TB

John Hall, Chairman
Pam Reed, Commissioner
Peggy Garner, Commissioner

EPA REGION VI
HAZARDOUS WASTE
RCRA PERMITS BRANCH
1993 APR -1 PM 4:14

TEXAS WATER COMMISSION

PROTECTING TEXANS' HEALTH AND SAFETY BY PREVENTING AND REDUCING POLLUTION

March 26, 1993

Carol

Ms. Guanita Reiter, Chief
RCRA Permits Branch
U.S. Environmental Protection Agency
Region VI - 6H-C
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: Transmittal of RCRA Facility Assessment
Baylor College of Medicine
Industrial Solid Waste Registration No. 50354

Dear Ms. Reiter:

In accordance with the agreement made between the State of Texas and the U.S. Environmental Protection Agency, transmitted herewith is the RCRA Facility Assessment (RFA) for Baylor College of Medicine in Houston, Texas.

The facility has one RCRA-regulated unit and no other solid waste management units. A visual site inspection was conducted on March 8, 1993. No visual evidence of spills or contamination from the unit exists because it is a new unit that has never been in operation. Furthermore, no evidence currently exists to indicate past releases from the unit. In addition, the unit appears to have been designed and constructed to control and mitigate spills and emissions, should they occur. No action is recommended for the unit.

Questions or comments on the RFA should be directed to the staff permit writer indicated below within 30 days of the receipt of this letter.

Applicant	Permit Writer	Permit No.	EPA I.D. No.
Baylor College of Medicine	Enoch Johnbull	HW-50354	TXD988070082

Sincerely,

Minor Brooks Hibbs

Minor Brooks Hibbs, Manager
Permits Section
Industrial and Hazardous Waste Division

MBR/ETJ/etj
Enclosure
cc: David R. Miller, Ph.D., Baylor College of Medicine - Houston (with enclosure)
TWC District 7 Office - Houston (with enclosure)

RCRA Facility Assessment
for
Baylor College of Medicine
Houston, Texas

Industrial Solid Waste Registration No. 50354
EPA I. D. No. TXD988070082
Proposed Hazardous Waste Permit No. HW-50354

Table of Contents

		Page
A.	Preliminary Review Facility Checklist	3
B.	Preliminary Assessment Unit Checklist	4
	RCRA Unit	4
C.	Attachments	
	I. Pollutant Dispersal Pathways	
	II. Target Populations of Concern	

PRELIMINARY REVIEW FACILITY CHECKLIST

Facility: Baylor College of Medicine
EPA I.D. No.: TXD988070082
ISW Registration No.: 50354
HAZSIT No.: None

Reviewer: Enoch Johnbull

Date: March 5, 1993

A. Waste Management Unit

1. RCRA Regulated Units

RFA Unit #	Type of Unit	Status	Recommended Action
01	Container Storage Area (CSA)	Inactive	No Action

2. Solid Waste Management Units: None

B. Reviewed Documents

1. Part A Hazardous Waste Permit Application

2. Part B Hazardous Waste Permit Application (all revisions and all attachments)

3. Correspondence Files 1992 through 1993

C. Enforcement Action

None

D. Exposure Information

This is a new unit and it has never been in operation. No run-on/run-off is possible because the CSA is within an existing warehouse, and no known ground-water or surface water contamination currently exists. Also, no air emission hazard currently exists. Surface water, ground water, and air exposure is still possible in the event of future ineffective management of the wastes. A spill could possibly run off into Bray's Bayou. However, the unit has been designed to control and mitigate spills and emissions, should they occur.

E. Summary

Baylor is seeking to permit the container storage area.

F. Recommended Actions

No action is recommended for the unit.

PRELIMINARY ASSESSMENT UNIT CHECKLIST

I. Waste Management Unit

a. RFA Unit No.01, RCRA, Inactive

b. Type: Container Storage Area

II. Description of Unit

CSA is located within a warehouse and secured by a fence with a locked gate and a 24-hour security guard. It has a maximum storage capacity of 200 55-gallon drums (or 11,000 gallons). The unit is equipped with chemical cabinets, a canopy hood exhaust, and a laboratory fume hood exhaust. Walls have a 4-inch concrete curb integrated with a concrete floor and are sealed with an epoxy coating. This is a new unit and it is currently not in operation.

III. Waste Characteristics

a. Waste Managed

NOR Waste No.	Waste Description	Class	Code	EPA Waste NO.
N/A	Metals and Metallic Salts	IH	N/A	D004-D011 P and U Wastes
N/A	Pesticides	IH	N/A	D002 P and U wastes
N/A	Miscellaneous (Lab Pack Chemicals)	IH	N/A	D018-D043 P and U wastes
N/A	Mixed Wastes	IH	N/A	D001 D018-D043 F001-F005 P and U wastes
N/A	Oxidizers	IH	N/A	D001 P and U wastes
N/A	Reactives	IH	N/A	D003 P and U wastes
N/A	Corrosives	IH	N/A	D002 P and U wastes

N/A	Cyanides and Sulfides	IH	N/A	P and U Listed cyanides & Sulfides
N/A	Organic Solvents	IH	N/A	D001 D018-D043 F001-F005 P and U wastes

b. Characteristics

Wastes to be managed in the container storage area exhibit characteristics of ignitability, corrosivity, reactivity, and TCLP toxicity.

IV. Evidence of Release

No visual evidence of spills or contamination.

V. Pollutant Dispersal Pathways

See Attachment I

VI. Target Populations of Concern

See Attachment II

VII. Summary

There have been no reports nor is there any evidence of past releases.

VIII. Recommended Action

No action is recommended

Attachment I

Pollutant Dispersal Pathways

Attachment I

Pollutant Dispersal Pathways

Ground Water

The Baylor facility is located in southeast Houston in the physiographic region known as the Texas Gulf Coast. The surficial soils of this region are deposits of the Pleistocene fluvial-deltaic system. The generalized stratigraphic column of the area consists primarily of sand, silt, clay, and gravel which have been deposited within the last 1.8 million years (Quaternary Period). The youngest sediments comprise the Recent-Holocene(post glacial) depositional surface which is composed of deltaic and coastal interdeltaic plains. The Pleistocene coastal plain occurs between the recent formations near the coast and the youngest Tertiary formation inland.

Pleistocene soils underlying the site consist of fluvial, deltaic, and associated marginal marine sediments deposited during interglacial stages of rising sea level within the Beaumont, Montgomery, Bentley, and Willis formations. In general, these formations are all comprised of similar lithologic material and for the most part do not have persistent individual characteristics that can be recognized in the subsurface.

According to the latest nomenclature by the U.S. Geological Survey, the formations which supply water wells in the Harris County area are from the oldest to youngest: the Fleming Formation of Miocene Age; the Goliad Sand of Pliocene Age; the Willis Sand, Bentley Formation, Montgomery Formation, and Beaumont Clay of Pleistocene Age; and Alluvium of Pleistocene and Recent Ages. Three of these four subdivisions are identified as aquifers and one is identified as a confining layer. From oldest to youngest, and deepest to shallowest, the subdivisions are the Jasper Aquifer, the Burkeville Confining Layer, the Evangeline Aquifer, and the Chicot Aquifer.

The Jasper Aquifer and the Burkeville Confining Layer are considered to be parts of the Fleming Formation. The Evangeline Aquifer includes the upper part of the Fleming Formation and the Goliad Sand. The Chicot Aquifer includes the remaining formations up to the land surface.

The facility is located on the Beaumont Formation of the Pleistocene Series. This formation consists of fluvial-deltaic deposits of clays, sandy silts, discontinuous sand seams, and some gravel. The underlying formations are, from youngest to oldest, the Montgomery, Bentley, and Willis Formations. These formations also consist of clays, sandy silts, sands, and gravel.

The Beaumont Formation is considered the uppermost portion of the Chicot Aquifer. No local wells screen the Chicot, whose base is at about five hundred feet in this area. The Upper Chicot Aquifer provides small quantities of usable quality water to private domestic wells in the Houston area from depths of 70 to 300 feet.

