roof deck over slab on grade. Houses plant utility systems and local control panels.
2. **Method of Construction:** Pre-engineered metal building.
3. **Major Equipment:**
   a. Package boilers and related auxiliary systems.
   b. Compressors.
   c. Chillers.
   d. Motor control centers (MCCs).

6.1.4.14 Bulk Chemical Storage (BCS)

The BCS will provide storage for the following chemicals:

1. Sulfuric acid (H_2SO_4)
2. Sodium hypochlorite (NaOCl)

[2] Subject to regulation as possible air pollution control source.

3. Sodium hydroxide (NaOH)
4. Phosphoric acid (H_3PO_4)
5. Isopropyl alcohol (C_3H_8O)

6.1.4.15 Temporary Construction Facilities

During construction, the following temporary facilities will be provided to effectively manage and perform the construction of BGCAPP:

1. Field offices (trailers)
2. Warehouses – storage handling
3. Change houses
4. Fabrication shops
5. Welder's test shop
6. First aid trailer
7. Temporary toilet facilities

6.1.5 Plant Systems and Subsystems Not Potentially Subject to KHW Regulation

The following systems are an integral part of the plant, but they are not subject to regulation under the RD&D permit. They are included here only to provide a complete description of the construction of the facility.

1. Process water system
2. Cooling water system
3. Compressed air and nitrogen
   a. Instrument air system
   b. Plant air system
   c. Life support air system
   d. Nitrogen supply system
4. Fire protection systems:
   a. Unpack area (UPA) sprinkler system
   b. Dry chemical system
   c. ECR deluge fire system
5. Fire detection systems for the following buildings:
   a. MDB
   b. UB

    c. SPB
    d. CHB
    e. LAB
    f. PMB
    g. CSB
    h. PSB
    i. ECF

6. Site communication systems (site communication meets all requirements of 401 KAR 34:020)
    a. Site public address (PA) and paging system
    b. Closed circuit television (CCTV) system
    c. Site radio system
    d. Agent alarm lights
7. Process steam supply system
8. Site utilities (above- and underground)
9. Intrusion prevention system
    a. CCTV system
    b. Motion detectors

6.2 Construction Sequence

The key construction sequencing is listed below:

1. Access road, access control building, and access control parking lot
2. Water storage facility, pump house, and distribution system
3. Construction temporary power
4. Civil/structural sequence by facility and building area (bottom to top of the structures)
5. Placement of large equipment (i.e., PMDs and EBHs) before the areas become inaccessible (placement of elevated slabs) for direct rigging
6. Concurrent facility construction to spread resources
7. Enclosure of facilities as soon as practical to allow bulk installation of commodities (HVAC, piping, and electrical) while the process buildings are being constructed
8. Ceiling-down installation of bulk items

The general construction sequence by building is provided in the following subsections.

6.2.1 Site Preparation

Prior to the start of construction of the BGCAPP the site will be prepared by performing the following activities:

1. Install the outer perimeter security fence, which will include any silt control as specified by the Soil and Erosion Control Plan.
2. Clear and grub the site, and prepare the laydown areas surrounding the facility (including roads).
3. Bring the site to the proper grade and establish drainage.
4. Install the temporary construction roads, using the permanent plant road subgrade and base course, wherever possible.
5. Excavate and install the sediment retention basins, if required.
6. Install the storm drain system.

Dust control procedures will be implemented immediately upon site occupancy. Water trucks with water monitors will be used as necessary to control dust during construction. These trucks or similar equipment will also be used during site preparation for soil compaction activities.

6.2.2 Construction Sequence

The construction sequence is as follows:

1. Administrative support building
2. Utility building
3. MDB[3]
4. PSB
5. Substations and outside plant utilities
6. MB
7. Site utilities (underground)
8. SDGs
9. CSB
10. LAB
11. Site utilities (aboveground)
12. SPB[3]
13. PMB

[3] Hazardous waste management units. The RD&D Permit is required prior to the start of construction of the Hazardous Waste Management Units. The remainder of the items are listed for completeness only.

14. CHB[3]
15. Hydrolysate storage tank area[3]
16. MDB filter area
17. ECF
18. LAB filter area (LFA)
19. Process and facilities control systems
20. GMB
21. IDS

6.2.3 Environmental Compliance During Construction

The environmental safety and health (E&SH) construction safety plan will include specific details relating to compliance with federal, state, and BGAD environmental regulations. BGCAPP will comply with the requirements of the permits as applicable to the construction portion of the project. At a minimum, this portion of the E&SH plan will address the following issues:

1. Uncontaminated construction waste, including:
   a. Packing material
   b. Machinery components
   c. General household waste
   d. Landscape waste
   e. Construction or demolition debris
2. Hazardous waste, including:
   a. Waste lubricating oil, motor fuel, hydraulic oils, and cutting oils
   b. Cleaning solvents such as those used by pipefitters, millwrights, and electricians
   c. Paint wastes (water- or oil-based) such as rags, slops, sludge, paint solvents, paint and varnish removers and strippers, and paint cans containing paint residue
3. Use, storage, transportation, and disposal of hazardous materials and hazardous wastes will comply with BGAD, state, and federal requirements
4. Chemical handling requirements will comply with all federal, state, and BGAD requirements
5. Stormwater runoff control will comply with the terms of the project's Stormwater Management Plan

6.3 Independent Facilities Construction Certification

During construction, a Professional Engineer (P.E.) licensed in Kentucky will be present at the facility to verify that the hazardous waste management units are being built in accordance with the facility design. Before pilot testing with hazardous waste begins, a registered professional engineer (licensed in Kentucky) will perform facilities construction certification (FCC) of each KHW-regulated building, area, and system that is directly associated with the hazardous waste management unit. The P.E. will certify that each building and system has been constructed as designed and in accordance with the RD&D permit. The FCC process is required by 401 KAR 38:030 Section 1 (12) (b).

6.4 Systemization (not subject to KHW regulation)

The construction sequence described in Section 6.2 results in the individual subsystems being completed in a staged manner. As a subsystem is completed, it will be turned over to the Systemization Group who will test its mechanical ability, liquid and gas containment integrity, and numerous other functions. No chemical agent or any agent-contaminated materials will be processed during systemization. The systemization will be conducted using simulant and surrogate materials in all cases. Although the systemization phase of the program is not subject to KHW regulation, it does form the first part of the overall on-site RD&D program. Its RD&D objective is to assess the system's overall ability to function as an integrated unit and to identify problems in the interfaces between the subsystems.

6.5 Performance of the RD&D Program – Pilot Testing

After all of the subsystems have been **subjected** to rigorous testing under the Systemization program and the results of systemization have been deemed acceptable by Army, Assembled Chemical Weapons Alternatives (ACWA), and Bechtel Parsons Blue Grass (BPBG) engineers, the program will move into the second on-site phase of the RD&D program, termed "pilot testing." Pilot testing starts by processing the munitions at very slow rates, and a large amount of testing and verification takes place during the processing.

Pilot testing will begin with the processing of GB rockets and projectiles at the rates shown in Table 6-1. Treatment of the GB ton container (TC) is not shown in Table 6-1 because it is a one-of-a-kind item. **T**he contents of the GB TC will be sampled and characterized **in 2004**. If this characterization identifies a need for additional treatability studies, tests will be conducted to validate its hydrolysis. It is anticipated that testing with the GB inventory will meet the system integration objectives of the RD&D program. The bases for this conclusion are as follows:

1. All of the components of the BGCAPP, except the projectile mortar disassembly (PMD) machine, are tested during the RD&D program. The PMD to be used is a derivative of the PMD design that has been successfully used at the Johnston Atoll Chemical Agent Disposal System (JACADS) and the Tooele Chemical Agent Disposal Facility (TOCDF). The PMD machine may be installed during construction for ease of installation along with the other equipment, which will be needed for the RD&D program.

2. The Aberdeen Chemical Agent Disposal Facility (ABCDF) and the Newport Chemical Agent Disposal Facility (NECDF) will have completed operations on mustard and VX, respectively, by the time the BGCAPP operations phase starts; therefore, an RD&D program should not be required for these agents.

Table 6-1 shows that, during the RD&D program, munitions processing will begin slowly. As the system is validated and issues are identified and resolved, the processing rates will increase over a period of approximately 6 months. The 6-month period is based on an assumption that no major problems arise. But the program schedule is designed to allow sufficient time to identify and overcome problems. If problems arise during the RD&D period, the RD&D program may require the full 1-year period allowed by the RD&D regulations that is being requested in this permit application. The RD&D program will end when the BGCAPP is operating at its full daily throughput rate and it has been determined that sufficient data is available to allow full-scale treatment of the remainder of the BGAD inventory.

6.5.1 Purpose and Objectives of RD&D Program

The EPA RD&D Guidance (EPA *Guidance Manual for Research, Development, and Demonstration Permit Units Under 40 CFR Section 270-65*, EPA/530-SW-86-008, July 1986), Section 4-1, advises the applicant to consider eight questions, as applicable, as a basis for preparing the application. Table 6-2 lists the eight questions and cites the sections of the RD&D permit application where they are addressed.

The objectives of the RD&D program are listed in Attachment 4, Section 4.1. The following subsections present additional details, including the justification for conducting the RD&D with hazardous waste, the measurements and observations used to determine success, safety and environmental considerations, and the success criteria that will be used to evaluate the results at each ramp-up rate.

6.5.1.1 System Integration

Conduct a thorough program of system integration including the conveyance of munitions and munition segments from one part of the treatment train to the next up to and including the release of the munition parts from the MDB.

System integration has two components:

1. **Ability of the equipment to function as one unit with the actual wastes.**
2. **Maximizing the operators' proficiency under safe operating conditions.**

Optimizing the proficiency of the operators under carefully controlled and supervised conditions has traditionally not been considered as RD&D. However, such human factors research is essential to maximize safety and protect the environment; hence it has been made an important component of the RD&D process.

