Carmen Johnson

Fac/Perm/Co ID	Date	Doc ID#
32-08	2/8/12	DIN

Glaxo

Research Triangle Park, North Carolina

RCRA Permit Application

Volume 1 of 2

Application

SIRRINE
ENVIRONMENTAL
CONSULTANTS

Raleigh, North Carolina

SIRRINE
ENVIRONMENTAL
CONSULTANTS

3733 National Drive
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Carmen Johnson

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December 14, 1989

Mr. Robert G. Wojtas
Glaxo, Inc.
Five Moore Drive
Research Triangle Park, NC 27709

Re: Glaxo, Inc.
Research Triangle Park, NC
Incinerator Permitting Project
SEC Project No. R-8279

Dear Bob:

Please find enclosed five (5) copies of the RCRA permit application for Glaxo, Inc., Research Triangle Park, NC.

Upon receiving Glaxo's transmittal letter by Tim Tyson, we will hand delivery seven (7) copies of the application to the N.C. Hazardous Waste Section on December 15, 1989.

If you have any questions, please contact me.

Sincerely,

SIRRINE ENVIRONMENTAL CONSULTANTS

Robert W Midgette

Robert W. Midgette

RWM/cc

Enclosure
cc: Mr. Calvin Overcash
Mr. Terry Bradham
Mr. Tim Roberts
Mr. Frank Tyndall
Project File, w/enc.

Glaxo

Glaxo Inc.

Thomas F. Cecich
Director
Safety, Health & Environmental Affairs

August 27, 1990

Dr. William F. Hamner
Hazardous Waste Section
Solid Waste Management Division
Department of Environment, Health and
Natural Resources
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Re: Glaxo Inc.
Research Triangle Park, North Carolina
RCRA Permit Application
Sirrine Job No. R-8279

Dear Dr. Hamner:

Please find enclosed seven (7) copies of our response to the First Notice of Deficiency for our RCRA permit application. As indicated on the attached Response to the First Notice of Deficiency, some pages of the RCRA application have been revised to address NOD comments. The revised pages (i.e., Revision No. 1) should be inserted in the appropriate location in the application. The corresponding pages from the original application (i.e., Revision No. 0) should be discarded. In cases where additional information was not necessary to address the NOD comment, a separate written response is provided in the Response to the First Notice of Deficiency. In cases where it was not possible to provide the requested information (e.g., a more recent Wind Rose) an explanation is provided.

For reference purposes, we have included in this response, a copy of the NOD with each comment numbered. These numbers correspond to those listed in the Response to the First Notice of Deficiency.

We believe we have fully addressed each of the comments in the NOD and look forward to your early response.

If you have any questions, please feel free to contact Bob Midgette of Sirrine Environmental Consultants (881-0777) or me (248-2655).

Five Moore Drive, P.O. Box 13358 Research Triangle Park, NC 27709 • Telex 802813 • Telephone (919) 248-2100

Sincerely,

Thomas F. Cecich

TFC/cjp

cc: Mr. Frank Tyndall
Mr. Timothy Tyson
Mr. Santo Costa

RESPONSE TO THE FIRST NOTICE OF DEFICIENCY
GLAXO INC.
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27709
NCD065655599

NOD COMMENT NO.	RESPONSE
1	All references have been changed to "North Carolina Hazardous Waste Section."
2-4	Part A has been revised.
5	The process design capacity for storage (S01) of 10,150 gallons corresponds to the maximum volume of liquid hazardous waste based on the maximum waste inventory assumptions described in Section I (i.e., 15 gallons of lab pack material in a 55-gallon container). It is recognized that the hazardous waste storage capacity based on the container arrangements specified in Section D (i.e., 15 gallons/nalgene tray) is only 5,760 gallons. Conservatively, the 10,150 gallon figure based on off-site disposal of the maximum waste inventory was listed in the Part A. The process design capacity for storage (S01) of 2,145 gallons, corresponds to the storage of thirty-nine 55-gallon containers of incinerator ash/baghouse dust in the ESF.
6	All hazardous waste that Glaxo plans to incinerate and/or store is listed in the Part A application. The radioactive waste (mixed waste) is included in the quantities of non-halogenated and halogenated solvents, scintillation vials and incinerator ash/baghouse dust.
7	More specific page numbers (i.e., 3A of 5) are provided.

NOD COMMENT NO.	RESPONSE
8	Drawing R-8279-B1, Facility Key Plan, has been provided to depict topography of the area extending 1,000 feet beyond Glaxo's property boundary and all surface waters on or near the facility. As indicated on Drawing R-8279-B1 and as stated during our meeting on June 25/26, 1990 this drawing was developed from a direct photocopy (i.e., not a reduction) from the USGS, SW and SE Durham Quadrangle maps (scale is 1:24,000). Additional off-site topographic information is not readily available.
9	A more recent wind rose is not available. The information gathered during the period of record 1965-1974 is from a one time study originally prepared for the FAA. The United States Department of Commerce, National Oceanic and Atmospheric Administration has stated that wind rose data is <u>not</u> periodically updated.
10	See revised pages B-10 and B-10a.
11	See revised pages C-6 to C-16. All waste streams other than liquid solvent wastes will be ram fed to the incinerator.
12	See revised page C-4.
13	See revised pages C-6 and C-9.
14	As indicated on page C-2, all of the individual wastestreams in each of the four general categories will be treated (i.e., incinerated) at the Glaxo facility with the exception of corrosive or reactive discarded commercial chemical products which will be stored but not incinerated on-site. This exception is stated on page C-6.
15	See revised page C-17.
16	See revised page C-17a.
17	See revised page C-35.

NOD COMMENT NO.	RESPONSE
18	As discussed during the meeting on June 25/26, 1990, radioactive and non-radioactive solvent waste will not be segregated in the flammable waste storage area.
19	As stated on page C-2 and in the Part A, scintillation vials will be incinerated. Revised page C-15 states that the boxes of vials will be ram fed.
20	See revised pages C-17a and C-22.
21	As indicated on the Tank Design Sheets in Appendix C, the range of specific gravity of material contained in the tanks will be 0.8 to 1.8. The description of the solvent waste on page C-2 and Table C-1 presents a complete listing of the toxic and ignitable hazardous waste constituents. As stated on pages C-33a and C-34, halogenated, non-halogenated and radioactive solvent wastes are not incompatible. As stated on page C-2, the solvent waste consists of research formulations containing mixtures of laboratory grade solvents and small amounts of P and U listed chemicals.
22	Sampling of waste stored in tanks is discussed in Section C-2b.
23	As discussed during the meeting of June 25/26, 1990, it is not possible to provide specific information on the wastes to be incinerated (i.e., chlorine content, ash content). The chlorine content, ash content and water content of liquid waste which will be fed to the incinerator through the liquid injection system (i.e., solvent wastes) will vary considerably. It is for this reason that Glaxo will perform a new waste analysis each time additional solvent waste is placed in a tank. Additional specific information on the small quantities of discarded commercial chemical products (solids or liquids) and scintillation vials which will be ram fed cannot be provided due to the variability of these wastestreams. However, as the wastes are generated, their chemical and physical properties will be known through published data and material safety data sheets provided by chemical suppliers.

NOD COMMENT NO.	RESPONSE
	(See pages C-29 to C-33).
	The heat values given on page C-25 were derived from values given in the Trial Burn Plan as follows:
	<u>For Test Stage #1</u>
	5.328 MMBTU/HR x 1 HR/908 lb = 5,868 BTU/lb
	<u>For Test Stage #2</u>
	5.68 MMBTU/HR x 1 HR/940 lb = 6,043 BTU/lb
24	See revised page C-26. As stated on page C-14 the expected composition of radioactive solvent waste is identical to the expected composition of non-radioactive solvent waste except that the water content may be higher.
25	See revised pages C-29, C-30 and C-31.
26	It is noted that the maximum HCl emission rate will be no greater than 4.0 lb/hr.
27	Additional analyses for radioactive wastes prior to storage or incineration, if required, will be in accordance with the radiation license granted by the NC Radiation Protection Section.
	Medical Waste Rules which became effective February 1, 1990 [10 NCAC 10G.1007(2)(17)] contain a requirement for collecting a periodic ash sample to be tested in accordance with the provisions of rule .0103(e) "Procedure and Criteria for Waste Determination." This rule is "used to determine whether a waste is (1) hazardous as defined by 10 NCAC 10F, and (2) suitable for disposal at a solid waste management facility."

NOD COMMENT NO.	RESPONSE
	As discussed on pages C-30 to C-31 the ash generated by the Glaxo incinerator will be considered a hazardous waste per 40 CFR 261.3(c)(2)(i) and will therefore not be suitable for disposal at a solid waste management facility. For this reason additional sampling and analysis in accordance with the Solid Waste regulations are not applicable. In the future, if the Hazardous Waste Section and the US Environmental Protection Agency, Region IV, accept a delisting petition for the incinerator ash, Glaxo will comply with the ash sampling and analysis requirements of rule .1007 prior to the disposal of ash in a solid waste landfill.
28	See revised page C-32.
29	See revised page C-32.
30	See revised page C-33.
31	It is apparent that this editing comment was intended to be included under C-1b, Tanks. Glaxo believes that section C-1b, Tanks is the appropriate location in the application for the general description of the tanks.
32	As explained during the meeting on June 25/26, 1990 it is not possible to provide more detailed information on the frequency of analysis.
33	Section C-2e addresses this comment.
34	Section C-2e addresses this comment.
35	As stated in section C-1b, corrosive and reactive discarded chemical products will <u>not</u> be incinerated on-site. The segregation of hazardous wastes is discussed in section C-2d and depicted in drawings R-8279-D1, R-8279-D2 and R-8279-D3. Section C-1a has been revised to clearly state that discarded commercial chemical product wastes will be ram fed to the incinerator.

NOD COMMENT NO.	RESPONSE
36	It is not possible at this time to discuss wastes which will be shipped off-site for "non-incineration disposal." Off-site disposal of some discarded commercial chemical product wastes and incinerator ash, baghouse dust and filters is discussed in the appropriate sections of Section C. However, it would not be practical for Glaxo to specify "non-incineration disposal" for wastes to be disposed off-site which have not yet been generated. As stated in Section C-3, Glaxo will comply with the appropriate land disposal restrictions in 40 CFR 268 before shipping any waste off-site for land disposal.
37	See revised page C-37.
38	See revised page C-37.
39	See revised pages C-36 and C-37.
40	See revised page C-37.
41	See revised page C-37.
42	See revised pages D-2 and D-2a.
43	The storage of wastes in tanks is described in detail in section D-2, Tank Systems. The storage of scintillation vials is described on revised page D-5.
44	See revised pages D-4, D-6, and D-7.
45	As stated on page D-5, only one layer of containers will be placed on each pallet (four 55-gallon containers per pallet). See revised page D-5.
46	As indicated on page D-5 and Drawing R-8279-D2, boxes of scintillation vials will be stored on shelving units. Also as depicted on Drawing R-8279-D2, the scintillation vial storage room floor is sloped to a trench drain and sump.

NOD COMMENT NO.	RESPONSE
47	As requested during our meeting of June 25/26, 1990, the floor drains to the spill containment systems in the HMMB have been indicated on Drawing R-8279-D1.
48	See revised page D-9.
49	See revised page D-6.
50	Flow to the neutralization system is <u>not</u> "regulated at 106 gallons per minute." As stated on page D-9a, the neutralization system was designed to accommodate a flowrate of 106 gallons per minute from the acid/caustic storage areas. See revised page D-9a.
51	See revised page D-13.
52	See revised pages D-13 and D-13a.
53	During our meeting on June 25/26, 1990, the HWS stated that this comment pertains to the potential for run-on in the truck unloading areas. As described on revised page D-13, trucks will be sealed against the docks during loading and unloading which eliminates the potential for run-on.
54	See revised page D-9a.
55-57	See revised pages D-13, D-13a, and D-14.
58	There are no other wastes stored in containers that do not contain free liquids. Spent HEPA and charcoal filters will be taken directly to the incinerator or shipped off-site for disposal without being stored.
59	See revised page D-14.
60	See revised Drawing R-8279-D2. There will not be any free liquids in this area.
61	See revised page D-15.

NOD COMMENT NO.	RESPONSE
62	See revised page D-16 and Drawing R-8279-D1. Transfer procedures are described in Section C-1a, page C-19.
63	The locations of all hazardous wastestreams are identified on Drawings R-8279-D1, R-8279-D2 and R-8279-D3. The storage facilities described in Section D were specifically designed to segregate hazardous wastes so that incompatibles are not stored in the same area. Information on the location and segregation of hazardous wastes is primarily presented in sections C-2d, D-1 and D-2 of the application.
64	The procedure to ensure compatibility of wastes which are placed in the same container are described in section C-2d.
65	See revised page D-16a.
66	Waste containers within each storage area will not be segregated. The various storage areas are provided to ensure that incompatible materials are not stored in the same area.
67	See revised pages D-16 and D-16a.
68	The operating pressure, design pressure and design temperature is provided on the Tank Design Sheets in Appendix C. The operating temperature is ambient temperature for the liquid waste storage room.
69	As pointed out during our meeting on June 25/26, 1990, the new tank system assessments provided in Appendix C incorporate the following documents by reference: 1. 40 CFR 264.192 and 270.16(a). 2. Design standards for the Liquid Hazardous Waste feed and storage system which includes: • Specifications for Low Pressure/Stainless Steel Tanks

NOD COMMENT NO.	RESPONSE
	• Specifications for Agitators • Specifications for Metering Pumps • Specifications for Activated Carbon Adsorber System • Specifications for Transmitting Rotameters • Specifications for Tank Level Transmitter • Drawing R-8279-D4, Liquid Waste Feed System Process and Instrumentation Diagram (NOTE: The above specifications are included in Appendix C and Drawing R-8279-D4 is included in Section D.) • Specifications and drawings associated with the foundation to support the tank systems. The certifications which have been provided by H. William Hauser, P.E. and William Douglass Henderson, P.E. constitute a written assessment, reviewed and certified by an independent, qualified registered professional engineer which fully meets the requirements of 40 CFR 264.192.
70	See page D-18.
71	See page D-19.
72	See page D-19.
73	See revised page D-19.
74	See revised pages D-19a and D-19b.

NOD COMMENT NO.	RESPONSE
75	As stated in response to NOD comment number 31, Glaxo believes that section C-1b, Tanks, is the appropriate location in the application for the general description of the tanks.
76	See revised page D-20.
77-79	These comments are based on design criteria for secondary containment systems contained in 264.193(c). As agreed during our meeting on June 25/26, 1990, Glaxo will be able to provide as built drawings upon request to document compliance with these requirements.
80	It is not possible to "provide demonstration that the leak detection system will detect the failure of either the primary or secondary containment structure on the presence of any release of hazardous waste or accumulated liquid in the secondary containment system within twenty-four (24) hours". Leak detection will be accomplished by daily inspection of the trench drain and sump as described on page D-21 and indicated on the inspection schedule (Section F).
81	See revised page D-12.
82	As stated in Section F (see Table F-5), inspections will be performed to ensure that leaked wastes will be removed from the secondary containment system within twenty-four (24) hours. As stated on page F-6, the inspection logs will be kept in the facility records for documentation.
83	Ancillary equipment will be inspected daily. See revised page F-13. Because ancillary equipment consists of pressurized above ground piping systems with automatic shut-off devices that are inspected daily, this requirement does not apply.
84	The size of all drawings presented in the permit application were selected for clarity and reader convenience. The size of drawings provided in the application are the most appropriate for their intended use.
85	See revised page D-27.

NOD COMMENT NO.	RESPONSE
86	See revised page D-27.
87	As indicated in section D-5b(1)(c), no restrictions on specific waste constituents will be imposed during Start-up/ Shakedown. Start-up/Shakedown conditions are fully described in D-5b(1)(c).
88	As discussed during our meeting on July 25/26, 1990, there is no discrepancy in the statements on pages D-28, D-33, and page 7 of the Trial Burn Plan.
89	See revised page D-29.
90	See revised page D-28.
91	Glaxo acknowledges the operating conditions which may be defined in the final permit.
92	During our meeting on June 25/26, 1990, the Hazardous Waste Section provided Glaxo with a handbook entitled "Quality Assurance/Quality Control (QA/QC) Procedures for Hazardous Waste Incineration" (January 1990). A Quality Assurance Project Plan for the Trial Burn Plan is provided. This plan should be inserted in Volume 2 of the application as Appendix G. The QA/QC associated with permit compliance and daily operation are included in Section D-5f. See pages D-48 to D-51.
93	See revised page D-30.
94	The incinerator is not a fixed multiple hearth type. It could be described as a fixed stepped hearth type incinerator.
95	See revised page D-31.
96	See revised Drawing R-8279-D5.
97	See revised page 7 of the Trial Burn Plan.

NOD COMMENT NO.	RESPONSE
98	See revised page 13 of the Trial Burn Plan. See calculations on revised page D-52. 3982 ACFM is the normal design flowrate which corresponds to a normal design retention time of 2.9 seconds. 5774 ACFM is a theoretical maximum flowrate which would correspond to a retention time of 2.0 seconds. Therefore, a minimum retention time of 2.0 seconds is ensured if the flowrate does not exceed 5774 ACFM. The stack gas velocity would be 19.6 ft/sec at a flowrate of 5774 ACFM.
99	See revised page 8 of the Trial Burn Plan.
100	See revised page 9 of the Trial Burn Plan and Figure D-1 which should be inserted in the application after Drawing R-8279-D5.
101	See revised page 10 of the Trial Burn Plan.
102	See revised page 11 of the Trial Burn Plan.
103	See revised page 12 of the Trial Burn Plan.
104	See revised page 11a of the Trial Burn Plan.
105	See revised page 12a of the Trial Burn Plan. The design and normal temperatures and pressure drops at various points in the system are listed on Drawing R-8279-D7. Dimensions are indicated on Drawing R-8279-D8. (Note: These drawings are referenced on page D-35.) A detailed engineering description of the incinerator and off-gas treatment system components is found on pages D-30 to D-40 of Section D.

NOD COMMENT NO.	RESPONSE
106	The automatic waste feed cutoff conditions are listed in Appendix B, Trial Burn Plan, pages 19-20. Implementation of cut-off conditions are achieved by automatic (programmable logic controller), independent safety circuits and manual operation of control functions. The detailed logic programs and electrical schematics for the incinerator and off-gas treatment systems have not yet been developed. The Process and Flow Diagrams and the Process and Instrumentation Diagrams included in the application in conjunction with the stated design conditions form the basis of the cut-off systems. Implementation of these design parameters into detailed schematics is not available at this time.
107	Monitoring and control devices are shown on the Process and Instrumentation Diagrams included in the application. Detailed descriptions of the process monitors and recording devices are not currently available. The exact and specific locations are not finalized at this time. This level of detailed information (final design and/or as purchased specifications) can be submitted to the Hazardous Waste Section upon request as a permit condition if necessary.
108	The HWS's recommendation to use "two thermocouples in separate wells" is acknowledged. The KVS design currently includes duplex thermocouples in a common ceramic tube at the outlet of both the Primary and Secondary Chambers. In each case one element is used for temperature recording and control and the other element is used for safety interlocking.
109	See revised Drawing R-8279-D6. Monitoring procedures are described in Section 4 of the Trial Burn Plan (Appendix B). Sampling procedures are described in Section 8.0 of the Trial Burn Plan. See revised page 16 of the Trial Burn Plan. Additional detailed information is not yet available. Glaxo understands that specific additional information may be requested as a permit condition.

NOD COMMENT NO.	RESPONSE
110	See revised page 37 of the Trial Burn Plan.
111	See revised pages D-41, D-42, and pages 31 and 35 of the Trial Burn Plan.
112	See revised page D-43.
113	See Section 5.3 of the Trial Burn Plan. Carbon tetrachloride will be added to liquid solvent waste.
114	See revised pages 34 and 35 of the Trial Burn Plan.
115	The projected normal and design (maximum) operating conditions for the air pollution control devices is provided on Drawing R-8279-D7, Off-Gas Treatment System Process Flow Diagram. A concise description of the air pollution control devices is provided in Section 3 of the Trial Burn Plan. A more detailed description of the air pollution control equipment is provided on pages D-34 to D-39. Also see Drawings R-8279-D8 and R-8279-D9.
116	See revised pages D-33 and D-33a.
117	During our meeting on June 25/26, 1990 the Hazardous Waste Section recommended the use of two POHCs for each wastestream in the event that sampling, analytical, or operational difficulties are encountered. The stated rational for the addition of these POHCs was that a demonstration of effective incineration of Dichlorobenzene and Hexachloroethane would allow Glaxo to incinerate some of the identified wastestreams in the event Glaxo failed to demonstrate effective incineration of Carbon Tetrachloride and Hexachlorobenzene. While Glaxo appreciates this recommendation, Glaxo is confident that implementation of the Trial Burn Plan will demonstrate the incinerator's ability to effectively incinerate Carbon Tetrachloride and Hexachlorobenzene and therefore all hazardous wastestreams proposed for incineration in the permit application.

NOD COMMENT NO.	RESPONSE
118	See revised page D-45 and revised Section 7.0 of the Trial Burn Plan. Also Section 10 of the QAPP (Appendix G) describes data reduction, validation and reporting.
119	See revised page D-46. Page 48 is included in the application addendum.
120	See revised inspection schedules (Tables F-1 through F-7, where applicable). It is unrealistic to list the inspection schedule, procedure and frequency of each monitor, pressure sensor, gauge and ammeter in this permit application. These items are categorized as controls or monitoring devices and will be identified and listed prior to incinerator system start-up and after receipt of the Operating and Maintenance manuals from the manufacturer. As stated in the application, these records and inspections logs will be available for review.
121(a)	Table F-5 includes the schedule and procedures for inspecting overfill controls.
121(b)	Table F-5 has been revised to specifically address the inspection of ancillary equipment. As indicated on Table F-5 data from visual inspections and the monitoring instruments (level indicator, pressure indicator) will be used daily to ensure that the tank systems are operated according to design. As indicated on Table F-5, the secondary containment system will be inspected daily for spills, leaks, cracks, or deterioration. Inspections to detect dead vegetation are not appropriate as the tanks will be located inside the Environmental Safety Facility.
121(c)	As stated on page F-6, a record of inspections will be kept at the facility for at least three years from date of inspection.

NOD COMMENT NO.	RESPONSE
122	Typical inspection log sheets are presented in Appendix C. The actual forms used may vary in format without changing the content. Because the ESF Tank Area Inspection Log Sheet is applicable to each of the three tanks a specific checklist for each tank is not necessary. Minimum tank wall thicknesses are included in the specifications in Appendix C.
123	See revised Table F-7 and revised ESF Incinerator System Inspection Log Sheet.
124	The detailed information on the controllers and specific-test circuits is not available at this time. However, the Process and Instrumentation Diagrams supplied with the RCRA Permit Application and the automatic waste feed cutoffs listed in the Trial Burn Plan (Appendix B), Section 4.4, will be tested either with electrical signals or electrical disconnection to simulate equipment failure or alarm conditions. The inspection schedules for incinerator controls already covers the procedure and frequency of inspections.
125	See revised page F-2.
126	The locations of telephones in the HMMB and ESF are depicted on Drawings R-8279-D1 and R-8279-D2. These drawings are referenced on revised page F-2 and revised page F-18.
127	See revised page F-18.
128	See revised page F-19. Procedures to prevent hazards in all loading/unloading operations are described in Section F-4a. Procedures to prevent hazards during transfer operation are described in Sections C-1a, F-5b, F-5d, F-5e, and F-5f.
129	See revised page F-19a.
130	See revised page F-20.

NOD COMMENT NO.	RESPONSE
131	See revised page F-21. As stated in Section C-1a, solvent waste is accumulated in safety containers. Discarded commercial chemical product wastes will be in their original containers. Scintillation fluid is contained in vials. Containment of waste as described prevents undue exposure of laboratory personnel to hazardous waste.
132	Waste transfer operations (i.e. transfer of waste to or from a 55-gallon container) will take place in the segregated waste handling areas in the HMMB and ESF. Therefore, the precautions described in F-5a are applicable during waste transfer operations.
133	As stated, the walk-in fume hood in the HMMB will be located in the Hazardous Material Laboratory. (See Drawing R-8279-D1). As discussed during our meeting on June 25/26, 1990, fume hoods are not required for the transfer of solvent waste into the waste accumulation safety can in the laboratory. Also as discussed, physical trial methods will not be used to ensure that incompatible or reactive wastes are not placed in a solvent waste safety container. As stated in Section F-5d procedures to ensure that incompatible wastes are not placed in the same container are addressed in Sections C-2d, F-5a, and F-5b.
134	See revised page F-24 and Section D-2g, Controls and Practices to Prevent Spills and Overflows.
135	It is Glaxo's opinion that Drawing R-8279-B7 provides adequate detail to depict the R&D facilities, property boundaries and access roads to the hazardous waste management facilities. If "a more complete detailed site plan" is required to be part of the Contingency Plan please specify what specific additional information is needed. See revised page G-4.

NOD COMMENT NO.	RESPONSE
136	See revised page G-6.
137	See revised page G-4.
138	See revised pages G-4 and G-9.
139	See revised page G-9a.
140	See revised page G-12. The manual or automatic closing of doors in response to the activation of the fire alarm system will not prevent the evacuation of personnel as the doors will not be locked.
141	The procedures for isolating containers so that fires, explosions and releases do not occur are contained throughout the RCRA application. Glaxo designed the hazardous waste storage facilities to provide separate storage and containment areas for wastes of different hazard classes (i.e. ignitable, acidic, corrosive, etc.). In the case of a fire, which is not immediately controlled or an explosion, Glaxo personnel will not attempt to remove or isolate containers to prevent the spread of the fire, explosion or release. The automatic and manually initiated multiplex fire alarm and sprinkler system is designed to control the spread of a fire (see Section G-5). Based on the design of the container storage areas, removing containers from the storage areas would not be an appropriate response to ensure that fires, explosions or releases do not occur, reoccur, or spread to other hazardous wastes at the facility except as required to contain and clean up a spill or release. Section G-4d(2) and Section G-4j provide a discussion of emergency response procedures for leaks and/or spills.
142	Table G-III provides a description of materials and equipment for spill containment and clean-up. Specific decontamination procedures for equipment and the affected area will depend on the nature of the release. See revised page G-17.

NOD COMMENT NO.	RESPONSE
143	The procedures used to determine the characteristics of the waste materials are the same as those described in Section G-4b, Identification of Hazardous Wastes. All reactive wastes will be contained in sealed containers. The automatic sprinkler system is intended to prevent flames or heat from affecting the reactive wastes in the event of a fire. It is possible that water reactive wastes could react with the fire water. However, this possibility does not warrant <u>not</u> attempting to suppress a fire with the automatic sprinkler system.
144	Additional information on the decontamination of reusable equipment is provided on revised page G-17. As stated, after an emergency event, equipment and supplies will be replaced as needed. Before operations are resumed, an inspection of all safety equipment will be conducted (see Sections F-2a and F-2b for inspection requirements).
145	(1) See Drawings R-8279-D1, R-8279-D2, Table G-III and page G-22. (2) See Drawings R-8279-D1, R-8279-D2 and page G-22. (3) See Drawings R-8279-D1, R-8279-D2, and page G-24. The precise locations where personal protective equipment will be stored have not yet been determined and, therefore, have not been specified in the permit application. (4) See revised page G-24. The precise locations where first-aid kits will be located have not been determined. However, first-aid kits will be located in accordance with OSHA requirements. First-aid kits will contain supplies to meet OSHA requirements.

NOD COMMENT NO.	RESPONSE
	(5) Decontamination equipment will include water, detergent and a high pressure cleaner (steam jenny). The specific locations for these have not yet been determined and, therefore, have not been specified in the permit application. See revised page G-17.
	(6) See Drawings R-8279-D1 and R-8279-D2.
146	See revised page G-25.
147	See revised page G-26.
148	See revised pages G-26 and G-28.
149	See revised pages H-13, H-15, and H-18.
150	See revised page H-19.
151	See revised page H-26.
152	See revised pages H-28, and H-32.
153	See revised page H-35.
154	See page H-2.
155	See revised page I-1.
156	All inventories of hazardous waste in the application should not be consistent. Inventories in Section I are based on waste contained in containers for which unit off-site disposal costs are available. Inventories in Section D are based on waste in containers which will be used for on-site storage. Section D inventories are used for calculating containment requirements and are, therefore, based on maximum quantities of waste in specific storage areas. The inventory presented In Section I is intended to represent the maximum quantity of solvent waste which could be located in the HMMB at closure. Therefore, the maximum waste inventory calculations have included a 55-gallon waste accumulation container for each of the three types of solvent wastes.

NOD COMMENT NO.	RESPONSE
	These accumulation containers will be located in the Hazardous Material Lab (see Section C-1a). Note that the maximum waste inventory for the three types of solvent waste in the flammable waste storage area includes radioactive solvent wastes. The maximum waste solvent inventory used for Section I calculations include: 1. Seven (7) drums of halogenated solvent in the flammable waste storage area; 2. Fourteen (14) drums of non-halogenated solvent in the flammable waste storage area; 3. Seven (7) drums of radioactive solvent in the flammable waste storage area; and 4. Three (3) accumulation drums in the Hazardous Materials Lab. Note that the inventory of waste in the flammable waste storage area is twenty-eight (28) drums. This quantity was correctly used on page D-6 for calculating the required containment volume.
157	The maximum waste inventory for radioactive solvent wastes includes both 55-gallon drums which will be stored in the flammable waste storage area and one gallon containers which will be stored in the radioactive waste storage area (see description of radioactive solvent waste beginning on page C-20).
158	See revised page I-4.
159	As stated on page I-4, Glaxo will maintain the inspection schedule outlined in Section F-2d during the closure period.
160	Revised page I-6 provides additional information on soil sampling.

NOD COMMENT NO.	RESPONSE
	See Section I-1e pages I-5 to I-9 for the specific information on how facility equipment structures will be decontaminated when closure is completed. The level of detail provided satisfies the applicable requirements of 40 CFR 264.112(b)(4) and 264.114.
161	Metals, except in de minimis quantities, will not be included in any of the wastestreams generated by Glaxo. Analysis for inorganic parameters during decontamination procedures is not considered appropriate.
162	See revised page I-8.
163	See revised pages I-8 and I-8a.
164	See revised page I-9.
165	See revised page I-11.
166	The maximum waste inventory calculations are included in Section I-1c, Maximum Waste Inventory. As explained in item 156 above, the inventory of waste shown in Section I-1c should not be identical to the inventory of waste used in Section D. Section D inventories are based on waste contained in containers used for the storage of waste at the Glaxo facility. In order to develop the closure cost estimate based on the maximum waste inventory, it has been assumed that some wastes (i.e., lab packs) would be repackaged into 55-gallon drums. For example, reactives will be stored at Glaxo in 28 nalgene trays with a maximum capacity of 15 one gallon containers per tray (see page D-8). This equals 420 gallons which was the basis for designing secondary containment. However, in order to develop a closure cost estimate based on a unit disposal cost for 55-gallon lab pack drums of reactive waste (a disposal cost for one gallon containers is not available), we estimated that 15 gallons of reactive waste will be contained in a 55-gallon lab pack drum

NOD COMMENT NO.	RESPONSE
	(see page I-3). As shown on page I-3, 420 gallons is equivalent to twenty-eight (28) 55-gallon containers each containing 15 gallons of reactive lab packs. These 28 drums, when added to the 5 drums (non lab pack reactives) make up the 33 drums which is used in the closure cost estimate (see page I-14). Similarly the acid and caustic waste storage areas contain wastes in nalgene trays. The maximum waste inventory in Section I-1c for these wastes is also based on transferring lab pack containers to 55-gallon drums (i.e., 15 gallons of discarded commercial chemical product waste per 55-gallon container). The inventory of solvent wastes appears different in Section D and Section I because the maximum waste inventory in Section I includes the three solvent waste accumulation drums in the Hazardous Materials Lab. This was done to account for a worst case scenario (i.e., maximum quantity of waste on-site at closure). These accumulation drums are not accounted for in Section D containment calculations because they are accumulation containers not storage containers. The accumulation containers will be transferred to the flammable waste storage area for storage upon being filled. Another reason why the inventories in Section D and Section I appear different is that radioactive wastes are stored in 55-gallon containers in the flammable wastes storage area and in one gallon containers in the radioactive waste storage area. In calculating the maximum waste inventory for off-site disposal we estimated that the contents of 45 one gallon containers will be placed in a 55-gallon container (see page I-3).

NOD COMMENT NO.	RESPONSE
	In order to calculate the required containment capacity in the scintillation vial storage room, the inventory of scintillation fluid waste is expressed in terms of gallons of liquid (see on page D-11). However, the unit cost for off-site disposal is given as $75 per cubic foot. Therefore it was necessary to describe the maximum waste inventory in Section I-1c in terms of cubic feet. See revised page I-13 for a statement that "the cost estimate is based on third party costs." Possible decontamination costs for re-cleaning and re-analysis if decontamination cannot be verified by the first analytical sample have not been included because Glaxo does not anticipate that re-cleaning and re-analysis will be needed. Glaxo recognizes that it is possible that re-cleaning and re-analysis may be needed and has stated in Section I-1e that "the decontamination process will be continued until analysis of the wash water demonstrates that decontamination is complete." However, it is not reasonable to estimate decontamination costs based on the possibility that the initial decontamination may not be successful.
167	In accordance with 10 NCAC 10F.0032(q)(6), a minimum of two observation wells, one upgradient and one downgradient of the facility, must be installed. The primary purpose of these wells is to establish background groundwater concentrations for all hazardous wastes that Glaxo will store and/or treat. In developing the well location map Glaxo considered this objective and the physical and access constraints which exist at the site. The northern most well is proposed to satisfy the requirement for one well downgradient of the facility. The southern most well is proposed to satisfy the requirement for one well upgradient of the facility. The eastern most well is proposed to provide a third point to measure groundwater elevations in order to confirm the predicted groundwater flow direction. (The predicted groundwater flow direction is based on measurements from temporary observation wells.)

NOD COMMENT NO.	RESPONSE
	In the NOD, it is stated that the downgradient well should be located immediately downgradient of the hazardous waste units. Rule .0032(q)(6) does not support this statement. As stated in rule .0032(q)(6) the purpose of the wells is to establish background conditions only. The proposed wells are not intended to be detection monitoring wells. Monitoring well details including well screen lengths, elevations, and placements in relation to bedrock are included on the Groundwater Monitoring Installation Detail sheets. These sheets should be inserted in Appendix E as section 8.
168	The worksheets to demonstrate substantial compliance per 10 NCAC 10F .0034(h) are provided. Please insert this information in Appendix E as section 9.
169	Information to address the EPA proposed amendments to Subpart O, Part 264 is currently being developed. This information will be submitted as soon as possible.

FIRST NOTICE OF DEFICIENCY
GLAXO, INC.
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27709
NCD065655599

1 Editing Comment: All references to "North Carolina Hazardous Waste Branch" should be changed to "North Carolina Hazardous Waste Section", and all references to "North Carolina Department of Human Resources" should be changed to "North Carolina Department of Environment, Health, and Natural Resources", throughout the permit application.

PART A - APPLICATION
[40 CFR 270.13 as adopted in 10 NCAC 10F .0034]

2 FORM 1, I
The EPA ID Number given on this page is incorrect for this facility. The correct EPA ID Number is NCD065655599. Correct all subsequent listings of Glaxo's EPA ID Number.
[40 CFR 270.13]

3 FORM 1, X
List only permits that are existing. Glaxo does not have a RCRA permit.
[40 CFR 270.13(k)]

FORM 3, II.A.
Operation will most probably not begin by November 1, 1990.
[40 CFR 270.13(g)]

5 FORM 3, III.B.
The amounts listed for container storage (S01) do not agree with process design capacities listed elsewhere in the Part B. Correct these discrepancies.
[40 CFR 270.13(i)]

6 FORM 3, IV
All waste that Glaxo plans to incinerate and/or store must be listed in the Part A application. Also identify the mixed radioactive and hazardous wastes.
[40 CFR 270.13(j)]

7 Editing Comment: Provide more specific page numbers for this section (i.e. 3A of 5, 3B of 5).

Place the correct EPA ID Number in the space provided on page 4.

PART B - FACILITY DESCRIPTION
[40 CFR 270.14 as adopted in 10 NCAC 10F .0034]

B-2 - Topographic Map
Topographic Map R-8279-B3 must depict the topography of the area extending 1,000 feet beyond Glaxo's property boundary and all surface

waters on or near the facility, including intermittent streams. Also identify the loading/unloading areas as described on page B-6.
[40 CFR 270.14(b)(19)]

9 B-2g - Wind Rose
Include a more recent wind rose in the application.
[40 CFR 270.14(b)(19)]

10 B-4 - Traffic Information
Describe access road surfacing and load bearing capacity.
[40 CFR 270.14(b)(10)]

PART C - WASTE CHARACTERISTICS
[40 CFR 264 as adopted in 10 NCAC 10F .0032]
[40 CFR 270 as adopted in 10 NCAC 10F .0034]
[40 CFR 268 as adopted in 10 NCAC 10F .0042]

11 C-1 - Chemical and Physical Analysis
Indicate which wastes are solid hazardous wastes and describe how they are handled (i.e. collected, stored, treated).
[40 CFR 264.13(a), 270.14(b)(2)]

12 Editing Comment: Be sure that the correct EPA Waste ID Numbers are listed for 1,4 Dioxane (U108), Xylene (F003, U239), and designate the isomer for Dichloroethane on page C-4.

13 Editing Comment: Provide the P or U designations for discarded commercial chemical products where applicable (e.g. Acrylic Acid is U008). The CAS number for Sulfuryl Chloride is 7791-25-5.

14 Indicate in the descriptions on pages C-12 to C-15 whether the infectious/medical solid waste, radioactive solvent waste, and scintillation vials will be incinerated
[40 CFR 264.13(a), 270.14(b)(2)]

15 List quantities for the hazardous wastestreams 1.a) and b) on page C-17.
[40 CFR 264.13(a), 270.14(b)(2)]

16 Describe the incinerator wastestream in more detail. Include all wastes from the incineration process (i.e. HEPA filters) and explain how they are handled and estimate the quantity generated.
[40 CFR 264.13(a), 270.14(b)(2)]

17 Describe the off-site wastes and explain how they are handled and estimate the quantity to be received.
[40 CFR 264.13(a), 270(b)(2)]

18 C-1a - Containers
Indicate whether radioactive solvent waste will be segregated in the flammable waste storage area.
[40 CFR 264.174]
Describe the fate of the boxes of scintillation vials.
[40 CFR 264.173]

Demonstrate that the incinerator wastes do not contain free liquids and describe how all of these wastes are handled (i.e. HEPA filters). [40 CFR 264.175]

C-1b - Tanks

21 Discuss the specific gravity of wastes, the waste specific parameters based on hazardous designation, incompatibilities, and other information required for safe operation. Clarify whether discarded commercial chemical products will ever be stored in tanks. [40 CFR 264.194]

22 Discuss sampling of the wastes stored in tanks. [40 CFR 264.194]

23 C-1d - Incinerators
More specific information is needed on the wastes to be treated by incineration (i.e. physical form of non-liquids, chlorine content, ash content). In addition, discuss the heat values given on page C-25 in relation to those given in the Trial Burn Plan. [40 CFR 270.62(b)(2)(i)]

24 Pertaining to the wastestream compositions beginning on page C-26, separate the non-Appendix VIII hazardous constituents from the Appendix VIII constituents and include heat value, water, chlorine, and ash content. According to page C-14, the water content of the radioactive solvent stream will be higher (up to 50%). Discuss the composition of this stream. [40 CFR 270.62(b)(2)(i)]

25 C-2 - Waste Analysis Plan
Editing Comment: Incinerator ash, spent lime, used HEPA filters, and scintillation vials are hazardous wastes generated by Glaxo. The statement at the bottom of page C-29 is misleading.

Discuss used HEPA filters and any other hazardous wastes generated by Glaxo which have not been described. [40 CFR 264.13]

26 C-2a - Parameters and Rationale (Checklist C-2a, 2b)
Editing Comment: Note that the HCl limit set in Glaxo's permit will be risk based. The maximum HCl emission rate will be no greater than 4.0 lb/hr.

27 Discuss parameters and rationale and test methods for any additional analysis of wastes before storage or incineration (i.e. radioactive waste, solid waste). [40 CFR 264.13(b)(1)]

28 Discuss the water content limit of 30%, given on page C-32. [40 CFR 264.13]

Discuss the fate of wastes which do not meet the given parameters.
[40 CFR 264.13(b)]

30 C-2b - Sampling Methods (Checklist C-2c)
More detailed information is needed on the specific sampling methods which will be used to obtain representative samples of the wastes to be analyzed.
[40 CFR 264.13(b)(3)]

31 Editing Comment: The specific information supplied in this section would be more appropriate in Section D.

32 C-2c - Frequency of Analysis (Checklist C-2d)
More detailed information is needed on the frequency of analysis for all testing to be performed on the wastes.
[40 CFR 264.13(b)(4)]

33 C-2e - Additional Requirements for Wastes Generated Off-Site
Clarify whether these wastes will be transferred to tanks for incineration, fed as solid hazardous wastes, or stored and shipped off-site.
[40 CFR 264.13]

34 Provide a description of the procedures used to inspect and/or analyze waste generated off-site that includes: the procedures which will be used to determine the identity of each movement of waste managed at the facility; sampling methods and frequency; waste analysis information supplied by generator.
[40 CFR 264.13, 264.73]

35 C-2d - Additional Requirements for Ignitable, Reactive or Incompatible Waste (Checklist C-2f)
Describe the procedure for determining which discarded chemical products will be incinerated, how they will be segregated, and how they will be fed to the incinerator.
[40 CFR 264.13(b)(6)]

36 C-3a - Waste Characteristics
Discuss any wastes which will be shipped off-site for non-incineration disposal.
[40 CFR 268.7]

37 Provide an analysis plan for all wastes that are stored on-site and shipped off-site for purposes other than incineration to determine possible restrictions from land disposal.
[40 CFR 268.30, 268.31, 268.32, 268.33]

38 C-3a(1) - Waste Characteristics: Solvent and Dioxin-Containing Wastes
Discuss the applicable parameters and analytical methods Glaxo will use to determine if any waste to be disposed is restricted from land disposal due to solvent or dioxin content.
[40 CFR 268.30, 268.31]

39 C-3a(2) - Waste Characteristics: California Wastes
Discuss the applicable parameters and analytical methods Glaxo will use to determine if any waste to be disposed is restricted from land disposal due to California listed waste content.
[40 CFR 268.32]

Clarify why Glaxo does not presently know if the wastes to be incinerated or shipped off-site for disposal contain California listed wastes.
[40 CFR 268.32]

40 C-3a(3) - Waste Characteristics: First Third Wastes
Discuss the applicable parameters and analytical methods Glaxo will use to determine if any waste to be disposed is restricted from land disposal due to First Third waste content.
[40 CFR 268.33]

Clarify why Glaxo does not presently know if the wastes to be incinerated or shipped off-site for disposal contain First Third wastes.
[40 CFR 268.33]

41 C-3b - Additional Requirements for Treatment Facilities
Editing Comment: Incineration is not the best available technology for all of Glaxo's hazardous wastes. Delete or rephrase the statement "incineration is considered to be the best available technology for Glaxo's hazardous waste" on page C-38.

PART D - PROCESS INFORMATION
[40 CFR 264 as adopted in 10 NCAC 10F .0032]
[40 CFR 270 as adopted in 10 NCAC 10F .0034]

42 D-1a(1) - Basic Design Parameters, Dimensions, and Materials of Construction
State that an engineering evaluation of the structural integrity of the concrete bases of the waste storage and handling areas of the HMMB and ESF will be provided after construction. Also discuss compatibility of the base with the wastes and specify the imperviousness of the base.
[40 CFR 264.175]

43 State that wastes will also be stored in tanks and describe how scintillation vials will be stored.
[40 CFR 264.175]

44 Editing Comment: The statement "Radioactive solvent wastes may be stored in 55-gallon or one-gallon containers" (see page D-4) does not agree with the description on page D-7 or with the required containment volume calculation on page D-10. Correct this discrepancy.

D-1a(2) - Description of How Design Promotes Drainage
Specify how many drums per pallet and whether pallets of drums will be stacked.
[40 CFR 270.15(a)(2), 264.175(b)(2)]

46 Discuss how scintillation vials are kept from contact with standing liquids in the containment system.
[40 CFR 270.15(a)(2), 264.175(b)(2)]

47 Describe and depict the drainage design and removal system for the HMMB (see Drawing R-8279-D1) and any other hazardous waste areas (i.e. incinerator room).
[40 CFR 270.15(a)(2), 264.175(b)(2)]

48 Discuss the drainage systems from the acid/caustic storage areas. Discuss any incompatibility problems.
[40 CFR 270.15(a)(2), 264.175(b)(2)]

49 D-1a(3) - Capacity of the Containment System
Editing Comment: On page D-6, state that the largest tank in storage is 1,000 gallons.

50 Describe in detail how containment capacity of the elementary neutralization system is assured at all times. Describe how flow is regulated at 106 gallons per minute.
[40 CFR 270.15(a)(3), 264.175(b)(3)]

51 D-1a(4) - Provisions for Preventing or Managing Run-On
Describe any measures taken to minimize run-on in the loading/unloading areas of the HMMB and ESF.
[40 CFR 264.175(b)(4)]

52 D-1a(5) - How Accumulated Liquids can be Analyzed and Removed to Prevent Overflow
Spilled or leaked waste must be removed from sump or collection areas as necessary to prevent overflow of the collection systems.
[40 CFR 264.175(b)(5), 270.15(a)(5)]

53 Describe in detail the removal equipment and methods to be used, including pump design, piping specifications, location, discharge point and capacity.
[40 CFR 264.175(b)(5), 270.15(a)(5)]

54 Describe any procedures used to prevent overflow of the elementary neutralization system.
[40 CFR 264.175(b)(5), 270.15(a)(5)]

55 Describe removal methods for spilled waste in the radioactive storage area and other areas that have Nalgene tray shelving units.
[40 CFR 264.175(b)(5), 270.15(a)(5)]

56 Discuss methods for absorbent material collection, analyses, storage and disposal.
[40 CFR 264.175(b)(5), 270.15(a)(5)]

57 Describe how spilled waste will be analyzed if the original container cannot be determined. Discuss disposal of any accumulated waste.
[40 CFR 264.175(b)(5), 270.15(a)(5)]

58 <u>D-1b - Containers Without Free Liquid</u>
Discuss any other wastes stored in containers that do not contain free liquids.
[40 CFR 270.15(b)]

59 <u>D-1b(1) - Test for Free Liquids</u>
Discuss how Glaxo will document that any wastes designated as a waste without free liquids has passed the Paint Filter Test (Method 9095).
[40 CFR 270.15(b)(1)]

60 <u>D-1b(2) - Description of Storage Area Design and Operation to Drain and Remove Liquids or How Containers Are Kept From Contact with Standing Liquids</u>
Provide a detailed description of the dry hazardous waste storage area and clearly label Drawing R-8279-D2. Discuss what free liquids might be in this storage area.
[40 CFR 264.175(c), 270.15(b)(2)]

61 <u>D-1c - Container Management</u>
Describe the dimensions and volumes of the fiber drums and cardboard safety boxes which will be used by Glaxo.
[40 CFR 264.170]

62 Discuss procedures for container handling with regards to prevention of rupturing or leaking. Describe transfer procedures and identify the walk-in fume hood on Drawing R-8279-D1.
[40 CFR 264.173]

63 Specify the location of ignitable, reactive and incompatible waste and discuss segregation of waste.
[40 CFR 264.176, 264.177(c)]

64 Discuss any procedures to ensure compatibility of wastes which are placed in the same container.
[40 CFR 264.177(a)]

65 Discuss the fate of all empty containers.
[40 CFR 264.177(b)]

66 Describe segregation of waste containers (e.g. radioactive vs. non-radioactive, on-site vs. off-site disposal, etc.) within each storage area.
[40 CFR 264.170]

67 Discuss management of a hazardous waste container which is not in good condition (e.g. severe rusting, apparent structural defects) or which begins to leak.
[40 CFR 264.171]

68 D-2 - Tank Systems
Include operating pressure and temperature for each tank described on page D-17.
[40 CFR 264.190]

69 D-2b - New Tank System
More specific information is required in the written assessment, reviewed and certified by an independent, qualified registered professional engineer, on the structural integrity and suitability of each tank system for handling hazardous waste. The written assessment that is submitted in the application must contain all of the following information:

(a) Owners or operators of new tank systems or components must obtain and submit to the Department, at time of submittal of Part B information, a written assessment, reviewed and certified by an independent, qualified registered professional engineer, in accordance with 270.11(d), attesting that the tank system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste. The assessment must show that the foundation, structural support, seams, connections and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail. This assessment, which will be used by the Department to review and approve or disapprove the acceptability of the tank system design, must include, at a minimum, the following information:

(1) Design standard(s) according to which tank(s) and/or the ancillary equipment are constructed;
(2) Hazardous characteristics of the waste(s) to be handled;
(3) Design considerations to ensure that:
(i) Tank foundations will maintain the load of a full tank.

70 (b) The owner or operator of a new tank system must ensure that proper handling procedures are adhered to in order to prevent damage to the system during installation. Prior to covering, enclosing or placing a new tank system or component in use, an independent, qualified installation inspector or an independent, qualified, registered professional engineer, either of whom is trained and experienced in the proper installation of tank systems or component, must inspect the system for the presence of any of the following items:

(1) Weld breaks;
(2) Punctures;
(3) Scrapes of protective coatings;
(4) Cracks;
(5) Corrosion;
(6) Other structural damage or inadequate construction/ installation.

All discrepancies must be remedied before the tank system is covered, enclosed, or placed in use.

71 (d) All new tanks' equipment must be tested and ancillary equipment must be tested for tightness prior to being covered, enclosed, or placed in use. If a tank system is found not to be tight, all repairs necessary to remedy the leak(s) in the system must be performed prior to the tank system being covered, enclosed, or placed in use.

72 (e) Ancillary equipment must be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.

73 (f) The owner or operator must obtain and keep on file at the facility written statements by those persons required to certify the design of the tank system and supervise the installation of the tank system in accordance with the requirement of paragraphs (b) through (f) of this section, that attest that the tank system was properly designed and installed and that repairs, pursuant to paragraphs (b) and (d) of this section, were performed. These written statement must also include the certification statement as required in 270.11(d) of this chapter.

[40 CFR 264.192]

74 <u>D-2b(3) - Description of Tank System Installation and Testing Plans and Procedures</u>

Provide a description of the support system and spacing for the ancillary equipment.
[40 CFR 264.192(e)]

75 <u>D-2c - Dimensions and Capacities of Each Tank</u>

Include information given in the general description of C-1b Tanks (pages C-23 and 24) in this section.
[40 CFR 270.16(b)]

76 <u>D-2d - Description of Feed Systems, Safety Cutoff, Bypass Systems and Pressure Controls</u>

The statement that "waste will be fed from drums into the incinerator" is not consistent with other information in the application. Explain this discrepancy. Also include more specific information on pressure controls, feed system flow controls, safety cutoff, and bypass systems. Describe how the electrical solenoids will shut down the valves during a power outage.
[40 CFR 270.16(c)]

D-2f - Containment and Detection of Releases
D-2f(1) - Plans and Description of the Design, Construction and Operation of the Secondary Containment System

Provide proof that secondary containment materials are compatible with the wastes in the tank system.
[40 CFR 264.193(c)(1)]

78 Provide information to show that the system has sufficient strength and thickness to prevent failure due to pressure gradients, physical contact with the wastes, climatic conditions, and stress of daily operation.
[40 CFR 264.193(c)(1)]

79 Provide calculations to prove that the system is placed on a foundation or base that is capable of providing support, resisting pressure gradients above and below the system, and preventing failure due to settlement, compression or uplift.
[40 CFR 264.193(c)(2)]
Provide description of the leak detection system, including its operating principle, design features, and operating procedures.
[40 CFR 264.193(c)(3)]

80 Provide demonstration that the leak detection system will detect the failure of either the primary or secondary containment structure or the presence of any release of hazardous waste or accumulated liquid in the secondary containment system within twenty-four (24) hours.
[40 CFR 264.193(c)(3)]

81 The containment area of the ESF Liquid Waste Storage Room must hold 100% of the volume of the largest tank plus 10% of the volume of the containers or the largest container's volume. This is 1000 gallons plus 55 gallons for a total of 1055 gallons. The total containment capacity of 1017 gallons given on page D-12 is not sufficient.
[40 CFR 264.193(e)(1)(i)]

82 Document how it will be ensured that spilled or leaked wastes will be removed from the secondary containment system within twenty-four (24) hours.
[40 CFR 264.193(c)(4)]

83 D-2f(1)(d) - Secondary Containment and Leak Detection Requirements for Ancillary Equipment

Provide a description of secondary containment for the ancillary equipment of the tank systems. Ancillary equipment must be provided with secondary containment (e.g. trench, jacketing, double-walled piping) that meets the requirements of 40 CFR 264.193(b) and (c) except for:

1) aboveground piping (exclusive of flanges, joints, valves, and other connections) that are visually inspected daily,
2) welded flanges, joints, and connections that are visually inspected daily,
3) Sealless or magnetic coupling pumps that are visually inspected daily, and
4) pressurized above ground piping systems with automatic shut-off devices that are visually inspected daily.

[40 CFR 264.193(f)(1)-(4)]

D-5 - Incinerator Design
Submit original size drawings (same size as drawings in Appendix F) for all drawings in the application.
[40 CFR 270.62(b)(2)(ii)]

85 D-5b(1)(b) - Startup/Shakedown Performance
Estimate the HCl emissions coming from the incinerator stack (i.e. after the Air Quality Control System).
[40 CFR 264.343(b)]

86 The limit for particulate emissions is 0.08 grains/dscf corrected for the amount of oxygen in the stack gas. Correct this.
[40 CFR 264.343(c)]

87 D-5b(1)(c) - Startup/Shakedown Conditions
Submit a statement which suggests conditions necessary to achieve compliance during startup/shakedown including restrictions on waste constituents and allowable variations in systems design or operating procedures.
[40 CFR 270.62(a)(1)]

88 Editing Comment: The statement that "the temperature in the primary combustion chamber will be maintained between 1000° F and 2000° F" on page D-28 conflicts with the description of "an equilibrium operating temperature of 1600° F or greater" on page D-42. Correct this discrepancy. See page D-33 and page 7 of the trial burn plan.

89 Explain how a negative pressure in the combustion zone will be maintained and verified.
[40 CFR 264.345(d)]

90 Provide the calculations used to derive the maximum stack gas velocity of 26.7 ft/sec and discuss how this relates to residence time in the incinerator.
[40 CFR 264.344(c)(1)]

91 D-5b(2) - Trial Burn Plan
(1.3 Permit Limitations)
Incinerator operating conditions which may be defined in the final permit include the following:

1) Minimum temperature measured at each combustion chamber exit,
2) Maximum CO emissions measured at the stack,
3) Maximum flue gas flowrate or velocity at the stack,
4) Maximum pressure in each combustion chamber,
5) Maximum feed rate of each waste type,
6) Minimum caustic feed to dry scrubber; minimum pressure differential across baghouse,
7) POHC incinerability limits,
8) Maximum total halides, metals, and ash feed rates to the incinerator system,
9) Maximum size of batches or containerized waste,
10) Maximum total heat input capacity for each chamber,

11) Liquid injection chamber burner settings: maximum viscosity of pumped waste; maximum burner turndown, minimum atomization fluid pressure, minimum waste heat value if waste provides 100% heat input.

92 Provide a Quality Assurance Project Plan (QAPjP) as a companion document to the Trial Burn Plan (TBP). The QAPjP will define QA/QC procedures to control and evaluate data quality for process monitoring, sampling, and analysis for both the initial trial burn and for later continuing operation of the incineration facility. Since the QAPjP covers all the QA/QC procedures necessary to fulfill the objectives of the trial burn, many areas of the TBP and QAPjP will overlap. The TBP is considered the primary document and the QAPjP may refer to subjects already considered in the TBP.
[QA/QC Procedures for Hazardous Waste Incineration, EPA/625/6-89/023]
[40 CFR 264.345]

93 D-5b(2)(a) - Incinerator Performance
Editing Comment: The phrase "operating conditions during startup/shakedown" should be changed to "operating conditions during the trial burn" on page D-30.

94 D-5b(2)(b) - Detailed Description and/or Drawing of the Incinerator
Clarify whether the incinerator is a fixed multiple hearth type incinerator.
[40 CFR 270.62(b)(2)(ii)]

95 Clarify whether the incinerator is fed from more than one (1) tank simultaneously.
[40 CFR 270.62(b)(2)(ii)]

96 Clarify on Drawing R-8279-D5 where the flue gases will pass from the primary chamber to the secondary chamber.
[40 CFR 270.62(b)(2)(ii)]

97 Clarify exactly where in the system dry lime will be added to the flue gases. Descriptions on page 36 of the application and page 7 of the TBP are conflicting.
[40 CFR 270.62(b)(2)(ii)]

98 Clarify that the prime mover is an induced draft fan. Discuss the relationship of the design capacity of 5600 ACFM for the fan and the maximum stack gas velocity of 26.7 ft/sec (corresponds to 7840 ACFM).
[40 CFR 270.62(b)(2)(ii)]

99 On page 8 of the Trial Burn Plan (TBP), clarify whether the solid waste may or may not be hazardous waste.
[40 CFR 270.62(b)(2)(ii)]

100 On page 9 of the TBP, include the cross sectional areas of the combustion chambers. Describe movement of waste and ash through the

primary chamber and supply a cross sectional drawing to depict this internal system (i.e. provide a detailed description).
[40 CFR 270.62(b)(2)(ii)]

101 The statement on page 10 of the TBP that "the liquid (solvent) waste is not atomized into the incinerator" conflicts with references to addition of a liquid waste feed nozzle in other portions of the application (page D-39 of the application and page 2 of the TBP), and conflicts with good engineering design principles. Provide a detailed description of the nozzle and burner design.
[40 CFR 270.62(b)(2)(ii)(H)]

102 Provide a more detailed description of the recirculation tower (gas mixer). Discuss where hot and cooled flue gases enter and exit and any internal mixing devices (e.g. baffles).
[40 CFR 270.62(b)(2)(ii)]

103 Provide a detailed description of the lime injection system depicted in Drawing R-8279-D8 and show on other drawings of the off-gas treatment system where lime will be injected.
[40 CFR 270.62(b)(2)(ii)]

104 Provide a more detailed description of the air to flue gas heat exchanger. Discuss how hydrated lime will affect the heat exchanger and provide overall dimensions.
[40 CFR 270.62(b)(2)(ii)]

105 Provide a more detailed description of the dry reactor, dust conditioning drum, fabric filter (baghouse), and flyash removal system including discussion of gas temperatures, pressure drop, and dimensions.
[40 CFR 270.62(b)(2)(ii)]

106 Provide a detailed description of the automatic waste feed cut-off system.
[40 CFR 270.62(b)(2)(ii)(F)]

107 Provide specific locations and detailed descriptions of all temperature, pressure, flow indicating and control devices, stack gas monitoring equipment, and recording devices.
[40 CFR 270.62(b)(2)(ii)(G),(J)]

108 <u>D-5b(2)(c) - Sampling and Monitoring Procedures</u>
The use of two (2) thermocouples in separate wells is recommended to provide a check on continued proper operation. Thermocouples should be located where gas velocity is high, but not within a direct line of sight of the flame.
[40 CFR 270.62(b)(2)(ii)(J), (iii)]

Provide a more detailed description of sampling and monitoring procedures including:

1) sampling and monitoring equipment,
2) sampling and monitoring frequency,
3) analytical procedures,
4) sampling and monitoring locations,
5) quality assurance/quality control programs.

[40 CFR 270.62(b)(2)(iii)]

110 D-5b(2)(d) - Test Schedule

It is recommended to plan only one (1) run per day, except in special cases when sampling is less complex than usual. EPA requires three (3) replicate runs for each set of operating conditions during the trial burn. Data from all runs must be submitted and will be considered in determining compliance with the performance standards and determining the final operating conditions.
[40 CFR 270.62(b)(2)(iv)]

111 Editing Comment: Rephrase the statement that "Each trial burn is scheduled for one 8-hour day", on page D-42. Table 6-2 should read "TEST STAGE #2" on page 35 of the TBP. Rephrase the statement that trial burn "activities are expected to require two (2) days of testing," on pages D-41-42.

Discuss additional waste accumulated or provided in the event of mistrials, aborted runs or other incinerator problems.
[40 CFR 270.62(b)(2)(iv)]

112 D-56(2)(e) - Test Protocols

Clarify if the secondary chamber temperature during test stage #2 will be 1900° F or 2000° F (see page D-43 and page 35 of the TBP).
[40 CFR 270.62(b)(2)(v)]

113 Explain why Tables 6-1 and 6-2 of the TBP list separate feed rates for liquid waste and carbon tetrachloride.
[40 CFR 270.62(b)(2)(v)]

114 Describe combustion gas velocity/flue gas flowrate for each test condition.
[40 CFR 270.62(b)(2)(v)]

115 D-5b(2)(f) - Pollution Control Devices

Provide a concise complete description of and planned operating conditions for all pollution control devices.
[40 CFR 270.62(b)(2)(vi)]

116 D-5b(2)(g) - Shut-Down Procedures

Provide procedures to be employed in the event of an equipment malfunction for:

1) rapidly stopping waste feed,
2) shutting down incinerator,
3) controlling emissions.

D-5b(2)(h) - Principal Organic Hazardous Constituents
Based on the waste analysis data in the trial burn plan, the Department shall specify as trial POHCs, those constituents for which destruction and removal efficiencies must be calculated during the trial burn. Selection of two (2) POHCs for each waste stream is recommended in the event that sampling, analytical, or operational difficulties are encountered. Carbon Tetrachloride and Hexachlorobenzene are acceptable as POHCs. Additional recommended POHCs are Dichlorobenzene in the liquid waste and Hexachloroethane in the solid waste. Dichlorobenzene is higher on the Thermal Stability List (Group 2, #24) than Carbon Tetrachloride. Hexachloroethane is higher on the Incinerability List (#6, based on heat of combustion) than Hexachlorobenzene. Use of all four (4) POHCs will satisfy selection criteria and mitigate any problems during the trial burn.
[40 CFR 270.62(b)(4)]

118 D-5b(3) - Trial Burn Results
Glaxo must comply with the requirements of 40 CFR 270.62(b)(6) as adopted in 10 NCAC 10F .0034 which specify the determinations the applicant must make during each approved trial burn. Provide an outline of the Trial Burn Report and the sampling and analysis parameters to be reported.
[40 CFR 270.62(b)(6)]

State that Glaxo will submit the Trial Burn Report within ninety (90) days of the date of completion of the trial burn. In addition, state that Glaxo will provide a certification that the trial burn was carried out in accordance with the approved trial burn plan.
[40 CFR 270.62(b)(7)]

State also that a certification from Glaxo will accompany the Trial Burn Report.
[40 CFR 270.62(b)(9) and 270.11]

119 D-5d - Monitoring
Describe how the monitoring data for each parameter will be recorded.
[40 CFR 264.347]

Editing Comment: Page 48 is missing from the Trial Burn Plan.

PART F - PROCEDURES TO PREVENT HAZARDS
[40 CFR 264 as adopted in 10 NCAC 10F .0032]
[40 CFR 270 as adopted in 10 NCAC 10F .0034]

120 F-2a - General Inspection Requirements
Specify the following in the inspection schedules Tables F-1 through F-7 (where applicable):

1) TSD Monitoring Equipment, including: scales, flow and liquid level monitors, hazardous gas detectors, pH monitors, pressure sensors, and temperature gauges.

2) Incinerator Monitoring and Recording Equipment, including: waste flow monitors, auxiliary fuel flow monitors, combustion air flow monitors, temperature monitors, flame sensors, CO monitors, pressure sensors, pressure differential indicators, pH monitors, ID fan ammeter, flue gas velocity monitor.
3) TSD Safety and Emergency Equipment, including: communication systems, emergency lighting and power systems, smoke detectors, first aid equipment and supplies, decontamination equipment.
4) TSD Security Devices, including: surveillance system, barrier surrounding facility, locking devices.
5) TSD Operating and Structural Equipment, including: fire and explosion barriers, ventilation equipment, sump pumps.
6) Any waste storage, mixing, loading and unloading areas, which are subject to spills.

F-2b(2) - Tank System Inspection
Provide the following information for the tanks:

121a a) The owner or operator must develop and follow a schedule and procedure for inspecting overfill controls.

121b b) The owner or operator must inspect at least once each operating day:
1) Aboveground portions of the tank system, if any, to detect corrosion or releases of waste;
2) Data gathered from monitoring and leak detection equipment (e.g. pressure or temperature gauges, monitoring wells) to ensure that the tank system is being operated according to its design; and
3) The construction materials and the area immediately surrounding the externally accessible portion of the tank system, including the secondary containment system (e.g. dikes) to detect erosion or signs of releases of hazardous waste (e.g. wet spots, dead vegetation).

121c c) The owner or operator must document in the operating record of the facility an inspection of those items in paragraphs (a) and (b) of this section.
[40 CFR 264.195]

122 Provide tank specific checklists to be used for each tank. Also include a description of minimum tank wall thickness.
[40 CFR 264.195]

123 F-2b(5) - Incinerator Inspection
Incinerator (i.e. primary chamber) and all associated equipment must be inspected visually at least daily for leaks, spills, fugitive emissions and signs of tampering.
[40 CFR 264.347(b)]

Clarify the specific emergency waste feed cutoff test circuits to be tested weekly. At a minimum, operational testing must be conducted at least monthly.
[40 CFR 264.347(c)]

125 F-3a(1) - Internal Communications
Describe an internal communications or alarm system capable of providing immediate emergency instruction (voice or signal) to facility personnel.
[40 CFR 264.32(a)]

126 F-3a(2) - External Communications
Specify the locations of telephones (immediately available at the scene of operations) or hand-held two-way radios, for summoning emergency assistance from local police departments, or state or local emergency response teams.
[40 CFR 264.32(b)]

127 F-3a(4) - Water Fire Control
State that Glaxo will have water at adequate volume and pressure to supply the automatic sprinkler systems.
[40 CFR 264.32(d)]

128 F-4a - Unloading Operations
Describe size/types containers to be transferred using utility carts. Describe procedures to prevent hazards in all loading/unloading/transfer operations. Describe the routes of hazardous waste on facility property.
[40 CFR 270.14(b)(8)(i)]

129 F-4b - Run-Off
Glaxo must prevent runoff from hazardous waste handling areas to other areas of the facility or environment. Describe in more detail the truck loading/unloading areas and discuss where the grated U-drains lead to.
[40 CFR 270.14(b)(8)(ii)]

130 F-4d - Equipment and Power Failure
Describe emergency lighting or other equipment necessary during power outages and equipment failure.
[40 CFR 270.14(b)(8)(iv)]

Describe the effect of power failure on incinerator operation.
[40 CFR 270.14(b)(8)(iv)]

131 F-4e - Personnel Protection Equipment
Describe how exposure of employees to hazardous waste is minimized in laboratories and transfer areas.
[40 CFR 270.14(b)(8)(v)]

F-5a - Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Wastes
Describe precautions to prevent actual ignition, including separation from sources of ignition such as hot surfaces (e.g. incinerator) or frictional heat during waste transfer operations.
[40 CFR 264.17(a) and (c), 270.14(b)(9)]

133 F-5b - General Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Waste
Clarify the location of the walk-in fume hood located in the HMMB. Discuss whether fume hoods will also be used in laboratories during transfer of wastes to safety containers and if any physical trial methods will be used to ensure that incompatible or reactive wastes are not placed in a solvent waste safety container.
[40 CFR 264.17(b) and (c), 270.14(b)(9)]

134 F-5e - Management of Ignitable or Reactive Wastes in Tanks
Provide more detailed information on transfer/bulking procedures used for ignitable wastes.
[40 CFR 264.198, 270.16(f)]

PART G - CONTINGENCY PLAN
[40 CFR 264 as adopted in 10 NCAC 10F .0032]
[40 CFR 270 as adopted in 10 NCAC 10F .0034]

G-1 - General Information
Provide a more complete detailed site plan. In the general description of page G-2, discuss wastes that will be shipped off-site to a permitted facility for disposal.
[40 CFR 264.52]

136 Editing Comment: On page G-6, the correct phone number for North Carolina Division of Environmental Management is (919) 733-7015.

137 G-2 - Emergency Coordinators
Provide more information on the emergency coordinators. Discuss whether they can reach the facility in a short period of time, their specific duties, and their hours of availability on site. Include a statement authorizing designated coordinators to commit the necessary resources to implement the contingency plan.
[40 CFR 264.52(d), 264.55]

138 G-4a - Notification
Clarify that the emergency coordinator will always be notified immediately in the event of an emergency and will be the person who implements the contingency plan.
[40 CFR 264.56(a)]

139 G-4b - Identification of Hazardous Wastes
Describe procedures to identify released hazardous wastes when the waste disposal forms and operating records are not readily available.
[40 CFR 264.56(b)]

140 G-4d - Control Procedures
Describe any environmental monitoring equipment to be used during an emergency and clarify that buildings will be evacuated if necessary before doors are closed manually or automatically.
[40 CFR 264.52(a)]

141 G-4e - Prevention of Recurrence or Spread of Fires, Explosions, or Releases
Describe the procedures for removing and isolating containers to ensure that fires, explosions, or releases do not occur, reoccur, or spread to other hazardous waste at the facility.
[40 CFR 264.56(e)]

142 G-4f - Storage and Treatment of Released Material
Describe in detail the type and amount of decontamination equipment available and the decontamination methods to be employed after an emergency (including decontamination of the affected area).
[40 CFR 264.56(g)]

143 G-4g - Incompatible Waste
Describe the procedures to be used to determine the characteristics of the waste materials. If applicable, describe how any water reactive wastes might be affected by the automatic sprinkler system.
[40 CFR 264.56(h)(1)]

144 G-4h - Post Emergency Equipment Maintenance
Describe the specific procedures for decontaminating and refitting equipment for reuse.
[40 CFR 264.56(h)(2)]

145 G-5 - Emergency Equipment
Provide specific information on location, description, and capabilities of all emergency equipment, including:

1) spill control equipment;
2) fire control equipment;
3) personnel protective items;
4) first aid kits (including contents);
5) emergency decontamination equipment;
6) emergency communication and alarm systems.

[40 CFR 264.52(e)]

146 G-6 - Coordination Agreements
Provide documentation of each organization's agreement or refusal to enter into a coordination agreement with Glaxo.
[40 CFR 264.37]

147 Provide more information on facility layout and the places where facility personnel would normally be working.
[40 CFR 264.37(a)(1)]

G-7 - Evacuation Plan
Editing Comment: Correct the sentence beginning "if evacuation through this exist..." on page G-26. The address at the bottom of page C-28 should be changed to:

North Carolina Department of Environment, Health and Natural Resources
Hazardous Waste Section
Post Office Box 27687
Raleigh, North Carolina 27611-7687

PART H - PERSONNEL TRAINING
[40 CFR 264 as adopted in 10 NCAC 10F .0032]
[40 CFR 270 as adopted in 10 NCAC 10F .0034]

149 H-1a - Job Titles and Duties
Specify which positions have Emergency Coordinator primary and secondary duties.
[40 CFR 264.16(d)(1), (2)]

150 On page H-19, clarify if this position also provides hazardous materials training for those not associated with the incinerator.
[40 CFR 264.16(d)(1), (2)]

151 H-1b - Training Content, Frequency and Techniques
Indicate which training program will be used for each job position (e.g. Environmental Safety Tech will have Operations Personnel Training).
[40 CFR 264.16(d)(3)]

152 Under the Hazardous Waste Management heading of the training outlines, add "Tank Areas" and "Incinerator Areas" where applicable.
[40 CFR 264.16(a)(3)]

153 H-1c - Training Director
State that the training director is trained in hazardous waste management procedures.
[40 CFR 264.16(a)(2)]

154 H-2 - Implementation of Training Program
Clarify that training will be successfully completed by facility personnel within six (6) months of their employment or transfer to a new position at the facility, whichever is later.
[40 CFR 264.16(b)]

PART I - CLOSURE PLAN, POST-CLOSURE PLAN, AND FINANCIAL REQUIREMENTS
[40 CFR 264 as adopted in 10 NCAC 10F .0032]
[40 CFR 270 as adopted in 10 NCAC 10F .0034]

155 I-1b - Partial Closure and Final Closure Activities
Discuss partial closure of Glaxo's hazardous waste units and the resulting closure procedures.
[40 CFR 264.112(b)]

I-1c - Maximum Waste Inventory
All inventories of hazardous waste in the application should be consistent (i.e. Sections C, D, and I). On page D-6, the flammable waste storage area is described as storing "up to twenty-eight 55-gallon containers of solvent waste". However, the maximum waste inventory for waste solvent in the HMMB is given as 23 drums (8 halogenated plus 15 non-halogenated) on page I-3. Explain this discrepancy.
[40 CFR 264.112(b)(3)]

157 On page D-7, radioactive solvent waste is described as "contained in one gallon plastic or glass container." The maximum waste inventory for radioactive waste solvents includes 55-gallon drums. Explain this discrepancy.
[40 CFR 264.112(b)(3)]

158 Discuss in detail the methods for removing, transporting, treating, storing, or disposing of all hazardous wastes, and identification of the type(s) of off-site hazardous waste management units to be used.
[40 CFR 264.112(b)(3)]

159 I-1d - Schedule for Closure
Include an inspection schedule during closure.
[40 CFR 264.112(b)(6)]

160 I-1e(1) - Inventory Removal, Disposal or Decontamination of Equipment
Provide more specific information on how all facility equipment and structures will be decontaminated or disposed of when closure is completed, including:

1) decontamination procedures,
2) criteria for determining decontamination,
3) list of equipment, structures, and soils,
4) disposal of contaminated soil and residues,
5) decontamination of clean up materials and equipment.
6) demonstrate decontamination has been effective.

[40 CFR 264.112(b)(4), 264.114]

161 I-1e(1) - Closure of Containers
Describe any applicable inorganic parameters to be tested during the decontamination procedures. At a minimum, these parameters should include any metals that Glaxo will be handling in the various wastestreams.
[40 CFR 264.114]

162 Editing Comment: The first sentence on page I-8 should state permitted "TSD facility."

163 I-1e(2) - Closure of Incinerator
Provide a detailed description of how at closure all hazardous waste and hazardous waste residues will be removed from the incinerator, associated duct work, piping, air pollution control equipment, sumps, and any other structures or operating equipment such as pumps, valves, etc., that have come into contact with the hazardous waste.
[40 CFR 264.351]

164 I-1e(3) - Closure of Tanks
Describe decontamination of all components of the tank systems and state that decontamination will be verified.
[40 CFR 264.197(a)]

165 I-3a - Certification of Closure
The certification must be signed by the owner/operator and by an independent registered professional engineer.
[40 CFR 264.115]

166 I-4 - Closure Cost Estimate
Describe how waste inventories were derived to show concurrence with inventories listed in other portions of the Part B. State that the cost estimate is based on third party costs. Discuss possible decontamination costs for re-cleaning and re-analysis if decontamination cannot be verified by one (1) analytical sample.
[40 CFR 264.112(b)(3), 264.142]

167 PART N - N.C. AMENDMENTS
Provide a discussion of the rationale for the chosen well locations. Downgradient wells should be located immediately downgradient of hazardous waste units. In addition, discuss well screen length, elevation, and placement in relation to bedrock.
[10 NCAC 10F .0032(q)(6)]

168 Additional Information
Glaxo has been provided with copies of two (2) worksheets and guidelines that have been developed to provide an efficient means to document an applicant's environmental operating history for use in determining substantial compliance per 10 NCAC 10F .0034(h). An "In-State" worksheet should be completed for each facility owned or operated in North Carolina by the applicant and any parent or subsidiary corporation. The "Out-of-State" worksheet should be used to document a summary of the compliance history for any parent or subsidiary corporation operating outside of North Carolina.
[10 NCAC 10F .0034(h), GS 130A-295]

169 The Environmental Protection Agency has proposed amendments to the Subpart O, Part 264 hazardous waste incinerator rules. The proposal states the Agency's conclusion that emissions of metals and hydrogen chloride (HCl) from hazardous waste incinerators can pose unreasonable levels of risk, and in those cases, need to be regulated more stringently than under existing rules in order to protect human health and the environment. Under the authority of Section 3005(c)(3) of the Resource Conservation and Recovery Act, permit requirements may be developed as necessary to ensure that metals and HCl emissions do not pose unacceptable risk to human health and the environment.

Using the attached worksheets, provide the specific data required to determine the incinerator location (especially its surrounding terrain), relevant factors affecting the dispersion of pollutants from the incinerator (its physical stack height and related information), and requested feed rates by feed system. These data are necessary to establish conservative feed rates or emission limits using screening tables. If these tables are found inappropriate for the facility, the applicant normally would be required to conduct dispersion modeling in conformance with the EPA "Guidelines on Air Quality Models".
[Section 3005(c)(3) of RCRA as amended by HSWA]

6/13/90
COU/mb/0213-1-23

Glaxo

Glaxo Inc.

Thomas F. Cecich
Director
Safety, Health & Environmental Affairs

October 4, 1990

Dr. William F. Hamner
Hazardous Waste Section
Solid Waste Management Division
Department of Environment, Health and Natural Resources
P. O. Box 27687
Raleigh, NC 27611-7687

Re: Glaxo Inc.
Research Triangle Park,
North Carolina
RCRA Permit Application

Dear Dr. Hamner:

Please find enclosed 7 copies of our results from "SITE-SPECIFIC MODELING AND RISK ANALYSIS FOR HCl AND METALS." This information was developed to address the EPA proposed amendments to Subparts O, Part 264.

As indicated on the enclosed revised Table Of Contents and revised Appendix A cover page, the "SITE-SPECIFIC MODELING AND RISK ANALYSIS FOR HCl AND METALS" should be inserted into the RCRA application as Section 7 of Appendix A.

If you have any questions please feel free to contact Bob Midgette of Sirrine Environmental Consultants (919) 881-0777 or me (919) 248-2655.

Sincerely,

Thomas F. Cecich

cc: Robert W. Midgette
Calvin W. Overcash
Timothy C. Tyson
Robert G. Wojtas

Five Moore Drive, P.O. Box 13358 Research Triangle Park, NC 27709 • Telex 802813 • Telephone (919) 248-2100

Glaxo

Glaxo Inc.

Thomas F. Cecich
Director
Safety, Health & Environmental Affairs

December 13, 1990

Dr. William F. Hamner
Hazardous Waste Section
Solid Waste Management Division
Department of Environment, Health and
Natural Resources
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Re: Glaxo Inc.
Research Triangle Park, North Carolina
RCRA Permit Application
Sirrine Job No. R-8279

Dear Dr. Hamner:

Please find enclosed seven (7) copies of our response to the Second Notice of Deficiency for our RCRA permit application. As indicated on the attached Response to the Second Notice of Deficiency, some pages of the RCRA application have been revised to address NOD comments. The revised pages (i.e., Revision No. 2) should be inserted in the appropriate location in the application. The corresponding pages from the original application (i.e., Revision No. 0 or Revision No. 1) should be discarded.

We believe we have fully addressed each of the comments in the NOD and look forward to your early response.

If you have any questions, please feel free to contact Bob Midgette of Sirrine Environmental Consultants (881-0777) or me (248-2655).

Sincerely,

Thomas F. Cecich

TFC/ckw

cc: Mr. Frank Tyndall
Mr. Timothy Tyson
Mr. Santo Costa

Five Moore Drive, P.O. Box 13358 Research Triangle Park, NC 27709 • Telex 802813 • Telephone (919) 248-2100

RESPONSE TO THE SECOND NOTICE OF DEFICIENCY
GLAXO INC.
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27709
NCD065655599

NOD COMMENT NO.	RESPONSE
1	See revised page 1 of 5 of Form 3.
2	See revised page B-5. (Note: Only three copies of the SE Durham Quadrangle map are included with this submittal. Four additional copies will be submitted as soon as they can be obtained.
3	See revised page B-6
4	See revised page C-6.
5	See revised pages C-7, C-8.
6	See revised page C-17.
7	See revised pages C-26, C-27.
8	See revised pages C-4, C-27, Part A Form 3 page 3A of 5.
9	See revised page C-33.
10	See revised page C-35.
11	Based on 40 CFR 268.33 which lists the specific "K" and "F" wastes which make up the first third wastes, the statement on page C-37 is correct.
12	See revised page C-37.
13	See revised pages D-13, D-13a.
14	See revised page D-2.
15	See revised page D-15a.

NOD COMMENT NO.	RESPONSE
16, 17	Revised/additional Tank System Assessment information will be submitted as soon as possible.
18	See revised page D-19.
19	See revised page D-22.
20	See revised page D-22.
21	See revised page D-27.
22	See revised page D-27a.
23	During test stage #1 organically bound chlorine feed rate limit (i.e., 40 lb/hr) will be contained in the POHCs. Therefore this test stage meets the same objective as running the acid forming halogenated waste. Generically the waste is either a liquid or solid. If the waste burned during the Trial Burn meets the maximum and minimum requirements of the proposed permit conditions, then it does represent a "worst" case. There is no difference in the maximum chlorine content whether Glaxo burns the actual waste or substitutes chlorinated POHCs to provide the same chlorine level in the waste. Also because there may be some carbon tetrachloride in the halogenated liquid, and because carbon tetrachloride has been proposed as a POHC, it is desirable not to burn the halogenated waste liquid during the trial burn. If the halogenated liquid waste is used in the Trial Burn then it must first be analyzed for Carbon Tetrachloride content. This would provide an unnecessary source of error in determining the organically bound chlorine in the waste feed.
24	See revised page D-30.
25	See revised page 8 of the Trial Burn Plan.
26	See revised pages 9 and 9b of the Trial Burn Plan.