The Evangeline Aquifer underlies the Chicot Aquifer and is hydraulically connected to it. The source of recharge for both aquifers is rainfall on the outcrop areas.

Surface Water

Baylors stormwater discharges through surface drainage to a county drainage ditch. This drainage ditch empties into Brays Bayou, then into Buffalo Bayou and then into the Houston Ship Channel.

Air

The predominant winds at the facility are from the south-southeast. The RCRA unit, because of its design, poses very little threat of air releases. Also, emissions from the unit will be regulated under Texas Air Control Board provisions.

Subsurface Gas

There are no known sources or pathways for subsurface gas.

Subsurface Soil

The soils underlying the facility are heterogeneous deposits of clays, silts, and sands which interfinger and grade into each other. These deposits are characteristic of the fluvial-deltaic environment of the Pleistocene to Recent coastal sedimentation. The soils are present from the land surface to a depth of approximately 50 feet. Colors of the sediments range from gray to tan to dark red.

II. SITE BACKGROUND INFORMATION

A. Location of Site

1. Facility Name: Baylor College of Medicine

   Street Address, if available: 3325 Yellowstone Blvd.

   County: Harris County

2. Give a verbal description of the location of the facility site with respect to known or easily identifiable landmarks.

   The proposed facility is located one block east of the 288 South Freeway and the Yellowstone Blvd. intersection.

3. Detail the access routes from the nearest U.S. or State Highway to the facility site.

   Traveling south on the 288 South Freeway, exit at Yellowstone Blvd. (Yellowstone Blvd. is south of U.S. Highway Alt. 90). After taking the Yellowstone Blvd. exit, travel eastward for one block. The proposed facility is located on the left hand side at 3325 Yellowstone Blvd.

4. Submit as "Attachment A" a United States Geological Survey (USGS), 7½ minute quadrangle map. Indicate on this map the location of the site and the land use patterns of the areas within 1 mile (1.6 km) of the site boundaries (e.g., residential, commercial, recreational, agricultural, undeveloped, etc.). Each area of land use should be labeled on the map. (Note: if such a map is not available, submit a substitute map such as a State Department of Highways and Public Transportation county map or a city map with sufficient scale to adequately show the site location and surrounding land use patterns. (Submission of an aerial photograph is recommended as it may clarify land use, topography, vegetation, etc., within the vicinity of the site.) This map and accompanying text should include the following information:

   a. existing zoning at the site (if within the territorial limits of a city); None; not applicable.

   b. location and distance to nearest residences, schools or other centers of community activity; See map, Attachment A.

   c. location of any utility easements, pipelines, or any underground oil and gas storage areas; See topographic map, Section 8 of Part B application.

5. a. Submit as "Attachment B" a map indicating the boundaries of all adjacent parcels of land, and a list of the names and mailing addresses of all adjacent landowners and other nearby landowners who might consider themselves affected by the activities described by this application. Cross-reference this list to the map through the use of appropriate keying techniques. The map should be a USGS map, a city or county plat, or another map, sketch or drawing with a scale adequate enough to show the cross-referenced affected landowners.

   b. Indicate from what source(s) the names and addresses of persons identified as affected were obtained.

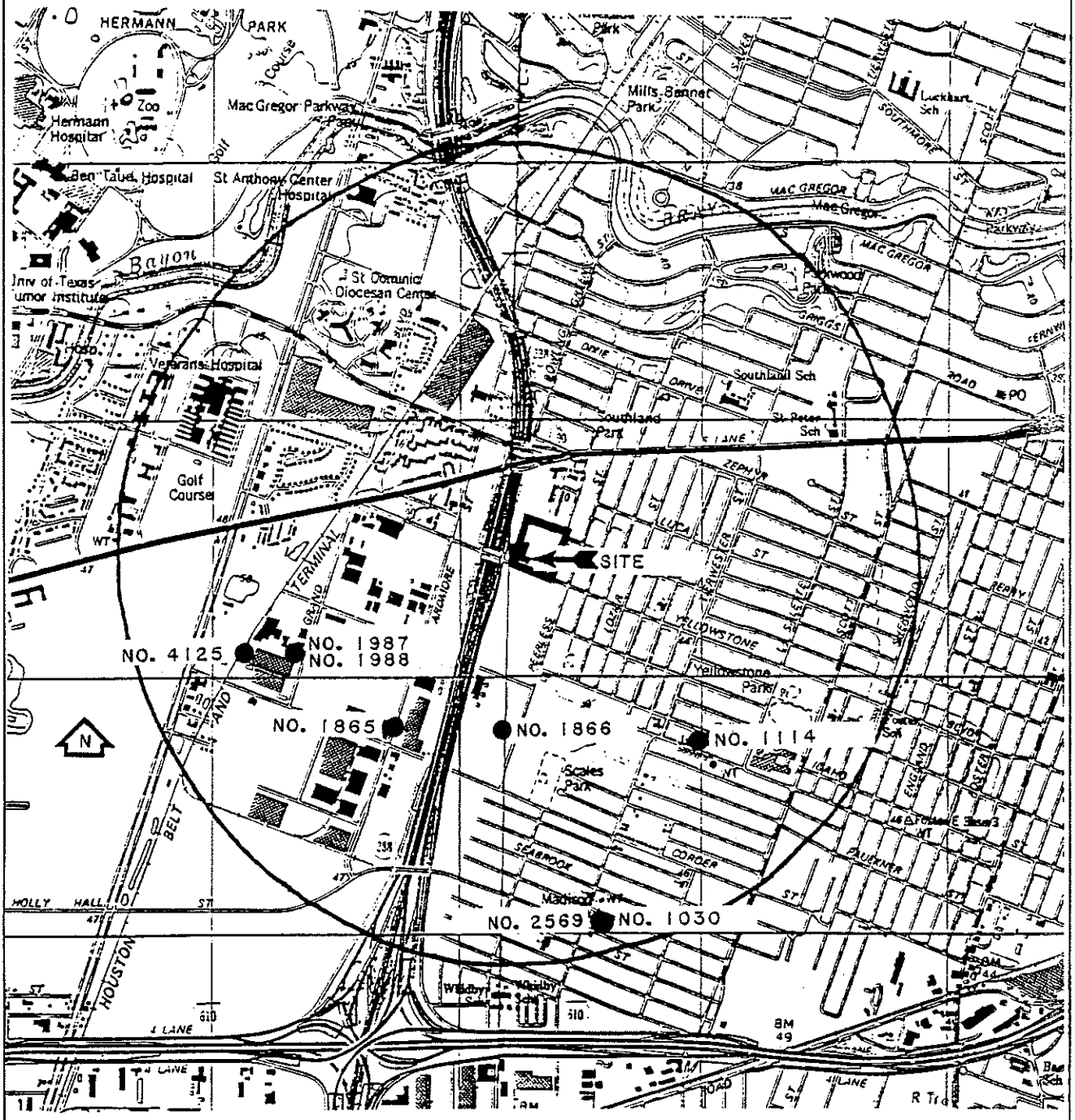
   City _____
   County _____
   School District _____
   Water District _____
   Abstract Co. _____
   Other (specify) tax roles

6. Enter the geographical coordinates of the site:

   Latitude: 29 deg 41 min 53 sec

   Longitude: 95 deg 22 min 26.5 sec

BAYLOR COLLEGE OF MEDICINE - PART A APPLICATION
TOPOGRAPHIC MAP



7.5 MINUTE SERIES (TOPOGRAPHIC)
BELLAIRE AND PARK PLACE QUADRANGLES
TEXAS-HARRIS COUNTY

SCALE 1:24 000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Attachment II

Target Populations of Concern

Baylor College of Medicine - Part A Application
Photographs

Photograph Number	Subject	Camera Direction
1	South side of building.	Northeast
2	North side of building, part of the fenceline and west side of the building.	South
3	South and west side of the building as viewed from Yellowstone Blvd.	Northeast
4	West side of building and part of the fenceline.	North
5 & 6	These two photographs depict the east side of the building. The receiving dock entrance is located under the canopy.	Southwest
7	Chemical Storage Room.	West
8	Chemical Storage Room.	South
9	Flammable Storage Room (Intrinsically safe lighting and blow-out panel).	Southeast
10	Security-surveillance system.	South
11	Carbon filter system for air.	Interior
12	Dry chemical fire suppression system.	Interior
13	Alarm system panel.	Interior