Before hazardous waste (agent) operations begin, the operators are thoroughly trained in their duties and responsibilities through coursework, simulations, and actual hands-on experience with simulated munitions. However, it must be recognized that handling and processing actual munitions can only be fully addressed by a slow and deliberate process in which the operators handle the munitions at initially very low rates and under the direct supervision of management and system engineers on the day shift. As the operators gain experience, the processing rates are increased in accordance with the ramp-up schedule in Table 6-1. Simulated equipment training hardware (SETH) munitions are constructed to have physical dimensions that are similar to the actual munitions, but they do not contain the chemical agent and energetics. Only operations conducted with actual munitions can provide the required operator experience and proficiency to verify that the process fully addresses human factors and, therefore, minimizes risk to human health and to the environment.

To take advantage of the increased management oversight available during the day shift, initial munition operations will occur on the day shift only. Night shift activities will concentrate on preventive and corrective maintenance activities, monitoring the EBH neutralization process and prestaging of munitions for the next day of operations. The step changes in processing rates are typically scheduled in 4-week intervals to ensure

that each of the four rotating operations shifts have an opportunity to process munitions on day shift. The step change in rate also factors in a logical progression to allow operator proficiency. The RD&D with agent munitions is required because of the differences experienced when processing actual munitions as compared to the simulated munitions used in systemization.

1. **Justification for Conducting with Hazardous Waste:** **To establish successful system integration, all BGCAPP subsystems must operate as an integrated facility. This requires that the processing include agent, agent hydrolysate, energetics, energetics hydrolysate, munition components, dunnage, and secondary waste. Appropriate development of this process integration requires the processing of real munitions that are unique to BGAD.**

2. **Measurements and Observations Required:** **Process integration is considered to be achieved when the process successfully operates at the peak munitions processing rate as described in Table 6-1. As discussed in Section 6.5.2, the EBHs are the rate-limiting units for the process. Process integration is the overarching objective: it describes the process' ability to achieve the necessary results when operating as a unit and when treating the actual hazardous wastes at the peak processing rate. The criteria that are required to assess and demonstrate the integrated process are discussed in Sections 6.5.1.2 through 6.5.1.7.**

3. **Safety and Environmental:** **Maximum safety and environmental protection is achieved by performing this verification at an initially very slow rate during weeks 1 through 4 and increasing the processing rate as information is gathered. This slow ramp-up ensures adequate time to properly evaluate the agent and energetic destruction results and to verify the operators' knowledge and performance to ensure safe operation. Plant operating rates are progressively increased at the nominal rates shown in Table 6-1.**

4. **Success Criteria:** **Process integration is considered to be successful at each ramp-up rate when all operators are assessed to be proficient at their functions, and all exit streams meet the safety and environmental requirements as discussed in the following subsections.**

6.5.1.2 Demonstrate 99.9999% Destruction Efficiency for GB

Demonstrate that 99.9999% destruction efficiency can be achieved for GB agent in the agent neutralization reactors (ANRs) as required by KRS 224.50-13 and 401 KAR 34:350.

1. **Justification for Conducting Operations with Hazardous Waste:** **Agent hydrolysis has been demonstrated to achieve the requisite 99.9999% destruction efficiency for GB in the previous testing conducted by the Program Manager, Assembled Chemical Weapons Assessment (PMACWA). Agent destruction at BGCAPP must be demonstrated using the BGCAPP equipment with the BGAD munitions as required by KRS 224.50-130(3)(a). This cannot be demonstrated without conducting tests with hazardous waste.**

2. **Measurements and Observations Required:** **Before GB is processed in the agent neutralization reactor (ANR), the GB drained from the munitions is stored in the ACS until a sufficient quantity of agent has been accumulated. The agent is transferred to an ANR, where it is hydrolyzed; the hydrolysate is analyzed for GB. The destruction efficiency is calculated using the equation presented in Attachment 10, Section 10.1. The number of ANS batches to be tested in this way**

is established as specified by the test plan, which will be submitted in accordance with the BGCAPP's compliance schedule.

3. **<u>Safety and Environmental:</u> The ANRs are batch reactors that contain the agent. The ANR's contents are not released from the MDB until the analytical results demonstrate that the target release level has been met. The ANR vents to the MDB OTS and then to the MDB HVAC filter system before release to the atmosphere. These multiple layers of protection provide a high degree of safety and protection of the environment. A slow start of operation (as specified in the test plan) maximizes personnel safety and protection of the environment by minimizing the amount of agent in process while the initial batch of agent is neutralized.**

4. **<u>Success Criteria:</u> The process meets the 99.9999% destruction efficiency as specified in Attachment 10, Section 10.1.**

6.5.1.3 Demonstrate EBH's Ability to Treat Rocket Energetics

Demonstrate that the rocket energetics can be treated in the EBHs and the energetics neutralization system (ENS).

1. **<u>Justification for Conducting with Hazardous Waste:</u> EBH performance has been demonstrated to achieve this objective using M61 rockets pieces with energetics during the technical risk reduction program (TRRP) for the EBH. The test also demonstrated that the hydrogen (H_2) levels could be maintained below 25% of the lower flammability limit (LFL). Although energetics neutralization has been demonstrated, it is necessary to verify and demonstrate these results with the BGCAPP equipment and BGAD munitions. This involves system integration and includes the transfer of the rocket segments from the RSM to the EBHs and the transfer of the treated rocket segments from the EBH to the HDC. This objective can only be validated by treating agent-contaminated energetic-components from the BGAD stockpile. This verification must be completed on all 16 installed EBHs.**

2. **<u>Measurements and Observations Required:</u> The hydrogen (H_2) gas concentration must be monitored in the EBHs' vent gases to ensure that H_2 gas concentration is below 25% of the LFL. The EBH and vent gas system will demonstrate their ability to handle the increase in hydrogen generation at each processing rate in the ramp-up schedule.**

   Hydrolysate leaving each EBH batch goes to the ENRs for further treatment. The solids leaving the EBHs go to the HDC. No specific measurements are made on the EBH solid residue except for observing that the mechanical equipment is operating properly under agent munition operations. The energetics hydrolysate is sampled in the ENR to verify successful treatment.

3. **<u>Safety and Environmental:</u> Maximum safety and environmental protection is achieved by verifying the system performance at a slow rate during weeks 1 through 4 and progressively increasing the processing rate as the performance objectives are met. This slow ramp-up ensures adequate time to verify that the energetics are hydrolyzed and the agent concentration meets the required target release level to transfer the hydrolysate to the HSA. The rocket feed rate is increased in accordance with the nominal feed rates as shown in Table 6-1.**

4. **<u>Success Criteria:</u>**

a. **Hydrogen monitoring system works as designed at all rocket ramp-up processing rates on each EBH.**

b. **EBH solids transfer system to the HDC works as the rocket feed rates increase.**

c. **Hydrolysate in the ENR meets the required energetics destruction and the agent target release level.**

d. **OTS can handle the vent gas from the EBH trains at each of the ramp-up rates.**

6.5.1.4 Demonstrate MPT's Ability to Treat Projectiles

Demonstrate that the MPT can thermally treat all projectile bodies in a batch to a minimum of 1,000°F for a minimum of 15 minutes.

1. <u>Justification for Conducting with Hazardous Waste:</u> **TRRP testing with SETH munitions have demonstrated that the MPT can thermally treat a full tray of projectiles to a minimum of 1,000°F for a minimum of 15 minutes. Thermal treatment in the MPT must be demonstrated to verify the previous results with actual munitions from the BGAD stockpile.**

2. <u>Measurements and Observations Required:</u> **Temperature measurements are performed to confirm the temperature profile previously demonstrated during systemization. The first trays of material are monitored for agent in the discharge airlock to verify that the MPT time and temperature conditions meet or exceed the minimum requirements to process the GB 8-inch projectiles.**

3. <u>Safety and Environmental:</u> **Slow initial operating rates ensure that all material in the MPT achieves the appropriate temperature before it is removed from the MPT. The batch nature of the operation allows the time per batch or the power input to be increased to establish the operating conditions necessary to ensure proper decontamination of the metal. Environmental protection is maintained by discharging the MPT offgas through the MPT OTS and then through the MDB HVAC filter system.**

4. <u>Success Criteria:</u> **Verify by temperature measurements of the treated munition bodies that the projectile carcasses in the first trays of material have all been exposed to a minimum of 1,000°F for a minimum of 15 minutes. Further verify the absence of agent residue by testing the air in the discharge airlock for agent.**

6.5.1.5 Demonstrate HDC's Ability to Treat Rocket Segments

Demonstrate that the HDC can thermally treat the rocket segments to a minimum of 1,000°F for a minimum of 15 minutes.