NOD COMMENT NO.	RESPONSE
27	See revised page 10 of the Trial Burn Plan.
28	Drawing R-8279-D6A, Incinerator Burner System Process and Instrumentation Diagram was provided in response to the first NOD. Also a revised version of Drawing R-8279-D4, Liquid Waste Feed System Process and Instrumentation Diagram is included in this response and should be inserted in Appendix F.
29	See revised page 13a of the Trial Burn Plan.
30	See revised page 15 and Figure 4-1 of the Trial Burn Plan.
31	See revised page 17 of the Trial Burn Plan.
32	See revised pages D-32, D-33.
33	See revised page D-38.
34	See revised page F-20a.
35	As discussed with the HWS on December 5, 1990, the lime feed system will be operated at a constant rate sufficient to neutralize the maximum allowable chlorine load of 40 lb/hr. Therefore, use of an HCl monitor as a device to control the lime feed rate is not appropriate. If future regulations require a continuous HCl monitor it will be provided.
36	The application states that these parameters with the exception of solid waste feed rates will be continuously monitored. See pages D-33a, D-34, D-46, D-47. The solid waste feed rate will be monitored by a batch weighing system.
37	See revised page 38 of the Trial Burn Plan.

NOD COMMENT NO.	RESPONSE
38	See revised page 54 of the Trial Burn Plan, Section 8.10 Process Sample Collection Procedures.
39	See revised Table 8-1 and Table II-1 in the Trial Burn Plan and Table 6-1 in the QAPP.
40	See revised page 43 of the Trial Burn Plan.
41	See revised page D-43.
42	See revised pages D-32, D-32a, D-32b.
43	The Trial Burn Plan has been revised to include two POHCs in each waste stream.
44	See revised pages F-20a, F-20b, F-20c.
45	See revised pages F-20a, F-20b, F-20c.
46	See revised pages F-20a, F-20b, F-20c.
47	See revised pages F-20a, F-20b, F-20c.
48	See Drawings R-8279-G1 and R-8279-G2. These drawings should be included at the end of Section G.
49	A revised version of Figure G-1 has been provided.
50	See revised Table G-III. The locations of emergency equipment is shown on Drawings R-8279-D1 and R-8279-D2.
51	See attached letters from response organizations. These letters should be included in Appendix D.
52	See revised page G-26a.

NOD COMMENT NO.	RESPONSE
53	See revised page G-28.
54	See revised pages D-4a, D-6.
55	See revised page I-7.
56	See revised page I-7.
57	See revised page I-7a.
58	See revised page I-8.
59	See revised pages 9a, 10 of the Trial Burn Plan.
60	See revised page D-33 and page 20 of the Trial Burn Plan. The primary chamber pressure transmitter is for pressure indication only, the secondary chamber pressure transmitter is connected to the PLC and this signal is used to control the pressure by modulating the ID fan damper. The SCC pressure setpoint will be -2.0 inches water gage. If the secondary chamber pressure goes to -0.5 inches water gage, both the solid and liquid waste feed will be stopped.
61	See pages 25, 25a, 26 of the Trial Burn Plan.
62	See revised page 42 of the Trial Burn Plan.
63	See revised page 33 of the Trial Burn Plan.
64	Additional information on Shutdown Procedures was also requested in NOD comment 42. See revised pages D-32, D-32a, D-32b.
65	Information to address this comment is being developed and will be submitted as soon as possible.

NOD COMMENT NO.	RESPONSE
66	The RFA is to be conducted by EPA representatives the week of December 10, 1990. As discussed with the NC Hazardous Waste Section, Glaxo plans to include the findings of the RFA in Section L of the permit application.
Notes:	Pages C-10, C-13, C-18, C-20, C-21, C-23, C-24, C-25, and C-28 have been revised to correct a typing error in the page headers. Sections 3, 5, 6, 7, 9, and 11 of the QAPP have been revised.

P.F.

SIRRINE
ENVIRONMENTAL
CONSULTANTS

3733 National Drive
Suite 120
Raleigh, North Carolina 27612
(919) 881-0777

December 28, 1990

Mr. Carl Utterback
Hazardous Waste Section
Solid Waste Management Division
Department of Environment, Health and
Natural Resources
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Re: Glaxo Inc.
Research Triangle Park, NC
RCRA Permit Application
Sirrine Project No. R-8279

Dear Carl:

Please find enclosed seven (7) copies of revised tank system assessments as well as additional supporting documents. This information should be included in Appendix C of the application. Also enclosed are seven copies of revised pages G-5 and G-26a. Page G-5 has been revised to reflect an address change. Page G-26a was inadvertently not included with the December 13, 1990 response to the second NOD.

If you have any questions, please call me.

Sincerely,

SIRRINE ENVIRONMENTAL CONSULTANTS

Robert W Midgette

Robert W. Midgette, P.E.

RWM/ra
Enclosure
cc: Mr. Calvin Overcash
Mr. Robert Wojtas
Mr. Terry Bradham
Project File 3A.4

SIRRINE
ENVIRONMENTAL
CONSULTANTS

3733 National Drive
Suite 120
Raleigh, North Carolina 27612
(919) 881-0777

January 9, 1991

Mr. Carl Utterback
Hazardous Waste Section
Solid Waste Management Division
Department of Environment, Health
and Natural Resources
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Re: Glaxo Inc., Research Triangle Park, NC
RCRA Permit Application
Sirrine Project No. R-8279

Dear Mr. Utterback:

Please find enclosed seven copies of supplemental information for the Site Specific Modeling and Risk Analysis for HCl and metals. This information should be included in Appendix A, Section 7 of the permit application.

If you have any questions, please call me.

Sincerely,

SIRRINE ENVIRONMENTAL CONSULTANTS

Robert W. Midgette

Robert W. Midgette, P.E.

RWM/kq
Enclosures

cc: Mr. Calvin Overcash
Mr. Robert Wojtas
Mr. Terry Bradham
Project File 3A.4

Glaxo

Glaxo Inc.

Thomas F. Cecich
Director
Safety, Health & Environmental Affairs

February 8, 1991

Mr. James H. Scarbrough, P.E., Chief
RCRA and Federal Facilities Branch
U.S. Environmental Protection Agency
345 Courtland Street
Atlanta, Georgia 30365

Re: Glaxo Inc., Research Triangle Park, North Carolina
EPA I.D. Number NCD065655599
RCRA Permit Application

Dear Mr. Scarbrough:

We are pleased to submit the enclosed information developed to address the RCRA Air Emission Standards which became effective on December 21, 1990. This information should be included in Appendix A, Section 8 of the Glaxo RCRA permit application.

Seven copies of this information have been sent to the North Carolina Hazardous Waste Section for incorporation into the permit application.

If you have any questions, please call me at (919) 248-2655.

Sincerely,

Cecich

Thomas F. Cecich

Enclosures

cc: Mr. Robert W. Midgette
Mr. Calvin W. Overcash
Mr. Carl Utterback
Mr. Robert G. Wojtas

Five Moore Drive, P.O. Box 13358 Research Triangle Park, NC 27709 • Telex 802813 • Telephone (919) 248-2100

Glaxo

Glaxo Inc.

Thomas F. Cecich
Director
Safety, Health & Environmental Affairs

February 8, 1991

Mr. Carl Utterback
Hazardous Waste Section
Solid Waste Management Division
Department of Environment, Health
and Natural Resources
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Re: Glaxo Inc., Research Triangle Park, North Carolina
RCRA Permit Application

Dear Mr. Utterback:

Please find enclosed seven copies of information developed to address the RCRA Air Emission Standards which became effective December 21, 1990. This information should be included in Appendix A, Section 8 of the RCRA Permit application.

If you have any questions, please call Bob Midgette of Sirrine Environmental Consultants at (919) 881-0777 or me at (919) 248-2655.

Sincerely,

Thomas F. Cecich

Enclosures

cc: Mr. Robert W. Midgette
Mr. Calvin W. Overcash
Mr. Robert G. Wojtas
Mr. James H. Scarbrough

Five Moore Drive, P.O. Box 13358 Research Triangle Park, NC 27709 • Telex 802813 • Telephone (919) 248-2100

SIRRINE
ENVIRONMENTAL
CONSULTANTS

3733 National Drive
Suite 120
Raleigh, North Carolina 27612
(919) 881-0777

February 28, 1991

Mr. Carl Utterback
Hazardous Waste Section
Solid Waste Management Division
Department of Environmental, Health and Natural Resources
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Re: Glaxo Inc.
Research Triangle Park, North Carolina
RCRA Permit Application - Proposed Well Locations
Sirrine Project No. R-8279.10

Dear Carl:

Glaxo was recently able to confirm the acceptability of the alternative locations for two downgradient wells at the Glaxo site per your September 7, 1990 letter to me and subsequent discussion during the September 19, 1990 meeting at your offices. Enclosed your review are seven (7) copies of the following revised information which should be incorporated into the permit application:

- Revised "Groundwater Monitoring Installation Details" for locations A and B (to be inserted in Section 8 of Appendix E of the Application) and

- Revised Well Location Map, Drawing R-8279-N1 (to be inserted in Appendix F of the Application)

Please review these proposed well locations as soon as possible so that Glaxo can proceed with the installation. If you have any questions, please call me at (919) 881-0777.

Sincerely,

SIRRINE ENVIRONMENTAL CONSULTANTS

Robert W Midgette

Robert W. Midgette, P.E.

RWM/ra
Enclosures

cc: Mr. Robert Wojtas
Mr. Calvin Overcash
Mr. Terry Bradham
Mr. Frank Tyndall
Project File 3A.4

Glaxo

Glaxo Inc.

Thomas F. Cecich
Director
Safety, Health & Environmental Affairs

March 22, 1991

Mr. James H. Scarbrough, P.E., Chief
RCRA and Federal Facilities Branch
U.S. Environmental Protection Agency
345 Courtland Street
Atlanta, Georgia 30365

Re: Glaxo Inc., Research Triangle Park, North Carolina
EPA I.D. Number NCD065655599
RCRA Permit Application

Dear Mr. Scarbrough:

We are pleased to submit two (2) copies of the enclosed information developed to address the additional Part B information requirements of 40 CFR 270.14(d) as requested in your letter of February 13, 1991. This information should be included in Section L and Section K of the Glaxo RCRA permit application.

In addition you requested a response to the notification of newly effective Organic Air Regulations (40 CFR 264 Subpart AA (process vents) and BB (pumps and valves) and informational requirements of 40 CFR 270 for these subparts). This information was previously submitted on February 8, 1991 (see attached letter) for inclusion in Appendix A, Section 8 of Glaxo's RCRA permit application.

Seven copies of this information have been sent to the North Carolina Hazardous Waste Section for incorporation into the permit application.

If you have any questions, please call me at (919) 248-2655.

Sincerely,

Thomas F. Cecich

Enclosures

cc: Mr. Robert W. Midgette
Mr. Calvin W. Overcash
Mr. Carl Utterback
Mr. Robert G. Wojtas

Five Moore Drive, P.O. Box 13358 Research Triangle Park, NC 27709 • Telex 802813 • Telephone (919) 248-2100

Glaxo

Glaxo Inc.

Thomas F. Cecich
Director
Safety, Health & Environmental Affairs

March 22, 1991

Mr. Carl Utterback
Hazardous Waste Section
Solid Waste Management Division
Department of Environment, Health
and Natural Resources
Post Office Box 27687
Raleigh, NC 27611-7687

Re: Glaxo Inc., Research Triangle Park, North Carolina
EPA I.D. Number NCD065655599
RCRA Permit Application

Dear Mr. Utterback:

Please find enclosed seven (7) copies of information developed to address the additional Part B information requirements of 40 CFR 270.14(d) as requested in a letter of February 13, 1991 from Mr. James H. Scarbrough. This information should be included in Section L and Section K of the Glaxo RCRA permit application.

In addition Mr. Scarbrough requested a response to the notification of newly effective Organic Air Regulations (40 CFR 264 Subpart AA (process vents) and BB (pumps and valves) and informational requirements of 40 CFR 270 for these subparts). This information was previously submitted on February 8, 1991 (see attached letter) for inclusion in Appendix A, Section 8 of Glaxo's RCRA permit application.

If you have any questions, please call Bob Midgette of Sirrine Environmental Consultants at (919) 881-0777 or me at (919) 248-2655.

Sincerely,

Thomas F. Cecich

Enclosures

cc: Mr. Robert W. Midgette
Mr. Calvin W. Overcash
Mr. James H. Scarbrough
Mr. Robert G. Wojtas

Five Moore Drive, P.O. Box 13358 Research Triangle Park, NC 27709 • Telex 802813 • Telephone (919) 248-2100

Glaxo

Glaxo Inc.

Thomas F. Cecich
Director
Safety, Health & Environmental Affairs

February 8, 1991

Mr. James H. Scarbrough, P.E., Chief
RCRA and Federal Facilities Branch
U.S. Environmental Protection Agency
345 Courtland Street
Atlanta, Georgia 30365

Re: Glaxo Inc., Research Triangle Park, North Carolina
EPA I.D. Number NCD065655599
RCRA Permit Application

Dear Mr. Scarbrough:

We are pleased to submit the enclosed information developed to address the RCRA Air Emission Standards which became effective on December 21, 1990. This information should be included in Appendix A, Section 8 of the Glaxo RCRA permit application.

Seven copies of this information have been sent to the North Carolina Hazardous Waste Section for incorporation into the permit application.

If you have any questions, please call me at (919) 248-2655.

Sincerely,

Thomas F. Cecich

Enclosures

cc: Mr. Robert W. Midgette
Mr. Calvin W. Overcash
Mr. Carl Utterback
Mr. Robert G. Wojtas

Five Moore Drive, P.O. Box 13358 Research Triangle Park, NC 27709 • Telex 802813 • Telephone (919) 248-2100

Glaxo

Glaxo Inc.

Thomas F. Cecich
Director
Safety, Health & Environmental Affairs

February 8, 1991

Mr. Carl Utterback
Hazardous Waste Section
Solid Waste Management Division
Department of Environment, Health
and Natural Resources
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Re: Glaxo Inc., Research Triangle Park, North Carolina
RCRA Permit Application

Dear Mr. Utterback:

Please find enclosed seven copies of information developed to address the RCRA Air Emission Standards which became effective December 21, 1990. This information should be included in Appendix A, Section 8 of the RCRA Permit application.

If you have any questions, please call Bob Midgette of Sirrine Environmental Consultants at (919) 881-0777 or me at (919) 248-2655.

Sincerely,

Thomas F. Cecich

Enclosures

cc: Mr. Robert W. Midgette
Mr. Calvin W. Overcash
Mr. Robert G. Wojtas
Mr. James H. Scarbrough

Five Moore Drive, P.O. Box 13358 Research Triangle Park, NC 27709 • Telex 802813 • Telephone (919) 248-2100

RCRA PERMIT APPLICATION

VOLUME 1 OF 2
APPLICATION

FOR

GLAXO INC.
RESEARCH TRIANGLE PARK, NORTH CAROLINA

DECEMBER 1989

SIRRINE ENVIRONMENTAL CONSULTANTS
RALEIGH, NORTH CAROLINA

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A Part A - Application

Please print or type in the unshaded areas only
(fill—in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-R0175

FORM 1 GENERAL

U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program

(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER

F N C D 0 6 5 6 5 5 5 9 9

LABEL ITEMS

I. EPA I.D. NUMBER

III. FACILITY NAME

V. FACILITY MAILING ADDRESS

VI. FACILITY LOCATION

PLEASE PLACE LABEL IN THIS SPACE

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill—in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill—in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold—faced terms.

SPECIFIC QUESTIONS	MARK "X" YES	NO	FORM ATTACHED
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.? (FORM 2A)		X	
B. Does or will this facility *(either existing or proposed)* include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)		X	
D. Is this a proposed facility *(other than those described in A or B above)* which will result in a discharge to waters of the U.S.? (FORM 2D)		X	
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)	X		X
F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X	
H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed **stationary source** which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	
J. Is this facility a proposed **stationary source** which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

III. NAME OF FACILITY

1 SKIP: G L A X O I N C

IV. FACILITY CONTACT

A. NAME & TITLE *(last, first, & title)*	B. PHONE *(area code & no.)*
2 OVERCASH, CALVIN, SUP ENV SAFETY	919 248 2263

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX

3 FIVE MOORE DRIVE PO BOX 13358

B. CITY OR TOWN	C. STATE	D. ZIP CODE
4 RESEARCH TRIANGLE PARK	NC	27709

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

5 FIVE MOORE DRIVE

B. COUNTY NAME

DURHAM

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE *(if known)*
6 RESEARCH TRIANGLE PARK	NC	27709	

CONTINUE ON REVERSE

CONTINUED FROM THE FRONT

VII. SIC CODES (4 digits in order of priority)

A. FIRST	B. SECOND	C. THIRD	D. FOURTH
8731 (specify) Commercial Physical and Biological Research	(specify)	(specify)	(specify)

VIII. OPERATOR INFORMATION

A. NAME: GLAXO INC.

B. Is the name listed in Item VIII-A also the owner? ☒ YES ☐ NO

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "O", specify.)
F = FEDERAL; M = PUBLIC (other than federal or state); S = STATE; O = OTHER (specify); P = PRIVATE

P (specify)

D. PHONE (area code & no.): A 919 248 2263

E. STREET OR P.O. BOX: FIVE MOORE DRIVE

F. CITY OR TOWN: RESEARCH TRIANGLE PARK

G. STATE: NC

H. ZIP CODE: 27709

IX. INDIAN LAND

Is the facility located on Indian lands? ☐ YES ☒ NO

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water): N	D. PSD (Air Emissions from Proposed Sources): P
B. UIC (Underground Injection of Fluids): U	E. OTHER (specify): 032-0799-1 (specify) Radiation License
C. RCRA (Hazardous Wastes): R	F. OTHER (specify): (specify)

XI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS (provide a brief description)

See Section B of this permit application

XIII. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the 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.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
Thomas W. D'Alonzo President of Glaxo	Thomas W. D'Alonzo	8/24/90

COMMENTS FOR OFFICIAL USE ONLY

C

Please print or type in the unshaded areas only
(fill—in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-S80004

FORM 3 RCRA

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

HAZARDOUS WASTE PERMIT APPLICATION

Consolidated Permits Program

(This information is required under Section 3005 of RCRA.)

I. EPA I.D. NUMBER

S												T/A	C
F	N	C	D	0	6	5	6	5	5	5	9		1

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (yr., mo., & day)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below *(mark one box only)* to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA I.D. Number, or if this is a revised application, enter your facility's EPA I.D. Number in Item I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

C 8 — YR. ___ MO. ___ DAY ___ FOR EXISTING FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

☒ 2. NEW FACILITY *(Complete item below.)*

YR. 9 1 MO. 0 5 DAY 0 1 FOR NEW FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION *(place an "X" below and complete Item I above)*

☐ 1. FACILITY HAS INTERIM STATUS

☐ 2. FACILITY HAS A RCRA PERMIT

III. PROCESSES — CODES AND DESIGN CAPACITIES

A. PROCESS CODE — Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code*(s)* in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the form *(Item III-C).*

B. PROCESS DESIGN CAPACITY — For each code entered in column A enter the capacity of the process.
1. AMOUNT — Enter the amount.
2. UNIT OF MEASURE — For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER *(barrel, drum, etc.)*	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D79	GALLONS OR LITERS
LANDFILL	D80	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D81	ACRES OR HECTARES
OCEAN DISPOSAL	D82	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D83	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER *(Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Item III-C.)*	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G	LITERS PER DAY	V	ACRE-FEET	A
LITERS	L	TONS PER HOUR	D	HECTARE-METER	F
CUBIC YARDS	Y	METRIC TONS PER HOUR	W	ACRES	B
CUBIC METERS	C	GALLONS PER HOUR	E	HECTARES	Q
GALLONS PER DAY	U	LITERS PER HOUR	H		

EXAMPLE FOR COMPLETING ITEM III *(shown in line numbers X-1 and X-2 below):* A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

S		T/A	C
C	DUP		1

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S02	600	G		5				
X-2	T03	20	E		6				
1	T03	0.45	D		7				
2	S01	5,760	G		8				
3	S02	2,000	G		9				
4	S01	2,145	G		10				

CONTINUE ON REVERSE

Continued from the front.

III. PROCESSES *(continued)*

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESSES *(code "T04")*. FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

IV. DESCRIPTION OF HAZARDOUS WASTES

A. **EPA HAZARDOUS WASTE NUMBER** — Enter the four—digit number from 40 CFR, Subpart D for each listed hazardous waste you will handle. If you handle hazardous wastes which are not listed in 40 CFR, Subpart D, enter the four—digit number*(s)* from 40 CFR, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.

B. **ESTIMATED ANNUAL QUANTITY** — For each listed waste entered in column A estimate the quantity cf that waste that will be handled on an annual basis. For each **characteristic** or **toxic contaminant** entered in column A estimate the total annual quantity of all the non—listed waste*(s)* that will be handled which possess that characteristic or contaminant.

C. **UNIT OF MEASURE** — For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:
   For listed hazardous waste: For each listed hazardous waste entered in column A select the code*(s)* from the list of process codes contained in Item III to indicate how the waste will be stored, treated, and/or disposed of at the facility.
   For non—listed hazardous wastes: For each characteristic or toxic contaminant entered in column A, select the code*(s)* from the list of process codes contained in Item III to indicate all the processes that will be used to store, treat, and/or dispose of all the non—listed hazardous wastes that possess that characteristic or toxic contaminant.
   Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code*(s)*.

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: **HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER** — Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B,C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each other EPA Hazardous Waste Number that can be used to describe the hazardous waste.

EXAMPLE FOR COMPLETING ITEM IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* — A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non—listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. EPA HAZARD. WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*	D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
X-1	K 0 5 4	900	P	T 0 3 D 8 0	
X-2	D 0 0 2	400	P	T 0 3 D 8 0	
X-3	D 0 0 1	100	P	T 0 3 D 8 0	
X-4	D 0 0 2				*included with above*

 CONTINUE ON PAGE 3

Continued from page 2.

NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N C D 0 6 5 6 5 5 5 9 9 T/A C 1	W DUP T/A C 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

Line	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	F003	175	T	T03 S01 S02	(NON-HALOGENATED SOLVENT WASTE)
2	F005				INCLUDED IN ABOVE
3	U003				"
4	U056				"
5	U154				"
6	U188				"
7	U180				"
8	U213				"
9	D001				"
10	F002	19	T	T03 S01 S02	(HALOGENATED SOLVENT WASTE)
11	U044	(D022)			INCLUDED IN ABOVE
12					"
13	U070				"
14	U071				"
15	U072	(D027)			"
16	U077	(D028)			"
17	U080				"
18	U211	(D019)			"

19–26

The non-halogenated and halogenated solvent wastes described above may contain small quantities of P and U listed commercial chemical products. In addition to the P and U listed wastes contained in the solvent wastes, Glaxo will store (S01) and incinerate (T03) discarded commercial chemical products in their original containers. It is estimated that less than ten (10) pounds of any P and U listed commercial chemical product waste will be generated each year. A complete list of the P and U listed wastes, which may be contained in the solvent wastes or stored and incinerated in their original containers, is provided in Appendix A.

Continued from page 2.

NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N C D 0 6 5 6 5 5 5 9 9 T/A C 1	W DUP T/A C 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

Line	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	F003	29	T	T03	S01			(Scintillation Vials)
2	F005							Included in above
3	U044	(D022)						" " "
4	U180							" " "
5	D001							" " "
6	F002	59	T	S01				(Incinerator Ash and Baghouse Dust)
7	F003							Included in above
8	F005							" "
9	The following hazardous wastes will be stored on-site but not							
10	incinerated. These wastes will be shipped off-site to a licensed disposal facility.							
11	D002	200	P	S01				
12	D003	400	P	S01				
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

EPA Form 3510-3 (6-80)

CONTINUE ON REVERSE

IV. DESCRIPTION OF HAZARDOUS WASTES *(continued)*

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM ITEM D(1) ON PAGE 3.

EPA I.D. NO. *(enter from page 1)*

C											T/A	C
F												6

V. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground–level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail)*.

VII. FACILITY GEOGRAPHIC LOCATION

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*
35 55 32N	078 51 43W

VIII. FACILITY OWNER

XX A. If the facility owner is also the facility operator as listed in Section VIII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VIII on Form 1, complete the following items.

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*
C E	

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE
C F	C G		

IX. 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.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
Thomas W. D'Alonzo	Thomas W. D'Alonzo	12/15/89

X. 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.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
Thomas W. D'Alonzo	Thomas W. D'Alonzo	12/15/89

CONTINUE ON PAGE 5

Continued from page 4.

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V. FACILITY DRAWING *(see page 4)*

FACILITY DESCRIPTION

SEE TEXT AND DRAWINGS IN SECTION B

Please print or type with ELITE type (12 characters per inch) in the unshaded areas only

Form Approved. OMB No. 2050-0034 Expires 12-31-91
GSA No. 0246-EPA-OT

For EPA Regional Use Only

Date Received
Month Day Year

EPA
United States Environmental Protection Agency
Washington, DC 20460

Hazardous Waste Permit Application Part A

(Read the Instructions before starting)

For State Use Only

I. ID Number(s)

A. EPA ID Number: N C D 0 6 5 6 5 5 5 9 9

B. Secondary ID Number *(if applicable)*:

II. Name of Facility

G L A X O I N C .

III. Facility Location *(Physical address not P.O. Box or Route Number)*

A. Street: F I V E M O O R E D R I V E

Street *(continued)*:

City or Town: R T P

State: N C

ZIP Code: 2 7 7 0 9 -

County Code *(if known)*:

County Name: D U R H A M

B. Land Type *(enter code)*: P

C. Geographic Location
LATITUDE *(degrees, minutes, & seconds)*: 3 5 5 5 3 2 N
LONGITUDE *(degrees, minutes, & seconds)*: 0 7 8 5 1 4 3 W

D. Facility Existence Date
Month Day Year: 1 0 0 1 1 9 9 1

IV. Facility Mailing Address

Street or P.O. Box: F I V E M O O R E D R I V E P O B O X 1 3 3 5 8

City or Town: R T P

State: N C

ZIP Code: 2 7 7 0 9 -

V. Facility Contact *(Person to be contacted regarding waste activities at facility)*

Name *(last)*: O V E R C A S H

(first): C A L V I N

Job Title: M G R . E N V . S A F E T Y

Phone Number *(area code and number)*: 9 1 9 - 2 4 8 - 2 2 6 3

VI. Facility Contact Address *(See Instructions)*

A. Contact Address Location: Mailing: X

B. Street or P.O. Box:

City or Town:

State:

ZIP Code: -

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EPA I.D. Number (enter from page 1)	Secondary I.D. Number (enter from page 1)
NCD065655599	

VII. Operator Information (see instructions)

Name of Operator: GLAXO INC.

Street or P.O. Box: FIVE MOORE DRIVE

City or Town	State	ZIP Code
RTP	NC	27709-

Phone Number (area code and number)	B. Operator Type	C. Change of Operator Indicator	Date Changed (Month Day Year)
919-248-2263	P	Yes ☐ No ☐	

VIII. Facility Owner (see instructions)

A. Name of Facility's Legal Owner: GLAXO INC.

Street or P.O. Box: FIVE MOORE DRIVE

City or Town	State	ZIP Code
RTP	NC	27709-

Phone Number (area code and number)	B. Owner Type	C. Change of Owner Indicator	Date Changed (Month Day Year)
919-248-2263	P	Yes ☐ No ☐	

IX. SIC Codes (4-digit in order of significance)

Primary		Secondary	
8731	(description) Commercial Physical and Biological Research		(description)
Secondary		**Secondary**	
	(description)		(description)

X. Other Environmental Permits (see instructions)

A. Permit Type (enter code)	B. Permit Number	C. Description
E	032-0799-1	Radiation License

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EPA I.D. Number (enter from page 1)												Secondary ID Number (enter from page 1)											
N	C	D	0	6	5	6	5	5	5	9	9												

XI. Nature of Business (provide a brief description)

Research and Development complex for discovering, developing and providing marketing support for new drugs.

XII. Process – Codes and Design Capacities

A. PROCESS CODE – *Enter the code from the list of process codes below that best describes each process to be used at the facility. Twelve lines are provided for entering codes. If more lines are needed, attach a separate sheet of paper with the additional information. If a process will be used that is not included in the list of codes below, then describe the process (including its design capacity) in the space provided in Item XIII.*

B. PROCESS DESIGN CAPACITY – *For each code entered in column A, enter the capacity of the process.*

1. AMOUNT – *Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process unit.*
2. UNIT OF MEASURE – *For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.*

C. PROCESS TOTAL NUMBER OF UNITS – *Enter the total number of units used with the corresponding process code.*

PROCESS CODE	PROCESS	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
	DISPOSAL:	
D79	INJECTION WELL	GALLONS; LITERS; GALLONS PER DAY; OR LITERS PER DAY
D80	LANDFILL	ACRE-FEET OR HECTARE-METER
D81	LAND APPLICATION	ACRES OR HECTARES
D82	OCEAN DISPOSAL	GALLONS PER DAY OR LITERS PER DAY
D83	SURFACE IMPOUNDMENT	GALLONS OR LITERS
	STORAGE:	
S01	CONTAINER (barrel, drum, etc.)	GALLONS OR LITERS
S02	TANK	GALLONS OR LITERS
S03	WASTE PILE	CUBIC YARDS OR CUBIC METERS
S04	SURFACE IMPOUNDMENT	GALLONS OR LITERS
	TREATMENT:	
T01	TANK	GALLONS PER DAY OR LITERS PER DAY
T02	SURFACE IMPOUNDMENT	GALLONS PER DAY OR LITERS PER DAY
T03	INCINERATOR	SHORT TONS PER HOUR; METRIC TONS PER HOUR; GALLONS PER HOUR; LITERS PER HOUR; OR BTU'S PER HOUR
T04	OTHER TREATMENT (Use for physical, chemical, thermal or biolgical treatment processes not occurring in tanks, surface impoundment or incinerators. Describe the processes in the space provided in Item XIII.)	GALLONS PER DAY; LITERS PER DAY; POUNDS PER HOUR; SHORT TONS PER HOUR; KILOGRAMS PER HOUR; METRIC TONS PER DAY; METRIC TONS PER HOUR; OR SHORT TONS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
GALLONS PER HOUR	E
GALLONS PER DAY	U
LITERS	L
LITERS PER HOUR	H
LITERS PER DAY	V
SHORT TONS PER HOUR	D
METRIC TONS PER HOUR	W
SHORT TONS PER DAY	N
METRIC TONS PER DAY	S
POUNDS PER HOUR	J
KILOGRAMS PER HOUR	R
CUBIC YARDS	Y
CUBIC METERS	C
ACRES	B
ACRE-FEET	A
HECTARES	Q
HECTARE-METER	F
BTU's PER HOUR	K

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EPA I.D. Number (enter from page 1)												Secondary ID Number (enter from page 1)											
N	C	D	0	6	5	6	5	5	5	9	9												

XII. Process – Codes and Design Capacities (continued)

EXAMPLE FOR COMPLETING ITEM XII (shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

Line Number		A. PROCESS CODE (from list above)			B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	C. PROCESS TOTAL NUMBER OF UNITS			FOR OFFICIAL USE ONLY
X	1	S	0	2	600	G	0	0	2	
X	2	T	0	3	20	E	0	0	1	
	1	S	0	1	7,905	G	0	0	2	
	2	S	0	2	2,000	G	0	0	3	
	3	T	0	3	0.45	D	0	0	1	
	4									
	5									
	6									
	7									
	8									
	9									
1	0									
1	1									
1	2									

NOTE: If you need to list more than 12 process codes, attach an additional sheet(s) with the information in the same format as above. Number the lines sequentially, taking into account any lines that will be used for additional treatment processes in Item XIII.

XIII. Additional Treatment Processes (follow instructions from Item XII)

Line Number (enter numbers in sequence with Item XII)		A. PROCESS CODE			B. TREATMENT PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. TREATMENT PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	C. PROCESS TOTAL NUMBER OF UNITS			D. DESCRIPTION OF PROCESS
		T	0	4						
		T	0	4						
		T	0	4						
		T	0	4						

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EPA I.D. Number (enter from page 1)												Secondary ID Number (enter from page 1)											
N	C	D	0	6	5	6	5	5	5	9	9												

XIV. Description of Hazardous Wastes

A. EPA HAZARDOUS WASTE NUMBER - *Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR, Part 261 Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.*

B. ESTIMATED ANNUAL QUANTITY - *For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.*

C. UNIT OF MEASURE - *For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:*

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed hazardous waste: For each listed hazardous waste entered in column A select the code(s) from the list of process codes contained in item XII A. on page 3 to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed hazardous waste: For each characteristic or toxic contaminant entered in column A, select the code(s) from the list of process codes contained in item XII A. on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that processes that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. Enter the first two as described above.
2. Enter "000" in the extreme right box of item XIV-D(1).
3. Enter in the space provided on page 7, item XIV-E, the line number and the additional code(s).

2. PROCESS DESCRIPTION - *If a code is not listed for a process that will be used, describe the process in the space provided on the form (D.(2)).*

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER - Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.

EXAMPLE FOR COMPLETING ITEM XIV (shown in line numbers X-1, X-2, X-3, and X-4 below) - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number	A. EPA HAZARD WASTE NO. (enter code)					B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESS (1) PROCESS CODES (enter)									D. PROCESS (2) PROCESS DESCRIPTION (If a code is not entered in D(1))
X	1	K	0	5	4	900	P	T	0	3	D	8	0				
X	2	D	0	0	2	400	P	T	0	3	D	8	0				
X	3	D	0	0	1	100	P	T	0	3	D	8	0				
X	4	D	0	0	2												Included With Above

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EPA I.D. Number (enter from page 1)	Secondary I.D. Number (enter from page 1)
N C D 0 6 5 6 5 5 5 9 9	

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)	D. PROCESSES (2) PROCESS DESCRIPTION (if a code is not entered in D(1))
1	F003	175	T	T03 S01 S02	(NON-HALOGENATED SOLVENT WASTE)
2	F005				INCLUDED IN ABOVE
3	U003				"
4	U019				"
5	U056				"
6	U108				"
7	U112				"
8	U117				"
9	U122				"
10	U154				"
11	U188				"
12	U196				"
13	D038				"
14	U213				"
15	U220				"
16	U239				"
17	D001				"
18	PXXX	*			"
19	UXXX	*			"
20					
21	F002	19	T	T03 S01 S02	(HALOGENATED SOLVENT WASTE)
22	U044				INCLUDED IN ABOVE
23	D022				"
24	U070				"
25	U071				"
26	U072				"
27	D027				"
28	U076				"
29					
30					
31					
32					
33					

*The non-halogenated and halogenated solvent wastes described above may contain small quantities of P and U listed commercial chemical products. In addition to the P and U listed wastes contained in the solvent wastes, Glaxo will store (S01) and incinerate (T03) discarded commercial chemical products in their original containers. It is estimated that less than ten (10) pounds of any P or U listed commercial chemical product waste will be generated each year. A complete list of the P and U listed wastes, which may be contained in the solvent wastes or stored and incinerated in their original containers, is provided after page 7 of 7 and in Appendix A of this permit application.

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Form Approved. OMB No. 2050-0034 Expires 12-31-91
GSA No. 0246-EPA-OT

EPA I.D. Number (enter from page 1): N C D 0 6 5 6 5 5 5 9 9

Secondary ID Number (enter from page 1):

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)	D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in D(1))
1	U077				INCLUDED IN ABOVE
2	D028				"
3	U080				"
4	U211				"
5	D019				"
6	PXXX	*			"
7	UXXX	*			"
8					"
9	F003	29	T	T03S01	(SCINTILLATION VIALS)
10	F005				INCLUDED IN ABOVE
11	U044				"
12	D022				"
13	U180				"
14	D001				"
15	F002	59	T	S01	(INCINERATOR ASH AND BAGHOUSE DUST)
16	F003				INCLUDED IN ABOVE
17	F005				"
18	The following hazardous wastes will be stored on-site but not incinerated. These wastes will be shipped off-site to a licensed disposal facility.				
19					
20	D002	200	P	S01	
21	D001				INCLUDED IN ABOVE
22	D007				"
23	U032				"
24	U123				"
25	U134				"
26					
27	D003	400	P	S01	"
28	D001				"
29	D006				"
30	U096				"
31	U020				"
32	U023				"
33	U133				"

Please print or type with ELITE type (12 characters per inch) in the unshaded areas only

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EPA I.D. Number (enter from page 1): N C D 0 6 5 6 5 5 5 9 9

Secondary ID Number (enter from page 1):

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)	D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in D(1))
1	U160				INCLUDED IN ABOVE
2	P009				"
3	P081				"
4	U189				"
5	U205				"
6	D010				"
7	P112				"
8	U234				"
9	U223				"
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EPA I.D. Number (enter from page 1)	Secondary ID Number (enter from page 1)
N C D 0 6 5 6 5 5 5 9 9	

XIV. Description of Hazardous Waste (continued)

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM ITEM D(1) ON PAGE 6.

Line Number	Additional Process Codes (enter)

XV. Map

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in this map area. See instructions for precise requirements.

XVI. Facility Drawing

All existing facilities must include a scale drawing of the facility (see instructions for more detail).

XVII. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).

XVIII. Certification(s)

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.

Owner Signature	Date Signed
Thomas W. D'Alonzo	7/2/91
Name and Official Title (type or print): Thomas W. D'Alonzo, Group VP, Glaxo Inc.	
Operator Signature: Thomas W. D'Alonzo	Date Signed: 7/2/91
Name and Official Title (type or print): Thomas W. D'Alonzo, Group VP, Glaxo Inc.	

XIX. Comments

Note: Mail completed form to the appropriate EPA Regional or State Office. (refer to instructions for more information)

These wastes and their corresponding EPA Hazardous Waste Numbers are:

Hazardous waste no.	Chemical Abstracts No.	Substance
P023	107-20-0	Acetaldehyde, chloro-
P002	591-08-2	Acetamide, N-(aminothioxomethyl)-
P057	640-19-7	Acetamide, 2-fluoro-
P058	62-74-8	Acetic acid, fluoro- sodium salt
P002	591-08-2	1-Acetyl-2-thiourea
P003	107-02-8	Acrolein
P070	116-06-3	Aldicarb
P004	309-00-2	Aldrin
P005	107-18-6	Allyl alcohol
P007	2763-96-4	5-(Aminomethyl)-3-isoxazolol
P008	504-24-5	4-Aminopyridine
P119	7803-55-6	Ammonium vanadate
P099	506-61-6	Argentate(1-),bis(cyano-C)-,potassium
P010	7778-39-4	Arsenic acid H_3AsO_4
P012	1327-53-3	Arsenic oxide As_2O_3
P011	1303-28-2	Arsenic oxide As_2O_5
P011	1303-28-2	Arsenic pentoxide
P012	1327-53-3	Arsenic trioxide
P038	692-42-2	Arsine, diethyl
P036	696-28-6	Arsonous dichloride, phenyl-
P054	151-56-4	Aziridine
P067	75-55-8	Aziridine, 2 methyl-
P013	542-62-1	Barium cyanide
P024	106-47-8	Benzenamine, 4-chloro-
P077	100-01-6	Benzenamine, 4-nitro-
P028	100-44-7	Benzene, (chloromethyl)-
P046	122-09-8	Benzeneethanamine, alpha,alpha-dimethyl-
P014	108-98-5	Benzenethiol
P001	[1]81-81-2	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, & salts, when present at concentrations greater than 0.3%
P028	100-44-7	Benzyl chloride
P017	598-31-2	Bromoacetone
P018	357-57-3	Brucine
P045	39196-18-4	2-Butanone, 3,3-dimethyl-1-(methylthio)-, O-[methylamino)carbonyl] oxime
P021	592-01-8	Calcium cyanide
P021	592-01-8	Calcium cyanide $Ca(CN)_2$
P022	75-15-0	Carbon disulfide
P095	75-44-5	Carbonic dichloride
P023	107-20-0	Chloroacetaldehyde
P024	106-47-8	p-Chloroaniline
P026	5344-82-1	1-(o-Chlorophenyl)thiourea
P027	542-76-7	3-Chloropropionitrile
P029	544-92-3	Copper cyanide
P029	544-92-3	Copper cyanide Cu(CN)
P030	.....	Cyanides (soluble cyanide salts), not otherwise specified
P031	460-19-5	Cyanogen
P033	506-77-4	Cyanogen chloride
P033	506-77-4	Cyanogen chloride(CN)Cl
P034	131-89-5	2-Cyclohexyl-4,6-dinitrophenol
P016	542-88-1	Dichloromethyl ether
P036	696-28-6	Dichlorophenylarsine
P037	60-57-1	Dieldrin
P038	692-42-2	Diethylarsine
P041	311-45-5	Diethyl-p-nitrophenyl phosphate
P040	297-97-2	O,O-Diethyl O-pyrazinyl phosphorothioate

[1] CAS Number given for parent compound only.

These wastes and their corresponding EPA Hazardous Waste Numbers are:

Hazardous waste no.	Chemical abstracts No.	Substance
P043	55-91-4	Diisopropylfluorophosphate (DFP)
P004	309-00-2	1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5alpha,8alpha,8abeta)-
P060	465-73-6	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-,(1alpha,4alpha,4abeta,5beta,8beta,8abeta)-
P037	60-57-1	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta,6beta,6aalpha,7beta,7aalpha)-
P051	[1]72-20-8	2,7:3,6-Dimethanonaphth[2,3b]cxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2abeta,3alpha,6alpha,6abeta,7beta,7aalpha)-, & metabolites
P044	60-51-5	Dimethoate
P046	122-09-8	alpha,alpha-Dimethylphenethylamine
P047	[1]534-52-1	4,6-Dinitro-o-cresol and salts
P048	51-28-5	2,4-Dinitrophenol
P020	88-85-7	Dinoseb
P085	152-16-9	Diphosphoramide, octamethyl-
P111	107-49-3	Diphosphoric acid, tetraethyl ester-
P039	298-04-4	Disulfoton
P049	541-53-7	Dithiobiuret
P050	115-29-7	Endosulfan
P088	145-73-3	Endothall
P051	72-20-8	Endrin
P051	72-20-8	Endrin & metabolites
P042	51-43-4	Epinephrine
P031	460-19-5	Ethanedinitrile
P066	16752-77-5	Ethanimidothioic acid, N[[(methylamino)carbonyl]oxy]-, methyl ester
P101	107-12-0	Ethyl cyanide
P054	151-56-4	Ethyleneimine
P097	52-85-7	Famphur
P056	7782-41-4	Fluorine
P057	640-19-7	Fluoroacetamide
P058	62-74-8	Fluoroacetic acid, sodium salt
P059	76-44-8	Heptachlor
P062	757-58-4	Hexaethyltetraphosphate
P116	79-19-6	Hydrazinecarbothioamide
P068	60-34-4	Hydrazine, methyl-
P063	74-90-8	Hydrocyanic acid
P063	74-90-8	Hydrogen cyanide
P096	7803-51-2	Hydrogen phosphide
P060	465-73-6	Isodrin
P007	2763-96-4	3(2H)-Isoxazolone, 5-(aminomethyl)-
P092	62-38-4	Mercury, (acetato-O)phenyl-
P082	62-75-9	Methanamine, N-methyl-N-nitroso-
P064	624-83-9	Methane, isocyanato-
P016	542-88-1	Methane, oxybis(chloro-
P118	75-70-7	Methanethiol, trichloro-
P050	115-29-7	6,9-Methano-2,4,3-benzodioxathiepin,6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-,3-oxide
P059	76-44-8	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-
P066	16752-77-5	Methomyl

[1]CAS Number given for parent compound only.

These wastes and their corresponding EPA Hazardous Waste Numbers are:

Hazardous waste no.	Chemical abstracts No.	Substance
P068	60-34-4	Methyl hydrazine
P064	624-83-9	Methyl isocyanate
P069	75-86-5	2-Methyllactonitrile
P071	298-00-0	Methyl parathion
P072	86-88-4	alpha-Naphthylthiourea
P073	13463-39-3	Nickel carbonyl
P073	13463-39-3	Nickel carbonyl, $Ni(CO)_4$,(T-4)-
P074	557-19-7	Nickel cyanide
P074	557-19-7	Nickel cyanide, $Ni(CN)_2$
P075	[1]54-11-5	Nicotine and salts
P076	10102-43-9	Nitric oxide
P077	100-01-6	p-Nitroaniline
P078	10102-44-0	Nitrogen dioxide
P076	10102-43-9	Nitrogen oxide NO
P078	10102-44-0	Nitrogen oxide NO_2
P082	62-75-9	N-Nitrosodimethylamine
P084	4549-40-0	N-Nitrosomethylvinylamine
P085	152-16-9	Octamethylpyrophosphoramide
P087	20816-12-0	Osmium oxide OsO_4,(T-4)-
P087	20816-12-0	Osmium tetroxide
P088	145-73-3	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid
P089	56-38-2	Parathion
P034	131-89-5	Phenol, 2-cyclohexyl-4,6-dinitro-
P048	[1]51-28-5	Phenol, 2,4-dinitro-
P047	[1]534-52-1	Phenol, 2-methyl-4,6-dinitro- and salts
P020	88-85-7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-
P092	62-38-4	Phenylmercury acetate
P093	103-85-5	Phenylthiourea
P094	298-02-2	Phorate
P095	75-44-5	Phosgene
P096	7803-51-2	Phosphine
P041	311-45-5	Phosphoric acid, diethyl 4-nitrophenyl ester
P039	298-04-4	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester
P094	298-02-2	Phosphorodithioic acid, O,O-diethyl,S-[(ethylthio)methyl] ester
P044	60-51-5	Phosphorodithioic acid, O,O-dimethyl S[2-(methylamino)-2-oxoethyl]ester
P043	55-91-4	Phosphorofluoric acid bis(1-methylethyl)-ester
P089	56-38-2	Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester
P040	297-97-2	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester
P097	52-85-7	Phosphorothioic acid, O-[4-[(dimethylamino)sulfonyl) phenyl] O,O-dimethyl ester
P071	298-00-0	Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester
P110	78-00-2	Plumbane, tetraethyl-
P098	151-50-8	Potassium cyanide
P098	151-50-8	Potassium cyanide K(CN)
P099	506-61-6	Potassium silver cyanide
P070	116-06-3	Propanal, 2-methyl-2-(methylthio)-,O-[(methylamino) carbonyl]oxime
P101	107-12-0	Propanenitrile
P027	542-76-7	Propanenitrile, 3-chloro-
P069	75-86-5	Propanenitrile, 2-hydroxy-2-methyl-
P017	598-31-2	2-Propanone, 1-bromo-
P102	107-19-7	Propargyl alcohol
P003	107-02-8	2-Propenal
P005	107-18-6	2-Propen-1-ol
P067	75-55-8	1,2-Propylenimine

[1]CAS Number given for parent compound only.

These wastes and their corresponding EPA Hazardous Waste Numbers are:

Hazardous waste no.	Chemical abstracts No.	Substance
P102	107-19-7	2-Propyn-1-ol
P008	504-24-5	4-Pyridinamine
P075	[1]54-11-5	Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S), & salts
P114	12039-52-0	Selenious acid, dithalium(1+) salt
P103	630-10-4	Selenourea
P104	506-64-9	Silver cyanide
P104	506-64-9	Silver cyanide Ag(CN)
P105	26628-22-8	Sodium azide
P106	143-33-9	Sodium cyanide
P106	143-33-9	Sodium cyanide Na(CN)
P107	1314-96-1	Strontium sulfide SrS
P108	[1]57-24-9	Strychnidin-10-one, and salts
P018	357-57-3	Strychnidin-10-one, 2,3-dimethoxy-
P108	[1]57-24-9	Strychnine and salts
P115	7446-18-6	Sulfuric acid, dithallium(1+) salt
P109	3689-24-5	Tetraethyldithiopyrophosphate
P110	78-00-2	Tetraethyl lead
P111	107-49-3	Tetraethyl pyrophosphate
P062	757-58-4	Tetraphosphoric acid, hexaethyl ester
P113	1314-32-5	Thallic oxide
P113	1314-32-5	Thallium oxide Tl_2O_3
P114	12039-52-0	Thallium(I) selenite
P115	7446-18-6	Thallium(I) sulfate
P109	3689-24-5	Thiodiphosphoric acid, tetraethyl ester
P045	39196-18-4	Thiofanox
P049	541-53-7	Thioimidodicarbonic diamide $[(H_2N)C(S)]_2NH$
P014	108-98-5	Thiophenol
P116	79-19-6	Thiosemicarbazide
P026	5344-82-1	Thiourea, (2-chlorophenyl)-
P072	86-88-4	Thiourea, 1-naphthalenyl-
P093	103-85-5	Thiourea, phenyl-
P123	8001-35-2	Toxaphene
P118	75-70-7	Trichloromethanethiol
P119	7803-55-6	Vanadic acid, ammonium salt
P120	1314-62-1	Vanadium oxide V_2O_5
P120	1314-62-1	Vanadium pentoxide
P084	4549-40-0	Vinylamine, N-methyl-N-nitroso-.
P001	[1]81-81-2	Warfarin & salts, when present at concentrations greater than 0.3%
P121	557-21-1	Zinc cyanide
P121	557-21-1	Zinc cyanide $Zn(CN)_2$

(f) The commercial chemical products, manufacturing chemical intermediates, or off-specification commercial chemical products referred to in paragraphs (a) through (d) of this section, are identified as toxic wastes [T], unless otherwise designated and are subject to the small quantity generator exclusion defined in Section 261.5(a) and (g).

[Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letters T (Toxicity), R (Reactivity), I (Ignitability) and C (Corrosivity). Absence of a letter indicates that the compound is only listed for toxicity.]

[1] CAS Number given for parent compound only.

These wastes and their corresponding EPA Hazardous Waste Numbers are:

Hazardous waste no.	Chemical abstracts No.	Substance
U001	75-07-0	Acetaldehyde (I)
U034	75-87-6	Acetaldehyde, trichloro-
U187	62-44-2	Acetamide, N-(4-ethoxyphenyl)-
U005	[1]53-96-3	Acetamide, N-9H-fluoren-2-yl
U240	[1]94-75-7	Acetic acid, (2,4-dichlorophenoxy), salts & esters
U112	141-78-6	Acetic acid, ethyl ester (I)
U144	301-04-2	Acetic acid, lead(2+) salt
U214	563-68-8	Acetic acid, thallium (1+) salt
see F027	93-76-5	Acetic acid, (2,4,5-trichlorophenoxy)-
U002	67-64-1	Acetone (I)
U003	75-05-8	Acetonitrile (I,T)
U004	98-86-2	Acetophenone
U005	53-96-3	2-Acetylaminofluorene
U007	79-06-1	Acrylamide
U008	79-10-7	Acrylic acid (I)
U009	107-13-1	Acrylonitrile
U011	61-82-5	Amitrole
U012	62-53-3	Aniline (I,T)
U136	70-60-5	Arsinic acid, dimethyl-
U014	492-80-8	Auramine
U015	115-02-6	Azaserine
U010	50-07-7	Azirino[2',3':3,4]pyrrolo[1,2-a]indole-4,7-dione, 6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8, 8a,8b-hexahydro-8a-methoxy-5-methyl- [1aS-(1aalpha, 8beta,8aalpha,8balpha)]-
U157	56-49-5	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-
U016	225-51-4	Benz[c]acridine
U017	98-87-3	Benzal chloride
U192	23950-58-5	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-
U018	56-55-3	Benz[a]anthracene
U094	57-97-6	Benz[a]anthracene, 7,12-dimethyl-
U012	62-53-3	Benzenamine (I,T)
U014	492-80-8	Benzenamine, 4,4'-carbonimidoylbis(N,N-dimethyl-
U049	3165-93-3	Benzenamine, 4-chloro-2-methyl-,hydrochloride
U093	60-11-7	Benzenamine, N-N'-dimethyl-4-phenylazo-
U328	95-53-4	Benzenamine, 2-methyl-
U353	106-49-0	Benzenamine, 4-methyl-
U158	101-14-4	Benzenamine, 4,4'-methylenebis[2-chloro-
U222	636-21-5	Benzenamine, 2-methyl-, hydrochloride
U181	99-55-8	Benzenamine, 2-methyl-5-nitro-
U019	71-43-2	Benzene (I,T)
U038	510-15-6	Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)- alpha-hydroxy, ethyl ester
U030	101-55-3	Benzene, 1-bromo-4-phenoxy-
U035	305-03-3	Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-
U037	108-90-7	Benzene, chloro-
U221	25376-45-8	Benzenenediamine, ar-methyl-
U028	117-81-7	1,2-Benzenedicarboxylic acid, [bis(2-ethylhexy)] ester
U069	84-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester
U088	84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester
U102	131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester
U107	117-84-0	1,2-Benzenedicarboxylic acid, dioctyl ester
U070	95-50-1	Benzene, 1,2-dichloro-
U071	541-73-1	Benzene, 1,3-dichloro-
U072	106-46-7	Benzene, 1,4-dichloro-
U060	72-54-8	Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro-

[1] CAS Number given for parent compound only.

These wastes and their corresponding EPA Hazardous Waste Numbers are:

Hazardous waste no.	Chemical abstracts No.	Substance
U017	98-87-3	Benzene, (dichloromethyl)-
U239	1330-20-7	Benzene, dimethyl-(I,T)
U201	108-46-3	1,3-Benzenediol
U127	118-74-1	Benzene, hexachloro-
U056	110-82-7	Benzene, hexahydro- (I)
U220	108-88-3	Benzene, methyl-
U105	121-14-2	Benzene, 1-methyl-2,4-dinitro-
U106	606-20-2	Benzene, 2-methyl-1,3-dinitro-
U055	98-82-8	Benzene, (1-methylethyl)- (I)
U169	98-95-3	Benzene, nitro-
U183	608-93-5	Benzene, pentachloro-
U185	82-68-8	Benzene, pentachloronitro-
U207	95-94-3	Benzene, 1,2,4,5-tetrachloro-
U061	50-29-3	Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-chloro-
U247	72-43-5	Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-methoxy-
U023	98-07-7	Benzene, (trichloromethyl)-
U234	99-35-4	Benzene, 1,3,5-trinitro-
U202	81-07-2	1,2-Benzisothiazol-3-(2H)-one, 1,1-dioxide and salts
U203	94-59-7	1,3-Benzodioxole, 5-(2-propenyl)-
U141	120-58-1	1,3-Benzodioxole, 5-(1-propenyl)-
U090	94-58-6	1,3-Benzodioxole, 5-propyl-
U064	189-55-9	Benzo[rst]pentaphene
U248	[1]81-81-2	2H-1-Benzopyran-2-one, 4-hydroxy-3(3-oxo-1-phenylbutyl)-& & salts, when present at concentrations of 0.3% or less
U022	50-32-8	Benzo[a]pyrene
U197	106-51-4	p-Benzoquinone
U085	1464-53-5	2,2'-Bioxirane
U021	92-87-5	(1,1'-Biphenyl)-4,4'diamine
U073	91-94-1	(1,1'-Biphenyl)-4,4'-diamine, 3,3'-dichloro-
U091	119-90-4	(1,1'-Biphenyl)-4,4'-diamine, 3,3'-dimethoxy-
U095	119-93-7	(1,1'-Biphenyl)-4,4'-diamine, 3,3'-dimethyl-
U225	75-25-2	Bromoform
U030	101-55-3	4-Bromophenyl phenyl ether
U128	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-
U172	924-16-3	1-Butanamine, N-butyl-N-nitroso-
U031	71-36-3	1-Butanol (I)
U159	78-93-3	2-Butanone (I,T)
U053	4170-30-3	2-Butenal
U074	764-41-0	2-Butene, 1,4-dichloro- (I,T)
U143	303-34-4	2-Butenoic acid, 2-methyl-, 7-[(2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy)methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester, [1S-[1alpha(Z),7(2S*,3R*), 7aalpha]]-
U031	71-36-3	n-Butyl alcohol (I)
U136	75-60-5	Cacodylic acid
U032	13765-19-0	Calcium chromate
U238	59-79-6	Carbamic acid, ethyl ester
U178	615-53-2	Carbamic acid, methylnitroso-, ethyl ester
U097	79-44-7	Carbamic chloride, dimethyl-
U114	[1]111-54-6	Carbamodithioic acid, 1,2-ethanediylbis-, salts & esters
U062	2303-16-4	Carbamothioc acid, bis(1-methylethyl)-S-(2,3-dichloro-2-propenyl) ester

Hazardous waste no.	Chemical abstracts No.	Substance
U215	6533-73-9	Carbonic acid, dithallium (I+) salt
U033	353-50-4	Carbonic difluoride
U156	79-22-1	Carbonochloridic acid. methyl ester (I,T)
U211	56-23-5	Carbon tetrachloride
U034	75-87-6	Chloral
U035	305-03-3	Chlorambucil
U036	57-74-9	Chlordane, alpha & gamma isomers
U026	494-03-1	Chlornaphazin
U037	108-90-7	Chlorobenzene
U038	510-15-6	Chlorobenzilate
U039	59-50-7	p-Chloro-m-cresol
U042	110-75-8	2-Chloroethyl vinyl ether
U044	67-66-3	Chloroform
U046	107-30-2	Chloromethyl methyl ether
U047	91-58-7	beta-Chloronaphthalene
U048	95-57-8	o-Chlorophenol
U049	3165-93-3	4-Chloro-o-toluidine, hydrochloride
U032	13765-19-0	Chromic acid H_2CrO_4, calcium salt
U050	218-01-9	Chrysene
U051	.....	Creosote
U052	1319-77-3	Cresols (Cresylic acid)
U053	4170-30-3	Crotonaldehyde
U055	98-82-8	Cumene (I)
U246	506-68-3	Cyanogen bromide (CN)Br
U197	106-51-4	2,5-Cyclohexadiene-1,4-dione
U056	110-82-7	Cyclohexane (I)
U129	58-89-9	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1alpha,2alpha,3beta,4alpha,5alpha,6beta)-
U057	108-94-1	Cyclohexanone (I)
U130	77-47-4	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-
U058	.50-18-0	Cyclophosphamide
U059	20830-81-3	Daunomycin
U062	2303-16-4	Diallate
U063	53-70-3	Dibenz[a,h]anthracene
U064	189-55-9	Dibenzo[a,i]pyrene
U066	96-12-8	1,2-Dibromo-3-chloropropane
U069	84-74-2	Dibutyl phthalate
U070	95-50-1	o-Dichlorobenzene
U071	541-73-1	m-Dichlorobenzene
U072	106-46-7	p-Dichlorobenzene
U073	91-94-1	3,3'-Dichlorobenzidine
U074	764-41-0	1.4-Dichloro-2-butene (I,T)
U078	75-35-4	1,1-Dichloroethylene
U079	156-60-5	1,2-Dichloroethylene
U025	111-44-4	Dichloroethyl ether
U027	108-60-1	Dichloroisopropyl ether
U024	111-91-1	Dichloromethoxy ethane
U081	120-83-2	2,4-Dichlorophenol
U082	87-65-0	2,6-Dichlorophenol
U084	542-75-6	1,3-Dichloropropene
U085	1464-53-5	1,2:3,4-Diepoxybutane (I,T)
U108	123-91-1	1,4-Diethyleneoxide
U028	117-81-7	Diethylhexyl phthalate
U086	1615--80-1	N,N-Diethylhydrazine

[1] CAS Number given for parent compound only.

Hazardous waste no.	Chemical abstracts No.	Substance
U087	3288-58-2	O,O-Diethyl-S-methyl-Dithiophosphate
U088	84-66-2	Diethyl phthalate
U089	56-53-1	Diethylstilbestrol
U090	94-58-6	Dihydrosafrole
U091	119-90-4	3,3'-Dimethoxybenzidine
U092	124-40-3	Dimethylamine (I)
U093	60-11-7	p-Dimethylaminoazobenzene
U094	57-97-6	7,12-Dimethylbenz[a]anthracene
U095	119-93-7	3.3'-Dimethylbenzidine
U097	79-44-7	Dimethylcarbamoyl chloride
U098	57-14-7	1,1-Dimethylhydrazine
U099	540-73-8	1,2-Dimethylhydrazine
U101	105-67-9	2,4-Dimethylphenol
U102	131-11-3	Dimethyl phthalate
U103	77-78-1	Dimethyl sulfate
U105	121-14-2	2,4-Dinitrotoluene
U106	606-20-2	2,6-Dinitrotoluene
U107	117-84-0	Di-n-octyl phthalate
U108	123-91-1	1,4-Dioxane
U109	122-66-7	1,2-Diphenylhydrazine
U110	142-84-7	Dipropylamine (I)
U111	621-64-7	Di-n-propylnitrosamine
U041	106-89-8	Epichlorohydrin
U001	75-07-0	Ethanal (I)
U174	55-18-5	Ethanamine, N-ethyl-N-nitroso-
U155	91-80-5	1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-
U067	106-93-4	Ethane, 1,2-dibromo-
U076	75-34-3	Ethane, 1,1-dichloro-
U077	107-06-2	Ethane, 1,2-dichloro-
U131	67-72-1	Ethane, hexachloro-
U024	111-91-1	Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro-
U117	60-29-7	Ethane, 1,1'-oxybis- (I)
U025	111-44-4	Ethane 1,1'-oxybis[2-chloro-
U184	76-01-7	Ethane, pentachloro-
U208	630-20-6	Ethane, 1,1,1,2-tetrachloro-
U209	79-34-5	Ethane, 1,1,2,2-tetrachloro-
U218	62-55-5	Ethanethioamide
U226	71-55-6	Ethane, 1,1,1-trichloro-
U227	79-00-5	Ethane, 1,1,2-trichloro
U359	110-80-5	Ethanol, 2-ethoxy-
U173	1116-54-7	Ethanol, 2,2'-(nitrosoimino)bis-
U004	98-86-2	Ethanone, 1-phenyl-
U043	75-01-4	Ethene, chloro-
U042	110-75-8	Ethene, 2-chloroethoxy-
U078	75-35-4	Ethene, 1,1-dichloro-
U079	156-60-5	Ethene, 1,2-dichloro-, (E)-
U210	127-18-4	Ethene, tetrachloro-
U228	79-01-6	Ethene, trichloro-
U112	141-78-6	Ethyl acetate (I)
U113	140-88-5	Ethyl acrylate (I)
U238	51-79-6	Ethyl carbamate (urethane)
U117	60-29-7	Ethyl (ether (I)
U114	[1] 111-54-6	Ethylenebisdithiocarbamic acid, salts and esters
U067	106-93-4	Ethylene dibromide
U077	107-06-2	Ethylene dichloride
U359	110-80-5	Ethylene glycol monoethyl ether
U115	75-21-8	Ethylene oxide (I,T)
U116	96-45-7	Ethylenethiourea

[1] CAS Number given for parent compound only.

Hazardous waste no.	Chemical abstracts No.	Substance
U076	75-34-3	Ethylidene dichloride
U118	97-63-2	Ethyl methacrylate
U119	62-50-0	Ethylmethanesulfonate
U120	206-44-0	Fluoranthene
U122	50-00-0	Formaldehyde
U124	110-00-9	Furan (I)
U125	98-01-1	2-Furancarboxaldehyde (I)
U147	108-31-6	Furandione
U213	109-99-9	Furan, tetrahydro- (I)
U125	98-01-1	Furfural (I)
U124	110-00-9	Furfuran (I)
U206	18883-66-4	Glucopyranose, 2-deoxy-2(3-methyl-3-nitrosoureido)- D-
U206	18883-66-4	D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-
U126	765-34-4	Glycidylaldehyde
U163	70-25-7	Guanidine, N-methyl-N'-nitro-N-nitroso-
U127	118-74-1	Hexachlorobenzene
U128	87-68-3	Hexachlorobutadiene
U130	77-47-4	Hexachlorocyclopentadiene
U131	67-72-1	Hexachloroethane
U132	70-30-4	Hexachlorophene
U243	1888-71-7	Hexachloropropene
U086	1615-80-1	Hydrazine, 1,2-diethyl-
U098	57-14-7	Hydrazine, 1,1-dimethyl-
U099	540-73-8	Hydrazine 1,2-dimethyl-
U109	122-66-7	Hydrazine, 1,2-diphenyl-
U135	7783-06-4	Hydrogen sulfide
U135	7783-06-4	Hydrogen sulfide H_2S
U116	96-45-7	2-Imidazolidinethione
U137	193-39-5	Indeno[1,2,3-cd]pyrene
U190	85-44-9	1,3-Isobenzofurandione
U140	78-83-1	Isobutyl alcohol (I,T)
U141	120-58-1	Isosafrole
U142	143-50-0	Kepone
U143	303-34-4	Lasiocarpine
U144	301-04-2	Lead acetate
U146	1335-32-6	Lead, bis(acetato-O)tetrahydroxytri-
U145	7446-27-7	Lead phosphate
U146	1335-32-6	Lead subacetate
U129	58-89-9	Lindane
U163	70-25-7	MNNG
U147	108-31-6	Maleic anhydride
U148	123-33-1	Maleic hydrazide
U149	109-77-3	Malononitrile
U150	148-82-3	Melphalan
U152	126-98-7	Methacrylonitrile (I,T)
U092	124-40-3	Methanamine, N-methyl- (I)
U029	74-83-9	Methane, bromo-
U045	74-87-3	Methane, chloro- (I,T)
U046	107-30-2	Methane, chloromethoxy-
U068	74-95-3	Methane, dibromo-

Hazardous waste no.	Chemical abstracts No.	Substance
U080	75-09-2	Methane, dichloro-
U075	75-71-8	Methane, dichlorodifluoro-
U138	74-88-4	Methane, iodo-
U119	62-50-0	Methanesulfonic acid, ethyl ester
U211	56-23-5	Methane, tetrachloro-
U153	74-93-1	Methanethiol (I,T)
U044	67-66-3	Methane, trichloro-
U121	75-69-4	Methane, trichlorofluoro-
U036	57-74-9	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-
U154	67-56-1	Methanol (I)
U155	91-80-5	Methapyrilene
U142	143-50-0	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one,1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-
U247	72-43-5	Methoxychlor
U154	67-56-1	Methyl alcohol (I)
U029	74-83-9	Methyl bromide
U186	504-60-9	1-Methylbutadiene (I)
U045	74-87-3	Methyl chloride (I,T)
U156	79-22-1	Methyl chlorocarbonate (I,T)
U226	71-55-6	Methyl chloroform
U157	56-49-5	3-Methylcholanthrene
U158	101-14-4	4,4'-Methylenebis(2-chloroaniline)
U068	74-95-3	Methylene bromide
U080	75-09-2	Methylene chloride
U159	78-93-3	Methyl ethyl ketone (MEK) (I,T)
U138	74-88-4	Methyl iodide
U161	108-10-1	Methyl isobutyl ketone (I)
U162	80-62-6	Methyl methacrylate (I,T)
U161	108-10-1	4-Methyl-2-pentanone (I)
U164	56-04-2	Methylthiouracil
U010	50-07-7	Mitomycin C
U059	20830-81-3	5,12-Naphthacenedione, 8-acetyl-10-[(3-amino-2,3,6-trideoxy)-alpha-L-lyxo-hexopyranosyl)oxyl-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-
U167	134-32-7	1-Naphthalenamine
U168	91-59-8	2-Naphthalenamine
U026	494-03-1	Naphthalenamine,N,N-bis(2-chloroethyl)-
U165	91-20-3	Naphthalene
U047	91-58-7	Naphthalene, 2-chloro-
U166	130-15-4	1,4-Naphthalenedione
U236	72-57-1	2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl-[1,1'-biphenyl]-4,4'diyl)-bis(azo)bis[5-amino-4-hydroxy]-tetrasodium salt
U166	130-15-4	1,4,Naphthoquinone
U167	134-32-7	alpha-Naphthylamine
U168	91-59-8	beta-Naphthylamine
U217	10102-45-1	Nitric acid, thallium(1+) salt
U169	98-95-3	Nitrobenzene (I,T)
U170	100-02-7	p-Nitrophenol
U171	79-46-9	2-Nitropropane (I,T)
U172	924-16-3	N-Nitrosodi-n-butylamine
U173	1116-54-7	N-Nitrosodiethanolamine
U174	55-18-5	N-Nitrosodiethylamine

Hazardous waste no.	Chemical abstracts No.	Substance
U176	759-73-9	N-Nitroso-N-ethylurea
U177	684-93-5	N-Nitroso-N-methylurea
U178	615-53-2	N-Nitroso-N-methylurethane
U179	100-75-4	N-Nitrosopiperidine
U180	930-55-2	N-Nitrosopyrrolidine
U181	99-55-8	5-Nitro-o-toluidine
U193	1120-71-4	1,2-Oxathiolane, 2,2-dioxide
U058	50-18-0	2H-1,3,2-Oxazaphosphorin-2-amine N,N-bis(2-chloroethyl)tetrahydro-, 2-oxide
U115	75-21-8	Oxirane (I,T)
U126	765-34-4	Oxiranecarboxyaldehyde
U041	106-89-8	Oxirane, (chloromethyl)-
U182	123-63-7	Paraldehyde
U183	608-93-5	Pentachlorobenzene
U184	76-01-7	Pentachloroethane
U185	82-68-8	Pentachloronitrobenzene (PCNB)
See F027	87-86-5	Pentachlorophenol
U161	108-10-1	Pentanol, 4-methyl-
U186	504-60-9	1,3-Pentadiene (I)
U187	62-44-2	Phenacetin
U188	108-95-2	Phenol
U048	95-57-8	Phenol, 2-chloro-
U039	59-50-7	Phenol, 4-chloro-3-methyl-
U081	120-83-2	Phenol, 2,4-dichloro-
U082	87-65-0	Phenol, 2,6-dichloro-
U089	56-53-1	Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E)-
U101	105-67-9	Phenol, 2,4-dimethyl-
U052	1319-77-3	Phenol, methyl-
U132	70-30-4	Phenol, 2,2'-Methylenebis[3,4,6-trichloro-
U170	100-02-7	Phenol, 4-nitro-
See F027	87-86-5	Phenol, pentachloro-
See F027	58-90-2	Phenol, 2,3,4,6-tetrachloro-
See F027	95-95-4	Phenol, 2,4,5-trichloro-
See F027	88-06-2	Phenol, 2,4,6-trichloro-
U150	148-82-3	L-Phenylalanine, 4-[bis(chloroethyl)amino]-
U145	7446-27-7	Phosphoric acid, lead(2+)salt(2-3)
U087	3288-58-2	Phosphorodithioic acid, O,O-diethyl- S-methyl ester
U190	85-44-9	Phthalic anhydride
U191	109-06-8	2-Picoline
U179	100-75-4	Picoline,1-nitroso-
U192	23950-58-5	Pronamide
U194	107-10-8	1-Propanamine (I,T)
U111	621-64-7	1-Propanamine, N-Nitroso-N-propyl-
U110	142-84-7	1-Propanamine, N-propyl- (I)
U066	96-12-8	Propane, 1,2-dibromo-3-chloro-
U083	78-87-5	Propane, 1,2-dichloro-
U149	109-77-3	Propanedinitrile
U171	79-46-9	Propane, 2-nitro- (I,T)
U027	108-60-1	Propane, 2,2'oxybis[2-chloro-
U193	1120-71-4	1,3-Propane sultone
See F027	93-72-1	Propanoic acid, 2-(2,4,5-trichlorophenoxyl)-
U235	126-72-7	1-Propanol, 2,3-dibromo-, phosphate (3:l)
U140	78-83-1	1-Propanol, 2-methyl- (I,T)

Hazardous waste no.	Chemical abstracts No.	Substance
U002	67-64-1	2-Propanone (I)
U007	79-06-1	2-Propenamide
U084	542-75-6	1-Propene, 1,3-dichloro-
U243	1888-71-7	1-Propene, 1,1,2,3,3,3-hexachloro-
U009	107-13-1	2-Propenenitrile
U152	126-98-7	2-Propanenitrile, 2-methyl- (I,T)
U008	79-10-7	2-Propenoic acid (I)
U113	140-88-5	2-Propenoic acid, ethyl ester (I)
U118	97-63-2	2-Propenoic acid, 2-methyl-, ethyl ester
U162	80-62-6	2-Propenoic acid, 2-methyl-, methyl ester (I,T)
U194	107-10-8	n-Propylamine (I,T)
U083	78-87-5	Propylene dichloride
U148	123-33-1	3,6-Pyridazinedione, 1,2-dihydro-
U196	110-86-1	Pyridine
U191	109-06-8	Pyridine, 2-methyl-
U237	66-75-1	2,4(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-
U164	56-04-2	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-
U180	930-55-2	Pyrrolidine, 1-nitroso-
U200	50-55-5	Reserpine
U201	108-46-3	Resorcinol
U202	81-07-2	Saccharin and salts
U203	94-59-7	Safrole
U204	7783-00-8	Selenious acid
U204	7783-00-8	Selenium dioxide
U205	7488-56-4	Selenium sulfide
U015	115-02-6	L-Serine, diazoacetate (ester)
See F027	93-72-1	Silvex (2,4,5-TP)
U206	18883-66-4	Streptozotocin
U103	77-78-1	Sulfuric acid, dimethyl ester
See F027	93-76-5	2,4,5-T
U207	95-94-3	1,2,4,5-Tetrachlorobenzene
U208	630-20-6	1,1,1,2-Tetrachloroethane
U209	79-34-5	1,1,2,2-Tetrachloroethane
U210	127-18-4	Tetrachloroethylene
See F027	58-90-2	2,2,4,6-Tetrachlorophenol
U213	109-99-9	Tetrahydrofuran (I)
U214	563-68-8	Thallium(I) acetate
U215	6533-73-9	Thallium(I) carbonate
U216	7791-12-0	Thallium(I) chloride
U216	7791-12-0	Thallium chloride TlCl
U217	10102-45-1	Thallium(I) nitrate
U218	62-55-5	Thioacetamide
U153	74-93-1	Thiomethanol(I,T)
U244	137-26-8	Thioperoxydicarbonic diamide, $[(H_2N)C(S)]_2S_2$, tetra-methyl-
U219	62-56-6	Thiourea
U244	137-26-8	Thiram
U220	108-88-3	Toluene
U221	25376-45-8	Toluenediamine
U328	95-53-4	o-Toluidine
U353	106-49-0	p-Toluidine
U222	636-21-5	o-Toluidine hydrochloride
U011	61-82-5	1H-1,2,4,-Triazol-3-amine
U227	79-00-5	1,1,2-Trichloroethane
U228	79-01-6	Trichloroethylene

Hazardous waste no.	Chemical abstracts No.	Substance
See F027	95-95-4	2,4,5-Trichlorophenol
See F027	88-06-2	2,4,6-Trichlorophenol
U182	123-63-7	1,3,5-Trioxane, 2,4,6-trimethyl-
U235	126-72-7	Tris(2,3-dibromopropyl) phosphate
U236	72-57-1	Trypan blue
U237	66-75-1	Uracil mustard
U176	759-73-9	Urea, N-ethyl-N-nitroso-
U177	684-93-5	Urea, N-methyl-N-nitroso-
U043	[1]75-01-4	Vinyl chloride
U248	[1]81-81-2	Warfarin, when present at concentrations of 0.3% or less
U239	1330-20-7	Xylene (I)

[1]CAS Number given for parent compound only.

B - Facility Description

SECTION B

FACILITY DESCRIPTION

This section provides a general description of the hazardous waste management facility as required by 40 CFR 270.14(a) and 264.18(a). This description is intended to give the permit application reviewer an overview of the facility.

B-1 GENERAL DESCRIPTION [40 CFR 270.14(b)(1), 40 CFR 264.18(a)]

Glaxo Inc. is located in Research Triangle Park, North Carolina. The street and mailing address is:

Glaxo Inc.
Five Moore Drive
Research Triangle Park, North Carolina 27709

The Facility contact name is:

Mr. Calvin Overcash
Supervisor, Environmental Safety
(919) 248-2263

In support of Glaxo Holdings' worldwide research objectives, Glaxo Inc. has initiated a program to develop an industry leading research establishment at the Research Triangle Park site. The intention is that the facility should ultimately be fully capable of discovering, developing and providing marketing support for new drugs.

The R&D complex will have approximately 1.5 million square feet of gross building space; this includes 424,000 square feet of parking garage space. Included in the complex is a Research and Development Administration Building for office and support services. Offices are provided for Research Management, Research and Development Administration, Regulatory Affairs, Medical Affairs, Planning and Project Management and Medical Services functions.

The various types of laboratories on-site and off-site that will be generating and sending wastes for disposal are as follows:

B-1 GENERAL DESCRIPTION [40 CFR 270.14(b)(1), 40 CFR 264.18(a)] - Continued

1. Pharmaceutical Development Laboratories as Pharmaceutics, Drug Metabolism, Clinical Pharmacokinetics and Analytical Chemistry have an important role in the selection of candidate drugs to provide the essential linkage between drug discovery and clinical evaluation of new chemical entities.

2. Discovery Research Laboratories as Molecular Pharmacology, Chemotherapy, Neurobiology, Biochemistry and Chemistry utilize the most advanced available technology to generate new chemical entities of therapeutic interest.

3. Drug Evaluation Laboratories support the bioassays and tests required for the selection of new chemical entities arising from the research programs.

4. Drug Safety Evaluation Laboratories provide the essential toxicological support to conduct preclinical research and development projects and required studies by the FDA.

The laboratories generate a variety of waste types that vary in degree and nature of hazard. The volume of hazardous wastes generated from a laboratory is typically small (less than 5 gallons per day). The generation of wastes is described in greater detail in Section C.

All solid, hazardous, and radioactive wastes handled at this facility are generated by Glaxo's research and development facilities, and will be accumulated, packaged, and stored on-site. Section A provides a list of the hazardous wastes which may be stored and incinerated at the facility. Glaxo will also be receiving

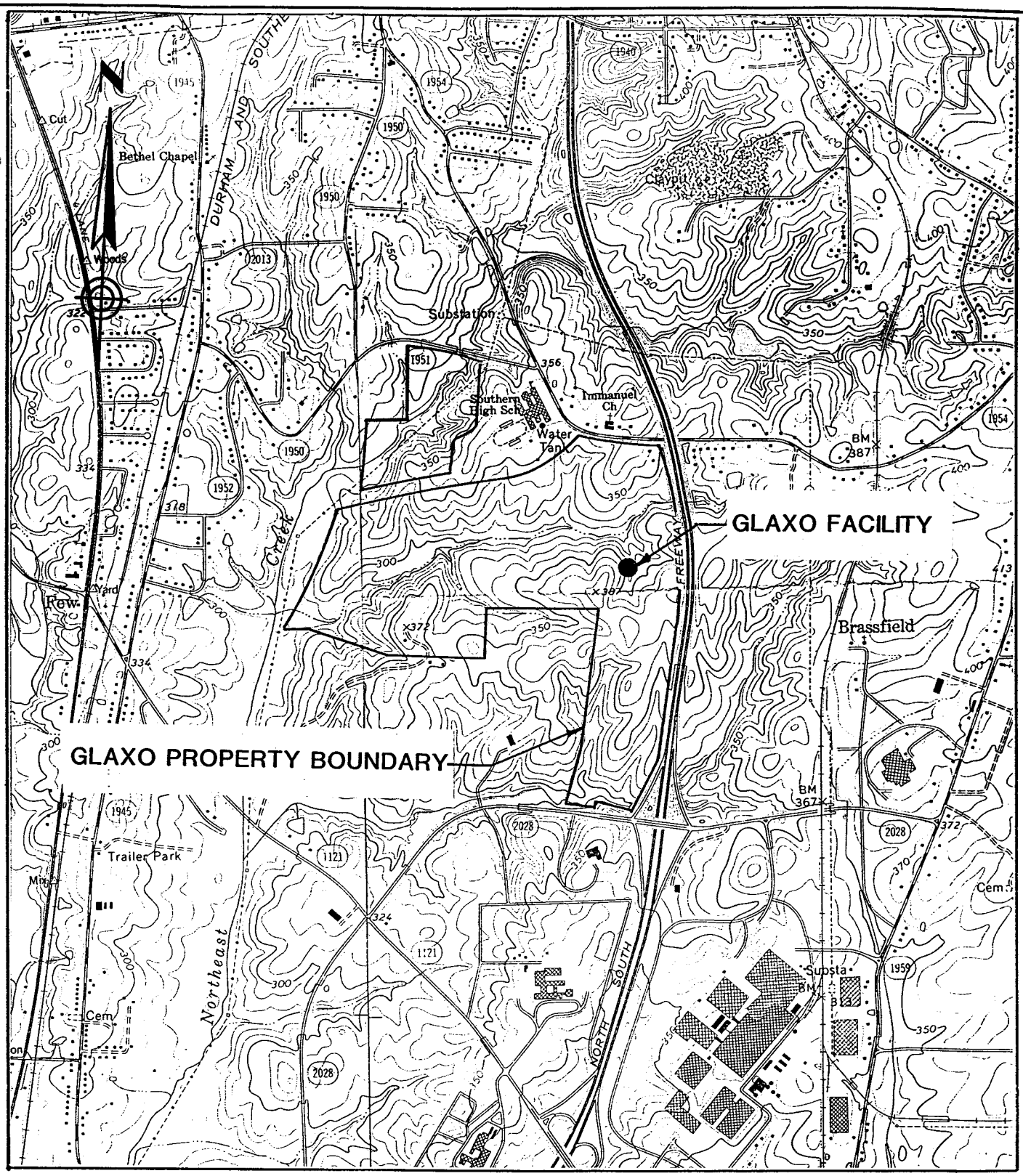
wastes from off-site Glaxo facilities in Research Triangle Park, Chapel Hill, Durham, and Morrisville and Zebulon. Wastes will be collected and shipped by a licensed hazardous waste transporter to the main R&D site for ultimate incineration. Glaxo will ensure that all medical waste generated at the facility will be transported in accordance with the requirements of 15A NCAC 13B.1205.

B-2 TOPOGRAPHIC MAP [40 CFR 270.14(b)(19)]

Drawing R-8279-B1 is a facility key plan showing the location of the Glaxo facility, the property boundary, and general layout of the surrounding land. The facility is located in Durham County, Research Triangle Park, North Carolina. Drawing R-8279-B1 is an excerpt from the two USGS maps for the area. The same USGS 7.5 minute Quadrangle maps for Southeast Durham and Southwest Durham have been included in Appendix F to provide information on the location of surface waters and additional topographic information for more than one mile beyond the property boundary. The scale of these maps is one inch equals two thousand feet (1" = 2000').

Drawing R-8279-B2 (See Appendix F) is a facility site plan that shows site utilities including storm sewers, sanitary sewers, water lines, fire water lines, and fire hydrants. Hazardous waste will be stored in the Hazardous Materials Management Building (HMMB) or in the Environmental Safety Facility indicated on the drawing.

Drawing R-8279-B3 (See Appendix F) is an area topographic map that shows topography for an area extending a minimum of 1000 feet in all directions from the HMMB and the Environmental Safety Facility. The drawing scale is one inch equals one hundred feet (1' = 100"), in accordance with the requirements of 40 CFR 270.14(b)(19). This map represents the facility site topography with two-foot contour intervals. Drawing R-8279-B1 and the USGS maps may also be referred to for additional topographic information.