Baylor College of Medicine - Part A Application
Adjacent Land Owners

Area	Direction From Property	Owner	Site Address	Mailing Address	Property Use
A	West	SouthWestern Bell Telephone	3247 Yellowstone Blvd.	P.O. Box 1530 Rm. 1205 Houston, TX 77251	Telephone Equip. Storage Building
B	North	Dia-Log Company	3330 O.S.T.	P.O. Box 14103 Houston, TX 77221	Oil Well Service Company Headquarters
C	East	Ford Alexander Corp.	6700 Allegheny	P.O. Box 14103 Houston, TX 77221-4103	Vacant Property
C	East	Poppi Investments Inc.	6801 thru 6819 Allegheny	P.O. Box 441826 Houston, TX 77244-0000	2-story Apartment Facility
D	South	Paolina Mazzeri Waddell	Vacant Commercial Prop. Yellowstone Blvd.	Charles E. Waddell C/O Robert O. Waddell P.O. Box 22232 Houston, TX 77027-2232	Vacant Property

Baylor College of Medicine - Part A Application
Photographs

1

2

Baylor College of Medicine - Part A Application
Photographs

3

4

Baylor College of Medicine - Part A Application
Photographs

5

6

Baylor College of Medicine - Part A Application
Photographs

7

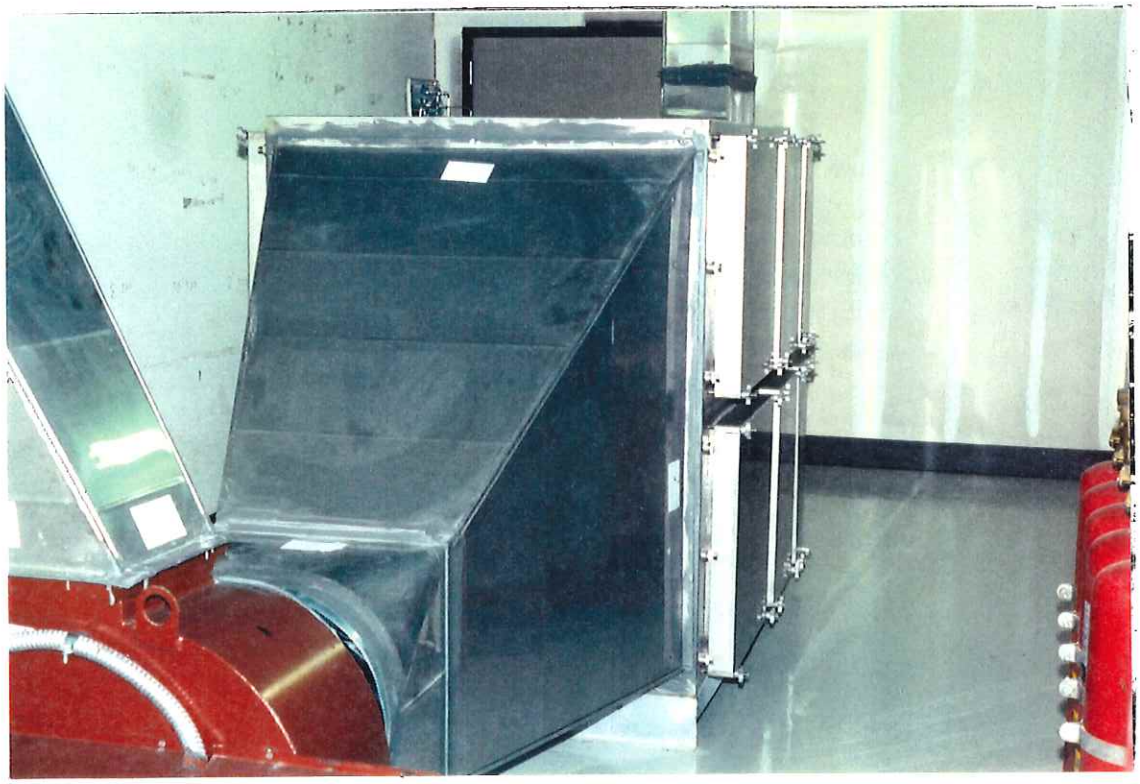
8

Baylor College of Medicine - Part A Application
Photographs

9

10

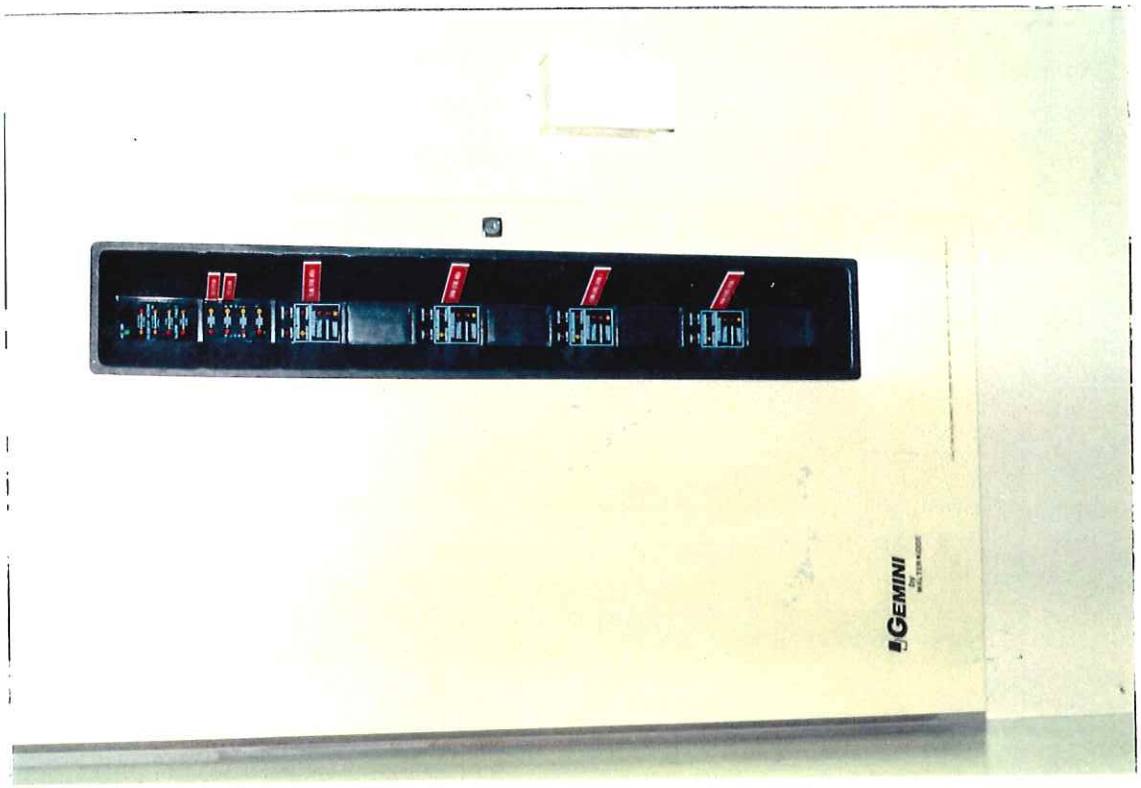
Baylor College of Medicine - Part A Application
Photographs



11

12

Baylor College of Medicine - Part A Application
Photographs



13

TB

John Hall, Chairman
Pam Reed, Commissioner
Peggy Garner, Commissioner

EPA REGION VI
HAZARDOUS WASTE
RCRA PERMITS BRANCH
1993 APR -1 PM 4:14

TEXAS WATER COMMISSION

PROTECTING TEXANS' HEALTH AND SAFETY BY PREVENTING AND REDUCING POLLUTION

March 26, 1993

Carol

Ms. Guanita Reiter, Chief
RCRA Permits Branch
U.S. Environmental Protection Agency
Region VI - 6H-C
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: Transmittal of RCRA Facility Assessment
Baylor College of Medicine
Industrial Solid Waste Registration No. 50354

Dear Ms. Reiter:

In accordance with the agreement made between the State of Texas and the U.S. Environmental Protection Agency, transmitted herewith is the RCRA Facility Assessment (RFA) for Baylor College of Medicine in Houston, Texas.