1. <u>Justification for Conducting with Hazardous Waste:</u> **Performance of the HDC at the baseline facilities has previously demonstrated the thermal treatment of the rocket segments to a minimum of 1,000°F for a minimum of 15 minutes. This same performance must be demonstrated on munitions from the BGAD stockpile during the RD&D program.** After **the HDC performance has been verified at the initial ramp-up rates, the rocket segments will continue to be processed while RD&D continues on the other upstream treatment units and the conveyance systems are demonstrated as the feed rate is ramped up to the design level.**

2. **Measurements and Observations Required:** **The first HDC bin of rocket segments will be monitored for agent before they are released from the MDB for each ramp-up processing rate. This verifies that the HDC's time and temperature conditions are adequate to process the GB rocket segments.**

3. **Safety and Environmental:** **The slow ramp-up rates allows sufficient time to ensure that all rocket segments being processed in the HDC achieve a minimum of 1,000°F for a minimum of 15 minutes. Environmental protection is maintained by discharging the HDC offgas through the EBH/ENR OTS and then through the MDB HVAC filter system.**

4. **Success Criteria:** **Monitoring the initial HDC bin verifies that the bin can be processed out of the MDB.**

6.5.1.6 Demonstrate the Performance of the SCWO Reactor System

1. **Justification for Conducting with Hazardous Waste:** **Tests with the agent and energetic hydrolysates were performed under the PMACWA EDS test program. Testing under the RD&D program is required to demonstrate three different operating scenarios:**

   a. **Energetics hydrolysate**

   b. **Blended (agent and energetics) hydrolysate**

   c. **DSH slurry**

   All materials fed to the SCWO have previously been tested for agent and verified to be below the target release level. Processing the hydrolysate ensures that the SCWO effluent meets the expected performance criteria before the water is further treated in the WRS. Because the SCWO performance can be assessed early in the RD&D program, the hydrolysate can either be stored in the HSA or it can continue to be processed through the SCWO units while RD&D continues on the other upstream treatment units. The continued processing of hydrolysate through SCWO is an important aspect of maintaining the plant water balance by recycling water to the ANRs and the EBHs; therefore, it is the preferred alternative.

2. **Measurements and Observations Required:** **The operating parameters of the SCWO reactors are monitored to verify that the equipment is performing properly. The SCWO effluent is analyzed for total organic carbon (TOC). The vents from the pressure letdown systems are monitored for carbon monoxide (CO) and total hydrocarbons to establish the criteria that reflect the SCWO's performance.**

3. **Safety and Environmental:** **SCWO has been demonstrated to have extremely low emissions. According to all available data, the air emissions from the SCWO do not require further treatment prior to release to the environment.**

4. **Success Criteria:** **These tests are intended to verify the operating parameters such as temperature and pressure that will provide maximum organic constituent destruction and maximize the SCWO's reliability.**

6.5.1.7 Characterize and Quantify the Emissions from WRS

1. **Justification for Conducting with Hazardous Waste:** **One aspect of process integration research is to verify the WRS operation with the BGAD-unique SCWO**

effluent. Tests with the actual SCWO effluent are required to verify the quality of the recycled water and to characterize the emissions from the WRS when its water production rate exceeds what can be recycled to the process; hence, the excess water is vented to the atmosphere. Water venting typically (but not exclusively) occurs when the BGCAPP is not processing munitions, and the SCWO continues processing the inventory energetic and agent hydrolysates. The water from the SCWO can either be stored or continued to be processed through the WRS while RD&D continues on the other upstream treatment units. The continued processing of water through the WRS is an important aspect of maintaining the plant water balance by recycling water to the ANRs and the EBHs; therefore, it is the preferred alternative.

2. **Measurements and Observations Required: The operating parameters for the WRS will be refined during the RD&D program. The quality of the WRS product water is analyzed for TOC and RCRA metals. Emissions are tested after an initial start-up period when the WRS is operated in its water-venting mode.**
3. **Safety and Environmental: According to all available data, the air emissions from the WRS do not require further treatment before release to the environment.**
4. **Success Criteria: These tests are intended to verify the operating parameters for the WRS that result in a suitable quality recycle water with a minimal release of contaminants to the environment during its water-venting mode.**

6.5.2 Quantities of Waste to be Treated

This section justifies the need for the proposed quantities of waste that are to be treated under this RD&D program. EPA *Guidance Manual for Research, Development, and Demonstration Permit Units under 40 CFR Section 270-65* (EPA/530-SW-86-008, July 1986), page 8, recommends the following limits on the amount of waste that is to be treated under an RD&D permit:

1. **Treat a maximum of 15,000 kg of hazardous waste per month for experimental purposes.**
2. **Store a maximum of 15,000 kg of hazardous waste intended for experimental purposes at any time.**
3. **Treat a maximum of 400 kg of hazardous waste per hour in any experiment.**

Table 6-1 presents the hourly, weekly, and monthly hazardous waste processing rates in the proposed RD&D program. These processing rates are nominal and will be increased only after the success criteria have been achieved as described in Section 6.5.1. The weekly and monthly rates in Table 6-1 are based on the nominal hourly processing rate and the projected hours of operation as determined by the throughput and availability analysis that was performed as part of the design of the system.

As Table 6-1 shows, the hourly hazardous waste processing rates do not exceed the recommended 400 kg/hr until weeks 25 through 28 of the RD&D program. These weeks constitute the preparation for the performance testing and the actual performance testing for the BGCAPP. Because these tests must be performed at the maximum operating rates, the requested rates will exceed the hourly test limits specified by the EPA's Guidance Manual for RD&D. The Guidance Manual recommends that no more than 15,000 kg of hazardous waste intended for experimental purposes be stored at any one time. The number of munitions to be stored at any one time for research will be less than

this value. Therefore, the research program does not exceed the storage limitation suggested by the Guidance Manual.

Table 6-1 also shows the monthly processing rates, which are calculated assuming 4 weeks of operation per month. These values exceed the 15,000 kg recommended by the EPA's Guidance Manual for RD&D. The justification for exceeding the recommended monthly quantity is based on two factors:

1. **The need to increase the processing rate to the maximum design rate by ramping up in small increments. Section 6.5.1 discusses the rationale for this requirement.**
2. **Each EBH can process 48 rocket warheads or motors in a batch. Therefore, a systematic approach to systemize all 16 EBHs in the BGCAPP requires that 16 x 48 = 768 rockets be treated.**

As Table 6-1 shows, over 20,000 kg of hazardous waste must be processed in order to generate enough energetics to test the performance of all EBHs for both rocket warheads and rocket motor segments. At this monthly processing rate, each EBH is only tested with one batch of propellant followed by one batch of warheads per month for the first 3 months. The subsequent months of RD&D will validate the process's integration at higher feed rates that require more complex operating scenarios.

As discussed in Section 6.5.1.1, to safely test the system's integration (including the human factors) at rates approaching the BGCAPP's full operating rate, the hazardous waste must be processed at rates exceeding the 15,000 kg per month.

The hazardous waste (i.e., munitions) processing rates on which Table 6-1 is based are maxima that are based on the assumption that the process integration RD&D will not identify any design issues that require correction. This is an improbable scenario: this RD&D program would not be necessary if it were otherwise. Hence, the most probable scenario will be a slower processing rate than requested.

Regardless of the actual waste processing rates, the RD&D program will not compromise health or the environment. This statement is based on the following design and operating characteristics of the BGCAPP:

1. **All agent-related processing is performed in the MDB, which is fully contained by the MDB HVAC filter system. This is a proven system that maintains protection even if an upset or operating anomaly occurs.**
2. **The MDB HVAC filter system is monitored for agent on a near-real-time basis.**
3. **Each batch of hydrolysate is tested and found to meet the target release levels for agent before it is transferred to the HSA.**
4. **The process' ability to achieve 99.9999% destruction efficiency for agent is demonstrated on the first batches of agent processed in the ANR. This initial validation satisfies the requirements of Attachment 10. The testing is performed in accordance with the procedures described in the Test Plan.**

In conclusion, the requested processing rates do not pose a risk to health or to the environment, and they are essential to meet the process integration needs of the RD&D program.

6.5.3 Testing Schedule and Criteria for Increasing Processing Rates

Section 6.5.2 explains the reasons for the processing rates proposed for the RD&D program. The explanation is based on the need to demonstrate process integration through research, which is discussed in Section 6.5.1.

The increase in projectile and rocket processing rates will be decided on the basis of all of the applicable success criteria identified in Sections 6.5.1. If all processes are working as designed, all batches of agent and energetics hydrolysate meet their respective target release levels, and all success criteria identified in Section 6.5.1 are satisfied at the given rate, then the munitions processing rate will be increased to the next higher rate.

This cautious approach, which recognizes human factors and provides safeguards at every step, maximizes safety and environmental protection and results in the safe and effective completion of the RD&D program on the chemical agent munitions.

6.6 Operation Subject to Regulation by KHW Part B Permit

During the design and construction phases of the BGCAPP program, the KHW Part B Permit Application will be prepared and submitted to KDEP and a Toxic Substances Control Act (TSCA) permit application will be submitted to U.S. EPA, Region 4. These submissions will be made in adequate time to allow both regulatory agencies to evaluate and approve the respective permits before the end of pilot testing.

As shown in Table 6-1, a performance test will be conducted at the conclusion of the RD&D program. This performance test will provide the final validation of the safety and environmental acceptability of the process. After completion of the performance test, operations will continue pending approval of the Part B Permit.