REFERENCE :USGS SW , SE DURHAM QUADRANGLES

SIRRINE ENVIRONMENTAL CONSULTANTS

Raleigh, North Carolina

SCALE 1:24,000

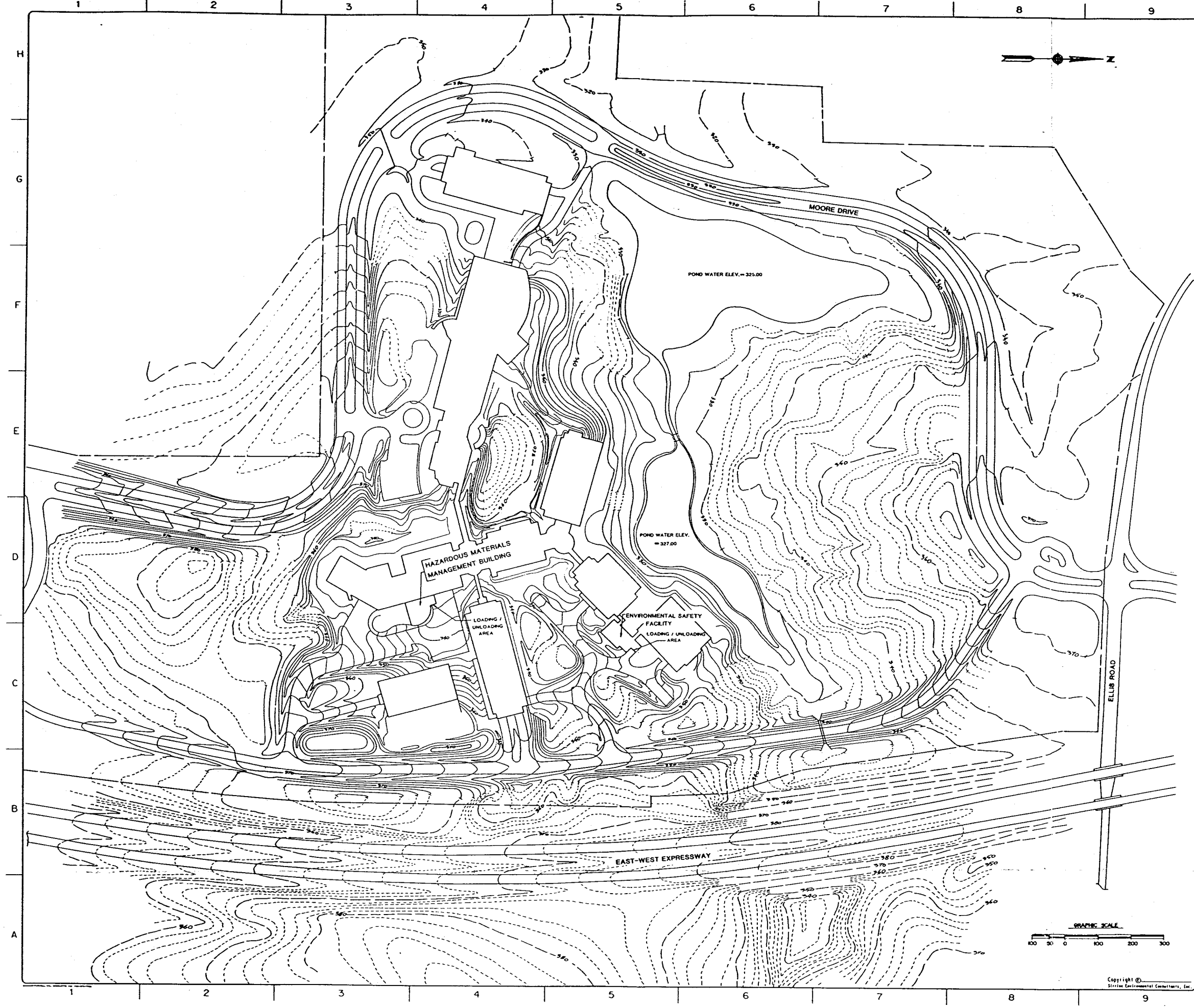
FACILITY KEY PLAN

GLAXO INC.,

RESEARCH TRIANGLE PARK , N.C.

DRAWING NO. R-8279-B1

DUNCAN-PARNELL, INC., CHARLOTTE 366 800-432-6022



NOTES

REFERENCE : THE KLING-LINDQUIST PARTNERSHIP , INC. DRAWING NOS. LA-301,LA-302, LA-303,LA-304,C-106,EP-300 AND LANDMARK ENGINEERING CO.,INC. AERIAL PHOTOGRAPHS NOS. 6749.01 AND 6749.03

LEGEND

EXISTING CONTOURS

PROPOSED CONTOURS

REV. NO.	CODE	CIRCLES	DATE	DESCRIPTION	SEC APPROVED
1	G	12	05 90	NOD REVISIONS	
	KWA				
0	G	12	15 89	ISSUED FOR RCRA PERMIT APPLICATION	
	RWM				

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ISSUE CODE			
A PRELIMINARY	D MAT'L T.O.	F CONST'N	
B DESIGN	E MAT'L PURC	G PERMIT	
	E BIDS	H	

SEAL

SIGNATURE

DATE

DR. MC	DATE
DSGN.	SEC FILE NUMBER
CK. JTB	
DPE	JOB NO. R-8279
CAD FILE NO.	

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Raleigh, North Carolina

GLAXO INC.,

RESEARCH TRIANGLE PARK

NORTH CAROLINA

DRAWING TITLE

TOPOGRAPHIC MAP

CLIENT DRAWING NUMBER

SEC DRAWING NUMBER

R-8279-B3

B-2a Site Access

Vehicle entrance control will be provided at both entrances to the Glaxo site - one at the south entrance from Alexander Drive and the other at the north entrance from Ellis Road. In addition to closed circuit television (CCTV) surveillance and a posted security officer in each security reception center, vehicle access will be controlled by full road width underground hydraulic bollards that can be raised or lowered.

The security systems for Glaxo's R&D Facilities will include CCTV surveillance, card access and security monitoring, security communication and vehicle entrance control. Monitoring of all security systems will be 24 hours per day.

B-2b Access to Hazardous Waste Management Facilities

To enter a building will require a card key access. If a door is opened without using a valid card or request to exit, an alarm signal will be sent to the Security Monitoring Center.

The area around the Environmental Safety Facility (ESF) and the HMMB will be under CCTV surveillance.

B-2c Loading/Unloading

The loading/unloading areas for the HMMB and the ESF are capable of accommodating tractor-trailer trucks. The loading/unloading area for the HMMB is located on the east side of the building and the loading area for the ESF is located on the northeast side of the building as depicted on Drawings R-8279-B3, R-8279-D1 and R-8279-D2.

B-2 TOPOGRAPHIC MAP [40 CFR 270.14(b)(19)] - Continued

B-2d Water Supply

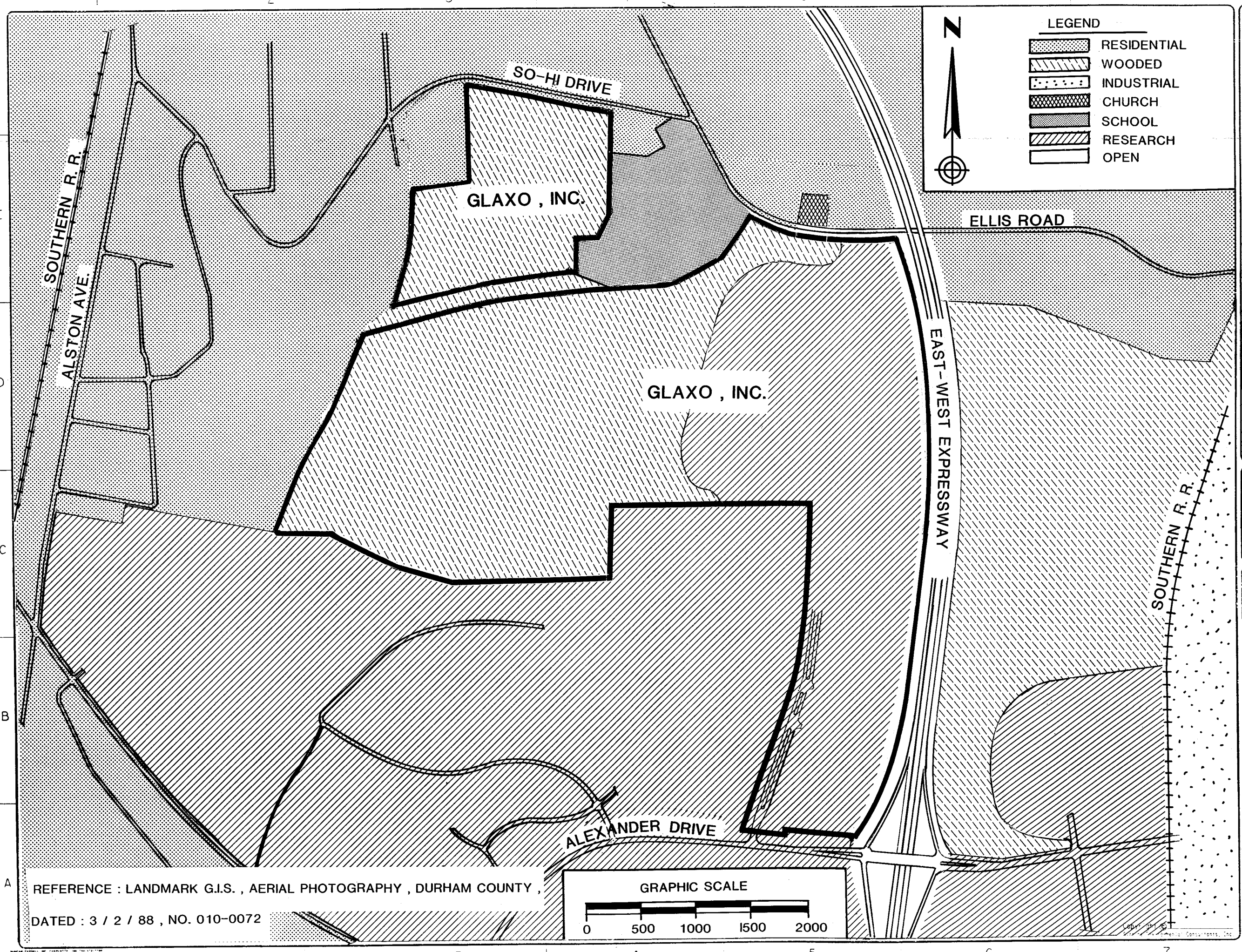
The potable and process water for the facility is supplied by the municipal water system from the City of Durham. Hydrants are located strategic to the facility site to combat any potential fires (see Drawing R-8279-B2).

B-2e Surface Waters

Refer to Section N-2c, "Water Supplies and Water Supply Watersheds" of this application for this information. There will also be stormwater collection ponds constructed on site as noted on Drawing R-8279-B3.

B-2f Surrounding Land Use

Drawing R-8279-B4 shows the current surrounding land use areas. The Glaxo property is bounded on the north by So-Hi Drive and Ellis Road, on the south by a research area and Alexander Drive, on the west by a residential area, and on the east by the Durham East-West Expressway. The immediate area surrounding Glaxo's property is zoned research. The closest residential area is located north of the facility off of Ellis Road, approximately 2000 feet from the hazardous waste management facilities.



REFERENCE : LANDMARK G.I.S. , AERIAL PHOTOGRAPHY , DURHAM COUNTY ,

DATED : 3 / 2 / 88 , NO. 010-0072

NOTES

REV. NO.	CODE CIRCLES	DATE	REV. BY	DESCRIPTION	SEC APPROVED
O	A		TDR	ISSUED FOR RCRA PERMIT APPLICATION	

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ISSUE CODE					
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B	DESIGN	D	MAT'L PURC.	G	
		E	BIDS	H	

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DATE

DR.	WMC	DATE	4-6-89
DSGN.	TDR	SEC FILE NUMBER	
CK.	JTB		
DPE		JOB NO.	R-8279
CAD FILE NO.			

SIRRINE ENVIRONMENTAL CONSULTANTS

Raleigh, North Carolina

GLAXO INC. ,
RESEARCH TRIANGLE PARK
NORTH CAROLINA

DRAWING TITLE

LAND USE MAP

CLIENT DRAWING NUMBER

SEC DRAWING NUMBER

R-8279-B4

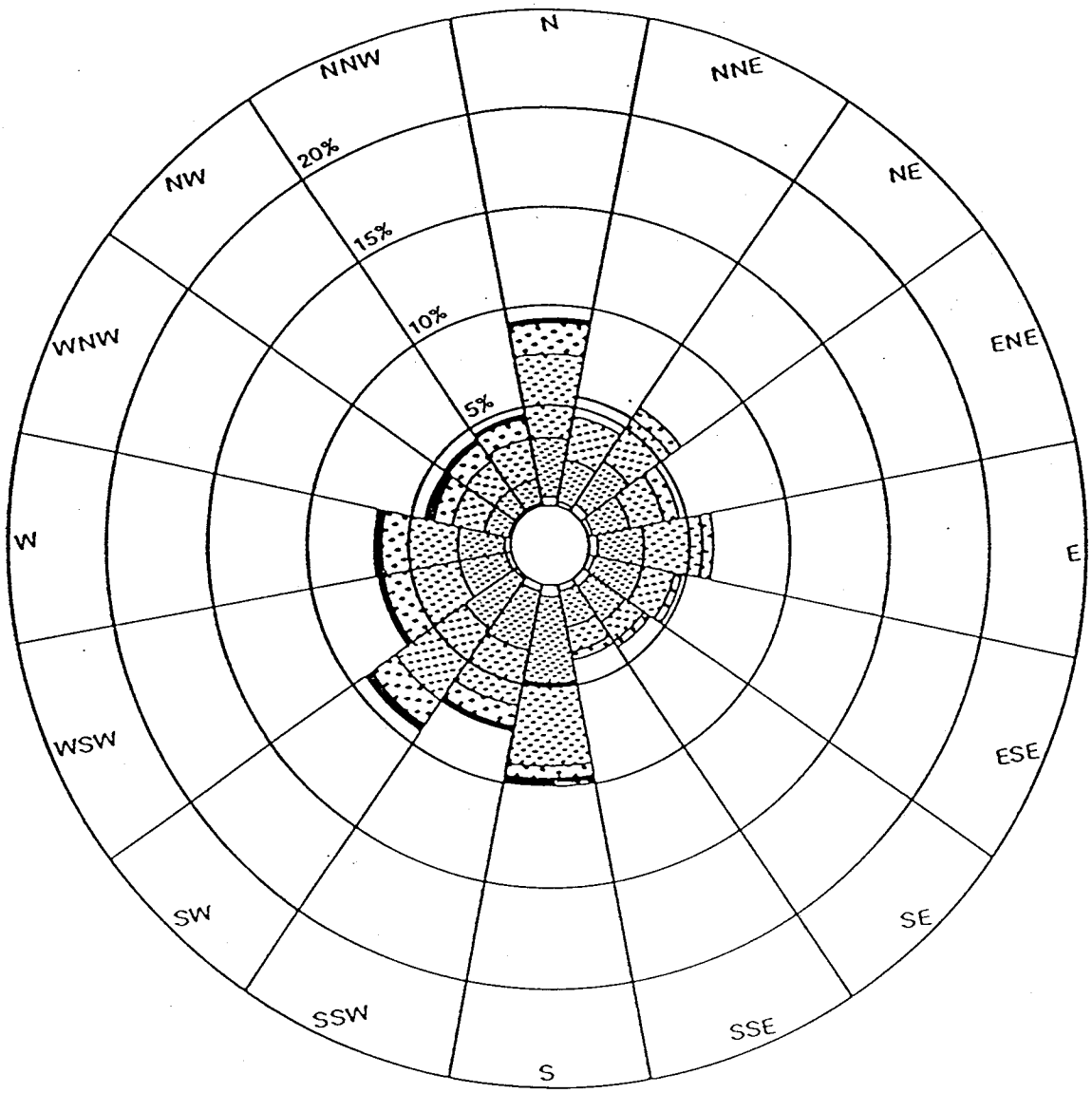
B-2 TOPOGRAPHIC MAP [40 CFR 270.14(b)(19)] - Continued

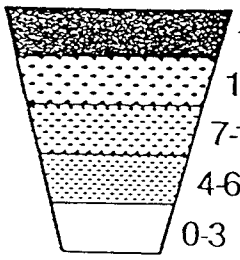
B-2g Wind Rose

Drawing R-8279-B5 provides the annual wind rose data collected at the nearest weather station between 1965 and 1974. The closest weather station to the Glaxo facility is located at the Raleigh-Durham International Airport. The prevailing wind direction for the Research Triangle Park area is generally from the southwest. This wind rose data is an annual distribution, and does not take into account seasonal, monthly, or daily variations in wind speed and direction.

Raleigh, North Carolina
Raleigh-Durham Airport

Period of Record 1965-74
29214 Observations
5.8% Calm





Wind Speed, knots

REFERENCE : NATIONAL CLIMATIC CENTER , ASHVILLE,NC.

SIRRINE ENVIRONMENTAL CONSULTANTS
Raleigh, North Carolina

WIND ROSE
GLAXO INC .,
RESEARCH TRIANGLE PARK , N.C.

SEC DRAWING NO. R-8279-B5

DUNCAN-PARNELL, INC., CHARLOTTE 388 800-432-6022

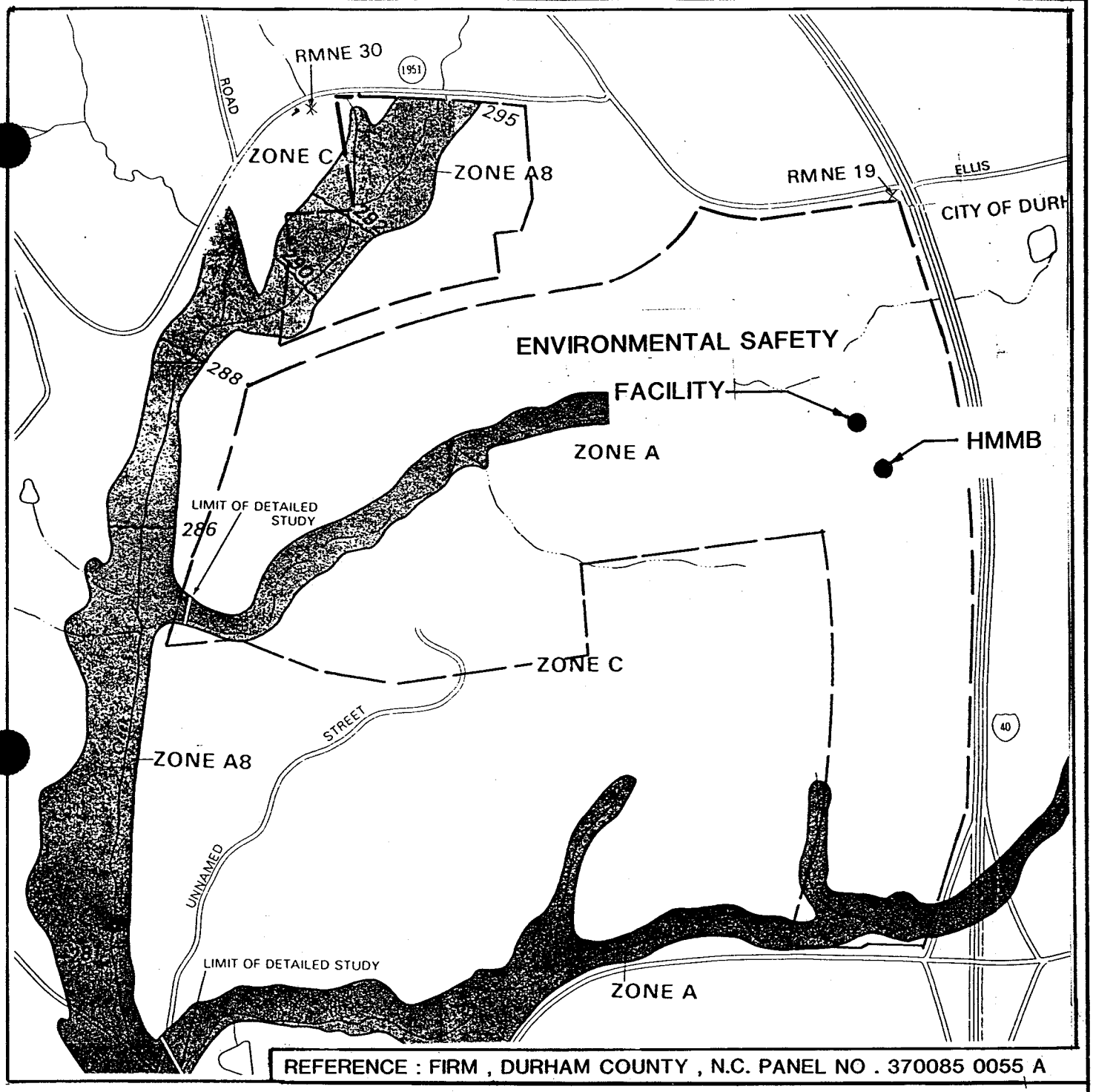
B-3 LOCATION INFORMATION [40 CFR 270.14(b)(11); 40 CFR 264.18]

B-3a Seismic Standard

This facility is not located in an area listed in 40 CFR 264, Appendix VI, which lists sensitive seismic areas.

B-3b Flood Plain Standard

The Glaxo hazardous waste management facilities are not located within the 100-year flood plain, as shown on Drawing R-8279-B6. The flood plain information was taken from a Federal Insurance Agency Insurance Rate Map, Community Panel No. 370085 0055A.



REFERENCE : FIRM , DURHAM COUNTY , N.C. PANEL NO . 370085 0055 A

APPROXIMATE SCALE

1000 0 1000 FEET

KEY TO MAP

500-Year Flood Boundary

100-Year Flood Boundary

Zone Designations*

100-Year Flood Boundary

500-Year Flood Boundary

ZONE B

ZONE B

SIRRINE ENVIRONMENTAL CONSULTANTS

Raleigh, North Carolina

FLOOD BOUNDARY MAP

GLAXO INC .,

RESEARCH TRIANGLE PARK N.C.

DRAWING NO. R-8279-B6

DUNCAN-PARNELL, INC., CHARLOTTE 388 800-432-6022

B-4 TRAFFIC INFORMATION [40 CFR 270.14(b)(10)]

The movement of wastes from the point of generation to storage and from storage to the incinerator is specifically described in Section D.

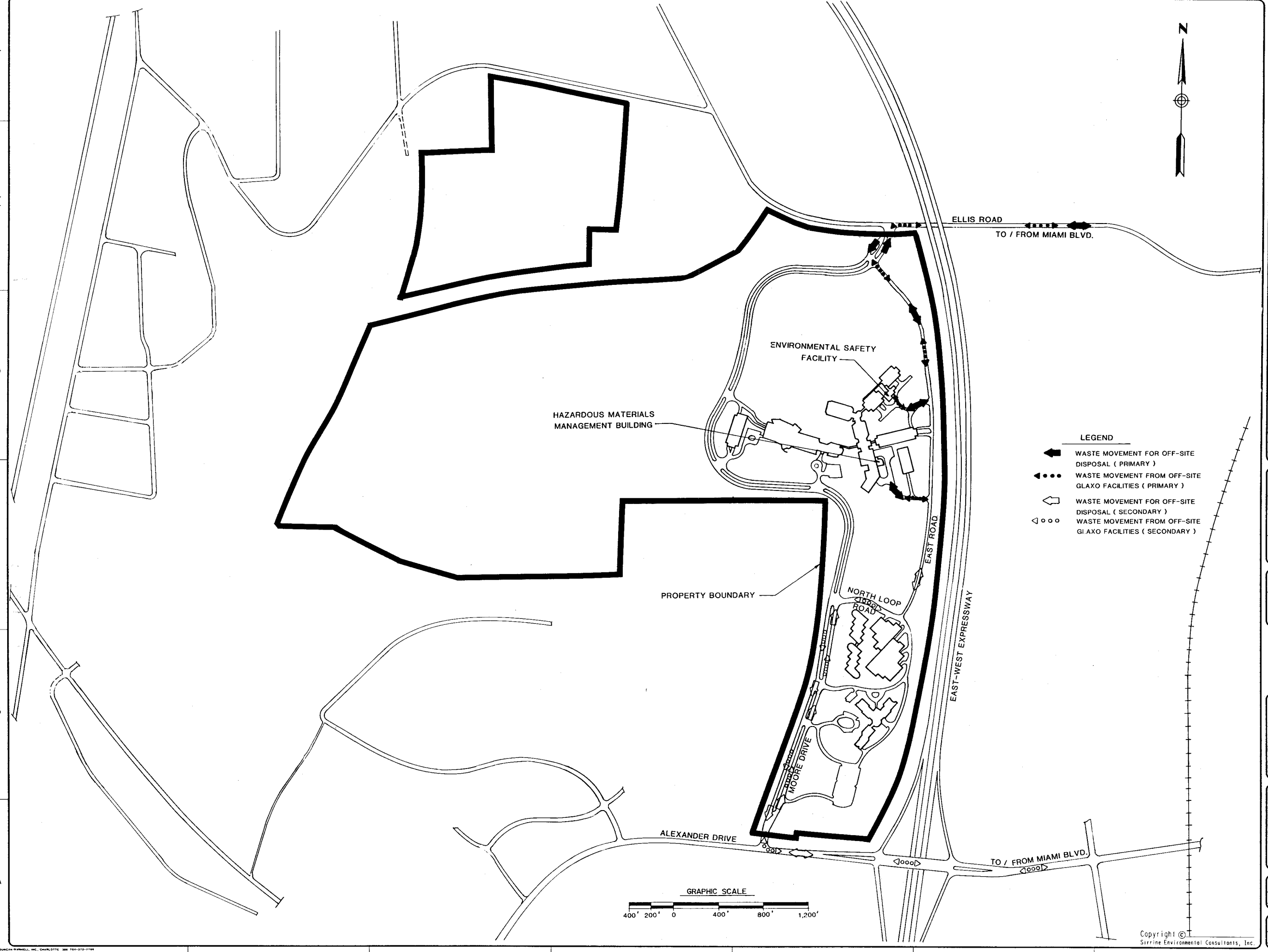
Traffic patterns for the movement of trucks carrying hazardous waste to and from the Hazardous Materials Management Building and the Environmental Safety Facility are shown on Drawing R-8279-B7 (See Appendix F). The primary route for accessing the Glaxo R&D facility from off-site Glaxo laboratories will be from Miami Boulevard to Ellis Road to the East Service Road. The secondary route will be Miami Boulevard to Alexander Drive to Moore Drive to North Loop Road to the East Service Road. The primary route for waste shipment for off-site disposal is the East Service Road to Ellis Road to Miami Boulevard to Alexander Drive to the Durham East-West Expressway. The secondary route is the East Service Road to North Loop Road to Moore Drive to Alexander Drive to the Durham East-West Expressway.

Hazardous waste truck traffic volume leaving the Glaxo site for disposal at a licensed disposal facility is estimated to average one to two tractor trailers per quarter. Truck traffic volume with the wastes generated at the off-site laboratories is estimated at two box vans per week.

T.W. Alexander Drive, Ellis Road, and Moore Drive are maintained by the North Carolina Department of Transportation. These roads are structurally sound and can accommodate trucks carrying legal loads. According to the NC Department of Transportation the maximum legal limit for these roads is 80,000 pounds. Also, according to the NC DOT the Durham East-West Expressway has a concrete surface. Ellis Road has an asphalt surface and TW Alexander Drive has an I-2 surface.

B-4 TRAFFIC MAP [40 CFR 270.14(b)(19)] - Continued

All internal roads at the Glaxo facility will be asphaltic concrete and will be constructed in accordance with the applicable provisions of the latest edition of the Standard Specifications for Roads & Highways, North Carolina Department of Transportation.



NOTES

REV. NO.	CODE	CIRCLES	DATE	DESCRIPTION	SEC APPROVED
0	G			ISSUED FOR RCRA PERMIT APPLICATION	
	RWM				

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ISSUE CODE					
A	PRELIMINARY	C	MAT'L T.O.	F	CONST'N
B	DESIGN	D	MAT'L PURC.	G	PERMIT
		E	BIDS	H	

SEAL

SIGNATURE

DATE

DR.	MC	DATE	
DSGN.	RWM	SEC FILE NUMBER	
CK.	JTB		
DPE		JOB NO.	R-8279
CAD FILE NO.			

SIRRINE ENVIRONMENTAL CONSULTANTS
Raleigh, North Carolina

GLAXO INC.,
RESEARCH TRIANGLE PARK
NORTH CAROLINA

DRAWING TITLE

TRAFFIC FLOW DIAGRAM

CLIENT DRAWING NUMBER

SEC DRAWING NUMBER
R-8279-B7

C - Waste Charateristics

SECTION C

WASTE CHARACTERISTICS

This section describes the chemical and physical nature of the hazardous waste stored and treated at the Glaxo facility and the Waste Analysis Plan for evaluating the wastes to ensure that sufficient information is available for their safe handling. The information submitted is in accordance with the requirements of 40 CFR 264.13, .17 and 40 CFR 270.14(b)(2), (3).

C-1 CHEMICAL AND PHYSICAL ANALYSIS [40 CFR 270.14, 40 CFR 264.13, 270.62(b)(2)]

There are four general categories of waste that will be stored and treated at the Glaxo facility - hazardous waste, solid waste, radioactive hazardous waste, and radioactive/solid waste. The following is a description of the individual wastestreams in each of the four general categories:

1. HAZARDOUS WASTE

a) Solvent Waste

The majority of the hazardous waste stored and incinerated will be liquid "solvent waste" which is generated in the Glaxo research laboratories. This waste will consist of research formulations containing mixtures of laboratory grade solvents (used as a carrier), and small amounts (less than 5%) of P and U listed commercial chemical products. The solvents used in the laboratories include (1) solvents listed under the F002, F003, and F005 designations; (2) solvents contained in the P and U hazardous waste lists; and (3) waste solvents which are hazardous because they exhibit the characteristic of ignitability (i.e., D001 waste solvents such as ethanol and hexane).

Table C-1 presents a complete list of the hazardous wastes which can be contained in the solvent waste. The solvent waste constituents are grouped under the following headings:

1. Non-halogenated solvents
2. Halogenated wastes

3. P-listed wastes
4. U-listed wastes

P-listed wastes are listed for acute toxicity.

For U-listed wastes the primary hazardous properties are indicated by the letters T (Toxicity) or I (Ignitability). Absence of a letter indicates that the compound is listed only for toxicity.

Table C-I

SOLVENT WASTE

WASTE	EPA WASTE NO.
1. Non-Halogenated Solvents	
Acetonitrile	U003
Acetone	F003, U002
Benzene	F005, U019
Cyclohexane	U056
Dimethyl Formamide	D001
1, 4 Dioxane	U108
Ethyl Acetate	F003, U112
Ethyl alcohol (Ethanol)	D001
Ethyl Ether	F003, U117
Formaldehyde	U122
Hexane	D001
Isoamyl Alcohol	D001
Isooctane	D001
Isopropyl alcohol	D001
Methanol	F003, U154
Methyl Ether	D001
N-Butanol	U154
Pentane	D001
Petroleum Ether	D001
Phenol	U188
Propylene Glycol (monoethylether)	D001
Pyridine	F005, U196, D038
Tetrahydrofuran	U213
Toluene	F005, U220
Xylene	F003, U239
2. Halogenated Solvents	
Carbon Tetrachloride	U211, D019
Chloroform	U044, D022
Dichlorobenzene	U070, U071, U072, D027
Dichloroethane	U076, U077, D028
Methylene Chloride	F002, U080

Table C-I (continued)
SOLVENT WASTE

3. P-Listed Wastes

[See Appendix A]

4. U-Listed Wastes

[See Appendix A]

b) Discarded Commercial Chemical Products

In addition to the solvent wastes, Glaxo will store and incinerate (ram feed) discarded commercial chemical products in small containers. Many of these products constitute hazardous waste when they are no longer considered a useful product because 1) their shelf life has expired or 2) the material is no longer needed. The discarded commercial chemical product hazardous wastes can be listed U-wastes, P-wastes, or D-Characteristic wastes (i.e., discarded commercial chemical products that exhibit a hazardous characteristic). The potential discarded commercial chemical products which will be stored and treated (i.e., incinerated) are the same chemicals which may be contained in the solvent waste research formulations. These potential wastes are listed in Appendix A. The following P- or U-listed wastes or D-Characteristic wastes may be stored in the appropriate designated areas of the HMMB, but will not be incinerated on-site (i.e., these wastes will be shipped off-site to a licensed facility):

Corrosive (D002) or D-Characteristic Wastes

Chemical	CAS Number	Hazardous Waste No.
ACIDS		
Benzoic Acid	65850	D002
Butyric Acid	107926	D002
Hydrobromic Acid	10035106	D002

Chemical	CAS Number	Hazardous Waste No.
Hydrochloric Acid	7647010	D002
Linoleic Acid	60333	D002
Myristic Acid	544638	D002
Oleic Acid	112801	D002
Oxalic Acid	144627	D002
Palmitic Acid	57103	D002
Phosphoric Acid	7664382	D002
Propionic Acid	79094	D002
Stearic Acid	57114	D002
Sulfuric Acid	7664939	D002, D003
Toluene Sulfonic Acid	25231463	D002
Trichloroacetic Acid	76039	D002
BASES		
Ammonium Hydroxide	1336216	D002
Potassium Hydroxide	1310583	D002
Sodium Hydroxide	1310732	D002

Reactive P-Listed, U-Listed or D-Characteristic Wastes

Chemical	CAS Number	Hazardous Waste No.
Acetic Acid	64197	D001, D002, D003
Acetic Anhydride	108247	D002, D003
Acetyl Chloride	75365	U006, D003
Alpha, Alpha Dimethylbenzyl Hydroperoxide	80159	U096, D003
Ammonium Nitrate	6484522	D003
Anisoyl Chloride	100072	D002, D003
Benzenesulfonyl Chloride	98099	U020, D003
Benzoyl Chloride	98884	D002, D003
Benzotrichloride	98077	U023, D003
Chromic Acid Solution	7738945	D002, D007
Formic Acid	64186	U123, D002
Hydrazine	302012	U133, D003
Hydrofluoric Acid	7664393	U134, D002
Hydrogen Peroxide	7722841	D003
Methyl Ethyl Ketone Peroxide	1338234	U160, D003
Nitric Acid	7697372	D003, D002
Perchloric Acid	7601903	D003, D002
Phenol, 2, 4, 6-Trinitroammonium Salt	131748	P009, D003

Chemical	CAS Number	Hazardous Waste No.
Phosphorous Pentachloride	10026138	D002, D003
Phosphorous Pentoxide	1314563	D002, D003
Potassium Chlorate	3811049	D003
Potassium Nitrate	7757791	D003
Potassium Perchlorate	7778747	D003
Potassium Permanganate	7722647	D003
1, 2, 3-Propanetriol, Trinitrate	55630	P081, D003
Phosphorous Sulfide	1314803	U189, D003
Selenium Sulfide SeS_2	7488564	U205, D003, D010
Sodium Chlorate	7775099	D003
Sodium Metal	7440235	D003
Sodium Nitrate	7631994	D003
Sodium Perchlorate	7601890	D003
Sodium Peroxide	1313606	D003
Sulfuryl Chloride	7791255	D002, D003
Tetranitromethane	509-14-8	P112, D003
1, 3, 5-Trinitrobenzene	99-35-4	U234, D003
Toluene Diisocyanate	26471-62-5	U223, D003
Thionyl Chloride	7719097	D002, D003

Chemical	CAS Number	Hazardous Waste No.
Zinc Chlorate	10361952	D003
Zinc Nitrate	7779886	D003

Part A of this document provides an estimate of the quantities of discarded commercial chemical products which will be generated.

Note that Formic Acid, Chromic Acid Solution and Hydrofluoric Acid will be stored in the reactive waste storage area and not the acid waste storage area because these materials are listed as toxic hazardous waste. For this reason they cannot be stored in the acid waste storage area which drains to an elementary neutralization system (see section D-1a(3)).

2. SOLID WASTE

a) Somat Waste

Somat Waste will consist of:

- Animal waste - feces and urine from noninfectious and nonradioactive animals.
- Animal bedding material - paper scraps approximately 1/4 inch square and paper sheet used in trays.

These materials will be processed in an animal bedding waste disposal system manufactured by Somat Corporation. The Somat system was designed to provide an efficient, sanitary, and economical method of disposing of animal bedding waste. This system produces a semi-dry animal bedding and waste pulp. A complete description of this system is included in Appendix A.

Somat waste will be piped from the Drug Safety Evaluation (DSE) building and the Drug Evaluation Laboratory (DEL) building to the accumulation area of the Environmental Safety Facility. Using a hopper system, Somat waste will be bagged and placed into carts for storage prior to being ram fed to the incinerator. Plastic bags will contain approximately 50 pounds of waste with a moisture content of approximately 30%. It is estimated that up to 17,750 pounds of Somat waste will be incinerated each month.

b) Animal Carcasses

Animal carcasses will be accumulated in plastic-lined cardboard safety boxes or plastic bags in the DSE and DEL buildings prior to being ram fed to the incinerator. Typically, 1.5 cubic foot boxes, or plastic bags, are used to accumulate approximately 68 pounds of waste. It is estimated that up to 460 boxes (bags) per month will be generated in the DEL building while only 40 boxes (bags) per month will be generated in the DSE building. The estimated total quantity of animal carcass waste to be incinerated each month is 34,000 pounds.

c) Disposable Laboratory Equipment and Supplies

Disposable laboratory equipment and supplies such as plastic pipets, pipet tips, lab coats, bench top paper, disposable gloves, and dry glassware will be accumulated in plastic-lined cardboard safety boxes prior to being ram fed to the incinerator. This solid wastestream is generated in all of the Glaxo laboratories. Typically, the dimensions of the safety boxes are 12"L x 12"W x 27"H. It is estimated that up to 25 boxes weighing approximately 40 pounds each will be generated per month. The estimated total quantity of disposable laboratory equipment and supplies to be incinerated each month is 1,000 pounds.

d) Infectious/Medical Solid Waste

Glaxo will comply with 15A NCAC 13B.1203 which specifies the general requirements for regulated medical waste, including methods of treatment and management of this waste.

Infectious/Medical waste generated in the Glaxo laboratory facilities includes:

- Infectious animal bedding
- Waste disposable laboratory equipment and supplies generated during experiments utilizing infectious agents
- Sharps

The infectious animal bedding will be accumulated in plastic bags inside cardboard safety boxes prior to being ram fed to the incinerator. Typically these boxes will measure 12" x 12" x 18" (1.5 $ft.^3$). It is estimated that up to 70 boxes weighing approximately 25 pounds each will be generated per month.

The waste disposable laboratory equipment and supplies which have potentially contacted infectious waste will be accumulated in plastic-lined cardboard safety boxes in the laboratories. Typically these boxes will measure 12" x 12" x 27" (2.25 $ft.^3$). It is estimated that up to 100 boxes weighing approximately 40 pounds each will be generated per month.

Infectious sharps will typically be accumulated in plastic-lined fiber safety boxes designed specifically for this purpose. It is estimated that up to 100 boxes weighing approximately 5 pounds each will be generated per month. These boxes will measure 4" x 4" x 8" (0.075 $ft.^3$).

Glaxo will satisfy the requirements of 15A NCAC 13B.1204 which specifies the requirements for generators of regulated medical waste, including the packaging, storage, labeling, and recordkeeping of this waste. A management plan for regulated medical waste will be prepared and maintained at the facility.

Glaxo will receive medical wastes from off-site Glaxo facilities in Research Triangle Park, Chapel Hill, Durham, Morrisville, and Zebulon. Glaxo will ensure that regulated medical waste generated but not treated at off-site Glaxo facilities is stored at the main R&D facility in accordance with the requirements of 15A NCAC 13B.1206.

3. RADIOACTIVE HAZARDOUS WASTE

Radioactive hazardous waste (and radioactive solid waste described in the following subsection) contain radioactive elements which will be included in Glaxo's license to incinerate radioactive materials granted by the N.C. Radiation Protection Section. These radioactive elements include:

Hydrogen	Iron	Indium
Carbon	Cobalt	Iodine
Phosphorous	Selenium	Barium
Sulfur	Rubidium	Cerium
Chlorine	Strontium	Samarium
Calcium	Niobium	Europium
Chromium	Technetium	Erbium
Manganese	Ruthenium	

a) Radioactive Solvent Waste

The description of this wastestream is identical to the hazardous liquid solvent waste described earlier except that in this wastestream radioactive tracer materials are added to the research formulations (solvent wastes) and the water content of this wastestream will be higher (up to 50%). Radioactive solvent waste is collected in one (1) gallon or five (5) gallon glass, polyethylene or nalgene containers. The estimated generation rate for this wastestream is 200 gallons per month.

b) Scintillation Vials

Scintillation vials are used in Glaxo research laboratories that work with radioactive materials to analyze samples for radioactivity. Vials contain hazardous solvents (scintillation fluids) and traces of radioactive isotopes (e.g., H-3, C-14, P-32, S-35) in the test medium (e.g., animal tissue, test pharmaceuticals, cell cultures). These vials are glass or polyethylene, capped, 7 or 20 milliliters in size and are normally one-half to two-thirds filled with liquid.

The Material Safety Data Sheets for the scintillation fluids used by Glaxo are included in Appendix A. The following hazardous waste constituents are contained in the scintillation vials:

Hazardous Constituent	EPA Waste No.
Xylene	F003
Methanol	F003

Toluene	F005
Chloroform	U044
Dioxane	U108
Hexane	D001
1,2,4 Trimethylbenzene	D001

After use, the vials are accumulated upright in cardboard trays with paper dividers. Each tray holds approximately 100 - 20 ml. vials or 150 - 7 ml. vials. These trays are placed in cardboard boxes typically 12" x 12" x 12" (1.0 ft.^{3}). Each box weighs approximately 16 pounds. It is estimated that up to 300 boxes will be generated per month for a total quantity of 4,800 pounds per month. These boxes will be ram fed to the incinerator.

4. RADIOACTIVE SOLID WASTE

a) Animal Carcasses

This wastestream consists of animal carcasses which have been exposed to research formulations containing radioactive tracers. These carcasses will be accumulated in plastic-lined cardboard safety boxes in the DEL and DSE buildings prior to being fed to the incinerator. Typically, 1.5 cubic foot boxes will be used to accumulate approximately 68 pounds of waste.

It is estimated that 20 boxes per month will be generated in the DEL building. Approximately 5 boxes per month will be generated in the DSE building. The total estimated quantity of radioactive animal carcasses to be incinerated each month is 1,700 pounds.

b) Animal Bedding

Some of the animal bedding waste generated at the Glaxo facility will constitute radioactive waste and therefore will not be processed through the Somat system. Radioactive animal bedding waste will be collected in plastic-lined cardboard safety boxes in the DEL and DSE buildings prior to being ram fed to the incinerator. Typically, 1.5 cubic foot boxes will be used to accumulate approximately 25 pounds of bedding. It is estimated that the generation rate of radioactive bedding waste will be 24 boxes per month in the DEL building and 16 boxes per month in the DSE building. The total estimated quantity to be incinerated each month is 1,000 pounds.

c) Disposable Laboratory Equipment and Supplies

In the laboratories where radioactive materials are used, disposable laboratory equipment such as plastic pipets, bench paper and gloves contaminated with radioactivity are accumulated in plastic-lined cardboard safety boxes with approximate dimensions of 12" x 12" x 27" (2.25 $ft.^3$) prior to being ram fed to the incinerator. It is estimated that up to 100 boxes, each weighing approximately 40 pounds, will be generated per month. The estimated total quantity of radioactive disposable laboratory equipment and supplies to be incinerated each month is 4,000 pounds.

The following is a brief summary of the wastestreams which will be stored and treated at the Glaxo R&D facility:

WASTESTREAM		ESTIMATED QUANTITY
1.	Hazardous Waste	
	a) Solvent Waste	30,200 lbs/mo.
	b) Discarded Chemical Product	Less than 10 lbs/yr of any individual waste
2.	Solid Waste	
	a) Somat Waste	17,750 lbs./mo.
	b) Animal Carcasses	34,000 lbs./mo.
	c) Disposable Lab Supplies	1,000 lbs./mo.
	d) Infectious/Medical Wastes	6,250 lbs./mo.
3.	Radioactive Hazardous Waste	
	a) Radioactive Solvent Waste	2250 lb/mo.
	b) Scintillation Vials	4,800 lbs./mo. (300ft.^{3}/mo.)
4.	Radioactive Solid Waste	
	a) Animal Carcasses	1,700 lbs./mo.
	b) Animal Bedding	1,000 lbs./mo.
	c) Disposable Lab Supplies	4,000 lbs./mo.

Incinerator ash and spent lime captured in the baghouse will also be stored at the Glaxo site. This material generated from the treatment (i.e. incineration) of hazardous waste retains the hazardous waste designations applicable to the waste prior to treatment.

Spent HEPA and Charcoal filters from the air pollution control equipment will not be stored on-site for more than ninety days before being ram fed to the incinerator or shipped off-site to a licensed facility for disposal. It is anticipated that the HEPA and Charcoal filters will be replaced less frequently than once every sixty (60) days.

C-1a Containers

This section describes the containers used to accumulate hazardous and radioactive hazardous wastes.

Solvent Waste:

These hazardous wastes are accumulated in safety containers within the individual laboratories. Each time an amount of solvent waste is emptied into a safety container by research personnel, an entry is made on a Waste Disposal Form (See Appendix A) which identifies the quantity of each constituent in the solvent waste. Included in each entry are the chemical name(s), quantities, date and signature or initials of the researcher making the entry. Halogenated and non-halogenated solvent wastes are placed in separate safety cans.

The types of safety containers used to accumulate solvent waste in the Glaxo laboratories include:

- High-density polyethylene (HDPE) round disposal can (2.5 or 5 gallon capacity).
- Five (5) or 2-1/2 gallon high-density polyethylene (HDPE) round disposal can with 4-inch wide mouth opening (Fisher Scientific catalog No. 04-664-40, 04-664-41 or equivalent).
- Five (5) or 2-1/2 gallon stainless steel round disposal can with 4-inch wide mouth opening (Fisher Scientific catalog No. 04-664-30, 04-664-31 or equivalent).

- Empty solvent product bottles with secondary containment. Secondary containment will consist of Fisherbrand or Nalgene safety bottle carriers (or equivalent) designed for storing and transporting breakable chemical bottles.

When a solvent waste safety container is filled, it and the completed Waste Disposal Form are picked up by an Environmental Safety Technician and transferred to the Hazardous Materials Management Building (HMMB). In the waste solvent storage area or hazardous materials lab of the HMMB, the contents of the safety containers will be emptied into a grounded/bonded 55-gallon container. The Waste Disposal Form for each safety container will be kept with the 55-gallon containers which received the corresponding solvent waste. The maximum amount of solvent waste placed into any 55-gallon container is 50 gallons. Halogenated and non-halogenated solvent wastes will be collected in separate 55-gallon containers.

The safety containers and 55-gallon containers are compatible with the solvent waste stored. Solvent wastes are stored in the HMMB in 55-gallon steel containers that meet U.S. Department of Transportation specification 17E.

Discarded Chemical Products:

On occasion, laboratory personnel will identify chemical products which are no longer needed in their laboratory. Unwanted chemical products will be transported in their original containers to the

appropriate location in the Hazardous Materials Laboratory of the HMMB by an Environmental Safety Technician. If the Environmental Safety Technician determines that the chemical product cannot be used by another Glaxo laboratory, the material is declared to constitute waste. If, based upon a review of the Material Safety Data Sheet or the product label, the waste is determined to constitute a hazardous waste, it will be labeled as such, accounted for on the hazardous waste inventory records and placed in storage as a hazardous waste.

The chemical products which have been designated as wastes will be stored in their original containers with the original labels intact. These containers will not be larger than 5-gallons and will be made of glass, metal or plastic. They will be segregated according to waste classification (i.e., ignitability, toxicity, reactivity, corrosivity).

Prior to being transported from the HMMB to the Environmental Safety Facility, these wastes will be placed in properly sealed U.S. Department of Transportation approved 20-gallon fiber drums (21C) or cartons (12B) or 5-gallon steel drums (37A). No incompatibilities will exist between the waste chemicals which are placed in the same containers.

Radioactive Solvent Waste:

The radioactive solvent waste will be handled in the same manner as the non-radioactive solvent wastes, except that radioactive solvent

wastes will be collected in 1-gallon or 5-gallon glass, polyethylene or nalgene containers.

Each container of waste will be sampled and assayed for total radioactive content. Containers containing short half-life radioisotopes (less than or equal to 90 days) will be stored in the Radioactive Waste Storage area in the HMMB to allow for radioactive decay. After radioactive decay the containers will again be sampled and assayed for total radioactivity and then bulked into 55-gallon HDPE drums and stored in the Flammable Waste Storage area of the HMMB as halogenated or non-halogenated solvent waste until transport to the ESF. Containers containing long half-life radioisotopes (greater than 90 days) will be bulked into 55-gallon HDPE drums and stored in the Flammable Waste Storage area of the HMMB as radioactive solvent waste until transport to the ESF.

Before transporting bulked radioactive solvent waste to the ESF for transfer to the incinerator feed tank, the total activity of each radioisotope in the drums will be determined by consulting past sampling and analysis records. Calculations, based on Glaxo's license to incinerate radioactive materials granted by the North Carolina Radiation Protection Section, will be used to determine which drums may be transported and combined in the tank.

Scintillation Vials:

Scintillation vials will be accumulated upright in cardboard trays with paper dividers. Each tray holds approximately 100 - 20 ml. vials or 150 - 7 ml. vials. These trays are placed in cardboard boxes, typically 12" x 12" x 12" (1.0 $ft.^3$).

Incinerator Ash and Spent Lime:

Incinerator ash and spent lime captured in the baghouse will be collected in 55-gallon steel drums and stored in the ESF before shipment for off-site disposal. Full drums of incinerator ash will weigh approximately 420 pounds while drums of spent lime will weigh approximately 225 pounds. These wastes will be compatible with the drums and with each other. These wastes will be dry. Upon initial generation, Glaxo will analyze this wastestream for free liquids using the Paint Filter Test, Method 9095 in SW-846. Records of this test will be maintained.

C-1b Tanks

As previously stated, the solvent wastestream represents the majority of the hazardous waste to be stored and incinerated. Full 55-gallon drums of solvent waste will be transported from the HMMB to the solvent waste storage area in the Environmental Safety Facility where the contents of the drums will be pumped into one of three vertical storage tanks. This section describes the tanks which will be used to store the solvent waste.

Three tanks will be located in the solvent waste storage area, one each for non-halogenated solvents, halogenated solvents and radioactive solvents. The following is a general description of the tanks:

Non-halogenated Solvent Tank

- Type - Vertical cone bottom tank
- Volume - 1000 gallons
- Diameter - 5'-6"
- Total height - 12'-9"
- Height of cone - 2'-9"
- Height of straight side - 6'-0"
- Height of cone tip from floor - 4'-0"

Halogenated Solvent Tank and Radioactive Solvent Tank

- Type - Vertical cone bottom tank
- Volume - 500 gallons
- Diameter - 4'-0"
- Total height - 12'-0"
- Height of cone - 2'-0"
- Height of straight side - 6'-0"
- Height of cone tip from floor - 4'-0"

The following is a list of specifications requirements which are common to all three tanks:

- Liquid contact materials of type 316L stainless steel.
- Corrosion allowance of 1/8 inch.

- Minimum tank thickness of 1/4 inch including the corrosion allowance.
- One foot freeboard included in straight side height.
- Closed top.
- Venting through activated carbon canisters.
- Inspection hatch on top.
- Multiple impellers and four 1/4" thick baffles (spaced 1" from tank wall) to maintain agitation when cone is half full.
- Vents to outside per NFPA 30, Flammable and Combustible Liquids Code (FCLA), page 15.
- Minimization of generating static electricity on fill pipe per NFPA 30, LCLC, pages 16, 18.
- Filling and emptying connections located 5' away from any building opening per NFPA 30, FCLC, page 16.
- Devices to prevent overflow per NFPA 30, FCLC, page 19.
- Tank supports protected by materials with a 2-hour fire resistance rating per NFPA 30, FCLA, page 19.
- Tanks, piping and machinery will be bonded or grounded per NFPA 30, FCLC, page 32.
- Conductive objects bonded to ground or another grounded conductive object per NFPA 77, Recommended Practice on Static Electricity, page 10.

C-1c Waste Piles

No wastes will be stored in waste piles at the facility.

C-1d Incinerators

C-1d(1) Trial Burn

The following is a discussion of the specific information which is required in 40 CFR 270.62(b)(2)(i). For a more detailed description of the wastes to be burned during the trial burn, see the Trial Burn Plan in Appendix B.

The average heat value of the waste in the form and composition in which it will be burned will be approximately 6,000 BTU/lb. The two wastes to be burned during the trial burn will have the following estimated heat values:

Test Stage #1;	5868 BTU/lb
Test Stage #2;	6043 BTU/lb

The solvent wastes to be burned will be liquid wastes capable of being pumped into the incinerator. The liquid solvent wastes to be burned will have low viscosities (less than 100 centipoises).

As described in Section C-2, the chemical composition of each wastestream is known based on process knowledge and strict recordkeeping procedures. The Appendix VIII constituents, which can be contained in the

wastestreams to be incinerated, are identified in Section C-1.

The following is an approximate quantification of the constituents (including Appendix VIII constituents which have been noted with an "*") which may be contained in the solvent wastestreams. Water which may be present in varying amounts is deliberately not included.

CONSTITUENT	PERCENT
1. Non-Halogenated Solvents (175 Tons per year)	
*Acetonitrile	10.3
Acetone	10.7
*Benzene	0.4
Cyclohexane	0.4
Dimethyl Formamide	0.4
1, 4 Dioxane	0.4
Ethyl Acetate	7.0
Ethyl alcohol (Ethanol)	7.6
Ethyl Ether	2.1
*Formaldehyde	0.4
Hexane	12.8
Isoamyl Alcohol	0.4
Isooctane	0.4
Isopropyl alcohol	7.8
Methanol	29.5
Methyl Ether	0.4
N-Butanol	0.4
Pentane	0.4
Petroleum Ether	0.4
*Phenol	0.4
Propylene Glycol (monoethylether)	2.1

CONSTITUENT	PERCENT
*Pyridine	0.4
Tetrahydrofuran	2.7
*Toluene	1.7
Xylene	0.4
*All Other Constituents (P&U lists)	<0.4

2. Halogenated Solvents
(19 Tons per year)

*Carbon Tetrachloride	0.8
*Chloroform	40.7
*Dichlorobenzene	0.8
*Dichloroethane	0.8
*Methylene Chloride	57.0
*All Other Constituents (P&U lists)	<0.5

It is projected that less than 10 pounds per year of any P or U listed discarded commercial chemical product waste (see Appendix A) will be incinerated.

The following is an approximate quantification of the constituents (including Appendix VIII constituents which have been noted with an "*") which may be contained in the scintillation vial wastestream (29 Tons per year).

CONSTITUENT	PERCENT
1,2,4 Trimethylbenzene	40 - 60
Xylene	10 - 30
Methanol	0 - 10
*Toluene	0 - 10
*Chloroform	0 - 10
Dioxane	0 - 10
Hexane	0 - 10

CONSTITUENT	PERCENT
*Pyridine	0.4
Tetrahydrofuran	2.7
*Toluene	1.7
Xylene	0.4
*All Other Constituents (P&U lists)	<0.4

2. Halogenated Solvents
(19 Tons per year)

*Carbon Tetrachloride	0.8
*Chloroform	40.7
*Dichlorobenzene	0.8
Dichloroethane	0.8
*Methylene Chloride	57.0
*All Other Constituents (P&U lists)	<0.5

It is projected that less than 10 pounds per year of any P or U listed discarded commercial chemical product waste (see Appendix A) will be incinerated.

The following is an approximate quantification of the constituents (including Appendix VIII constituents which have been noted with an "*") which may be contained in the scintillation vial wastestream (29 Tons per year).

CONSTITUENT	PERCENT
1,2,4 Trimethylbenzene	40 - 60
Xylene	10 - 30
Methanol	0 - 10
*Toluene	0 - 10
*Chloroform	0 - 10
Dioxane	0 - 10
Hexane	0 - 10

C-1d(2) Data in Lieu of Trial Burn

A trial burn will be conducted at the Glaxo facility. Glaxo is not submitting an analysis of each waste to be burned, in lieu of a trial burn plan.

C-1e Landfills

There will be no waste disposed in landfills at the facility.

C-1f Land Treatment

There will be no land treatment of wastes at the facility.

C-2 WASTE ANALYSIS PLAN [40 CFR 270.14, 40 CFR 264.13]

The hazardous wastestreams other than residual waste from the incinerator process generated by Glaxo are laboratory waste. Because of the large number of chemicals used by Glaxo, the wastestreams can vary considerably from day to day. The composition and physical properties of the wastestreams are known, however, since a record is kept of the exact commercial chemical products which make up the wastestreams. Physical and chemical properties of the chemicals are known through existing published data and from Material Safety Data Sheets (MSDS's) submitted by chemical suppliers. MSDS's are used to identify hazardous components of chemical mixtures.

Solvent Waste

As previously stated in Section C-1a, each time an amount of solvent waste is emptied into a safety container by a researcher, an entry is made on a Waste Disposal Form. This record provides all the information necessary to identify all the waste constituents.

Discarded Chemical Products

As previously described in Section C-1a, when the Environmental Safety Technician determines that a chemical product is no longer needed by any Glaxo laboratory, or when the shelf-life of a chemical has expired, a waste is generated. The waste will constitute a hazardous waste if the waste contains a listed U or P hazardous waste or if based on a review of the MSDS and/or product label the waste is determined to exhibit a hazardous characteristic (i.e., ignitability, toxicity, reactivity, corrosivity). All hazardous wastes generated by Glaxo, other than solvent wastes and wastes generated from the incinerator process, are discarded commercial chemical products.

There is no physical or chemical difference between the original products and the waste chemicals. The wastes are contained in their original containers with the original labels intact. No waste analysis will need to be performed to identify waste constituents.

Radioactive Solvent Waste

Radioactive solvent waste will be tracked in the same manner as the non-radioactive solvent waste. The Waste Disposal Form will provide all the information necessary to identify waste constituents.

Scintillation Vials

Scintillation vials contain known quantities of scintillation fluid, radioactive isotopes and organic scintillants. The Material Safety Data Sheets for the scintillation fluids used at Glaxo are included in Appendix A. In the waste generating laboratories, each box of scintillation vials is labeled with the date, type of scintillation fluid (solvent) and the amount of radioactivity. No waste analysis will need to be performed to identify the hazardous waste constituents.

Incinerator Ash, Spent Lime, HEPA and Charcoal Filters

These wastes are generated from the operation of the incinerator. These will be dry wastes with no free liquids and a low moisture content. None of the wastestreams will have any characteristics of hazardous waste. However, since listed hazardous wastes will be incinerated, the resultant incinerator ash, and

spent lime and filters will be considered a hazardous waste per 40 CFR 261.3(c)(2)(i). Glaxo may submit a petition to the North Carolina Hazardous Waste Section and the U.S. Environmental Protection Agency, Region IV to delist these two wastestreams per the requirements of 40 CFR 260.22.

As stated in Section C-1, spent HEPA and Charcoal filters will not be stored on-site for more that ninety days before being ram fed to the incinerator or shipped off-site to a licensed facility for disposal. It is anticipated that HEPA and Charcoal filters will be replaced less frequently than every sixty (60) days.

Before any of this waste is disposed of off-site at a RCRA permitted land disposal facility, a complete material profile will be completed in accordance with the requirements of the RCRA permitted facility which will receive the waste.

The following is a waste analysis plan which has been developed for the liquid solvent wastes that are accumulated and stored in the solvent waste tanks and incinerated through the liquid injection system. The solvent waste to be incinerated will be analyzed according to this waste analysis plan to ensure that the required incineration efficiencies can be achieved.

C-2a Parameters and Rationale

The solvent waste fed to the incinerator will be in liquid form. The following is a summary of the waste parameters which will be determined, the rationale for their selection and methods of analysis.

Heating Value

- To measure heat content of waste to establish adequate incinerator conditions to achieve waste destruction.
- Test Method - ASTM D240.

Chlorine Content (%)

- The halogenated and radioactive solvent wastestreams will be analyzed for chlorine content to assure compliance with the maximum HCl emission rate of 4.0 lb./hour. Chlorine content in the waste designated for incineration that day shall be at a level which would not generate HCl emissions in excess of 4.0 lb./hour at the maximum incinerator charge rate assuming 100 percent conversion of chlorine to HCl.
- Test Method - SW-846, Method 9020.

Water Content (%)

- Process control purposes.
- The solvent waste must not have a water content greater than 30%. Radioactive solvent waste must not have a water content greater than 50%. These are the optimum operational limit for these wastestreams at the maximum waste feed rate. If the water content is greater than these limits, the waste feed rates will be reduced to ensure incinerator operation within acceptable limits. Alternatively solvent waste with a high water content may be disposed off-site at a licensed facility.
- Water Content Test Method - ASTM D95.

Viscosity

- Assessment of waste delivery system's adequacy.
- Test Method - ASTM D2170 (Kinematic Viscometer).

Ash Content (%)

- Process control purposes. Maintain compliance with particulate emission standards.
- Test Method - ASTM D482.

Metals

- Precautionary analysis to verify absence of metal.
- Test Method - EPA-SW846, 7000 series.

C-2b Sampling Methods

As stated in section C-1b, the solvent waste tanks will be provided with multiple impellers and baffles to maintain agitation and a homogeneous mixture. Solvent waste samples will be obtained from sample ports on the straight side of the tanks. The sample ports are designed to minimize dead volume so that the first material drawn from the tank will be a representative sample. The tap sampling method to be used is described in ASTM Standard D-4057-9.3 or EPA-600/8-84-002 Method S004 or equivalent.

C-2c Frequency of Analysis

A sample of the contents of a solvent waste tank will be analyzed according to the waste analysis plan before any of the waste is

incinerated. When additional solvent waste is placed in a tank, a new waste analysis will be performed before liquid feed to the incinerator is resumed.

C-2d Additional Requirements for Ignitable, Reactive or Incompatible Waste

The solvent waste stored and incinerated at the Glaxo facility is not reactive. The wastes stored and incinerated that are incompatible with any other waste are the corrosive and reactive discarded chemical products. Acidic and basic corrosive wastes will be stored in separate areas of the HMMB. Similarly, reactive wastes which include oxidants will be stored in the reactive waste area of the HMMB.

All solvent waste is considered to be ignitable and is stored in the flammable waste area of the HMMB and in the solvent waste area of the Environmental Safety Facility. Halogenated, non-halogenated

and radioactive solvent wastes are not incompatible. The individual laboratory researchers will be responsible for ensuring that incompatible or reactive materials are not placed in the 5-gallon solvent waste containers or the one-gallon radioactive solvent waste containers. The Environmental Safety Technician will be responsible for transferring the contents of these containers into 55-gallon containers and for pumping the contents of the 55-gallon containers into the solvent tanks located in the Environmental Safety Facility. As previously stated in C-1a, each time an amount of solvent waste is placed into a safety container by research personnel, an entry is made on the Waste Disposal Form which identifies the quantity of each constituent in the solvent waste. Trained research personnel and the Environmental Safety Technicians will use published information sources to evaluate waste compatibility including MSDS's, 40 CFR 264 Appendix V - Examples of Potentially Incompatible Waste, Condensed Chemical Dictionary, and the Merck Index.

C-2e Additional Requirements for Waste Generated Off-Site

Glaxo will receive off-site wastes from Glaxo laboratories which are not located on contiguous property to the R&D complex. However, the wastestreams generated at the off-site facilities are the same as the wastestreams generated at the main R&D complex.

All wastestreams generated at the off-site Glaxo laboratories will be accumulated and handled in the same manner as the wastestreams generated on-site. Off-site wastes will be transported to the HMMB by a licensed hazardous waste transporter. Once the off-site waste

and accompanying manifests and waste disposal forms are received at the HMMB the containers will be physically inspected to determine packaging integrity, absence of leaks and agreement with the manifest. Receipt will be acknowledged on the hazardous waste manifest. If discrepancies are noted, the transporter will be immediately notified. If the discrepancies are not immediately resolved, the generator will be notified. Waste will not be integrated with other wastes at the HMMB until discrepancies are resolved. If a discrepancy cannot be resolved, the waste will be returned to the Glaxo generator.

No additional procedures are required to determine that the identity of the waste matches the identity of the waste designated on the accompanying manifest and waste disposal form.

It is estimated that wastes from off-site Glaxo laboratories will represent approximately twenty-five percent of the total waste stored and treated at the main R&D complex.

C-3 ADDITIONAL WASTE ANALYSIS REQUIREMENTS PERTAINING TO LAND DISPOSAL RESTRICTIONS [40 CFR 270.14b(3), 40 CFR 264.13(a)(1), 40 CFR 264.13(b)(c),40 CFR 268.7]

C-3a Waste Characteristics

The waste to be incinerated will include materials restricted from land disposal under 40 CFR 268. Knowledge of the waste to be incinerated is based on the waste analysis plan presented in section C-2 above. The incinerator ash, baghouse dust and charcoal filters are considered hazardous waste in accordance with 40CFR 261.3(C). Section C-3(b) below contains the analysis plan for this waste to determine if it is restricted from land disposal.

C-3a(1) Waste Characteristics: Solvent Wastes and Dioxin Containing Wastes.

The wastes to be incinerated will contain solvent wastes prohibited for land disposal under 40 CFR 268.30. No dioxin containing wastes will be incinerated. A determination if the incinerator ash, baghouse dust and filters are restricted from land disposal will be made after analysis of a sample in accordance with Section C-3(b) below.

C-3a(2) Waste Characteristics : California List Wastes.

The wastes to be incinerated will contain California List Wastes. The incinerator ash, baghouse dust and filters will

be evaluated in accordance with Section C-3(b) below to determine if they are prohibited from land disposal.

C-3a(3) Waste Characteristics: First Third Wastes.

The waste to be incinerated will not contain First Third Wastes. Knowledge of the waste to be incinerated is based on the waste analysis plan contained in Section C-2 above.

C-3b Additional Requirements for Treatment Facilities

Incinerator ash, baghouse dust and filters cannot be sampled and analyzed prior to the issuance of this permit. Glaxo will, therefore, collect the incinerator ash and baghouse dust and store it in 55-gallon drums in the Environmental Safety Facility. Prior to disposal, a representative sample will be collected for analysis in accordance with 40 CFR 268.41 and 40 CFR 268.43. All analysis will be performed in accordance with SW 846 or equivalent method . The constituents chosen for analysis will be in accordance with 40 CFR 268. Sample collection procedures will be in accordance with Section 3.3 of the Hazardous Waste Incineration Measurement Guidance Manual, June 1989 EPA/625/6-89/021. Ash and baghouse dust samples will be collected by EPA-600/8-84-002 Method S007 or equivalent. Filters will be sampled by ASTM Standard D346-75, D420-69 or equivalent.

C-3 ADDITIONAL WASTE ANALYSIS REQUIREMENTS PERTAINING TO LAND DISPOSAL RESTRICTIONS [40 CFR 270.14b(3), 40 CFR 264 13(a)(1), 40 CFR 264.13(b)(c), 40 CFR 268.7] - Continued

The results of analyses will be used to certify that the ash and baghouse dust and filters meet the requirements for land disposal described in 40 CFR 268, Land Disposal Restrictions. The initial sample collected and analyzed prior to disposal of any incinerator ash, baghouse dust or filters will be the only planned analysis.

C-3 ADDITIONAL WASTE ANALYSIS REQUIREMENTS PERTAINING TO LAND DISPOSAL RESTRICTIONS [40 CFR 270.14b(3), 40 CFR 264 13(a)(1), 40 CFR 264.13(b)(c), 40 CFR 268.7] - Continued

Knowledge of the waste being incinerated and incineration process, verified by the sampling and analysis, will establish sufficient knowledge of the waste to determine if it is restricted under 40 CFR 268. Glaxo reserves the right to petition for delisting of the incinerator ash, baghouse dust and filters under 40 CFR 260.22.

C-3c Additional Requirements for Disposal Facilities

Does not apply.

C-3d Additional Requirements for Surface Impoundants Exempted from Land Disposal Restrictions.

Does not apply.

C-3e Requirements for Land Disposal Facilities with an Approved Exemption or Extension.

Does not apply.

D - Process Information

SECTION D

PROCESS INFORMATION

The information provided in this section is submitted in accordance with the requirements of 40 CFR Part 270.15 and 270.16. Specific regulations addressed to complete this section include 40 CFR 264.17; 264.35; 264.171; 264.172; 264.173; 264.174; 264.175; 264.176; 264.177; 264.191; 264.192; 264.193; 264.194; 264.195; 264.196; 264.198; and 264.199.

D-1 CONTAINER DESIGN [40 CFR 270.15]

Hazardous wastes generated at the Glaxo facility will be stored in the Hazardous Materials Management Building (HMMB) and Environmental Safety Facility (ESF) as shown on drawing R-8279-D1 and R-8279-D2. The HMMB will include a loading area, a hazardous materials laboratory for waste staging and segregation, waste storage areas for flammable waste (solvent waste), caustic waste, acid waste, reactive (oxidizer) waste, and radioactive waste.

The ESF will include a loading dock area, a liquid waste storage room for flammable wastes (solvent wastes) and waste storage areas for scintillation vials, incinerator ash, baghouse dust, somat waste and animal carcasses.

The maximum hazardous waste inventory which can be stored at the facility is 7,905 gallons in containers and 2,000 gallons in tanks.

D-1a Containers with Free Liquids/Description of System

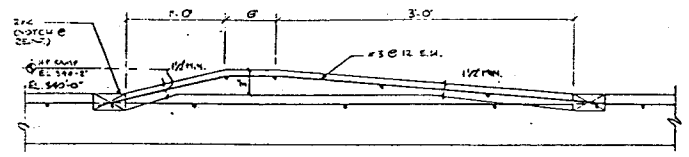
D-1a(1) Basic Design Parameters, Dimensions, and Materials of Construction

The base of all floors, trenches, and sumps in the waste storage and handling areas of the HMMB and ESF will be epoxy-coated concrete, free of cracks and gaps, and will be sufficiently impervious to contain leaks and/or spills until the collected material is detected and removed. An engineering

evaluation of the structural integrity of the concrete bases of the waste storage and handling areas of the HMMB and ESF will be performed before waste storage and incineration activities are initiated.

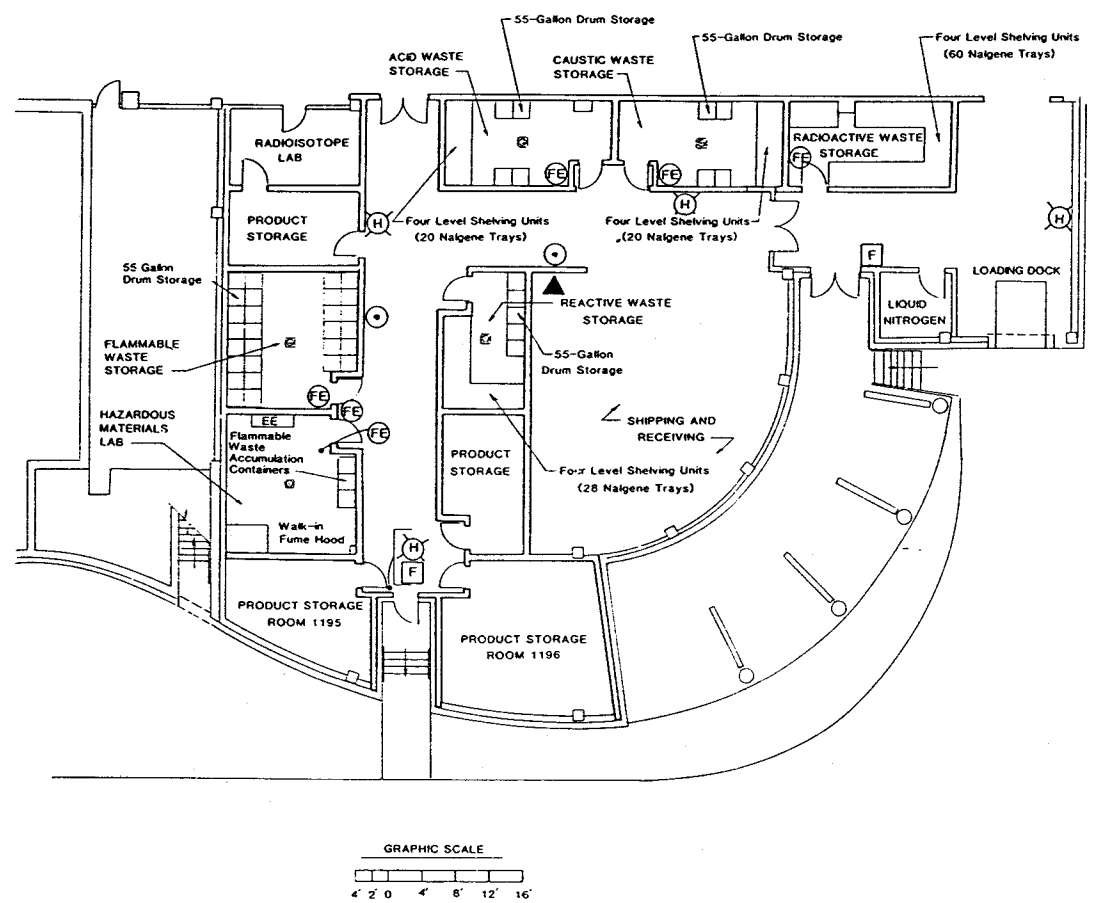
The architectural and structural design of the HMMB and ESF has been done by licensed architectural and structural engineers of The Kling Lindquist Partnership located in Philadelphia, PA. The concrete foundations have been designed according to accepted engineering practice and meet all State and local building codes. Glaxo has hired a separate independent agency to test and inspect all concrete and foundation work for these buildings. All records and delivery tickets are submitted and retained on construction materials, concrete cylinder tests and daily inspection logs to ensure conformance to project specifications.

In areas used for storage of hazardous wastes and the incinerator pit area will receive a coating of chemical resistant epoxy composition and topcoat sealer to contain any spills.



TYPICAL RAMP DETAIL AT STORAGE ROOM DOORWAYS

SCALE 1/8" = 1'-0"



GRAPHIC SCALE

4' 2' 0 4' 8' 12' 16'

LEGEND

- FE — FIRE EXTINGUISHER
- F — FIRE ALARM MANUAL PULL STATION
- H — COMBINED FIRE ALARM HORN AND FLASHING STROBE INDICATOR
- EE — EMERGENCY EQUIPMENT PER TABLE G-III
- SAFETY SHOWER
- TELEPHONE
- FLOOR DRAIN TO CONTAINMENT SYSTEM

NOTES

1. ALL FIRE EXTINGUISHERS TO BE ABC-TYPE PER FACTORY MUTUAL, LOCATED AS SHOWN ON DRAWING.
2. ALL HAZARDOUS WASTE STORAGE AREAS TO BE PROTECTED BY WET-PIPE SPRINKLER SYSTEMS IN ACCORDANCE WITH NFPA 13, INSTALLATION OF SPRINKLER SYSTEMS, AS MODIFIED BY IRI (INSURANCE UNDERWRITER).
3. ALL CONCRETE FLOOR AND WALL AREAS TO HAVE A CHEMICAL RESISTANT AND WATERPROOF LINER INSTALLED.
   ALL CONCRETE MASONRY UNITS TO BE COATED WITH CHEMICAL RESISTANT EPOXY COATING.
   FLOORS IN HAZARDOUS WASTE STORAGE AREAS TO HAVE A SEAMLESS EPOXY COMPOSITION FLOORING SYSTEM WITH 4" HIGH INTEGRAL COVED BASE.
4. THE BASE WILL BE FREE OF CRACKS AND GAPS, SUFFICIENTLY IMPERVIOUS TO THE WASTE BEING STORED AND STRUCTURALLY SOUND.
5. ALL DOORS TO HAZARDOUS WASTE STORAGE AREAS SHALL HAVE A FIRE RESISTANCE RATING OF 1 HOUR.
6. ALL HAZARDOUS WASTE STORAGE ROOMS WILL BE EQUIPPED WITH EMERGENCY HIGH SPEED ROOM DILUTION VENTILATION SYSTEMS.
7. HAZARDOUS WASTE STORAGE AREAS WILL BE PROVIDED WITH EXPLOSION-PROOF LIGHTING FIXTURES AND POWER OUTLETS. GROUNDING FACILITIES FOR PREVENTION OF STATIC CHARGE BUILD-UP WILL BE PROVIDED.
8. REFERENCE: TKLP DRAWING NO. 1A.

REV. NO.	CODE	CIRCLES	DATE	DESCRIPTION	SEC APPROVED
1	G	8	16	NOD REVISIONS	
	RWM	90			
0	G	12	15	ISSUED FOR RCRA PART B APPLICATION	
	RWM	89			

NOTE: [illegible]

ISSUE CODE: A PRELIMINARY; B DESIGN; C MATL'L PURC; D MATL'L PURC; E BIDS; F CONST'N; G PERMIT; H

SEAL

SIGNATURE

DATE

DR	MC	DATE	12/11/89
DSGN.	RWM	SEC FILE NUMBER	
CK	JTB		
DPE		JOB NO	R-8279
CAD FILE NO			

SIRRINE ENVIRONMENTAL CONSULTANTS

Raleigh, North Carolina

GLAXO, INC.
RESEARCH TRIANGLE PARK
NORTH CAROLINA

DRAWING TITLE

HAZARDOUS MATERIALS MANAGEMENT BUILDING GENERAL ARRANGEMENT

CLIENT DRAWING NUMBER

SEC DRAWING NUMBER

R-8279-D1

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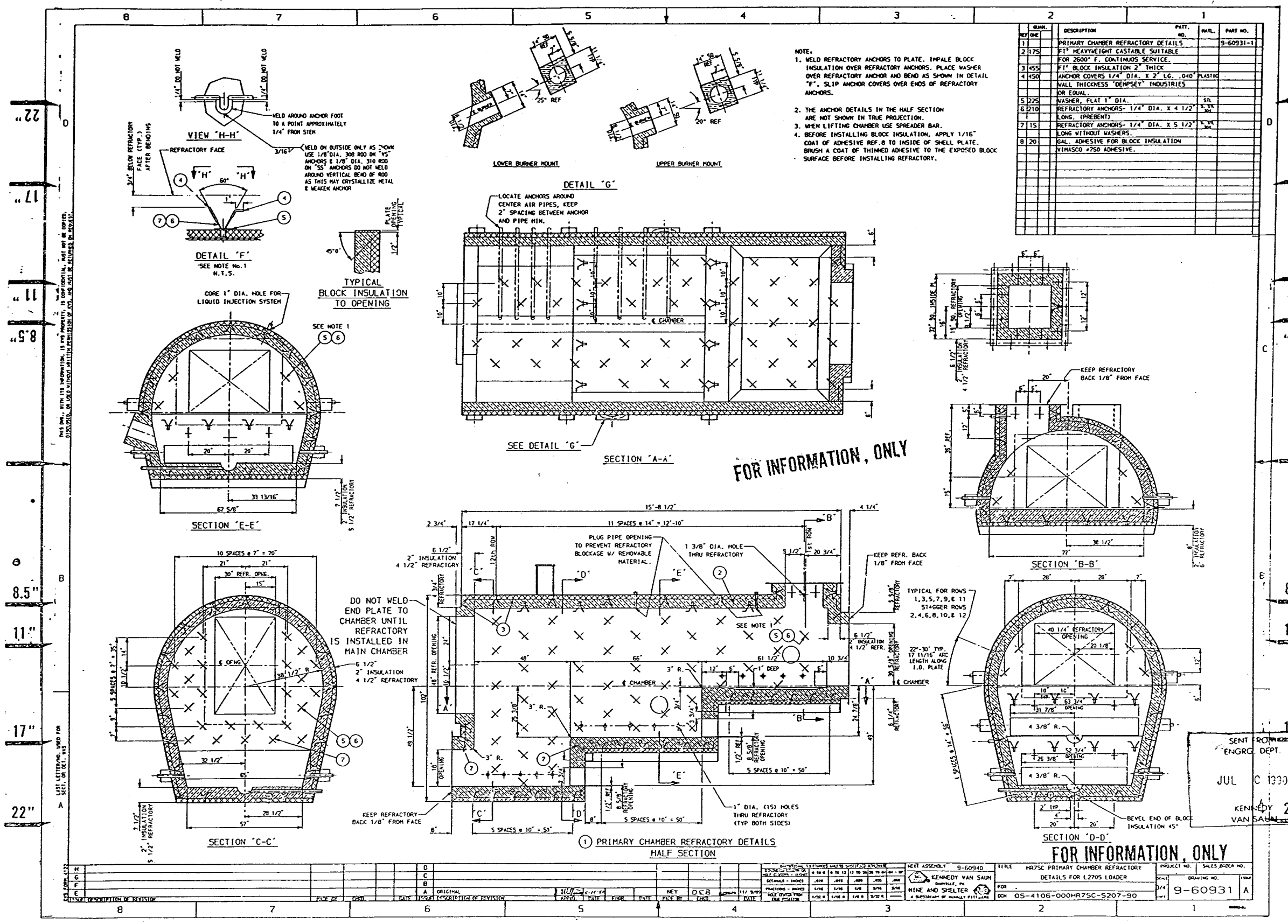
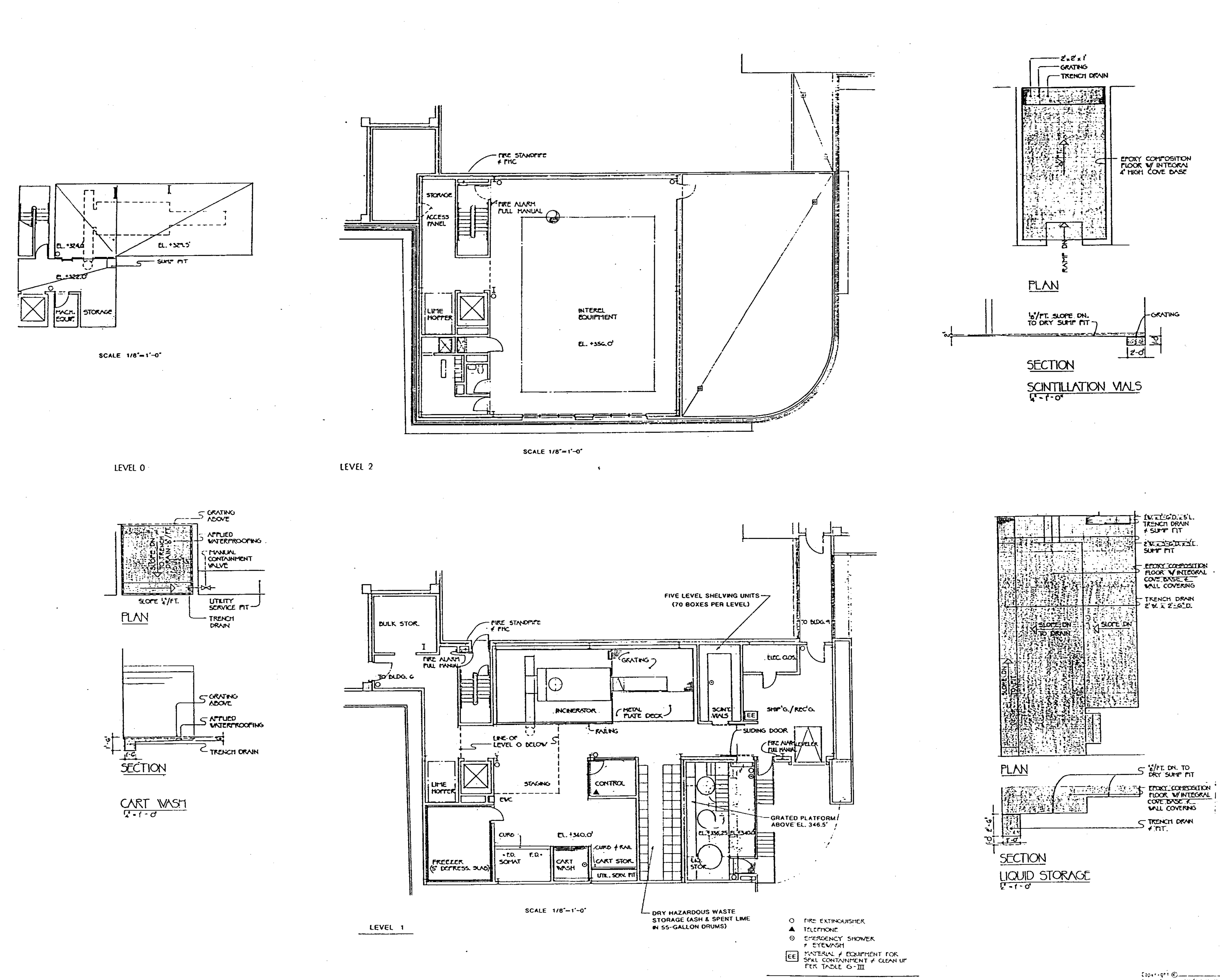
FIGURE D-1



REF	QUAN. ONE		DESCRIPTION	PATT. NO.	MATL.	PART NO.
1			PRIMARY CHAMBER REFRACTORY DETAILS			9-60931-1
2	175		FT³ HEAVYWEIGHT CASTABLE SUITABLE			
			FOR 2600° F. CONTINUOS SERVICE.			
3	455		FT³ BLOCK INSULATION 2" THICK			
4	450		ANCHOR COVERS 1/4" DIA. X 2" LG. .040"		PLASTIC	
			WALL THICKNESS 'DEMPSEY' INDUSTRIES			
			OR EQUAL.			
5	225		WASHER, FLAT 1" DIA.		STL	
6	210		REFRACTORY ANCHORS- 1/4" DIA. X 4 1/2"		3-3% 304	
			LONG. (PREBENT)			
7	15		REFRACTORY ANCHORS- 1/4" DIA. X 5 1/2"		3-3% 304	
			LONG WITHOUT WASHERS.			
8	20		GAL. ADHESIVE FOR BLOCK INSULATION			
			VIMASCO #750 ADHESIVE.			