The facility has one RCRA-regulated unit and no other solid waste management units. A visual site inspection was conducted on March 8, 1993. No visual evidence of spills or contamination from the unit exists because it is a new unit that has never been in operation. Furthermore, no evidence currently exists to indicate past releases from the unit. In addition, the unit appears to have been designed and constructed to control and mitigate spills and emissions, should they occur. No action is recommended for the unit.

Questions or comments on the RFA should be directed to the staff permit writer indicated below within 30 days of the receipt of this letter.

Applicant	Permit Writer	Permit No.	EPA I.D. No.
Baylor College of Medicine	Enoch Johnbull	HW-50354	TXD988070082

Sincerely,

Minor Brooks Hibbs

Minor Brooks Hibbs, Manager
Permits Section
Industrial and Hazardous Waste Division

MBR/ETJ/etj
Enclosure
cc: David R. Miller, Ph.D., Baylor College of Medicine - Houston (with enclosure)
TWC District 7 Office - Houston (with enclosure)

RCRA Facility Assessment
for
Baylor College of Medicine
Houston, Texas

Industrial Solid Waste Registration No. 50354
EPA I. D. No. TXD988070082
Proposed Hazardous Waste Permit No. HW-50354

Table of Contents

		Page
A.	Preliminary Review Facility Checklist	3
B.	Preliminary Assessment Unit Checklist	4
	RCRA Unit	4
C.	Attachments	
	I. Pollutant Dispersal Pathways	
	II. Target Populations of Concern	

PRELIMINARY REVIEW FACILITY CHECKLIST

Facility: Baylor College of Medicine
EPA I.D. No.: TXD988070082
ISW Registration No.: 50354
HAZSIT No.: None

Reviewer: Enoch Johnbull

Date: March 5, 1993

A. Waste Management Unit

1. RCRA Regulated Units

RFA Unit #	Type of Unit	Status	Recommended Action
01	Container Storage Area (CSA)	Inactive	No Action

2. Solid Waste Management Units: None

B. Reviewed Documents

1. Part A Hazardous Waste Permit Application

2. Part B Hazardous Waste Permit Application (all revisions and all attachments)

3. Correspondence Files 1992 through 1993

C. Enforcement Action

None

D. Exposure Information

This is a new unit and it has never been in operation. No run-on/run-off is possible because the CSA is within an existing warehouse, and no known ground-water or surface water contamination currently exists. Also, no air emission hazard currently exists. Surface water, ground water, and air exposure is still possible in the event of future ineffective management of the wastes. A spill could possibly run off into Bray's Bayou. However, the unit has been designed to control and mitigate spills and emissions, should they occur.

E. Summary

Baylor is seeking to permit the container storage area.

F. Recommended Actions

No action is recommended for the unit.

PRELIMINARY ASSESSMENT UNIT CHECKLIST

I. Waste Management Unit

a. RFA Unit No.01, RCRA, Inactive

b. Type: Container Storage Area

II. Description of Unit

CSA is located within a warehouse and secured by a fence with a locked gate and a 24-hour security guard. It has a maximum storage capacity of 200 55-gallon drums (or 11,000 gallons). The unit is equipped with chemical cabinets, a canopy hood exhaust, and a laboratory fume hood exhaust. Walls have a 4-inch concrete curb integrated with a concrete floor and are sealed with an epoxy coating. This is a new unit and it is currently not in operation.

III. Waste Characteristics

a. Waste Managed

NOR Waste No.	Waste Description	Class	Code	EPA Waste NO.
N/A	Metals and Metallic Salts	IH	N/A	D004-D011 P and U Wastes
N/A	Pesticides	IH	N/A	D002 P and U wastes
N/A	Miscellaneous (Lab Pack Chemicals)	IH	N/A	D018-D043 P and U wastes
N/A	Mixed Wastes	IH	N/A	D001 D018-D043 F001-F005 P and U wastes
N/A	Oxidizers	IH	N/A	D001 P and U wastes
N/A	Reactives	IH	N/A	D003 P and U wastes
N/A	Corrosives	IH	N/A	D002 P and U wastes

N/A	Cyanides and Sulfides	IH	N/A	P and U Listed cyanides & Sulfides
N/A	Organic Solvents	IH	N/A	D001 D018-D043 F001-F005 P and U wastes

b. Characteristics

Wastes to be managed in the container storage area exhibit characteristics of ignitability, corrosivity, reactivity, and TCLP toxicity.

IV. Evidence of Release

No visual evidence of spills or contamination.

V. Pollutant Dispersal Pathways

See Attachment I

VI. Target Populations of Concern

See Attachment II

VII. Summary

There have been no reports nor is there any evidence of past releases.

VIII. Recommended Action

No action is recommended

Attachment I

Pollutant Dispersal Pathways

Attachment I

Pollutant Dispersal Pathways

Ground Water

The Baylor facility is located in southeast Houston in the physiographic region known as the Texas Gulf Coast. The surficial soils of this region are deposits of the Pleistocene fluvial-deltaic system. The generalized stratigraphic column of the area consists primarily of sand, silt, clay, and gravel which have been deposited within the last 1.8 million years (Quaternary Period). The youngest sediments comprise the Recent-Holocene(post glacial) depositional surface which is composed of deltaic and coastal interdeltaic plains. The Pleistocene coastal plain occurs between the recent formations near the coast and the youngest Tertiary formation inland.

Pleistocene soils underlying the site consist of fluvial, deltaic, and associated marginal marine sediments deposited during interglacial stages of rising sea level within the Beaumont, Montgomery, Bentley, and Willis formations. In general, these formations are all comprised of similar lithologic material and for the most part do not have persistent individual characteristics that can be recognized in the subsurface.

According to the latest nomenclature by the U.S. Geological Survey, the formations which supply water wells in the Harris County area are from the oldest to youngest: the Fleming Formation of Miocene Age; the Goliad Sand of Pliocene Age; the Willis Sand, Bentley Formation, Montgomery Formation, and Beaumont Clay of Pleistocene Age; and Alluvium of Pleistocene and Recent Ages. Three of these four subdivisions are identified as aquifers and one is identified as a confining layer. From oldest to youngest, and deepest to shallowest, the subdivisions are the Jasper Aquifer, the Burkeville Confining Layer, the Evangeline Aquifer, and the Chicot Aquifer.

The Jasper Aquifer and the Burkeville Confining Layer are considered to be parts of the Fleming Formation. The Evangeline Aquifer includes the upper part of the Fleming Formation and the Goliad Sand. The Chicot Aquifer includes the remaining formations up to the land surface.

The facility is located on the Beaumont Formation of the Pleistocene Series. This formation consists of fluvial-deltaic deposits of clays, sandy silts, discontinuous sand seams, and some gravel. The underlying formations are, from youngest to oldest, the Montgomery, Bentley, and Willis Formations. These formations also consist of clays, sandy silts, sands, and gravel.

The Beaumont Formation is considered the uppermost portion of the Chicot Aquifer. No local wells screen the Chicot, whose base is at about five hundred feet in this area. The Upper Chicot Aquifer provides small quantities of usable quality water to private domestic wells in the Houston area from depths of 70 to 300 feet.