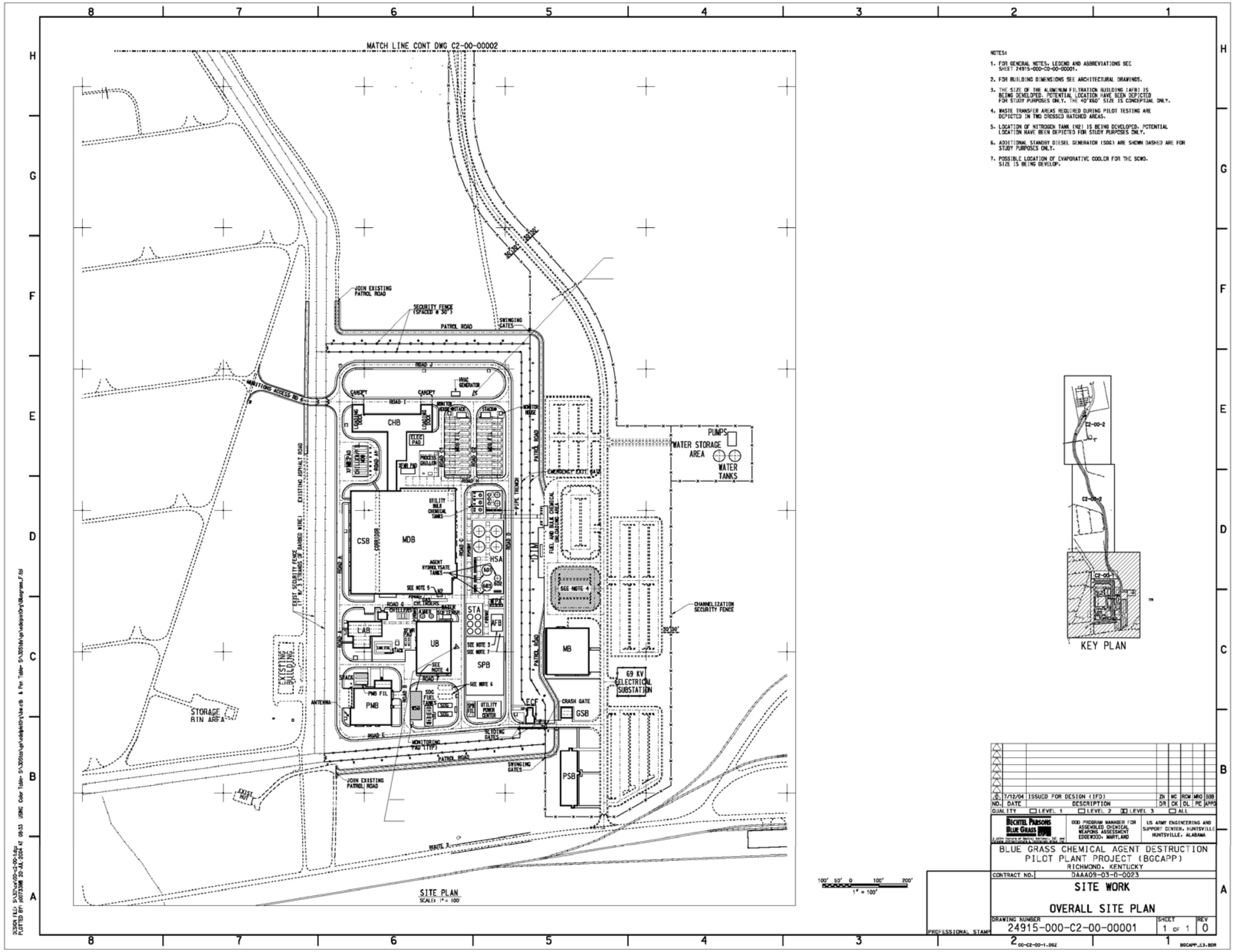


Figure 6-1—BGCAPP Building Layout

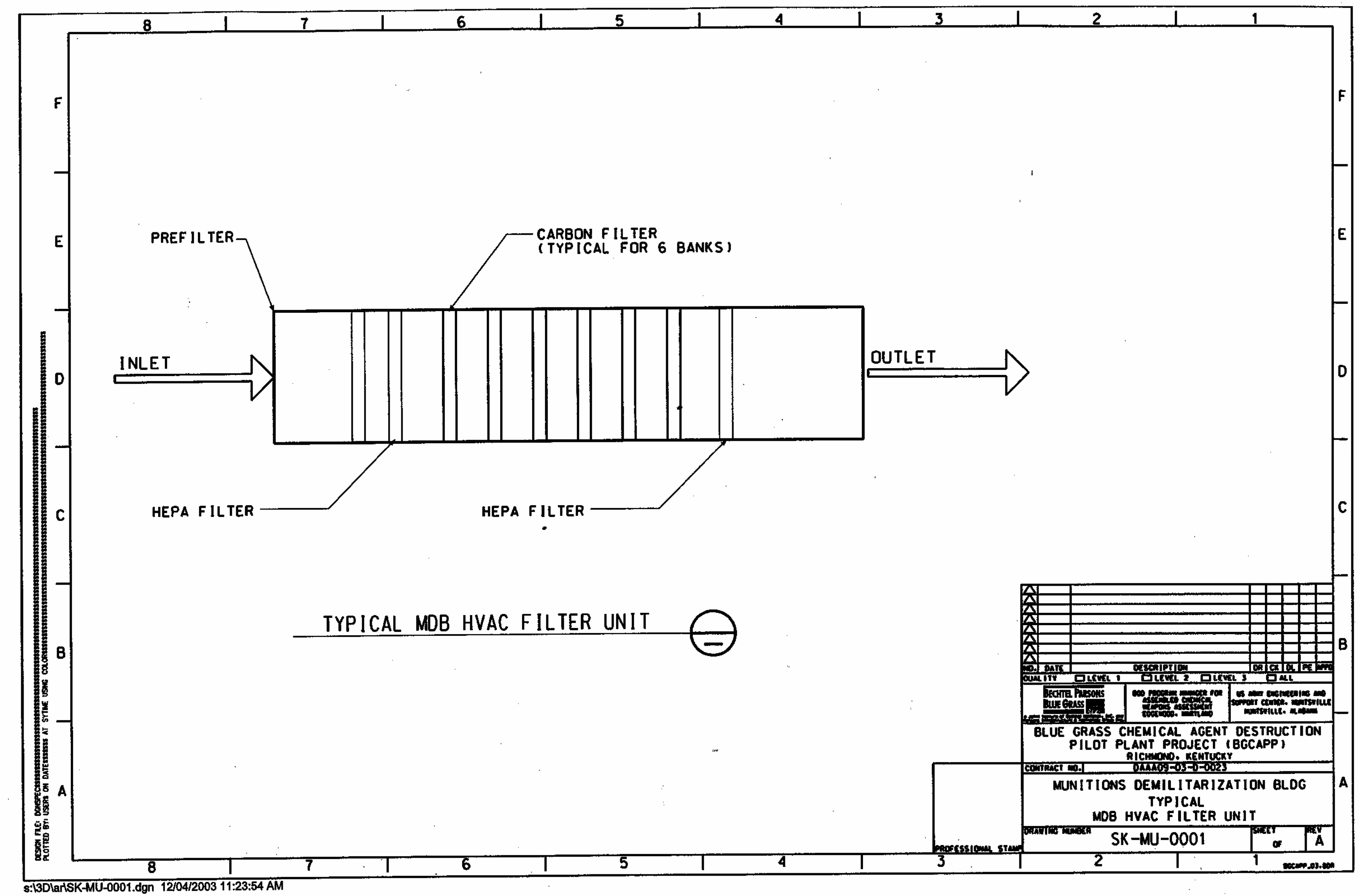


Figure 6-2—MDB HVAC Filter Unit

Table 6-1—BGCAPP Pilot Testing Nominal Feed Rate

Week of RD&D	Operation, hr/wk		Rounds per Hour		Rounds per Week		Rounds per Month		Hazardous Waste Processed, kg	
	Rockets	Projectiles	Rockets	Projectiles	Rockets	Projectiles	Rockets	Projectiles	Hourly	Monthly
1	48	48	4	6	192	288			100	
2	48	48	4	6	192	288			100	
3	48	48	4	6	192	288			100	
4	48	48	4	10	192	480	768	1344	126	17,376
5	48	48	4	10	192	480			126	
6	48	0	7	0	336	487			106	
7	48	0	7	0	336	0			106	
8	48	0	7	0	336	0	1,200	973	106	24,662
9	48	0	7	0	336	0			106	
10	48	0	7	0	336	0			106	
11	48	0	10	0	480	0			152	
12	50	0	10	0	500	0	1,652	0	152	25,110
13	56	0	10	0	560	0			152	
14	56	0	10	0	560	0			152	
15	56	0	10	0	560	0			152	
16	57	0	13	0	741	0	2,421	0	198	36,799
17	56	0	20	0	1,120	0			303	
18	56	0	20	0	1,120	0			303	
19	56	0	20	0	1,120	0			303	
20	56	0	20	0	1,120	0	4,480	0	303	68,096
21	56	0	20	0	1,120	0			303	
22	56	0	20	0	1,120	0			303	
23	63	0	20	0	1,260	0			303	
24	72	0	26	0	1,872	0	5,372	0	395	81,654
25	72	0	40	0	2,880	0			608	
26	72	0	40	0	2,880	0			608	
27-Test	78	78	40	15	3,120	970			707	
28-Test	78	78	40	15	3,120	1,170	12,000	2,140	707	196,524

1. The feed rates shown for the RD&D program are nominal. The actual processing rates will be driven by the results of the RD&D program. Actual processing rates will be established on the basis of ongoing and future RD&D activities.
2. Test refers to the performance test, which will fully demonstrate the process at full operating rate.

Table 6-2—Cross Sections to Select Items in Guidance Manual for RD&D Permit

Item #[a]	Item	Cross Reference
1	Purpose of Project	Attachment 4
2	Minimum Quantities of Hazardous Waste required to meet the RD&D Objectives	See Section 6.5.2
3	Anticipated Environmental Releases	Attachment 5.
4	Sampling and Analytical Procedures	To be provided as part of the Waste Analysis Plan, and the Performance Test Plan, which are Compliance Schedule item identified in Attachment 12.3.
5	Research Personnel Experience	Attachment 1, Key Personnel
6	Emergency Response Procedures	To be provided under the "Procedures to Prevent Hazard", which is a Compliance Schedule item identified in Attachment 12.3.
7	Facility Closure at Conclusion of the Research	Attachment 9.
8	Financial Responsibility for Closure	To be provided as part of the Detailed Closure Plan, which is a Compliance Schedule item identified in Attachment 12.3.

[a] The numbers correspond to the item numbers in the EPA's Guidance Manual for Research, Development, and Demonstration Permit.

Attachment 7 Contents

Attachment 7 Recordkeeping Procedures

In accordance with the requirements of 401 KAR 34:050 Section 4 and 401 KAR 34:290, BGCAPP will develop recordkeeping procedures to maintain the written operating record. An outline of some of these procedures is provided below for the various waste types.