NOTE:
1. WELD REFRACTORY ANCHORS TO PLATE. IMPALE BLOCK INSULATION OVER REFRACTORY ANCHORS. PLACE WASHER OVER REFRACTORY ANCHOR AND BEND AS SHOWN IN DETAIL "F". SLIP ANCHOR COVERS OVER ENDS OF REFRACTORY ANCHORS.
2. THE ANCHOR DETAILS IN THE HALF SECTION ARE NOT SHOWN IN TRUE PROJECTION.
3. WHEN LIFTING CHAMBER USE SPREADER BAR.
4. BEFORE INSTALLING BLOCK INSULATION, APPLY 1/16" COAT OF ADHESIVE REF.8 TO INSIDE OF SHELL PLATE. BRUSH A COAT OF THINNED ADHESIVE TO THE EXPOSED BLOCK SURFACE BEFORE INSTALLING REFRACTORY.

34"



NOTES

1. DRAWING ORIGINALLY PREPARED BY THE KLING-LINDQUIST PARTNERSHIP, INC. (REFERENCE: TKLP DRAWING NO. PD-1).
2. ALL CONCRETE FLOOR AND WALL AREAS TO HAVE A CHEMICAL RESISTANT AND WATERPROOF LINER INSTALLED. ALL CONCRETE MASONRY UNITS TO BE COATED WITH A CHEMICAL RESISTANT EPOXY COATING. FLOORS IN HAZARDOUS WASTE STORAGE AREAS TO HAVE A SEAMLESS EPOXY COMPOSITION FLOORING SYSTEM WITH 4" HIGH INTEGRAL COVED BASE.
3. THE BASE WILL BE FREE OF CRACKS AND GAPS, SUFFICIENTLY IMPERVIOUS TO THE WASTE BEING STORED AND STRUCTURALLY SOUND.
4. HAZARDOUS WASTE STORAGE AREAS WILL BE PROVIDED WITH EXPLOSION-PROOF LIGHTING FIXTURES AND POWER OUTLETS. GROUNDING FACILITIES FOR PREVENTION OF STATIC CHARGE BUILD-UP WILL BE PROVIDED.

REV. NO.	CODE	CIRCLES DATE	REV. BY	DESCRIPTION	SEC APPROVED
1	G	8-16-90	RWM	NOD REVISIONS	
0	G	12-15-89		ISSUED FOR RCRA PART B APPLICATION	

ISSUE CODE: A PRELIMINARY; B DESIGN; C MAT'L T.O. & CONSTR.; D MAT'L PURC. G PERMIT; E BIDS

SEAL

SIGNATURE

DATE

DR	DATE 12/11/89
DSGN	SEC FILE NUMBER
CK	JOB NO R-8279
DPE	
CAD FILE NO	

SIRRINE ENVIRONMENTAL CONSULTANTS
Raleigh, North Carolina

GLAXO, INC.
RESEARCH TRIANGLE PARK
NORTH CAROLINA

DRAWING TITLE
ENVIRONMENTAL SAFETY FACILITY
GENERAL ARRANGEMENT

CLIENT DRAWING NUMBER

SEC DRAWING NUMBER
R-8279-02

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The caustic and acid waste storage areas in the HMMB will drain to the facilities wastewater neutralization tank. This tank will be constructed of precast concrete. The interior of the tank will be coated with Graffiti Guard II as manufactured by Preco Industries Ltd., or equivalent. The flammable waste and reactive waste storage areas of the HMMB will drain to separate underground spill collection tanks. These tanks will be fiberglass-reinforced polyester double-wall tanks and will be sufficiently impervious to contain leaks and/or spills until the collected material is detected and removed. These tanks will not store hazardous waste. The tanks will always be empty unless a spill occurs in the reactive or flammable waste storage area. Both tanks will be provided with liquid leak detectors and audible and visual signals to indicate the presence of any accumulated liquid. Accumulated waste will be removed in a timely manner in accordance with the procedures described in Section D-1a(5). The technical specification for the spill collection tanks and an approval letter from the Durham County Fire Marshall are included in Appendix C.

Wastes will be stored within the HMMB and ESF in 55-gallon containers placed on pallets. Small (i.e., five gallon or less) containers will be stored inside nalgene trays on metal shelving units.

The approximate floor space for the separate storage areas for containers with free liquids will be as follows:

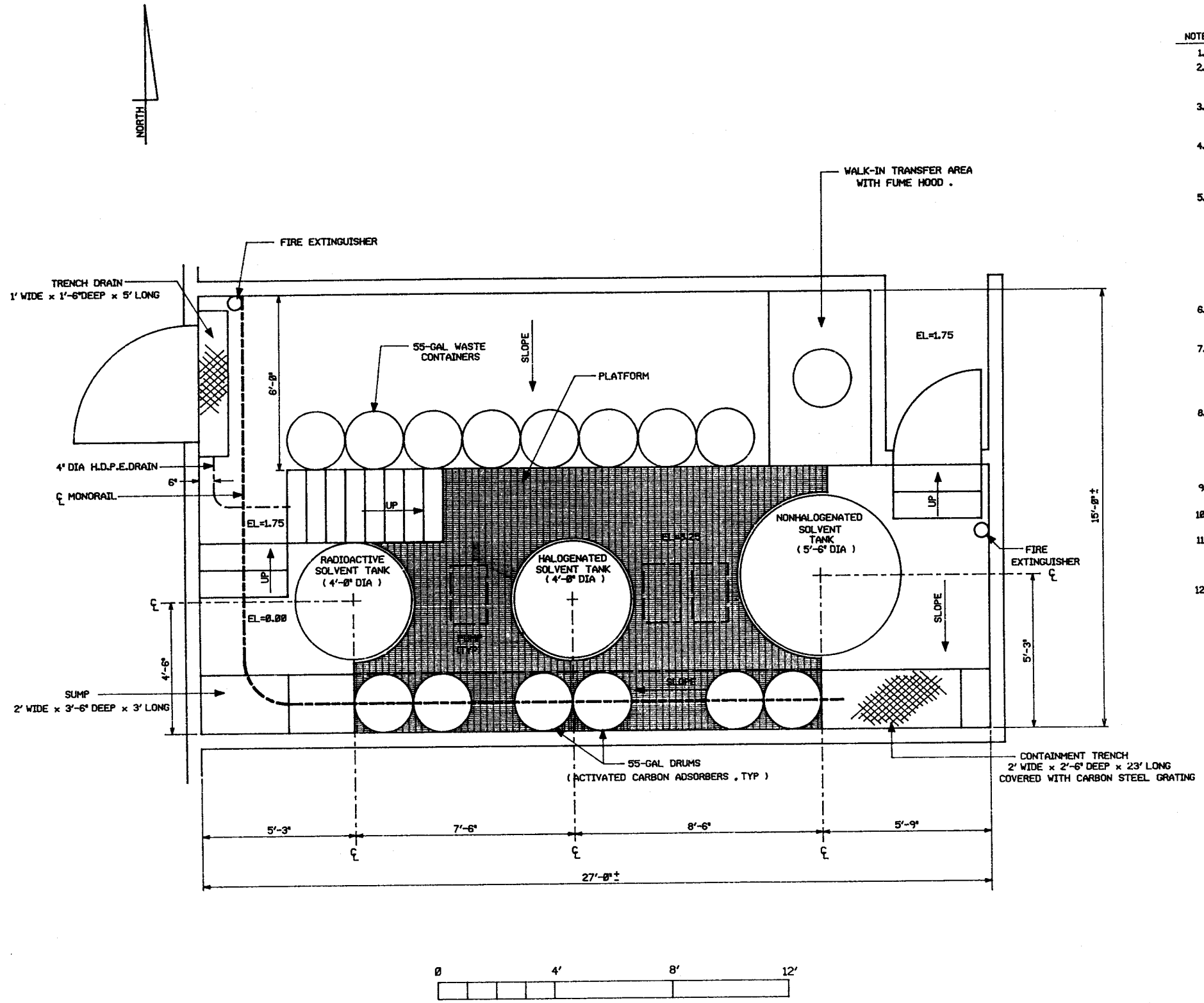
Storage Area	Floor Space
HMMB AREAS	
Flammable Waste (in 55-gallon containers)	240 sq. ft.
Radioactive Waste (in 1 or 5-gallon containers)	190 sq. ft.
Caustic Waste	100 sq. ft.
Acid Waste	100 sq. ft.
Reactive Waste	140 sq. ft.
Hazardous Materials Lab	240 sq. ft.
ESF AREAS	
Liquid Waste Storage Room	120 sq. ft.
Scintillation Vials	130 sq. ft.

It should be noted that the flammable waste includes halogenated, non-halogenated and radioactive solvent wastes as described in Section C, Waste Characteristics. The non-radioactive solvents will be stored in 55-gallon drums. Radioactive solvent wastes may be stored in 55-gallon containers in the flammable waste storage area or one or five gallon containers in the radioactive waste storage area.

An accumulation drum for each of halogenated, non-halogenated and radioactive solvent wastes may be located in the hazardous materials lab. In that an accumulation drum may remain in the lab for more than 90 days, the lab is considered part of the flammable waste storage area.

D-1a(2) Description of How Design Promotes Drainage

All wastes in 55-gallon containers will be stored on pallets. Only one layer of containers will be placed on each pallet (four containers per pallet). The maximum number of 55-gallon drums per storage area is as noted on drawings R-8279-D1 and R-8279-D2. Small containers will be stored in nalgene trays on shelving units. Scintillation Vials will be stored in boxes on shelves as depicted on drawing R-8279-D2. The floors in both the HMMB and the ESF waste storage and handling areas will be coated with a seamless epoxy composition flooring system with a four-inch high integral coved base. The walls will also be epoxy coated. The base of the floor in all waste storage areas will be sloped approximately 1% so that any free liquid in the area will be diverted to the containment system as noted on drawings R-8279-D1 and R-8279-D2. The sloped floors will prevent accumulation of any leaked/spilled waste and will aid in the early detection of a leak/spill. The entrances to all storage areas in the HMMB will be provided with a three (3) inch high ramp. One entrance to the liquid waste storage room in the ESF will have a trench drain at the threshold. The second entrance to the liquid waste storage room (from the outside) will be elevated 1.75 feet from the containment area (see drawing R-8279-D3).



NOTES

1. PLATFORM 8'-3" A.F.F.
2. ALL FIRE EXTINGUISHERS TO BE ABC-TYPE PER FACTORY MUTUAL.LOCATED AS SHOWN ON DRAWING .
3. LIQUID STORAGE ROOM TO BE PROTECTED BY A HIGH EXPANSION FOAM SUPPRESSION SYSTEM RATED FOR NEMA 1 EXPLOSION PROOF DESIGN .
4. CONSTRUCTION TO BE STRUCTURAL CONCRETE FLOOR AND WALLS IN CONTAINMENT ZONE AND CONCRETE MASONRY ABOVE THE CONTAINMENT AREA WITH AN EAVE HEIGHT OF 17'FT.
5. ALL CONCRETE FLOOR AND WALL AREAS TO HAVE A CHEMICAL RESISTANT AND WATER-PROOF LINER INSTALLED. ALL CONCRETE MASONRY UNITS TO BE COATED WITH CHEMICAL RESISTANT EPOXY COATING. FLOORS IN HAZARDOUS WASTE STORAGE AREAS TO HAVE A SEAMLESS EPOXY COMPOSITION FLOORING SYSTEM WITH 4" HIGH INTEGRAL COVED BASE .
6. THE BASE WILL BE FREE OF CRACKS AND GAPS, SUFFICIENTLY IMPERVIOUS TO THE WASTE BEING STORED AND STRUCTURALLY SOUND.
7. ALL ELECTRICAL WORKS SHALL BE CLASS 1, DIVISION 2 IN ACCORDANCE WITH THE NEC. ALL ELECTRICAL WORKS WITHIN 3 FEET OF THE FLOOR AREA FOR STORAGE, CONTAINMENT AND TRANSFER SHALL BE CLASS 1, DIVISION 1.
8. MECHANICAL VENTILATION DESIGNED FOR ENTIRE ROOM TO HAVE 6 AIR CHANGES PER HOUR . IN THE EVENT OF A SPILL THE AIR CHANGES PER HOUR WILL AUTOMATICALLY BE INCREASED TO 15 . SWITCH AND PILOT LIGHT FOR VENTILATION SYSTEM TO BE LOCATED OUTSIDE OF ROOM.
9. ALL CONTAINMENT TRENCHES AND FLOORS TO INCORPORATE ⅛" PER FOOT SLOPE.
10. ALL DOORS TO BE RATED EXPLOSION PROOF BY FACTORY MUTUAL.
11. PLATFORM SHALL BE REINFORCED FIBERGLASS , STRUCTURAL SHAPES SHALL BE COATED WITH HIGH SOLIDS CATALYZED EPOXY COATING WITH A TOPCOAT OF HIGH BUILD EPOXY-POLYAMIDE COATING .
12. NITROGEN FROM CENTRAL NITROGEN SYSTEM .

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NOTES

REV. NO.	CODE	CIRCLES	DATE	DESCRIPTION	SEC APPROVED
0	G	-	12	ISSUED FOR RCRA	
	RLF		15	PART B APPLICATION	
			89		

REV. BY

NOTE: CIRCLE ALL REVISIONS. IDENTIFY WITH DIAMOND, NUMBER AND ARROW. REMOVE ONLY CIRCLE AND ARROW BEFORE NEXT REVISION.

ISSUE CODE					
A	PRELIMINARY	C	MAT'L T.O.	F	CONST'N
B	DESIGN	D	MAT'L PURC.	G	PERMIT
		E	BIDS	H	

SEAL

SIGNATURE

DATE

DR.	MC	DATE	11/03/89
DSGN.	HWH	SEC FILE NUMBER	
CK.	RLF		
DPE		JOB NO.	R-8279
CAD FILE NO.			

SIRRINE ENVIRONMENTAL CONSULTANTS
Raleigh, North Carolina

GLAXO , INC.
RESEARCH TRIANGLE PARK
NORTH CAROLINA

DRAWING TITLE
LIQUID WASTE STORAGE ROOM
GENERAL ARRANGEMENT

CLIENT DRAWING NUMBER

SEC DRAWING NUMBER
R-8279-D3

D-1a(3) Capacity of the Containment System

All liquid hazardous waste container storage areas in the HMMB and ESF have containment systems of sufficient capacity to contain at least ten percent of the total liquid volume stored. The largest container in storage will be a 55-gallon drum. The largest storage tank in the ESF is 1,000 gallons. The maximum waste inventory has been used as the basis for the required containment volume. The actual spill containment capacity in each area will be greater than the required containment volume.

HAZARDOUS MATERIALS MANAGEMENT BUILDING (HMMB)

The HMMB hazardous waste will be stored in 55-gallon containers and in small (five gallon or less) containers.

The flammable waste storage area will store up to twenty-eight 55-gallon containers of solvent waste and/or radioactive solvent waste. Up to three 55-gallon solvent waste accumulation containers may be stored in the hazardous materials lab.

The reactive waste, acid waste, and caustic waste areas will be capable of storing 55-gallon containers of waste. Typically these drums will contain small lab pack containers of

discarded commercial chemical products. It is possible however, that a research laboratory could generate a reactive, acid, or caustic waste in a 55-gallon drum. The reactive waste, acid waste, and caustic waste areas will store discarded commercial chemical products in their original containers. These containers will range in size up to a maximum volume of five gallons and will be stored in nalgene trays on shelves. The nalgene trays (2' x 3' x 0.5') provide secondary containment. A maximum of fifteen gallons (i.e., fifteen one-gallon containers or three five-gallon containers) can be stored in a nalgene tray. If other size containers are stored in the trays, the total volume will not exceed fifteen gallons.

The radioactive waste storage area will store radioactive solvent waste in one or five gallon containers and radioactive solid wastes in boxes contained in nalgene trays (2' x 3' x 0.5') on shelves. The maximum hazardous waste storage quantity will exist when all of the waste in this area is radioactive solvent waste. Radioactive solvent waste will be contained in one or five gallon plastic or glass containers. A maximum of fifteen gallons will be stored in a nalgene tray.

The following calculations for containment requirements and capacity are based on data presented on drawing R-8279-D1.

FLAMMABLE WASTE STORAGE AREA AND HAZARDOUS MATERIALS LAB

The floors in both of these storage areas drain to an underground spill tank for flammables.

A. Required Containment Volume

31 containers x 55 gallons/container x 10% = 170.5 gallons

B. Containment Capacity

The underground spill tank has a capacity of 8,000 gallons.

REACTIVE WASTE STORAGE AREA

The floor in the reactive waste storage area drains to an underground spill tank.

A. Required Containment Volume

5 containers x 55 gallons/container x 10% +
28 nalgene trays x 15 gallons/tray x 10% = 69.5 gallons

B. Containment Capacity

The underground spill tank has a capacity of 3,000 gallons. The nalgene trays provide additional containment for the discarded commercial chemical products wastes stored on shelves.

ACID AND CAUSTIC WASTE STORAGE AREAS

The floors in both of these storage areas drain to a waste water neutralization system which constitutes an Elementary Neutralization Unit as defined in 40 CFR 260.10 in that it:

(1) Is used for neutralizing wastes that are hazardous only because they exhibit the corrosivity characteristic defined in Section 261.22 of this chapter, or are listed in Subpart D of Part 261 of the chapter only for this reason (i.e., are listed wastes only due to corrosivity) and;

(2) Meets the definition of tank... in Section 260.10 of this chapter, 260.10 defines a tank as "a stationary device, designed to contain an accumulation of hazardous waste which is constructed primarily of nonearthen materials (e.g., concrete) which provide structural support."

As stated in 40 CFR 264.1(g)(6), an elementary neutralization system is exempt from the requirements of 40 CFR 264.

The individual drain lines from the acid and caustic storage areas are routed to a common line which leads to the elementary neutralization system. This design is considered by Glaxo to be acceptable as the probability of simultaneous spills in the acid and caustic storage areas is remote.

A. Required Containment Volume

8 containers x 55 gallons/container x 10% +
40 nalgene trays x 15 gallons/trays x 10% = 104 gallons

B. Containment Capacity

The waste water neutralization system was designed to accommodate a flowrate of 106 gallons per minute from the acid/caustic storage areas. In order to ensure containment capacity is available at all times, the elementary neutralization system was designed with two neutralization tanks - one in operation, the other on standby. Therefore, at all times the required containment capacity of 104 gallons is provided.

Any spills from the acid or caustic rooms will be drained to a 650 gallon chemical sump tank where it will be pumped to one or two neutralization tanks, each of 1,500 gallon capacity. Each neutralization tank is equipped with a high or low level sensor for monitoring and controlling which tank will be in the receiving mode for process and liquid waste. Any alarm condition on the neutralization system is monitored by a Facility Management System that is manned 24 hours per day.

The flow rate from the chemical sump tank is dependent on duplex sump pumps each with 54 gallons per minute capacity. A single pump will normally operated until a high level sensor activates the second pump in the sump tank. There is a capacity of 106 GPM with both pumps operating at full flow.

The nalgene trays provide additional containment for the discarded commercial chemical product wastes stored on shelves.

RADIOACTIVE WASTE STORAGE AREA

Radioactive solvent waste and radioactive solid waste will be stored in this area. Radioactive solvent waste will be stored in one or five gallon plastic or glass containers (0.5 ft. in diameter) stored in nalgene trays (2' x 3' x 0.5') which provide secondary containment. A maximum of fifteen gallons (i.e., fifteen one-gallon containers or three five-gallon containers) can be stored in a tray. Also, this storage area will be provided with a three (3) inch high ramped entrance. Therefore, the radioactive waste storage area (190 sq. ft.) will have 355 gallons of tertiary containment (190 $ft.^2$ x 0.25 ft. x 7.48 gal/ft^3 = 355 gallons).

A. Required Containment Volume

Total: 60 trays x 15 gallons/tray x 10% = 90 gallons

Per Tray: 15 gallons x 10% = 1.5 gallons/tray

B. Containment Capacity

Total: 60 trays x (2 x 3 x 0.5) ft^3 x 7.48 gal/ft^3 - 60 trays x 15 containers/tray x (3.14×0.25^2) ft^2 x 0.5 ft x 7.48 gal/ft^3 = 686 gallons

Per Tray: 686 gallons ÷ 60 trays = 11.4 gallons/tray

ENVIRONMENTAL SAFETY FACILITY (ESF)

SCINTILLATION VIAL STORAGE AREA

As described in Section C, scintillation vials are either 7 or 20 milliliters in size and are normally one-half to two-thirds full. Up to five trays of vials can be contained in the cardboard boxes. A tray can hold 100-20 ml. vials or 150-7 ml. vials. Therefore, the maximum quantity of scintillation fluid which can be contained in a cardboard scintillation vial storage box is 10 liters.

A. Required Containment Volume

350 containers x 10 liters/container x 1 gal/3.785 l. x 10% = 92.5 gallons

B. Containment Capacity

Trench Drain: 2 ft. x 0.75 ft. x 7 ft. x 7.48 gallon/ft^3 = 78.5 gallons

Sump: 2 ft. x 1 ft. x 2 ft. x 7.48 gallons/ft^3 = 29.9 gallons

Total Containment Capacity = 108 gallons

LIQUID (SOLVENT) WASTE STORAGE AREA

Both 55-gallon containers and solvent waste storage tanks are contained in this room.

A. Required Containment Volume

9 containers x 55 gallons/container x 10% + 2,000 gallons (in three tanks) x 10% = 249.5 gallons

The largest tank has a capacity of 1,000 gallons. Therefore, the required containment volume for this area is 1,000 gallons.

B. Containment Capacity

Trench Drain: 2 ft. x 2.5 ft (min. depth) x 23 ft. x 7.48 gallons/ft^3 + 2 ft. x 1/2 [2.74 (max. depth) - 2.5] x 23 ft. x 7.48 gallons/ft^3 = 901

Sump: 2 ft. x 3.5 ft. x 3 ft. x 7.48 gallons/ft^3 = 157 gallons

Total Containment Capacity = 1058 gallons

D-1a(4) Provisions for Preventing Run-On

Run-on will be prevented as all hazardous waste will be stored and managed inside the HMMB or ESF. Internal

trench drains, floors, and walls in the storage areas will be sealed with an epoxy resin. All wastes in 55-gallon containers will be stored on pallets to prevent contact with liquids. Small waste containers will be stored on shelves.

Run-on from rainfall in the loading/unloading areas of the HMMB and ESF is not possible as trucks will be sealed against docks when loading and unloading. Also the loading/unloading areas of the HMMB and ESF are protected from rain or snow by building overhangs.

D-1a(5) Removal of Accumulated Liquids

Spilled or leaked waste will be removed from the sump collection areas in as timely a manner as possible to prevent overflow of the containment system. The collected waste will be transferred by a portable pump to an empty container. The pump will be a multipurpose stainless steel seal-less pump meeting the following specifications:

- suitable for hazardous duty
- double-insulated
- thermal overload protected with mechanical reset

- capacity - 50 gallons/minute at 0 feet head to 0 gallons/minute at 50 feet head. The relationship between capacity and feet of head is linear.

Small quantities or leaks found in the sumps or nalgene trays will be removed with absorbent material and transferred to an appropriate container for incineration or off-site disposal.

The flammable and reactive waste spill containment tanks are equipped with a permanent, three-inch suction pipe extending to the bottom. This pipe will be used to remove any liquid which has collected in the bottom. For smaller spills, a vacuum suction pump will be attached and the liquid pumped to a 55-gallon drum on the surface. For spills involving large quantities of liquid, a tank truck equipped with a vacuum suction system will be utilized to remove the liquid. Collected waste will be removed from the spill containment tanks in as timely a manner as possible to prevent overflow of the containment system. Liquid flammable waste collected from the tanks may be disposed on-site through the incinerator or at an off-site disposal site. Reactive waste will be disposed at an off-site disposal site.

In the event the permanent, three-inch suction pipe is unable to be utilized to remove liquid collected in the tanks, a submersible pump will be utilized to remove the liquid. This pump will be lowered through the manway at the top of the tank and positioned at the lowest point inside the tank. Depending on the quantity of liquid in the tank, it will be pumped to either 55-gallon drums or to a tank truck.

In the event of a leak or spill into a containment area, the collected waste will be identified by visual inspection and/or by the label on the container from which it came. If the material cannot be readily identified, a sample will be collected for characterization analysis.

D-1b Containers Without Free Liquids

The incinerator ash and baghouse dust will constitute hazardous waste in containers without free liquids.

D-1b(1) Test for Free Liquids

Upon initial generation, Glaxo will analyze the incinerator ash and baghouse dust for free liquids using the Paint Filter Test, Method 9095 in SW-846. Records of these tests will be maintained at the facility.

D-1b(2) Description of Storage Area Design

Dry hazardous waste will be stored in the ESF on pallets such that contact with any free liquids will be prevented. (See drawing R-8279-D2).

D-1c Container Management

To help prevent any leaked/spilled waste from coming into contact with other containers, containers will be stored on pallets or on shelves in the HMMB and ESF. All containers will meet U.S. Department of Transportation specifications. The DOT specification and the maximum number of containers to be placed on pallets vary depending on container size. Typical containers, DOT specs and dimensions are presented below:

Container Size	DOT Spec	Dimensions
55-gallon Closed Top Metal	17E	35.5" x 23.5"D
55-gallon Open Top Metal	17H	35.5" x 23.5"D
55-gallon HDPE	34	35.5" x 23.5"D
Fiber Drums	21C	0.5 to 4.1 ft^3 (square, rectangular or cylindrical)
Cardboard Safety Boxes	12B	12" x 12" x 12" (min.)
		18" x 18" x 24" (max)
5-gallon Steel Drums	37A	11" diameter, 14" high

Fifty-five gallon containers will be transported via handtruck or forklift truck equipped with chime clamps. Lab pack waste and small containers of solvent waste will be transported in the HMMB and ESF on heavy duty utility carts (Fisher Scientific catalog No. 11-926.85 or equivalent). Lab pack wastes will be manually handled and placed on shelves by designated trained staff.

All metal or plastic drums will be secured with caps and tops closed during transportation and storage. Fiber drums and boxed wastes will be closed and sealed during storage and transportation.

In order to prevent compatibility problems, potentially incompatible reactive wastes will be stored in separate nalgene trays.

Each container of hazardous waste generated on site will be labeled appropriately as to contents, hazardous waste I.D. number, generator information, DOT shipping information, accumulation start date, and the warning "Hazardous Waste: Federal Law Prohibits Improper Disposal." Loads of waste being shipped by Glaxo will be appropriately manifested.

Hazardous wastes will only be stored in the appropriately designated storage areas. Floor space allotments are described in Section D-1a(1) and depicted on drawings R-8279-D1, R-8279-D2, and R-8279-D3. The maximum waste inventory of hazardous wastes which may be stored in these areas at the facility is noted in Section I-1c.

Sufficient aisle space in the storage areas will be maintained to allow handtruck and personnel access without the risk of damaging the containers by scraping, puncturing, or dropping. Trained employees will carefully handle containers with regards to prevention of rupturing or leaking. A minimum of three feet of aisle space will be maintained for all aisles to allow for personnel access and inspection. Weekly inspections of the containers storage area will be performed. Each container will be stored with labels facing out for inspection purposes. See Tables F-3 and F-4 in Section F for the frequency of inspection for all container storage areas and the inspection procedures.

Empty 55-gallon containers in good condition will be returned to the HMMB for reuse. Containers will be reused for the same wastestream that was originally placed in the container to ensure that incompatibles (i.e., acids and bases) are not mixed together.

Lab pack containers will be ram fed to the incinerator. Any hazardous waste container which is found to be leaking or in poor condition (i.e., structural defects) will be placed in an overpack container.

D-2 TANK SYSTEMS [40 CFR 270.16]

Glaxo intends to install one 1,000-gallon stainless steel tank for the storage of non-halogenated solvent waste, one 500-gallon stainless steel tank for the storage of halogenated solvent waste, and one 500-gallon stainless steel tank for the storage of radioactive solvent waste in the Liquid Waste Storage Room in the ESF as noted on Drawings R-8279-D2 and R-8279-D3. A general description of the tanks is included in Section C-1b.

The wastes to be stored in the tanks are described in Section C-1. Specifications for the new tank systems along with the assessment of the integrity of the new tank systems have been included in Appendix C. There will be no treatment of hazardous wastes in tanks at the site.

D-2a Existing Tank Systems

Glaxo will not be storing or treating hazardous wastes in an existing tank system.

D-2b New Tank Systems

D-2b(1) Assessment of New Tank System's Integrity

A written assessment of the tank system's structural integrity and suitability for handling hazardous waste by an independent, qualified registered professional engineer is included in Appendix C.

D-2b(2) External Corrosion Protection

The tanks at Glaxo will be located in the ESF building, and, therefore, external corrosion protection is not necessary.

D-2b(3) Description of Tank System Installation and Testing Plans and Procedures

Prior to placing the tank system, or any components thereof into service, a qualified installation inspector or an independent, qualified registered professional engineer will inspect all components of the new tank system to determine the presence of:

- Weld breaks
- Punctures
- Scrapes of protective coatings
- Cracks
- Corrosion
- Other structural damage or inadequate construction/installation

Any discrepancies or problems discovered during the inspection will be repaired prior to placing the tank system into service. The inspector or engineer noted above will notify Glaxo in writing of the discrepancies or problems. The

inspector or engineer shall inspect the system again after the corrections or repairs have been completed prior to placing the tank system into service.

As part of the inspection noted above, tanks and ancillary equipment will be tested for tightness prior to being placed in use. The tightness test will consist of hydrostatic and pneumatic tests as noted in Part 1.4.4 of the "Specifications for Low Pressure Stainless Steel Tanks" located in Appendix C. If the tank system is found not to be tight, repairs will be made as noted above and tested again for tightness.

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

Glaxo will keep on file at the facility written statements by those persons required to certify the design of the tank system and supervise the installation of the tank system in accordance with the requirement of paragraphs (b) through (e) of 40 CFR 264.192, that attest that the tank system was properly designed and installed and that repairs, pursuant to paragraphs (b) and (d) of 40 CFR 264.192, were performed. These statements will include the certification statement as required in 40 CFR 270.11(d).

The ancillary piping systems for the hazardous waste storage tanks at Glaxo will be installed in accordance with the following standards:

1. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)

    a. Materials, design and manufacture of pipe hangers and supports shall conform to MSS SP-58-1975.

    b. Selection and application of pipe hangers and supports shall conform to MSS SP-69-1976.

    c. Fabrication and installation practices of pipe hangers and supports shall conform to MSS SP-89-1978.

2. National Fire Protection Association (NFPA)

    a. Pipe hangers and supports for fire protection piping systems shall be designed in accordance with the applicable NFPA Standards (12A, 13 and 14) and shall be UL listed for fire protection service.

b. When the requirements of this Section differ or conflict with the requirements of specified NFPA Standards for fire protection systems, the requirements of the MFPA Standards shall be complied with.

3. American National Standards Institute (ANSI)

a. All work shall conform to ANSI/ASME B31 Code for Pressure Piping.

4. ASHRAE Systems Handbook, 1984 Edition, Chapter 32 (Hangers and Supports for Vibration Control).

Pipe runs will be supported using hangers and supports. Hangers will be spaced so that the supported load does not exceed the load recommended by the hanger manufacturer. The supported load shall not overstress the building structural members.

D-2c Dimensions and Capacities of Each Tank

The capacities of the three stainless steel tanks are as follows:

Contents	Equipment No.	Capacity
Halogenated Solvent Waste	T-101	500 gallons
Radioactive Solvent Waste	T-102	500 gallons
Non-halogenated Solvent Waste	T-103	1,000 gallons

The dimensions of the three tanks are noted on the Tank Design Sheets attached to the "Specifications for Low Pressure Stainless Steel Tanks" in Appendix C.

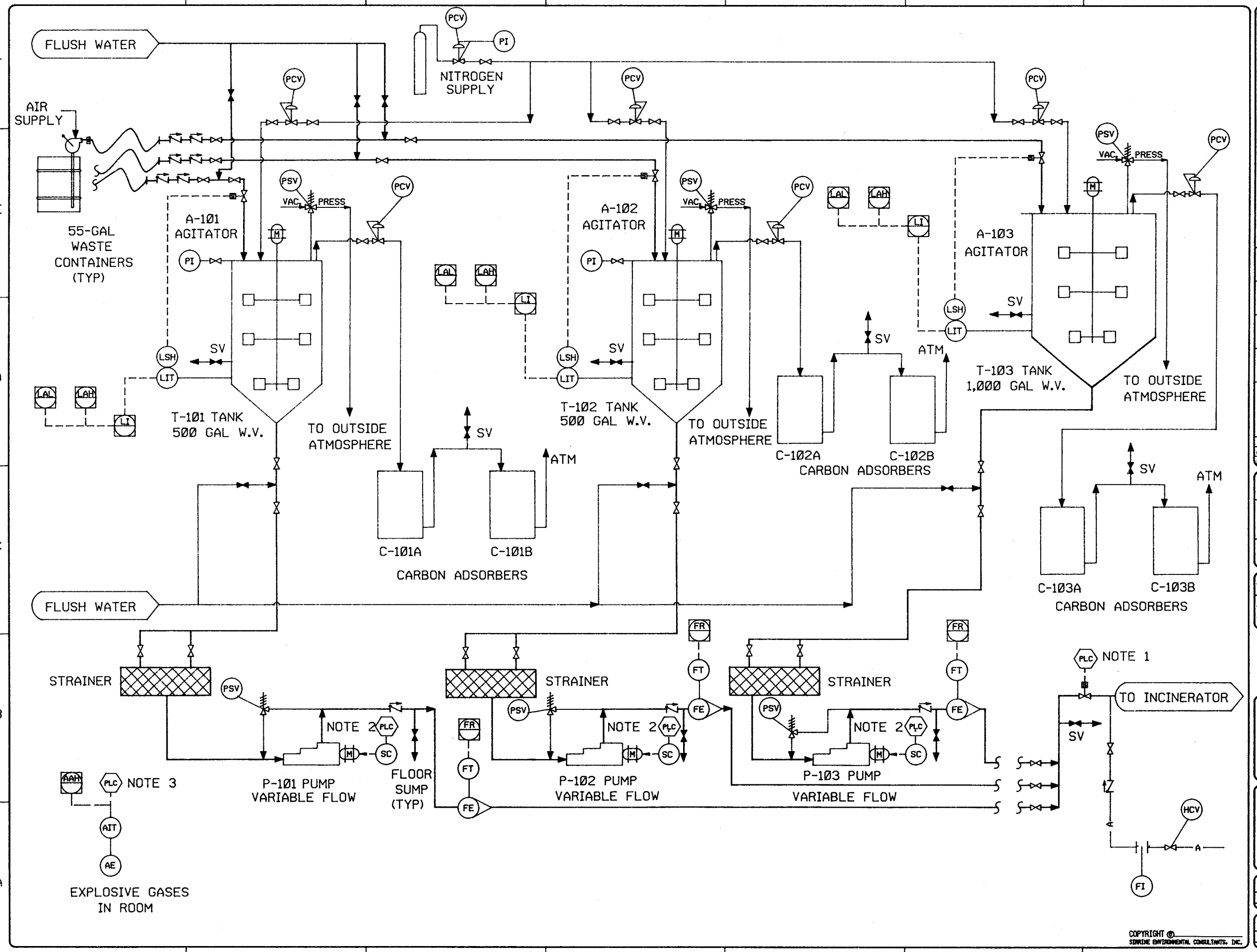
D-2d Description of Feed Systems, Safety Cutoff, Bypass Systems, and Pressure Controls

Waste will be fed from drums into the tanks via drum pumps as noted on Drawing No. R-8279-D4. Details on the metering pumps can be found in the "Specifications for Metering Pump" located in Appendix C. Flows from the tanks to the incinerator will be measured with transmitting rotameters which have been detailed in Form 13300-10F located in Appendix C. Wastes in the various tanks will be mixed by dedicated agitators which are shown on Drawing No. R-8279-D4 and described in detail in the "Specifications for Agitators" located in Appendix C.

All metering pumps are interlocked to shut off when a solenoid valve closes. Conditions which will automatically trigger the waste feed cut-off from the tanks are described in Section D-5b(2)(b)(6) and Section 4.4 of the Trial Burn Plan located in Appendix B.

Each tank will be equipped with a vacuum pressure relief valve per the North Carolina OSHA requirements.

Pressure controls, feed system flow controls, safety cutoff and bypass systems are depicted on Drawing R-8279-D4. Additional information on the liquid waste feed system is contained in Appendix C.



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NOTES

1. INCINERATOR TEMPERATURE (HI/LO) IS INPUT TO PLC.
2. PUMPS INTERLOCKED TO SHUT OFF WHEN SOLENOID VALVE CLOSES.
3. LOWER EXPLOSIVE GASES LIMIT IMPUT TO PLC SHALL ACTIVATE THE HIGH SPEED VENTILATION OF STORAGE ROOM.
4. SV-SAMPLE VALVE
5. ——A—— AIR
6. ALL SYMBOLS COMPLY WITH STANDARDS FOR INSTRUMENTATION (ANSI Y32.20) SPONSORED BY THE INSTRUMENT SOCIETY OF AMERICA, UNLESS OTHERWISE NOTED.

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DRAWING TITLE
LIQUID WASTE FEED SYSTEM PROCESS AND INSTRUMENT DIAGRAM

CLIENT DRAWING NUMBER

SEC DRAWING NUMBER
R-8279-D4

D-2e Diagram of Piping, Instrumentation, and Process Flow

Drawing No. R-8279-D4 is a diagram of the piping, instrumentation, and process flow.

D-2f Containment and Detection of Releases

Secondary containment for the three waste storage tanks and ancillary equipment located in the Liquid Waste Storage Room will be provided by the internal trench drain and sump as shown on Drawing No. R-8279-D3.

D-2f(1) Plans and Description of the Design, Construction, and Operation of the Secondary Containment System

The secondary containment system for the liquid waste tanks and ancillary equipment is described in Section D-1a. This system will be inspected daily to ensure that spilled or leaked wastes will be removed within twenty-four (24) hours.

D-2f(2) Requirements for Tank Systems Until Secondary Containment is Implemented

The secondary containment for the tanks and ancillary equipment will be in place prior to use of the tank system.

D-2f(3) Variance from Secondary Containment is Implemented

No variance from secondary containment is being sought by Glaxo. Ancillary equipment consists of pressurized above-ground piping systems with automatic shut-off devices that are visually inspected daily. Therefore secondary containment for ancillary equipment is not required.

D-2g Controls and Practices to Prevent Spills or Overflows

At least one foot of freeboard will be maintained in each of the tanks. Filling of the tanks will always be supervised. Spills and overfilling of the tanks will be prevented by the use of an automatic tank level indicator as noted on Drawing No. R-8279-D4. Form 13300-23F located in Appendix C provides details for the tank level transmitters. If the high or low liquid level is reached, an alarm will be activated and the operator will manually shut off the drum pump.

Fugitive vapor emissions from the tanks will be collected by the carbon adsorbers. The carbon adsorbers are described in detail in the "Specifications for Activated Carbon Adsorbtion System" located in Appendix C. If the lower explosive gases limit is reached, the high speed ventilation of the storage room will be activated. Spent carbon adsorbers will be returned to the manufacturer for regeneration. These will be packaged, manifested and shipped as hazardous waste in accordance with applicable DOT regulations.

Schedules and procedures for inspecting the tanks and ancillary equipment is described in Section F-2.

D-2h Description of How Ignitable, Reactive, or Incompatible Wastes Will Be Stored

Section F-5(e),(f) provide a description of how these wastes are stored in the tank system in order to prevent ignition or reaction of the wastes. All tanks and ancillary equipment will be appropriately bonded and grounded.

D-3 WASTE PILES [40 CFR 270.18]

Glaxo will not have any waste piles; therefore, Section D-3 is not applicable.

D-4 SURFACE IMPOUNDMENTS [40 CFR 270.17]

Glaxo will not have any surface impoundments; therefore, Section D-4 is not applicable.

D-5 INCINERATOR DESIGN [40 CFR 270.19]

The wastes to be incinerated at the Glaxo facility are described in Section C-1. The proposed incinerator system is presented in Drawings R-8279-D4 through R-8279-D9. Drawings R-8279-D6, R-8279-D7, and R-8279-D9 are located in Appendix F. The location of process sensors is noted on Drawings R-8279-D4, R-8279-D6, and R-8279-D9. The proposed system will be located in the ESF as noted on Drawing R-8279-D2.

D-5a Justification for Exemption

Glaxo will be burning wastes that are considered toxic as well as ignitable; therefore, no exemption from the trial burn requirements is being sought.

D-5b Trial Burn

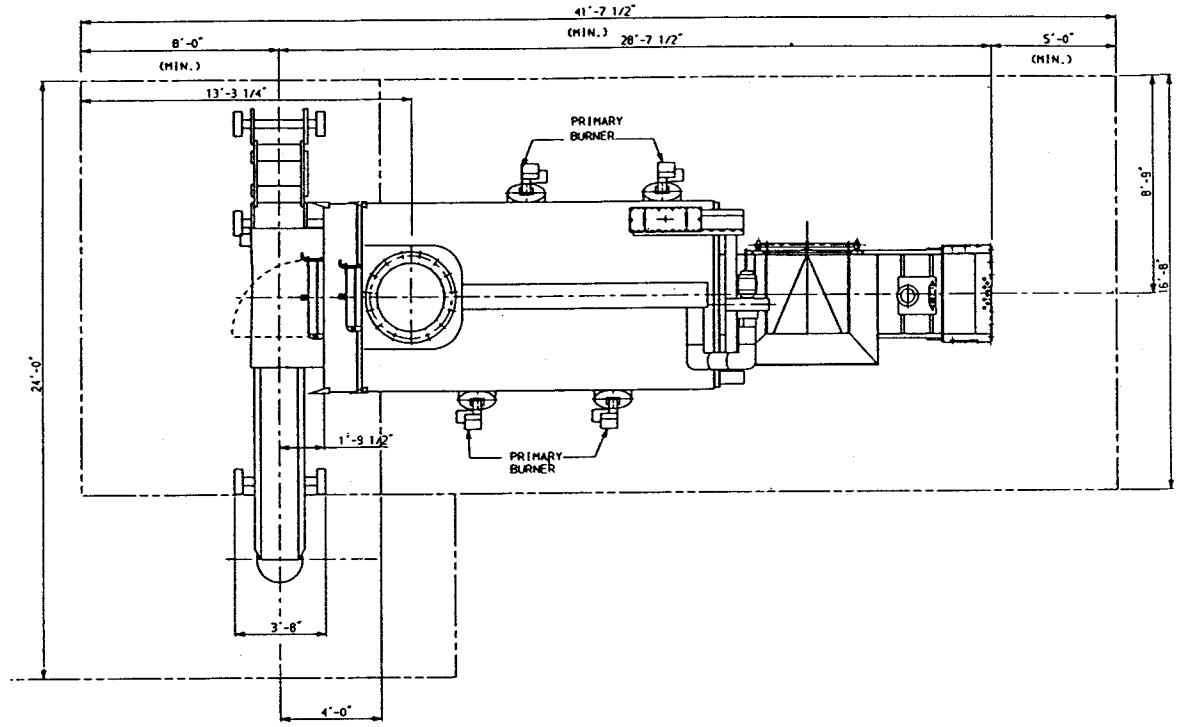
D-5b(1) New Incinerator Start-Up/Shakedown:

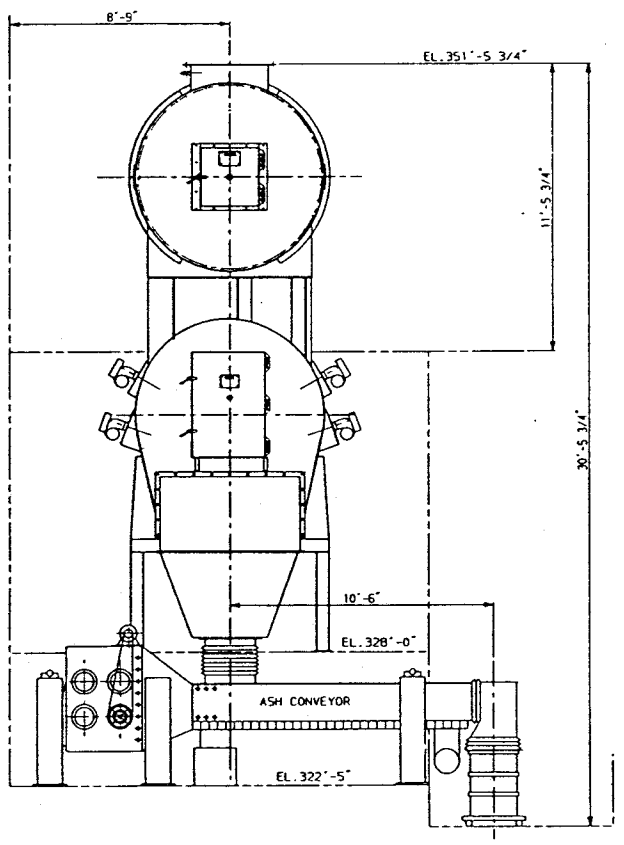
(a) Start-Up/Shakedown Period

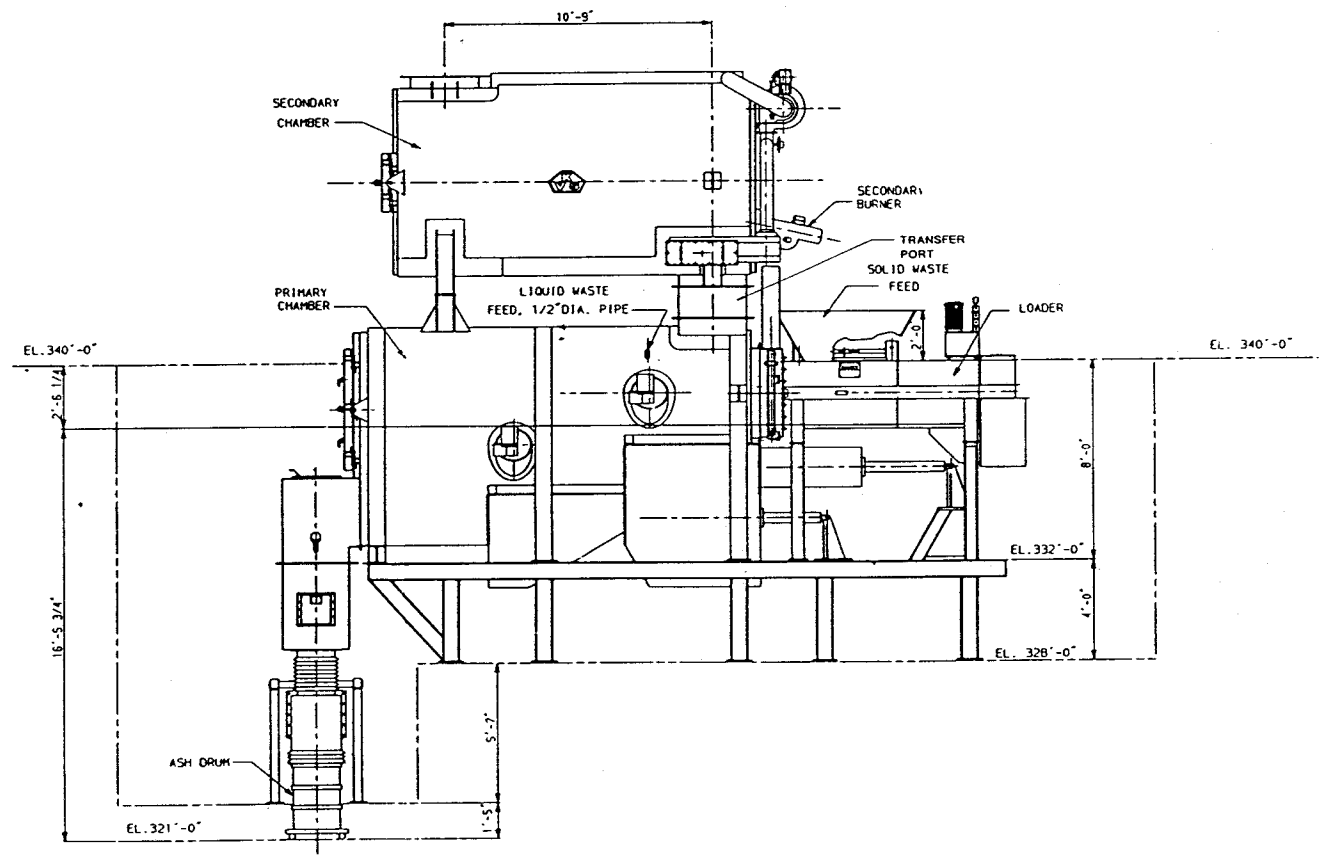
It is anticipated that the start-up/shakedown will be completed without exceeding 720 hours of waste feeding time.

(b) Start-Up/Shakedown Performance

1. A Destruction Removal Efficiency (DRE) of 99.99% will be achieved for all Principle Organic Hazardous Constituents (POHC's) selected.







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INCINERATOR
GENERAL ARRANGEMENT

CLIENT DRAWING NUMBER

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R-8279-D5

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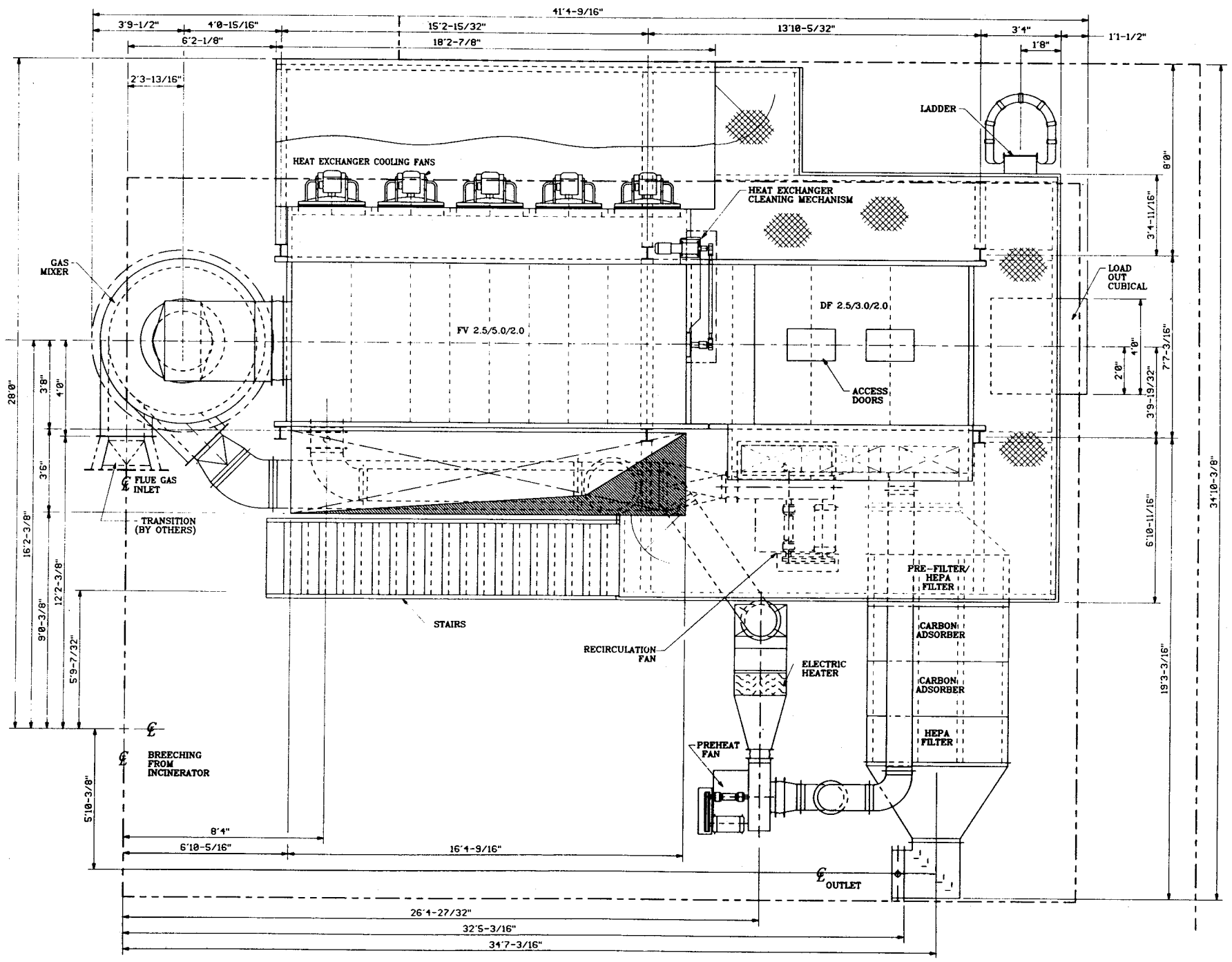

PLAN VIEW

NOTES

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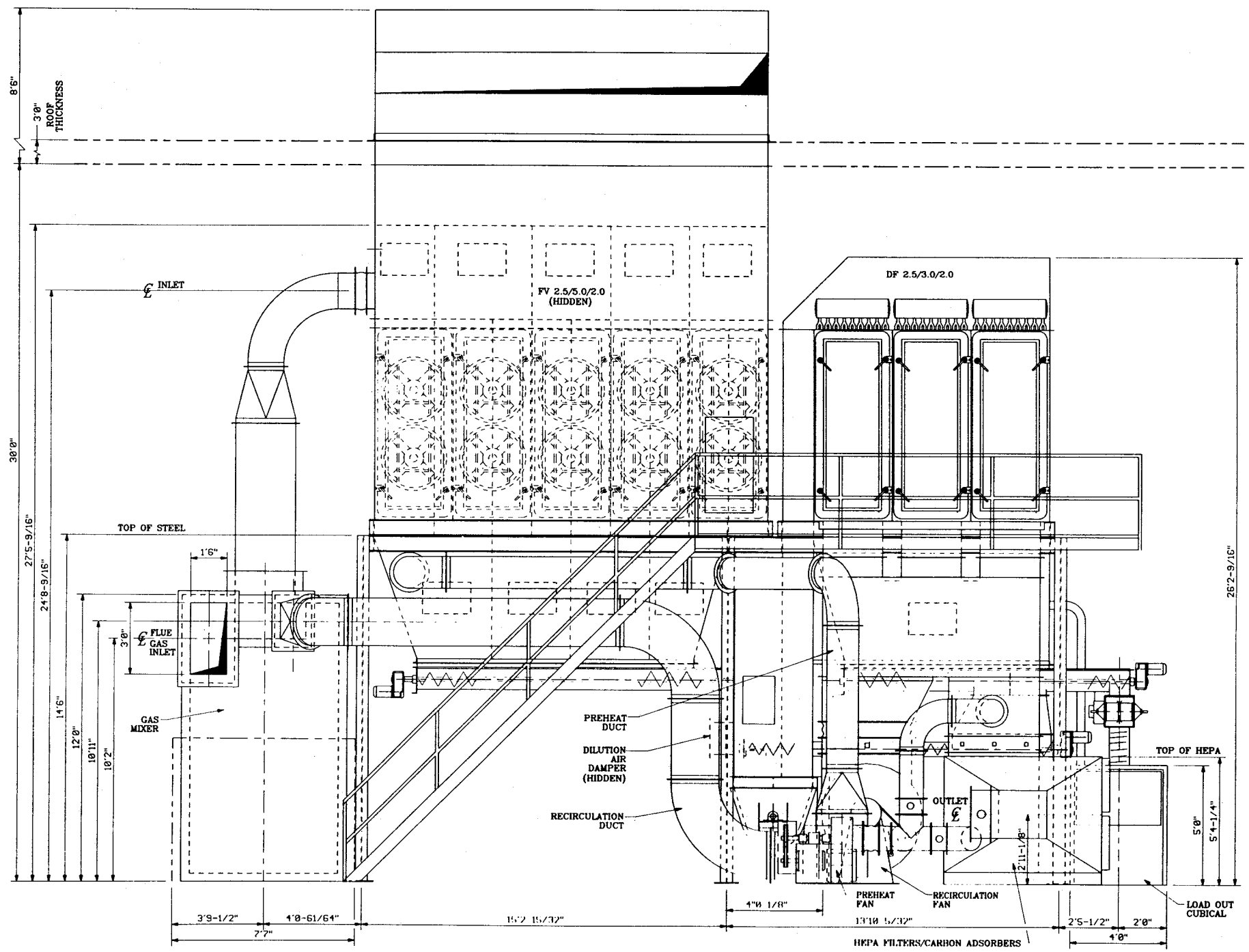

FRONT ELEVATION

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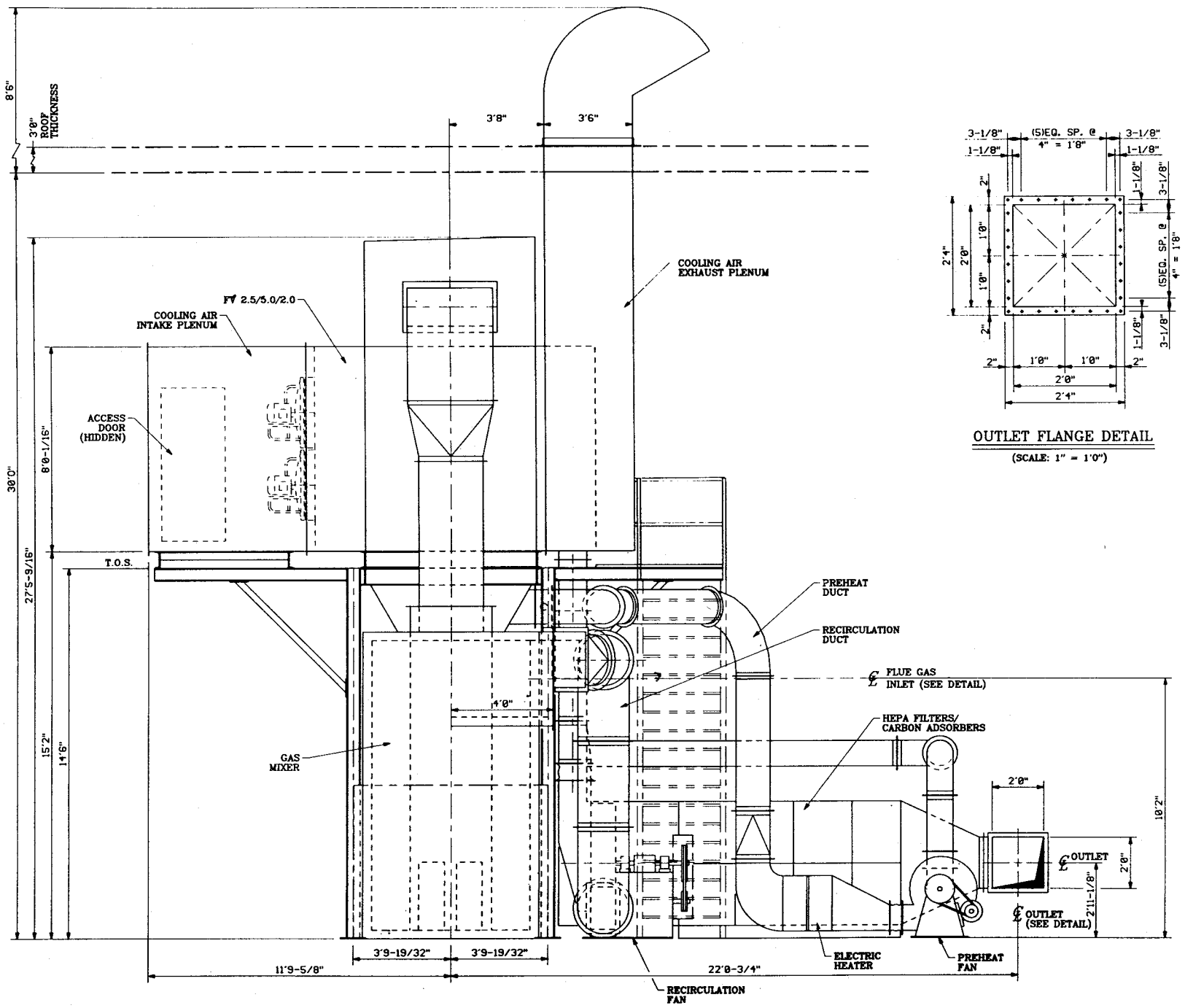

SIDE ELEVATION

OUTLET FLANGE DETAIL

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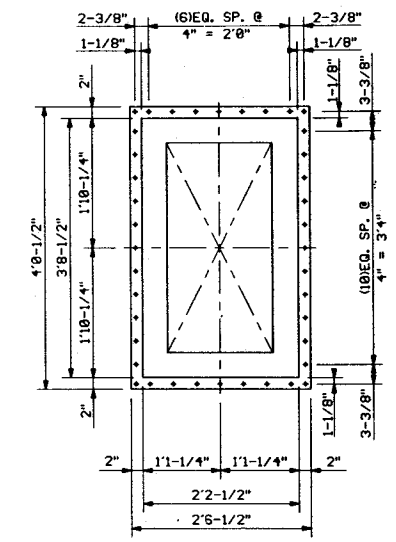

INLET FLANGE DETAIL

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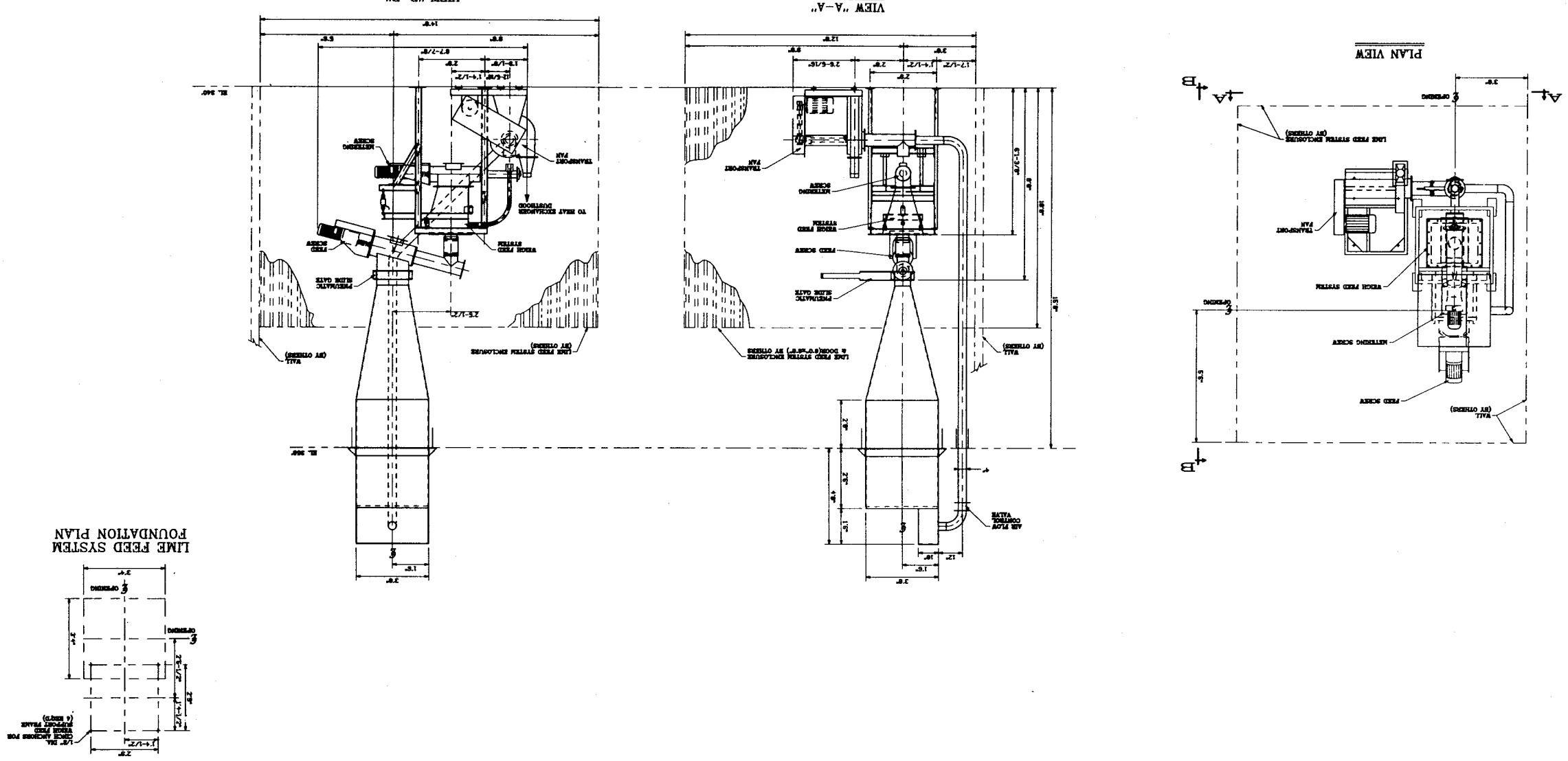

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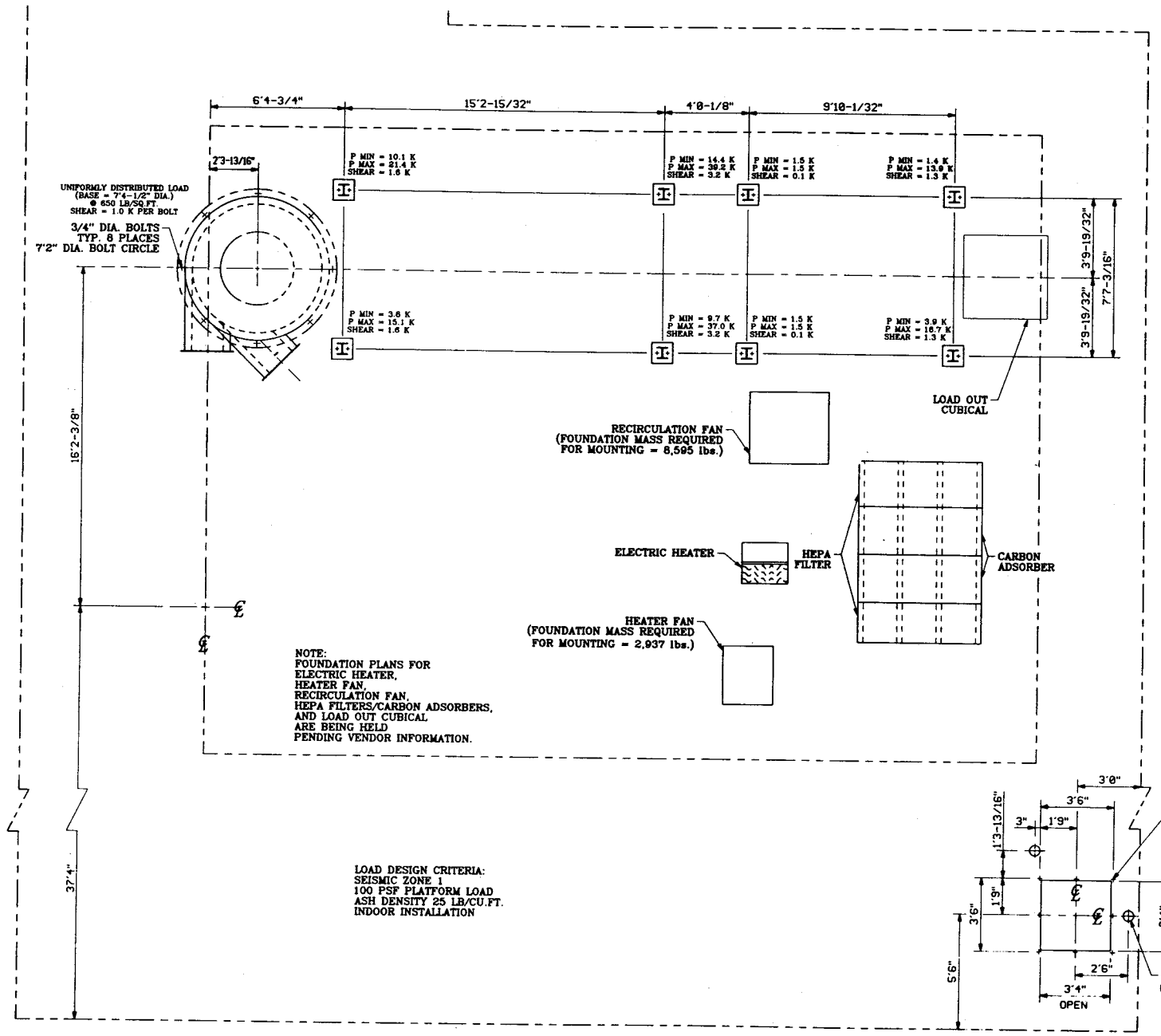

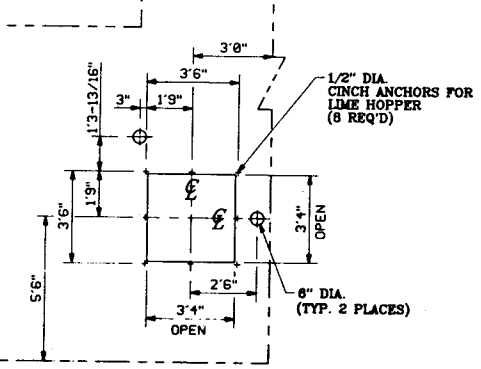

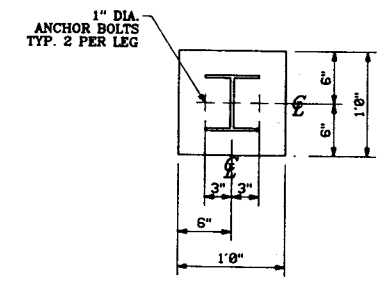

SUPPORT PLATE DETAIL
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Operating conditions during start-up/shakedown will conform to those set forth in Section D-5b(2)(e), Test Protocols.

2. HCl emissions in the flue gas is projected to be 31.9 lbs/hr, however, the Air Quality Control System is sized to handle up to 40 lbs/hr. The maximum organically bound chlorine in the waste will not exceed 40 lbs/hr. The Air Quality Control System is expected to remove 99% of the HCl that is produced in the combustion process. Therefore, the estimated maximum HCl emission from the incinerator stack is 0.319 lbs/hr.

3. Particulate emissions will be below 0.08 grains/dscf corrected for the amount of oxygen in the stack according to the formula in 264.343(c). The design of the Air Pollution Control System with the fabric filter and five stage HEPA filtration and carbon adsorption unit is designed to limit particulate emissions to 0.015 grains/dscf corrected for the amount of oxygen in the stack.

(c) Start-Up/Shakedown Conditions

During the start-up/shakedown period, the incinerator will be operated in such a manner as to help ensure compliance with the performance standards of 40 CFR 264.343 with specific conditions listed below.

1. During the start-up/shakedown period, hazardous wastes as described in Section C-1 will be incinerated. These wastes will be analyzed in accordance with the Waste Analysis Plan in Section C-2.

2. During the start-up/shakedown period, the liquid waste feed rate will be limited to 350 lbs/hr.

The solid waste feed rate will be limited to 900 lbs/hr. The combined liquid and solid waste feed rate will be limited to 900 lbs/hr.

3. During the start-up/shakedown operations, the system will be operated so that the carbon monoxide in the stack exhaust will not exceed 100 ppm on the basis of a 60-minute rolling average corrected to 7% oxygen.

4. The temperature in the primary combustion chamber will be maintained between 1000°F and 2000°F. The temperature in the secondary combustion chamber will be maintained between 1700°F and 2200°F.

5. The stack gas velocity will not be allowed to exceed 19.6 ft/sec (corresponds to 5774 ACFM) while waste is being fed (calculation provided at end of Section D-5). Based on this flow, the minimum residence time in the secondary combustion chamber at the operating temperature will be two seconds.

6. A single point mass flowmeter will be installed to continuously monitor the flue gas flow in the stack. The purpose of the flue gas velocity measurement is to determine the retention time in the combustion chambers.

7. Fugitive emissions during start-up/shakedown will be controlled by maintaining a negative pressure in the combustion zone during all times that waste is being fed.

   The primary and secondary chambers will have pressure transmitters connected to the programmable logic controller. The combustion chamber pressure will operate within an allowable negative range with all abnormal conditions reported as an alarm or system shutdown.

8. No hazardous waste will be fed to the incinerator unless it is being operated within acceptable limits to comply with the requirements listed in Section D-5b(1)(b).

9. All automatic waste feed cut-off systems will be operational during start-up/shakedown. These systems are listed in Section D-5b(2)(b)6.

D-5b(2) Trial Burn Plan

The proposed Trial Burn Plan (TBP) has been included in its entirety in Appendix B.

(a) Incinerator Performance

For the duration of the trial burn, the operating conditions will be sufficient to demonstrate emissions requirements.

1. Operating conditions during the trial burn will conform to those set forth in Section D-5b(2)(e), Test Protocols, whenever hazardous waste is being fed to the incinerator indicating a DRE of 99.99%.

2. The procedure for compliance with the HCl emission requirements is described in Section D-5b(1)(b)2.

3. The Trial Burn operating conditions designed to meet the particulate compliance requirements are described in Section D-5b(1)(b)3.

(b) Detailed Engineering Description of Incinerator

The proposed incinerator is described in full in Section 3 of the Trial Burn Plan located in Appendix B.

1. The proposed waste incinerator has been designed and will be manufactured by the Kennedy Van Saun Corporation (KVS) of Danville, Pennsylvania. The proposed incinerator is a KVS Model No. HR-75 with a rated capacity of 900 lbs/hr. The air quality

control system has been designed by Interel Corporation.

2. The incinerator system shall consist of a primary combustion chamber with ram feeder and liquid injection, a secondary combustion chamber, a dry ash conveyor system, and an air quality control system. The solid waste feed system and liquid waste injection system are described in Sections 3.2 and 3.5, respectively, in the Trial Burn Plan in Appendix B. The incinerator will be fed from only one waste solvent tank at a time.

3. The primary combustion chamber is described in Section 3.3 of the Trial Burn Plan in Appendix B including dimensions and materials of construction.

Following the primary chamber, the hot flue gases will pass through a reduced cross section and then expand into a secondary combustion chamber sized for 2,9 seconds retention. The function of the secondary chamber is to provide additional residence time for mixing and completion of the combustion reaction. The secondary chamber is described in Section 3.4 of the TBP in Appendix B.

4. Natural gas will be used for the pilot and for auxiliary fuel to maintain temperature in the primary and secondary combustion chambers. The auxiliary fuel system is described in Section 3.6 in the Trial Burn Plan in Appendix B.

5. The prime mover (ID Fan) will be a V-belt driven fan which will draw the combustion gases through the system. The fan design has a design capacity of 5600 ACFM when operating at a 24-inch water column differential.

6. Instrumentation will be provided to monitor process conditions, provide data for assuring compliance with regulatory requirements, and provide appropriate process response and control, operational flexibility, and safety interlocking and shutdown features. The safety interlocks and shutdown features comprise a major portion of the control system.

   The actual written procedure identifying exactly which control buttons and switches must be activated will be developed after operational manuals are delivered and before equipment start-up and training.

The design of the incinerator and the off-gas treatment systems will incorporate emergency stop buttons for operator intervention. Within the control room located on Level 1 of the ESF (see R-8279-D2), there are two main control panels - one for the incinerator and the other for the off-gas treatment equipment. Each panel has an emergency stop button. In addition, a remote control panel adjacent to the incinerator will be equipped with an emergency incinerator stop button.

Loading of solid waste feed is a manual operation that is constrained within the high and low temperature limits of the primary chamber. If these limits are not met, both the solid and liquid waste feed are locked out by the PLC.

The selection of one of the three solvent storage tanks to feed the incinerator and the initiation of the pump start switch is manually controlled by the operator. Once initiated, the liquid waste flow rate is automatically controlled to operate within the primary chamber temperature limits. Shutdown of the liquid

waste feed by the operator will not trigger an emergency shutdown and dump from the incinerator or off-gas treatment system.

The incinerator control system is designed to ensure that while hazardous waste is present in the incinerator, the flame, temperature, combustion air, and air pollution control equipment will be maintained.

All liquid waste to the incinerator will be cut off by solenoid operated valves and the solid waste feed mechanism automatically taken out of service if any of the following occur:

- CO concentration in the flue gas of >100ppm dry basis on a sixty minute rolling average, corrected to 7% oxygen.
- Electrical power failure.

- Low natural gas pressure.
- Flame failure in the primary and/or secondary burner.
- Primary combustion chamber. temperature below 1000°F or above 2000°F.
- Combustion air pressure failure.
- Stack Gas Flow above 5774 ACFM.
- Secondary combustion chamber temperature below 1700°F or above 2200°F.
- Ash conveyor system fails.
- Lime system fails.
- Temperatures into the heat exchanger exceed 1000°F.
- Temperatures above 260°F to the fabric filter.
- Secondary combustion chamber pressure greater than -0.05 inches water gage.

Waste feed will be cut off manually in the event of visible fugitive emissions.

The natural gas burner train will include an internal interlock system that shuts down the burner (i.e., natural gas flow) if a flame is detected during preignition, the pilot fails to ignite, the burner fails to ignite, or there is a loss of flame after ignition.

The incinerator and off-gas treatment systems incorporate an emergency shutdown button in the event of a major equipment malfunction. HOA switches are also available for controlling waste feed and permitting the completion of the burning cycle, ash discharge and off-gas treatment.

Actual written procedures identifying exactly which control buttons and switches must be activated will be developed after operational manuals are delivered and before equipment start-up and training.

7. Continuous stack gas monitoring for carbon monoxide and oxygen will be achieved through

extractive monitoring systems as described in Table 4-2 in the Trial Burn Plan in Appendix B. A visual and audible alarm is activated at 100 ppm CO on a sixty minute rolling average. The waste feed is cut off automatically.

A single point mass flowmeter will be installed in the stack to continuously monitor the flue gas flow rate. Since the purpose of the flue gas flow measurement is to control the residence time in the incinerator to greater than or equal to two seconds, the stack flow is limited to 5774 ACFM when burning waste. Higher flow rates will automatically cut off the waste feed. The unit will be a Kurz Model No. 455-76-4-N4W-D-132-111 flowmeter or equal.

The proposed air pollution control equipment will be a dry lime injection/absorption system with fabric filter, followed by a HEPA filtration/adsorption unit. The equipment will be designed and manufactured by the Interel Corporation. The dry scrubbing technology is known as the Dry Additive Process (DAP) licensed by Interel from Heinrich Luhr Staubtechnic of West Germany. Drawing No.