The Evangeline Aquifer underlies the Chicot Aquifer and is hydraulically connected to it. The source of recharge for both aquifers is rainfall on the outcrop areas.

Surface Water

Baylors stormwater discharges through surface drainage to a county drainage ditch. This drainage ditch empties into Brays Bayou, then into Buffalo Bayou and then into the Houston Ship Channel.

Air

The predominant winds at the facility are from the south-southeast. The RCRA unit, because of its design, poses very little threat of air releases. Also, emissions from the unit will be regulated under Texas Air Control Board provisions.

Subsurface Gas

There are no known sources or pathways for subsurface gas.

Subsurface Soil

The soils underlying the facility are heterogeneous deposits of clays, silts, and sands which interfinger and grade into each other. These deposits are characteristic of the fluvial-deltaic environment of the Pleistocene to Recent coastal sedimentation. The soils are present from the land surface to a depth of approximately 50 feet. Colors of the sediments range from gray to tan to dark red.

II. SITE BACKGROUND INFORMATION

A. Location of Site

1. Facility Name: Baylor College of Medicine

   Street Address, if available: 3325 Yellowstone Blvd.

   County: Harris County

2. Give a verbal description of the location of the facility site with respect to known or easily identifiable landmarks.

   The proposed facility is located one block east of the 288 South Freeway and the Yellowstone Blvd. intersection.

3. Detail the access routes from the nearest U.S. or State Highway to the facility site.

   Traveling south on the 288 South Freeway, exit at Yellowstone Blvd. (Yellowstone Blvd. is south of U.S. Highway Alt. 90). After taking the Yellowstone Blvd. exit, travel eastward for one block. The proposed facility is located on the left hand side at 3325 Yellowstone Blvd.

4. Submit as "Attachment A" a United States Geological Survey (USGS), 7½ minute quadrangle map. Indicate on this map the location of the site and the land use patterns of the areas within 1 mile (1.6 km) of the site boundaries (e.g., residential, commercial, recreational, agricultural, undeveloped, etc.). Each area of land use should be labeled on the map. (Note: if such a map is not available, submit a substitute map such as a State Department of Highways and Public Transportation county map or a city map with sufficient scale to adequately show the site location and surrounding land use patterns. (Submission of an aerial photograph is recommended as it may clarify land use, topography, vegetation, etc., within the vicinity of the site.) This map and accompanying text should include the following information:

   a. existing zoning at the site (if within the territorial limits of a city); None; not applicable.

   b. location and distance to nearest residences, schools or other centers of community activity; See map, Attachment A.

   c. location of any utility easements, pipelines, or any underground oil and gas storage areas; See topographic map, Section 8 of Part B application.

5. a. Submit as "Attachment B" a map indicating the boundaries of all adjacent parcels of land, and a list of the names and mailing addresses of all adjacent landowners and other nearby landowners who might consider themselves affected by the activities described by this application. Cross-reference this list to the map through the use of appropriate keying techniques. The map should be a USGS map, a city or county plat, or another map, sketch or drawing with a scale adequate enough to show the cross-referenced affected landowners.

   b. Indicate from what source(s) the names and addresses of persons identified as affected were obtained.

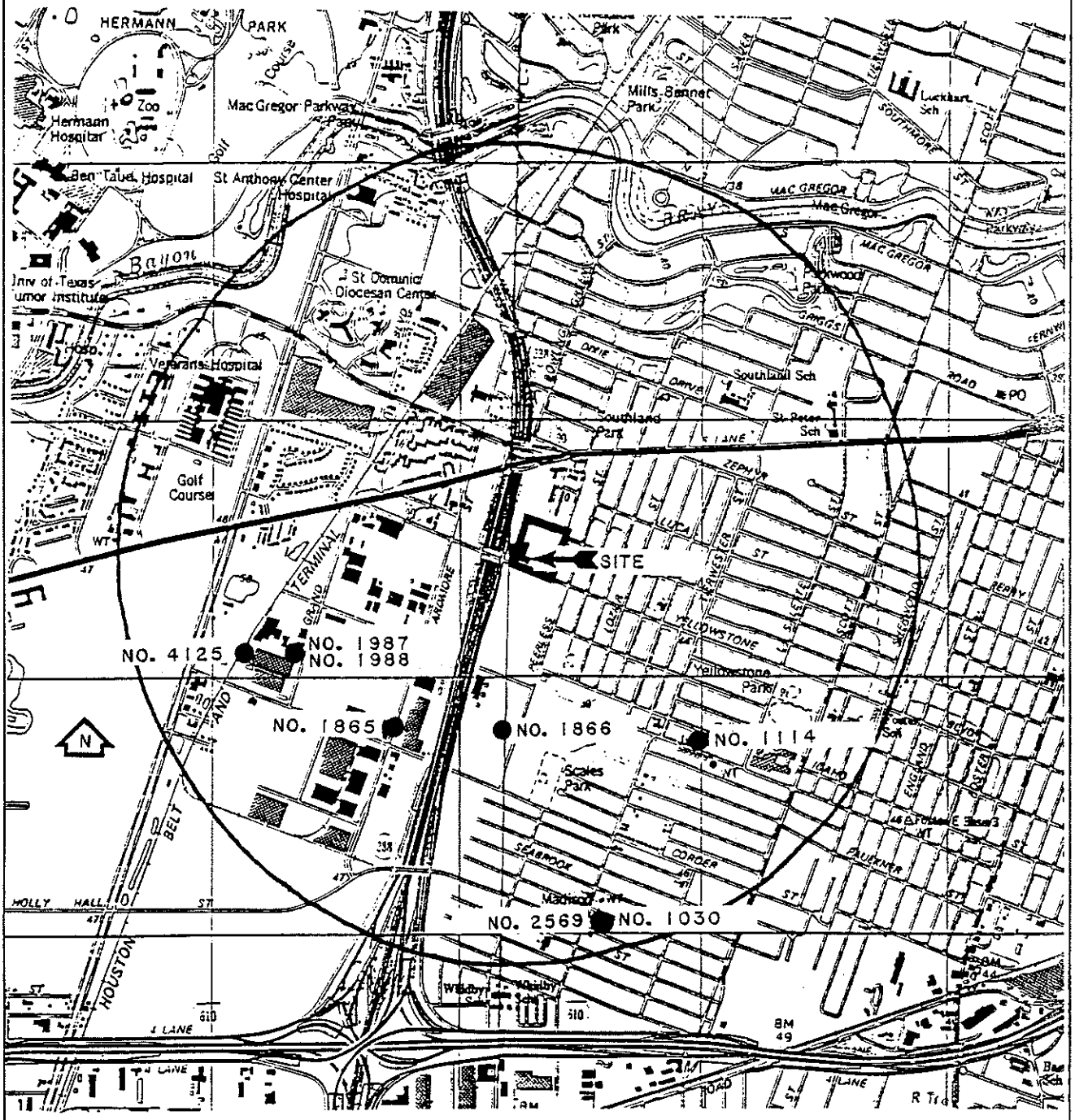
   City _____
   County _____
   School District _____
   Water District _____
   Abstract Co. _____
   Other (specify) tax roles

6. Enter the geographical coordinates of the site:

   Latitude: 29 deg 41 min 53 sec

   Longitude: 95 deg 22 min 26.5 sec

BAYLOR COLLEGE OF MEDICINE - PART A APPLICATION
TOPOGRAPHIC MAP



7.5 MINUTE SERIES (TOPOGRAPHIC)
BELLAIRE AND PARK PLACE QUADRANGLES
TEXAS-HARRIS COUNTY

SCALE 1:24 000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Attachment II

Target Populations of Concern

Baylor College of Medicine - Part A Application
Photographs

Photograph Number	Subject	Camera Direction
1	South side of building.	Northeast
2	North side of building, part of the fenceline and west side of the building.	South
3	South and west side of the building as viewed from Yellowstone Blvd.	Northeast
4	West side of building and part of the fenceline.	North
5 & 6	These two photographs depict the east side of the building. The receiving dock entrance is located under the canopy.	Southwest
7	Chemical Storage Room.	West
8	Chemical Storage Room.	South
9	Flammable Storage Room (Intrinsically safe lighting and blow-out panel).	Southeast
10	Security-surveillance system.	South
11	Carbon filter system for air.	Interior
12	Dry chemical fire suppression system.	Interior
13	Alarm system panel.	Interior