7.1 Munition Waste Tracking

7.1.1 Munition Receipt in Container Handling Building (CHB)

Each pallet of munitions loaded into an enhanced onsite container (EONC) will be recorded onto an Army accountability form to document the required information to track the munitions from the storage igloo through the process.

When the EONC is received at the CHB, the paperwork will be checked by BGCAPP personnel for completeness before the EONC is accepted into CHB storage. The EONC will be stored in the CHB until it is transferred to the unpack area (UPA) for unloading.

7.1.2 Munition Receipt in Unpack Area (UPA)

After the EONC is received in the UPA, the UPA personnel will document the date the EONC is placed in storage in the UPA, and the EONC will be monitored with a near real-time monitor to determine whether the munitions are leaking. If agent is detected in the EONC, additional personnel protective equipment (PPE) will be required to unload the munitions in the UPA or the EONC will be transferred to the toxic maintenance area (TMA) to be unloaded in PPE.

The EONC will be opened in either the UPA or the TMA and the information on the accountability form will be verified before unloading. If there is a discrepancy in count, lot number or munition type, the EONC will be closed and the discrepancy will be resolved with the Blue Grass Chemical Activity (BGCA) before unloading.

After the count is verified, the munitions will be unloaded from the EONC. The following sections discuss the three processing trains.

7.1.2.1 Rocket Processing

The pallet of rockets will be placed on the table by the rocket indexing machine, where they will be loaded manually onto the rocket indexing machine by the UPA personnel. The control room operator (CRO) monitors the movement of the rockets into the ECR and into the punch-and-drain station. The CRO will then record the processing of each rocket through the rocket shear machine (RSM) on a log sheet.

7.1.2.2 Energetic Projectile Processing

The energetic projectiles will be loaded one at a time onto the conveyor that will move the projectile into the ECR for processing through the projectile/mortar disassembly machine (PMD). As with the rocket processing line, the CRO monitors PMD operation as the projectile is processed through the machine. The burster is conveyed to the warhead energetics batch hydrolyzer (WEBH) for treatment. The projectile will then be loaded on to a munition tray for processing through the munition washout system (MWS) as outlined in Section 7.1.2.3. The nose closures are placed in the tray and are then conveyed to the metal parts treater (MPT) for **thermal** treatment. The CRO will record the munition tray number on a log sheet to track the projectile processing through the MWS and MPT.

7.1.2.3 Nonenergetic Projectile Processing

Nonenergetic projectiles are loaded onto a munition tray in the UPA, and the UPA personnel record the tray number on a log sheet. The tray is loaded onto the bypass conveyor where the CRO will move the tray to the nose closure removal station (NCRS). The nose closures are conveyed to the MPT for **thermal** treatment. The projectile tray is then conveyed to the MWS. The projectile burster tube is pressed into the projectile cavity to remove the agent and wash out any solids in the projectile. The tray of projectiles is then processed through the MPT for **thermal** treatment.

7.2 Neutralization Process

Each batch of material that is processed through the WEBH, propellant energetics batch hydrolyzer (PEBH), energetics neutralization system (ENS), and agent neutralization system (ANS) will have a batch processing log sheet. The agent, energetics, and propellants that are processed through the neutralization systems will be sampled and analyzed before they are transferred into the hydrolysate storage tanks. The analytical results will be attached to the batch processing log sheet.

7.3 Hydrolysate Storage Tanks

As each batch of neutralized agent, energetics, and propellant is transferred into the hydrolysate storage tanks, the source and the amount of material being transferred will **be** recorded on a transfer log. As each batch is transferred to a supercritical water oxidation (SCWO) unit, the SCWO unit number and the amount transferred will be recorded on a log sheet.

7.4 SCWOs

Each batch of hydrolysate, processed through the SCWOs, will be recorded on a log sheet. The treated waste stream from the SCWO units will be transferred into the SCWO storage tanks and recorded on a log sheet.

7.5 SCWO Storage Tanks

As each batch of SCWO treated water is transferred into the SCWO storage tanks, the transfer will be recorded on the SCWO log sheet. As each batch is transferred to the water recovery system, the amount transferred will be recorded on a log sheet.

7.6 Water Recovery System

The water recovery system concentrates the salts that are present in the SCWO outlet water stream. The solid salts waste stream will be disposed of at a permitted hazardous waste treatment, storage, and disposal facility (TSDF). The treated water stream will be recycled to the process as makeup water or shipped off site to a permitted TSDF.

7.7 Metal Parts Treater (MPT)

A log sheet will be used to track all trays of projectiles that are processed through the MPT. Projectiles and nose closures will be loaded into a roll-off box for disposal at a permitted TSDF.

7.8 Heated Discharge Conveyor (HDC)

A log sheet will be used to track each HDC bin that contains solid residues from the processing of sheared rocket pieces. The waste in the HDC bins will be transferred into a roll-off box for disposal at a permitted TSDF.

7.9 Secondary Waste

Agent-contaminated secondary wastes (e.g., wood pallets, carbon, and PPE) will be tracked through the dunnage shredding and handling (DSH) system. The treatment steps associated with each type of waste will be recorded on a log sheet specifically designed for secondary wastes.

Agent-contaminated liquid waste streams generated in the BGCAPP (e.g., spent decontamination solution and spilled hydraulic fluid) will be processed through the neutralization system, SCWO, and the water recovery system before they are disposed of at a TSDF.

Attachment 8 Contents

Attachment 8 Procedures for Water Monitoring, Groundwater Monitoring, Soil Testing, and Waste Analysis

Before the start of the construction of BGCAPP, a background soil and water investigation will be completed to establish baseline information to be used during the closure phase of the project. This investigation may include surface water and groundwater sampling and analysis as well as soil sampling and analysis.

The wastes treated at BGCAPP will be processed in engineered vessels and facilities designed to contain the wastes and to prevent contamination of the soil and the groundwater. All wastewater generated in the facility is either recycled back into the process or shipped to a permitted treatment, storage, and disposal facility (TSDF). As a result, surface water or groundwater monitoring or soil testing is not needed during the research, development, and demonstration (RD&D) program.

Several munitions types that will be treated at the BGCAPP have been characterized either at Blue Grass Army Depot (BGAD) or at other chemical demilitarization facilities. Attachment 2 provides the available laboratory analyses of the agent contained in the munitions.

The solid wastes that will be produced during the RD&D program will be characterized in accordance with the current edition of SW-846 before they are shipped to a permitted TSDF.

The sampling and analytical methods used at BGCAPP will be based on the following methods:

1. U.S. Army or programmatic agent and agent-related methods
2. USEPA SW-846 methods and procedures
3. Methods for the Examination of Water or Wastewater (20th Ed.)
4. Protocols and techniques that are recognized and accepted by the scientific community.

These methods may require modification to effectively analyze BGCAPP sample matrices. The analytical methods will be validated and documented to show that data and results from BGCAPP are scientifically and technically defensible. These analytical procedures will be provided to KDEP for review when they have been developed.

Attachment 9 Contents

Attachment 9 Closure Process for BGCAPP

9.1 General Information

The objective of closure for the Blue Grass Chemical Agent-Destruction Pilot Plant (BGCAPP) is to render the facility "clean" in accordance with the Kentucky Department for Environmental Protection (KDEP) and Resource Conservation and Recovery Act (RCRA) criteria and to close the facility with no requirement for post-closure care. The lessons learned from the closure of previous demilitarization facilities will be reviewed and incorporated into the BGCAPP design to minimize the rework engineering required during the closure phase. **The Closure Plan presented in this attachment is a broad outline;** the **detailed** Closure Plan will **address the requirements of 401 KAR 34:070 Section 3, including the treatment and disposal of all contaminated waste residues and components, soils, structures, and equipment. The** Closure Plan will be submitted to KDEP **DWM in accordance with the Compliance Schedule that is discussed in Attachment 12.** The facility owner, Blue Grass Army Depot (BGAD) and the facility operator, Bechtel Parson Blue Grass (BPBG), will not proceed with the final closure of BGCAPP until the Closure Plan is approved by KDEP.

Any closure activities not related to BGCAPP operations will not be addressed as part of the BGCAPP Closure Plan, but they will be addressed by BGAD as part of the Closure Plan for BGAD.

9.2 Closure Plan

9.2.1 Closure Performance Standard

In accordance with the requirements of 401 KAR 34:070 Section 2, BGCAPP will be closed in a manner that accomplishes the following goals:

1. Minimize the need for further maintenance.
2. Control, minimize, or eliminate, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or waste decomposition products to the ground or surface waters or to the atmosphere.
3. Comply with the KDEP closure requirements for containers, tanks, and miscellaneous units.

Waste generated during the closure period will be processed as follows:

1. Solid (physical state) wastes that might be contaminated with chemical agent will be monitored to verify **that the waste has been** decontaminat**ed to the Army Decontamination Standard. These** wastes will be containerized and disposed of at a permitted hazardous waste

treatment, storage, and disposal facility (TSDF). Any waste materials that **have not been** decontaminat**ed to the Army Decontamination Standard** will be decontaminated again or treated in one of the hazardous waste management units in the facility.

2. **S**olid waste (e.g., metal parts) that can be processed through the metal parts treater (MPT) or the heated discharge conveyor (HDC) **will be thermally treated to a minimum of 1,000°F for a minimum of 15 minutes**.

3. For buildings and structures (both metal and concrete), the clean closure target levels will be developed and included in the Closure Plan.

4. Prior to shipment of any waste material offsite, wastes will be characterized in accordance with Kentucky Hazardous Waste Regulations.

The closure of the BGCAPP will be accomplished by demonstrating that the clean closure target levels have been achieved in the following locations:

1. On surfaces within the facility and waste storage areas.

2. On surfaces and subsurfaces where surface contamination has been discovered surrounding the facility and waste storage areas.