R-8279-D7 is a process flow diagram of the proposed air pollution control system, Drawing No. R-8279-D8 shows the general arrangement of the equipment, and Drawing No. R-8279-D9 is a process and instrumentation diagram for the system.

Exhaust gases from the incinerator will be ducted directly into a refractory-lined gas mixer where they will combine with a percentage of cooled exhaust gas blend off the main duct after the fabric filter. By recirculating a controlled percentage of the system flow, the temperature of the exhaust gas leaving the incinerator at 2100°F can be reduced to approximately 900°F prior to entering the air-to-air heat exchanger.

The heat exchanger will be a non-contact air-to-air unit designed to further reduce the gas temperature from 900°F down to approximately 250°F. Temperature control of the air-to-air heat exchanger will be maintained by a signal from a sensor in the exhaust gas leaving the exchanger.

Hydrated lime will be utilized as the reagent for scrubbing acid gases from the incinerator exhaust. The lime will be pneumatically injected into the system just prior to the heat exchanger. A blower rated at 650 SCFM will provide the conveying air to transport the lime from a metering bin to the control system.

The heat exchanger cooling air fans are variable frequency driven in order to maintain an elevated tube wall temperature. Along with the lime addition, there is no possibility of corrosive conditions developing in the exchanger at the lower temperatures occurring toward the gas discharge end. The exchanger incorporates a built-in cleaning mechanism to prevent build-up of deposits on the heat transfer surfaces.

Following the heat exchanger, the exhaust stream enters the two-pass dry scrubber reaction tower. At the base of the reactor tower, where the gas turns back up from its first downward pass, the flow passes through a dust conditioning drum. The drum is a simple device consisting of a rotating perforated cylinder partially filled with ceramic balls. Flue gas

travels radially through the drum, where previously filtered, aged dust is retained and used to pre-condition the fresh dust entrained in the gas stream. The ceramic balls are free to roll within the rotating drum and act to grind the accumulated material and prevent caking and dust accumulation.

The recirculated dust load can be a large multiple of the original dust load in the flue gas. As a result, the reactive surface area and residence time of the hydrated lime in the flue gas stream are substantially increased. This approach improves the acid gas removal efficiency and reduces the required ratio of hydrated lime to acid gases so that it approaches the stoichiometric ratio.

From the reactor tower, the flue gas flows directly into a three-compartment fabric collector with pulse jet cleaning. Each compartment will house 154 horizontal oval bags, 1.25 inches wide by 6.125 inches deep by 80.5 inches long. The bags will be manufactured from polymer coated polyester material. The operating air-to-cloth ratio with all compartments on line will

travels radially through the drum, where previously filtered, aged dust is retained and used to pre-condition the fresh dust entrained in the gas stream. The ceramic balls are free to roll within the rotating drum and act to grind the accumulated material and prevent caking and dust accumulation.

The recirculated dust load can be a large multiple of the original dust load in the flue gas. As a result, the reactive surface area and residence time of the hydrated lime in the flue gas stream are substantially increased. This approach improves the acid gas removal efficiency and reduces the required ratio of hydrated lime to acid gases so that it approaches the stoichiometric ratio.

From the reactor tower, the flue gas flows directly into a thee-compartment fabric collector with pulse jet cleaning. Each compartment will house 154 horizontal oval bags, 1.25 inches wide by 6.125 inches deep by 80.5 inches long. The bags will be manufactured from polymer coated polyester material. The operating air-to-cloth ratio with all compartments on line will

be 3.6:1. The filter will use on-line cleaning. The cleaning cycles will be field set for optimum system performance and will be automatically operated based upon either pressure differential or time. There will be a safety dilution air damper at the fabric collector inlet to prevent filter damage in the event that a high temperature situation is encountered. The inlet temperature to the fabric filter is continuously sensed by a type "J" thermocouple. The millivolt signal is processed by a two-point temperature alarm relay. When a "high-high" temperature (285°F) is sensed the "safety damper" opens. The sensors and normal operating temperature are shown on Drawings R-8279-D9 and R-8279-D7, respectively. The "safety damper" is normally closed and its function is to prevent damage to the fabric filter and HEPA filters in an upset condition.

The lime feed system will be situated below the lime storage bin and will include the transport fan, a metering screw, a weigh scale and controller and chart recorder. The storage bin will have a slide gate discharge which will operate automatically on demand from the weigh scale controller as will the metering feed

screw. The hydrated lime utilized in the dry scrubbing system will be delivered to the site in bags. After the dry scrubber fabric filter, the cleaned flue gas is further processed through a five stage HEPA filtration and carbon adsorption unit incorporating a pre-filter, a HEPA filter, carbon absorbers, and lastly another HEPA filter. The entire unit is solidly welded together and will have bag-in/bag-out side access compartments.

Flyash will be continuously removed from hoppers in the base of the heat exchanger and the fabric filter via a sealed rotary discharge valve. As previously explained, a portion of the dust removed in the fabric filter is recirculated to the conditioning drum in the scrubber reactor tower. The remainder of the flyash along with the dust from the heat exchanger will be mechanically conveyed in a common sealed conveyor system to sealed dust-tight containers for final disposal.

The air pollution control system will incorporate a preheat air system. This will be utilized whenever the incinerator is not in operation to maintain temperature throughout the dry scrubbing system.

8. The liquid waste injection system is presented in Drawing No. R-8279-D4. A description of the nozzles and burners is provided in Section 3.5 of the Trial Burn Plan in Appendix B.

9. The Materials of construction for each component of the incinerator system is described in Section 3 of the Trial Burn Plan in Appendix B.

10. The location and description of temperature, pressure, and flow indicating and control instruments are noted on Drawings R-8279-D4, R-8279-D6, and R-8279-D9.

(c) Sampling and Monitoring Procedures

1. Refer to the Trial Burn Plan (TBP), Section 8, which is located in Appendix B, for a complete description of the sampling equipment. Stack gas monitoring equipment is described in Section D-5b(2)(b), and Section 4 of the Trial Burn Plan (see Appendix B).

2. The sampling and analysis schedule during the trial burn is delineated in Table 8-1, Samples and Analytical Procedures, in Section 8 of the Trial Burn Plan (see Appendix B).

3. The standard sample preparation and analysis procedures are listed in Table 8-1 of the Trial

Burn Plan in Appendix B. Gas analysis for CO will be by a continuous monitoring system as described in Section 4.3 of the Trial Burn Plan.

4. Sampling and monitoring locations are identified on Figure 4-1 and in Tables 4-1, 4-2 and 4-3 of the Trial Burn Plan in Appendix B. Waste mixtures and the lime will be prepared and sampled prior to the start of the trial burn runs, in addition to the 15-minute grab sample frequency during the runs. Exit gas samples will be obtained from the sample port on the stack. Ash samples from the fabric filter and HEPA filters will also be obtained.

5. The quality assurance program is described in Section 9 and the quality control program is detailed in Section 11 of the Trial Burn Plan (see Appendix B).

(d) Test Schedule

1. Trial burn activities are expected to be held within sixty to ninety days after permit issuance and approval of the Trial Burn Plan. These activities are expected to require six

days of testing. Several days are required to set up and calibrate all sampling and monitoring equipment prior to the trial burn, and one day is required to remove the test equipment. The proposed daily schedule for the trial burn is shown in Table 7-1 in the Trial Burn Plan in Appendix B.

2. The trial burn test schedule is presented in Section 7 of the Trial Burn Plan (Appendix B). This time frame may have to be extended if problems are encountered.

3. The composition and quantity of each waste burned during Test Stage #1 of the Trial Burn is discussed in Sections 5.3 and 5.4 of the Trial Burn Plan in Appendix B. Section 6 of the Trial Burn Plan describes the test conditions.

(e) Test Protocols

For each waste to be burned, variations are identified below.

1. The trial burn test conditions will attempt to establish an equilibrium operating temperature of approximately 1600°F or greater in the primary chamber

and approximately 2000°F in the secondary chamber (1900°F for Test Stage #2). The waste feed systems will be shut off if the temperatures are outside of the ranges noted in Section D-5b(1)(c)4.

2. After the incinerator is brought up to the desired operating temperature in the primary and secondary chambers with natural gas, and conditions have stabilized, it is planned to start the waste feeds and smoothly but expeditiously bring them up to the steady state test conditions. The feed rates will be as noted in Section 5.4 in the Trial Burn Plan in Appendix B.

3. The combustion gas flow in the secondary combustion chamber will be limited such that the residence time in the secondary chamber is at least 2.0 seconds. The combustion gas velocity is calculated to be 4.6 ft/sec. at a residence time of 2.9 seconds.

4. Auxiliary fuel will be used to bring the incinerator up to operating conditions. It is expected that the waste heating value will be sufficient to maintain approximately 1600°F in the primary combustion chamber and approx. 2000°F in the

3. In the event of an equipment malfunction and for upsets or interruptions, the air quality control system will stay in operation. Procedures for maintaining the air emission controls operational in the event of a malfunction shutdown of the incinerator are included in Section D-5b(2)(b)6.

(h) Principal Organic Hazardous Constituents (POHC's)

The two POHC's which have been proposed for the trial burn for which destruction and removal efficiencies will be calculated are carbon tetrachloride and hexachlorobenzene. The logic for these selections is presented in the appended Section 5.1 of the Trial Burn Plan (see Appendix B).

D-5b(3) Trial Burn Results

The Trial Burn Report is discussed in Section 7.0 of the Trial Burn Plan (Appendix B).

D-5b(4) Post Trial Burn Period

Operating conditions will be as described in Section D-5b(1)(b) during the post trial burn period to comply with the requirements for DRE, HCl emissions and particulate emissions.

Operating conditions, restrictions, control of fugitive emissions, hazardous waste feed restrictions, and automatic waste feed cut-off systems will be as described in Section D-5b(1)(c) for the post trial burn period.

D-5c Trial Burn Substitute Submissions

Not applicable.

D-5d Monitoring

The parameters indicated below will be monitored on a continuous basis while incinerating hazardous waste. Monitoring data will be recorded automatically using strip charts and/or data loggers.

Combustion Temperatures and Stack Gas

Temperature sensors will be used to measure the temperature in the primary and secondary combustion chambers and the stack gas as noted

on Drawings R-8279-D6 and R-8279-D9. The signals from these sensors will be the input to the computer for control of the combustion temperature, and will also activate alarms and automatic shut down procedures.

Waste Flow Rate

Flowmeters will sense the liquid waste flow rates and output from the flowmeter will input the programmable logic controller (PLC).

Combustion Gas Velocity

The indicator for combustion gas velocity is explained in Section D-5b(1)(c)-7.

Carbon Monoxide (CO)

The monitor for the CO in the exhaust gas is explained in Section D-5b(1)(c)-3.

D-5e Waste Feed Cut-Off

All liquid waste to the incinerator will be automatically cut off by solenoid-operated valves and the solid waste feed system automatically shut down if any of the conditions develop as described in Section D-5b(2)(b)6.

D-5f QA/QC Associated with Permit Compliance and Daily Operation

D-5f(1) Waste Feed Limitation

At least semi-annually, the calibration of feed rate monitoring devices will be checked and if warranted, recalibrated. Applicable calibration methods, depending on the device, may include:

- Using standard weights or other known weights/flows
- Comparing readings with a duplicate or alternative devices
- Using manufacturer's methods
- Returning the instrument to the manufacturer for calibration

Specific feed rate monitoring equipment calibration requirements can be identified only after receipt of the Operating and Maintenance manuals from the manufacturer.

The frequency of reanalysis and the parameters to be determined, and the documentation requirements associated with continuing waste characterization are described in Section C of this application.

If some permit limits are expressed as loading rates (i.e., total chlorine input, total heat input), a calculation will be kept in the operating log to demonstrate compliance with these limits.

D-5(f)(2) Continuous Emission Monitoring Systems (CEMS) for Carbon Monoxide and Oxygen

A QC program will be provided in accordance with manufacturer specifications to ensure that the CEMS continues to operate properly and that reliable results continue to be obtained. The primary components of the QC program for CEMS will be:

- Routine calibration checks
- Preventative maintenance programs
- Performance tests
- Record keeping

D-5(f)(3) Other Monitored Parameters

Proper continuing operation of each monitoring instrument associated with a permit-limited operating condition is a crucial portion of the RCRA incineration program. For this reason the applicable calibration methods, depending on the device, will be specified in the Operating and Maintenance manuals from the manufacturer.

D-5(f)(4) Automatic Waste Feed Shutoff System

As specified in Section F of this permit application the automatic waste feed shutoff (AWFSO) system will be tested weekly. The parameters which trigger the AWFSO system are listed on page 19 of the Trial Burn Plan.

The AWFSO system will be tested in accordance with the procedures specified in the Operation and Maintenance manuals from the manufacturer. Each week at least one triggering parameter will be used to test the AWFSO system Options may include testing at least one parameter a week on a rotating basis, or weekly testing that includes all triggering parameters over a month's time. Records will be maintained to document compliance with shutoff limits.

D-5(f)(5) Record Keeping

Glaxo will maintain the records required to document compliance with the permit conditions. These records will include:

- Records associated with continuously monitored operating parameters
- Records associated with waste characterization
- Records associated with the characterization and handling of by-product waste

- Records associated with inspections performed by facility staff
- Calibration and maintenance logs
- Automatic waste feed shutoff system records
- Records of specific issues (e.g., emergency vent stack openings, waste acceptance, blending, etc.)

D-5(f)(6) Operational Requirements for Regulated Medical Waste Treatment Facilities

Glaxo will comply with the requirements of 15A NCAC 13B.1207 (1) and (3) which specify conditions for storage and incineration of medical waste.

CALCULATIONS

1. Maximum Stack Gas Flowrate

KVS Design Criteria:

Normal Stack Gas Flowrate	=	3982 ACFM
Corresponding Retention Time	=	2.9 Seconds

In order to maintain a minimum retention time of at least 2.0 seconds, the corresponding flowrate must not exceed:

$$3982 \text{ ACFM} \times \frac{2.9}{2.0} = 5774 \text{ ACFM}$$

Therefore, a 2.0 second retention time will be maintained if the stack gas flow does not exceed 5774 ACFM.

2. Maximum Stack Gas Velocity (V)

Max. flowrate (Q): 5774 ACFM

Stack Inside Diameter (D): 30 Inches = 2.5 ft

$$V = \frac{Q}{A} = \frac{5774 \text{ ACFM}}{\frac{\pi}{4}(2.5)^2 \text{ FT}^2} \times \frac{1 \text{ min}}{60 \text{ sec}} = 19.6 \text{ ft/sec}$$

D-6 LANDFILLS [40 CFR 270.21]

Glaxo will not have any landfills; therefore, Section D-6 is not applicable.

D-7 LAND TREATMENT [40 CFR 270.20]

Glaxo will not have any land treatment; therefore, Section D-7 is not applicable.

D-8 MISCELLANEOUS UNITS [40 CFR 270.23]

Glaxo will not manage hazardous wastes in units that may be construed as a miscellaneous unit as defined in 40 CFR 260.10 (80a); therefore, Section D-8 does not apply.

E - Groundwater Monitoring System

SECTION E

GROUNDWATER MONITORING SYSTEMS

The requirements for groundwater monitoring are not applicable to the hazardous waste management facilities at Glaxo.

F - Procedures To Prevent Hazards

SECTION F

PROCEDURES TO PREVENT HAZARDS

The information provided in this section is submitted in accordance with the requirements of 40 CFR Part 270.14(b)(4), (5), (6), (8), and (9).

This section addresses the following subject areas:

1. General Security Provisions [40 CFR Part 270.14(b)(4)]
2. Inspection Schedule [40 CFR Part 270.14(b)(5)]
3. Request for Waiver of Preparedness and Prevention Requirements [40 CFR Part 270.14(b)(6)]
4. Preventive Procedures, Structures, and Equipment [40 CFR Part 270.14(b)(8)]
5. Prevention of Accidental Ignition or Reaction of Ignitable, Reactive or Incompatible Wastes [40 CFR Part 270.14(b)(9)]

Other regulations addressed to complete this section include 40 CFR 264.14, 264.17, 264.32, 264.33, 264.35, 264.176, 264.177, 264.195, 264.198, 264.199, and 264.347.

F-1a Security Procedures and Equipment

Vehicle entrance control will be provided at both entrances to the Glaxo site - one at the south entrance from Alexander Drive and the other at the north entrance from Ellis Road. In addition to closed circuit television (CCTV) surveillance, there will be a posted security officer in each security reception center.

The security systems for Glaxo's R&D Facilities will include CCTV surveillance, card access and security monitoring, security communication, and vehicle entrance control. Monitoring of all security systems will be 24 hours per day.

To enter a building will require a card key access. If a door is opened without using a valid card or request to exit, an alarm signal will be sent to the Security Monitoring Center.

The area around the Environmental Safety Facility (ESF) and the Hazardous Materials Management Building (HMMB) will be under CCTV Surveillance.

An internal telephone system with telephones located throughout the facility provides instant communication. Telephone will be located in the HMMB and the ESF as depicted on Drawings R-8279-D1 and R-8279-D2. These telephones can be used for outside calls as well as internal communication.

An alarm system (public address system) capable of providing immediate emergency instructions will be provided in both the HMMB and ESF.

Fire alarm pull station will be located as depicted on Drawings R-8279-D1 and R-8279-D2.

F-1a(1) Twenty-Four Hour Surveillance System

Glaxo will maintain a 24-hour surveillance system as described above.

F-1a(2) Barrier and Means to Control Entry

In addition to the 24-hour surveillance system, vehicle access will be controlled by full road width underground hydraulic bollards that can be raised or lowered.

F-1a(3) Warning Signs

Signs which are legible from a distance of 25 feet will be posted at each entrance to the HMMB and ESF buildings. These signs will be visible from all angles of approach and will bear the legend "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT."

F-1b Waiver

Glaxo does not request a waiver of the requirements stated in Part 264.14(a)(1) and (2) regarding injury to intruder and violation by intruder.

F-2a General Inspection Requirements

Glaxo will conduct regular inspections of the facility for the use and management of containers, tanks, incinerator, and discharges that could cause or lead to the release of hazardous wastes and adversely affect the environment or threaten human health.

F-2a(1) Types of Problems

Tables F-1 to F-7 present the schedules for inspecting the HMMB, ESF, and safety and emergency equipment. The items listed in the tables are considered important because of their role in preventing, detecting, or responding to environmental or human health hazards. Provided with each item is a list of problems that could be encountered.

F-2a(2) Frequency of Inspection

Tables F-1 to F-7 also provide the frequency of inspection for each item.

F-2b Specific Process Inspection Requirements

Inspections will be conducted according to the inspection schedule provided in Tables F-1 to F-7 for containers, tanks, the incinerator, and safety and emergency equipment. The following inspection schedules (Tables F-1 to F-

7) define the items to be inspected, the inspection procedure and/or types of problems, and the frequency of inspection. A visual inspection or check refers to inspection for unusual physical or operating conditions and includes, where appropriate, such items as a check for corrosion, physical damage or loose supports, hangers, fasteners, or mountings. A comprehensive inspection refers to a thorough inspection for worn or broken components. This inspection can include a major overhaul, inspection of internal or concealed components for corrosion, erosion or wear, and special tests which could predict imminent failure. The equipment manufacturer has specific instructions and recommendations for inspection and maintenance which are incorporated into the inspection plan.

Results of each inspection will be recorded on inspection log sheets (See Appendix C). Information requested on the log sheets includes the inspector's name and title, date and time of inspection, item of inspection, status of the item, observations, and the date and nature of repairs and remedial action. The inspection procedure and/or typical problems that may be encountered with each item of inspection are specified in the inspection schedule to serve as a reminder to the inspector and to ensure a complete inspection. The inspector will be required to check the status of each item and indicate whether its condition is acceptable or unacceptable. If the status of a particular item is unacceptable, appropriate and complete information will be recorded, including date and nature of repairs and remedial action. When the inspection log sheets are completed, they will be placed in a three-ring binder and kept with the facility's records.

F-2c Remedial Action

If inspections reveal that non-emergency maintenance is needed, it will be completed as soon as possible to preclude further damage and eliminate the need for emergency repairs. If a hazard is imminent or has already occurred during the course of an inspection or any time between inspections, remedial action will be taken immediately. The Emergency Coordinator will notify the appropriate authorities as designated in the Contingency Plan (See Section G), and initiate remedial actions. In the event of an emergency involving the release of hazardous substances to the environment, efforts will be directed towards containing the hazard, removing it, and then decontaminating the affected area. Refer to the Contingency Plan for further details.

F-2d Inspection Log

An inspection log will be maintained, for each calendar year, in a three-ring binder that is subdivided by sections for areas and equipment. After an inspection, each log sheet will be filed in the binder according to specific area and equipment to provide a case history of the system. The inspection log will be kept with the inspection schedule in the facility's records. As required by 40 CFR 264.15(d), records of inspections will be kept for at least three years from the date of inspection. A copy of the inspection log may be found in Appendix C.

TABLE F-1
HMMB SAFETY AND EMERGENCY EQUIPMENT
INSPECTION SCHEDULE

SPECIFIC ITEM	INSPECTION PROCEDURE / TYPES OF PROBLEMS	FREQUENCY OF INSPECTION
Standard Industrial Absorbents	Visual Inspection of Condition and Quantity	Weekly
55-gallon drums	Visual Inspection of Condition and Quantity	Weekly
Overpack Drum	Visual Inspection of Condition and Quantity	Weekly
Portable Sump Pump and Hoses	Visual Inspection of Condition	Monthly
Emergency Shower and Eyewash	Operation Test	Monthly
Shovels, Brooms, Dust Pan	Visual Inspection for Proper Location and Condition	Monthly
SCBA Equipment	Visual Inspection and Operation Test	Monthly / after each use
Full Face Respirators	Visual Inspection of Condition and Supply	Monthly / as used

TABLE F (Continued)
HMMB SAFETY AND EMERGENCY EQUIPMENT
INSPECTION SCHEDULE

SPECIFIC ITEM	INSPECTION PROCEDURE / TYPES OF PROBLEMS	FREQUENCY OF INSPECTION
Fire Extinguishers	Charge Test	Monthly / after each use
Fire Blankets	Visual Inspection for Condition	Monthly
Protective Clothing	Visual Inspection for Condition and Quantity	Monthly / as used
Alarm System (Fire and Security)	Operational Test	Monthly
Emergency Lighting and Power	Visual Inspection for Charge Condition/ Operational Test	Monthly
First Aid Equipment	Visual Inspection for Condition and Quality	Monthly/ as used
Communication System (PA)	Operational Test	Monthly

TABLE F-2
ESF SAFETY AND EMERGENCY EQUIPMENT
INSPECTION SCHEDULE

SPECIFIC ITEM	INSPECTION PROCEDURE / TYPES OF PROBLEMS	FREQUENCY OF INSPECTION
Standard Industrial Absorbents	Visual Inspection of Condition and Quantity	Weekly
55-gallon drums	Visual Inspection of Condition and Quantity	Weekly
Overpack Drum	Visual Inspection of Condition and Quantity	Weekly
Portable Sump Pump and Hoses	Visual Inspection of Condition	Monthly
Emergency Shower and Eyewash	Operation Test	Monthly
Shovels, Brooms, Dust Pan	Visual Inspection for Proper Location and Condition	Monthly
SCBA Equipment	Visual Inspection and Operation Test	Monthly / after each use
Full Face Respirators	Visual Inspection of Condition and Supply	Monthly / as used

TABLE H (Continued)
ESF SAFETY AND EMERGENCY EQUIPMENT
INSPECTION SCHEDULE

SPECIFIC ITEM	INSPECTION PROCEDURE / TYPES OF PROBLEMS	FREQUENCY OF INSPECTION
Fire Extinguishers	Charge Test	Monthly / after each use
Fire Blankets	Visual Inspection for Condition	Monthly / as used
Protective Clothing	Visual Inspection for Condition and Quantity	Monthly
Alarm System (Fire and Security)	Operational Test	Monthly
Emergency Lighting and Power	Visual Inspection for Change Condition/ Operational Test	Monthly
First Aid Equipment	Visual Inspection for Condition and Quantity	Monthly/ as used
Communication System (PA)	Operational Test	Monthly

TABLE F-3
HMMB CONTAINER STORAGE INSPECTION SCHEDULE

SPECIFIC ITEM	INSPECTION PROCEDURE / TYPES OF PROBLEMS	FREQUENCY OF INSPECTION
Container Placement	Visual Check of Aisle Space, Height of Stacks, Segregation.	Daily
Sealing of Containers	Visual Check for Seals, Leakage	Daily
Container Condition	Visual Check for Leakage, Damage	Daily
Containment Systems	Visual Inspection for Leaks, Debris, or Refuse	Daily
Loading Area	Visual Inspection for Leaks, Spill	Daily, when in use
Staging Areas	Visual Inspection for Leaks, Spill	Daily, when in use
Labeling of Containers	Visual Check for Improper Identification, Missing Date	Weekly
Pallets	Visual Inspection to Detect Damage	Weekly
Floor, Dikes, Ramps	Visual Inspection for Cracks, Spalling, Erosion or Deterioration	Weekly
Warning Signs	Visual Inspection for Damage	Weekly

TABLE F-4
ESF CONTAINER STORAGE
INSPECTION SCHEDULE

SPECIFIC ITEM	INSPECTION PROCEDURE / TYPES OF PROBLEMS	FREQUENCY OF INSPECTION
Container Placement	Visual Check of Aisle Space, Height of Stacks, Segregation.	Daily
Sealing of Containers	Visual Check for Seals, Leakage	Daily
Container Condition	Visual Check for Leakage, Damage	Daily
Containment Systems	Visual Inspection for Leaks, Debris, or Refuse	Daily
Loading Area	Visual Inspection for Leaks, Spill	Daily, when in use
Staging Areas	Visual Inspection for Leaks, Spills	Daily when in use
Labeling of Containers	Visual Check for Improper Identification, Missing Date	Weekly
Pallets	Visual Inspection to Detect Damage	Weekly
Floor, Dikes, Ramps	Visual Inspection for Cracks, Spalling, Erosion or Deterioration	Weekly
Warning Signs	Visual Inspection for Damage	Weekly

TABLE F-5
ESF TANK AREA
INSPECTION SCHEDULE

SPECIFIC ITEM	INSPECTION PROCEDURE / TYPES OF PROBLEMS	FREQUENCY OF INSPECTION
Monitoring Instruments	Operational Check of Pressure Indicators and Level Indicators	Daily
Monitoring Equipment	Visual Inspection of Condition	Daily
Tank Structure	Visual Inspection for Corrosion, Erosion, Leaks	Daily
Containment System	Visual Inspection for Spills, Leaks, Cracks, or Deterioration	Daily
Liquid Level	Visual Inspection to Confirm Accuracy of Level Indicator	Daily
Tank Corrosion	Measurement of Corrosion or Erosion	Annually
Ancillary Equipment	Visual Inspection for Leaks	Daily

TABLE F-6
ESF INCINERATOR CONTROLS
INSPECTION SCHEDULE

SPECIFIC ITEM	INSPECTION PROCEDURE / TYPES OF PROBLEMS	FREQUENCY OF INSPECTION
Emergency Feed Cutoff (Sensors and Alarms)	Activate Test Circuit	Weekly
Low Secondary Combustion Chamber (SCC) Temperature	Activate Test Circuit	Weekly
Excessive SCC Temperature	Activate Test Circuit	Weekly
Combustion Gas Velocity	Activate Test Circuit	Weekly
Incinerator Operating Interlocks	Activate Test Circuit	Weekly
Combustion Air Fans	Activate Test Circuit	Weekly
Hydraulic Ram Feed System	Activate Test Circuit	Weekly
Waste Feed Cutoff Valves	Positive Valve Closure	Weekly

TABLE F (Continued)
ESF INCINERATOR CONTROLS
INSPECTION SCHEDULE

SPECIFIC ITEM	INSPECTION PROCEDURE / TYPES OF PROBLEMS	FREQUENCY OF INSPECTION
Control Instruments	Check Calibration	Monthly
Control Valves	Check Control Calibration and Operation	Annually
Monitoring and Recording Devices	Check Calibration	Semi-annually

TABLE F-7
ESF INCINERATOR SYSTEM
INSPECTION SCHEDULE

SPECIFIC ITEM	INSPECTION PROCEDURE / TYPES OF PROBLEMS	FREQUENCY OF INSPECTION
Incinerator Feed Piping	Visual Inspection for Leaks, Spills, Damage	Daily
Refractory	Visual Check for Damage through View Ports Comprehensive Inspection	Daily Quarterly
Primary Combustion Chamber	Visual Refractory Check, Leaks, Fugitive Emissions, Damage, Shell Temperature Comprehensive Inspection	Daily Quarterly
Secondary Combustion Chamber	Visual Refractory Check, Leaks, Fugitive Emissions, Damage Shell Temperature Comprehensive Inspection	Daily Quarterly
Ash Hopper	Visual Inspection for Leaks, Spills, Level	Daily
Air Quality Control System (AQCS) Recirculation Tower and Appurtenances	Check General Condition, Leaks, Damage, Operation. Complete Inspection for Corrosion, Structural Defects.	Daily Quarterly

TABLE [illegible] (Continued)
ESF INCINERATOR SYSTEM
INSPECTION SCHEDULE

SPECIFIC ITEM	INSPECTION PROCEDURE / TYPES OF PROBLEMS	FREQUENCY OF INSPECTION
AQCS Heat Exchanger and Appurtenances	Check General Condition, Leaks, Damage, Operation	Daily
	Complete Inspection for Corrosion, Structural Defects	Quarterly
AQCS Dry Reactor and Appurtenances	Check General Conditions, Leaks, Damage, Operation	Daily
	Complete Inspection for Corrosion, Structural Defects	Quarterly
AQCS Fabric Filter (Baghouse) and Appurtenances	Check General Conditions, Leaks, Damage, Operation	Daily
	Complete Inspection for Corrosion, Structural Defects	Quarterly
AQCS Fly Ash/Residue Overflow Container	Visual Inspection for Leaks, Spills, Level	Daily
Stack	Visual Inspection for Structural Damage	Weekly
Building HVAC Equipment	Visual Inspection for Leaks, Wear and Replacement	Monthly and as Recommended by Equipment Supplies
Weighing Scales	Check Control Calibration and Operation	Annually

F-3 PREPAREDNESS AND PREVENTION REQUIREMENTS [40 CFR 270.14(b)(6)]

Glaxo does not request a waiver from the preparedness and prevention requirements of 40 CFR 174, Subpart C which are primarily addressed in Section D, Section F, and Section G of this application.

F-3a Equipment Requirements

Internal and external communications equipment (telephones), emergency equipment, and fire control equipment are shown on drawing R-8279-D1 and R-8279-D2 and discussed in Section F-1a and G-5.

F-3b Aisle Space Requirements

Adequate aisle spacing will be maintained to ensure that all drums of solvent waste can be inspected and to ensure that emergency response personnel will have access. Drummed wastes in the HMMB and ESF will be placed no more than one drum high and/or one pallet wide. Minimum aisle space will be maintained as indicated on Drawings R-8279-D1, R-8279-D2, and R-8279-D3.

Potable water and fire water for the Glaxo facility are provided by the City of Durham. Glaxo will have available an adequate volume and pressure to supply the fire suppression equipment.

F-4 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT [40 CFR 270.15(b)(8)]

F-4a Loading/Unloading Operations

Truck loading/unloading operations at the facility will take place at the HMMB and ESF. Wastes will be shipped to and from the Glaxo facility via truck. Also, wastes can be transferred between the HMMB and ESF via truck using East Road (see Drawing R-8279-B7).

Laboratory generated waste will be accumulated and transferred to the HMMB in small containers (i.e., lab packs, safety cans, cardboard safety boxes, fiber drums). The on-site laboratories are physically connected to the HMMB which enables waste accumulation containers to be transferred internally using a heavy duty polymer utility cart and/or utility service cart. Waste accumulation containers will include 1-gallon, 2 1/2 gallon and 5 gallon solvent waste containers, cardboard safety boxes of various sizes up to 4.5 cubic feet capacity, and fiber drums of various sizes up to 4,1 cubic feet capacity. Internal movement of fifty-five gallon containers will be accomplished with a hand truck or forklift truck equipped with chime clamps.

Wastes are transferred from the generation points to the HMMB and ESF by authorized personnel only. Hazardous wastes received from off-site laboratories will be loaded/unloaded at the HMMB.

The truck loading/unloading areas at the HMMB and ESF will include spill containment provisions. The areas will slope towards grated U-drains at the

base of the loading docks. These drains will be temporarily plugged during the loading and unloading of hazardous wastes. The loading/unloading areas will be provided with dock levelers and wheel chocks to reduce the potential for mishandling containers due to uneven surfaces or trailer movement. Spotlights will be provided to illuminate the inside of trailers or trucks during loading.

F-4b Run-Off and Run-On

The HMMB and ESF are totally enclosed buildings. Spill containment systems will be provided in these buildings to contain any spillage or leakage. Therefore, run-off and run-on will be prevented.

At the HMMB truck loading/unloading dock, the outside trench drain is for control of storm water runoff. This underground line discharges into the storm water system. During the transfer of hazardous wastes at the loading dock, the drain inlet can be plugged for containment of any spill.

At the EST truck loading/unloading dock, the outside trench drain is for control of storm water runoff. This underground line discharges into the storm water system. During transfer of hazardous waste drums at the loading dock, a manual shutoff valve in the drainline can be used for containment of any spill.

F-4 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT [40 CFR 270.15(b)(8)] - Continued

F-4c Water Supplies

Contamination of water supplies will be prevented by eliminating the discharge of hazardous materials onto unprotected ground. The HMMB and ESF will have impervious floors and containment systems.

F-4d Equipment and Power Failure

The effects of a power or equipment failure at the HMMB and ESF will be minimal since a heating and air conditioning system will not be required for adequate storage of wastes. The HMMB and ESF are designed with secondary containment to hold any spills that may occur. If dedicated sump pumps become inoperable, accumulated liquid can be removed by using portable sump pumps.

Equipment failure resulting in an incinerator process upset will be monitored by instrumentation. Detection of abnormal operating conditions or process parameters initiates a controlled automatic shutdown including waste feed cut-off.

The actual written procedures identifying the manufacturer's recommended servicing and maintenance of process equipment will be developed after operational manuals are delivered and before start-up and training. The proposed procedures will include the equipment listed in subsection F-2d

F-4 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT [40 CFR 270.15(b)(8)] - Continued

Inspection Log of Section F Procedures to Prevent Hazards by utilizing preventive and predictive maintenance programs. Preventive maintenance involves the periodic inspection and replacement of worn or defective parts as part of an ongoing program to ensure continuous and reliable operation of equipment. Predictive maintenance utilizes vibrational analysis of rotating equipment, such as fan shafts, to detect shaft displacements that can eventually result in bearing failures.

At the HMMB, emergency lighting fixtures and critical exhaust fans are connected into the emergency power generation system.

The emergency by-pass valve to the stack will be opened under the following conditions:

a. Electrical power failure.
b. Loss of compressed air. A duplex compressor will be provided to minimize equipment failure.
c. Induced draft fan failure.
d. High-high temperature at any of the following:
   - Heat exchanger
   - Fabric filter inlet
   - Recirculation duct
e. Loss of open position signal at the system isolation damper (see R-8279-D9), last damper before I.D. fan).
f. Secondary chamber outlet pressure "positive" for 10 seconds. Normal secondary chamber pressure is negative.

Drawing R-8279-D6 Incinerator P&ID shows two bypass valves: one (normally open, fail closed) in the breeching to the air quality control system, and the other which is the emergency by-pass valve (normally closed, fail open) in the breeching to the stack. These are 30-inch diameter air operated butterfly valves, lined with refractory, with a stainless steel blade that fits tightly against a recessed seat.

The use of the "bypass valve" will occur only under emergency situations. Temperature and pressure monitoring of the combustion gases by instrumentation alerts the operator of abnormal conditions so the waste feed rate can be stopped and the burndown cycle manually initiated. The control system for the emergency bypass valve is designed so that a bypass of the air pollution control equipment will occur only in order to avoid a potentially catastrophic event (i.e., explosion due to pressure build-up) and only after the ID fan has been shut off and the fan damper closed. If the emergency bypass is opened the resident heat in the SCC serves to complete the combustion of organic constituents in the combustion gases before they exit. Bypass valve opening will be avoided by providing alarm settings below the emergency alarm points to advise of conditions which would result in a bypass valve opening. These early warnings will allow the operator to take corrective action before the bypass valve opens.

All levels of the ESF including Class 1, Division 2, rooms have emergency lighting battery packs capable of 1.5 hour operation to provide safe egress and sufficient time to close down operations. The dedicated hazardous exhaust fans from the liquid storage and scintillation vial storage rooms are provided

with emergency standby power from diesel engine driven generators located in the Central Plant in the event of a utility supply failure. Continuous exhaust is always maintained.

Fire alarm, security and communication systems and the hazardous spill detection equipment for the liquid storage room have standby power supplied from the emergency generators.

A high level of reliability has been provided for the R&D site electrical system by use of an integrated purchased power and emergency generated power supply and distribution system. Two 100% capacity main feeder circuits supply the facility and will automatically be switched if one feeder fails. On-site generated emergency power is supplied to critical loads for total power failure or failure at any building.

F-4e Personnel Protection Equipment

The exposure of employees to a hazardous waste is minimized to the greatest extent possible. The constituents of each hazardous waste stream are known and recorded on the waste disposal form. Information regarding toxicity, fire,

explosion hazards, protective equipment recommendations and first aid is included in the Material Safety Data Sheets which are kept on file at Glaxo for each of the hazardous wastes generated, stored, and incinerated. This information along with knowledge, experience, and training enables Glaxo employees to safely handle these wastes.

Available personnel protective equipment includes:

- Full face respirators with combined organic vapor, acid gas, and radioactive material cartridges;
- Tyvek suits, coveralls, lab coats, or aprons;
- Safety glasses, face shield, goggles;
- Nitrile gloves;
- Neoprene Boots;
- SCBA Equipment

Use of the protective equipment is covered in the initial and continuing personnel training program (See Section H), which satisfies the Occupational Safety and Health Standards of 29 CFR 1910, Subpart I - Personnel Protection Equipment.

Walk-in fume loads are provided for transfer operations of solvent wastes in the HMMB and the ESF (See Drawing R-8279-D1 and R-8279-D3).

F-5 PREVENTION OF IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTES [40 CFR 270.14(b)(9)]

F-5a Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Wastes

Ignitable (flammable) and reactive wastes will be stored in the HMMB and ESF as shown on Drawings R-8279-D1, R-8279-D2, and R-8279-D3. The containers will be compatible with the contained wastes, and therefore, any possible source of ignition would be external to the containers. The waste containers will remain closed while stored in the HMMB and ESF except during transfer operations. Heat sources such as open flames, spontaneous ignition, or radiant heat will be kept away from drums of ignitable waste at all times. To help prevent a possible source of ignition, signs clearly marked "NO SMOKING" and "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT" will be placed at each entrance to the HMMB and ESF as well as at strategic locations inside these buildings. During the transfer of waste into or out of a 55-gallon container, the container will be grounded/bonded.

If any activities that generate flame or sparks, such as welding or cutting, are to be performed in an ignitables storage area, all drums of ignitables will be removed from the area. At all other times, non-sparking equipment will be used for work performed in the ignitables storage areas.

F-5b General Precautions for Handling Ignitable or Reactive Wastes and Mixing of Incompatible Wastes

As previously stated, waste containers will remain closed except when solvent waste is transferred from one container to another. Normally closed containers minimize the release of fumes. Close supervision will be maintained during transfer operations to ensure that the time the containers are uncovered is kept

to a minimum. Solvent wastes will be transferred from the safety containers into 55-gallon drums in a walk-in fume hood located in the hazardous material laboratory in the HMMB.

As shown on drawing R-8279-D1, potentially incompatible wastes will be segregated in the HMMB. Separate rooms will be provided for flammable waste (i.e., waste solvents), reactive/oxidizer waste, acid waste, and caustic wastes.

As described in Section C-2d, the individual researchers will be responsible for ensuring that incompatible or reactive wastes are not placed in a solvent waste safety container.

F-5c Management of Ignitable or Reactive Wastes in Containers

Ignitable and reactive wastes will be stored in designated areas in the HMMB and ESF (see drawing R-8279-D1 and R-8279-D2). These buildings will be located greater than 50 feet (15 meters) from the property line.

F-5d Management of Incompatible Wastes in Containers

The procedures used to insure that incompatible wastes are not placed in the same container are addressed in Sections C-2d, F-5a, and F-5b. To prevent the mixture of incompatible materials, solvent wastes will only be placed in containers or drums which were purchased as new, empty containers or drums, or empty solvent product drums.

Discarded commercial chemical product wastes will remain in their original containers.

F-5e Management of Ignitable or Reactive Wastes in Tanks

As described in Section C-2d, the solvent wastes which are stored in tanks in the ESF will not be reactive or incompatible.

All three solvent waste storage tanks have been designed to accommodate ignitable hazardous waste.

Management of waste in tanks in the ESF complies with the maintenance of protective distances from any public way, street, alley, or adjoining property line as required by NFPA "Flammable and Combustible Liquids Code." These tanks will be protected from conditions that may cause the waste to ignite. Safe practices are enforced for all employees in the ESF including observing no smoking regulations and using grounding devices on all material transfers. The solvent waste will be transferred from grounded/bonded containers to the tanks using pneumatic drum pumps as depicted on Drawing R-8279-D4.

F-5f Incompatible Waste in Tanks

As described in Section C-2d, the individual laboratory researchers will ensure that incompatible materials will not be placed in the solvent waste safety cans used to accumulate solvent wastes. The Environmental Safety Technician will be responsible for the transfer of the contents of the safety containers into 55-gallon drums in the HMMB and the transfer of material from the 55-gallon

drums to the solvent waste storage tanks in the ESF. Because the new tanks will be dedicated to storing solvent waste, there will be no potential for placing waste in a tank that previously held an incompatible waste or material.

G - Contingency Plan

SECTION G

CONTINGENCY PLAN

The following information is submitted in accordance with the requirements for a contingency plan contained in 40 CFR 270.14(b)(7). The intent of Section 264, Subpart D (Contingency Plan and Emergency Procedures), of RCRA is to ensure that facilities that treat, store, or dispose of hazardous wastes have established the necessary procedures to follow in the event of an emergency situation.

G-1 GENERAL INFORMATION [40 CFR 270.14(b), 264.52, 264.53, 265.37]

Name of Facility:	Glaxo, Inc.
Location:	Five Moore Drive Research Triangle Park, NC 27709
Director of Safety & Environmental Affairs:	Mr. Thomas Cecich
Telephone Number:	(919) 248-2100

At the Research Triangle Park site Glaxo is engaged in pharmaceutical research and development. The R&D complex will have approximately 1.5 million square feet of gross building space. Included in the complex is a Research and Development Administration Building, Research and Development Laboratories, a Development Pilot Plant, two parking garages and a Central Utility Plant.

Hazardous and radioactive hazardous wastes generated in the laboratories are initially accumulated in the Hazardous Materials Management Building (HMMB), and then transported to the Environmental Safety Facility (ESF) for storage and incineration. Generated solid waste is transferred directly to the ESF for storage and incineration. Waste will also be shipped to the Glaxo R&D facilities in Research Triangle Park from off-site Glaxo laboratories located in Research Triangle Park, Morrisville, Durham, Chapel Hill and Zebulon. Drawing R-8279-B7, which was developed for the RCRA permit application, depicts the R&D facilities, the property boundaries, and access roads to the hazardous waste management facilities (i.e., the Hazardous Materials Management Building and the Environmental Safety Facility). This drawing has been included at the end of this Contingency Plan.

The following is a list of the wastes which will be stored and incinerated at the Glaxo facility.

1. Hazardous Waste

   (a) Solvent Waste
   (b) Discarded Chemical Products

2. Solid Waste

   (a) Somat Waste
   (b) Animal Carcasses
   (c) Disposable Lab Supplies
   (d) Infectious/Medical Wastes

3. Radioactive Hazardous Waste

   (a) Radioactive Solvent Waste
   (b) Scintillation Vials

4. Radioactive Solid Waste

   (a) Animal Carcasses
   (b) Animal Bedding
   (c) Disposable Lab Supplies

G-2 EMERGENCY COORDINATORS [(40 CFR 264.52(d), 264.55]

Corrosive and Reactive discarded chemical product wastes will be stored in the HMMB in designated areas. These wastes will not be incinerated but will be shipped off-site for disposal. Also incinerator ash/spent lime and potentially HEPA and charcoal filters will be shipped off-site to a permitted facility for disposal.

If any emergency situation develops at the facility, the person who discovers it will contact the primary Emergency Coordinator. If the primary Emergency Coordinator is not available, one of the two alternate Emergency Coordinators will be contacted. The duty of the Emergency Coordinator (or alternate) will be to implement the Contingency Plan if warranted. Either the primary Emergency Coordinator or one of the alternate Emergency Coordinators will be on call at all times by telephone, pager, or two-way radio. Table G-I lists the home addresses and telephone numbers for each of these coordinators. An Emergency Coordinator can reach the facility in a short period of time. Generally, the Emergency Coordinators will work on-site for forty (40) hours per week. The primary and alternate Emergency Coordinators will have complete authority to commit all necessary resources of the company in the event of an emergency. Table G-II lists organizations that may be contacted by the Emergency Coordinator in an emergency.

TABLE G-I
EMERGENCY COORDINATORS

Primary:	Calvin W. Overcash Route 3, Box 235A Highway 751 Durham, NC 27713 Telephone: 919-248-2263 (office) 919-544-9523 (home)
First Alternate:	Dr. Nelson W. Couch 118 Bounty Lane Durham, NC 27713 Telephone: 919-248-2648 (office) 919-544-2853 (home)
Second Alternate:	Thomas F. Cecich 113 Kenneth Ridge Court Apex, NC 27502 Telephone: 919-248-2655 (office) 919-387-0942 (home)

TABLE G-II
EMERGENCY CONTACTS

EMERGENCY	ORGANIZATION/AGENCY	EMERGENCY NUMBER
Injury	Hospitals	
	Duke University Medical Center Durham, North Carolina	919-684-2413
	Durham County Hospital Corp. Medical Emergency Services (Ambulance Response) Durham, North Carolina	919-470-7351 Dispatched via 911
Fire/Explosion	Bethesda Volunteer Fire Department	911
	Durham County Sheriff's Department	911
Hazardous Material Spill or Release	North Carolina Hazardous Waste Section	919-733-2178 (8am - 5pm)
	North Carolina Division of Environmental Management	919-733-7015 (8am - 5pm)
	Highway Patrol Control Center	800-662-7956 (24 hours)
	National Response Center	800-424-8802
If Spill Reaches Navigable Water	US EPA, Region IV Emergency Response Control Section	404-347-3931
	Durham County Emergency Management Agency	919-560-4517
Natural Disaster	Durham County Sheriff's Department	911

G-3 IMPLEMENTATION OF THE CONTINGENCY PLAN [40CFR264.52(a),264.56(d)]

The decision to implement the contingency plan depends upon whether or not an imminent or actual incident could threaten human health or the environment. The purpose of this section is to describe the basis of decision-making to be used by the Emergency Coordinator in deciding whether or not to implement the plan. The contingency plan will be implemented in the following situations:

1. Fire and/or Explosion

   a. If a fire causes the release of toxic fumes.
   b. If a fire spreads and could possibly ignite materials at other locations on-site or could cause heat-induced explosions.
   c. If a fire could possibly spread to off-site areas.
   d. If use of water or chemical fire suppressant could result in contaminated runoff.
   e. If an imminent danger exists where an explosion could occur.
   f. If an imminent danger exists that an explosion could ignite other flammable materials at the facility.
   g. If an imminent danger exists that an explosion could result in release of toxic material.
   h. If an explosion has occurred.

2. Spills or Material Release

   a. If a spill could result in release of flammable liquids or vapors, thus causing a fire or gas explosion hazard.
   b. If a spill could cause the release of toxic liquids or fumes.
   c. If a spill can be contained on-site, but the potential exists for ground water contamination.

d. If a spill cannot be contained on-site, resulting in off-site soil contamination and/or ground or surface water pollution.

3. Floods

If the potential exists for surface water contamination induced by flooding. Note that this is an extremely remote possibility, since the facility is not located within the 100-year flood plain.

G-4 EMERGENCY RESPONSE PROCEDURES

G-4a Notification [40 CFR 265.56(a)]

Any employee discovering a fire or hazardous waste release that is not readily controllable with equipment and materials at hand must activate the emergency system by dialing Glaxo's emergency number (248-2222) and reporting the location and nature of the emergency. Dialing this number places the caller simultaneously in contact with the Security Center, the Environmental Safety Department (the Environmental Safety Department will immediately contact the Emergency Coordinator), and the Occupational Health Services Department. The Security Center will activate the alarm system, if necessary, which will result in notification of the Fire Department.

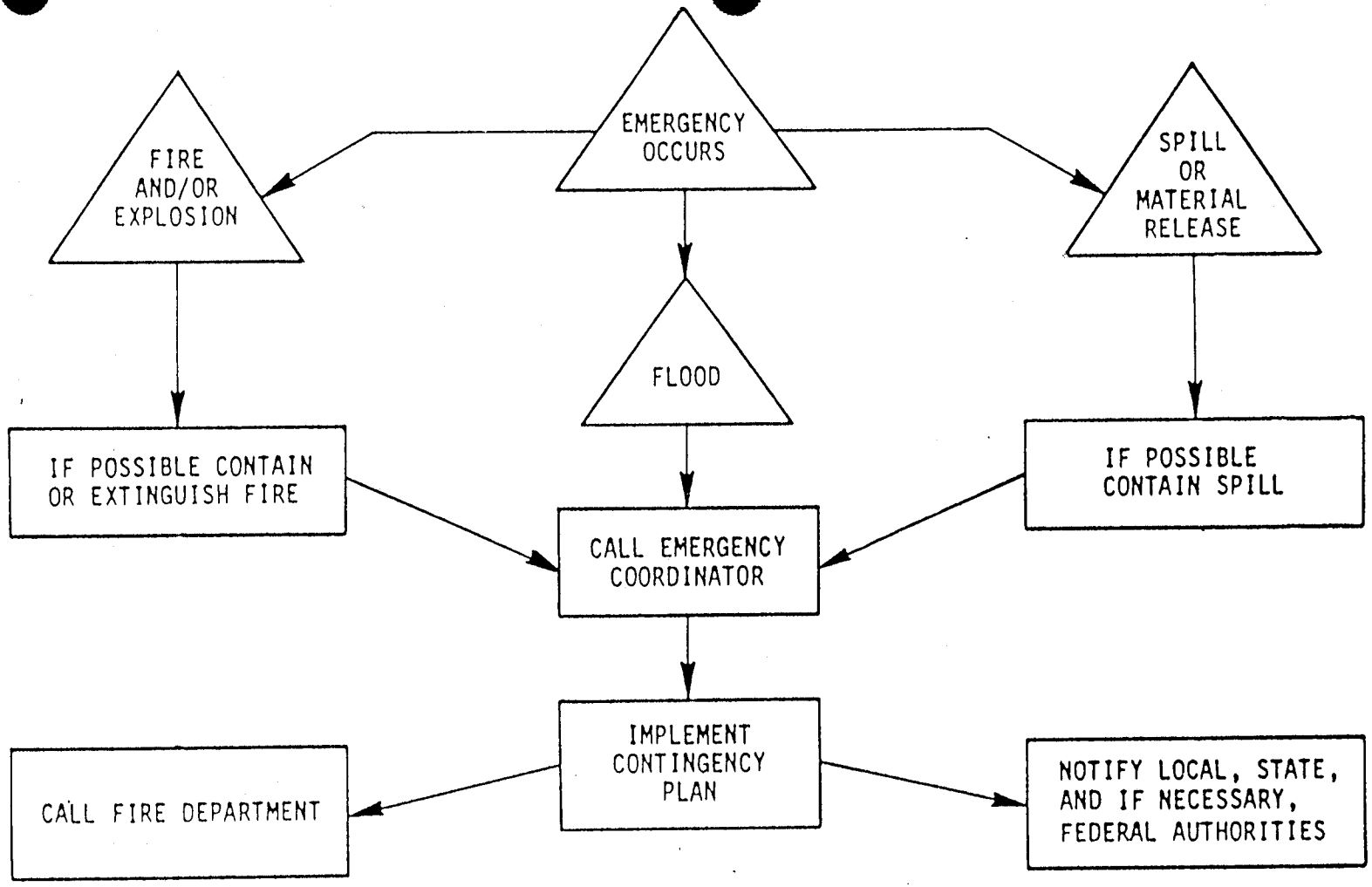
All employees hearing the alarm must close down and secure their equipment and proceed immediately along designated evacuation routes to designated assembly areas. Employees will remain in assembly areas and await further instruction.

The Emergency Coordinator will be contacted during working hours by dialing 248-2222 and after working hours by security personnel. In the event of a fire, the fire department will be contacted immediately. The Emergency Coordinator will assess the situation and notify the appropriate agencies identified in Table G-II. Figure G-1 provides an outline of the emergency plan of action.

G-4b Identification of Hazardous Wastes [40 CFR 264.56(b)]

The Emergency Coordinator will immediately identify the character, exact source, amount, and areal extent of a release. He may do this by visual observation and review of the operating records. Generally, hazardous wastes will be identified by examining the waste disposal form.

If a released hazardous waste cannot be identified by the Emergency Coordinator, a complete characterization analysis will be performed.



Overview of emergency plan of action.

SIRRINE ENVIRONMENTAL CONSULTANTS
Raleigh, North Carolina

EMERGENCY PLAN OF ACTION
GLAXO INC.,
RESEARCH TRIANGLE PARK N.C.
FIGURE G-1

DUNCAN-PARNELL, INC., CHARLOTTE 366 800-437-6073

G-4c Hazard Assessment [40 CFR 264.56(c,d)]

1) For a contingency situation, the on-site Emergency Coordinator will assess the possible hazards to the environment and human health. The Emergency Coordinator will make this assessment based on the following information:

- Type of material released, spilled, or burning.
- Location of the release, spill or fire/explosion.
- Quantity and rate of release.
- Direction in which the spill, release, or fire (smoke) is heading.
- Location of on-site personnel who might have been in the area.
- Potential for fire, explosion, or toxic fume release.
- Potential for the situation (fire, explosion) to intensify or spread.
- Potential for off-site migration.

2) The Emergency Coordinator will assess the need for evacuation of the site and notification of authorities based on the facility's capability to handle the situation. First consideration will be given to protect the health and safety of personnel. Personnel potentially affected by the occurrence will be given first aid, and immediate medical attention will be sought. If the situation appears to be controllable by use of the facility's safety equipment, the Emergency Coordinator will instruct personnel to contain the situation and minimize environmental damage. Should the Emergency Coordinator determine that the situation is too hazardous for facility personnel to handle, the appropriate agencies (Table G-II) will be immediately contacted.

3) The Emergency Coordinator will work in conjunction with local authorities to notify and evacuate off-site personnel if necessary.

4) If evacuation of the local area is required, then the Emergency Coordinator will notify either the Durham County Emergency Management Agency or the National Response Center (see Table G-II for phone numbers). These agencies will be provided with the following information:

- Name and telephone number of reporter.
- Name and address of the facility.
- Time and type of release.
- Name and quantity of material involved.
- Extent of injuries.
- Possible hazards to human health or the environment.

G-4d Control Procedures [40 CFR 264.52(a)]

Potential incidents fall under three general classifications:

- Fire and/or Explosions
- Spills or Material Releases
- Floods

1) Fire and/or Explosions

The following actions will be taken in the area affected by fire or explosion:

- The Emergency Coordinator will be contacted.

- The Bethesda Volunteer Fire Department will be notified by Security and/or the Emergency Coordinator.
- Doors in the building will be closed manually or automatically through the operation of the fire alarm system. (Note: The closing of doors will not prevent the evacuation of personnel as the doors will not be locked.)
- The Emergency Coordinator will assess whether or not the incinerator must be shut-down. If the incinerator is shut-down, the Emergency Coordinator will monitor valves, pipes, and other equipment for leaks, pressure build-up, gas generation, or rupture.
- Work in the area will cease immediately.
- The area will be cleared of all personnel. The department supervisors will be responsible for accounting for personnel.
- All injured persons will be removed, and medical treatment will be administered by qualified personnel.

Because fire is always a potential hazard when flammable materials spill, all possible sources of ignition will be eliminated. Vehicular traffic and work in the area will cease until the spill is contained and safety is restored.

The Environmental Safety Facility and Hazardous Materials Management Building can be easily reached by fire fighting and other emergency equipment. Fire fighting will not be performed at the risk of injury to the persons involved. Glaxo personnel will attempt to extinguish small fires only. The Bethesda Volunteer Fire Department will be contacted immediately if the fire cannot be contained and extinguished with portable fire extinguishers.

An "all clear" signal will be given when the fire has been extinguished and the safety of personnel is no longer endangered. All equipment used in the emergency will be cleaned and made suitable for use prior to the resumption of operation in the affected area.

2) Spills or Material Release

In the event of a major emergency involving a chemical spill, the following procedures will be used for rapid and safe response and control of the situation. Emergency contacts found in Table G-II will provide a quick reference guideline to follow in the event of a major spill.

If an employee discovers a chemical spill, or a storage area problem resulting in a material release, he or she will immediately report it to a supervisor or the Emergency Coordinator.

The supervisor will contact the designated Emergency Coordinator at the time of the incident. When contacted, the Emergency Coordinator will obtain the following information:

- The material spilled or released.
- Location of the release or spillage.
- An estimate of quantity released and/or the rate at which it is being released.
- Direction in which the spill is heading.
- The injuries involved.
- Fire and/or explosion or possibility of these events.

This information will help the Emergency Coordinator assess the magnitude and potential seriousness of the spill or release. If the accident is determined to lie within the facility's emergency response capabilities, the Emergency Coordinator will contact and deploy the necessary facility personnel. If the emergency conditions resulting from the accident are beyond facility capabilities, the Emergency Coordinator will contact the appropriate outside agencies. Table G-II lists the appropriate agencies and the corresponding telephone numbers.

Next, the Emergency Coordinator will:

- Initiate evacuation of the hazard area. For small spills or leaks, isolate at least 50 feet in all directions. For large spills, initially isolate at least 100 feet in all directions and keep all persons upwind of the spill.
- Obtain medical attention for any injured persons.
- Call the fire department if a fire is involved that cannot be extinguished by facility personnel.
- Contact the proper authorities (Table G-II) if the spill or release is large. Contact local authorities first so that, if necessary, downstream water users and/or persons downwind of the vapor can be notified and, if necessary, evacuated.

Clean-up personnel will:

- Ensure that all persons not participating in the emergency response are removed from the hazard area.
- Use protective clothing and equipment.

- If flammable wastes are involved remove all ignition sources, and use spark and explosion proof equipment and clothing in containment and clean-up.
- If possible, try to stop the leak. Special materials will be kept on hand for temporary repairs.
- Remove all surrounding materials that could be especially reactive with materials in the spill. Determine the major components in the waste at the time of the spill.
- Use absorbent pads, booms, sandbags, sand, and other inert materials to contain, divert and clean up a spill.
- If wastes escape the containment and flow to the stormwater drainage ditches, containment dams will be put in place at strategic locations to prevent the wastes from escaping from the site. When this is accomplished, corrective action will be taken to remove the contaminated water, soil, and spilled material from the area. Absorbent booms and sweeps may be used around the outfall to contain and absorb water-insoluble organics.
- Place all containment and clean-up materials in containers for proper disposal at a permitted treatment, storage or disposal facility. Some items, such as absorbent rags, or booms, may have to be cut up.
- Place all recovered liquid wastes and contaminated soil in containers for disposal at a permitted treatment, storage or disposal facility.

3) Flood - Since Glaxo is not located in a 100 year flood classification zone, this subsection is not applicable.

G-4e Prevention of Recurrence or Spread of Fires, Explosions, or Releases [40 CFR 264.56 (e)]

The actions that will be carried out to prevent the recurrence or spread of fires, explosions, or releases are discussed and referenced in the subsequent paragraphs.

1) The Emergency Coordinator will visually monitor any problems in a manner similar to the control procedures discussed in Subsection G-4d.

2) The collecting, containing, and treating of released wastes will be performed after the safety of all involved personnel is assured and the material released has been identified. See Subsection G-4d (2) for procedures and equipment that will be used to quickly and safely contain and collect the released material. The contained waste will then be appropriately sent to a permitted treatment, storage or disposal facility or incinerated on-site.

3) Collected spill material will be placed in containers and isolated from other wastes. The material will be labeled for shipment to a permitted treatment, storage or disposal facility or incinerated on-site.

4) Personnel training will be provided to employees in the proper use of all emergency abatement equipment (i.e., fire control structures and fire fighting equipment.

G-4f Storage and Treatment of Released Material [40 CFR 264.56(f,g)]

1) Glaxo will have on-site collecting equipment, collecting media and storage containers as provisions for storage of any released material.

2) See Subsection G-5 for the emergency equipment that will be available on the Glaxo site.

3) Immediately after assessing the magnitude of the emergency, the Emergency Coordinator will deploy the appropriate and necessary resources for abatement of the emergency. See Subsection G-4c (Hazard Assessment) for the procedures.

4) See Subsection G-4d for Control Procedures in the event of a fire and/or explosion or chemical spills.

5) Appropriate decontamination of reusable equipment and the affected area will be completed. Specific decontamination procedures will depend on the nature of the release. Generally, decontamination after the released material is removed will be accomplished using a combination of water, detergent solution and high pressure cleaner (steam jenny). Collected rinse waters will be handled as hazardous waste unless analyses demonstrate that the concentration of hazardous constituents is below detection limits. Additional information on decontamination procedures is contained in Section I-1e.

G-4g Incompatible Waste [40 CFR 264.56 (h)(1)]

The Emergency Coordinator will identify the character of the released material, and then will ensure that wastes which may be incompatible with the released material are not stored, treated, or disposed of in the affected areas until clean-up procedures are completed. The disposition of the released material will depend on the material's characteristics. See Subsection G-4f also.

G-4h Post-Emergency Equipment Maintenance [40 CFR 264.56 (h)(2), 264.56(i)]

After an emergency event, reusable equipment listed in Subsection G-5 will be cleaned/decontaminated so that it is suitable for future use. Equipment and supplies will be replaced, as needed.

Before operations are resumed, an inspection of all safety equipment will be conducted. The appropriate state and local authorities will be notified when the post-emergency equipment maintenance has been performed and before operations are resumed.

G-4i Container Spills and Leakage [40 CFR 264.171]

Refer to Subsection G-4d (2) for a discussion of emergency response procedures for container spills and leakage.

If a container holding hazardous waste is not in good condition or if it begins to leak, Glaxo will transfer the contents to a container in good condition.

G-4j Tank Spills and Leakage [40 CFR 264.194(c)]

If there is a leak or spill from any of the tanks in the liquid storage area of the Environmental Safety Facility, Glaxo will do the following:

1) Halt the flow into the tank and inspect the system to determine the cause of the release.

2) Remove waste from the tank.

a. As soon as practicable, the waste will be removed from the tank to prevent further release of hazardous waste to the environment and to allow for inspection and repair of the tank.

b. Material released to the secondary containment area will be removed in a timely manner.

3) Contain visible releases to the environment.

a. The Emergency Coordinator will visually inspect releases to confirm that migration of leaks or spills to soil or surface water has not occurred. Note that the potential for migration of leaks or spills is minimal as the tanks are located inside the ESF and are provided with secondary containment.

4) Notify North Carolina Hazardous Waste Section of any release to the environment greater than or equal to one pound.

a. Report a release to the environment within 24 hours of its detection to the North Carolina Hazardous Waste Section.

b. Within 30 days of detection of a release to the environment submit a report to the North Carolina Hazardous Waste Section containing the following information:

- Most probable rate of migration of the release.
- Characteristics of the surrounding soil; including soil composition, geology, hydrogeology, and climate.
- The results of monitoring or sampling.
- Proximity to downgradient drinking water, surface water, and populated area.
- Description of response actions taken or planned.

5) All necessary repairs will be made to correct inadequacies in either the tanks or secondary containment that resulted in spills or leakage to the environment.

6) All major repairs will be certified by a professional engineer before a leaking tank is returned to service. The certification will be submitted to the North Carolina Hazardous Waste Branch within seven days of the date that the tank system is returned to use.

G-4k Surface Impoundments, Spills, Leakage, and Sudden Drops [40 CFR 264.227]

Glaxo will not operate any surface impoundments at this facility; therefore, this subsection is not applicable.

G-4l Waste Pile Spills and Leakage

Glaxo will not operate any hazardous waste piles at this facility; therefore, this subsection is not applicable.

G-4m Landfill Leakage

Glaxo will not operate a hazardous waste landfill at this facility; therefore, this subsection is not applicable.

G-5 EMERGENCY EQUIPMENT [40 CFR 264.52(e)]

The location of emergency equipment in the HMMB and ESF buildings is shown on Drawings R-8279-D1 and R-8279-D2. The following list of equipment will be available in these buildings for emergency purposes.

1. Spill Control Equipment

   Table G-III lists the spill control equipment that will be housed in the HMMB and ESF buildings. In addition to the equipment specified on these lists both buildings will be constructed with appropriate spill containment capacities, as well as, emergency high speed dilution ventilation systems in areas with hazardous spill potential.

2. Fire Control Equipment

   The following fire control equipment will be built into the HMMB and ESF building.

   a. An automatic and manually initiated multiplex Fire Alarm System. This system will be supervised continuously by personnel in the Security Center.

   b. Automatic sprinkler systems for fire suppression. This system will be monitored continuously.

   c. Smoke and heat detection systems will be provided as necessary to meet or exceed fire code requirements.

Table G-III

MATERIALS AND EQUIPMENT FOR SPILL CONTAINMENT AND CLEAN-UP

Material(s) Equipment	Quantity	Substances Contained/ Absorbed/Cleaned-Up	Notes
Standard Industrial Absorbents (Sorb-All, Vermiculite, etc.)	A container should be placed in all areas where small spills are possible.	For small spills of solvents or aqueous materials. Do not use for acids or caustics unless first neutralized.	Each container should be accompanied with broom (or shovel) with dustpan.
55-Gallon Drums	A minimum of two (2) drums in HMMB and ESF	Spills or leaks	One open-top drum for solids and one liquid storage drum.
Portable Sump Pump and Flexible Neoprene Hoses	One in HMMB One in ESF	Liquid spills accumulated in in contaminated areas.	Neoprene is resistant to most acids and solvents.
Overpack Drums	One in HMMB One in ESF	Leaking 55-gallon drum	Steel drums are compatible with solvent wastes.
SCBA Equipment	One in HMMB One in ESF	N/A	-------
Full Face Respirators	One in HMMB One in ESF	N/A	With combined organic vapor, acid gas, and radioactive material cartridges.
Protective Clothing	Two sets in HMMB Two sets in ESF	N/A	Includes Tyvek suits, Nitrile gloves and neoprene boots.
Mop, Bucket, Soap	One set in HMMB One set in ESF	Residues remaining after removal of spilled materials	------

In addition to these fire control systems, portable fire extinguishers will be provided. The types, sizes, and locations of extinguishers will be selected in accordance with National Fire Protection Association standards.

3. Personal Protective Equipment

The following personal protection, decontamination, and first-aid equipment will be housed in appropriate locations in both the HMMB and ESF building. First-aid kit contents and locations will be in accordance with OSHA requirements.

- Coveralls
- Chemical-resistant clothing (i.e., tyvek)
- Nitrile gloves
- Neoprene boots
- Full-face respirators with combined organic vapor, acid gas, and radioactive material cartridges
- Safety glasses
- Emergency eye wash station and safety shower
- First-aid kit

4. Emergency Communication Systems

Both the HMMB and the ESF buildings shall be equipped with external and internal, telephone systems.

G-6 COORDINATION AGREEMENTS [40 CFR 264.37, 264.52(c), 264.53(b)]

The following local organizations have been sent copies of the contingency plan.

- Durham County Fire Marshall
- Bethesda Volunteer Fire Department
- North Carolina Highway Patrol
- Durham County Sheriff's Department
- Duke University Hospital
- Durham County General Hospital
- Durham County Emergency Management Agency

Copies of the transmittal letters relaying the above information are located in Appendix D. In these letters dated December 11, 1989, the organizations were requested to advise Glaxo if they will not be able to respond in the event of an emergency. None of the organizations have indicated that they will not be able to provide the appropriate type of emergency response.

G-7 EVACUATION PLAN [40 CFR 264.52(F)]

All emergencies require prompt and deliberate action. In the event of any major emergency, it will be necessary to follow an established set of procedures. However, in specific emergency situations, the Emergency Coordinator may deviate from the procedures to bring the situation under control more effectively. The Emergency Coordinator is responsible for determining which emergency situations require evacuation of the HMMB and ESF buildings.

Although personnel access to all areas in the HMMB and ESF is controlled, all areas of these buildings are accessible to authorized Glaxo personnel.

All persons located in the HMMB and ESF buildings will evacuate under the following conditions:

- A fire is beyond the capabilities of plant personnel;
- A fire involves waste such that toxic fumes are being emitted; or
- A person hears the emergency alarm.

The HMMB building will have three exits, while the ESF building will have five. In the event of an emergency in the HMMB building, the primary evacuation route will be through the exit near product storage Room 1196. If evacuation through this exit is prohibited due to the nature of the emergency, the exit between the Radioisotope Lab and the Acid Waste storage room will serve as an alternate route. The primary evacuation routes for the ESF building will be the exit near the incinerator and the exit in the loading dock area. The connectors to Buildings 6 and 9 and the exit from the liquid waste storage room will serve as alternate escape routes. As part of the initial training program, employees will be given information on emergency evacuation procedures. Employees will also be exposed to the evacuation signal as part of this initial training.

EVACUATION PLAN [40 CFR 264.52(F)] (Continued)

Two signals are used concurrently to begin evacuation: (1) a 95 dBa continuous sounding horn, and (2) a flashing white strobe light. These signal devices are located throughout the HMMB and the ESF as well as the adjoining structures.

G-8 REQUIRED REPORTS [40 CFR 264.56(j)]

As required by Section 264.56(j), any emergency event (i.e., fire, explosion, etc.) that requires implementing the contingency plan will be reported in writing within 15 days to the Head of the North Carolina Hazardous Waste Section (Regional Administrator). A reporting form for emergencies is shown in Figure G-2. Copies of all reports will be maintained in the facility operating record.

Amendments to the Contingency Plan:

The contingency plan will be reviewed and immediately amended, if necessary, whenever:

1. The facility permit is revised.

2. After an emergency event, opportunities for improving the plan are identified through review of the plan's effectiveness.

3. The facility changes in its design, construction, operation, maintenance, or other circumstances in a way that materially increases the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or changes in the response necessary in an emergency.

4. The list of Emergency Coordinators changes.

5. The list of emergency equipment changes.

FIGURE G-2

REPORTING FORM FOR EMERGENCY EVENTS

_____

Name, address, and phone number of owner or operator

_____

Name, address, and phone number of facility

_____

Date, time and type of incident (e.g., fire, explosion, etc.)

_____

Name and quantity of material(s) involved

_____

Extent of injuries (if any)

_____

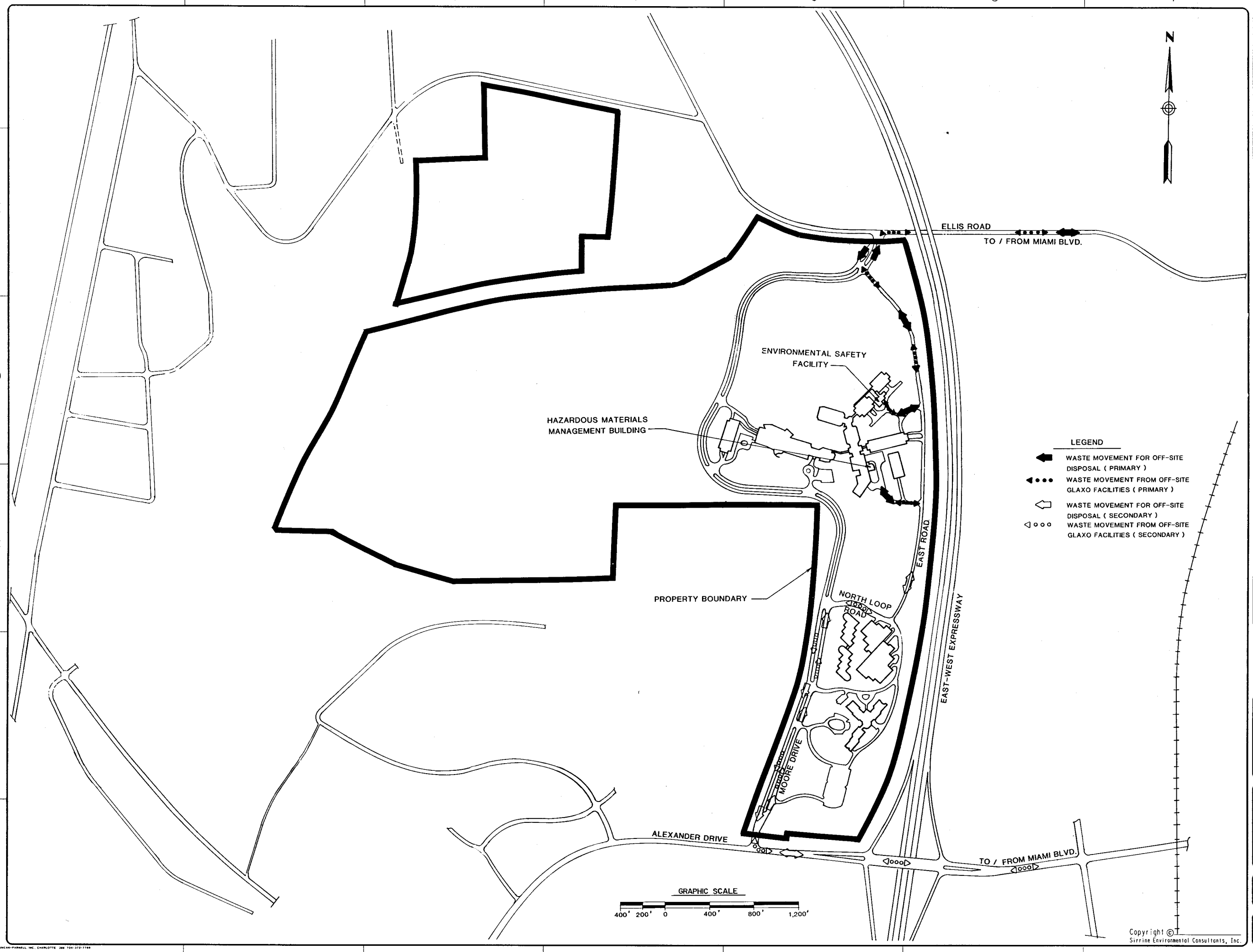
Assessment of actual or potential hazards to human health or the environment (if applicable)

_____

Estimated quantity and disposition of material recovered from the incident

_____

Send to: Hazardous Waste Section
NC Department of Environment, Health and Natural Resources
P.O. Box 27687
Raleigh, NC 27611-7687



NOTES

REV. NO.	CODE / CIRCLES / REV. BY	DATE	DESCRIPTION	SEC APPROVED
0	G / RWM		ISSUED FOR RCRA PERMIT APPLICATION	

NOTE: CIRCLE ALL REVISIONS, IDENTIFY WITH DIAMOND, NUMBER AND ARROW. REMOVE ONLY CIRCLE AND ARROW BEFORE NEXT REVISION.

ISSUE CODE					
A	PRELIMINARY	C	MAT'L T.O.	F	CONST'N
B	DESIGN	D	MAT'L PURC.	G	PERMIT
		E	BIDS	H	

SEAL

SIGNATURE

DATE

DR.	MC	DATE	
DSGN.	RWM	SEC FILE NUMBER	
CK.	JTB		
DPE		JOB NO.	R-8279
CAD FILE NO.			

SIRRINE ENVIRONMENTAL CONSULTANTS
Raleigh, North Carolina

GLAXO INC.,
RESEARCH TRIANGLE PARK
NORTH CAROLINA

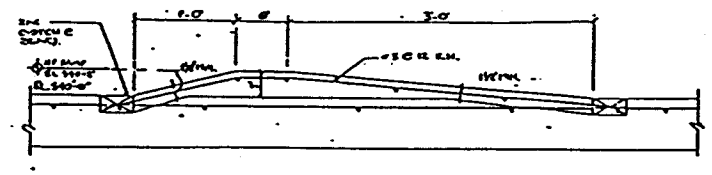
DRAWING TITLE

TRAFFIC FLOW DIAGRAM

CLIENT DRAWING NUMBER

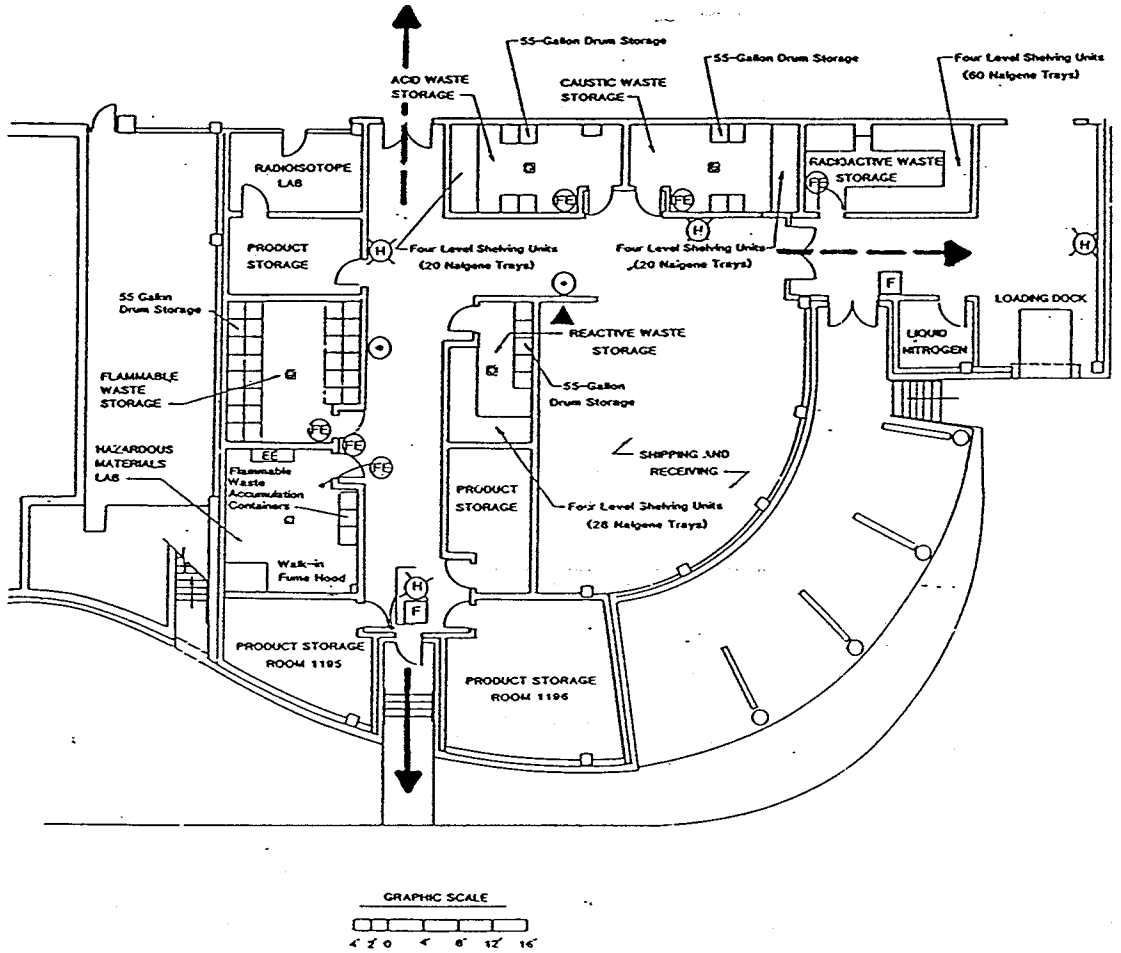
SEC DRAWING NUMBER
R-8279-B7

DUNCAN-PARNELL, INC. CHARLOTTE 369 704-372-7749



TYPICAL RAMP DETAIL AT STORAGE ROOM DOORWAYS

SCALE 1/8" = 1'-0"



GRAPHIC SCALE

4' 2' 0 4' 8' 12' 16'

EVACUATION ROUTES:

PRIMARY

SECONDARY

LEGEND

- FE — FIRE EXTINGUISHER
- F — FIRE ALARM MANUAL PULL STATION
- H — COMBINED FIRE ALARM HORN AND FLASHING STROBE INDICATOR
- EE — EMERGENCY EQUIPMENT PER TABLE G-II
- SAFETY SHOWER
- TELEPHONE
- FLOOR DRAIN TO CONTAINMENT SYSTEM

NOTES

1. ALL FIRE EXTINGUISHERS TO BE ABC-TYPE PER FACTORY MUTUAL, LOCATED AS SHOWN ON DRAWING.
2. ALL HAZARDOUS WASTE STORAGE AREAS TO BE PROTECTED BY WET-PIPE SPRINKLER SYSTEMS IN ACCORDANCE WITH NFPA 13, INSTALLATION OF SPRINKLER SYSTEMS, AS MODIFIED BY IRI (INSURANCE UNDERWRITER).
3. ALL CONCRETE FLOOR AND WALL AREAS TO HAVE A CHEMICAL RESISTANT AND WATERPROOF LINER INSTALLED.
   ALL CONCRETE MASONRY UNITS TO BE COATED WITH CHEMICAL RESISTANT EPOXY COATING.
   FLOORS IN HAZARDOUS WASTE STORAGE AREAS TO HAVE A SEAMLESS EPOXY COMPOSITION FLOORING SYSTEM WITH 4" HIGH INTEGRAL COVED BASE.
4. THE BASE WILL BE FREE OF CRACKS AND GAPS, SUFFICIENTLY IMPERVIOUS TO THE WASTE BEING STORED AND STRUCTURALLY SOUND.
5. ALL DOORS TO HAZARDOUS WASTE STORAGE AREAS SHALL HAVE A FIRE RESISTANCE RATING OF 1 HOUR.
6. ALL HAZARDOUS WASTE STORAGE ROOMS WILL BE EQUIPPED WITH EMERGENCY HIGH SPEED ROOM DILUTION VENTILATION SYSTEMS.
7. HAZARDOUS WASTE STORAGE AREAS WILL BE PROVIDED WITH EXPLOSION-PROOF LIGHTING FIXTURES AND POWER OUTLETS. GROUNDING FACILITIES FOR PREVENTION OF STATIC CHARGE BUILD-UP WILL BE PROVIDED.
8. REFERENCE: TKLP DRAWING NO. 1A.