Baylor College of Medicine - Part A Application
Adjacent Land Owners

Area	Direction From Property	Owner	Site Address	Mailing Address	Property Use
A	West	SouthWestern Bell Telephone	3247 Yellowstone Blvd.	P.O. Box 1530 Rm. 1205 Houston, TX 77251	Telephone Equip. Storage Building
B	North	Dia-Log Company	3330 O.S.T.	P.O. Box 14103 Houston, TX 77221	Oil Well Service Company Headquarters
C	East	Ford Alexander Corp.	6700 Allegheny	P.O. Box 14103 Houston, TX 77221-4103	Vacant Property
C	East	Poppi Investments Inc.	6801 thru 6819 Allegheny	P.O. Box 441826 Houston, TX 77244-0000	2-story Apartment Facility
D	South	Paolina Mazzeri Waddell	Vacant Commercial Prop. Yellowstone Blvd.	Charles E. Waddell C/O Robert O. Waddell P.O. Box 22232 Houston, TX 77027-2232	Vacant Property

Baylor College of Medicine - Part A Application
Photographs

1

2

Baylor College of Medicine - Part A Application
Photographs

3

4

Baylor College of Medicine - Part A Application
Photographs

5

6

Baylor College of Medicine - Part A Application
Photographs

7

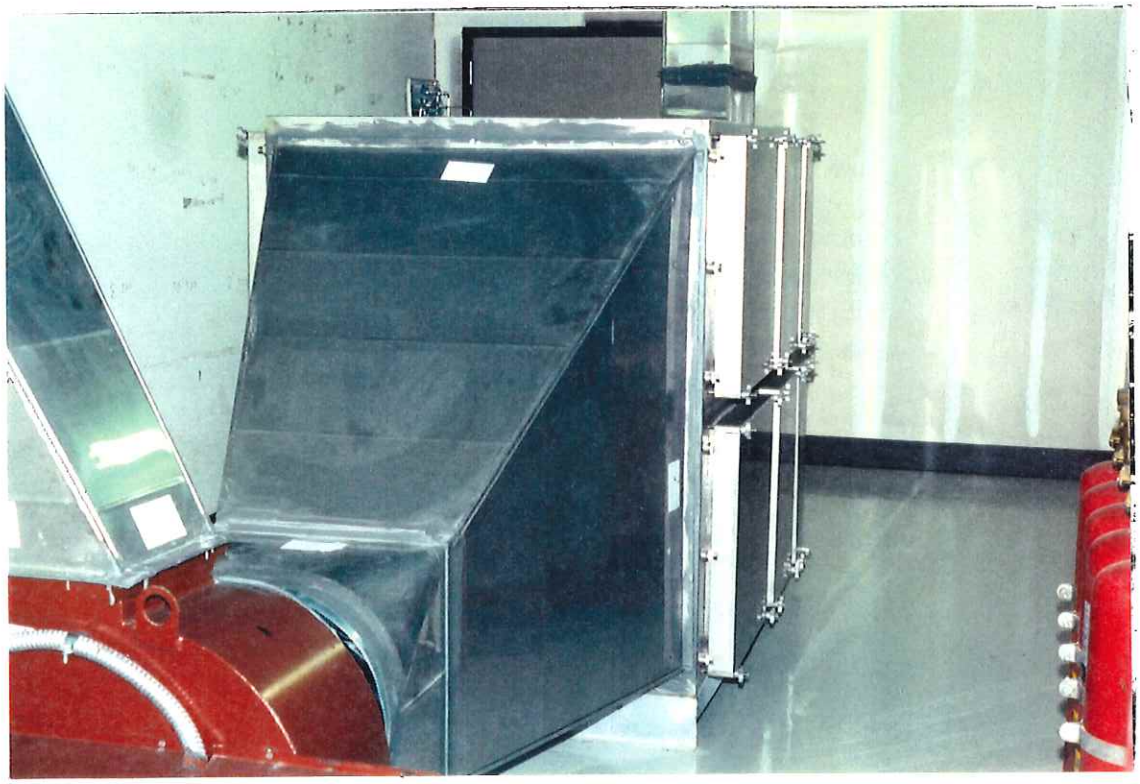
8

Baylor College of Medicine - Part A Application
Photographs

9

10

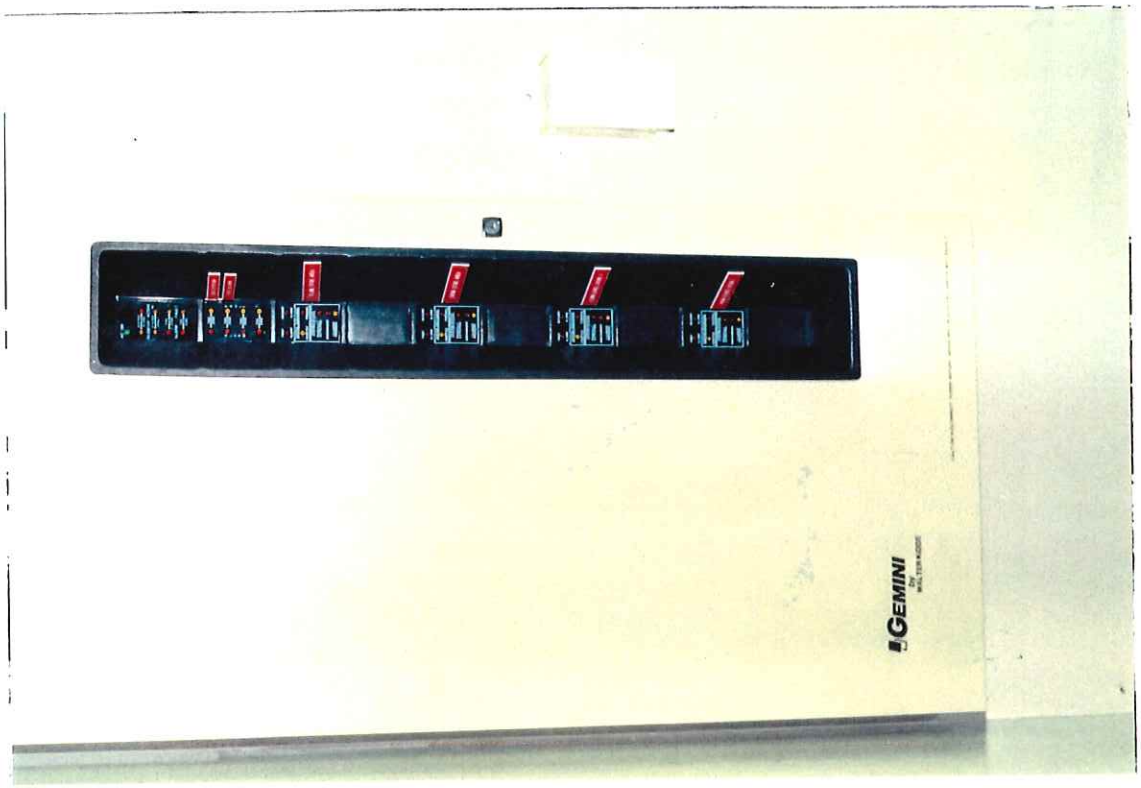
Baylor College of Medicine - Part A Application
Photographs



11

12

Baylor College of Medicine - Part A Application
Photographs



13

BCM
Baylor College of Medicine

Baylor College of Medicine
Hazardous Waste Training Manual
3325 Yellowstone Blvd.
Houston, Texas 77030