3. On subsurfaces directly beneath the facility and waste storage areas that have been removed, where necessary.

4. On or within any other area or structure deemed to be included in the BGCAPP closure through the RCRA Facility Assessment (RFA) or other means.

Sampling and analysis will be performed to demonstrate that the clean closure target levels have been met in accordance with EPA's SW-846 (most recent edition) or equivalent methods approved by the KDEP, and as described in the sampling and analysis plan to be provided with the detailed Closure Plan.

9.2.2 Closure Activities

BGCAPP will be closed completely after the chemical agent stockpile has been destroyed and all munitions have been decontaminated. Closure activities will include:

1. Treatment and/or disposal of existing waste inventories [including secondary wastes such as spent carbon, used personnel protective equipment (PPE), etc.]

2. Decontamination of equipment, structures, and soils, as required

3. Dismantling and disposal of contaminated process and support equipment

4. Treatment and/or disposal of wastes generated during closure

5. Demolition of structures that will not be reused by BGAD after the completion of BGCAPP closure activities

9.2.3 General Decontamination Procedures and Techniques

Where liquid chemical agent contamination is suspected (based on operating history) or in monitoring areas where sustained levels of agent vapors are routinely present, chemical agent decontamination procedures will be used. A list of these areas will be included in the Closure Plan.

Agent-contaminated items will be decontaminated **to the Army Decontamination Standard**. In general, decontamination will be accomplished **either** by wash down with decontamination (decon) solution followed by flushing with water **or** by heating the item to **a minimum of** 1,000°F for **a minimum of** 15 minutes. Items that **require additional** decontamination will be further treated by **one of** the following means:

1. Additional chemical decontamination
2. Processed through the MPT or the HDC
3. Processed through the dunnage shredding and handling system (DSH) and the supercritical water oxidation (SCWO) units

Decontamination will be performed under the direction of the Closure Manager, who will consult regularly with the certifying Registered Engineer.

Items contaminated with hazardous wastes other than agent will be decontaminated onsite, if necessary, with waste-specific techniques or they will be containerized and shipped offsite to a permitted hazardous waste TSDF.

9.3 Maximum Waste Inventory

Section 3 (2) of 401 KAR 34:070 requires that the Closure Plan identify steps necessary to perform partial and final closure of the facility at any point during the facility's active life, including an estimate of the maximum waste inventory that was ever on site and a detailed description of the methods to be used for removal, treatment, storage, and disposal of all hazardous waste at a permitted TSDF. Because this information is used by privately owned facilities to develop closure cost estimates and closure financial requirements from which federal facilities are exempt, this requirement will not be addressed in the BGCAPP Closure Plan. However, the waste inventory will be maintained at the lowest level possible while efficiently operating the plant equipment. As such, the waste inventory at the end of the operations phase will be substantially less than the storage tank design capacity of the plant because the storage tank capacity was designed for the storage of waste generated during the initial campaign (GB).

9.4 Schedule for Closure

Based on the lessons learned from Johnston Atoll Chemical Agent Disposal System (JACADS), closure is expected to take approximately 2 years. The detailed schedule for closure will be provided as part of the Closure Plan. The Closure Plan will also provide a detailed description of the decontamination process that will be used in the BGCAPP. The current projected schedule for BGCAPP indicates that closure will take place between 2012 and 2014 (subject to funding constraints that could delay the start of waste disposal activities). The start of closure is based on the completion of munition processing. Partial closure of some equipment can begin after the completion of the VX rocket and projectile campaigns, respectively.

9.5 Closure Timeline

9.5.1 Time Allowed for Closure

The Closure Plan will delineate the timeline for closure as discussed previously.

9.5.2 Extension for Closure Time

BGCAPP does not expect to request an extension of time for closure beyond what is proposed in the Closure Plan. However, if additional time is required, the proper request will be made in accordance with KDEP regulations.

9.6 Closure Procedures

9.6.1 Removal of Hazardous Waste Inventory

All waste will be removed from BGCAPP tanks and container storage areas and will either be processed through the treatment facilities at BGCAPP or characterized properly, packaged, and transported to a permitted hazardous waste TSDF.

9.6.2 Inventory of Contaminated Buildings, Equipment, and Soils

The final Closure Plan will include a listing of BGCAPP buildings or rooms within buildings [e.g., the munitions demilitarization building (MDB)] and a designation (based on BGCAPP operations' knowledge at the time of Closure Plan submittal) of whether each building has, has not, or may have been contaminated with chemical agent or other hazardous waste. The list will further indicate whether each building will be demolished, stripped of all equipment but left in place, left in place with equipment, or removed from site for salvage (e.g., portable trailers). This list may be updated until completion of operations and in the early stages of closure as additional data become available.

Criteria used to determine the necessity of soil sampling to evaluate contamination will include generator knowledge such as spill history and/or major breaches to any secondary containment (as applicable). Soil removal is not expected to be necessary during closure because any incidents that involve agent release (or other hazardous waste) during the operational life of the facility will be addressed immediately to minimize the potential of migration of hazardous constituents. Hazardous waste operations will occur in totally enclosed buildings with secondary containment to prevent contamination of the surrounding soil if there is an accidental spill.

9.6.3 Decontamination of Tank Systems and Container Storage Areas

Decontamination of equipment and material that was exposed to chemical agent will be performed in accordance with BGCAPP decontamination procedures. After waste, equipment, and materials are removed, walls, floors, and doors will be decontaminated, if necessary, using appropriate mechanical abrasion (e.g., scabbling), physical extraction or chemical extraction technologies (e.g., high-pressure steam and water sprays that include appropriate surfactant, acids, bases, or detergents).

Spent wash and rinse solutions generated as part of decontamination procedures will be treated onsite or will be characterized, containerized, and disposed of at a permitted hazardous waste TSDF. Any solid residues, building components, appurtenances, etc., that cannot be decontaminated **to the Army Decontamination Standard** will be processed onsite in the metal parts treater (MPT), heated discharge conveyor (HDC), or the dunnage shredding and handling (DSH), as appropriate, and disposed of at a permitted hazardous waste TSDF.

9.6.4 Disposal of Contaminated Soil

As discussed in Section 9.6.2, no contaminated soil is expected to be disposed of during closure. If soil removal is necessary, residues that exceed clean closure target levels of hazardous constituents will be containerized and shipped to a permitted hazardous waste TSDF.

9.6.5 Documentation of Closure

After the facility closure is complete, a copy of the certification by the owner/operator and the registered professional engineer (stating that the facility was closed in accordance with the approved closure plan) will be submitted to KDEP. The certification will be accompanied by the appropriate documentation.

9.7 Post-Closure Plans

Post-closure maintenance or monitoring are not anticipated for the BGCAPP because no contaminated equipment, structures, or soils resulting from the BGCAPP operation are expected to remain above closure target levels following final closure. If predetermined closure target levels cannot be achieved, the Closure Plan will be revised accordingly. The facility site will remain under the control of BGAD after closure of BGCAPP.

Attachment 10 Contents

Attachment 10 Process Efficiency and Performance Criteria

As discussed in Attachment 4, Section 4.1, the main purpose of this research, development, and demonstration (RD&D) is to evaluate and demonstrate the integrated process as one operating unit. This will be done by operating the individual (proven) components [e.g., rocket shear machine (RSM), energetics batch hydrolyzer (EBH), and heated discharge conveyor (HDC) together, first with surrogates (during systemization) and then with agent-bearing wastes under this RD&D program. In this way, it will be possible to fully assess the process efficiency and performance.

During the RD&D program, the integrated process will be assessed for its ability to meet **all** efficiency and performance criteria **that are discussed in Attachment 6, Section 6.5. The process will be tested to**:

1. **Demonstrate** 99.9999% **destruction** efficiency for agent via hydrolysis **on the first batches of agent processed**.
2. **Demonstrate s**ufficient destruction of energetics by hydrolysis to allow safe operation in the heated discharge conveyor (HDC) to **ensure that the solids exiting the HDC** meet the **401 KAR 37:040** treatment standard for D003 waste streams (Deactivation).
3. **Verify that a**ll emission sources meet the environmental requirements as defined by the health and environmental risk assessments that will be performed as part of the RD&D program.[1]
4. Validate the plant's anticipated overall hazardous waste generation rates and assess the wastes' characteristics to allow evaluation and approval by offsite disposal facilities.
5. Identify the individual process parameters and their ranges to ensure successful simultaneous operation of systems and processes while meeting all applicable environmental standards.
6. Confirm and validate the procedures of support services such as environmental compliance and hazardous waste management.

The environmental impact of the BGCAPP is very small: it consists primarily of air emissions. All air emissions that may contain agent pass through redundant banks of filters, including the MDB HVAC filter system, which is discussed in Section 10.2 and Attachment 6, Section 6.1.3. The HVAC filter system is a proven system with over 20 years of combined operation at other chemical demilitarization sites[2]. All wastes that are generated in the munitions demilitarization building (MDB) will be characterized during the RD&D program to assess the type of disposal facility that is appropriate for each.

The following sections discuss how these criteria will be met. Section 10.1 presents the method to be used to demonstrate 99.9999% destruction efficiency for agent. The remaining sections show how the RD&D objectives will be met for each of the air emission sources and the

[1] The Final Environmental Impact Statement (EIS), Destruction of Chemical Munitions at Blue Grass Army Depot, Kentucky, December 2002, submitted for the program and included herein by reference indicates that all aspects of the program meet all health, safety, and environmental requirements.

[2] At JACADS, TOCDF, ANCDF, and ABCDF, the same type of system is also installed or planned for the remaining chemical demilitarization sites.

polychlorinated biphenyls (PCBs). Process-specific RD&D objectives and performance criteria are discussed throughout Attachments 4 and 6. Although the results demonstrate that the process can be made safe, they should not be construed as the maximum safe emissions from the BGCAPP. The maximum safe—and hence allowable—emissions under the RD&D program and other permits will be based on an environmental assessment of the BGCAPP, which will be performed in sufficient time prior to the start of testing with agent to allow a full evaluation of the results.