REV. NO.	CODE	CIRCLES	DATE	DESCRIPTION
0	G	12		ISSUED FOR RCRA
		12		PART B APPLICATION
	RWM	90		

NOTE: [illegible]

ISSUE CODE					
A	PRELIMINARY	D	NAT'L T.O.	F	CONST'N
B	DESIGN	E	NAT'L PURC.	G	PERMIT
				H	

SEAL

SIGNATURE

DATE

DR.	MC	DATE	12/6/90
DSGN.	RWM	SEC FILE NUMBER	
CK.	JTB		
DPC		JOB NO.	R-8279
CAD FILE NO.			

SIRRINE ENVIRONMENTAL CONSULTANTS

Raleigh, North Carolina

GLAXO, INC.
RESEARCH TRIANGLE PARK
NORTH CAROLINA

DRAWING TITLE

HMMB EVACUATION PLAN

CLIENT DRAWING NUMBER

SEC DRAWING NUMBER

R-8279-G1

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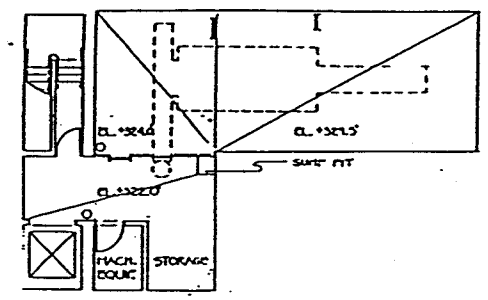

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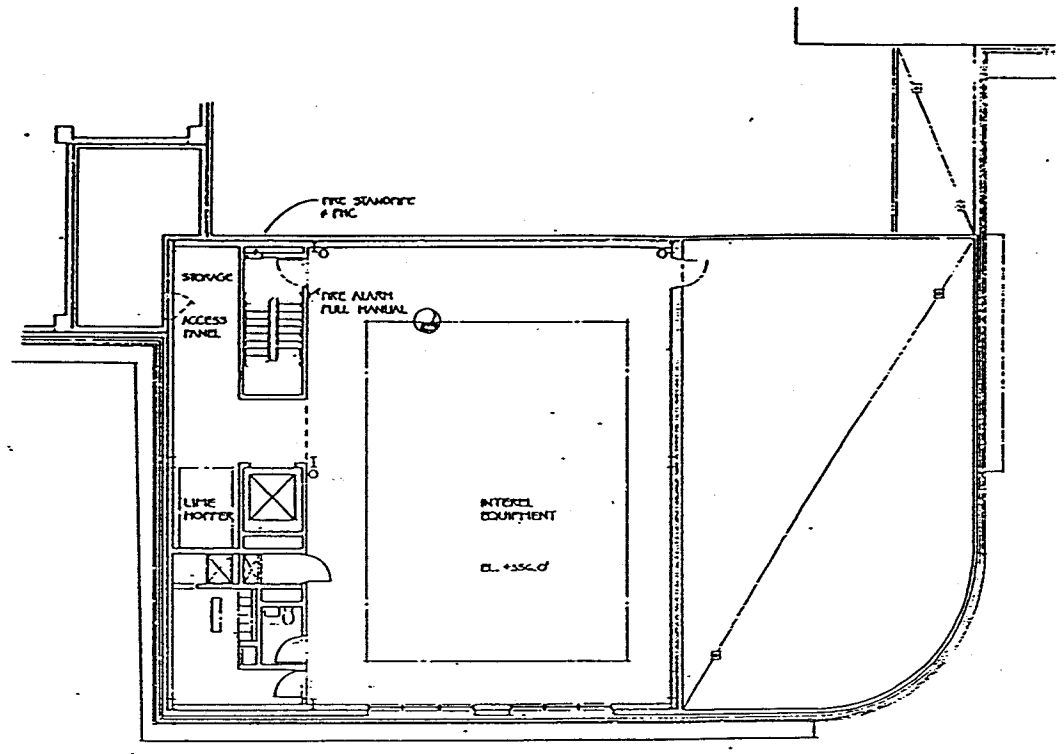
LEVEL 0



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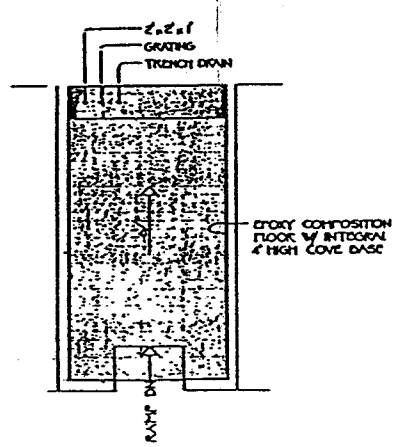
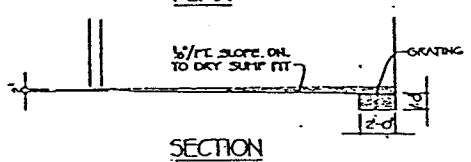
LEVEL 2



PLAN



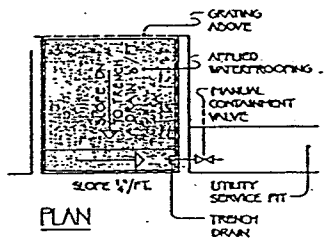
SECTION

SCINTILLATION VIALS
1/4"=1'-0"

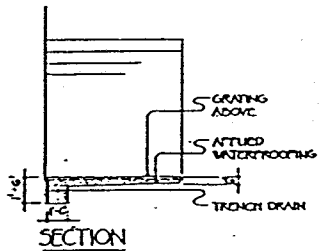
EVACUATION ROUTES:

PRIMARY →

SECONDARY - - →

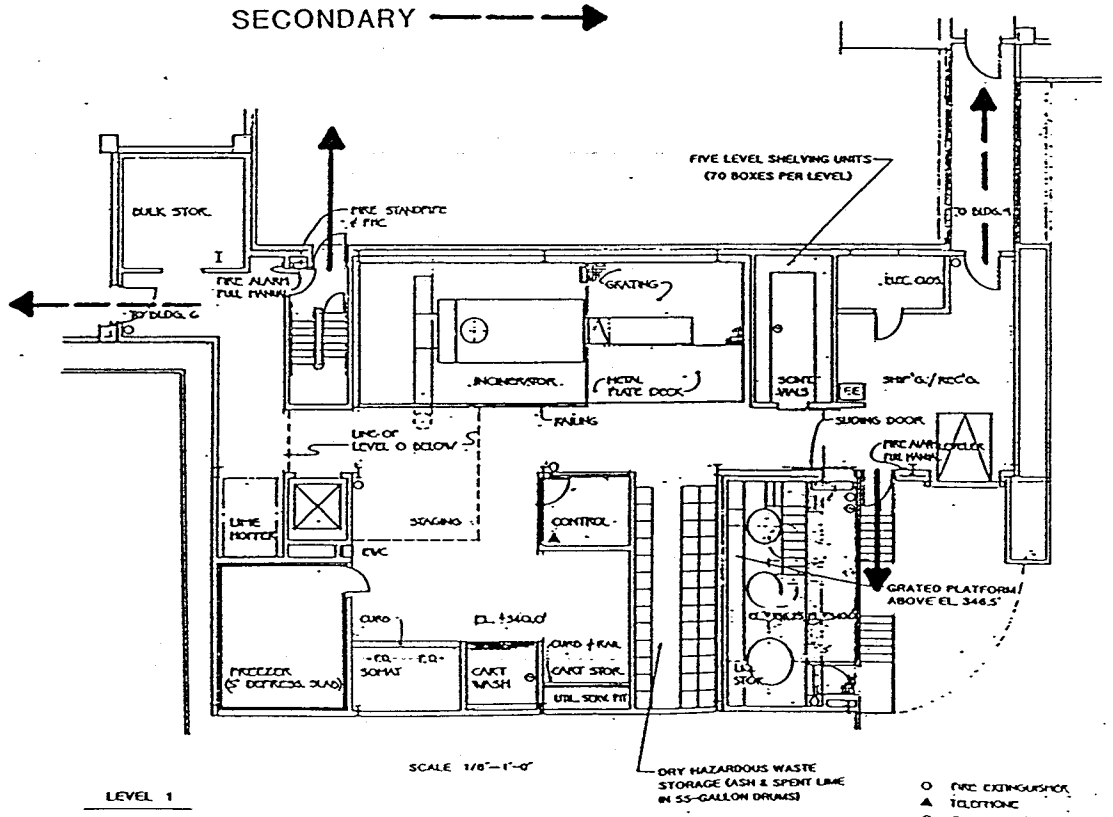


PLAN



SECTION

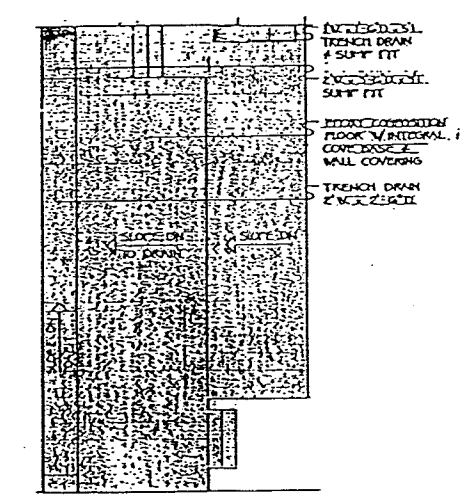
CART WASH
1/4"=1'-0"



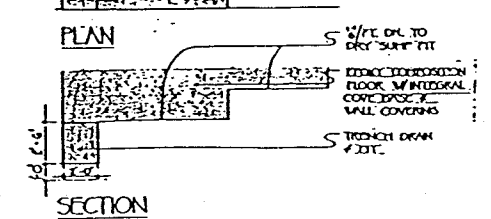
SCALE 1/8"=1'-0"

LEVEL 1

- FIRE EXTINGUISHER
- TELEPHONE
- EMERGENCY SHOWER & EYEWASH
- EE MATERIAL & EQUIPMENT FOR SPILL CONTAINMENT & CLEAN UP PER TABLE G-III



PLAN



SECTION

LIQUID STORAGE
1/4"=1'-0"

NOTES

1. DRAWING ORIGINALLY PREPARED BY THE KLING-LINDQUIST PARTNERSHIP, INC. (REFERENCE: TRLP DRAWING NO. FD-1).
2. ALL CONCRETE FLOOR AND WALL AREAS TO HAVE A CHEMICAL RESISTANT AND WATERPROOF LINER INSTALLED. ALL CONCRETE MASONRY UNITS TO BE COATED WITH A CHEMICAL RESISTANT EPOXY COATING. FLOORS IN HAZARDOUS WASTE STORAGE AREAS TO HAVE A SEAMLESS EPOXY COMPOSITION FLOORING SYSTEM WITH 4" HIGH INTEGRAL COVED BASE.
3. THE BASE WILL BE FREE OF CRACKS AND GAPS, SUFFICIENTLY IMPERVIOUS TO THE WASTE BEING STORED AND STRUCTURALLY SOUND.
4. HAZARDOUS WASTE STORAGE AREAS WILL BE PROVIDED WITH EXPLOSION-PROOF LIGHTING FIXTURES AND POWER OUTLETS. GROUNDING FACILITIES FOR PREVENTION OF STATIC CHARGE BUILD-UP WILL BE PROVIDED.

REV. NO.	CODE	DATE	DESCRIPTION
0	C	12	ISSUED FOR RCRA
		12	PART B APPLICATION

ISSUE CODE: A PRELIMINARY, B DESIGN, C MAT'L T.O., D MAT'L PURC., E SITOS, F CONST'N, G PERMIT

SEAL

SIGNATURE

DATE

DR. / DSGN. / CK. / DPC — DATE 12/06/90

CAD FILE NO. — SEC FILE NUMBER — JOB NO. R-8279

SIRRINE ENVIRONMENTAL CONSULTANTS
Raleigh, North Carolina

GLAXO, INC.
RESEARCH TRIANGLE PARK
NORTH CAROLINA

DRAWING TITLE
ESF EVACUATION PLAN

CLIENT DRAWING NUMBER

SEC DRAWING NUMBER
R-8279-G2

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H - Personnel Training

SECTION H

PERSONNEL TRAINING

This section details the Glaxo personnel training program as required by 40 CFR 270.14(b)(12), 40 CFR 264.16, and 29 CFR 1910.120(p).

H-1 OUTLINE OF THE TRAINING PROGRAM [40 CFR 270.14(b)(12)]

(1) INTRODUCTION

The purpose of this section is to present the introductory and continuing training programs that prepare employees to operate and maintain the Glaxo facility in a safe manner and that ensure compliance with the requirements of the North Carolina Hazardous Waste Management Regulations. In all cases, introductory and specific job training will be completed within six months of the hiring date, or transfer date if the employee is being assigned to a new position. On-the-job training will be used as part of this comprehensive program. Employees will not be allowed to work in unsupervised positions until they have completed the appropriate training program. Annually, the Hazardous Waste Manager will review the personnel training program with employees to determine its effectiveness and/or weaknesses.

As required by 29 CFR 1910.120(p), forty (40) hours of classroom instruction and three (3) days of supervised instruction will be provided to each employee before they are permitted to participate in hazardous waste or emergency response operations. All trained personnel will participate in an annual eight (8) hour refresher course.

(2) THE GLAXO TRAINING PROGRAM STRUCTURE

The Glaxo personnel training program is designed to give employees a basic understanding of facility operations, safety rules, and emergency procedures. In addition, the program includes detailed training in the specific area in which the person will be working, and the rules and procedures unique to that area. This program structure allows Glaxo employees to be efficiently and properly

trained in the procedures, equipment, and systems used in managing hazardous waste at the facility.

Prior to formal training in the specific area in which the employee will be working, all employees are required to complete an Employee Safety Orientation Program. The goal of this orientation is to give new employees an awareness and general overview of the safety rules and guidelines applicable to the Glaxo facility. It also gives the employees hands-on training in the location and proper use of emergency safety equipment and personal protective equipment. Finally, the orientation presents the procedures that need to be followed in the event of an emergency. This entails a working understanding of the facility Contingency Plan and Evacuation Plan.

There are four major job classification areas for Glaxo personnel involved with hazardous waste management. These are operations personnel, transportation/ staging personnel, management personnel, and office personnel. After the Employee Safety Orientation Program has been completed, specific introductory training will be completed for one or more of the four major job classification areas. Each new or transferred employee must complete the appropriate program which corresponds to that employee's classification.

The four introductory programs generally cover the same areas of hazardous waste management and emergency procedures. The differences between the programs are in the emphasis and detail which is placed on certain sections. Operations, transportation/staging, and management personnel are trained in three general areas: (1) Waste Handling Safety, (2) Hazardous Waste Management, and (3) Emergency Procedures Implementation. Office personnel are trained in Hazardous Waste Management and Emergency Procedures

Implementation. The four introductory programs, though containing similar information, are tailored to the job duties that the employees will be performing.

When an employee completes an introductory program, the appropriate training record is completed and added to the employee's personnel file. Employee's will also receive a certificate noting completion of training as required by 29 CFR 1910.120(p).

The discussion below highlights the Employee Safety Orientation Program for all new employees, and then presents separate discussions on the four specific introductory programs and the contents of each one.

(3) EMPLOYEE SAFETY ORIENTATION PROGRAM

All new personnel are given an "Employee Safety Orientation" brochure and a Glaxo Safety Manual. These handouts are designed to give new employees an awareness and general overview of the safety rules and guidelines applicable to the Glaxo facility. During this orientation phase the Hazardous Waste Manager will review with new employees the items covered in the Glaxo Safety Manual and will answer any questions they may have concerning facility safety. Also, the training includes details about Glaxo's safety organization and the procedures outlined in the safety manual.

The Employee Safety Orientation Program is presented in three parts: (1) Basic Facility Information, (2) Basic Safety Training, and (3) Emergency Procedures. Every new employee must complete all three parts before proper documentation is added to the employee's personnel file. Upon completion of the program, an employee begins training in the introductory program which represents the

employee's job classification (e.g. Operations, Transportation/Staging, Management or Office).

The basic facility information portion of the program informs new employees of the general layout of the facility. This includes the location of all hazardous waste management areas as well as the location of the various facility buildings. In addition, this portion of the program reviews the rules and procedures of the Glaxo Safety Manual, a copy of which all new employees receive. As is the case during all portions of the Glaxo personnel training program, employees are encouraged to ask questions and to comment on any aspect of facility operations.

The basic safety training section of the orientation program includes presentations in emergency safety equipment, personal protective equipment, and fire prevention. Equipment training involves instructions in the location and use of fire extinguishers, eye wash stations, and safety shower stations. This instruction includes hands-on training where appropriate. To avoid accidents and injuries to the individual, all employees are trained in the location and use of personal protective equipment, and the locations in the facility where this equipment must be worn. Finally, this portion includes training in basic fire prevention safety. Employees are trained in the importance of observing "NO SMOKING" signs, of maintaining good housekeeping in all work areas, of knowing where fire exits are located, and of knowing the location and use of the telephone, intercom, and alarm systems.

The final portion of the Employee Safety Orientation Program is the training in emergency procedures. All employees are instructed in the implementation of the Contingency and Evacuation Plans, which includes the role that employees play during an emergency, and the strict procedures that must be followed to

avoid compounding the situation. Finally, employees are instructed in the procedures to be followed in the event of an accident or injury. First-aid station locations throughout the facility are identified. Employees are instructed to immediately notify their supervisor of all accidents and injuries, no matter how insignificant they may seem.

(4) OPERATIONS PERSONNEL

The training program for the operations personnel involves four general areas of training: (1) Employee Safety Orientation, (2) Waste Handling Safety, (3) Hazardous Waste Management, and (4) Emergency Procedures Implementation.

The employee safety orientation as discussed above is a general introduction to all new employees. Personnel safety is of utmost importance at the Glaxo facility, and it is the goal of the orientation program, as well as the entire training program, to instill that understanding in Glaxo employees.

The waste handling safety training familiarizes the trainees with the hazardous properties of the waste that the facility is handling. This is an awareness program to make employees understand and respect the characteristics of the material for which they will be responsible. This training covers the effects of exposure on human health, and the first aid and antidotes for such effects. The presentation begins with an introduction which includes the general nomenclature and classification of chemicals and distinctions between various chemical categories (acids, bases, etc.). This section also includes the presentation of procedures to be used in the handling and segregation of materials.

Operations personnel training in hazardous waste management includes presentations on operating procedures, container management, labelling, containment of spills, and interplant shipping documentation. This training involves both on-the-job and classroom instruction. General drum storage and log use procedures are taught so that employees are aware of proper storage and handling procedures and are able to spot any potential problems. Finally, spill containment procedures are presented and demonstrated for various types of chemicals.

The final major area of operational training involves the implementation of emergency response procedures. This training concentrates on emergency and monitoring equipment and the use, inspection, repair, and replacement of such equipment. Part of this training includes the proper implementation of the Contingency Plan. This involves response to fires and explosions and the use and location of the communication and alarm systems. If necessary under the Contingency Plan, cut-off systems are activated. Where applicable, employees are trained in the location and operation of all cut-off valves and controls and the procedures for the total shutdown of operations. Finally, trainees are briefed on responses to groundwater contamination incidents.

(5) TRANSPORTATION/STAGING PERSONNEL

The training program for transportation/staging personnel includes four areas of training: (1) Employee Safety Orientation, (2) Waste Handling Safety, (3) Hazardous Waste Management, and (4) Emergency Procedure Implementation.

The employee safety orientation is the same for all personnel. Variations in safety rules procedures for the particular group being trained is highlighted during the appropriate introductory program. As in all Glaxo training programs, questions and comments are encouraged throughout the sessions.

Waste handling safety training for transportation/staging personnel emphasizes the safety aspects of transporting hazardous waste. This includes the types of chemicals handled, the packaging requirements, and the segregation of materials during transportation.

Hazardous waste management training for transportation/staging personnel involves learning procedures for proper labelling, spill containment, and shipment documentation. Spill containment training includes the appropriate response actions and notification requirements that must be taken for spills occurring either during transportation or loading/unloading (staging). Such personnel are trained to inspect transportation vehicles and containers to recognize situations that require prompt attention. An important aspect of the operation is the paperwork requirement, which entails an understanding of both transfer documentation and labelling. In addition, intraplant transportation personnel are trained to recognize various types of identification labels and the proper completion of hazardous waste labels.

Finally, as with the operations personnel, intraplant transportation/staging personnel are trained in the implementation of emergency response procedures. Where applicable, this includes the inspection, repair, and replacement of emergency and monitoring equipment. Such personnel review all aspects of the Contingency Plan and, in particular, are trained in the operation and location of cut-off valves and controls in the loading/unloading areas. This training also

involves the use and location of the communication and alarm systems, and the procedures to be followed in implementing these systems. Finally, transportation personnel are trained to respond to fires or explosions and to recognize situations which may require the implementation of facility shutdown procedures.

(6) MANAGEMENT PERSONNEL

The management personnel training program is designed to educate all management level employees on hazardous wastes specific to the Glaxo facility. The program includes: (1) Employee Safety Orientation, (2) Waste Handling Safety, (3) Hazardous Waste Management, and (4) Emergency Procedures Implementation. Within this structure, management personnel become familiar with the operation and implementation of all the plans required under the hazardous waste regulations, as well as general site operations. These plans include the Waste Analysis Plan, Contingency Plan, Closure Plan, and Inspection Procedures. The discussion below explains the management training program in terms of these various plans.

The Waste Analysis Plan is that section of the operating records that contains procedures for the testing and monitoring of hazardous waste. Management trainees are given a detailed presentation of the Waste Analysis Plan including: the analytical methods used, visual inspection procedures, and the waste analysis parameters. Finally, trainees are made familiar with all the reports and records required under the plan.

Inspection procedures ensure that the facility is being operated properly, and that the mechanical systems are performing at their intended standards. Management employees must be kept informed of the operating efficiency of

the facility. To sufficiently understand whether the facility is operating at its potential, it is important that management realize how such an analysis is made. The inspection schedules and associated inspection logs aid in this overall determination; therefore, it is imperative that all management trainees be trained in the details of the site inspection procedures.

The Contingency Plan provides the procedures to be used in the event of a facility emergency. Given the nature of this plan, it is of prime importance that all management trainees be thoroughly versed in emergency procedures. Management is often the initial coordinating force during an emergency, and in all cases a member of management is designated as the Emergency Coordinator. The Emergency Coordinator is responsible for delegating the response duties and committing resources for any facility emergency, and thus must be thoroughly familiar with the Contingency Plan. Therefore, an important part of the training program is the understanding of this plan so that it can be implemented quickly and efficiently by all management personnel. In addition, since management personnel are designated as Emergency Coordinators, the trainees are taught the duties and requirements of the Emergency Coordinator.

The Closure Plan presents the waste removal procedures to be used at the close of the facility's intended operating life. Though the initial management personnel may not be involved in the facility's ultimate closure, it is important that all management personnel be adequately aware and prepared to begin the plan's implementation procedures. This is necessary so that the Closure Plan can be implemented at any point in the life of the facility, and it is for this reason that the plan has been incorporated into the management personnel introductory training program.

(7) OFFICE PERSONNEL

The program for office personnel is a three (3) part program which trains office personnel in procedures related to clerical work and site operations: (1) Employee Safety Orientation, (2) Hazardous Waste Management, and (3) Emergency Procedures Implementation.

As with all new personnel, office personnel participate in the employee safety orientation. This information gives office personnel an understanding of the important role safety plays in the activities of facility personnel. Hazardous waste management training for office personnel emphasizes the regulatory paperwork requirements and the forms which must be filed on a routine basis.

Also, office personnel are thoroughly trained in emergency procedures implementation which includes instruction in the response and communication procedures for alerting local doctors and hospitals of accidents requiring medical attention. This training is necessary because the administrative personnel are at the center of facility activity during emergency response and therefore the office personnel must be able to adequately respond to and coordinate emergency procedures through the Emergency Coordinator. The training includes an understanding of the Contingency Plan and, specifically, the location and operation of the communication and alarm systems.

(8) CONTINUATION OF TRAINING

A continuing training program is an integral part of the company training process. Glaxo will provide an eight (8) hour annual retraining session for its hazardous waste employees. An initial introductory program presents to new

or transferred employees the rules and procedures used at the facility at that particular point in time. Operating, emergency, and safety procedures are constantly changing due to new regulatory requirements, shifting operational emphasis, and improved and more efficient operating techniques. Therefore, it is an essential responsibility of Glaxo management to continually train its employees, as the need arises, in areas that affect the operation of the facility. Written documentation of such training is added to an employee's file upon its completion. In addition, the Hazardous Waste Manager annually reviews the training program and meets with employees in order to make improvements in the entire process.

H-1a Job Titles and Duties

This section details the job title, duties, and job description for all employees associated with hazardous waste management, as required by 40 CFR 264.16(d)(1) and (2).

I. Director, Safety and Environmental Affairs

General Function

The Director of Environmental Safety is responsible for directing the overall management and operations of environmental activities at Glaxo facilities. The basic objective of this position is to identify and coordinate environmental activities and direct responsibilities of the environmental management staff to ensure regulatory compliance and maximize environmental safety. The Director of Environmental Safety serves as the second alternate Emergency Coordinator.

Character and Nature of the Position

The nature of this position requires the incumbent to have exceptional communications and management skills. The Director of Safety and Environmental Affairs decides the direction and emphasis of the Safety and Environmental Affairs Program including waste handling and disposal. The effectiveness of the program and the company's compliance with federal, state, and local regulations are part of the responsibilities of the Director of Safety and Environmental Affairs.

This position requires an extensive background in the areas of safety and environmental protection. A degree or combination of degrees in engineering, business administration, chemistry or a related discipline with a minimum of five (5) years of technical training and experience in the areas of safety and environmental protection, plus a minimum of five (5) years supervisory and management experience is required for this position. The incumbent must possess good oral and written communication skills and excellent "people-oriented" skills. Leadership, organization of employees and interaction with regulatory agencies as well as company executives are important functions of the Director of Safety and Environmental Affairs.

Principal Duties

1. Performance of programs to protect the company and community from hazardous environmental emissions during the company's overall operations.

2. Plans and schedules goals and duties for the Manager of Environmental Safety.

3. Follows legislation concerning environmental matters to ensure the company is prepared to meet new regulations as they are promulgated.

4. Interacts with company executives on matters of safety and environmental protection.

II. Manager of Environmental Safety

General Function

Under the general direction of the Director of Safety and Environmental Affairs, this individual plans and directs programs designed to protect Glaxo and the general public and community from hazardous environmental emissions during the Company's everyday operation. These programs may include air emission control, radiation safety, waste disposal, and groundwater monitoring. The Manager of Environmental Safety has responsibility for developing, coordinating, and administering appropriate programs assuring compliance with federal, state, and local regulations, including training. The Manager of Environmental Safety serves as the first alternate Emergency Coordinator.

Character and Nature of the Position

The critical nature of this position requires the incumbent to be responsive to complex conditions subject to rapid change.

The Manager of Environmental Safety is responsible for planning and directing programs and activities to protect employees from injury and health hazards, to protect plant property, to control air emissions and the storage and treatment of wastes. The incumbent ensures compliance with local, state, and federal laws and regulations governing environmental matters, obtains all necessary permits and licenses, and coordinates all contacts with regulatory agencies.

This position requires a high level of technical and specialized competence in all areas of environmental control and a thorough knowledge of applicable local, state, and federal codes, standards, and regulations. Additionally, the incumbent must be knowledgeable of a wide scope of processes, equipment, and materials in order to assess the impact on the

environment and employee safety and health. A degree in engineering, chemistry, or related discipline is required plus a minimum of five (5) years experience in one or more of the areas of specialized knowledge.

The individual must have good oral and written communications skills since much of the work involves extensive recordkeeping and personal contacts with internal management and governmental agencies.

Principal Duties

1. Plans and directs the environmental control program which may include air emissions, wastewater discharge, chemical control, radiation safety, solid waste disposal, and groundwater monitoring.

2. Ensures adequate emergency personnel, equipment, and training in order to comply with all governmental safety and training requirements as they relate to hazardous materials and evacuation plans.

3. Participates in review of all explosions, fires, spills, and leaks relating to hazardous materials and assures that adequate corrective action is taken and all necessary reports are filed.

4. Keeps abreast of changing governmental regulations and changes in processes or new projects affecting environmental control. Initiates or recommends appropriate action.

5. Processes and maintains regulatory permits, licenses, and plans and handles or coordinates all contacts with representatives of governmental agencies.

6. Coordinates local contacts with appropriate staff on environmental matters.

7. Has primary responsibility to ensure that all reports, records, and correspondence are accurate and are handled in a timely and efficient manner.

III. Hazardous Waste Manager

General Function

The Hazardous Waste Manager is responsible for the initiation of programs designated or determined necessary from the Manager of Environmental Safety to ensure safe operations of the waste treatment facility. The incumbent shall also oversee daily activities to ensure compliance with permit and regulatory requirements pertaining to the operations of the hazardous waste treatment unit. The Hazardous Waste Manager serves as the primary Emergency Coordinator.

Character and Nature of the Position

The Hazardous Waste Manager will be responsible for tracking federal, state and local regulations concerning the management of hazardous wastes. This activity will be coordinated with the Manager of Environmental Safety to ensure appropriate changes to waste management procedures per changes to the regulations.

This position will require the incumbent to work on a daily basis with technicians, operators, etc. in an effort to minimize environment risk relative to the management of hazardous waste.

The incumbent must have good organizational skills and good communication skills. This position requires a bachelor of science degree in chemistry, engineering, environmental science or a related field and a minimum of five (5) years experience in one or more of the areas of specialized knowledge.

Principal Duties

1. Evaluate daily operations for regulatory compliance.

2. Interface with regulatory agencies

3. Interface with chemist and operational personnel.

4. Initiate and evaluate safety procedures.

5. Maintain technical understanding of Federal, State and local regulations applicable to hazardous waste treatment.

6. Maintain knowledge concerning analysis and computations on test data for waste characterization activities.

7. Implement programs designed to characterize waste for treatability.

8. Implement proper Quality Assurance/Quality Control programs as necessary.

9. Provide hazardous materials training to Environmental Safety Department personnel, research personnel, and other support personnel (i.e. maintenance) who may be associated with the hazardous waste management activities.

IV. Environmental Safety Technician

General Function

Under the Hazardous Waste Manager the Environmental Safety Technician conducts daily on-site activities associated with laboratory waste management. This position serves as the daily representative of the Environmental Safety Department in the research laboratories and as such the duties assigned to this position are expected to ensure compliance with federal, state, local, and company safety and environmental regulations regarding laboratory waste.

Education

The incumbent shall possess a high school diploma or shall have successfully completed the high school equivalency GED examination. Two (2) to three (3) years experience in hazardous waste handling, chemistry, safety or related field is required. Additional training will be received according to regulatory requirements for hazardous waste handlers.

Duties and Responsibilities

1. Collect waste from the laboratories and transport to the HMMB or ESF for staging.

2. Ensure laboratory waste is properly packaged, labelled and stored in the laboratories.

3. Maintain records for generation, transport and disposal of laboratory waste.

4. Provide clean-up guidance and assistance, if necessary, in the event of a spill involving chemicals or hazardous materials.

5. Maintain an adequate supply of equipment and materials on hand to effectively manage all types of laboratory waste.

6. Provide information and guidance to laboratory personnel on the collection, storage, labelling and disposal of all types of laboratory waste.

7. Package laboratory waste destined for disposal on-site according to department policies and procedures.

8. Package laboratory waste destined for disposal off-site according to applicable regulations.

V. Operator

General Function

Under the direction of the Hazardous Waste Manager the Operator runs the incinerator and controls designed to monitor and control waste treatment processes. Assists in maintenance of equipment, collection of samples, and handling of waste.

Education

The incumbent shall possess a high school diploma or shall have successfully completed the high school equivalency GED examination. Receives training relative to federal, state, and local regulations pertinent to this position.

Duties and Responsibilities

1. Operates the treatment processes by computerized controls.

2. Coordinates all activities affecting the processes while in operation.

3. Verifies any mechanical malfunctions.

4. Records daily logs concerning operations.

5. Assists maintenance with repairs during shutdown.

6. Performs routine maintenance as needed.

7. Performs other duties from time to time which may be assigned by the immediate supervisor as appropriate for the effective operation of the Company.

VI. Secretary

General Function

The secretary performs general secretarial duties and scheduling as directed by the Hazardous Waste Manager.

Education

The incumbent shall possess a high school diploma with one (1) to two (2) years secretarial experience.

Duties and Responsibilities

1. Processes and completes paperwork subsequent to receipt of waste.

2. Drafts departmental correspondence.

3. Initiates and compiles treatment information.

4. Functions as the central communications operator for the Environmental Safety Department.

5. Performs other duties as assigned.

VII. Research and Development Personnel

General Function

Research and development personnel in the laboratories are the generators of hazardous waste at Glaxo and will be responsible for collecting the waste according to company policies and procedures.

Education

R & D personnel have been trained through education and experience to work in a laboratory environment with a variety of hazardous substances. In addition, they will receive training in the form of a formal safety training course presented by the Environmental Safety staff which will include a section on hazardous waste collection, segregation and minimization presented by the Hazardous Waste Manager. This training will include procedures for collection and segregation of waste, and discussions of waste minimization.

Principal Duties

1. Determine if a waste is hazardous and collect and segregate it properly at the point of generation.

2. Fill out the Hazardous Waste Disposal form for each container listing all constituents of the waste containers.

3. Minimize hazardous waste production where possible.

H-1b Training Content, Frequency, and Techniques

The following outlines illustrate the content of the training courses provided to Glaxo personnel. As mentioned earlier, training involves a safety orientation given to all new employees, and further introductory safety training programs for separate groupings of employees. These introductory courses are given for operations, transportation, management and office personnel.

The following list indicates which training program(s) will be used for each position listed in section H-1a.

	Training Program	Job Position (as listed in H-1a)
1)	Employee Safety Orientation Program	I, II, III, IV, V, VI, VII
2)	Operations Personnel Introductory Training	IV, V
3)	Transportation/Staging Personnel Introductory Training	VIII
4)	Management Personnel Introductory Training	I, II, III
5)	Office Personnel Introductory Training	IV

Employee Safety Orientation Program Outline

Basic Facility Information

A. Plant Layout

B. Location of Hazardous Materials

C. Safety Policy

D. History

Basic Safety Training

A. Emergency Safety Equipment (where and how to use)

1. Fire Extinguishers
2. Eye Wash Stations
3. Safety Shower Stations

B. Personal Protective Equipment

1. Hard Hats
2. Safety Glasses
3. Safety Shoes
4. Full Face Respirators
5. Gloves
6. Tyvek Suits/Coveralls
7. S.C.B.A.

C. Fire Prevention

Emergency Procedures

A. Contingency Plan

B. Evacuation Plan

C. Communication/Alarm Systems

D. In Case of an Accident

Operations Personnel

Introductory Training

Waste Handling Safety

A. Categories

B. Hazards

C. Material Safety Data Sheets

D. Labelling and Identification

E. Handling Procedures

F. Spill Control Procedures

Hazardous Waste Management

A. Definition of a Hazardous Waste

B. Facility Security

C. Inspection Procedures

D. Preparedness and Prevention

E. Contingency Plan

F. Preventative Procedures, Structures, and Equipment

G. Control of Incompatible Waste

H. Container Areas

I. Tank Areas

J. Incinerator Areas

K. Reporting Requirements

Emergency Procedures Implementation

A. Emergency and Monitoring Equipment

   1. Inspection

   2. Repair

   3. Replacement

B. Emergency Cut Off Valves and Controls

C. Communication Systems

D. Alarm System

E. Response to Groundwater and Other Contamination

F. Response to Fire or Explosions

G. Shutdown of Operations

Transportation/Staging Personnel

Introductory Training

Waste Handling Safety

A. Categories

B. Hazards

C. Material Safety Data Sheets

D. Labelling and Identification

E. Handling Procedures

F. Spill Control Procedures

Hazardous Waste Management

A. Definition of a Hazardous Waste

B. Facility Security

C. Inspection Procedures

D. Preparedness and Prevention

E. Contingency Plan

F. Preventative Procedures, Structures, and Equipment

G. Control of Incompatible Waste

H. Container Areas

I. Reporting Requirements

Emergency Procedures Implementation

A. Emergency and Monitoring Equipment

1. Inspection

2. Repair

3. Replacement

B. Emergency Cut Off Valves and Controls

C. Communication Systems

D. Alarm System

E. Response to Groundwater and Other Contamination

F. Response to Fire or Explosions

G. Shutdown of Operations

Management Personnel

Introductory Training

Waste Handling Safety

A. Categories

B. Hazards

C. Material Safety Data Sheets

D. Labelling and Identification

E. Handling Procedures

F. Spill Control Procedures

Hazardous Waste Management

A. Definition of a Hazardous Waste

B. Facility Security

C. Inspection Procedures

D. Preparedness and Prevention

E. Contingency Plan

F. Preventative Procedures, Structures, and Equipment

G. Control of Incompatible Waste

H. Closure

I. Container Areas

J. Tank Areas

K. Incinerator Areas

L. Reporting Requirements

Emergency Procedures Implementation

A. Emergency and Monitoring Equipment

1. Inspection

2. Repair

3. Replacement

B. Emergency Cut Off Valves and Controls

C. Communication Systems

D. Alarm System

E. Response to Groundwater and Other Contamination

F. Response to Fire or Explosions

G. Shutdown of Operations

Office Personnel

Introductory Training

Hazardous Waste Management

A. Definition of a Hazardous Waste

B. Facility Security

C. Inspection Procedures

D. Preparedness and Prevention

E. Contingency Plan

F. Preventative Procedures, Structures, and Equipment

G. Control of Incompatible Wastes

H. Container Areas

I. Reporting Requirements

Emergency Procedure Implementation

A. Communication Systems

B. Alarm System

Continuing training involves an eight (8) hour annual refresher course on all of the information presented in the introductory course, as well as additional information relating to changing conditions in the operations.

Training is conducted in both a classroom setting and on-the-job, as appropriate. Classroom instruction involves lecture, reading, hands-on instruction and testing. On-the-job training provides supervised instruction with the components and procedures that will be encountered in daily activities, and is used as a very effective supplement to classroom instruction.

H-1c Training Director

The Training Director at Glaxo is the Hazardous Waste Manager. The technical level necessary to successfully carry out the duties of this position is considered adequate to offer instruction to company employees. The training director is trained in hazardous waste management procedures.

As mentioned above, the Hazardous Waste Manager is required to possess a degree in engineering, chemistry, environmental science or a related discipline and have several years experience in a number of areas of specialized knowledge including safety. In order to adequately fulfill the responsibilities of Training Director, continuing education in health and safety areas is provided through attendance at short courses offered through universities and government agencies.

H-1d Relevance of Training to Job Position

The information requested in this part, in order to comply with 40 CFR 264.16(a)(2), is discussed in the summary of training, Section H-1. To review, the same information is supplied to virtually all employees involved in the training programs. Specific jobs are handled by focusing applicable information on the specific activities involved and emphasizing those areas of the Health and Safety training that are pertinent. For example, a manager might receive detailed instruction on how to properly complete inventory paperwork, while an operator might only be made aware of its existence and function. Conversely, a mechanic might be given specific instructions on sensor maintenance, while a supervisor would only be made aware of its location and purpose.

H-1e Training for Emergency Response

This information is documented in Section H-1b above.

H-2 IMPLEMENTATION OF TRAINING PROGRAM

As stated above, all employees complete a safety orientation and participate in introductory safety training prior to performing any hazardous waste handling or disposal responsibilities.

All training records are maintained at the facility in the care of the Hazardous Waste Manager. These records include the job title (and employee's name) and a written job description for each position at the facility related to hazardous waste management. This description includes the requisite skills, education (or other qualifications), and duties of employees assigned to each position. The records also contain a written description of the type and amount of training that is given to each person filling a hazardous waste associated position at Glaxo and includes documentation that such training has been given to, and completed by, facility personnel. Finally, when continuing training is given to employees, the files will be supplemented with continuing training program documentation.

Training records on current personnel will be kept until closure of the facility. Training records on former employees will be kept at the facility for at least three (3) years from the date the employee last worked at the facility.

I - Closure Plans

SECTION I

CLOSURE PLAN, POST-CLOSURE PLAN, AND FINANCIAL REQUIREMENTS

This section is submitted according to the requirements of 40 CFR 270.14(b)(13),(15),(17), 264.112 through 115, 264.140 through 143, 264.178, and 264.351. This plan identifies all the steps that will be necessary to completely close the facility at the end of its intended operating life. A Post-Closure Plan is not required because all waste materials will be removed from the site at closure.

Glaxo will maintain an on-site copy of the approved closure plan and all revisions to the plan until certification of closure completeness has been submitted and accepted by the North Carolina Hazardous Waste Section. Glaxo will notify the Section Head at least 45 days prior to the date that final closure is expected to occur. The estimated closure date for the entire facility will be the year 2024. Upon completion of closure, Glaxo will submit to the Section Head a certification by both Glaxo and an independent registered Professional Engineer that the facility has been closed according to the specifications in the approved closure plan.

Partial closure (i.e., closure of an individual hazardous waste management unit) is not anticipated at the Glaxo facility. However, if an individual waste management unit (i.e., tank, container storage area or the incinerator) is closed, partial closure activities will be conducted in accordance with procedures described in this closure plan for that type of unit. Glaxo will notify the NC Hazardous Waste Section at least 45 days prior to initiating any partial closure activities. Any partial closure activity will be certified by Glaxo and an independent Professional Engineer registered in North Carolina.

I-1 CLOSURE PLAN [40 CFR 270.14(b)(13), 264.112]

I-1a Closure Performance Standard [40 CFR 264.111]

The basic premise of the facility closure plan is that the need for future maintenance will be minimized and that there will be no adverse impact on the environment during closure activities at the site. The following sections discuss, in detail, the approach Glaxo will take in order to satisfy the closure performance standards.

I-1b Final Closure Activities [40 CFR 264.112(b)]

Section I-1e of the Closure Plan presents procedures for final closure of the HMMB and ESF buildings. If any modifications to existing facility equipment, structures, instruments, or procedures related to the management of this area are anticipated, Glaxo will revise the Closure Plan accordingly.

Glaxo will arrange for the transportation and disposal of contaminated waste materials to a licensed treatment, storage, or disposal facility (TSD), upon facility closure.

I-1c Maximum Waste Inventory [40 CFR 264.112(b)(3)]

The maximum amount of hazardous waste that will be stored in the HMMB and ESF buildings during normal operations for the life of the facility is as follows:

(1) Non-radioactive Waste Solvent

HMMB Storage Capacity:

Halogenated: 8 drums @ 55 gallons/drum = 440 gallons

Non-halogenated: 15 drums @ 55 gallons/drum = 825 gallons

ESF Storage Capacity:

Halogenated:
3 drums @ 55 gallons/drum + 500 gallons = 665 gallons

Nonhalogenated:
3 drums @ 55 gallons/drum + 1000 gallons = 1165 gallons

(2) Radioactive Waste Solvents

HMMB Storage Capacity:
8 drums @ 55 gallons/drum = 440 gallons
900 gallons in 1 gallon containers = 20 55-gallon drums

ESF Storage Capacity:
3 drums @ 55 gallons/drum + 500 gallons = 665 gallons

(3) Reactive Wastes

HMMB Storage Capacity:
5 drums @ 55 gallons/drum = 275 gallons
420 gallons in lab pack containers = 28 55-gallon drums

(Note: It is estimated that 15 gallons of discarded commercial chemical product waste will be contained in a 55-gallon lab pack drum.)

(4) Acid and Caustic Wastes

HMMB Storage Capacity:
8 drums @ 55 gallons/drum = 440 gallons
600 gallons in lab pack containers = 40 55-gallon drums

(5) Scintillation Vials

ESF Storage Capacity: 350 containers @ 1 ft^3 each

(6) Incinerator Ash (Listed)

ESF Storage Capacity: 26 drums

(7) Baghouse Dust

ESF Storage Capacity: 13 drums

The maximum waste inventory described above will be transported by a licensed transporter to a licensed off-site treatment, storage or disposal facility upon closure.

I-1d Schedule for Closure [40 CFR 264.112(b)(6)]

The estimated expected year of closure for the HMMB and the ESF is the year 2024. A closure schedule is shown on FIGURE I-1. Glaxo will maintain the inspection schedule outlined in Section F-2d and the inspection log sheets located in Appendix C during the closure period.

I-1d(1) Time Allowed for Closure [40 CFR 264.113(a), (b)]

All hazardous wastes will be removed off-site within 90 days of receipt of the final volume of waste materials at the HMMB and ESF. All closure activities will be completed within 180 days of receipt of the final volume of waste.

SIRRINE ENVIRONMENTAL CONSULTANTS

Raleigh, North Carolina

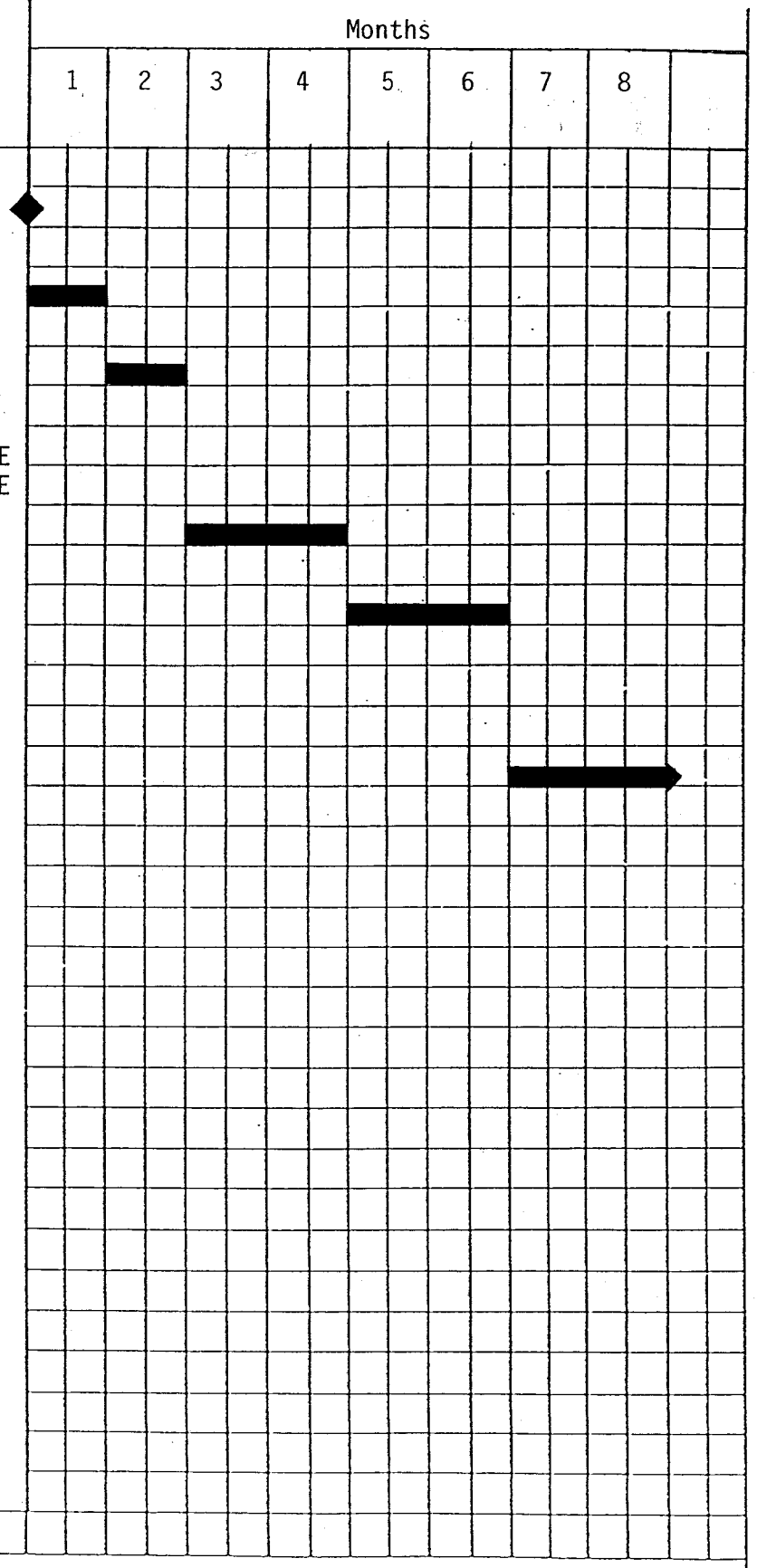
JOB NO.: R-8279

DATE: July, 1989

BY: DOT

GLAXO INC., Research Triangle Park, NC

Facility Closure Schedule



REVISED KEY TO SYMBOLS

Receipt/Submittal ◆

Activity ▬

KEY TO SYMBOLS

Revisions:

FEB 77 - JES 170

FIGURE I-1

I-1d(1)(a) Extensions for Closure Time [40 CFR 264.113(a), (b)]

Glaxo does not anticipate that closure operations will exceed 180 days.

I-1e Inventory Removal, Disposal or Decontamination of Equipment [40 CFR 264.114, 264.112(b)(4)]

Removal of waste drums and decontamination of equipment, including the incinerator and tanks, will be supervised and performed using qualified personnel. Personnel will be equipped with acid/solvent-resistant coveralls, head protection, neoprene-coated gloves, and boots resistant to solvents and acids. Full-face respirators with organic vapor, acid gas or combination filter cartridges that seal directly to the mask will be used. Spill control absorbent will be available for use in the event of any spills during the drum removal process. Used spill control absorbent will be placed in 55-gallon steel recovery drums and will be transported and disposed at a licensed TSD. While decontamination activities are being performed, no open flames, hot surfaces, or smoking will be permitted in the work area.

The floor and walls of the waste storage area of the HMMB, and the waste storage and incinerator areas of the ESF building will be decontaminated by steam cleaning. This wash water will be transferred to 55-gallon drums via portable pumps. The waste will then be disposed as described in Section I-1e(1).

Decontamination of personnel protective clothing will be accomplished using a high pressure cleaner (steam jenny). A detergent solution will be utilized to clean the outside of all protective clothing items. Water will be used to rinse these items and will be collected and handled as described above.

All pumps used to transfer wash water will be decontaminated internally and externally with a detergent solution and rinsed with water. The wash water will be collected in a 55-gallon drum and disposed as described in Section I-1e(1). After decontamination, all equipment, protective clothing, floors and walls will be rinsed with water. The rinse water will be collected and analyzed for potential contaminants in order to verify that decontamination was effective.

In the event that the HMMB is closed, the underground spill tanks for the flammable and reactive waste storage areas will be removed and disposed off-site by an underground tank removal contractor. In order to verify that soil contamination does not exist after the tanks are removed, two samples will be collected from the soils surrounding each tank. These samples will be analyzed for volatiles (EPA method #624) and Base/Neutral/Acid Extractables (EPA Method #625). These tanks are always empty except in the event of a spill and any accumulation of waste will be removed in a timely manner in accordance with the procedures in Section D-1a(5). These tanks will be empty at the time of closure. (During decontamination of the floors in the flammable and reactive waste storage areas, the drains to the spill tanks will be plugged.) As a safety precaution, the tank will be rinsed with water before removal. The rinse water will be collected and analyzed as described in Section I-1e(1). It is estimated that 200 gallons of rinse water will be collected. The rinse water will be disposed as outlined in Section I-1e(1).

I-1e(1) Closure of Containers [40 CFR 264.178]

All hazardous waste remaining on-site at the initiation of closure and all hazardous waste generated during the decontamination process will be placed in 55-gallon drums for off-site disposal. Only compatible wastes will be placed together in the same drum (e.g., acids and bases will not be placed in the same drum). Lab pack wastes will remain in their containers and will be placed in drums with absorbment packing such as vermiculite to help ensure that the containers are not ruptured within the drum. All 55-gallon drums will be appropriately labelled as to contents. These drums will be transported to a licensed TSD facility by a licensed transporter.

The hazardous waste storage areas of the HMMB and ESF buildings, the incinerator area of the ESF building, the personal protective clothing, and the portable sump pumps will be decontaminated as described in I-1e. Wastewater and residues generated during the decontamination process will be collected in the floor trenches and sumps, pumped into 55-gallon drums using portable sump pumps, and analyzed to determine the concentration of hazardous constituents present. The rinsewater will be analyzed for the following parameters:

Parameter	Method	Detection Limit (mg/l)
pH	EPA-600/4-79-020	0.1 pH units
Ignitability	ASTM D-93-79 D-93-80	
Volatiles	EPA#624	0.01
Base/Neutral Extractables	EPA#625	0.01/0.025
Acid Extractables	EPA#625	0.025/0.25
RCRA Metals	EPA-SW846, 7000 series	Varies (0.0005 to 0.01)

The decontamination process will be continued until analysis of the wash water demonstrates concentration levels below the detection limits shown above.

If the laboratory analyses indicate that the wash water is hazardous, the material will be pumped into a tank truck and sent off-site for disposal at a permitted TSD facility. If laboratory analysis shows no evidence of contamination, wastewater and residues will be discharged to the City of Durham sanitary sewer system. A copy of the analytical results demonstrating decontamination will be included in the certification of closure report which will be submitted to the N.C. Hazardous Waste Section.

Approximately 700 gallons of wastewater and residue are anticipated to result from the decontamination of the HMMB and ESF buildings.

I-1e(2) Closure of Incinerators [40 CFR 264.351]

As stated previously in I-1e, the incinerator system (including air pollution control equipment) will be decontaminated. The first step will be to complete a burn out procedure. This will involve operating the incinerator system while burning only non-hazardous fuel. The duration of the burn out procedure will be determined at the time of closure based on the condition of the refractory. Restrictions on operating temperatures will be maintained as if burning hazardous waste. The equipment will then be disassembled as necessary to allow for cleaning with a detergent solution utilizing a high pressure washing unit (e.g., steam jenny). Decontamination will continue until visual inspection indicates that the equipment (internally and externally) is free of hazardous waste and hazardous waste residues. Subsequent decontamination will consist of steam cleaning the equipment to remove residual cleaning solutions. When the resultant

rinse water appear to be clean, steam cleaning will cease and a sample from the final rinse will be collected and analyzed in accordance with the procedures listed in I-1e(1). The decontamination process will continue until analysis of the rinse water demonstrates that decontamination is complete.

I-1e(3) Closure of Tanks [40 CFR 264.197]

The remaining contents of the tanks in the ESF will be emptied into 55-gallon drums. These drums will be disposed off-site at a licensed facility. Pipelines into and out of the storage tanks will be disconnected leaving blank flanges on each open nozzle on the tanks

to protect against leaks. The tanks will be rinsed out with water. The water will be drained from the tanks to 55-gallon recovery containers located beneath the outlets. The tanks will be steam cleaned as described in Section I-1e. Steam will be added rapidly enough to heat the tanks thoroughly but not enough to cause appreciable quantities of uncondensed steam to escape. After steam cleaning the tanks, they will again be rinsed with water. This rinse water will be collected, analyzed and disposed as described in Section I-1e(1).

Ancillary tank equipment (e.g., piping, pumps, valve) will be disassembled as necessary to allow for internal and external decontamination. This equipment will also be decontaminated in accordance with I-1e. Decontamination will continue until visual inspection indicates that the equipment is free of hazardous waste and hazardous waste residues. Rinse water will be collected, analyzed and disposed as described in Section I-1e(1). The decontamination process will continue until analysis on the rinse water demonstrates that decontamination is complete.

Approximately 100 gallons of rinsewater is anticipated to result from the decontamination of the storage tanks. The decontamination wash water will be disposed as outlined in Section I-1e(1).

I-2 POST-CLOSURE PLANS [40 CFR 270.14(b)(13)]

A Post-Closure Plan is not required for this facility. All waste materials will be removed from the site at closure.

I-3 NOTICES REQUIRED FOR DISPOSAL FACILITIES [40 CFR 264.115, 116, 119, 120]

I-3a Certification of Closure [40 CFR 264.115]

A registered Professional Engineer will certify that this facility has been closed in accordance with this closure plan. A certification signed by the appropriate Glaxo representative and an independent registered Professional Engineer will be submitted to the North Carolina Hazardous Waste Section within 60 days of final closure.

I-3b Survey Plat [40 CFR 264.116]

Glaxo will not have a land disposal facility; therefore, this regulation does not apply.

I-3c Notice to Local Land Authority [40 CFR 264.119]

Glaxo will not have a land disposal facility; therefore, this regulation does not apply.

I-3d Post-Closure Certification [40 CFR 264.120]

Glaxo will not have a land disposal facility; therefore, this regulation does not apply.

I-3 NOTICES REQUIRED FOR DISPOSAL FACILITIES [40 CFR 264.115, 116, 119, 120] - Continued

I-3e Notice in Deed to Property [40 CFR 264.119]

Glaxo will not have a land disposal facility; therefore, this regulation does not apply.

I-4 CLOSURE COST ESTIMATE [40 CFR 270.14(b)(15), 264.142]

The closure cost information presented is submitted according to the requirements of 40 CFR 270.14(b)(15) and 264.142 and is based on third party costs.

An estimated $204,300 (December 1989 cost estimate) will be needed to close the Glaxo HMMB and ESF buildings.

The closure costs will be structured as follows:

I. Inventory Disposal Cost

A. Non-radioactive waste solvent

1. Halogenated

Disposal Container: 55-gallon drum (50 gallons of waste/drum)

Maximum quantity stored on-site:

665 gal (ESF) 440 gallons (HMMB)

Disposal Cost:

Unit: $350/drum

Total Cost: $8,050

2. Non-Halogenated

Disposal Container: 55-gallon drum (50 gallons waste/drum)

Maximum quantity stored on-site:

1165 gallons (ESF) 825 gallons (HMMB)

Disposal Cost:

Unit: $250/drum

Total Cost: $10,000

3. Radioactive Waste Solvent

Disposal Container: 55-gallon drum (50 gallons of waste/drum)

Maximum quantity stored on-site:

665 gallons (ESF) 440 gallons (HMMB)
900 gallons (HMMB)

Disposal Cost:

Unit: $500/drum*

Total Cost: $20,500

*Note: Currently, there is no acceptable method for off-site disposal of this waste stream. Assuming that an off-site disposal option is available at the time of closure, a disposal cost of $500/drum has been estimated.

B. Reactive Wastes

Disposal Container: 55-gallon drums

Maximum quantity stored on-site:

33 drums (HMMB)

Dispoal Cost:

Unit: $500/drum

Total Cost: $16,500

C. Acid and Caustic Wastes

Disposal Container: 55-gallon drums

Maximum quantity stored on-site:

48 drums (HMMB)

Disposal Cost:

Unit: $500/drum

Total Cost: $24,000

D. Scintillation Vials

Disposal Container: Boxes

Maximum quantity stored on-site:

350 cu. ft. (ESF)

Disposal Cost:

Unit:	$75/cu.ft.
Total Cost:	$26,250

E. Incinerator Ash (Listed)

Disposal Container: 55-gallon drum

Maximum quantity stored on-site:

26 drums (ESF)

Disposal Cost:

Unit:	$300/drum
Total Cost:	$7,800

F. Baghouse Dust

Disposal Container: 55-gallon drum

Maximum quantity stored on-site:

13 drums (ESF)

Disposal Cost:

Unit:	$300/drum
Total Cost:	$3,900

Note: Disposal costs include transportation costs.

G. Labor for Inventory Disposal

Supervisory:

Two (2) personnel (40 hours each @ $50/hr): $ 4,000

Hourly:

Four (4) personnel (40 hours each @ $35/hr): $ 5,600

2. Decontamination Cost

Steam-cleaning equipment rental: $ 4,000

Laboratory analysis of wastewater (includes sampling and analytical costs)*

Eight (8) samples @ $2000/sample $ 16,000

Wastewater bulk disposal (as hazardous waste)

1000 gallons @ $1.33/gallon $ 1,330

Labor

Supervisory:

Two (2) personnel (40 hours each @ $50/hr.): $ 4,000

Hourly:

Two (2) personnel (40 hours each @ $35/hr.): $ 2,800

3. Spill Containment Tank Excavation and Disposal (including soil sampling and analysis) $ 28,000

4. Engineering Certification

Forty (40) hours @ $75/hr $ 3,000

5. Subtotal $185,730

*This assumes that the initial decontamination attempt was effective.

6.	Contingency (10%)	$ 18,570
7.	Grand Total	$204,300

This closure cost estimate will be retained at the Glaxo facility. It will be reviewed annually and revised as necessary to insure the accuracy of both the Closure Plan and the closure cost estimate. The closure cost estimate will be adjusted annually (from the date of its original development) for inflation. The Department of Commerce's Annual Implicit Price Deflator for Gross National Product will be used to make this adjustment.

---

[1]Published by U.S. Department of Commerce in its monthly publication "Survey of Current Business."

I-5 FINANCIAL ASSURANCE MECHANISM FOR CLOSURE [40 CFR 270.14(b)(15), 264.143, and 264.151]

Glaxo will utilize a surety bond [40 CFR 264.143(b)] to demonstrate financial assurance for closure required under RCRA. The surety bond document will be provided to the N.C. Hazardous Waste Section for incorporation into Appendix D, 60 days prior to the date when Glaxo will start storing or incinerating hazardous waste at the facility.

I-6 POST-CLOSURE COST ESTIMATE [40 CFR 270.14(b)(16) and 264.144]

A Post-Closure cost estimate is not required. All waste materials will be removed from the site at closure.

I-7 FINANCIAL ASSURANCE MECHANISM FOR POST-CLOSURE [40 CFR 270.14(b)(16), 264.145, and 264.151]

Not applicable.

I-8 LIABILITY REQUIREMENTS [40 CFR 270.14(b)(17) and 264.147]

Glaxo plans to demonstrate financial assurance for liability coverage required under RCRA by acquiring appropriate environmental liability insurance. In the event that Glaxo is not able to acquire the appropriate liability coverage, it will meet its liability coverage requirements by acquiring a surety bond. The sudden liability coverage required for the hazardous waste facilities is $1,000,000 per accidental occurrence with an annual aggregate of at least $2,000,000 exclusive of legal defense costs. The liability coverage documents will be provided to the N.C. Hazardous Waste Section for incorporation into Appendix D, 60 days prior to the date when Glaxo will start storing a incinerating hazardous waste at the facility.

I-9 STATE FINANCIAL MECHANISM [40 CFR 270.14(b)(18)]

Not applicable.

J - Other Federal Laws

SECTION J

OTHER FEDERAL LAWS

Information will be provided according to the requirements of 40 CFR Part 270.14 at the request of the Hazardous Waste Management Branch. At this time, however, this facility is in compliance with the following federal laws: The Wild and Scenic Rivers Act, the National Historic Preservation Act, the Fish and Wildlife Coordination Act, the Endangered Species Act, and the Coastal Zone Management Act. (See correspondence to the appropriate agencies in Appendix E).

K - Certification

SECTION K

CERTIFICATION

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. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, 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 knowing violations.

Date: 3/22/91 Signature Thomas W. Dilley

Title: Group V.P., Glaxo Inc.

APPROVED
AS TO LEGAL FORM
LAW DEPT.

SECTION K

CERTIFICATION

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. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, 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 knowing violations.

Date: 12/15/89 Signature Thomas W. D'Alonzo

Title: President of Glaxo Inc.

SECTION K

CERTIFICATION

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. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, 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 knowing violations.

Date: August 24, 1990 Signature Thomas W. Allen

Title: President, Glaxo Inc.

Solid Waste Management Units

SECTION L

SOLID WASTE MANAGEMENT UNITS

L-1 Solid Waste Management Units [40 CFR 270.14(d)]

This section presents Solid Waste Management Unit (SWMU) information as required by 40 CFR 270.14(d).

Five SWMU's were identified during an Interim RCRA Facility Assessment conducted for EPA Region IV by A.T. Kearney, Inc. No hazardous waste or hazardous constituents have been released from any of these SWMU's. These SWMU's are individually described in the following text.

Concrete Truck Wash Point Catch Pond

The concrete truck wash point catch pond was constructed in-place by creating a small depression in the ground and providing siltation control along one side of the structure. The pond was approximately 20 feet in diameter and 3 feet deep. It was designed to be used as a central, controlled area to receive the water and residual concrete washed out of concrete trucks after they had emptied their loads at the construction site. This prevented concrete trucks from washing out at unidentified areas throughout the construction site where the mixture of water and concrete could flow freely across the site and solidify.

The residual concrete contained in the washout was allowed to settle to the bottom of the pond and solidify. At the end of the life of the pond the water was allowed to evaporate and the solidified concrete was excavated and disposed as rubble.

The pond was created in June 1988 and eliminated in January 1991. During the lifetime of the pond it was periodically cleaned out as described above. At it's elimination in January 1991 the pond was cleaned out and backfilled with clean fill dirt.

Process Waste Neutralization Tank System In The Hazardous Materials Management Building (HMMB)

Within the Hazardous Materials Management Building (HMMB), the Acid Waste Storage room and the Caustic Waste Storage room has a floor drain (shown on Drawing R-8279-D1) that is routed to an underground chemical sump tank. The sump tank is located in the Neutralization room that is directly adjacent to the Caustic Waste Storage room.

Any spillage from the Acid or Caustic Waste Storage rooms will be drained to the 650 gallon chemical sump tank and lifted by one or both 54 GPM sump pumps to a 1500 gallon polypropylene tank, mixed with other treatable process waste, pH adjusted and discharged into the sanitary sewer system.

The neutralization tank system is installed primarily for the treatment of process waste from the adjacent Pharmaceutical Development Building #1 (see Drawing R-8279-B2). The Pilot Plant within Building #1 generates several types of liquid wastes that must be treated and properly disposed of in accordance with local and/or federal regulations.

- Wastewater from the General Process rooms, including sink and floor drains, is gravity drained directly into one of the two 1500 gallon neutralization tanks for treatment.

- Wastewater from each of seven Isolation Suites including floor drains and decontamination showers, can be directed via control valves to either the neutralization tanks or an underground holding tank where it can be pumped out to a truck. This holding tank is located outdoors and is adjacent to the solvent spill tanks for the HMMB. The wastewater from the Isolation Suites is non-hazardous.

- Wastewater from the floor drains in the Mechanical rooms is piped to the chemical sump tank for pumping into the neutralization tanks.

- Wastewater from the toilet/locker rooms and vending areas is discharged directly, without treatment, to the sanitary sewer system.

The above ground neutralization tanks are designed to function in a batch processing mode. While one tank is in service, the other will be in standby. Influent into the tank is continuously checked by an ultrasonic level monitor that is staged to signal low, high and high-high alarm conditions. Upon reading high level, the influent valve is closed and incoming waste is directed to the second standby tank. The isolated tank is then brought to the desired pH range by the addition of acid or caustic chemicals. After the proper pH has been established a preset time delay is initiated during agitator mixing to ensure the pH does not drift out of range. Only after pH has been proven acceptable for the delay cycle will the automatic drain valve open. Draining will continue until low level is

detected by the level controller at which time the valve will close. The tank will then be in the standby mode ready to repeat the process.

Any alarm condition on the neutralization tank system will be detected by the Facility Management System that is manned 24 hours per day.

Somat Unit Located In The Environmental Safety Facility (ESF)

The Somat unit is a mechanical system used to automatically collect and transport non-hazardous animal bedding from cages in the buildings used for care and handling of animals to the ESF. This is a closed system designed to prevent personnel from being exposed to animal hair, dander and urine contained in the bedding. The system is completely described in Appendix A of the Permit Application.

The animal bedding is emptied from the cages into a pulper. The bedding is ground and mixed with water to form a homogenous pulp. The pulp is pumped via pipeline to the extractor located in the ESF. The solids are extracted and discharged into a collection hopper and the water is recirculated back to the pulper in a closed circuit system. The pulp from the hopper is loaded into carts to be loaded into the incinerator.

This system is a package unit and is in the process of being installed. Performance testing of the system will be conducted prior to conduction of the Trial Burn. Operation of the system is expected to begin in conjunction with the operation of the incinerator.

Carcass Freezer Located In The ESF

The freezer located in the ESF is designed for storage of animal carcasses awaiting incineration. It is a package unit and is not yet installed. Installation is expected to occur in mid 1991.

The freezer interior dimensions are 14.83' x 15.66' x 8.83' for a total volume of 2052.16 cubic feet. The unit is designed to maintain a temperature of -4°F.

Performance testing of the freezer will be conducted prior to conduction of the Trial Burn. Operation of the freezer is expected to begin in conjunction with the operation of the incinerator.

Trash Dump Site Mentioned In An Environmental Assessment Previously Performed On A 174-Acre Site Proposed For Purchase By Glaxo

This trash dump area was identified during a previous environmental assessment performed on a 174-acre site proposed for purchase by Glaxo. The area where the trash dump was identified was not purchased and Glaxo has no intention at this time of purchasing the area.

Therefore, this SWMU does not and never has belonged to Glaxo and should not be given further consideration.

L-2 ADDITIONAL INFORMATION ON PREVIOUS FUEL OIL RELEASES

In addition to SWMU information, EPA Region IV requested additional information regarding two incidents involving fuel oil releases. A brief summary of the two fuel oil releases follow. Supporting materials in the form of correspondence with the North Carolina Division of Environmental Management (NCDEM) and technical reports by the contract Environmental Engineering firms have been included as attachments to this Section.

Summary Of April 3, 1990 Fuel Oil Release

On April 3, 1990 number two fuel oil was discovered emanating from a 10,000 gallon underground storage tank at the Glaxo facility located at Five Moore Drive in Research Triangle Park, North Carolina. The release was due to a ruptured underground fuel line feeding an emergency power generator. Steps were immediately taken to eliminate the source of the release and contain the released fuel. An Environmental Engineering firm and a firm specializing in fuel oil remediation were contracted to perform the cleanup.

Remediation of the site began April 9, 1990. The emptied tank was excavated and removed and excavation of the remaining contaminated soil began. At the direction of the contract Environmental Engineer contaminated soil was excavated to the extent feasible. Approximately 1600 tons of soil were removed and disposed off-site via thermal treatment. Soil samples taken during the excavation process indicate all contaminated soil was removed.

A preliminary subsurface investigation indicated the possibility of a small amount of contamination associated with the subsurface water table. An investigation to identify evidence of groundwater contamination was begun in July 1990. Water

samples were collected in September 1990 and March 1991 to provide a basis for determining if groundwater contamination exists. Results of the March 1991 samples are pending laboratory analysis and will be reported to NCDEM upon receipt. At that time a decision will be made concerning future activities necessary at the site.

Summary Of October 11, 1990 Fuel Oil Release

On October 11, 1990 number two fuel oil was discovered from the surface vent of a 40,000 gallon underground storage tank located at the Central Utility Plant of the Glaxo Research and Development facility located on Moore Drive in Research Triangle Park, North Carolina. The release was caused by the failure of a high level control switch to de-energize a pump during a transfer of fuel from a storage tank to a working tank. This failure allowed the working tank to be overfilled and fuel to be discharged through the vent onto the ground surface. The fuel flowed a short distance, approximately 20 feet, and entered a storm drain. The storm drain discharged the fuel into a holding pond located on Glaxo property where it was contained.

The pump was immediately de-energized thus eliminating the source of the discharge. A firm specializing in fuel oil remediation was contacted and the cleanup was initiated. Removal of the "free product" floating on the pond was completed on October 12, 1990. A minor amount of soil, contaminated during the process of removing "free product" from the pond, was excavated and disposed off-site via thermal treatment. All cleanup activities were completed by October 15, 1990.

An Environmental Engineering firm was contacted to investigate the possibility of subsurface contamination surrounding the underground storage tank. No evidence of contamination was indicated. A request to close out the site was made to NCDEM on March 5, 1990.

APRIL 3, 1990 FUEL RELEASE

SUPPORTING DUCUMENTATION

Glaxo

Glaxo Inc.

April 9, 1990

Mr. Arthur Mouberry
Environmental Supervisor
Raleigh Regional Office
Division of Environmental Management
3800 Barrett Drive
Raleigh, NC 27609

Dear Mr. Mouberry:

This letter serves to confirm a report of an apparent fuel oil release made via telephone to you approximately 4:30 p.m. Tuesday, April 3, 1990. At that time I reported we had discovered a release of number two fuel oil apparently emanating from a 10,000 gallon underground storage tank used to supply fuel to an emergency power generator. The fuel had entered a small stream on Glaxo property. Steps taken to immediately contain the release included emptying the tank, placing oil absorbent material on areas of obvious soil contamination and in the stream, and placing oil absorbent booms at strategic locations across the stream.

At your request I also notified Mr. Art Smith at the EPA Region IV Emergency Response Center. Mr. Smith stated your organization would be providing regulatory oversight for the release and resultant cleanup.

We have retained the services of Sirrine Environmental Consultants to provide engineering guidance throughout the remediation efforts. Enclosed is the document "Technical Specifications for Removal, Cleaning, and Disposal for Underground Petroleum Fuel Storage Tank; Excavation and Disposal of Contaminated Soil" prepared by Sirrine to direct the remediation contractor during the cleanup. Noble Oil Services Company has been chosen as the remediation contractor for the project. Cleanup efforts began Friday April 6, 1990.

As the cleanup progresses, I will keep your office informed. Please contact me if you have any questions or comments pertaining to this project.

Sincerely,

Calvin W. Overcash, Supervisor
Environmental Safety

Enclosure

cc: T. Cecich, Glaxo Inc.
C. Fernandez, Glaxo Inc.

Glaxo

Glaxo Inc.

April 10, 1990

Raleigh Regional Office
Division of Environmental Management
3800 Barrett Drive, Suite 101
Raleigh, NC 27609

ATTENTION: Mr. Jay Zimmerman

Dear Mr Zimmerman:

This is in response to a letter from Arthur Mouberry dated April 18, 1990 and received April 26, 1990 concerning Notice of State and Federal Requirements applicable to a release of petroleum from an underground storage tank at the Research Triangle Park location of Glaxo Inc. Glaxo intends to comply with all applicable state and federal regulations regarding this incident, however there is some question regarding the applicability of the federal regulations found at Part 280 of Title 40 of the Code of Federal Regulations.

Per our discussion today, Glaxo hereby requests a 14 day extension to provide a written response of intent to comply with the above cited regulations. This extension will allow sufficient time for review and legal interpretation of the regulations. Glaxo will provide a written response on or before May 24, 1990. Granting this extension will in no way impede the current activities associated with cleanup of the site.

In addition, attached is a brief status report prepared by Sirrine Environmental Consultants describing activities performed at the site to date. It also briefly outlines future cleanup activities planned for the site.

If you have any questions or need additional information, please do not hesitate to contact me at (919) 248-2263.

Sincerely,

Calvin W. Overcash

Calvin W. Overcash, Supervisor
Environmental Safety

Attachment

cc: Mr. T. Cecich, Glaxo
Ms. C. Fernandez, Glaxo
Mr. W. D. Dixon, Sirrine Environmental

SIRRINE
ENVIRONMENTAL
CONSULTANTS

3733 National Drive
Suite 120
Raleigh, North Carolina 27612
(919) 881-0777

RECEIVED
MAY - 9 1990

May 8, 1990

Mr. Calvin Overcash
Glaxo Inc.
Five Moore Drive
Research Triangle Park, NC 27709

Re: Brief Status Report Pertaining to
Underground Storage Tank Closure and
Remediation of Fuel Oil Leak
Glaxo, RTP
Sirrine Project No. R-0174

Dear Calvin:

In response to an observed release of petroleum fuel from the underground storage tank (UST) system located on the east side of the Glaxo Headquarters facility at Research Triangle Park, the following activities were performed under oversight by Sirrine Environmental Consultants in order to (1) prevent release of additional petroleum into the environment from the UST system, (2) mitigate the spread of contamination existing in the subsurface, and (3) restore the area exhibiting obvious contamination.

- The UST system was permanently closed via excavation and removal;
- All soil exhibiting obvious contamination as indicated by stain, product saturation and/or elevated organic vapor concentrations was excavated to the extent practicable and transported to Southeastern Soil Recovery, Inc.;
- Groundwater which exhibited signs of free product was pumped from the excavation created during removal of the stained soil; and
- The excavated area was backfilled with "clean" fill material.

During excavation activities, soil sampling was performed throughout the area affected the release. Analyses were performed both in the field (via headspace using a Century 128 OVA) and in the laboratory. Laboratory analyses were performed using both infrared (EPA Method 418.1) and gas chromatography (modified EPA Method 8015, SW-846). Results indicate that excavation activities were successful in removing practically all vadose zone (zone extending from land surface to the capillary fringe) soil containing detectable concentrations of petroleum hydrocarbons except for soil located immediately adjacent to and possibly beneath the generator. These soils will be addressed upon removal of the generator.

Based on observations of minor seepage of fuel into the stream, and evidence of product in several test pits (installed via post hole diggers) it appears that some free product has migrated just beyond the excavated area originally designated by stained surface soil. It is believed that the area containing product is relatively small (possibly 300-400 square feet). As we discussed in the field, I felt it was inadvisable to "chase" the free product by excavating the vadose zone. Alternatively we plan to define extent and estimated quantity of free product through construction of additional test pits and installation of several shallow monitoring wells. I will provide you with an assessment plan which will include locations of these test pits and wells and will also include results of all sampling conducted to date.

If you should have any questions or need additional information, please contact me at (919) 881-0777.

Sincerely,

SIRRINE ENVIRONMENTAL CONSULTANTS

Douglass

W. Douglass Dixon, P.E.

cc: Mr. Terry Bradham
Project File

APR 2 6 1990

State of North Carolina
Department of Environment, Health, and Natural Resources
Raleigh Regional Office

James G. Martin, Governor
William W. Cobey, Jr., Secretary

Larry South
Regional Manager

DIVISION OF ENVIRONMENTAL MANAGEMENT
April 18, 1990

Certified Mail
Return Receipt Requested

Glaxo, Incorporated
Five Moore Drive
Research Triangle Park, N.C. 27709

Attention: Mr. Calvin Overcash

Re: NOTICE OF STATE AND FEDERAL REQUIREMENTS
Release of Petroleum from Commercial
Underground Storage Tank
Glaxo, Inc., Research Triangle Park
Durham County

Dear Mr. Overcash:

Part 2A, Article 21A of Chapter 143 of the North Carolina General Statutes provides for the Commercial Leaking Petroleum Underground Storage Tank Cleanup Fund ("Commercial Fund"). The Division of Environmental Management (Division) has the delegated authority to administer the Commercial Fund and to enforce G.S. 143-215.94A et. seq. The Division is also the implementing agency of the Federal Underground Storage Tank Program under the authority of 42 U.S.C. 6991, et. seq. The applicable federal rules are found at Part 280 of Title 40 of the Code of Federal Regulations (CFR).

On April 4, 1990, this office received confirmation of a release from an underground storage tank system at the subject location. This confirmation was in the form of a site investigation conducted by the staff of the Raleigh Regional Office on April 4, 1990.

3800 Barrett Drive, Suite 101 • Raleigh, N.C. 27609
Telephone (919) 733-2314 • FAX Number (919) 733-7072

An Equal Opportunity Affirmative Action Employer

As owner of the underground storage tank which discharged or released petroleum, you are required under G.S. 143-215.94E(a) to immediately undertake to collect and remove the discharge or release and to restore the area affected.

Owners of petroleum or hazardous substance underground storage tank systems, in response to a confirmed release, must comply with the attached Federal regulations. The following will give you some explanation of the requirements.

1. 40 CFR 280.61, Initial Response. You have already complied with paragraph (a); however, you must take the required actions in paragraphs (b) and (c).

2. 40 CFR 280.62, Initial Abatement Measures and Site Check. The Division is requiring you to take all six measures set out in 40 CFR 280.62(a). The report required in 40 CFR 280.62(b) was received on April 12, 1990.

3. 40 CFR 280.63, Initial Site Characterization. The Division is requiring you to submit a report including all the information described in 40 CFR 280.63(a) as well as the results of the clean up to date. The report is due on May 21, 1990.

4. 40 CFR 280.64, Free Product Removal. If you detect the presence of free product, you must comply with this regulation. The Division will determine how much free product must be removed. If free product is present, the Division will require you to submit a report in accordance with 40 CFR 280.64(d) which is due on May 21, 1990.

5. 40 CFR 280.65, Investigations for Soil and Groundwater Cleanup. If you determine under 40 CFR 280.65(a)(1), (2) or (3), or if the Division requests under 40 CFR 280.65(a)(4), that an investigation for soil and groundwater cleanup is necessary, please contact the Division so that we can establish a schedule. The schedule may be established in a Special Order by Consent, as authorized by G.S. 143-215.2.

You should also be advised that at any point after reviewing the information submitted in compliance with 40 CFR 280.61 through 40 CFR 280.63, the Division may require you to submit additional information or to develop a corrective action plan for responding to contaminated soils and groundwater, under the authority of 40 CFR 280.66. You will be notified of this decision in a separate letter. If a corrective action plan is necessary, you will be required to clean up to the standards established in 15 NCAC 2L, Groundwater Classifications and Standards.

Failure to comply with G.S. 143-215.94E(a) may result in the recommendation of enforcement action. If you violate the Federal regulations, the Division may report the matter to the Environmental Protection Agency, who may hold you liable for a civil penalty of not more than $10,000 for each day of continued noncompliance.

You may be reimbursed for cleanup costs over $50,000 and up to $1,000,000 from the Commercial Fund under the provisions of G.S. 143-215.94E. The costs must be reasonable and necessary, and appropriate documentation must be submitted. When you have paid an amount in excess of $50,000, send the receipts and documentation to Babette McKemie at the following address: Department of Environment, Health, and Natural Resources, Division of Environmental Management, Groundwater Section, 3800 Barrett Drive, Raleigh, N.C. 27609. The Division must approve the costs before reimbursement will be made.

The statutes require you to continue to proceed with cleanup beyond the time that your receipts exceed $50,000. You should be advised that if you fail to proceed to undertake to collect and remove the discharge or release and State or Federal Money is used for such purposes the State will seek cost recovery against you for the total amount expended, unless you prove that you did not have the resources to pay for the corrective action.