Prepared By William T. Davis, CHMM

Contact	Office Number	Home Phone Number	Cell Phone Number
William T. Davis, CHMM Supervisor, Chemical Safety	**713-798-3851**	**281-648-1733**	**713-515-7021**
Paul Muraca, Director, Environmental Safety	**713-798-6617**	**713-972-9764**	**713-591-8359**
David McCormick Environmental Safety Specialist	713-798-1583	**936-588-3719**	713-398-7209

Employment Manual Version Control

Version	Date	Author	Change Description
2	11-1-2005	William T. Davis, CHMM	Updated Contingency Plan
3	11-3-2007	William T. Davis	Updated Contingency Plan
4	11-1-2008	William T. Davis	Updated Contingency Plan
5	3/25/2010	William T. Davis	Updated Alarm Equipment

1 Facility Safety

The Baylor College of Medicine (BCM) Hazardous Waste Storage Facility is permitted for waste accumulation for up to one year of receipt. The facility is managed and maintained according to 40 CFR 264 and 265. All regulations pertaining to the permit are adhered by BCM. Waste is picked up and processed by BCM safety personnel at specific waste accumulation areas and transported to the facility for storage. The waste is then processed for transportation and disposal method by preferred waste vendor.

1.1 Security

General Security

The entire property is provided with ample security to prevent the unknowing or unauthorized entry of persons or livestock onto the active portion of the facility. Surrounding the property is an eight-foot, chain-link, wire fence that is topped with three-stand barbed wire. The perimeter of the property is monitored with high resolution, pan, tilt, zoom capable cameras from a permanently staffed command center. All surveillance is recorded via digital recordings maintained for approximately eight weeks before write over. The interior of the buildings are also monitored and recorded in the same fashion with high resolution, fixed, cameras.

1.2 Restricted Access

Access onto the property is controlled twenty-four hours a day by security personnel at the command center. Authorizations are approved based on departmentally defined need to enter and is limited to the duration of the defined need. Visitors are not authorized entry unless escorted by an approved employee. Visitors can contact the command center via intercom located at the entrance of the gate. There is also an key access card locked in a fire box for the emergency response personnel to gain access at any time. The entrance gate is the only gate in the fence. The entrance gate is closed when not in use and only authorized personnel have access to the gate opening system.

Entry into the property does not allow entry into the building structures on the property. The existing building that will store hazardous waste is locked when personnel are not present in the building. Access to keys for this building is restricted to authorized personnel.

1.3 Warning Signs

Warning signs in **English** and **Spanish** stating "**Danger-Unauthorized Personnel Keep Out**" are posted in the gate entrance and other locations near the active portion of the facility. At a minimum, these signs are legible up to twenty-five feet and are present in sufficient quantities to be seen from any approach to the active portion of the facility.

1.4 Storage Areas

The Chemical Storage Area (CSA) and the Flammable Storage Area (FSA) are bermed and will contain a spill equal to ≥10 % of that area's storage capacity. Spill control equipment is located in the CSA and on the mobile spill cart. The CSA has a laboratory fume hood and a canopy exhaust hood for additional temporary storage. The FSA is equipped with explosion proof wiring and blow out panels, for the unlikely event of an accident. All ignitable and reactive chemicals must be placed on the left side of the fume hood (near the FSA doors) to comply with the requirements that ignitable materials be stored (50) feet from the property line (see appendix A).

1.5 Hazardous and Solid Waste Containers

All waste received at the facility are kiln ready. The only time containers are opened shall be in the event that compatible waste is consolidated together. Some containers are opened in order to meet the requirements of the waste analysis plan.

1.6 Waste Analysis Plan

OES is required to follow the waste analysis plan developed in accordance with 40 CFR 264.13, which requires a representative sample of the incoming liquid wastes, based on the number of containers received. To comply with the permit, a binder in which all samples must be recorded. The sampling parameters are based on visual assessment (i.e. labeling, color, and physical form) of the contents of the container. See (Appendix B).

1.7 Hazardous and Solid Waste Containers

All waste received at the facility are kiln ready. The only time containers are opened shall be in the event that compatible waste is consolidated together. Some containers are opened in order to meet the requirements of the waste analysis plan.

2 Fire Suppression System

2.1 Fire Suppression System and Extinguishers

The Yellowstone Facility was renovated to meet the requirements of the City of Houston building codes and the Houston Fire Department. The facility meets all requirement listed in 40 CFR 264 and 265. Review Appendix C for schematics of fire safety equipment. The primary concerns are containment and segregation of potential hazardous releases. Fire safety equipment within the facility (portable and fixed) is designed to complement the containment features of the facility. (i.e. there are no sprinklers or suppression system which uses water as the primary extinguishing agent). The use of water would contribute to "run off" or have an adverse effect on reactives which may be stored within the facility, should a fire occur.

The extinguishing agent used for the fire suppression system is Foray Dry Chemical provided by Ansul Fire Protection Co., which has a yellow pigment, no odor, and contains 75% monoammonium phosphate. By OSHA standards monoammonium phosphate. By OSHA standards monoammonium phosphate is considered a nuisance dust and will mildly irritate the eyes and the respiratory system. Use a full face respirator equipped with particulate filters or half faced respirator with safety goggles. In the event that overexposure occurs, the symptoms related are coughing, and shortness of breath. If problems persist, please seek immediate medical attention. Use soap and water to clean affected areas.

All overheads doors within the facility are installed with an electromagnetic release mechanism. The doors close if a fire alarm is initiated in any of the storage/processing rooms. This feature is also a means of containment during a emergency.

The radioactive and chemical storage areas have 1,450 lbs. of dry chemical extinguishing agent to suppress or contain a fire. This system is actuated in the chemical storage area by UV flame detection devices and or several rates of rise heat detectors.

All fire alarms are monitored off site remote be ADT and BCM security on main campus. The actuation of a fire alarm would be received in all or at least one of (3) different locations.

The actuation of a fire alarm initiates several processes:

1. All HVAC and ventilation processes will stop;
2. Overhead and double doors will close;
3. A (90) decibel alarm/gong will sound for (60) seconds;
4. ADT, BCM security is alerted;
5. The HFD is notified by ADT and BCM security;
6. If actual fire occurs, the fire suppression system will dump.
7. Key card is located in the fire lock box in front of gate.

All systems, extinguishers, doors and other fire equipment is checked by certified contractors on a routine schedule. Records are maintained by OES.

The facility has (7) fire extinguishers located throughout the facility, two are Class D rated for metal fires and five (5) are dry chemical. The two Class D are located in the CSA and the FSA. The dry chemical extinguishers are located in the CSA (1), the office (1), the radioactive processing area (2), and the long term storage area (1).

3 Exhaust System (Design specifications, Emission Point Parameters, and Emission Control, Reliability Demonstration)

The design specifications for each emission control device, emission point parameters, and emission control system reliability demonstration are as follows:

3.1 Chemical Storage Room

Fan Design Specifications

A two speed floor mounted exhaust fan located in the mechanical room adjacent to the chemical storage room will provide continuous exhaust from this area. The exhaust fan will be utility vent set type with steel housing, air foil centrifugal wheel and a 7.5 horsepower (hp) two speed motor. The entire unit will be coated with a 4 to 6 mil (dry film thickness) here site coating. The fan will exhaust in up-blast arrangement. The air quality at low speed will be 2,500 cubic feet per minute (cfm) at 2.75 inches standard pressure, and the air quality at high speed will be 3,750 (cfm)at 6.25 inches standard pressure.

3.2 Exhaust Duct

The exhaust fan duct for the chemical storage room will be approximately 18 inches in diameter reduced to approximately 16 inches in diameter above the finished roof. The exhaust duct will be terminated at approximately 24 inches above the roof level exhausting in straight up arrangement. The low speed flow and velocity will be 2,500 cfm at approximately 1800 feet per minute (fpm). The high speed flow and velocity will be 3,750 cfm at approximately 2700 fpm. The temperature will be approximately 70 to 80 degrees Fahrenheit.