10.1 Calculation Method for 99.9999% Destruction Efficiency

Destruction efficiency is the term used to measure the ability of an incinerator to destroy organic materials. The equation that is specified in 401 KAR 34:350 is not appropriate for the neutralization process as used in the BGCAPP. The following equation is proposed as a more appropriate method of calculating the destruction efficiency for the BGCAPP:

$$\%\ \text{Destruction Efficiency} = 100\% \times (M_{in} - M_{out}) / M_{in}$$

M_{in} = Mass of agent per reactor batch into the agent neutralization system (ANS) reactor (also called the “agent hydrolyzer” in Figure 4-1)

M_{out} = Mass of agent per reactor batch exiting the ANS in the hydrolysate

Attachment 12 includes the waiver request for this change.

10.2 Munitions Demilitarization Building (MDB)

Except for the processes listed below, all processes within the MDB perform mechanical processes on the munitions (e.g., punching, draining, washing, and shearing of the munitions):

1. EBH**, ENR,** and HDC, which vent into the common EBH/HDC offgas treatment system
2. ANS and metal parts treater (MPT), which vent into the common MPT offgas treatment system
3. Dunnage shredding and handling (DSH), which vents into the DSH particulate treatment system

The emissions from these three components **will** be discharged into the MDB heating, ventilating, and air conditioning (HVAC) filter system.

All air emissions from the MDB are filtered through the HVAC filter system described in Attachment 6. The HVAC filter system is a proven system with over 20 years of combined operation at other chemical demilitarization sites[2].

10.3 Agent and Energetics Hydrolysate Storage

These storage tanks form a buffer between the treatment operations in the MDB and the SCWO process. The hydrolysates’ vapor pressures are very low. However, as a precaution and to control possible vapors, the hydrolysate tanks are vented to activated carbon adsorbers. The RD&D program will identify the frequency of replacement that these filters will require to ensure that vapor control can be achieved during normal operation.

10.4 Supercritical Water Oxidation (SCWO) Processing Building (SPB)

This building includes the SCWO reactors and the water recovery system. All materials that enter this building have been analyzed and shown to be below the target release level for agent and the emissions from these sources pose no agent hazard. The processing may produce small quantities of other emissions. Extensive tests have been conducted on SCWO systems treating agent and energetics hydrolysates and hydrolysate simulants as part of the Program Manager for Alternative Technologies and Approaches (PMATA) and Program Manager, Assembled Chemical Weapons Alternatives (PMACWA) programs. These tests were reviewed and evaluated by a number of National Research Council (NRC) panels. The panels findings and conclusions and an extensive list of references containing the data on which their conclusions are based are presented in the reports that are listed in Attachment 4, Table 4-1. The reports all concluded that the emissions from the General Atomics Design SCWO reactor were extremely low. The RD&D program will further characterize these emissions and verify their levels for the actual wastes found in the Blue Grass Army Depot (BGAD).

The SCWO system selected at BGAD has been successfully demonstrated at a scale comparable to that to be used at BGCAPP during the extensive demonstration under ACWA. The demonstrations were performed at increasingly longer time frames and culminated in a series of long-term tests, termed the 500-hour tests, on the materials that will be treated by SCWO at BGAD. These are GB, VX, and mustard hydrolysates; energetic hydrolysates; and slurried dunnage. All tests demonstrated extremely and consistently high levels of organic chemical destruction. The tests were documented and critiqued by internal Department of Defense (DOD) groups and independently reviewed by many NRC panels. Table 4-1 lists the major reports in which the NRC panels chronicled and critiqued the progress of the evaluation and selection process. The NRC reports cite the numerous internal government reports that document all of the demonstration programs.

The evaluation process first examined numerous alternative technologies (NRC 1993) and in NRC 2002 and NRC 2002a identified two technologies that had been demonstrated. It identified the General Atomics Total Solution (GATS) process, on which the BGCAPP design is based, as the one with lower total hydrocarbon and carbon monoxide (CO) emissions. The Final Environmental Impact Statement (EIS) for BGCAPP (December 2002) also discusses alternate technologies and draws the same conclusion.

Based on the testing referenced above, the gas streams exiting the SCWO unit[3] are typically very low in total hydrocarbons (less than 1 ppm). The CO concentration has been demonstrated to be consistently less than 2 ppm and particulates less than 4 mg/dry standard cubic meter (DSCM). Cadmium (Cd) + lead (Pb) are less than 0.015 mg/DSCM, and antimony (Sb) + Arsenic (As) + Beryllium (Be) + Chromium (Cr) are less than 0.045 mg/DSCM[4]. Most of these values are below the lower limit of detection of the measurement method[5]. These results support the conclusion that the SCWO technology has a negligible impact on the environment.

The emissions from the water recovery system (WRS) are also extremely low. The SCWO demonstrations identified the SCWO liquid effluent to be uniformly low in organic material; its

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[3] The only gas releases from the SCWO are through the gas-liquid separators and pressure reducers.

[4] They are presented as uncorrected for dilution because the oxygen concentration in the SCWO gas streams is below 7%.

[5] Quantities at or below the method detection limit are typically reported as less than the method detection limit.

total organic carbon (TOC) concentration was less than 3 ppm. Evaporation of this effluent will not produce any significant emissions. This finding will be corroborated during the RD&D program.

The concentrations identified above were measured during the system demonstration programs. Although they do demonstrate that the system is safe and protective of the environment, they should not be construed as the requested performance limits on the final system. The actual emission limits for the BGCAPP will be established on the basis of the environmental and health evaluations that will be performed during the RD&D program.

10.5 Polychlorinated Biphenyls (PCBs)

PCBs have been found in the rocket shipping and firing tubes. These materials are part of the matrix of the shipping and firing tubes. They exit the process as part of the rocket solids and this waste stream will be disposed of at a permitted Toxic Substances Control Act (TSCA) offsite disposal facility.

Attachment 11 Contents

Attachment 11 Criteria to be Used to Determine Effects on Human Health and Environment

The research, development, and demonstration (RD&D) program that will be performed under the requested permit will not have an adverse effect on human health and the environment.

During malfunctions, upsets, or unplanned shutdowns, any agent compounds (including degradation products) will be contained, reprocessed, or controlled to prevent agent release as required by KRS 224.50-130(3)(a).

It is critical to keep the following in mind when assessing the BGCAPP's impact on health and the environment:

1. Its projected period of operation is approximately 20 months at full operation. The permit for the RD&D program is requested for 1 year of agent testing as allowed by 401 KAR38:060 Section 6 (a).
2. Its total store of material is fixed so that its chronic impact is best assessed on the basis of total plant impact over the life of the plant rather than as an hourly or yearly impact.
3. The plant is a sealed entity with only **five** emission points[1], which are controlled by redundant air pollution equipment.
4. All emission points that can contain chemical agent are monitored by systems that have been proven to detect levels of chemical agent below the established maximum safe ambient air concentration.
5. Groundwater and soil are not plausible pathways for contaminant release from the BGCAPP.
6. The plant produces no process wastes discharged to sewer, groundwater or to surface water.

Before the start of agent operation, a risk assessment will be performed for the facility, using a risk assessment protocol that will be established through discussions with the Kentucky Department for Environmental Protection (KDEP).

11.1 Anticipated Composition of Exit Streams from BGCAPP

The BGCAPP process produces solid effluents, treated air, and recyclable water. The effluent type, its constituents, and each effluent's final treatment and disposal method are described in the following sections.

The estimated anticipated releases from the BGCAPP are found in the material balances presented in Appendix E. It is noteworthy that the material balances are based on the proposed peak rates for the BGCAPP.

[1] The emission points are (1) munitions demilitarization building (M**DB**) HVAC filter; (2) hydrolysate storage tank vent filters; (3) supercritical water oxidation (SCWO); (4) water recovery system **(WRS)**, and (5) **aluminum filtration building (AFB)**.

11.2 Waste Solids

Waste solids include **thermally** decontaminated metal parts, rocket shipping and firing tube residues from the energetics batch hydrolyzer (EBH)/heated discharge conveyors (HDCs), dried aluminum oxide filter cake from the EBH filter cake system, and salt residues from the water recovery system (WRS). Salt residues include sodium chloride, sodium phosphate, wood ash (lime and K_2O), sodium sulfate, sodium fluoride, metal oxides from the hydrolysate feeds, calcium from personnel protective equipment (PPE) residues, and bound water. The solids production rates and composition are given in the material balance calculations in Appendix E. All of these wastes will be characterized during the RD&D program and will be managed by appropriate methods to minimize waste. The residue from the EBH/HDC is assumed to contain polychlorinated biphenyls (PCBs); it will be sent to a TSDF that is approved for PCB disposal.

11.3 Process Liquid Effluents

The BGCAPP is a closed-loop, zero-discharge plant. It does not release any process effluent to surface or groundwater or to onsite wastewater treatment plants. Any liquid waste that might be shipped offsite will be shipped to an appropriate hazardous waste TSDF.

11.4 Non-Process Liquid Effluents

Clean water from tanks used during systemization that never contained hazardous materials may be discharged into the sanitary sewer system. Except for sanitary sewage and stormwater, no liquid effluent is discharged to the surface- or ground waters of the Commonwealth or to the sanitary sewer system of the BGAD.