If the cleanup costs exceed a total of $1,000,000, the site may be eligible, under limited conditions, for funds from the Federal Leaking Underground Tank Trust Fund, 42 U.S.C. 6991 et seq. However, if the site is not eligible for federal funds, you will be responsible for the amount in excess of $1,000,000 pursuant to G.S. 143-215.94E(d).

Please make a written response to this letter within two weeks from date of letter and indicate your intent to comply with the above requirements or your reasons why you cannot or will not comply with the requirements.

Your response and questions should be directed to Babette McKemie of the Raleigh Regional Office at (919) 733-2314.

Sincerely,

Arthur Mouberry

Arthur Mouberry, P.E.
Regional Supervisor
Raleigh Regional Office

AM:BMc:cs
cc: Incident Management Unit

APR 2 6 1990

ENVIRONMENTAL

State of North Carolina
Department of Environment, Health, and Natural Resources
Raleigh Regional Office

James G. Martin, Governor
William W. Cobey, Jr., Secretary

Larry South
Regional Manager

DIVISION OF ENVIRONMENTAL MANAGEMENT
April 19, 1990

Certified Mail
Return Receipt Requested

Glaxo, Inc.
Five Moore Drive
Research Triangle Park, N.C. 27709

Attention: Mr. Calvin Overcash

Re: Notice of Violation
North Carolina Administrative Code Title 15
Subchapter 2L Section .0202
Research Triangle Park, Durham County

Dear Mr. Overcash:

Chapter 143, North Carolina General Statutes, authorizes and directs the Environmental Management Commission of the Department of Environment, Health & Natural Resources to protect and preserve the water and air resources of the State. The Division of Environmental Management has the delegated authority to enforce adopted pollution control rules and regulations.

On April 4, 1990, you reported to the Groundwater Section staff of the Raleigh Regional Office a release from an underground storage tank (UST) system.

The information to date indicates that a contravention of Groundwater Quality Standards, established in North Carolina Administrative Code, Title 15, Subchapter 2L .0202 (15 NCAC 2L .0202) has occurred as a result of activities at Glaxo, Inc.

You have been identified as the owner of the underground storage tank systems at Glaxo, Inc. and are being held responsible for the discharge of a regulated petroleum substance which has impacted the

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groundwaters of the State. Ownership of the underground storage tanks has been established pursuant to the Federal requirement that owners register their tanks in accordance with Section 9002 of the Resource Conservation and Recovery Act (RCRA).

As a result of these findings, you are requested to submit a written response to this Notice describing your plans to achieve compliance with the above cited laws or regulations within thirty (30) days from receipt of this letter.

Failure to respond within the time specified may result in issuance of a proposed penalty assessment by the Director under authority of G.S. 143-215.6 which provides that a civil penalty of not more than $10,000.00 may be assessed against any person who violates any classification, standard, limitation, or management practice established pursuant to G.S. 143-214.1 or 143-215. If any action or failure to act is continuous, each day may be considered a separate violation.

Should you have any questions, contact Ms. Babette McKemie at (919) 733-2314.

Sincerely,

Arthur Mouberry

Arthur Mouberry, P.E.
Regional Supervisor
Raleigh Regional Office

AM:BMc:cs

Glaxo

Glaxo Inc.

June 7, 1990

Raleigh Regional Office
Division of Environmental Management
3800 Barrett Drive, Suite 101
Raleigh, NC 27609

ATTENTION: Ms. Babette McKemie

Dear Ms. McKemie:

Attached is the "Report of Initial Site Characterization and Free Product Removal for the Underground Storage Tank Closure at the Research Triangle Park, NC" prepared for Glaxo Inc. by Sirrine Environmental Consultants. This report is submitted in response to the release from an underground storage tank system reported to your office on April 4, 1990.

If you have any questions or comments please contact me at (919)248-2263.

Sincerely,

Calvin W. Overcash

Calvin W. Overcash, Supervisor
Environmental Safety

cc: Thomas F. Cecich, Glaxo Inc.
Cristina M. Fernandez, Glaxo Inc.
W. Douglass Dixon, Sirrine

REPORT OF
INITIAL SITE CHARACTERIZATION
AND
FREE PRODUCT REMOVAL

FOR THE

UNDERGROUND STORAGE TANK CLOSURE

AT

RESEARCH TRIANGLE PARK, NC

PREPARED FOR

GLAXO INC.

RTP, NC

JUNE 5, 1990

SIRRINE PROJECT NO. R-0174

SIRRINE ENVIRONMENTAL CONSULTANTS

RALEIGH, NORTH CAROLINA

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INITIAL SITE CHARACTERIZATION

1.0 INFORMATION REQUIRED PURSUANT TO 40 CFR 280.63(a)(1) & (2)

1.1 Nature of the Release: Based on visual observations of fuel oil in the soil and results of soil contaminant screening via organic vapor analysis, it appears that the release of fuel oil occurred in the vicinity of the fill pipe with subsequent migration below grade in the direction of the drain pipe before exiting the embankment below the emergency generator. Based on reports of construction workers, it is possible that the fill pipe may have been dislodged during construction work in the vicinity of the tank. The lack of a fill pipe apparently resulted in the release of fuel oil as dirt and water entering the tank displaced the product. The fill pipe was replaced immediately upon discovery that the original pipe was missing.

1.2 Estimated Quantity of the Release: Since the fill pipe may have been missing for a period of up to two years (the tank contained fuel but was temporarily out of service during this period), it is not possible to ascertain the quantity of fuel displaced from the tank prior to discovery of the leak. However, reports indicate that approximately 200-300 gallons of water and mud was pumped out of the tank prior to being returned to service. This may provide some indication of the quantity of fuel oil displaced from the tank.

1.3 Surrounding Land Use And Populations: The spill site is located within a large tract of land owned by Glaxo Inc. The location of the facility is shown on Figure 1. The Glaxo property is bounded on the north by So-Hi Drive and Ellis Road, on the south by a research area and Alexander Drive, on the west by a residential area, and on the east by the Durham

TABLE 3

GROUNDWATER SAMPLING RESULTS
FUEL OIL LEAK REMEDIATION
GLAXO INC., RTP, NC

Parameter	Results (ug/l)	NC Groundwater Standards ([1]) (ug/l)
Benzene	BDL	1.0
Toluene	BDL	1,000.0
Ethylbenzene	BDL	29.0
Xylenes (total)	3.3	400.0
Chlorobenzene	BDL	300.0
1,2-Dichlorobenzene	16.0	620.0
1,3-Dichlorobenzene	1.3	620.0
1,4-Dichlorobenzene	20.0	1.8

Notes:

BDL = Below Detection Limit; Detection Limit = 1 ug/l
([1]) North Carolina Administrative Code, Title 15, Subchapter 2L, Section .0200

East-West Expressway. The immediate area surrounding Glaxo's property is zoned research. The closest residential area is located north of the facility off of Ellis Road, approximately 4000 feet from the UST leak site.

1.4 Water Quality: Reports indicate that the predominant source of groundwater in Durham County is from fractures and other secondary openings in rock. This water is reported to be suitable for most domestic, municipal and industrial purposes. Groundwater quality data exhibited in Table 1 was taken from Bulletin No. 7 "Geology and Groundwater in the Durham Area, North Carolina," prepared by the North Carolina Department of Water Resources and U.S. Geological Survey, 1966.

1.5 Use and Approximate Location of Wells Potentially Affected By The Release: None identified. According to state officials, no public water supplies exist within a one-mile radius of the Glaxo facility.

1.6 Subsurface Soil Conditions: The soils in the vicinity of the Glaxo facility are from the White Store Series which consist of nearly level to moderately steep, moderately well-drained soils on uplands. In a typical profile, the permeability ranges from 2.0 to 6.0 inches per hour in the 0-6 inch interval (sandy loam), and less than 0.06 inches per hour in the 6-35 inch interval (clay loam). The clay loam is underlain by weathered sandstone and shale. Additional information concerning the White Store Series, taken from the Soil Survey of Durham County, is contained in Appendix A.

As shown in the cross section exhibited in Figure 4, weathered sandstone was encountered at a depth of approximately six feet below land surface in the vicinity of the tank excavation. The sandstone is overlain by a layer,

approximately one foot in thickness, of relatively loose, clayey silt. Soil in the "lower" spill area (southeastern portion of the site) is predominantly a clayey silt.

1.7 Location of Subsurface Sewers: There are no subsurface sewers located in the immediate vicinity of the fuel oil leak. However, as indicated in Figure 2, a duct bank and a natural gas line pass along the northwest side of the UST excavation area. These lines are buried at relatively shallow depths (less than three feet below land surface) and would not likely serve as conduits for migration of product nor create hazards associated with accumulation of vapors in confined spaces.

1.8 Climatological Conditions: Conditions for Durham County are described in the excerpt contained in Appendix B. This information was taken from the Soil Survey of Durham County and includes data pertaining to temperature, precipitation, cloudiness, storms and windiness.

2.0 INFORMATION REQUIRED PURSUANT TO 40 CFR 280.63(a)(3)

2.1 Sample Types: Except for one groundwater sample, collected from the excavation in the vicinity of T-4 (see Figure 2), all samples collected were grab samples of soil.

2.2 Sample Locations: Sample locations of all samples submitted for laboratory analysis are shown in Figures 2, 3 and 4. Locations were selected primarily to determine the extent of lateral migration of fuel oil and to identify preferential pathways of fuel migration. Vertical movement of fuel was constrained by a shallow groundwater table in the southeastern portion of the spill area and by consolidated rock in the northwestern portion.

2.3 Measurement Methods: All samples were placed immediately on ice and delivered to the laboratory under proper chain-of-custody procedures. The groundwater sample was analyzed using EPA Method 602 as referenced in "Test Procedures For The Analysis Of Pollutants Under The Clean Water Act," Federal Register Vol. 49, No. 209, 40 CFR Part 136, October 26, 1984. Because of the need for accelerated turnaround time in order to aid in directing remediation efforts, selected soil samples were analyzed using EPA Method 418.1 found in Methods For Chemical Analysis Of Water And Wastes, EPA-600/4-79-020, Revised March 1983. The remainder of the soil samples were analyzed using a modified version of EPA Methods 3550 and 8015 found in Test Methods For Evaluating Solid Wastes: Physical/Chemical Methods, 3rd Edition, 1986, US EPA Publication Number SW-846.

2.4 Analytical Results: Analytical results for soil and groundwater are summarized in Tables 2 and 3, respectively. Copies of analytical reports are contained in Appendix C. As indicated by the sampling results contained in Table 2, soil contamination outside of the area exhibiting surface stains appeared to be non-existent or relatively minor with the exception of the "GT" sampling area and the "lower" spill area around sample locations E-3 and T-3.

2.5 Corrective Action: As documented in the 20-day initial abatement report dated May 8, 1990, the following corrective action steps were taken in immediate response to the release:

2.5.1 The UST system was permanently closed via excavation and removal. Approximately 9,618 gallons of fuel oil were removed from the tank prior to closure and delivered to a fuel blending facility operated by Noble Oil Service in Sanford, NC. The tank was cleaned, cut into sections and sold as scrap metal to Safeway Tank.

2.5.2 All soil exhibiting obvious contamination was excavated to the extent practicable. Initial soil removal in the "lower" spill area was limited to the area exhibiting surface stains. However, the excavated area was expanded upon receiving analytical results associated with sample nos. T-1, T-2, T-3 and E-3. Excavation vertically in the area of these samples was defined by the upper reaches of the saturated zone (water table). Excavation vertically in the area of the UST was defined by the tank support pad and bedrock located between the pad and the drainage pipe. Approximately 1,382 tons of contaminated soil was removed from the site and transported to Southeastern (Southeastern) Soil Recovery, Inc. located in Charleston, SC. At Southeastern, soil is decontaminated using a thermal treatment process then subsequently incorporated into a traditional asphalt mix.

2.5.3 Groundwater, along with trace amounts of free product, was pumped from the excavation created during removal of the stained soil. After leaving the excavation open overnight, product was observed in narrow bands primarily along the sides of the excavation. These bands revealed no discernable thickness thereby indicating that the quantity of product remaining in the subsurface was nominal. Approximately 4,555 gallons of water (with trace amounts of fuel) were pumped from the excavation in an effort to

remove the product discovered and induce movement of additional product into the excavation. Groundwater which recharged the excavation prior to backfilling contained no significant accumulation of product.

2.5.4 The excavation area was backfilled with "clean" fill material. The area was seeded and currently supports a healthy cover of Fescue grass.

3.0 INFORMATION REQUIRED PURSUANT TO 40 CFR 280.63(a)(4)

Free product was encountered essentially in four areas at the site.

3.1 Area 1 - beneath the UST. Product leaving the fill pipe area apparently migrated alongside the tank and accumulated in pockets between the tank bottom and supporting sandy backfill. Upon removing the tank and disturbing the backfill, the product was absorbed by surrounding backfill which was removed and transported to Southeastern Soil Recovery, Inc.

3.2 Area 2 - along the excavation sidewall adjacent to the emergency generator pad. During excavation in this area, fuel oil was observed seeping from the sidewall in one or two locations. It is possible that this product may have migrated beneath the edge of the generator pad and accumulated in several isolated "pockets" within the coarse backfill upon which the generator is located. Investigation to determine if additional product exists in this area will be conducted upon removal of the generator.

3.3 Area 3 - area between stream and sample location T-1. On April 10, 1990, several test pits were constructed in this area to determine if free product was present in the subsurface. A test pit constructed approximately four feet south of T-1 revealed evidence of product estimated at 1/16" - 1/8" thickness. An additional test pit located approximately thirteen feet south of T-1 contained an oil sheen of immeasurable thickness. Several additional test pits constructed in the immediate area revealed no evidence of free product. Observation of all test pits on May 31, 1990 revealed only a sheen of immeasurable thickness in one pit.

3.4 Area 4 - seepage into the stream. Product was observed to be seeping into the stream predominantly from the streambank between sampling location SB-2 and a point five feet upstream of location SB-1. This product was removed from the stream with absorbent pads and booms over a period of several weeks. No product was observed either in the stream or seeping from the stream bank in the vicinity of SB-1 and SB-2 on May 31, 1990.

FREE PRODUCT REMOVAL

With respect to free product removal requirements listed at 40 CFR 280.64, all feasible efforts to remove observed product have been performed as described in the Initial Site Characterization section of this report. Based on recent observations of test pits and surface water conditions, it appears that only a trifling amount of product remains in the subsurface. However, steps will be taken during investigation of soil beneath the generator to identify and remove any remaining free product in this area.

TABLES

TABLE 1

GROUNDWATER QUALITY DATA

DURHAM AREA, NORTH CAROLINA

Constituent	Parts per million		
	Minimum	Maximum	Median
Silica (SiO_2)	6.6	4.7	25
Iron (Fe)	0.00	5.4	0.19
Calcium (Ca)	1.1	388	23
Magnesium (Mg)	0.4	89	7.9
Sodium (Na)	0.2	188	13
Potassium (K)	0.1	6.3	0.3
Bicarbonate (HCO_3)	14	412	111
Sulfate (SO_4)	0.4	67	4.4
Chloride (Cl)	0.2	750	12
Flouride (F)	0.0	1.5	0.1
Nitrate (NO_3)	0.0	75	3.2
Hardness	5	1340	86
Dissolved Solids	16	806	162
Hydrogen-ion concentration (pH)	5.8	8.0	6.8
Specific Conductance in micromhos	22	3100	255

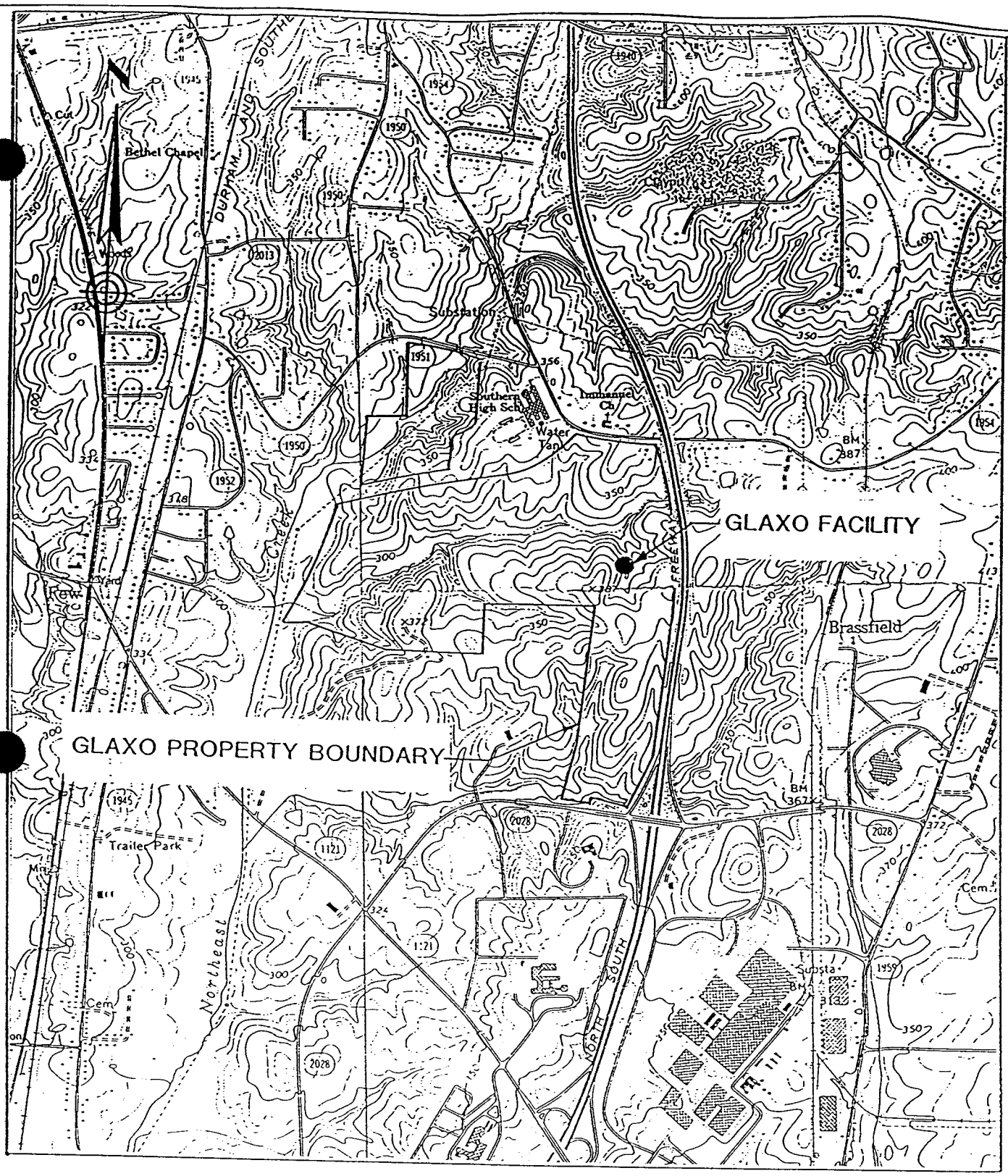
TABLE 2

SOIL SAMPLING RESULTS
FUEL OIL LEAK REMEDIATION
GLAXO INC., RTP, NC

SAMPLE ID #	TOTAL PETROLEUM HYDROCARBONS (mg/kg) EPA METHOD 418.1 (FT-IR) (1)	MODIFIED EPA METHOD 3550/8015 (GC-MS) (2)
GT-1		1300
GT-2		BDL
GT-3	180	
GT-4	1900	
IT-1	BDL	
IT-2	BDL	
GSW-1	BDL	BDL
GSW-2		BDL
E-1	BDL	
E-2	BDL	
E-3	1400	
T-1	27	
T-2	30	
T-3	11000	
T-4	1900	
SB-1		BDL
SB-2		BDL
SW-1/SEC-1	BDL	BDL
WW-1		BDL
WW-2		BDL
WW-3		20
WW-4		BDL
BA-1		BDL
BA-2		BDL
BA-3		BDL
BA-4		BDL

Notes:
BDL - Below Detection Limit
(1) - Detection Limit = 25 MG/KG
(2) - Detection Limit = 10 MG/KG

FIGURES



REFERENCE :USGS SW , SE DURHAM QUADRANGLES

FIGURE 1

SCALE 1:24,000

SIRRINE ENVIRONMENTAL CONSULTANTS

Raleigh North Carolina

FACILITY KEY PLAN

GLAXO INC .,

RESEARCH TRIANGLE PARK , N.C.

SIRRINE PROJECT NO. R-0174

DUNCAN-PARNELL, INC., CHARLOTTE 366 800-432-6022

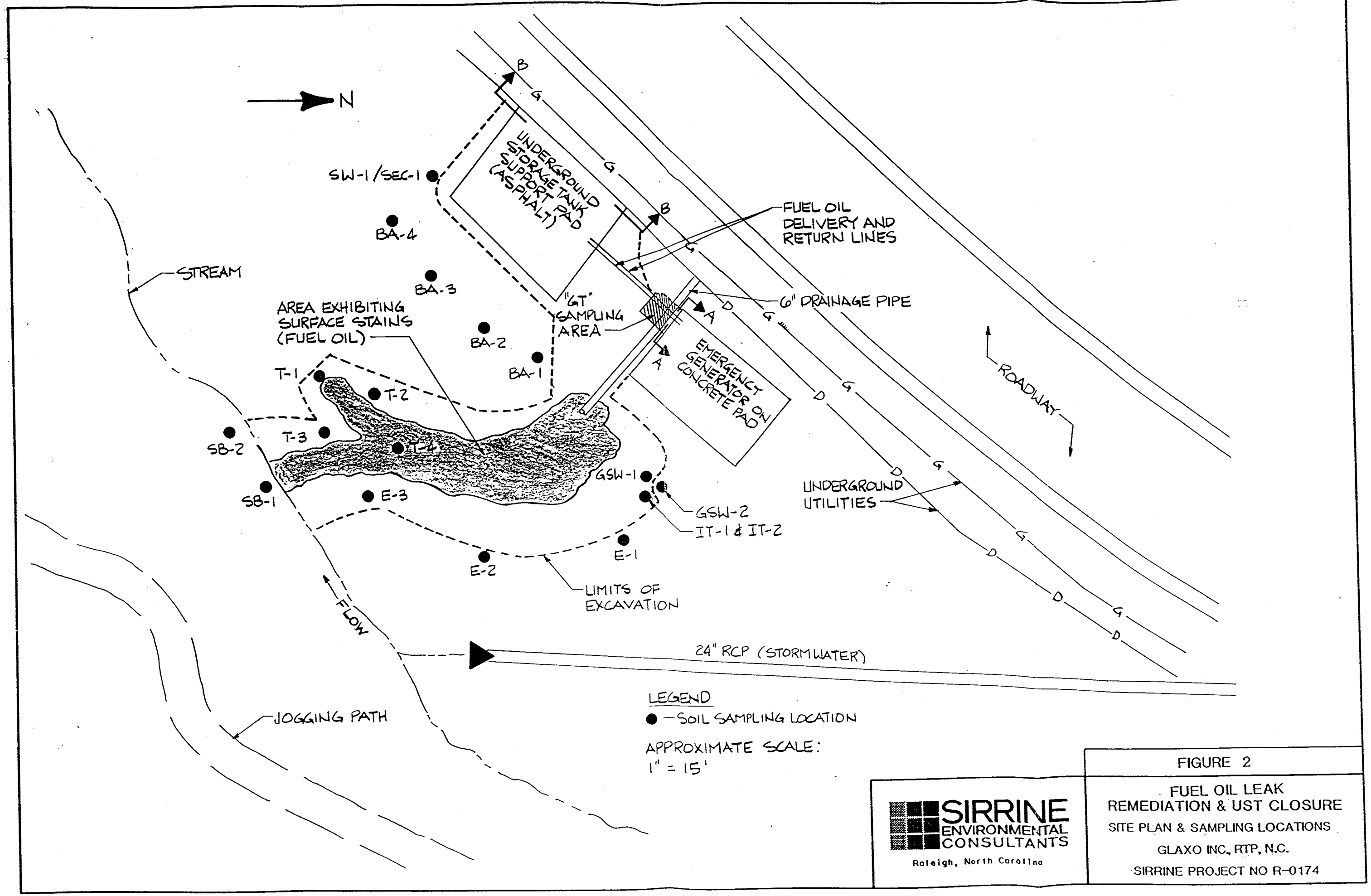


FIGURE 2

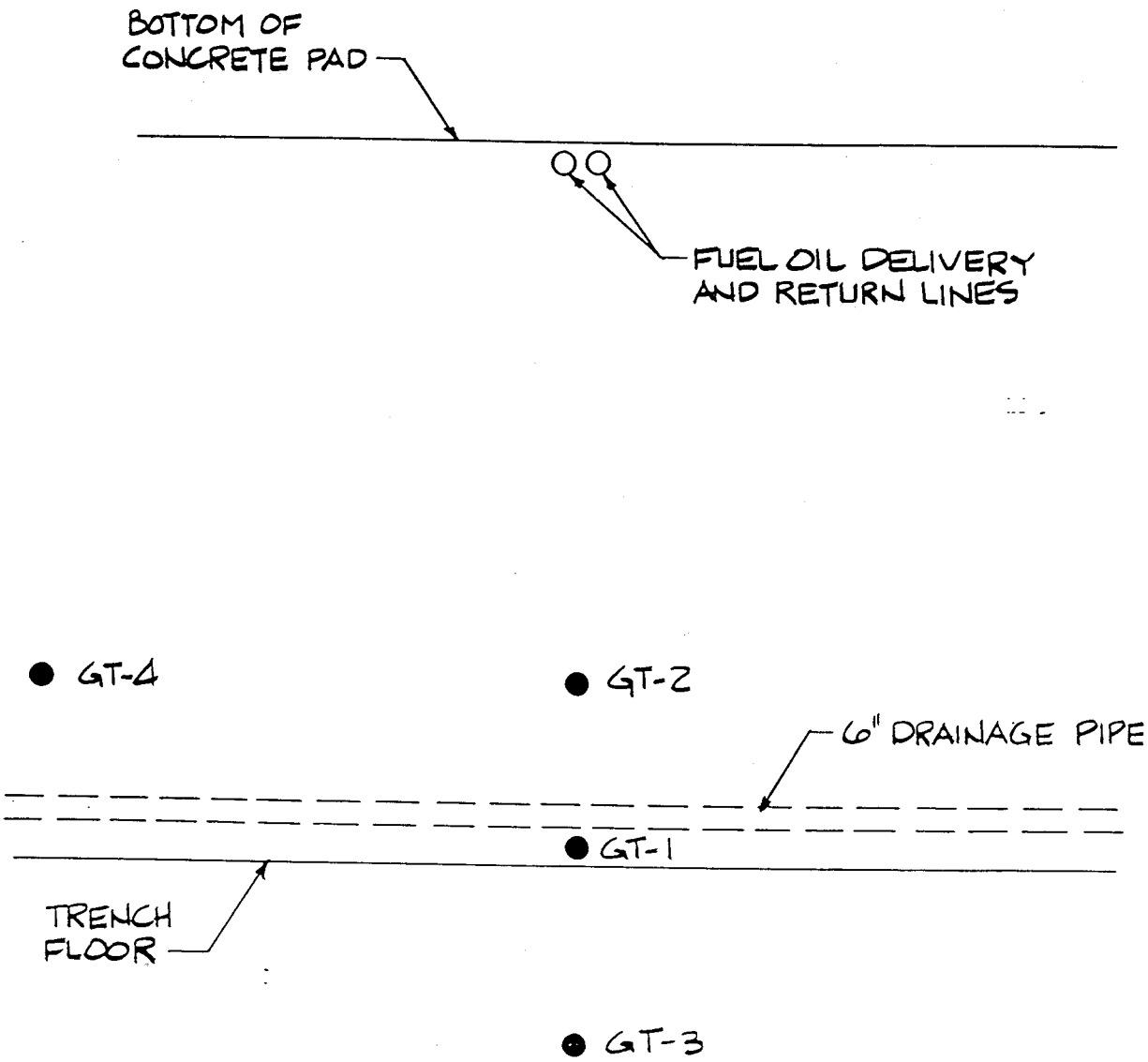
SIRRINE ENVIRONMENTAL CONSULTANTS
Raleigh, North Carolina

FUEL OIL LEAK
REMEDIATION & UST CLOSURE
SITE PLAN & SAMPLING LOCATIONS
GLAXO INC., RTP, N.C.
SIRRINE PROJECT NO R-0174

DUNCAN-PARNELL, INC., CHARLOTTE 866 600-482-6022

APPENDIX A

SUBSURFACE SOIL CONDITIONS



SECTION A-A

LEGEND

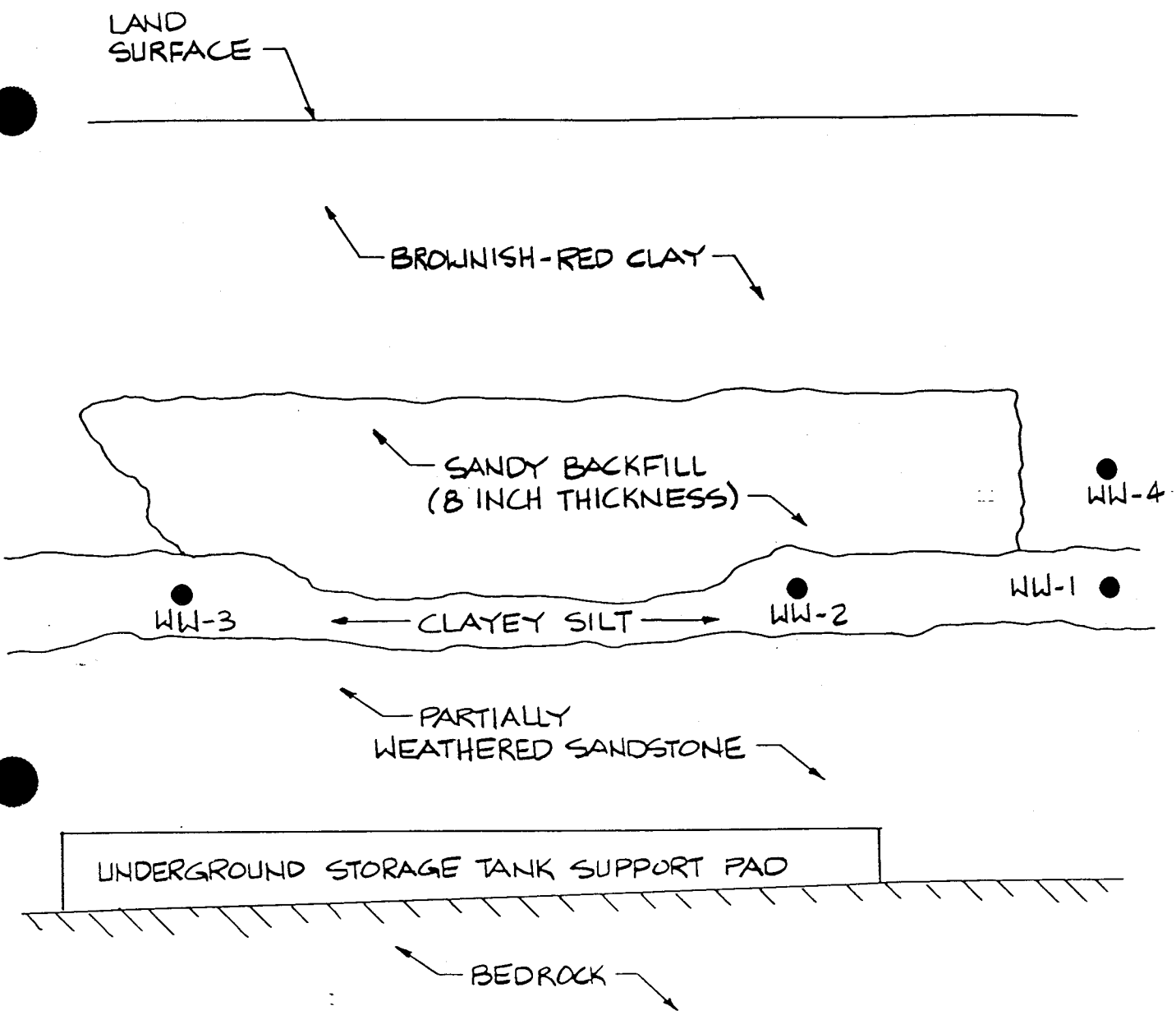
● — SOIL SAMPLING LOCATION

APPROXIMATE SCALE:
1" = 1'

FIGURE 3

SIRRINE ENVIRONMENTAL CONSULTANTS
Raleigh, North Carolina

FUEL OIL LEAK
REMEDIATION & UST CLOSURE
"GT" SAMPLING AREA CROSS SECTION
GLAXO INC., RTP, N.C.
SIRRINE PROJECT NO R-0174



SECTION B-B

LEGEND

● — SOIL SAMPLING LOCATION

APPROXIMATE SCALE:
VERT. : 1" = 2'
HORIZ : 1" = 5'

FIGURE 4

SIRRINE ENVIRONMENTAL CONSULTANTS
Raleigh, North Carolina

FUEL OIL LEAK
REMEDIATION & UST CLOSURE
"UST" EXCAVATION CROSS SECTION
GLAXO INC , RTP, N.C.
SIRRINE PROJECT NO R-0174

A2—3 to 9 inches, light yellowish-brown (10YR 6/4) sandy loam; weak, medium, granular structure; very friable; common medium roots; strongly acid; abrupt, wavy boundary.

B1—9 to 12 inches, reddish-yellow (7.5YR 6/6) sandy clay loam; moderate, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common medium pores; very strongly acid; clear, wavy boundary.

B2t—12 to 30 inches, strong-brown (7.5YR 5/8) clay; moderate, medium, subangular blocky structure; firm, sticky, plastic; few fine roots; common fine pores; few discontinuous clay films on faces of peds; strongly acid; gradual, wavy boundary.

B3—30 to 36 inches, mottled strong-brown (7.5YR 5/6) and very pale brown (10YR 7/4) clay loam; weak, medium, subangular blocky structure; firm, slightly sticky, slightly plastic; few, fine, hard, white silty fragments; strongly acid; gradual, wavy boundary.

C—36 to 60 inches, mottled strong-brown (7.5YR 5/6), very pale brown, (10YR 7/4) and white (10YR 8/2) saprolite that crushes to silt loam; massive; friable; very strongly acid.

Depth to bedrock is more than 4 feet. The B horizon is very strongly acid or strongly acid.

The Ap horizon, if present, is yellowish brown, and the A1 horizon is dark brown or dark grayish brown. The A2 horizon is commonly yellow, light yellowish brown, or brown. The B1 horizon, if present, is reddish-yellow or brownish-yellow sandy clay loam or loam. The B2t horizon is strong-brown or brownish-yellow clay or sandy clay. The B3 horizon is strong-brown and very pale brown clay loam, sandy clay loam, or loam. The B horizon commonly has very pale brown mottles. The C horizon is mottled strong-brown, brown, very pale brown, yellow, red, or white saprolite that crushes to silt loam or loam.

Wedowee sandy loam, 10 to 15 percent slopes (WmD).—This well-drained soil is on side slopes adjacent to major drainageways in the uplands. It has the profile described as representative of the series. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 8 acres in size.

Included with this soil in mapping are areas where stones are on the surface and spots where the soil is eroded. Also included are areas of Nason soils.

This Wedowee soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Slope and the erosion resulting from runoff are the major concerns in management. Capability unit IVe-1; woodland suitability group 3o7.

Wedowee sandy loam, 15 to 25 percent slopes (WmE).—This well-drained soil is on side slopes adjacent to major drainageways in the uplands. It has a surface layer of yellowish-brown or dark-brown sandy loam. Its subsoil is reddish-yellow to strong-brown, firm clay loam to sandy clay loam. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 15 acres in size.

Included with this soil in mapping are places where slopes are more than 25 percent. Also included are areas of Nason soils.

Infiltration is moderate, and runoff is rapid.

This soil is well suited to pine and hardwood forest and to pasture. Slope and the erosion resulting from runoff are the major concerns in management. Capability unit VIe-1; woodland suitability group 3r8.

Wehadkee Series

The Wehadkee series consists of nearly level, poorly drained soils on flood plains. These soils formed in fine loamy alluvium washed from soils on uplands.

In a representative profile the surface layer is brown silt loam about 7 inches thick. The subsoil to a depth of about 46 inches is mottled light-gray, friable silty clay loam. Below this to a depth of 60 inches is mottled dark-brown and light-gray, friable clay loam.

Wehadkee soils are flooded very frequently for very brief periods. They are low in natural fertility and medium in organic-matter content. Permeability is moderate, and available water capacity is high. The root zone is deep. Shrink-swell potential is low. The seasonal high water table is generally at or near the surface late in winter and early in spring.

Most of the acreage is now forested with mixed hardwoods. If adequately drained, these soils are fairly well suited to some row crops, including corn. The major limitations are wetness and flooding.

Representative profile of Wehadkee silt loam in a hardwood forest 5.7 miles southwest from Durham on U.S. 15-501; 100 feet south of road, and 100 feet west of New Hope Creek:

A1—0 to 7 inches, brown (10YR 5/3) silt loam; weak, coarse, granular structure; friable, slightly sticky, slightly plastic; many fine roots; few brittle concretions; medium acid; abrupt, smooth boundary.

B1—7 to 12 inches, light-gray (10YR 7/2) silty clay loam; many, coarse, distinct, dark-brown (10YR 4/3) mottles; weak, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; common medium pores; common, small, soft, dark-brown concretions; medium acid; clear, wavy boundary.

B2g—12 to 46 inches, light-gray (10YR 7/1) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) and dark-brown (10YR 4/3) mottles; weak, coarse, subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots to a depth of about 24 inches; common medium pores; common small concretions; medium acid; gradual, irregular boundary.

B3—46 to 60 inches, mottled dark-brown (10YR 4/3) and light-gray (10 YR 7/1) clay loam; weak, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; common, small, soft, dark-brown concretions; medium acid.

Depth to bedrock is more than 5 feet. The B horizon is medium acid or slightly acid.

The Ap horizon, if present, is grayish brown, and the A1 horizon is brown, grayish brown, or gray. The B1 horizon is light-gray or gray silty clay loam or loam. The B2 horizon is light-gray or gray silty clay loam or clay loam mottled with yellowish brown and dark brown. The B3 horizon is mottled dark brown or brown and light gray. The C horizon, if present, is commonly gray or light-gray sandy loam or gray stratified sand and gravel.

Wehadkee silt loam (Wn).—This poorly drained soil is on narrow flood plains. Areas generally occur as narrow bands parallel to small streams and are 3 to 50 acres in size. Slopes range from 0 to 2 percent.

Included with this soil in mapping are areas of Congaree and Chewacla soils.

This Wehadkee soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture. Infiltration is moderate, and runoff is slow.

This soil is fairly well suited to corn and pasture. Flooding and wetness are the major concerns in management. Capability unit IVw-1; woodland suitability group 1w9.

White Store Series

The White Store series consists of nearly level to moderately steep, moderately well drained soils on uplands. The landscape is one of rounded divides and steep side slopes. These soils formed under forest vegetation, in material weathered from Triassic Mudstone.

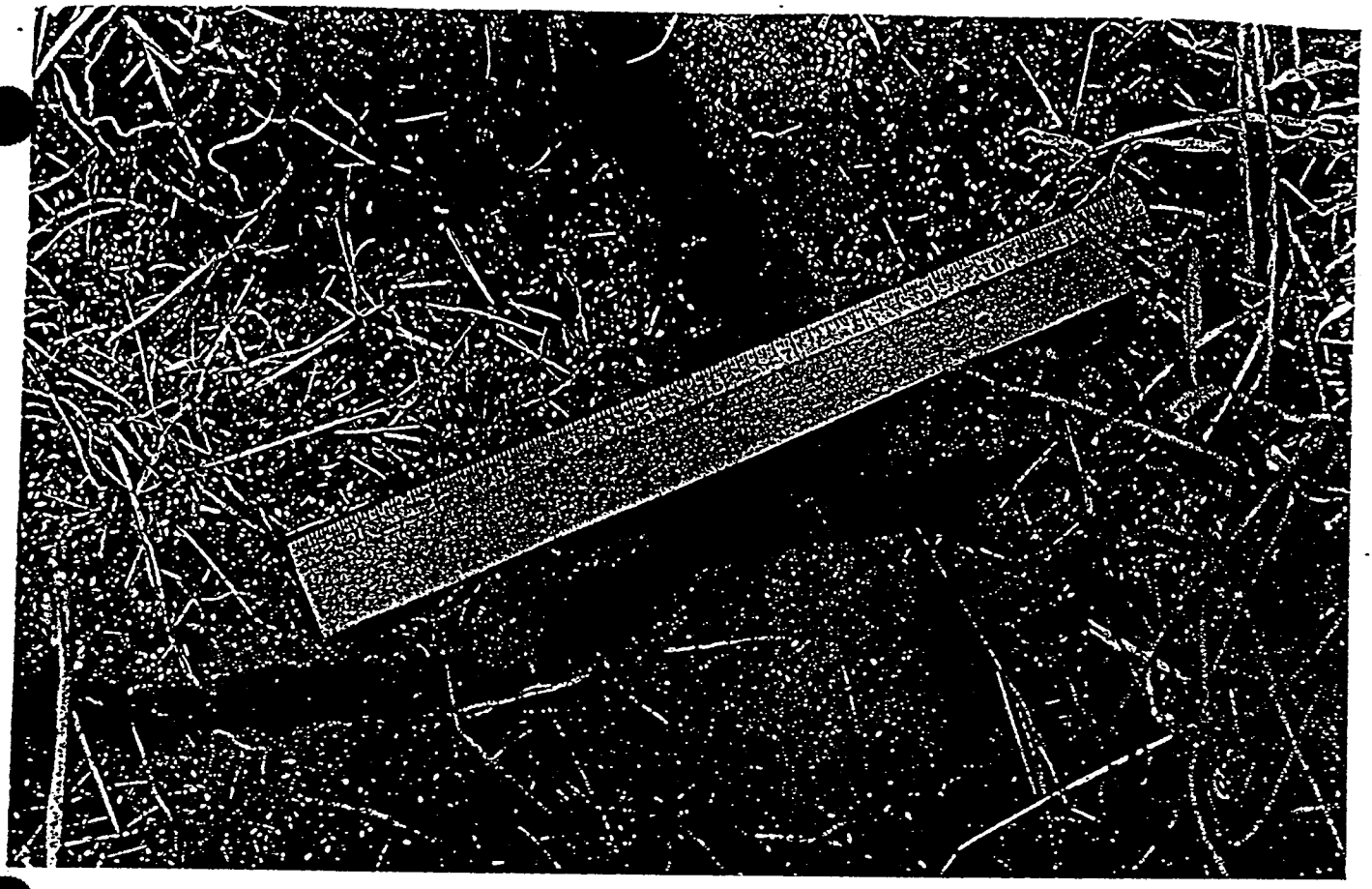


Figure 8.—Cracks 1¾ inches wide and 10 inches deep in a White Store soil.

In a representative profile the surface layer is brown sandy loam about 6 inches thick. The subsoil is about 29 inches thick. The upper part is strong-brown, firm clay loam. The lower part is mottled yellowish-red, very firm clay. The underlying material to a depth of 60 inches is dark reddish-brown, highly weathered sandstone and shale and mottled red and pink, partly weathered, fine-grained sandstone that crushes to fine sandy loam.

White Store soils are low in natural fertility and organic-matter content. Permeability is very slow, and available water capacity is medium. The root zone is deep. Shrink-swell potential is high; the soil shrinks when dry and swells when wet (fig. 8). Depth to the seasonal high water table is about 1½ feet.

Most of the acreage is forested with loblolly pine and low-quality hardwoods. The rest is chiefly in pasture or under cultivation. The soils are well suited to most crops commonly grown in the county, including tobacco, corn, and small grain. The major limitations are the erosion hazard resulting from runoff, the very slow permeability, the steep slopes, the high shrink-swell potential, and a perched water table.

Representative profile of White Store sandy loam, 2 to 6 percent slopes, in a young pine forest 1 mile north of Nelson on State Road 1959 at the intersection with State Road 1969; 25 feet west of road:

Ap—0 to 6 inches, brown (10YR 5/3) sandy loam; weak, medium, granular structure; very friable; common fine roots; few quartz pebbles; medium acid; abrupt, wavy boundary.

B1t—6 to 10 inches, strong-brown (7.5YR 5/6) clay loam; weak, medium, subangular blocky structure; firm, sticky, plastic; few fine roots; few discontinuous clay films; few quartz pebbles; strongly acid; clear, wavy boundary.

B21t—10 to 22 inches, yellowish-red (5YR 5/6) clay; common, medium, distinct, reddish-brown (5YR 4/4) and yellowish-brown (10YR 5/6) mottles; prismatic structure parting to moderate, fine and medium, blocky structure; very firm, very sticky, very plastic; few fine roots; common continuous clay films on faces of peds; very strongly acid; gradual, wavy boundary.

B22t—22 to 28 inches, yellowish-red (5YR 4/6) clay; many, medium, distinct, reddish-brown (5YR 4/4) and light brownish-gray (10YR 6/2) mottles; moderate, medium, blocky structure; very firm, very plastic, very sticky; few discontinuous clay films on faces of peds; very strongly acid; gradual, wavy boundary.

B3t—28 to 35 inches, yellowish-red (5YR 5/6) clay; many, coarse, distinct mottles and streaks of reddish brown (2.5YR 4/4) and gray (10YR 5/1); weak, medium, blocky structure; very firm, sticky, plastic; few discontinuous clay films on faces of peds; few small flakes of mica; common soft shale fragments; very strongly acid; gradual, wavy boundary.

C1—35 to 38 inches, dark reddish-brown (2.5YR 3/4), highly weathered sandstone and shale containing pockets of

clay; many, coarse, distinct, gray (10YR 6/1) and yellowish-brown (10YR 5/4) mottles; massive; friable; few small flakes of mica; strongly acid; clear boundary.

C2—38 to 60 inches, mottled red and pink, partly weathered, fine-grained sandstone that crushes to fine sandy loam; massive; medium acid.

Depth to bedrock is more than 4 feet. The B horizon is very strongly acid or strongly acid.

The Ap horizon is brown or yellowish brown, and the A1 horizon, if present, is grayish brown, brown, or yellowish brown. The A horizon is sandy loam or clay loam. The B1t horizon, if present, is strong-brown or brown clay, clay loam, or sandy clay loam. The B2t horizon is yellowish-red or reddish-brown clay to silty clay. The B3 horizon, if present, is reddish-yellow, yellowish-red, dark reddish-brown, or dusky red clay to silty clay loam. The B horizon has many red, brownish-yellow, or gray mottles. The upper part of the C horizon is commonly dark reddish-brown, weathered sandstone or siltstone that has gray mottles. The lower part of the C horizon is gray, red, and light-red, partly weathered sandstone.

White Store sandy loam, 2 to 6 percent slopes (WsB).—This moderately well drained soil is on broad ridges on uplands. It has the profile described as representative of the series. Areas are generally elliptical in shape and 2 to 10 acres in size.

Included with this soil in mapping are areas of similar soils that have a surface layer of fine sandy loam or silt loam and a few small areas where the soil is eroded. Also included are a few areas of Creedmoor and Mayodan soils.

This White Store soil is easy to keep in good tilth. Because the subsoil is very slowly permeable, however, tillage is restricted after heavy rain. Infiltration is moderate, and runoff is medium.

This soil is well suited to tobacco, corn, small grain, hay, and pasture. Erosion resulting from runoff, high shrink-swell potential, and very slow permeability are the major concerns in management. Capability unit IIe-3; woodland suitability group 4c2.

White Store sandy loam, 6 to 10 percent slopes (WsC).—This moderately well drained soil is on narrow side slopes on uplands. It has a surface layer of brown or yellowish-brown sandy loam. Its subsoil is yellowish-red, very firm clay or silty clay that in most places is mottled with red and gray. Areas occur as narrow bands that are roughly rectangular in shape and range from 3 to 15 acres in size.

Included with this soil in mapping are areas of soils that have a surface layer of fine sandy loam and a few areas where the soil is eroded. Also included are a few acres of Creedmoor and Pinkston soils.

This White Store soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

The soil is well suited to pine and hardwood forests and to corn, tobacco, small grain, and pasture. The slope, the erosion resulting from runoff, the high shrink-swell potential, and the very slow permeability are the major concerns in management. Capability unit IIIe-3; woodland suitability group 4c2.

White Store sandy loam, 10 to 25 percent slopes (WsE).—This moderately well drained soil is on side slopes adjacent to major drainageways in uplands. It has a surface layer of yellowish-brown or grayish-brown sandy loam. Its subsoil is yellowish-red, very firm clay. Areas occur as long, narrow bands that are roughly rectangular in shape and 3 to 20 acres in size.

Included with this soil in mapping are areas of soils that have a surface layer of fine sandy loam or loam and spots where the soil is eroded. Also included are areas of Mayodan and Pinkston soils.

Infiltration is moderate, and runoff is rapid.

This soil is well suited to pine and hardwood forests and to pasture. The slope, the erosion resulting from runoff, the high shrink-swell potential, and the very slow permeability are the major concerns in management. Capability unit VIe-1; woodland suitability group 4c2.

White Store clay loam, 2 to 10 percent slopes, eroded (WvC2).—This moderately well drained soil is on ridges and narrow side slopes on uplands. It has a surface layer of yellowish-brown clay loam. Its subsoil is reddish-brown, very firm clay that in most places is mottled with red and gray. Areas occur as narrow bands that are roughly rectangular in shape and 2 to 25 acres in size.

Included with this soil in mapping are a few spots where the surface layer is fine sandy loam and a few acres where shallow gullies have formed. Also included are a few acres of Pinkston and Wilkes soils.

This White Store soil is easy to keep in good tilth, but it can be worked within only a narrow range of moisture content because the surface layer has a high content of clay. Infiltration is slow, and runoff is rapid.

This soil is well suited to pine and hardwood forest and to pasture. The slope, the erosion resulting from runoff, the high shrink-swell potential, and the very slow permeability are the major concerns in management. Capability unit VIe-2; woodland suitability group 4c2.

White Store clay loam, 10 to 25 percent slopes, eroded (WvE2).—This moderately well drained soil is on side slopes adjacent to major drainageways on uplands. It has a surface layer of yellowish-brown clay loam. Its subsoil is yellowish-red, very firm clay or silty clay. Areas occur as long, narrow bands that are roughly rectangular in shape and 2 to 20 acres in size.

Included with this soil in mapping are a few spots where the surface layer is fine sandy loam and a few places where deep gullies have formed. Also included are areas of Pinkston soils.

Infiltration is slow, and runoff is rapid.

This soil is suited to pine and hardwood forests and to pasture. The slope, the erosion resulting from runoff, the high shrink-swell potential, and the very slow permeability are the major concerns in management. Capability unit VIIe-2; woodland suitability group 4c2.

White Store-Urban land complex, 0 to 10 percent slopes (WwC).—This complex consists of White Store soil and Urban land, which is mainly White Store soil material. As much as 30 percent of each mapped area is covered by streets, houses, and other structures. About 30 percent is an undisturbed White Store soil. About 25 percent is a White Store soil that in places has been covered with as much as 18 inches of fill material and in other places has had as much as two-thirds of the original soil material removed. The rest is fill, 18 inches or more thick, or places where the original soil material has been cut away. The fill material is commonly a mixture of sandy loam and clay.

Included with this complex in mapping are areas of Creedmoor and Mayodan soils. Capability unit unassigned; woodland suitability group unassigned.

White Store-Urban land complex, 10 to 25 percent slopes (WwE).—This complex consists of White Store soil and Urban land, which is mainly White Store soil material.

About 25 percent of each mapped area is covered by houses, streets, driveways, and sidewalks. About 40 percent is an undisturbed White Store soil. About 30 percent is a White Store soil that has been graded or terraced. In these graded or terraced areas, as much as two-thirds of the original soil material has been cut away or as much as 18 inches of fill material has been added. The rest of each mapped area is fill, 18 inches or more thick, or places where the original soil material has been cut away. The fill material is a mixture of sand and very plastic clay.

Included with this complex in mapping are areas of Mayodan soils. Capability unit unassigned; woodland suitability group unassigned.

Wilkes Series

The Wilkes series consists of strongly sloping and moderately steep, well-drained soils on uplands. The landscape is one of rounded divides and steep side slopes. These soils formed under forest vegetation, in residuum from mixed acidic and basic rock.

In a representative profile the surface layer is grayish-brown sandy loam about 3 inches thick. It is underlain by a 3-inch layer of light brownish-gray sandy loam. The subsoil is yellowish-brown, firm clay and clay loam about 7 inches thick. The underlying material to a depth of about 40 inches is mottled yellowish-brown, green, black, and gray saprolite that crushes to silt loam. Hard bedrock is at a depth of 40 inches.

Wilkes soils are medium in natural fertility and low in organic-matter content. Permeability is moderately slow, and available water capacity is low. The root zone is moderately deep. Shrink-swell potential is moderate. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is forested with loblolly pine and low-quality hardwoods. The rest is chiefly in pasture. The soils are fairly well suited to most row crops grown in the county, including tobacco and corn. The major limitations are the erosion hazard resulting from runoff, the steep slopes, the depth to bedrock, and the seasonal high water table.

Representative profile of Wilkes sandy loam, 10 to 25 percent slopes, in a wooded area 10.4 miles southeast of Durham on State Road 1901; 100 feet north or road:

O1—3 inches to 1 inch, undecomposed mixed hardwood and pine forest litter.

O2—1 inch to 0, partly decomposed forest litter.

A1—0 to 3 inches, grayish-brown (2.5Y 5/2) sandy loam; moderate, medium, granular structure; very friable; common fine and medium roots; common quartz pebbles ¼ inch to 2 inches in diameter; strongly acid; abrupt, smooth boundary.

A2—3 to 6 inches, light brownish-gray (2.5Y 6/2) sandy loam; moderate, medium and coarse, granular structure; very friable; common fine and medium roots; common small strong-brown fragments of weathered rocks; common quartz pebbles ¼ inch to 2 inches in diameter; strongly acid; abrupt, smooth boundary.

B2t—6 to 10 inches, yellowish-brown (10YR 5/6) clay; common, fine, prominent black and green mottles and common, fine, faint, strong-brown mottles which are assumed to be partly weathered primary materials; massive parting to coarse, angular blocky structure; firm, sticky, plastic; few fine roots; few small pores; few, discontinuous clay films on faces of peds and on walls of cracks; few medium pebbles; material from A horizon in old root channels; slightly acid; clear, wavy boundary.

B3t—10 to 13 inches, yellowish-brown (10YR 5/6) clay loam; weak, coarse, subangular blocky and platy structure; firm, sticky, plastic; common, fine, partly weathered black, gray, and green primary minerals; few fine roots; few discontinuous clay films on faces of peds; common hard schist fragments; slightly acid; abrupt, wavy boundary.

C—13 to 40 inches, mottled yellowish-brown, green, black, and gray saprolite which crushes to silt loam; massive (platy rock structure); friable; few fine roots; thin discontinuous clay films line vertical cracks; common, small and medium, hard schist fragments; neutral; abrupt, wavy boundary.

R—40 inches, hard bedrock.

Depth to bedrock is more than 2 feet. The B horizon is medium acid to neutral.

The Ap horizon, if present, is brown, and the A1 horizon is grayish brown or yellowish brown. The A2 horizon is light brownish gray or yellowish brown. The B horizon is mottled with black, green, and brown. The B2t horizon is yellowish-brown or brown clay or clay loam. The B3t horizon, if present, is yellowish-brown or brown clay loam, loam, or silt loam and in places has partly weathered rock fragments. The C horizon is commonly mottled yellowish-brown, green, black, and gray saprolite that crushes to silt loam or loam.

Wilkes sandy loam, 10 to 25 percent slopes (WxE).—This well-drained soil is on side slopes adjacent to major drainageways in the uplands. Areas occur as narrow bands that are roughly rectangular in shape and range from 2 to 10 acres in size.

Included with this soil in mapping are places where slopes are less than 10 percent and areas where many stones are on the surface.

Infiltration is moderate, and runoff is rapid.

This soil is well suited to pine and hardwood forest and to pasture. The slope, the erosion resulting from runoff, the depth to bedrock, and the seasonal high water table are the major concerns in management. Capability unit VIe-1; woodland suitability group 4r2.

Use and Management of the Soils

This section describes use and management of the soils for crops and pasture, woodland, wildlife, recreation, and engineering. It does not give detailed information about management of individual soils. For specific suggestions, consult a representative of the local office of the Soil Conservation Service, the Extension Service, or the Agricultural Experiment Station.

Crops and Pasture[3]

The pages that follow explain the system of capability grouping and suggest management of the soils of Durham County by capability units. Estimated yields for specific crops under superior management are listed in table 2.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the

[3] J. E. Pollock, conservation agronomist, and R. S. Tennant, district conservationist, Soil Conservation Service, helped prepare this section.

TABLE 6.—*Estimates of soil propertie*

Soil name and map symbols	Flood hazard	Depth to seasonal high water table	Depth to bedrock	Depth from surface of representative profile	USDA texture	Classification	
						Unified	AASHO
		Feet	*Feet*	*Inches*			
White Store: WsB, WsC, WsE, WvC2, WvE2, WwC, WwE. Urban land part of WwC and WwE too variable to estimate.	None	>1½	>4	0–6	Sandy loam	SM, SM-SC	A-4, A-2
				6–35	Clay loam	CH, CL	A-7
				35–60	Weathered sandstone and shale.		
Wilkes: WxE	None	>6	>2	0–6	Sandy loam	SM, SM-SC	A-2, A-4
				6–13	Clay, clay loam	CH, CL	A-7
				13–40	Silt loam	ML, CL-ML	A-4
				40	Bedrock.		

[1] Rating applies to all layers of soil.
[2] NP is nonplastic.
[3] Coarse fraction more than 3 inches in diameter is 30 percent.

difficulty of layout and construction and also the hazard of erosion, lateral seepage, and downslope flow of effluent. Large rocks or boulders increase construction costs.

Sewage lagoons are shallow ponds constructed to hold sewage within a depth of 2 to 5 feet long enough for bacteria to decompose the solids. A lagoon has a nearly level floor and sides, or embankments, of compacted soil material. The assumption is made that the embankment is compacted to medium density and the pond is protected from flooding. Properties are considered that affect the pond floor and the embankment. Those that affect the pond floor are permeability, organic-matter content, and slope; and if the floor needs to be leveled, depth to bedrock becomes important. The soil properties that affect embankments are the engineering properties of the embankment material as interpreted from the Unified Soil Classification and the amounts of stones, if any, that influence the ease of excavation and compaction of the embankment material.

Shallow excavations are those that require digging or trenching to a depth of less than 6 feet, as for example, excavations for pipelines, sewer lines, phone and power transmission lines, basements, open ditches, and cemeteries. Desirable soil properties are good workability, moderate resistance to sloughing, gentle slopes, absence of rock outcrops or big stones, and freedom from flooding or a high water table.

Dwellings, as rated in table 7, are not more than three stories high and are supported by foundation footings placed in undisturbed soil. The features that affect the rating of a soil for dwellings are those that relate to capacity to support load and resist settlement under load and those that relate to ease of excavation. Soil properties that affect capacity to support load are wetness, susceptibility to flooding, density, plasticity, texture, and shrink-swell potential. Those that affect excavation are wetness, slope, depth to bedrock, and content of stones and rocks.

Sanitary landfills are areas of dug trenches for disposing of refuse. The waste is spread in thin layers, compacted, and covered with soil throughout the disposal period. Landfill areas are subject to heavy vehicular traffic. Some soil properties that affect suitability for landfill are ease of excavation, hazard of polluting ground water, and trafficability. The best soils have moderately slow permeability, withstand heavy traffic, and are friable and easy to excavate. Unless otherwise stated, the ratings in table 7 apply only to a depth of about 6 feet, and therefore limitation ratings of *slight* or *moderate* may not be valid if trenches are much deeper than that. For some soils, reliable predictions can be made to a depth of 10 or 15 feet, but every site should be investigated before it is selected.

Local roads and streets, as rated in table 7, have an all-weather surface expected to carry automobile traffic all year. They have a subgrade of underlying soil material; a base consisting of gravel, crushed rock, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. These roads are graded to shed water and have ordinary provisions for drainage. They are built mainly from soil at hand, and most cuts and fills are less than 6 feet deep. Soil properties that most affect design and construction of roads and streets are load-supporting capacity and stability of the subgrade and the workability and quantity of cut and fill material available. The AASHO and Unified classifications of the soil material and also the shrink-swell potential indicate load-supporting capacity. Wetness and flooding affect stability of the material. Slope, depth to hard rock, content of stones and rocks, and wetness affect ease of excavation and amount of cut and fill needed to reach an even grade.

Ratings for light industry are for the undisturbed soils that are used to support building foundations. Emphasis is on foundations, ease of excavation for underground utilities, and corrosion potential of uncoated steel pipe. The undisturbed soil is rated for spread footing foundations for buildings less than three stories high or foundation loads not in excess of that weight. Properties affecting load-supporting capacity and settlement under load are wetness, flooding, texture, plasticity, density, and shrink-swell behavior. Properties affecting excavation are wetness, flooding, slope,

gnificant in engineering—Continued

Percentage less than 3 inches in diameter passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential	Probability of corrosion on—[1]	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
				Percent		*Inches per hour*	*Inches per inch of soil*	*pH*			
95–100	90–100	60–95	30–50	<25	NP–5	2.0–6.0	0.11–0.13	4.5–6.0	Low	High: drainage and texture.	Moderate: texture and reaction.
95–100	90–100	75–100	70–95	45–90	25–65	<0.06	0.10–0.15	4.5–6.0	High		
95–100	90–100	60–80	30–50	<25	NP–4	2.0–6.0	0.11–0.13	5.1–7.3	Low	High: texture.	Low.
95–100	90–100	75–100	70–90	45–90	25–65	0.2–0.6	0.05–0.10	5.6–7.3	Moderate		
95–100	95–100	80–100	60–90	<25	NP–7	0.6–2.0	0.11–0.13	5.6–7.3	Moderate		

[1] Water table is at or near the surface.
[2] Coarse fraction more than 3 inches in diameter is 15 to 25 percent.

nd depth to bedrock. Properties affecting corrosion of uried uncoated steel pipe are wetness, texture, total acidity, nd electrical resistivity.

Pond reservoir areas hold water behind a dam or embankent. Soils suitable for pond reservoir areas have low seepage, hich is related to their permeability and depth to fractured r permeable bedrock or other permeable material (fig. 14).

nd embankments are raised structures of soil material ructed across drainageways in order to impound water. ese embankments are generally less than 20 feet high, are onstructed of homogeneous soil material, and are comacted to medium density. Embankments of core and shell ype construction are not rated in this table. Embankment oundation, reservoir area, and slope are assumed to be uitable for pond construction. Soil properties are considered hat affect the embankment and the availability of borrow naterial. The best soils have good slope stability, low ermeability, slight compressibility under load, and good esistance to piping and erosion. The best borrow material is ree of stones or rocks and thick enough for easy excavation.

Aquifer-fed excavated ponds are bodies of water created by xcavating a pit or dugout into a ground-water aquifer. Excluded are ponds fed by runoff and also embankment-type onds where the depth of water impounded against the embankment exceeds three feet. The assumption is that the ond is properly designed, located, and constructed and that he water is of good quality. Soil properties affecting aquifered ponds are the existence of a permanent water table, ermeability of the aquifer, and properties that interfere vith excavation (stoniness and rockiness).

Road fill is soil material used in embankments for roads. The suitability ratings reflect the predicted performance of oil after it has been placed in an embankment that has been roperly compacted and provided with adequate drainage and the relative ease of excavating the material at borrow areas.

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected ly by ease of working and spreading the soil material, as in preparing a seedbed; natural fertility of the material, or the response of plants when fertilizer is applied; and absence of substances toxic to plants. Texture of the soil material and its content of stone fragments are characteristics that affect suitability, but also considered in the ratings is damage that will result at the area from which topsoil is taken.

Agricultural drainage is affected by such soil properties as permeability, texture, and structure; depth to claypan, rock, or other layers that influence rate of water movement; depth to the water table; slope; stability in ditchbanks; susceptibility to stream overflow; salinity or alkalinity; and availability of outlets for drainage.

Irrigation of a soil is affected by such features as slope; susceptibility to stream overflow, water erosion, or soil blowing; soil texture; content of stones; accumulations of salts and alkali; depth of root zone; rate of water intake at the surface; permeability of soil layers below the surface layer and fragipans or other layers that restrict movement of water; available water capacity; and need for drainage or depth to water table or bedrock.

Terraces and diversions are embankments or ridges constructed across the slope to intercept runoff so that it soaks into the soil or flows slowly to a prepared outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock or other unfavorable material; presence of stones; permeability; and resistance to water erosion, soil slipping, and soil blowing. A soil suitable for these structures provides outlets for runoff and is not difficult to vegetate.

Soil test data

Table 8 contains engineering test data for some of the major soil series in Durham County. These tests were made to help evaluate the soils for engineering purposes. The engineering classifications given are based on data obtained by mechanical analyses and by tests to determine liquid limits and plastic limits. The mechanical analyses were made by combined sieve and hydrometer methods.

APPENDIX B

CLIMATOLOGICAL CONDITIONS

TABLE 14.—*Temperature and precipitation*

[All data recorded at Durham, or estimated as indicated]

Month	Temperature					Precipitation				
	Average daily maximum	Average daily minimum	2 years in 10 will have at least four days with— Maximums equal to or higher than—	2 years in 10 will have at least four days with— Minimums equal to or lower than—	Soil temperature 4 inch depth, bare, level ground (estimated)	Average monthly total	1 year in 10 will have Less than—	1 year in 10 will have More than—	Days with snow cover 1 inch or more	Average depth of snow on days with snow cover
	°F	°F	°F	°F	°F	Inches	Inches	Inches	Number	Inches
January	53	31	69	13	40	3.3	1.5	5.8	3	2
February	55	31	72	18	42	3.4	1.2	5.5	2	2
March	63	37	76	23	48	3.6	1.6	5.6	2	3
April	73	46	86	32	59	3.4	1.6	5.4	(1)	(1)
May	81	55	91	42	67	3.2	.8	4.8	0	----------
June	88	64	97	53	76	3.7	1.8	6.0	0	----------
July	89	67	98	60	79	5.4	2.5	7.5	0	----------
August	88	66	97	58	79	4.7	1.7	7.8	0	----------
September	83	60	92	45	73	3.4	.7	7.6	0	----------
October	74	48	86	32	63	2.7	.6	5.4	0	----------
November	62	37	77	24	52	2.9	.5	6.3	(1)	(1)
December	53	31	67	13	43	3.0	1.2	4.9	1	1
Year	72	48	[2] 99	[3] 10	60	42.7	27.8	51.3	8	2

[1] Less than one-half.
[2] Average annual highest temperature.
[3] Average annual lowest temperature.

The county is served by four railroads. Interstate Highway 85 and United States Highways 70, 15, and 501 traverse the county. A good county road system provides access to schools and local markets.

A major commercial airport is located midway between Raleigh and Durham.

Information about physiography, relief, and drainage, the water supply, and the climate of Durham County follows.

Physiography, Relief, and Drainage

About two-thirds of Durham County lies in a basin or lowland that is underlain by Triassic rocks of the Newark Group. This basin is characterized by mature, U-shaped valleys and fairly wide flood plains. Distinct escarpments of resistant metavolcanic rocks border this basin on the northwest and southeast. An undulating surface dissected by many drainageways has formed on these resistant metavolcanic rocks. There are some Granodiorite intrusions in these volcanic rocks. The Triassic rocks and some areas of volcanic rocks have intrusions of diabasic materials.

Many young, V-shaped valleys that have short, steep sides formed near streams where differences in elevation range from 50 to 100 feet. The topography generally slopes in a southeasterly direction.

Elevation ranges from 450 to 600 feet above sea level in the northern section of the county and from 275 to 400 feet in the southern part. The highest elevation, 700 feet, is in the northwest part of the county, south of Mt. Lebanon Church. The lowest elevation, 234 feet, is south of the city of Durham near the intersection of Farrington and Stagecoach roads.

A thick layer of soil material and soft weathered rock overlies the bedrock throughout most of the county. In some places where roadbanks are deep, this soft weathered material is exposed to a depth of more than 15 feet.

The county is drained by the New Hope and Neuse River systems. The confluence of the Eno and Flat Rivers east of Fairntosh marks the beginning of the Neuse River. Major streams, including New Hope, Ellerbe, Morgan, Little, Burden Northeast, Third Fork, Sandy, Buffalo, Dial, Camp, Deep, and Panther Creeks and the Little River, are tributaries to the major rivers (*3*).

Natural surface drainage is generally medium to rapid. It is slow, however, on nearly level interstream divides and the flood plains.

Water Supply

Water for most of the industry, research facilities, educational institutions, and more than 75 percent of the people in Durham County comes from the surface water impounded in Lake Michie, located near Bahama. The rest of the water supply comes from wells.

Drilled wells, rather than dug wells, are the most dependable source of ground water. Wells drilled in the volcanic rocks yield nearly twice the amount of water per foot of uncased well as wells in the Triassic rocks. A yield of approximately 12 gallons per minute can be obtained from wells that penetrate the metavolcanic rocks to an average depth of 108 feet.

Ground water in Durham County is principally a calcium bicarbonate type suitable for most domestic, municipal, and industrial purposes (*3*).

TABLE 15.—*Probabilities of last freezing temperatures in spring and first in fall*

[From data recorded at Durham, modified for a rural environment]

Probability	Dates for given probability and temperature				
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower
Spring:					
1 year in 10 later than	March 10	March 24	April 4	April 18	April 26
2 years in 10 later than	February 28	March 15	March 28	April 12	April 20
5 years in 10 later than	February 10	February 25	March 10	March 30	April 11
Fall:					
1 year in 10 earlier than	November 25	November 15	November 5	October 26	October 14
2 years in 10 earlier than	December 3	November 21	November 10	October 30	October 19
5 years in 10 earlier than	December 12	December 2	November 20	November 11	October 28

Climate[6]

Durham County is mostly rolling country, but the variation in elevation is not large. In the northern part of the county the higher ground is around 600 feet above mean sea level, and the lower streambeds are near 300 feet. The southern part of the county is lower. Some streambeds are at elevations of about 200 feet, and the higher elevations are about 500 feet. The Blue Ridge Mountains, about 100 miles to the northwest, form a northeast-southwest barrier at elevations of 3,000 to 5,000 feet; in the opposite direction the topography slopes gradually down to the Atlantic Ocean about 135 miles away. These features and the latitude and position are the principal factors influencing the climate. Data on temperature and precipitation are given in tables 14 and 15.

TEMPERATURE

The average length of the growing season is about 200 days. It lasts from the second week in April until the last week in October. Table 15 shows the probabilities of freezes of various intensities in spring and fall. The temperature falls below freezing at Durham on more than half the days in winter, but rarely remains that low for 24 hours. It drops to 0° F. less than once in 10 years. On the average, it rises about 100° perhaps once every 3 years. Temperatures of 90° are possible from late in March well into October and average about 50 occurrences in a summer.

PRECIPITATION

Much of the rain in the growing season comes from summer thunderstorms and varies widely from place to place and from one season to the next. Hail occasionally occurs during a thunderstorm, but in most cases only a small area is affected. A given locality can be without significant rain for 1 to 3 weeks. Irrigation is used in these areas to increase crop production. In winter rain results mainly from low-pressure storms moving through or near the area, and it is less variable than in summer. There are no distinct wet and dry seasons, however, and measurable rain falls on an average of 1 to 3 days per week.

Some snow falls in Durham County every winter, but total amounts vary from 1 inch to 1½ feet. The average total amount in winter is about 6 inches. Generally only a few inches accumulate at one time, and such accumulations generally melt within a few days. Once in several years, however, 8 or 10 inches fall at one time. About as often, snow covers the ground for a week or more. In 1960, the total amount of snow for February and March was 27 inches. Snow accumulated on the ground to a depth of 13 inches at Durham, and remained on the ground in varying amounts continuously from March 2 to March 18.

CLOUDINESS, STORMS, AND WINDINESS

On the average slightly more than half the sky is covered with clouds during daylight hours. The greatest amount of cloudiness occurs in winter and the least in autumn. The sun shines during about half of the daylight hours in winter and nearly two-thirds in other seasons. The average relative humidity is near 85 percent at sunrise, dropping off to around 50 percent by midafternoon.

Tropical storms from the Atlantic Ocean and Gulf of Mexico are greatly weakened if they move inland as far as Durham County. Highest winds most often result from summer thunderstorms. Such winds affect limited areas and are of short duration. A little hail occurs in the county every few years, but does not generally cause damage to more than 1 or 2 square miles of area. No destructive tornadoes have occurred in the county.

Surface wind directions are variable in all seasons. Winds from the southwest and northeast are dominant, and come from the two opposite directions with almost equal frequency. Northeasterlies are more prevalent late in summer and in autumn and southwesterlies at other seasons. Highest winds

[6] Prepared by A. V. HARDY, climatologist for North Carolina, National Oceanic and Atmospheric Administration, National Weather Service, U. S. Department of Commerce.

quite often come from the northwest quadrant. The average speed of the wind near the earth's surface is about 8 miles per hour.

Literature Cited

(1) American Association of State Highway Officials. 1961. Standard specifications for highway materials and methods of sampling and testing. Ed. 8, 2 v., illus.
(2) McCracken, R. J., Weed, S. B., and Goldston, E. F. 1964. Planosolic piedmont soils of North Carolina: I. morphology and composition. Reprinted from Soil Sci., v. 98, No. 1.
(3) North Carolina Department of Water Resources. 1966. Geology and ground water in the Durham area, North Carolina. Bul. No. 7, 143 pp.
(4) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dept. Agr. Handbook No. 18, 503 pp., illus.
(5) ——— 1967. Soil survey laboratory methods and procedures for collecting soil samples. Soil Survey Invest. Rpt. No. 1, 50 pp. Revised April 1972.
(6) ——— 1969. Soil survey interpretations for woodlands in the Southern Piedmont area of Alabama, Georgia, North Carolina, and South Carolina. Prog. Rpt. W-13, U.S. Dept. Agr., Soil Conserv. Serv., 20 pp.
(7) United States Department of Defense. 1968. Unified soil classification system for roads, airfields, embankments and foundations. MIL-STD-619B, 30 pp., illus.

Glossary

Acidity, soil. See Reaction, soil.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Cation exchange capacity. The sum total of exchangeable cations absorbed by a soil, expressed in milliequivalents per 100 grams of soil.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidl permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and ar free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly o intermediate texture.

Moderately well drained soils commonly have a slowly permeabl layer in or immediately beneath the solum. They have uniforc color in the A and upper B horizons and mottling in the lower I and the C horizons.

Somewhat poorly drained soils are wet for significant periods but no all the time, and some soils commonly have mottling at a dept below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray an generally mottled from the surface downward, although mottlin may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have dark-gray or black surface layer and are gray or light gray, wit or without mottling, in the deeper parts of the profile.

Erosion. The wearing away of the land surface by wind (sandblast running water, and other geological agents.

Flood plain. Nearly level land, consisting of stream sediments, tha borders a stream and is subject to flooding unless protecte artificially.

Horizon, soil. A layer of soil, approximately parallel to the surfac that has distinct characteristics produced by soil-forming processe These are the major horizons:

O horizon.—The layer of organic matter on the surface of a miner soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below a O horizon. This horizon is the one in which living organisms a most active and therefore is marked by the accumulation humus. The horizon may have lost one or more of soluble salt clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon in part a layer of change from the overlying A to the underlyin C horizon. The B horizon also has distinctive characteristi caused (1) by accumulation of clay, sesquioxides, humus, or son combination of these; (2) by prismatic or blocky structure; (3) b redder or stronger colors than the A horizon; or (4) by son combination of these. Combined A and B horizons are usuall called the solum, or true soil. If a soil lacks a B horizon, the horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath tl solum. In most soils this material is presumed to be like th from which the overlying horizons were formed. If the materi is known to be different from that in the solum, a Rom numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usual underlies a C horizon but may be immediately beneath an A or horizon.

Infiltration. The downward entry of water into the immediate surf of soil or other material, as contrasted with percolation, which movement of water through soil layers or material.

Mottling, soil. Irregularly marked with spots of different colors th vary in number and size. Mottling in soils usually indicates po aeration and lack of drainage. Descriptive terms are as follo abundance—*few*, *common*, and *many*; size—*fine*, *medium*, a *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The si measurements are these: *fine*, less than 5 millimeters (about 0 inch) in diameter along the greatest dimension; *medium*, rangi from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) diameter along the greatest dimension; and *coarse*, more than millimeters (about 0.6 inch) in diameter along the greate dimension.

Ped. An individual natural soil aggregate, such as a crumb, a pris or a block, in contrast to a clod.

Permeability. The quality that enables the soil to transmit water air. Terms used to describe permeability are as follows: *very slo slow*, *moderately slow*, *moderate*, *moderately rapid*, *rapid*, and *ve rapid*.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mi ture of clay with quartz and other diluents that commonly sho as red mottles, usually in platy, polygonal, or reticulate patter Plinthite changes irreversibly to hardpan or to irregular aggrega upon repeated wetting and drying. It is a form of laterite.

Reaction, soil. The degree of acidity or alkalinity of a soil, express in pH values. A soil that tests to pH 7.0 is precisely neutral reaction because it is neither acid nor alkaline. An acid, or "sou soil is one that gives an acid reaction; an alkaline soil is one that

APPENDIX C

LABORATORY ANALYTICAL REPORTS

SIRRINE ENVIRONMENTAL CONSULTANTS
P.O. BOX 24000
GREENVILLE, SC 29606
(803)234-2314

Client: Glaxo

Project: Soil Remediation/RTP

Samples Collected By: W.D. Dixon

Date Sampled: 04/10/90

Lab ID #	Sample Description
48819	GSW - 1 (Grab)
48820	GSW - 2 "
48821	BA - 1 "
48822	BA - 2 "
48823	BA - 3 "
48824	BA - 4 "

Lab ID #	TPH
48819	<10
48820	<10
48821	<10
48822	<10
48823	<10
48824	<10

TPH results are in mg/kg

REVIEWED BY: Steve L. Hoeffner
STEVE L. HOEFFNER
LABORATORY MANAGER

SC LAB ID # 23102

SIRRINE ENVIRONMENTAL CONSULTANTS
P.O. BOX 24000
GREENVILLE, SC 29606
(803)234-2314

Client: Glaxo

Project: SEC Lab Study

Samples Collected By: W.D. Dixon

Date Sampled: 04/11/90

LAB ID #	SAMPLE DESCRIPTION
48792	GT - 1
48793	GT - 2
48794	TW - 1
48795	TW - 2
48796	SB - 1
48797	SB - 2

Lab ID #	TPH
48792	1300
48793	<10
48795	---
48796	<10
48797	<10

Parameter	48794
Benzene	<1.0
Toluene	<1.0
Chlorobenzene	<1.0
Ethlybenzene	<1.0
m- & p- Xylene	<1.0
o - Xylene	3.3
1,3 - Dichlorobenzene	1.3
1,4 - Dichlorobenzene	20
1,2 - Dichlorobenzene	16

TPH results are in mg/kg, BETX and Chloronated benzene results are in ug/l.

REVIEWED BY: Steve L. Hoeffner
STEVE L. HOEFFNER
LABORATORY MANAGER

SC LAB ID # 23102

SIRRINE
ENVIRONMENTAL
CONSULTANTS

Client: Glaxo

Project: Soil Remediation/RTP

Samples Collected By: W.D. Dixon

Date Sampled: 04/16/90 - 04/17/90

Lab ID #	Sample Description
48895	SW - 1, South Wall, East Corner
48896	WW - 1, West Wall, North Corner, silt
48897	WW - 2, West Wall, Central silt
48898	WW - 3, West Wall, South End, silt
48899	WW - 4, West Wall, North End, Clay

Lab ID #	TPH
48895	<10
48896	<10
48897	<10
48898	20
48899	<10

TPH results are in mg/kg

REVIEWED BY: Steve L. Hoeffner SC LAB ID # 23102
STEVE L. HOEFFNER
LABORATORY MANAGER

Mailing Address: 3 Pilgrim Road, Greenville, SC 29616

COMPUCHEM LABORATORIES, INC.

TOTAL PETROLEUM HYDROCARBONS
SUMMARY REPORT

PETROLEUM HYDROCARBONS

ITEM NO.	SAMPLE IDENTIFIER	COMPUCHEM NUMBER	CONCENTRATION (mg/kg)	DETECTION LIMIT (mg/kg)
1.	T-1	331533	27	25
2.	T-2	331534	30	25
3.	T-3	331535	11000	25
4.	T-4	331537	1900	25

BDL = BELOW DETECTION LIMITS

Reviewed by/ID#: Pat C. / 1599 Date: 4-17-90

Reviewed by/ID#: JMD / 981 Date: 4/17/90

COMPUCHEM LABORATORIES, INC.

TOTAL PETROLEUM HYDROCARBONS
SUMMARY REPORT

PETROLEUM HYDROCARBONS

ITEM NO.	SAMPLE IDENTIFIER	COMPUCHEM NUMBER	CONCENTRATION (mg/kg)	DETECTION LIMIT (mg/kg)
1.	GT-3	331704	180	25
2.	GT-4	331708	1900	25
3.	IT-1	331709	BDL	25
4.	IT-2	331710	BDL	25
5.	E-1	331711	BDL	25
6.	E-2	331712	BDL	25
7.	E-3	331713	1400	25
8.	GSW-1	331805	BDL	25
9.	SEC-1	332660	BDL	25

BDL = BELOW DETECTION LIMITS

Reviewed by/ID#: [signature] / 1599 Date: 4-18-90

Reviewed by/ID#: [signature] / 981 Date: 4/18/90

RECEIVED
JUL 29 1990
ENVIRONMENTAL SAFETY

State of North Carolina
Department of Environment, Health, and Natural Resources
Raleigh Regional Office

James G. Martin, Governor

William W. Cobey, Jr., Secretary

DIVISION OF ENVIRONMENTAL MANAGEMENT
July 20, 1990

Glaxo, Inc.
Five Moore Drive
Research Triangle Park, N. C. 27709

Attention: Calvin Overcash

Subject: Well Construction Permit
No. 31-0354-WM-0141
Durham County

Dear Mr. Overcash:

In accordance with your application received 12 July 1990, we are forwarding herewith Well Construction Permit No. 31-03540WM-0141 dated 20 July 1990, issued to Glaxo, Inc. for the construction of (4) four or more monitor wells.

This Permit will be effective from the date of its issuance and shall be subject to the conditions and limitations as specified therein.

Sincerely,

Arthur Mouberry

Arthur Mouberry, P.E.
Regional Supervisor
Raleigh Regional Office

AM:STA:cs
cc: Groundwater Files
Durham County Health Department
Law Engineering
Bob Cheek
Enclosure

3800 Barrett Drive, Suite 101 • Raleigh, N.C. 27609
Telephone (919) 733-2314 • FAX Number (919) 733-7072

An Equal Opportunity Affirmative Action Employer

NORTH CAROLINA
ENVIRONMENTAL MANAGEMENT COMMISSION
DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES
RALEIGH, NORTH CAROLINA
PERMIT FOR THE CONSTRUCTION OF A WELL

In accordance with the provisions of Article 7, Chapter 87, North Carolina General Statutes, and other applicable Laws, Rules and Regulations.

PERMISSION IS HEREBY GRANTED TO
Glaxo, Inc.

FOR THE CONSTRUCTION OF A MONITOR WELL SYSTEM located at Five Moore Drive, Research Triangle Park, N.C., in the triassic soils of eastern Durham County, in accordance with the application dated 2 July, 1990, and in conformity with specifications and supporting data, all of which are filed with the Department of Environment, Health and Natural Resources and are considered a part of this permit.

This Permit is for well construction only, and does not waive any provision or requirement of any other applicable law or regulation.

Construction of a well under this Permit shall be in compliance with the North Carolina Well Construction Regulations and Standards (15 NCAC 2C .0108), other State and Local laws and regulations pertaining to monitoring well construction.

This permit will be effective from the date of its issuance until 1 July, 1991 or as this date shall be amended and shall be subject to other specified conditions, limitations, or exceptions as follows:

1. Furnish copies of chemical analyses to the Division of Environmental Management, Raleigh Regional Office, Groundwater Section, P.O. Box 27687, Raleigh, N.C. 27611-7687.

2. Notify the Raleigh Regional Office Groundwater Section at 733-2314 upon completion to allow a well construction inspection.

Permit issued this the 20th day of July, 1990.

FOR THE NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

Arthur Mouberry

Arthur Mouberry,P.E., Regional Supervisor
Division of Environmental Management

By Authority of the Environmental Management Commission
Permit No. 31-0354-WM-0141

RECEIVED
JUL 12 1990
RALEIGH REGIONAL OFFICE

LAW ENGINEERING
GEOTECHNICAL, ENVIRONMENTAL & CONSTRUCTION MATERIALS CONSULTANTS

July 2, 1990

North Carolina Department of Environment, Health, and Natural Resources
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Attention: Mr. Tom Arrington

Subject: **Monitoring Well Installation**
Glaxo Inc., Research Triangle Park
Well Permit Application

Dear Mr. Arrington:

On behalf of Mr. Calvin Overcash, Law Engineering submits the enclosed application for well permits. Proposed monitoring wells MW-1, MW-2, MW-3, and MW-4 will be installed to determine if ground-water contamination has occurred as a result of a release from an underground storage tank that has been closed.

If you have any questions, please do not hesitate to call.

Sincerely,

LAW ENGINEERING, P.C.

Chris W. Cornelissen

Chris W. Cornelissen
Senior Environmental Engineering Technician

CWC/alc

cc: Mr. Calvin Overcash

3301 ATLANTIC AVE.
P.O. BOX 18288
RALEIGH, NC 27619
919-876-0416

NORTH CAROLINA
ENVIRONMENTAL MANAGEMENT COMMISSION
DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT

APPLICATION FOR PERMIT TO CONSTRUCT MONITOR/RECOVERY WELL(S)

To: NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION July 2, 1990

Gentlemen:

In accordance with the provisions of Article 7, Chapter 87, General Statutues of North Carolina, and regulations pursuant thereto, application is hereby made by Glaxo Inc. (name of well owner) for a permit to construct a monitor/recovery well(s) as described below and in the accompanying data submitted as a part of this application.

(a) Name of property owner: Glaxo Inc.

(b) Location of property: Five Moore Drive (Road, Industry, Community, etc.) Research Triangle Park Town Durham County

(c) Type of facility or site being monitored: Abandoned Underground Storage Tank

(d) Types of contamination being monitored or recovered: #2 fuel oil

(e) Existing monitor well numbers: N/A

(f) Existing monitor wells showing contamination (well no.): N/A

(g) Estimated water-table depth: 3 feet

(h) Estimated date of construction: Begin 7/9/90 Complete 7/13/90

(i) Drilling constractor: Law Engineering

(j) Location of well: Provide a detailed map showing the location of the proposed well(s), and of any wells in an existing monitoring system (if applicable), in relation to the pollution source(s) being monitored and to at least two (2) nearby permanent reference points such as roads, intersections, and streams. Identify roads with State Highway road identification numbers. (Show all existing water supply wells within a radius of 1,000 feet of the proposed well.)

(k) Well construction diagram: Provide a diagram showing proposed construction specifications, including diameter, estimated depth, screens, sand pack, grout, type of materials, etc.

The Applicant hereby agrees the proposed well will be constructed in accordance with approved specifications and conditions of the Well Construction Permit. As regulated under the Well Construction Standards (Title 15 - North Carolina Administrative Code, Subchapter 2C)

Mr. Calvin Overcash
Five Moore Drive Research Triangle Park, N
(Mailing Address of Well Owner-Required) 277(

Law Engineering
P.O. Box 18288 Raleigh, NC 27619
(Mailing Address of Agent-if other than above)

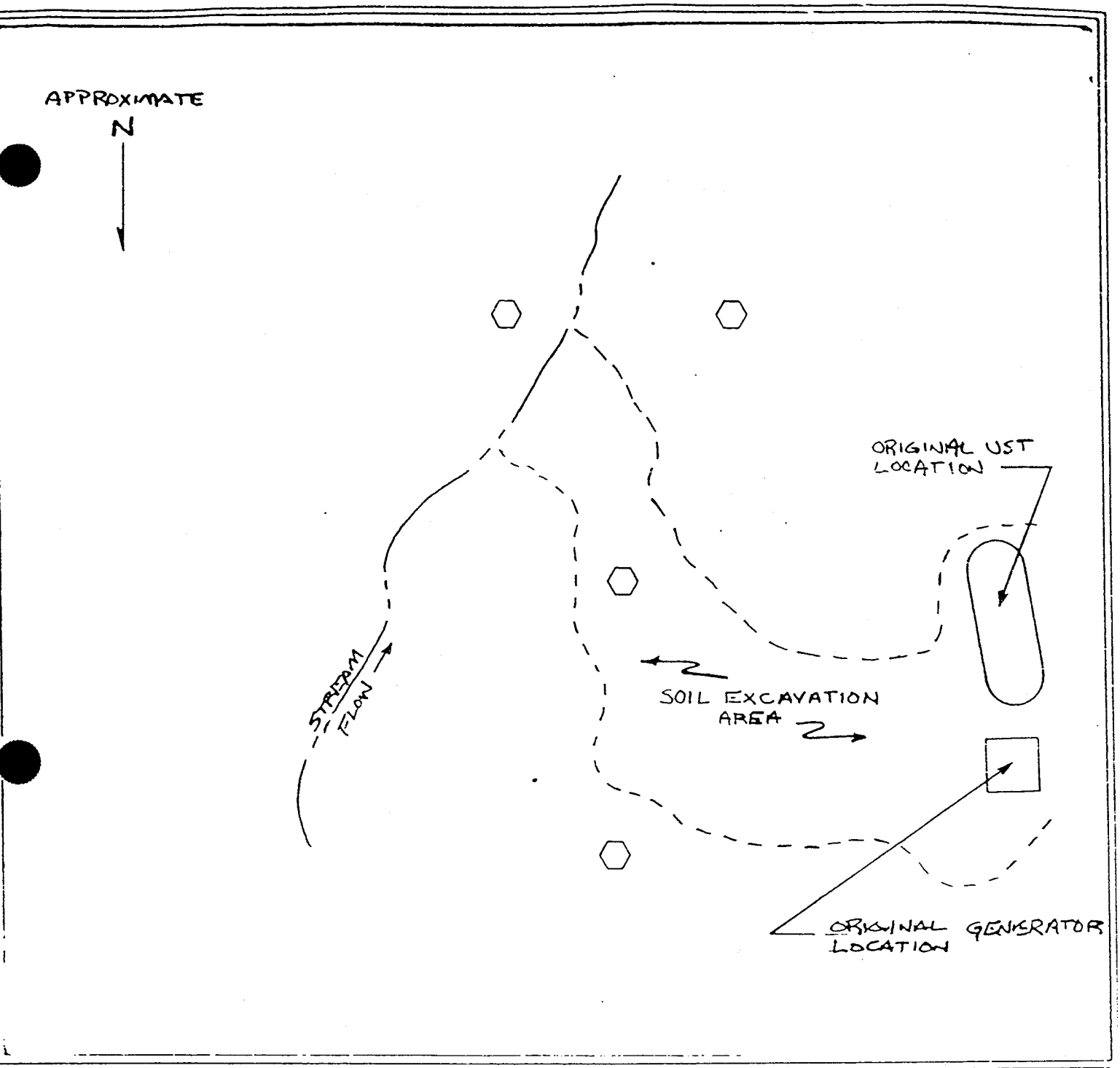
Chris W. Carchesse
Signature of Well Owner or Agent

Senior Environmental Engineering Technician
Title (if applicable)

FOR OFFICE USE ONLY

PERMIT NO. 31 0354 WM 0141 issued 20 JUL 1990

GW-22B

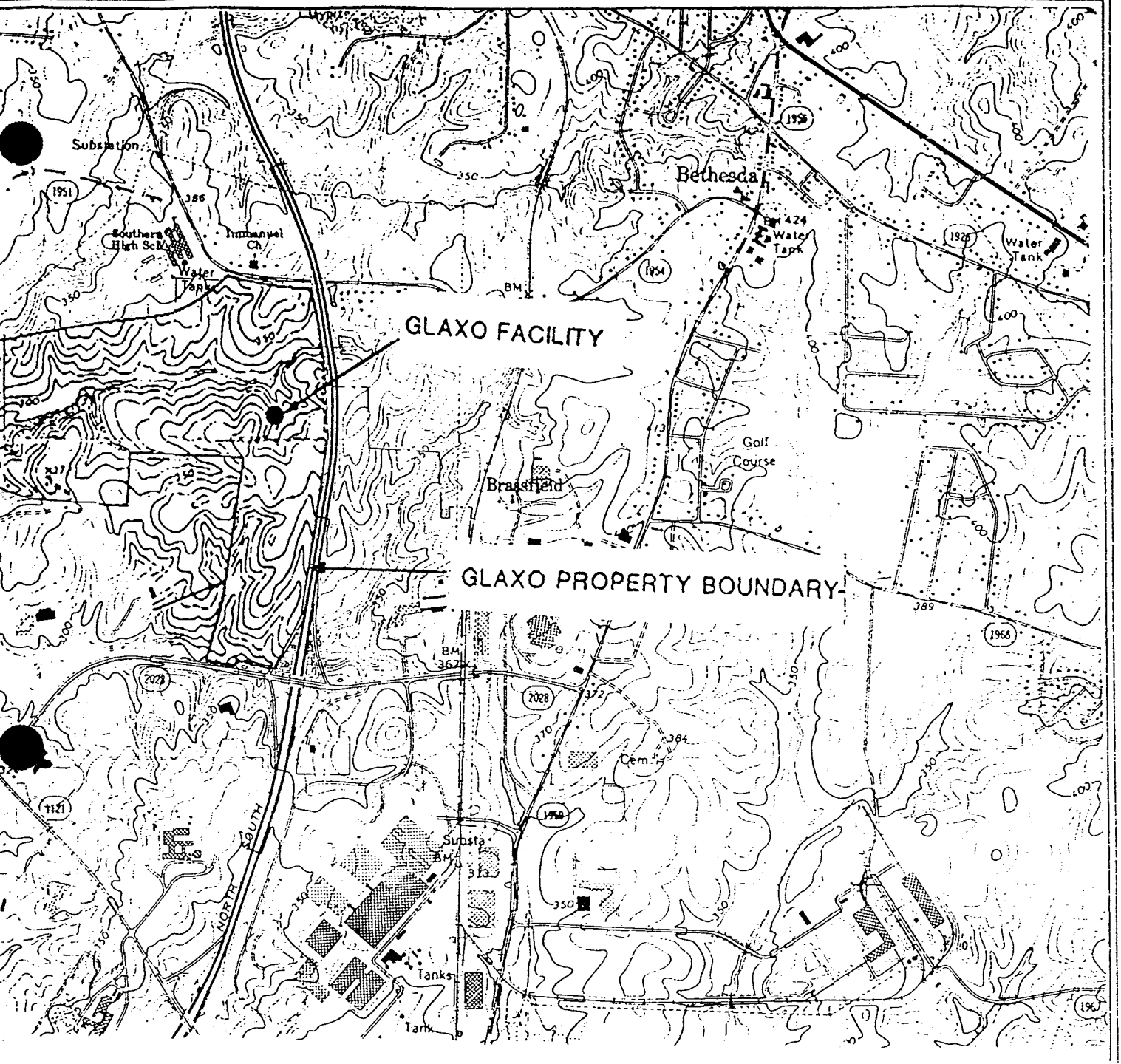


⬡ PROPOSED MONITORING WELL LOCATIONS

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

Monitoring Well Permit Application
Glaxo Inc.
Research Triangle Park, North Carolina

DRAWN:	DATE:
DFT CHECK:	SCALE:
ENG CHECK:	JOB NO.



LAW ENGINEERING
RALEIGH, NORTH CAROLINA

Monitoring Well Permit Application
Glaxo Inc.
Research Triangle Park, North Carolina

DRAWN:	DATE:
DFT CHECK:	SCALE:
ENG CHECK:	JOB NO.

PIEZOMETER INSTALLATION RECORD

JOB NAME Glaxo Inc. JOB NUMBER

WELL NUMBER INSTALLATION DATE

LOCATION Research Triangle Park, North Carolina

GROUND SURFACE ELEVATION REFERENCE POINT ELEVATION

GRANULAR BACKFILL MATERIAL Torpedo Sand SLOT SIZE .010

SCREEN MATERIAL PVC SCREEN DIAMETER 2"

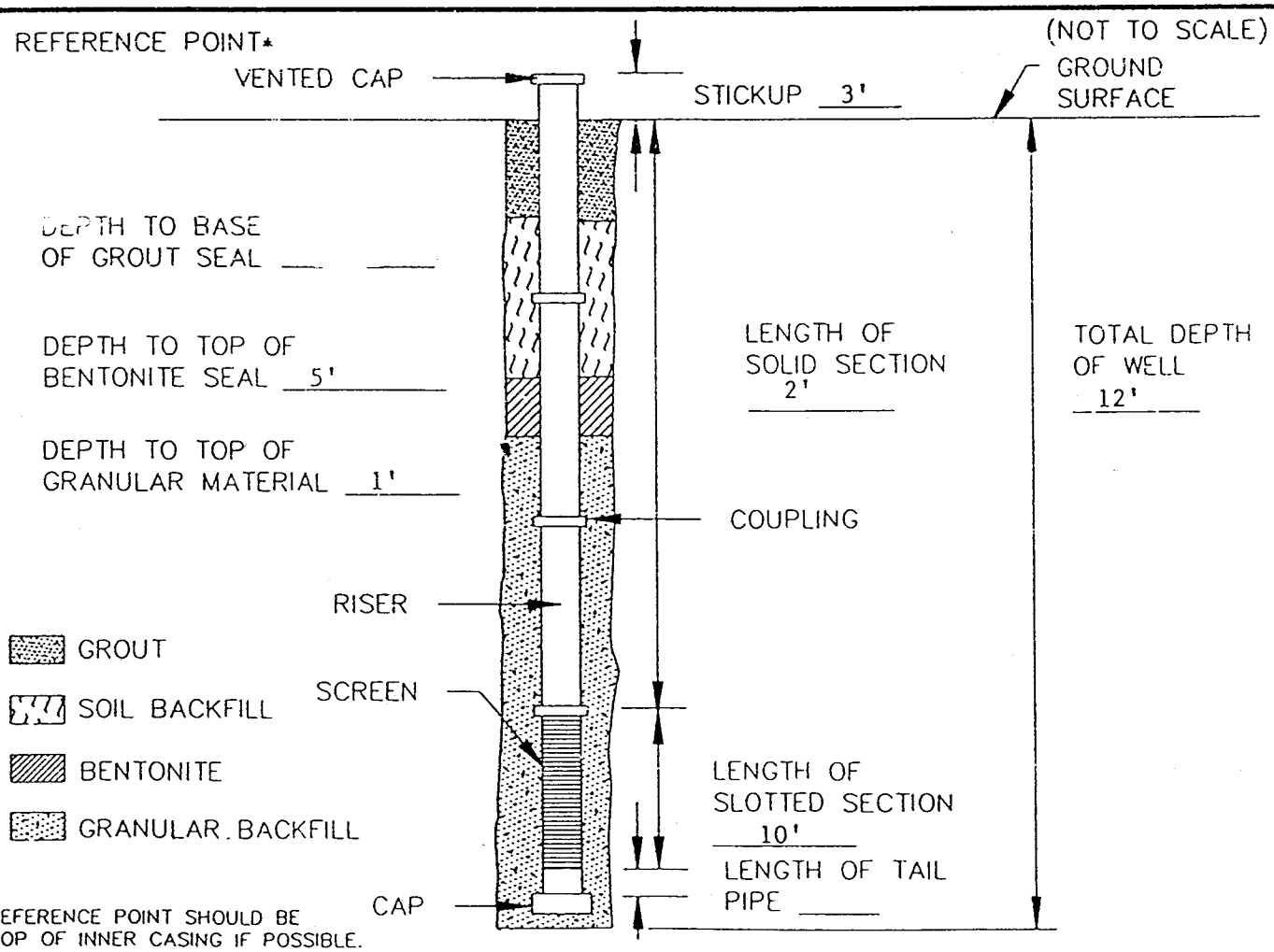
RISER MATERIAL PVC RISER DIAMETER 2"

DRILLING TECHNIQUE Hand Auger DRILLING CONTRACTOR Law Engineering

BOREHOLE DIAMETER 6" LAW ENGINEERING FIELD REPRESENTATIVE Chris Cornelissen

STABILIZED WATER LEVEL FEET BELOW MEASURING POINT N/A

MEASURED ON



*REFERENCE POINT SHOULD BE TOP OF INNER CASING IF POSSIBLE.

LAW ENGINEERING

PIEZOMETER INSTALLATION RECORD

FNAME: DEPT4754

RECEIVED
JUL - 3 1990
ENVIRONMENTAL SAFETY

LAW ENGINEERING

GEOTECHNICAL, ENVIRONMENTAL
& CONSTRUCTION MATERIALS
CONSULTANTS

July 2, 1990

North Carolina Department of Environment, Health,
and Natural Resources
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Attention: Mr. Tom Arrington

Subject: **Monitoring Well Installation**
Glaxo Inc., Research Triangle Park
Well Permit Application

Dear Mr. Arrington:

On behalf of Mr. Calvin Overcash, Law Engineering submits the enclosed application for well permits. Proposed monitoring wells MW-1, MW-2, MW-3, and MW-4 will be installed to determine if ground-water contamination has occurred as a result of a release from an underground storage tank that has been closed.

If you have any questions, please do not hesitate to call.

Sincerely,

LAW ENGINEERING, P.C.

Chris W. Cornelissen

Chris W. Cornelissen
Senior Environmental Engineering Technician

CWC/alc

cc: Mr. Calvin Overcash

3301 ATLANTIC AVE.
P.O. BOX 18288
RALEIGH, NC 27619
919-876-0416

PIEZOMETER INSTALLATION RECORD

JOB NAME Glaxo Inc. JOB NUMBER

WELL NUMBER INSTALLATION DATE

LOCATION Research Triangle Park, North Carolina

GROUND SURFACE ELEVATION REFERENCE POINT ELEVATION

GRANULAR BACKFILL MATERIAL Torpedo Sand SLOT SIZE .010

SCREEN MATERIAL PVC SCREEN DIAMETER 2"

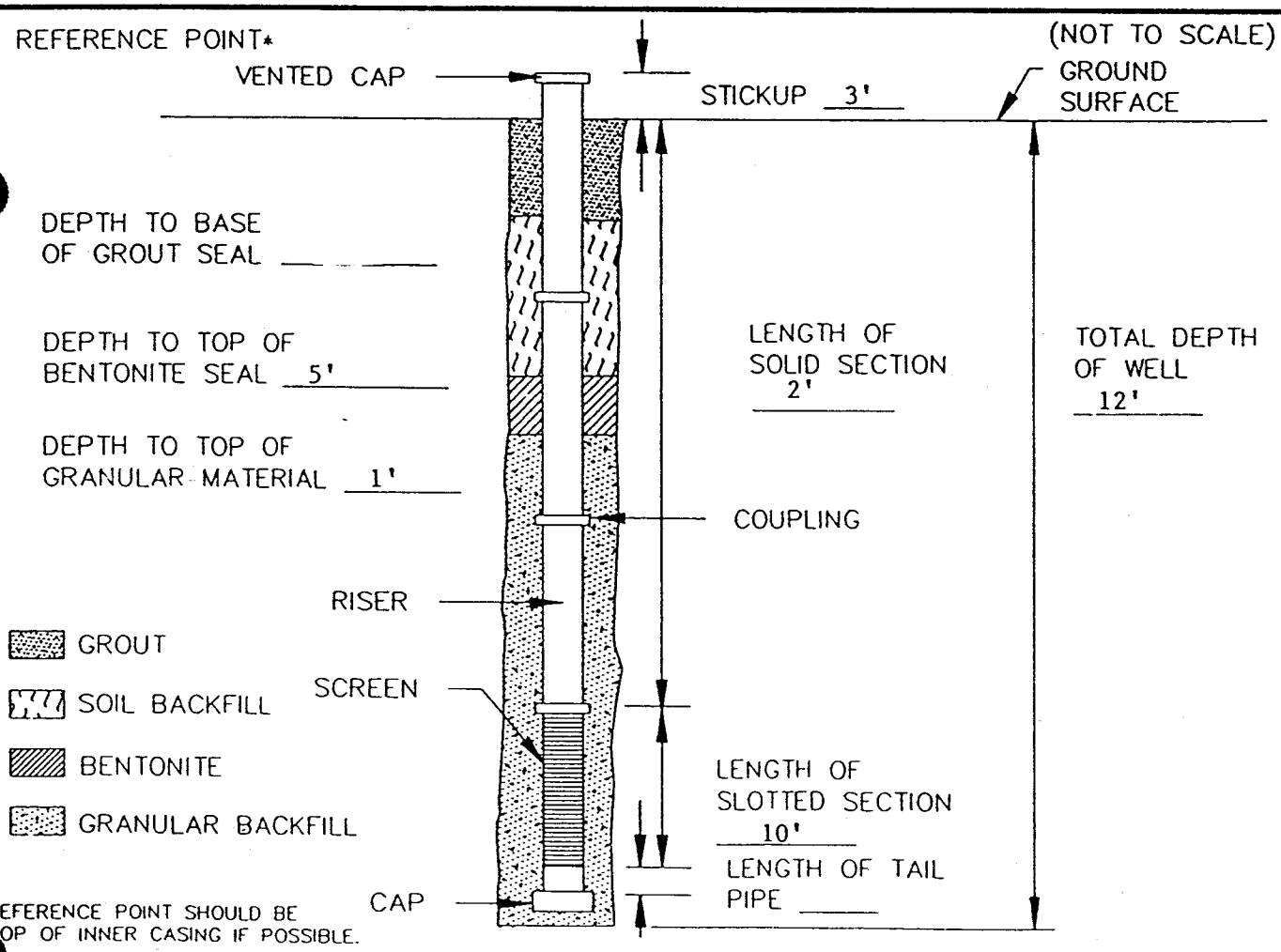
RISER MATERIAL PVC RISER DIAMETER 2"

DRILLING TECHNIQUE Hand Auger DRILLING CONTRACTOR Law Engineering

BOREHOLE DIAMETER 6" LAW ENGINEERING FIELD REPRESENTATIVE Chris Cornelissen

STABILIZED WATER LEVEL FEET BELOW MEASURING POINT N/A

MEASURED ON



*REFERENCE POINT SHOULD BE TOP OF INNER CASING IF POSSIBLE.

LAW ENGINEERING

PIEZOMETER INSTALLATION RECORD

NAME: DEPT4754

Glaxo

Glaxo Inc.

July 24, 1990

Raleigh Regional Office
Division of Environmental Management
3800 Barrett Drive, Suite 101
Raleigh, NC 27609

ATTENTION: Ms. Babette McKemie

Dear Ms. McKemie:

Attached is the "Amendment to Report of Initial Site Characterization and Free Product Removal for the Underground Storage Tank Closure and Fuel Oil Leak Remediation at the Research Triangle Park, NC" prepared for Glaxo by Sirrine Environmental Consultants. This report details the excavation of the remaining contaminated soil resulting from a release from an underground storage tank system reported to your office on April 4, 1990. Analytical results provided in this and the previously submitted reports indicate excavation was successful in removing all soil containing a concentration of petroleum hydrocarbons in excess of 10 ppm.

In addition Glaxo has contracted the services of Law Engineering to identify evidence of groundwater contamination at this site. I have attached the Proposal for Environmental Services to perform this work as well as the Application for Permit to Construct Monitor/Recovery Wells which was submitted on July 2, 1990.

If you have any questions or comments please contact me at (919) 248-2263.

Sincerely,

Calvin W. Overcash

Calvin W. Overcash, Supervisor
Environmental Safety

Attachments

cc: Thomas F. Cecich, Glaxo
Cristina M. Fernandez, Glaxo

Five Moore Drive, P.O. Box 13438 Research Triangle Park, NC 27709 • Telex 802813 • Telephone (919) 248-2100

RECEIVED
JUL 13 1990
ENVIRONMENTAL SAFETY

SIRRINE
ENVIRONMENTAL
CONSULTANTS

3733 National Drive
Suite 120
Raleigh, North Carolina 27612
(919) 881-0777

July 12, 1990

Mr. Calvin Overcash
Glaxo Inc.
Five Moore Drive
Research Triangle Park, NC 27709

Re: Amendment to Report of Initial Site Characterization
and Free Product Removal
UST Closure and Fuel Oil Leak Remediation
Glaxo Inc., RTP, NC
Sirrine Project No. R-0174

Dear Calvin:

This letter report is intended to provide you with the results of site investigation and corrective action activities associated with the area located beneath the emergency generator as discussed in the above referenced report. Work in this area was delayed until the generator could be safely moved. Relocation of the generator and demolition of the concrete support pad were performed on June 7-8, 1990. Excavation of the soil beneath the generator began on Monday, June 11, 1990 and backfilling of the excavated area occurred on June 13, 1990.

Since the fuel oil delivery and return lines represented a potential source of subsurface contamination, the area located beneath these lines was investigated initially. Soil removed from beneath these lines contained an obvious odor of petroleum fuel, therefore, further soil investigation was performed by excavating several narrow trenches across the site. Observation of trench walls quickly led to the conclusion that fuel originating from two sources (the transmission lines and the tank fill pipe area as discussed in the above referenced report dated June 5, 1990) apparently migrated laterally through a sandy gravel layer located approximately four feet below land surface. This sandy gravel layer also contained a significant quantity of moisture indicative of its ability to transmit fluids which were prevented from moving vertically in the subsurface by underlying clayey silt and sandstone. Water seeping from the sandy gravel layer contained only trace amounts of "free product" and all liquids accumulating in the area were subsequently removed via absorption by excavated soil.

The sand and gravel ("crusher run") was emplaced as fill to support the generator and concrete pad and extended from land surface to a depth of approximately four feet. The clayey silt layer is situated immediately below the sandy gravel and grades into a partially weathered sandstone extending to between five and six feet below land surface. Coherent rock (incapable of being readily excavated by track hoe) was generally encountered at five to six feet below land surface throughout the excavated area. A plan view of the excavated area showing soil sampling locations is attached.

Since the fuel oil apparently followed a path vertically to the "confining" layer of clayey silt and then laterally through the lower-most sandy gravel material, remediation proceeded via removal of the top three feet of uncontaminated soil and placement of this material in a "reserve" pile for subsequent backfilling. All soil (approximately 505 tons) between a depth of three feet and the top of coherent rock was excavated, loaded into trucks, and transported to Southeastern (Southeastern) Soil Recovery, Inc. located in Charleston, South Carolina. At Southeastern, the soil is decontaminated using a thermal treatment process and incorporated into a traditional asphalt mix. With the exception of the area in which sample G-1 was obtained, the excavation extended beyond the sandy gravel backfill. Native clay was encountered in the areas from which samples G-2, G-4 and G-5 were obtained. Excavation in the direction of sample G-3 extended into fill material which was emplaced as part of remediation efforts conducted in May 1990.

Excavation limits were established based on field observations and soil contaminant screening with an organic vapor analyzer (Foxboro Century Model 128). Five soil samples for laboratory analysis were collected from the excavated area at locations shown in the attached site plan in order to confirm the success of soil removal activities. Samples were analyzed using a modified version of EPA Methods 3550 and 8015 found in Test Methods For Evaluating Solid Wastes: Physical/Chemical Methods, 3rd Edition, 1986, US EPA Publication Number SW-846. Analytical results are summarized in the following table and a copy of the laboratory report is attached.

Sample ID #	Depth Below Land Surface (ft)	Total Petroleum Hydrocarbons (mg/kg)
G-1	3	<10
G-2	4	<10
G-3	4	<10
G-4	5	<10
G-5	4	<10

As indicated by the laboratory analytical results, excavation was successful in removing all soil containing concentration of petroleum hydrocarbons in excess of 10 ppm (mg/kg).

If you should have any questions or need additional information, please let me know.

Sincerely,

SIRRINE ENVIRONMENTAL CONSULTANTS

Terry Bradham, P.E.

JTB/ra
Attachments

cc: Project File, w/attachment

JUN 2 - 1990

ENWRIGHT
ENVIRONMENTAL

CERTIFICATE OF ANALYSIS

CLIENT: Sirrine Environmental
Raleigh
PROJECT: UST Fuel Oil Remediation

LAB CERTIFICATION NO: 66

DATE SAMPLED: 06/13/90

DATE RECEIVED: 06/15/90

DATE REPORTED: 06/26/90

LAB NO.:	90-F470-01	90-F470-02	90-F470-03	90-F470-04	90-F470-05
SAMPLE ID:	G-1	G-2	G-3	G-4	G-5
Parameters:					
Total Petroleum Hydrocarbon	<10	<10	<10	<10	<10

The above results are reported in milligrams per kilogram.

Analytical methods are those approved by the U.S. Environmental Protection Agency.

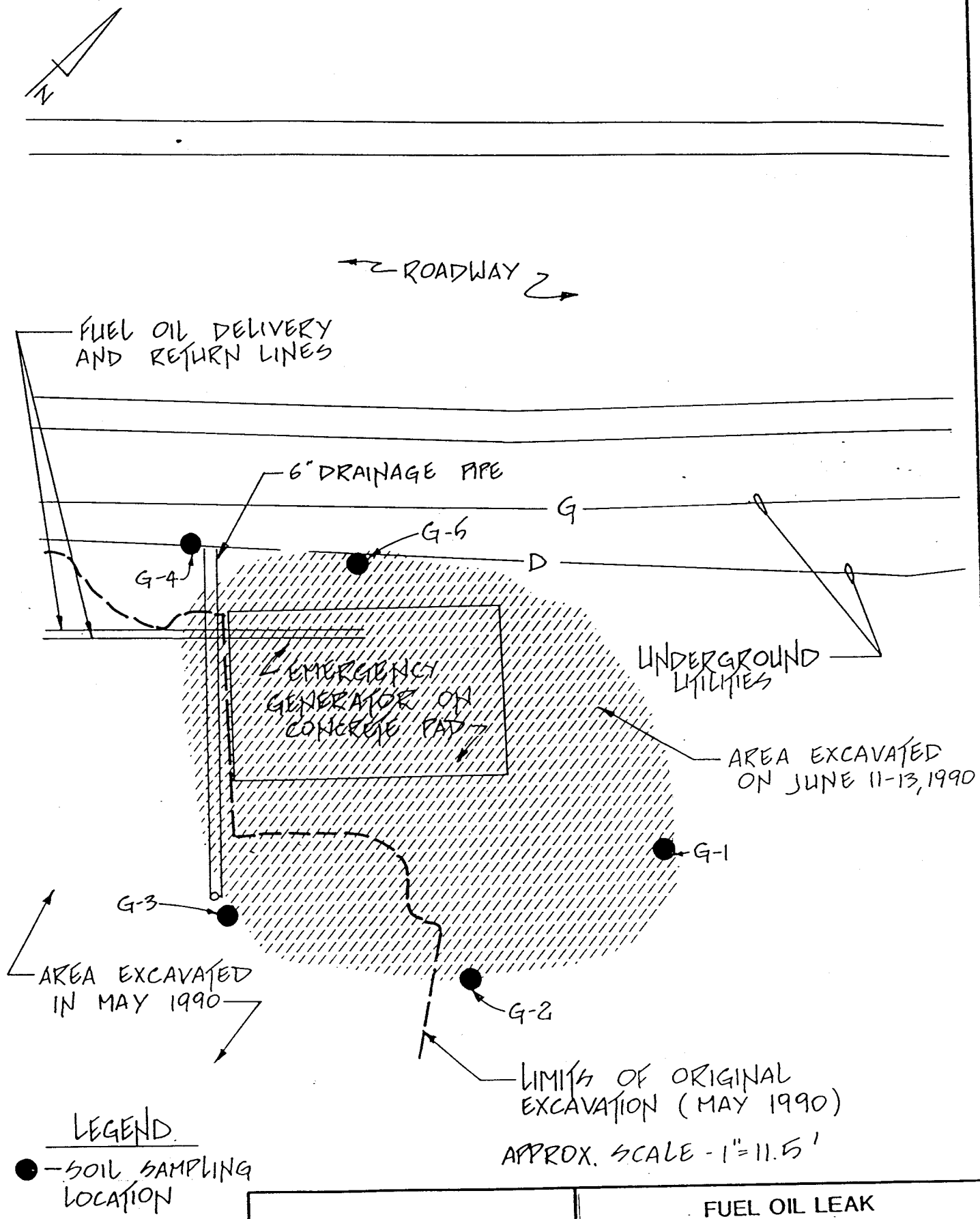
Respectfully submitted,

ENWRIGHT ENVIRONMENTAL
CONSULTING LABORATORIES, INC.

Charles H. Reece

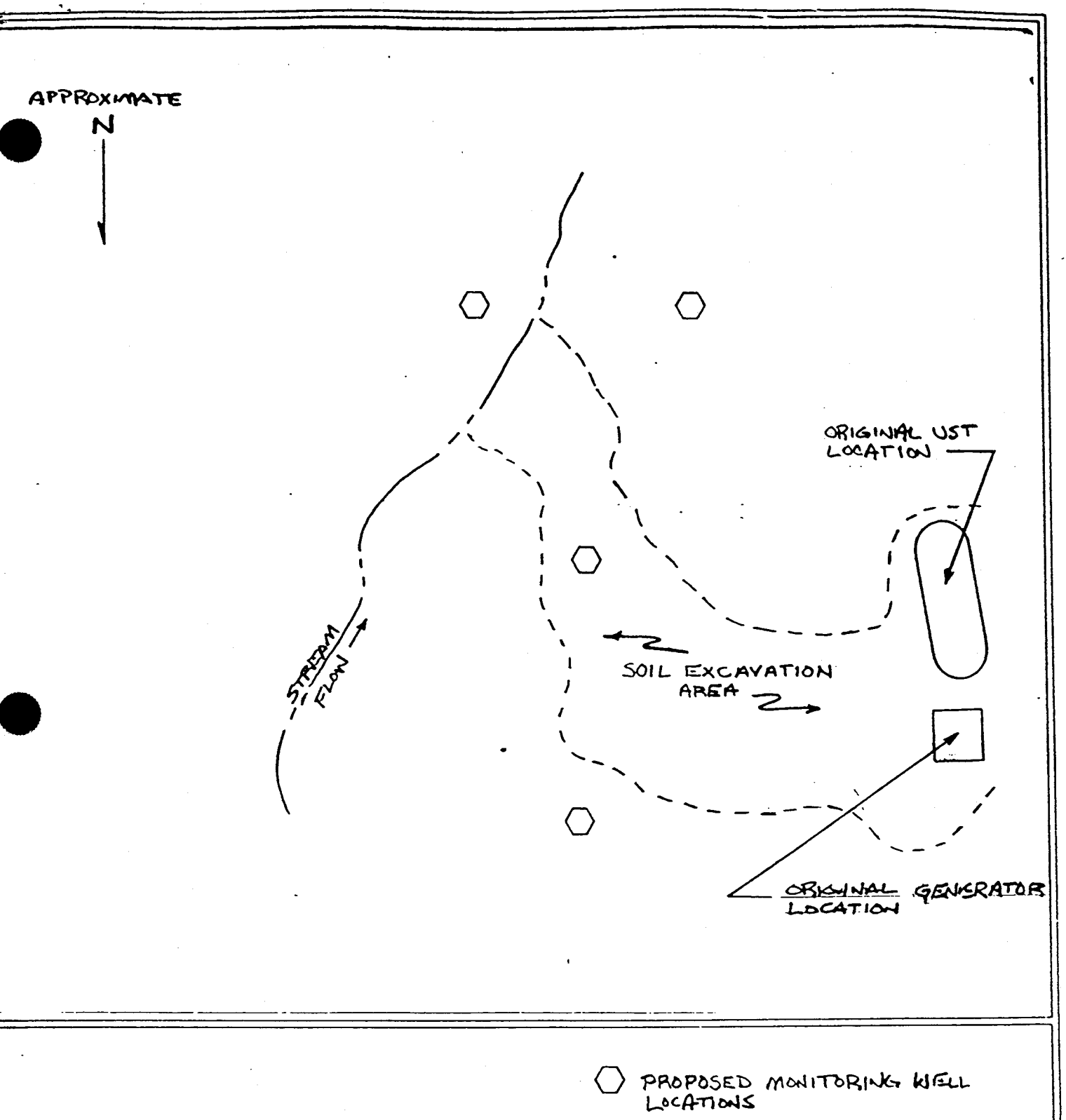
Charles H. Reece, Ph.D.
Laboratory Manager

kgb



SIRRINE ENVIRONMENTAL CONSULTANTS
Raleigh, North Carolina

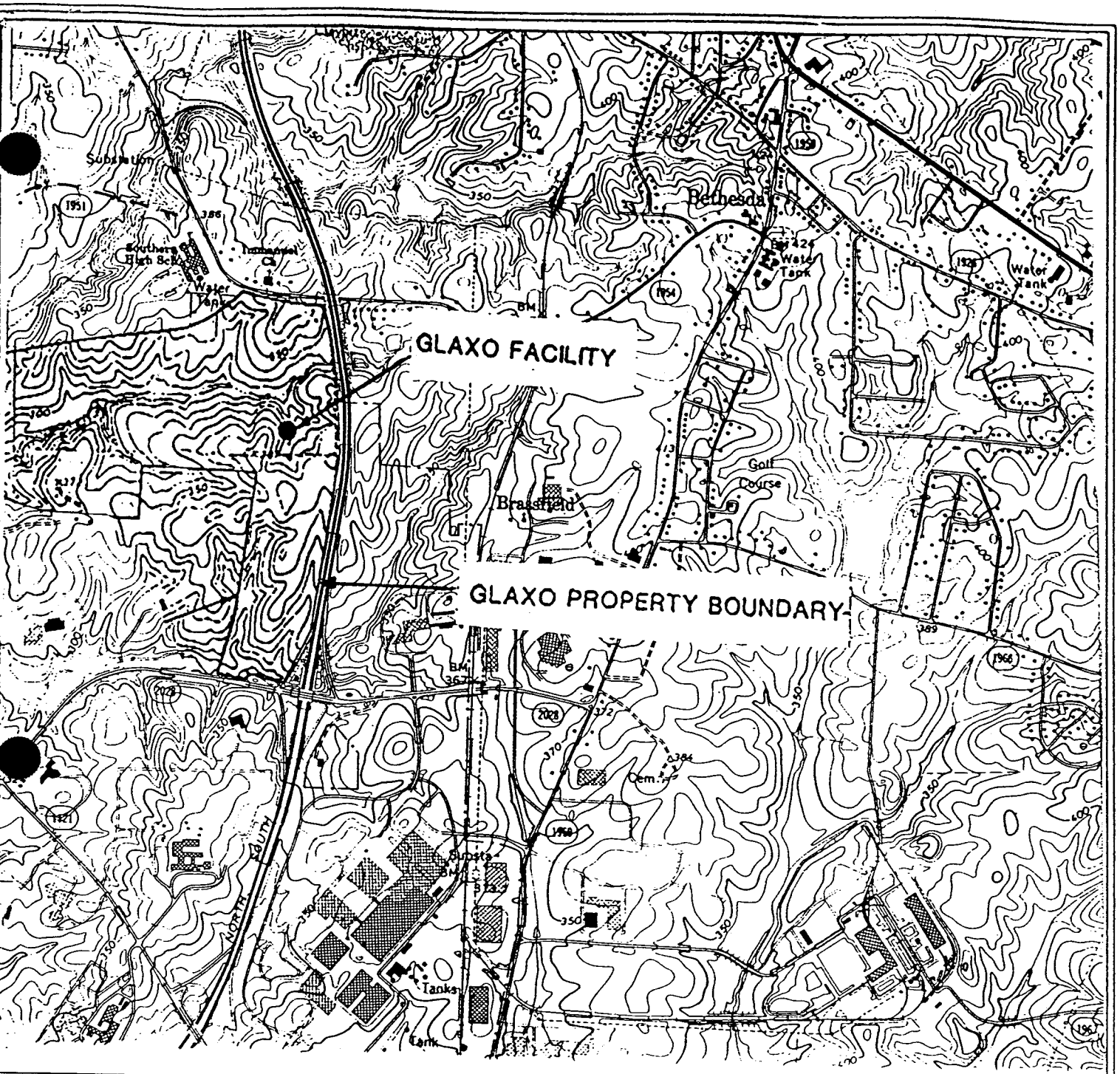
FUEL OIL LEAK
REMEDIATION & UST CLOSURE
SITE PLAN & SAMPLING LOCATIONS
GLAXO INC., RTP, N.C.
SIRRINE PROJECT NO R-0174



LAW ENGINEERING
RALEIGH, NORTH CAROLINA

Monitoring Well Permit Application
Glaxo Inc.
Research Triangle Park, North Carolina

DRAWN:	DATE:
DFT CHECK:	SCALE:
ENG CHECK:	JOB NO.



LAW ENGINEERING
RALEIGH, NORTH CAROLINA

Monitoring Well Permit Application
Glaxo Inc.
Research Triangle Park, North Carolina

DRAWN:	DATE:
DFT CHECK:	SCALE:
ENG CHECK:	JOB NO.

LAW ENGINEERING

GEOTECHNICAL, ENVIRONMENTAL
& CONSTRUCTION MATERIALS
CONSULTANTS

July 3, 1990

Glaxo Inc.
Five Moore Drive
Research Triangle Park, NC 27709

Attention: Mr. Calvin W. Overcash

Subject: **Proposal for Environmental Services**
Glaxo Inc.
Research Triangle Park, North Carolina
Law Engineering Proposal No.: P47590-3297

Dear Calvin:

Law Engineering (Law) is pleased to submit this proposal for providing environmental services for your project. Included in this proposal is an outline of the project information, proposed scope of services, fee estimate, and schedule.

PROJECT INFORMATION

Project information has been provided by Mr. Calvin Overcash of Glaxo. The project site is located on Glaxo property in Research Triangle Park, North Carolina. Previous work at the project site involved removal of a 10,000 gallon underground storage tank used for storing #2 fuel oil and excavation of over 1,500 tons of soil contaminated with petroleum fuel.

PROPOSED SCOPE OF SERVICES

The objective of our services is to identify evidence of ground-water contamination resulting from a release of #2 fuel oil at the project site. Based on our understanding of site conditions and our previous experience with similar projects, we propose to conduct the following activities:

I. Monitoring Well Installation

Law will install four monitoring wells in the immediate vicinity of the spill area. Based on our understanding of ground-water conditions at the project site, we propose to install the monitoring wells to a depth of approximately 12 feet below land surface. Actual depths and locations of the monitoring wells will be based on site conditions encountered during performance of field work.

3301 ATLANTIC AVE
P O BOX 18288
RALEIGH NC 27619
919 876 0316

Due to access constraints at the project site, all borings will be advanced by hand auger. Field activities will be monitored by a qualified geologist or engineer so that work plan modifications can be implemented in a timely manner.

The monitoring wells will be constructed as per EPA Type I guidelines utilizing two-inch schedule 40 flush threaded PVC pipe. After installation, the wells will be developed by using either a dedicated PVC bailer or hand pump in order to maximize the hydraulic connection between the well bore and the aquifer.

A diagram of a Type I well is illustrated in the attached drawing.

II. Ground-water Sampling and Laboratory Testing

After a sufficient amount of time for stabilization of water levels (not less than 48 hours), ground-water level measurements will be obtained from all wells. A ground-water sample will then be obtained from each well and analyzed for purgeable aromatics (EPA Method #602). In addition, one of the water samples will also be tested for polynuclear aromatic hydrocarbons (EPA Method #610). Appropriate EPA protocol will be utilized during sampling and laboratory procedures, including proper chain-of-custody procedures. This sampling event will be repeated approximately six to eight months after the initial sampling (during anticipated seasonal high water table conditions).

III. Reports

After completion of the field work and receipt of analytical results associated with the first sampling event, Law will submit a brief report to include:

- A summary of field activities and observations;
- Ground water level measurements and a site plan exhibiting estimated ground-water elevation contours;
- Detailed monitoring well installation records;
- Results of laboratory testing;
- A discussion of the chemical testing results as they relate to the project objective; and
- Conclusions and recommendations.

A similar report will be submitted after performance of the second sampling event.

IV. Well Abandonment

After receiving acceptable test results (i.e., test results showing no indication of dissolved phase contamination) from the second sampling event along with regulatory approval for project "close-out", all four monitoring wells will be properly abandoned. The PVC casing will be severed below land surface and the well will be filled with a bentonite-cement slurry from bottom to top.

FEE ESTIMATE

Law Engineering will perform the "Proposed Scope of Services" outlined in this proposal for the following estimated fee which is composed of three parts:

Engineering
Field Services
Laboratory Testing

Total Estimated Fee

Compensation for the services outlined above, or any additional services you request, will be based upon the actual time spent and tests performed in accordance with the attached fee schedules. The estimate assumes that all wells will be constructed of two-inch diameter PVC casing and screen. Borehole cuttings and purge water will be screened for evidence of contamination. If contamination is consistently detected above background concentrations, cuttings and purge water will be properly containerized for disposal. Containers and disposal will be the responsibility of the Client.

To keep you updated on the charges incurred, invoices will be submitted every four weeks for the portion of work completed. If we anticipate that our fee will exceed our estimate, we will notify your office.

SCHEDULE

Based upon our present schedule we anticipate that initial field work could commence within one week after we receive written authorization to proceed. We expect the field work, including well installation and sampling to take approximately one week to complete. Normal turnaround time for chemical analysis is three weeks, however, turnaround time may be shortened at an increased

cost via priority designation upon request. A written report will be issued within one week after receipt of the analytical results.

AUTHORIZATION

If this proposal is acceptable, please sign the attached Proposal Acceptance Sheet and return one copy of the completed proposal to our office. Please indicate any special instructions you may have on the Acceptance Sheet such as coordination, report distribution, etc. Also, if you have any special invoicing requirements that would expedite processing, please indicate those on the Proposal Acceptance Sheet. The General Conditions on the reverse side of the Proposal Acceptance Sheet form an integral part of this proposal.

Law appreciates the opportunity to submit this proposal for environmental services and looks forward to working with you on this project. If you have any questions or need additional information, please contact us at 919/876-0416.

Sincerely,

LAW ENGINEERING, P.C.

Chris Cornelissen
Senior Environmental Engineering Technician

FOR
W. Douglass Dixon, P.E.
Environmental Project Engineer

J. Allen Kibler, Jr., P.G.
Senior Environmental Geologist

CWC/WDD/JAK/alc

Attachments: Proposal Acceptance Sheet
Terms and Conditions
Fee Schedule EP

PIEZOMETER INSTALLATION RECORD

JOB NAME _____ JOB NUMBER _____

WELL NUMBER _____ INSTALLATION DATE _____

LOCATION _____

GROUND SURFACE ELEVATION _____ REFERENCE POINT ELEVATION _____

GRANULAR BACKFILL MATERIAL _____ SLOT SIZE _____

SCREEN MATERIAL _____ SCREEN DIAMETER _____

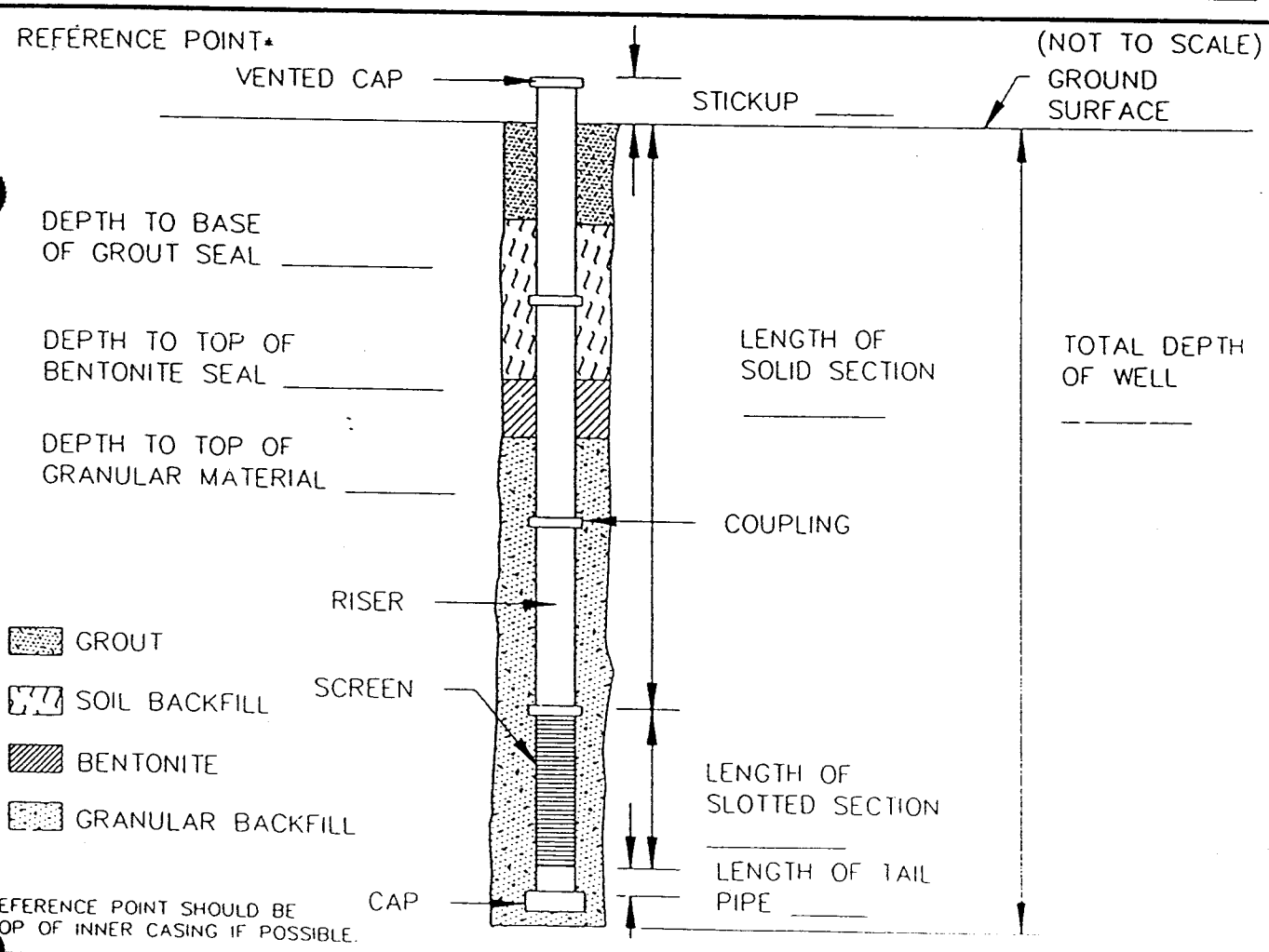
RISER MATERIAL _____ RISER DIAMETER _____

DRILLING TECHNIQUE _____ DRILLING CONTRACTOR _____

BOREHOLE DIAMETER _____ LAW ENGINEERING FIELD REPRESENTATIVE _____

STABILIZED WATER LEVEL _____ FEET BELOW MEASURING POINT _____

MEASURED ON _____



*REFERENCE POINT SHOULD BE TOP OF INNER CASING IF POSSIBLE.

NAME: DEPT4754	LAW ENGINEERING	PIEZOMETER INSTALLATION RECORD

NORTH CAROLINA
ENVIRONMENTAL MANAGEMENT COMMISSION
DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT

APPLICATION FOR PERMIT TO CONSTRUCT MONITOR/RECOVERY WELL(S)

To: NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION July 2, 1990

Gentlemen:

In accordance with the provisions of Article 7, Chapter 87, General Statutes of North Carolina, and regulations pursuant thereto, application is hereby made by Glaxo Inc. (name of well owner) for a permit to construct a monitor/recovery well(s) as described below and in the accompanying data submitted as a part of this application.

(a) Name of property owner: Glaxo Inc.

(b) Location of property: Five Moore Drive (Road, Industry, Community, etc.) Research Triangle Park (Town) Durham (County)

(c) Type of facility or site being monitored: Abandoned Underground Storage Tank

(d) Types of contamination being monitored or recovered: #2 fuel oil

(e) Existing monitor well numbers: N/A

(f) Existing monitor wells showing contamination (well no.): N/A

(g) Estimated water-table depth: 3 feet

(h) Estimated date of construction: Begin 7/9/90 Complete 7/13/90

(i) Drilling constractor: Law Engineering

(j) Location of well: Provide a detailed map showing the location of the proposed well(s), and of any wells in an existing monitoring system (if applicable), in relation to the pollution source(s) being monitored and to at least two (2) nearby permanent reference points such as roads, intersections, and streams. Identify roads with State Highway road identification numbers. (Show all existing water supply wells within a radius of 1,000 feet of the proposed well.)

(k) Well construction diagram: Provide a diagram showing proposed construction specifications, including diameter, estimated depth, screens, sand pack, grout, type of materials, etc.

The Applicant hereby agrees the proposed well will be constructed in accordance with approved specifications and conditions of the Well Construction Permit. As regulated under the Well Construction Standards (Title 15 - North Carolina Administrative Code, Subchapter 2C)

Mr. Calvin Overcash
Five Moore Drive Research Triangle Park, NC 27709
(Mailing Address of Well Owner-Required)

Law Engineering
P.O. Box 18288 Raleigh, NC 27619
(Mailing Address of Agent-if other than above)

Signature of Well Owner or Agent

Senior Environmental Engineering Technician
Title (if applicable)

FOR OFFICE USE ONLY

PERMIT NO. _____ issued _____ 19__

GW-22B

OCTOBER 11, 1990 FUEL RELEASE

SUPPORTING DUCUMENTATION

Glaxo

Glaxo Inc.

October 12, 1990

Mr. Arthur Mouberry
Environmental Supervisor
Raleigh Regional Office
Division of Environmental Management
3800 Barrett Drive
Raleigh, NC 27609

Dear Mr. Mouberry:

This letter serves to confirm a report of an apparent fuel oil release made via telephone to Ron Farrell of your office approximately 10:30 a.m. Thursday, October 11, 1990. At that time I reported we had discovered a release of number two fuel oil emanating from the vent of an underground storage tank. The tank is used to supply fuel to the boilers and emergency generators at Glaxo's new R&D site located due north of Glaxo's Moore Drive site.

The fuel was being routinely transferred from a 40,000 gallon underground storage tank to a 40,000 gallon underground working tank when a high level shut-off switch in the working tank apparently malfunctioned and allowed the tank to be overfilled. Fuel was released through the tank vent and migrated to an adjacent storm sewer. The release was discovered shortly after it began and the pump was manually shut-off.

Fuel migrated through the storm sewer and discharged into a rainwater runoff retention pond located on Glaxo property. The pond discharge valve was closed at the time of the release as a result of the low water level due to the recent dry conditions. No fuel discharge from the pond occurred.

Noble Oil Services was immediately contacted and began removal of free product from around the tank and from the pond surface. Free product removal will be completed today.

We have retained the services of Law Engineering to provide engineering guidance on the assessment of the contamination associated with the soil around tank. Assessment will begin Monday, October 15.

As the cleanup progresses, I will keep your office informed. Please contact me if you have any questions or comments pertaining to this project.

Sincerely,

Calvin W. Overcash

Calvin W. Overcash, Supervisor
Environmental Safety

Enclosure

cc: T. Cecich, Glaxo Inc.
C. Fernandez, Glaxo Inc.

Glaxo

Glaxo Inc.

March 5, 1991

Mr. Arthur Mouberry
Environmental Supervisor
Raleigh Regional Office
Division of Environmental Management
3800 Barrett Drive
Raleigh, NC 27609

Dear Mr. Mouberry:

On October 11, 1990, Glaxo reported a release of number two fuel oil emanating from the vent of an underground storage tank. This initial report was confirmed per a letter to you dated October 12, 1990.

Noble Oil Services was immediately contacted and began removal of free product from around the tank and from the pond surface. Free product removal was completed on October 12, 1990. Two small areas, located in the east and west corners of the pond, contained soil that was contaminated with fuel during the process of free product removal. This contaminated soil was excavated and disposed off-site via thermal treatment. All cleanup activities were completed by October 15, 1990.

There was some concern that the soil surrounding the fuel oil storage tanks may be contaminated with residual fuel oil. Glaxo retained the services of Law Engineering to provide engineering guidance on the assessment of the contamination associated with the soil around the tank. Hand auger soil borings were conducted on each side of the tank. No evidence of contamination was indicated by observations, field screening or laboratory testing. A copy of the report prepared by Law Engineering, including laboratory results, is attached.

A site inspection was conducted by Robert Harding of your office on October 26, 1990. During that inspection Mr. Harding was informed of all aspects of the remediation and given a tour of the areas affected by the release. No further recommendations for cleanup were made. Mr. Harding indicated he was satisfied that the cleanup was complete contingent upon receipt of the laboratory results from the soil borings conducted around the tank.

Based on the laboratory results from the soil samples taken from around the underground tank and the site inspection conducted by Mr. Harding, Glaxo believes the site has been remediated to current State Standards. Please review the information related to this site and advise me if the site can be closed out.

If you need further information please contact me at (919) 248-2263.

Sincerely,

Calvin W. Overcash

Calvin W. Overcash, Supervisor
Environmental Safety

Enclosure

cc: T. Cecich, Glaxo Inc.
C. Fernandez, Glaxo Inc.

LAW ENGINEERING

GEOTECHNICAL, ENVIRONMENTAL
& CONSTRUCTION MATERIALS
CONSULTANTS

November 15, 1990

Glaxo Inc.
Five Moore Drive
Research Triangle Park, North Carolina 27709

RECEIVED
NOV 16 1990
ENVIRONMENTAL SAFETY

Attention: Mr. Calvin W. Overcash
Environmental Safety Specialist

Subject: REPORT OF ENVIRONMENTAL SERVICES
GLAXO PETROLEUM STORAGE TANK OVERFILL
RESEARCH TRIANGLE PARK, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6067

Dear Mr. Overcash:

Based on your conversations with Mr. Douglass Dixon and Mr. Dan Nielsen, it is Law Engineering's understanding that on October 11, 1990 an electrical malfunction resulted in an overfill of the No. 2 fuel oil operating tank at building Eight of the Glaxo Inc. complex in Research Triangle Park, North Carolina. Approximately 7000 gallons of fuel oil was released from the storage tank system through a vent line above ground surface. The released fuel oil drained into a nearby drop box feeding into the facility storm sewer system and eventually into nearby ponds located on Glaxo property. Fuel oil was also observed by Glaxo personnel within a manway which provides access to the top of the underground fuel oil storage tank. The fuel, which accumulated within the nearby ponds and within the manway, was reportedly collected by Noble Oil Services.

Per your request, Mr. Dixon visited the subject site on October 12, 1990 to assess the environmental impact and cleanup efforts. Mr. Dixon observed that the potential existed for the fuel oil, which had accumulated in the manway, to have seeped into the subsurface. The preferential pathway created at the underground storage tank-backfill interface may have expedited the subsurface migration of the fuel oil.

In order to assess the subsurface conditions directly adjacent to the underground storage tank in the vicinity of the manway, we proposed to advance one hand auger boring directly adjacent to each side of the underground tank. Soil samples were to be collected at routine three foot intervals and tested for volatile organic vapors using a photoionization detector (PID). The proposed borings were to extend to a depth of approximately 12 feet below land surface (BLS). Based upon design drawings of the tank system provided by Glaxo, a depth of 12 feet BLS would be below the center of the tank and encounter the suspected preferential pathway of the fuel oil.

On October 15, 1990 Mr. Dan Nielsen of Law Engineering advanced two hand auger soil borings adjacent to the underground storage tank. Each boring was terminated at a depth of 13 feet BLS. Silty clays were encountered from land surface to a depth of approximately 11 feet BLS. A medium to coarse sand was observed from 11 feet BLS to boring termination. Soil from each boring was collected at approximate three foot intervals, visually observed for any obvious staining or evidence of petroleum

3301 ATLANTIC AVE
P.O. BOX 18288

contamination, and tested with the PID. We observed no visual evidence of contamination and the PID readings revealed that detectable levels of volatile organic vapors were not present in the collected soil samples. The hand auger boreholes were capped but not backfilled.

On October 26, 1990, Mr. Nielsen and Mr. Dixon returned to the subject site to attempt to further advance the borings to a depth equivalent to the top of the tank support pad (approximately 18 feet BLS). The soil encountered during the extension of the borings was again a medium to coarse sand. In addition, at a depth of 17 feet 9 inches BLS (auger refusal at surface of support pad), a soil sample was collected from each boring for laboratory chemical testing of total petroleum hydrocarbons (TPH). The results of the laboratory chemical tests (attached) for the samples collected from each boring show that TPH was not detected in the soil samples in concentrations at or above the laboratory quantitation limit of 2.0 mg/kg.

In our opinion, the PID soil screening and the laboratory chemical test results suggest that the subsurface adjacent to the underground storage tank has not been adversely affected by the petroleum overfill. The samples, which were tested by PID and laboratory analysis, were collected from areas within preferential pathways which further substantiates our opinion that the subsurface in the vicinity of underground storage tank has not been adversely affected by the fuel oil release.

As previously indicated, we recommend that the hand auger boreholes be grouted from bottom to top in order to eliminate these potential pathways for vertical movement of surface contaminants. If Law Engineering may be of further assistance, please do not hesitate to call.

Sincerely,

LAW ENGINEERING

Richard A. Kolb for

Daniel H. Nielsen, E.I.T.
Environmental Engineer

Douglass Dixon

W. Douglass Dixon, P.E.
Registered Professional Engineer

J. Allen Kibler, P.G.
Senior Environmental Engineer
Licensed, North Carolina 1107

Attachments

DHN/WDD/JAK/alc

Industrial & Environmental Analysts, Inc.
P.O. Box 12846
Research Triangle Park, North Carolina 27709
(919) 677-0090
FAX (919) 677-0427

November 6, 1990

RECEIVED BY
NOV 07 1990
LAW ENGINEERING
RALEIGH

W. Douglass Dixon
Law Engineering & Testing
P.O. Box 18288
Raleigh, NC 27619

Reference IEA Report No.: 287225
Project ID: 6067

Dear Mr. Dixon,

Transmitted herewith are the results of analyses on two samples submitted to our laboratory.

Please see the enclosed reports for your results.

Very truly yours,

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.

Linda F. Mitchell
Director, Technical Support Services

State Certification:

Alabama - #40210	New Jersey - #67719	South Carolina - #99021
Georgia - #816	Tennessee - #00296	North Carolina - #37720
Kansas - #E-158	Virginia - #00179	#84

Total Petroleum Hydrocarbon Analysis

IEA Sample No: 287-225-1 Date Received: 10-26-90

Client Sample No: B-1 Date Extracted: 10-28-90

Client Project No: 6067

Extraction (SW 846 - 3550) / GC-FID analysis (for #2 fuel oil,kerosene,varsol)
Date Analyzed: 11-01-90

The sample does not contain a petroleum hydrocarbon blend in the distillation range referenced above. The quantitation limit is 2.0 mg/kg.

Comment:

==========

Purge and Trap (SW 846 - 5030) / GC-FID analysis (for gasoline only)
Date Analyzed: 11-01-90

The sample does not contain a petroleum hydrocarbon blend with a distillation range similar to gasoline. The quantitation limit is 2.0 mg/kg.

Comment:

Total Petroleum Hydrocarbon Analysis

IEA Sample No:	287-225-2	Date Received:	10-26-90
Client Sample No:	B-2	Date Extracted:	10-28-90
Client Project No:	6067		

Extraction (SW 846 - 3550) / GC-FID analysis (for #2 fuel oil,kerosene,varsol)
Date Analyzed: 11-01-90

The sample does not contain a petroleum hydrocarbon blend in the distillation range referenced above. The quantitation limit is 2.0 mg/kg.

Comment:

==========

Purge and Trap (SW 846 - 5030) / GC-FID analysis (for gasoline only)
Date Analyzed: 11-01-90

The sample does not contain a petroleum hydrocarbon blend with a distillation range similar to gasoline. The quantitation limit is 2.0 mg/kg.

Comment:

STRIAL & ENVIRONMENTAL
ANALYSTS, INC.
1901 NORTH HARRISON AVE.
CARY, N.C. 27513

CHAIN OF CUSTODY RECORD

NO: 10949

PROJECT #	PROJECT NAME
067	GLAXO RTP

PLERS (SIGNATURE): Doug/Andy Dixon

PLE	DATE	TIME	COMP	GRAB	STATION LOCATION	# OF CONTAINERS	MATRIX SOIL	MATRIX WATER	REQUESTED PARAMETERS: TPH BY GC
-1	10-25-90	11:30	[illegible]	X		1	X		X
2	10-25-90	2:30	[illegible]	X		1	X		X

QUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY	DATE	TIME
Doug/Andy Dixon	10-25-90	3:30			

QUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LAB BY	DATE	TIME
			Jay [illegible]	10-25-90	3:31

IEA QUOTE NO.	IEA RUSH NO.

PROJECT MANAGER (PLEASE PRINT)	P.O. NO.
W Douglass Dixon	6067

IEA REMARKS: IEA # 287-225

FIELD REMARKS: LAW ENGINEERING 919-876-0416

M - Closure Equiv. Determination

SECTION M

CLOSURE EQUIVALENCY DETERMINATION

The requirements of this section do not apply since Glaxo will not be managing hazardous wastes in land disposal units.

N - NC Amendments

SECTION N

INFORMATION REQUIRED BY THE N.C. AMENDMENTS

N-1 DESCRIPTION OF 10 NCAC 10F .0034(b)(13)(A) REQUIREMENTS

N-1a Public Meetings

Per the requirements of 10 NCAC 10F .0032(q)(7), Glaxo conducted a public meeting on December 15, 1989 at the Dreyfus Auditorium at Research Triangle Institute. The meeting addressed proposed hazardous waste activities at the site including the following:

(1) The hazardous properties of the waste to be managed;
(2) The type of management proposed for the wastes;
(3) The mass and volume of the wastes; and
(4) The source of the wastes.

The community was allowed to express specific health, safety and environmental concerns or problems associated with the facility. Public notice of the first meeting and a follow-up meeting on January 24, 1990, was made at least thirty (30) days prior to the meeting.

The following additional information is included in Appendix E as required by 10 NCAC 10F .0032(q)(7):

(1) A copy of the public notice for both required meetings;
(2) Copies of the required notices to the different Boards of County Commissioners.

A complete written transcript of the meetings along with all written material submitted or used during the meetings will be submitted for incorporation into Appendix E of this application no later than thirty (30) days after the meetings.

The written transcript of the first public meeting and other written material submitted or used at the meeting will be made available at the public library at least thirty (30) days before the second public meeting is held.

N-2 DESCRIPTION OF 10 NCAC 10F .0034(b)(13)(B) REQUIREMENTS

N-2a Floodplain

The Glaxo incinerator is not located within the 100-year flood plain as shown on drawing R-8279-B6 (See Section B). The floodplain information was taken from the National Flood Insurance Program, Flood Insurance Rate Map for Durham County, North Carolina (Community - panel number 3700850055 A), effective February 15, 1979.

N-2b Groundwater

Bulletin No. 7 "Geology and Groundwater in the Durham Area, North Carolina" was prepared by the North Carolina Department of Water Resources in cooperation with the U.S. Geological Survey in 1966. This document is the source of the following groundwater quality data.

Minimum, Maximum, and Median Concentrations of
Chemical Constituents in Ground Water in the Durham Area

Constituent	Parts per million		
	Minimum	Maximum	Median
Silica (SiO_2)	6.6	47	25
Iron (Fe)	0.00	5.4	0.19
Calcium (Ca)	1.1	388	23
Magnesium (Mg)	0.4	89	7.9
Sodium (Na)	0.2	188	13
Potassium (K)	0.1	6.3	0.3
Bicarbonate (HCO_3)	14	412	111
Sulfate (SO_4)	0.4	67	4.4
Chloride (Cl)	0.2	750	12
Flouride (F)	0.0	1.5	0.1
Nitrate (NO_3)	0.0	75	3.2
Hardness	5	1340	86
Dissolved Solids	16	806	162
Hydrogen-ion concentration (pH)	5.8	8.0	6.8
Specific Conductance in micromhos	22	3100	255

Glaxo excavated ninety (90) test borings to investigate subsurface conditions at the facility site. Five (5) of the borings were converted to temporary observation wells. Drawing R-8279-N1 shows the location and groundwater elevation of each well and the general direction of groundwater flow.

The depth to bedrock ("blastable rock") at the facility site generally ranges from 2.5 to 24 feet. Blastable rock may be defined as material exhibiting penetration resistances of $\geq$ 50 blows per 2-inches of penetration.

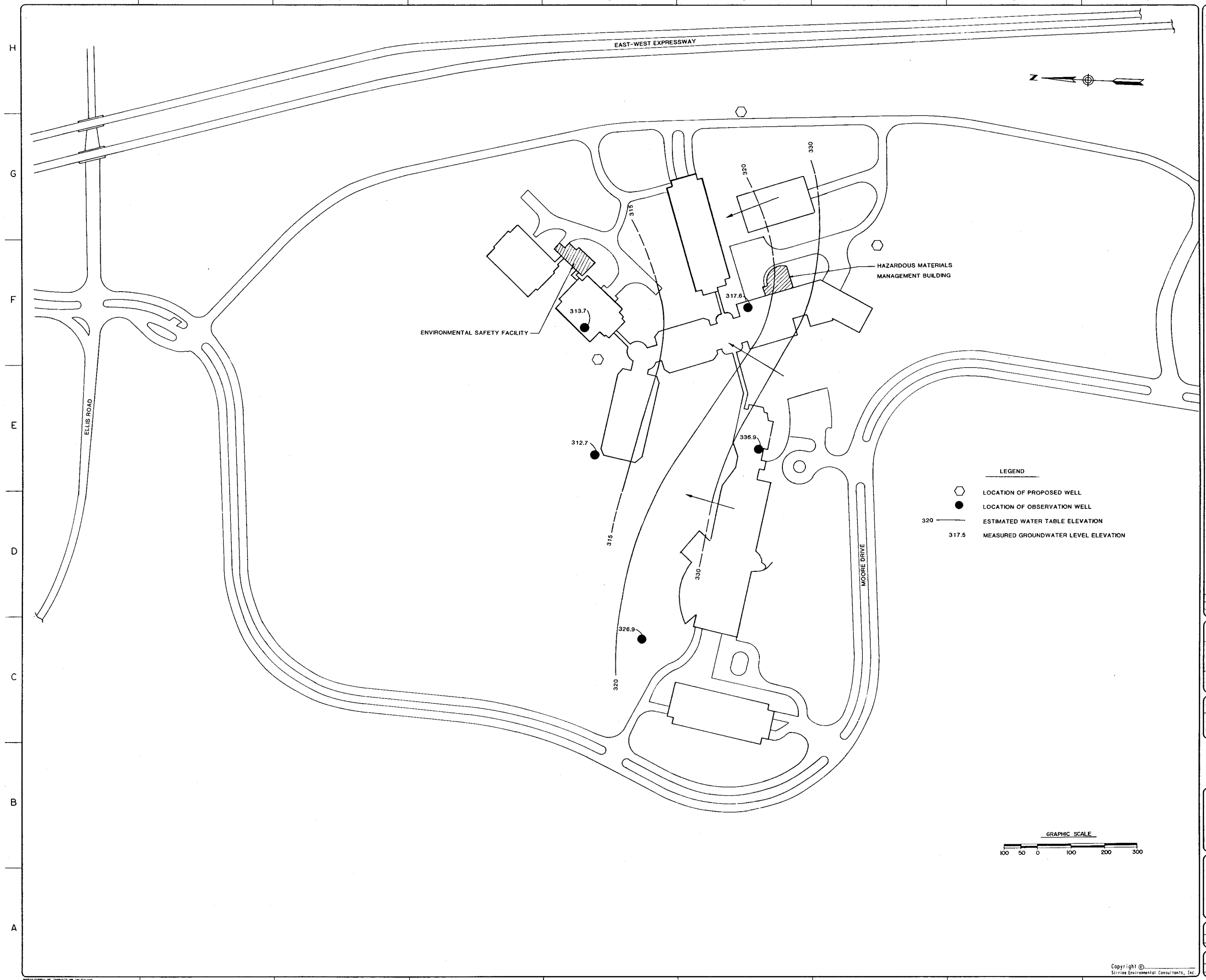
Based on field observations of grain size during construction of the five (5) observation wells (see Test Boring Records in Appendix E) and water level measurements, it is estimated that average linear groundwater velocity in the area of Glaxo is approximately .00123 meters per day (See Appendix E for calculation).

In accordance with 10 NCAC 10F .0032(q)(6), Glaxo plans to install three permanent monitoring wells at locations shown on Drawing R-8279-N1 . These wells will be sampled in order to establish background groundwater concentrations for all hazardous wastes that Glaxo proposes to store, treat, or dispose at the facility.

For information on the location and withdrawal rates of well water users within a one-mile radius of the facility, see the letter from Mr. Frank O. Morris, P.E., Regional Engineer (Appendix E).

N-2c Water Supplies and Water Supply Watersheds

The area in the vicinity of the Glaxo facility has public water service provided by the City of Durham Water Department.



NOTES

REFERENCE :

THE KLING-LINDQUIST PARTNERSHIP INC

DRAWING NO. LA-101 AND EP-300

REV. NO.	CODE	CIRCLES	DATE	DESCRIPTION
0	G	–	12	ISSUED FOR RCRA PERMIT
			15	APPLICATION
	RWM		89	

NOTE: CIRCLE ALL REVISIONS, IDENTIFY WITH DIAMOND, NUMBER AND ARROW. REMOVE ONLY CIRCLE AND ARROW BEFORE NEXT REVISION.

ISSUE CODE					
A	PRELIMINARY	C	MAT'L T.O.	F	CONST'N
B	DESIGN	D	MAT'L PURC.	G	PERMIT
		E	BIDS	H	

SEAL

SIGNATURE

DATE

DR.	MC	DATE	
DSGN.	RWM	SEC FILE NUMBER	
CK.	JTB		
DPE		JOB NO.	R-8279
CAD FILE NO.			

SIRRINE ENVIRONMENTAL CONSULTANTS

Raleigh, North Carolina

GLAXO INC.,

RESEARCH TRIANGLE PARK

NORTH CAROLINA

DRAWING TITLE

WELL LOCATION MAP

CLIENT DRAWING NUMBER

SEC DRAWING NUMBER

R-8279-N1

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A tributary of Northeast Creek passes within 1000 feet of the facility. Northeast Creek is a tributary of the New Hope Creek arm of the New Hope River arm of B. Everett Jordan Lake. Northeast Creek and New Hope Creek are classified by the NC Division of Environmental Management as Class C NSW. Class C is the lowest of the freshwater classifications. NSW designations indicate that the waters are nutrient sensitive which requires limitations on nutrient inputs. Class C surface water is primarily suited for fish and wildlife propagation, secondary recreation, agriculture, and other uses requiring waters of lower quality. The New Hope River arm of B. Everett Jordan Lake is classified as SW-III and B NSW water. Class WS-III waters are considered water supply segments with no categorical restrictions on watershed development or discharges. Class B NSW waters are best suited for primary recreation and any other usage specified by the C classification. However, such waters are considered to be nutrient sensitive as indicated by the NSW designation.

The U. S. Geological Survey has collected surface water quality data at a gaging station on Northeast Creek at Secondary Road 1100 near Genlee, North Carolina. This water quality data is presented in U.S. Geological Survey Water-Data Report, NC-87-1 (Appendix E).

For information on the location and withdrawal rates of surface water users within the immediate drainage basin, see the letter from Mr. Frank O. Morris, P.E., Regional Engineer (Appendix E).

N-2 DESCRIPTION OF 10 NCAC 10F .0034(b)(13)(B) REQUIREMENTS - Continued

N-2d Soils

The soils in the vicinity of the Glaxo facility are from the White Store Series which consist of nearly level to moderately steep, moderately well-drained soils on uplands.

In a typical profile, the permeability ranges from 2.0 to 6.0 inches per hour in the 0 - 6 inch interval (sandy loam), and less than 0.06 inches per hour in the 6 - 35 inch interval (clay loam). The clay loam is underlain by weathered sandstone and shale. The soil pH ranges from less than 4.5 to 6.0.

Based on the predominant soil type in the area (sandy loam), the cation exchange capacity is expected to be in the range of 10 - 15 meq/100g. Higher cation exchange capacities in the range of 15 - 20 meq/100g are expected in the underlying clay loam.

See the attached information (Appendix E) taken from the Soil Survey of Durham County for additional information concerning these soil types.

N-2e Climate

See the attached climatological survey for Durham County, North Carolina (Appendix E).

N-2f Local Air Quality

The "Ambient Air Quality, 1986," data report for North Carolina was printed by the Air Quality Section, Division of Environmental Management in October of 1987. This report provides a summary of the valid 1986 ambient air quality data collected by State and/or local agencies in North Carolina. The monitoring stations in the Durham area are located at the County Health Building (300 E. Main St.), the Old Health Building (302 E. Main St.), and the City Park on University Drive. The County Health Building monitoring station measures Total Suspended Particulates (TSP), while the monitoring stations at the Old Health Building and the City Park measure carbon monoxide levels. The following data is from measurements taken at these stations during 1986:

Total Suspended Particulates (TSP)
North Carolina Standard

-	24 hour average	150 ug/m^3
-	annual geometric mean	75 ug/m^3

Measured at the County Health Building

-	Highest 24 hour average	156 ug/m^3
-	annual geometric mean	50 ug/m^3
-	exceedances	1*
*	no violations of the air quality standard	

Carbon Monoxide (CO)
North Carolina Standard

-	1 hour average	40 mg/m^3
-	8 hour average	10 mg/m^3

Measured at the Old Health Building

-	Highest 1 hour average	28 mg/m^3
-	Highest 8 hour average	16 mg/m^3
-	exceedances	(11) 8-hour average exceedances

Measured at the City Park

-	Highest 1 hour average	10 mg/m^3
-	Highest 8 hour average	9 mg/m^3
-	exceedances	none

N-2g Seismic Activity

The Glaxo facility is not located in an area listed in 40 CFR 264, Appendix VI, which lists sensitive seismic areas.

N-3 DESCRIPTION OF NCAC 10F .0034(b)(13)(C) REQUIREMENTS

N-3a Proximity To and Potential Impact on Wetlands, Endangered Species Habitats, Parks, Forests, and Wilderness Areas:

See the attached correspondence with the North Carolina Natural Heritage Program for comments concerning these areas. (Appendix E)

N-3b Proximity To and Potential Impact on Mines:

See the attached correspondence with the Land Quality Section for comments concerning these areas. (Appendix E)

N-3c Proximity To and Potential Impact on Historical Sites:

See the attached correspondence with the Division of Archives and History for comments concerning these areas. (Appendix E)

N-3d Potential Impact on Air Quality and Potential of Fugitive Emissions:

Glaxo will operate permitted air pollution control devices for its incinerator. No significant air quality impact is expected from the hazardous waste storage and treatment activities at Glaxo. Modeling for Air Toxics will be performed and the results will be submitted to the Air Quality Section of the N.C. Department of Environmental, Health, & Natural Resources as part of the air quality permit application.

N-4 DESCRIPTION OF 10 NCAC 10F .0034(b)13)(D) REQUIREMENTS

N-4a Land Use

Drawing R-8279-B5 (see Section B) shows the current surrounding land use areas. The immediate area surrounding the Glaxo facility is zoned research and residential. Land zoned industrial is within 2400 feet of the Glaxo property line.

N-4b Proximity to Schools and Airports

The nearest school is Southern High School, which is located approximately 0.4 miles from the Glaxo facility.

The nearest airport is the Raleigh-Durham International Airport which is located 5.4 miles southeast of the Glaxo facility.

N-5 DESCRIPTION OF 10 NCAC 10F .0034(b)(13)(E) REQUIREMENTS

N-5a Proximity to Waste Generators and Population Centers

The Glaxo treatment facility will receive off-site wastes from Glaxo-owned laboratories located in Research Triangle Park, Chapel Hill, Durham, and Morrisville.

The Glaxo facility is located approximately 2.5 miles from the city limits of Durham, North Carolina.

N-5b Method of Waste Transport

A licensed transporter will transport all hazardous waste received on-site or shipped off-site. For details regarding waste transport, see Section B-4, Traffic Patterns.

N-5c Transportation Authority Comments on Proposed Route

See the attached letters from the Department of Transportation for comments. (Appendix E)