11.5 Gaseous Emissions

The emission points are listed below:

1. Munitions demilitarization building (MDB) HVAC filter
2. Hydrolysate storage tank vent filters
3. SCWO
4. Metal parts treater (MPT) offgas treatment system
5. EBH/HDC offgas treatment system

For the purposes of the RD&D program, all emissions from the MPT and the EBH/HDC offgas treatment systems will be ducted to the MDB HVAC filter system (FIL). This arrangement will ensure a redundant level of protection of health and of the environment, because the gaseous emissions from these sources will first be treated by their respective offgas treatment systems and then again by the extremely efficient multiple high-efficiency particulate air (HEPA) filters and activated carbon adsorption banks of the FIL.

As discussed in Attachment 10, Section 10.1, hydrolysate will have been sampled and analyzed for residual agent, before it is released from the MDB to the hydrolysate storage tanks.

Nevertheless, the vents on the hydrolysate storage tanks will be filtered through activated carbon adsorbers.

The SCWO system and the water recovery system treat only the hydrolysates and slurries of shredded and micronized organic (i.e., wood and plastic) dunnage with energetics hydrolysate. As discussed in Attachment 10, these systems produce inherently low emissions and do not require additional air pollution control equipment. They vent directly to the atmosphere.

The following criteria will be used to assess the impact of the air emissions on health and the environment:

1. Measure the actual emissions from all sources and apply them to the risk assessment methodology that will have been developed.

2. Demonstrate that the emissions do not exceed risk-based values for acceptable risk and environmental protection.

Attachment 12 Contents

Attachment 12 Additional Information Pertinent to Proposed Operation of Experimental Waste Facility or Process

In addition to the information contained in this RD&D Permit Application, additional information is referenced in previously published documents and attached appendixes. These information sources are listed below.

12.1 Previously Published Documents

1. Final Environmental Impact Statement, Destruction of Chemical Munitions at Blue Grass Army Depot (BGAD), Kentucky, December 2002.

2. Chemical Weapon Storage Permit Application, Blue Grass Army Depot, January 2002. BGAD previously submitted this document to the Kentucky Department for Environmental Protection (KDEP). This document contains more detailed weapon descriptions, the contingency plan, and the procedure to prevent hazards.

12.2 Appendixes

Appendix A	Site Topographic Map
Appendix B	Wind Rose for BGAD
Appendix C	Process Flow Diagrams (PFDs) **and Material Balances** for BGCAPP
Appendix D	Material Safety Data Sheets (MSDSs)
Appendix E	**(Deleted)**
Appendix F	RD&D Permit Pre-Application Meeting Documentation

12.3 Additional Information to Be Provided to KDEP

Currently, detailed design for the Blue Grass Chemical Agent-Destruction Pilot Plant (BGCAPP) has not been completed. It is recognized that KDEP will require several additional pieces of information for the BGCAPP. Submittal of this information will be made in sufficient time to allow a thorough KDEP review prior to the start of agent (hazardous waste) operations. It is requested that submittal of these items be made conditions of the RD&D permit. The information to be provided include:

1.	Detailed design, including P&IDs	401 KAR 38:090 Section 2
2.	Tank Assessment Report	401 KAR 34:190 Section 3(1)
3.	Waste Analysis Plan	401 KAR 34:020 Section 4

The analytical methods used at BGCAPP will be based on U.S. Army or programmatic agent and agent-related methods, USEPA, SW-846 methods and procedures, Methods for the Examination of Water or Wastewater (20th Ed. or most current), or protocols and techniques that are recognized and accepted by the scientific community. These methods may require modification to effectively analyze BGCAPP sample matrices. The analytical methods will be validated and documented to show that data and results from BGCAPP are scientifically and technically defensible. These analytical procedures will be provided to KDEP for their review when they have been developed.

1.	Security Equipment and Procedures	401 KAR 34:020 Section 5
2.	Procedures To Prevent Hazards	401 KAR 34:020 Section 5
3.	Contingency Plan	401 KAR 34:040
4.	Inspection Plan	401 KAR 34:020 Section 6
5.	Personnel Training Plan	401 KAR 34:020 Section 7
6.	Monitoring Plan	401 KAR 34:020
7.	Closure Plan	
8.	Performance Test Plan	

12.4 Regulatory Waiver Requests

To maximize safety during the RD&D program and operation of the facility, BGCAPP requests a waiver from the permitting requirements listed below. These requests are made under 401 KAR 38:060 Section 6 (2).

1. 401 KAR 34:180 Section 4 (3) – "A container holding hazardous waste shall be labeled "Hazardous Waste" upon the date that hazardous waste is first added to the container."

   The EONC will be labeled upon receipt at the Container Handling Building (CHB). The labeling of the individual munitions will not be done as this would require additional handling of the munitions prior to destruction, increasing the risk to human health and the environment.

2. 401 KAR 34:180 Section 5 – "Inspections. At least weekly, the owner or operator must inspect areas where containers are stored, looking for leaking containers and for deterioration of containers and the containment system caused by corrosion or other factors."

   In lieu of visual inspections of chemical munitions and containers inside of EONCs, BGCAPP proposes that for any EONC containing hazardous wastes that are stored at the Container Handling Building (CHB) more than 7 days, chemical agent monitoring of the air in the EONC will be performed. This request maximizes safety of workers at the facility while allowing BGCAPP personnel to detect leaking munitions.

3. 401 KAR 34:350 – Chemical Munitions
   401 KAR 34:350 requires permit applicants to demonstrate "…99.9999 percent destruction or neutralization of each substance proposed to be treated or destroyed." The regulation further defines this destruction efficiency by the equation listed below.

$$DE\ \% = \frac{(W_{in} - W_{out} - W_{res}) \times 100\%}{W_{in}}$$

Where:

Win = Mass feed rate of waste to the incinerator.

Wout = Mass emission rate of the same waste present in exhaust emissions prior to release to the atmosphere.

Wres = Mass removal rate of waste via the incinerator residues.

Because this equation is more applicable to incinerators (hence the reference to removal rate of incinerator residues), this equation is not appropriate for the proposed neutralization process. The following equation is proposed as a more appropriate method of calculating the destruction efficiency for the BGCAPP:

% Destruction Efficiency = 100% x $(M_{in} – M_{out}) / M_{in}$

M in = Mass of agent per reactor batch into the Agent Neutralization System (ANS) Reactor (also called the “Agent Hydrolyzer” in Figure 4-1)

M_{out} = Mass of agent per reactor batch exiting the ANS in the hydrolysate

DEP 7094B (35/92)

Attachment 13 Public Notice

PURSUANT TO APPLICATION NUMBER: ____________________

The Natural Resources and Environmental Protection Cabinet, Division of Waste Management, has received a special waste,

research, development, and demonstration permit application from:

Name of Applicant __Blue Grass Army Depot________________________________

Name of Facility ____See Above____

Address ___________2091 Kingston Highway____ _______________________________

City ___Richmond_______________State ______KY________Zip Code _40475-5001_

This application, if approved, would allow the construction of the facility to accept the following types of waste and the following activities:

This facility would be used to conduct Research, Development and Demonstration on

technology selected to be used to destroy the chemical weapon stockpile at the BGAD

____

The proposed facility may be accessed from _KY Route 52________________________

by traveling east from Richmond toward Waco________________________________

____

Additional information regarding this application may be obtained from:

Contact Person ___Mr. Dave Easter[1]____

Address __________2091 Kingston Hwy____ ___________________________________

City _____Richmond_____________ State ______KY__________Zip Code _40475-5007

Phone No. (859) _**779**-6221____

The permit application is being processed at the following location:

Division of Waste Management
Solid Waste Branch
14 Reilly Road
Frankfort, Kentucky 40601

1 All correspondence and questions regarding this notice may also be directed to Mickey Morales, 301 Highland Park Drive, Richmond, KY 40475 – (859) 625-1291.

Within thirty (30) days of the publication of this notice, any person who wishes to comment on the application may submit written comments, and, if desired, request from the Cabinet a public meeting.

Please refer to Application No.______________________on all correspondence.

Publication pursuant to KRS 224.40-310.

DEP 7094B(3/92)

Attachment 14 Public Notice

Pursuant to Application Number: ____________________

The Natural Resources and Environmental Protection Cabinet, Division of Waste Management, has received a special waste, research, development, and demonstration permit application from, and has prepared a draft permit for:

Name of Applicant Blue Grass Army Depot

Name of Facility ____________________

Address 2091 Kingston Highway

City Richmond State KY Zip Code 40475-5001

This application, if approved, would allow the construction of the facility to accept the following types of waste and the following activities: No offsite waste would be Accepted; the facility would only be used to destroy chemical weapons stored onsite

The proposed facility may be accessed from KY Route 52

by traveling east from Richmond toward Waco

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Additional information regarding this application may be obtained from:

Contact Person Mr. Dave Easter[1]

Address 2091 Kingston Hwy

City Richmond State KY Zip Code 40475-5007

Phone No. (859) **779**-6221

All data submitted by the applicant and other documents concerning this application are available for public inspection during normal business hours at the following location:

Office Blue Grass Chemical Stockpile Outreach Office

Address 301 Highland Park Drive

City Richmond State KY Zip Code 40475

The permit application is being processed at the following location:

Division of Waste Management
Solid Waste Branch

[1] All correspondence and questions regarding this notice may also be directed to Mickey Morales, 301 Highland Park Drive, Richmond, KY 40475 – (859) 625-1291.

14 Reilly Road
Frankfort, Kentucky 40601
10

DEP 7094B(3/92)

A public hearing has been scheduled to receive public comments and will be conducted at the following location and time:

Place____

Address____

City_________________________ State _______________ Zip Code ___________

From_________________________________ to _________________________________

Any person who wishes to comment on the draft permit decision for this special waste site or facility may file comments with the Cabinet and, if desired request a public hearing within thirty (30) days of the publication of this notice pursuant to Section 6 of 401 KAR 45:050.application may submit written comments, and, if desired, request from the Cabinet a public meeting.

Please refer to Application No.________________________on all correspondence.

Publication pursuant to KRS 224.40-310.