3.3 Control Technology

All exhaust air from the chemical storage room will be filtered through two- inch thick pre-filters and charcoal activated carbon filters with 360 pounds of type 787 FVI carbon. The filters will be located in draw-through configuration with respect to the fan.
OES is required by the permit to monitor the carbon absorption system for breakthrough once a month. A organic vapor analyzer is used to test for Total Hydrocarbons (TOTH).

3.4 Fan Controls

The fan will be manually started and stopped from a two- speed low/high/stop switch located at the entrance of the chemical storage room. The exhaust fan will be equipped with a suitable means of automatically starting the generator set and transferring power to the exhaust fan upon failure of the normal electrical power source.

3.5 Flammable Storage Area

Fan Design Specifications

A single speed floor mounted exhaust fan located in the mechanical room adjacent to the flammable storage area will provide continuous exhaust from this area. The exhaust fan will be utility vent set type with steel housing, airfoil centrifugal wheel and 1.5 hp motor. The entire unit will be coated with a 4 to 6 mil (dry film thickness) here site coating. The fan will be in up-blast arrangement. The air quality will be 1,400 cfm at 3.0 inches standard pressure.

3.6 Exhaust Duct

The exhaust fan duct for the flammable storage room will be approximately 14 inches in diameter reduced to approximately 12 inches in diameter above the finished roof. The exhaust duct will be terminated at approximately 24 inches above the roof level exhausting in straight up arrangement. The flow type and velocity will be 1,400 cfm at approximately 1,800 fpm. The temperature will be approximately 70 to 80 degrees Fahrenheit.

3.7 Control Technology

All exhaust air from the flammable storage room will be filtered through two -inch thick pre-filters and charcoal activated carbon filters with 95 pounds of type 787 FVI carbon. The filters will e located in draw-through configuration with respect to the fan. OES is required by the permit to monitor the carbon absorption system for breakthrough once a month. A organic vapor analyzer is used to test for Total Hydrocarbons (TOTH).

3.8 Fan Controls

The fan will be manually started and stopped from a start/stop switch located at the entrance of the flammable storage room. The exhaust fan will be provided with standby power of 24-hour duration. The standby power system will be equipped with a suitable means of automatically starting the generator set and transferring power to the exhaust fan upon failure of the normal electrical power source.

3.9 Emission Points

The last diagram in this section identifies the two emission points from the facility: All air is exhausted through charcoal filter system in the permitted hazardous waste storage area. The exhaust fans have a back up emergency generator. The air condition system is 100% fresh from the outside.

(17) Flammable storage room exhaust duct.
(19) Chemical storage room exhaust duct.

4 Facility Records

The facility records including manifest, inspections, permits, and all applicable records are kept in Y1521.

4.1 Hazardous Waste Permit # 50354 – Issued by TCEQ on 3-05-2004

A copy of the permit is kept at the facility at all times, it is to be mad e available at the request of personnel from the Texas Commission on Environmental Quality (TCEQ-Region 12) and the Environmental Protection Agency (EPA-Region 6).

The operating record consists of information and data concerning the date, type and quantity of wastes managed, waste analysis, facility inspections, operating hours, sampling, and monitoring data shall be maintained in the operating record at the site upon the request of the site an made jurisdiction under the TCEQ. The operating records consisting of the weekly inspections and monthly inspections.

The facility inspections consist of the following:

- The chemical storage area (CSA) shall be inspected weekly,
- Emergency equipment (i.e. fire extinguishers, safety showers) are inspected weekly and/or monthly (see Appendix D), and
- The receiving dock is inspected for at least three years following the date that the information or data is obtained.

Manifests are required for shipments received at the facility and sent from the facility. Since the facility receives waste for storage only, a waste receipt summary for each month is reported by STEERS to the TCEQ. The monthly waste receipts are filed with the supporting manifest.

Discrepancy reports are required if a significant discrepancy in a manifest is discovered, OES is required to attempt to reconcile the discrepancy. If it is not resolved within 15 days, we are required to submit a letter, including a copy of the manifest, to the Executive Director of the TCEQ.

Documentation of equipment maintenance is located in the file cabinet in the office. The tow motor and hand jack are inspected quarterly (i.e. every four months)

The bulletin board contains employee information and numbers which may be needed to contact other essential personnel. The information on the board consists of a contact list for employee problems, OES list of emergency numbers, Garner Environmental the emergency responder to clean up spills, the evacuation plan for Yellowstone, and the list of personnel qualified to operate the forklift.

4.2 Wastes Authorized in Table IV.B shall not contain any of the following:

- Polychlorinated biphenyls (PCB's), as defined by the EPA in regulations issued pursuant to the Toxic Substances Control Act under Title 40 Code of Federal Regulations (CFR) Part 761 , unless the permit tee is compliant with the federal requirements for PCB storage as specified in 40 CFR Part 761;
- Radioactive waste unless the permit tee is authorized to store, process and dispose of these waste in compliance with specific licensing and permitting requirements under Chapter 401 of the Texas Health and Safety Code and the rules of the Texas Commission on Environmental Quality or Texas Department of Health of Texas Railroad Commission, and/or any other rules state or federal authorities;
- Explosive material, as defined by the Department of Transportation under 49 CFR Part 173;
- Dioxin-containing wastes, identified by EPA as F020, F021, F022, F023, F026, and F027 wastes in 40 CFR 261.31;
- Ignitable compressed gas;
- Municipal garbage;
- Special waste from the Health-Care Related Facilities subject to 25 TAC Chapter 1 or 30 TAC Chapter 330.

4.3 Information Sources and Materials

Environmental Safety network access is available through the computer in the office at Yellowstone in Y152. The T1 cable is connected by a router to the BCM server. All Material Safety Data Sheets (MSDS's) can be retrieved by using **The Canadian Center for Occupational Health and Safety (CCOHS)** MSDS's which have been downloaded on the OES network or the MSDS Online web based site also the (https://intranet.bcm.edu/index.cfm?tmp=research/enviro_safety/chemsafety/msds) hard copies of MSDS's have been organized in a binder located in the office for review.

Unless otherwise specified, regular full-time employees are expected to work at least forty (40) hours per workweek.

4.4 Waste Analysis Plan

Baylor College of Medicine

Waste Analysis Plan

Reference: Section IV.D, TCEQ Application

Introduction

The analysis philosophy for this plan is based upon the fact that the Baylor College of Medicine (Baylor) hazardous waste program will receive and store primarily very small quantities of waste, many of the containers received ranging from one pound to one gallon in size. In addition, the source of the wastes received is well documented and in many instances, the chemicals within the containers have not been used or, if used, have been contaminated with chemicals for which the composition and quantity is known. Given the excellent process and component knowledge available on these compounds, minimal analysis is required.

This waste analysis plan includes a description of the wastes expected to be received, the parameters for which each hazardous waste will be analyzed, the rationale for selection of these parameters, the sampling methods and test methods to be used, and the frequency of analysis. A copy of this plan will be maintained at the facility.

Waste Description

The types of hazardous wastes entering and exiting the facility are described below. The facility will operate as a hazardous waste storage facility, and will be able to process and commingle waste on site. Incoming wastes may be handled by various methods intended to reduce their volume. The categories of incoming wastes are thus defined by general chemical characteristics while the outgoing waste categories are established by the waste's ultimate packaging configuration.

Incoming Waste

The hazardous waste to be stored will be generated from three general processes: (1) medical and research laboratory activities, (2) associated support services (e.g., maintenance) activities, and (3) the surplus chemicals exchange program. Surplus chemicals are made available for use by other researchers via an exchange program. Not all surplus chemicals are suitable for recycling due to contamination, lack of demand, age or other reasons, In addition, some surplus

chemicals listed in the exchange program are not successfully placed with users and thus are removed from the program.

Those surplus chemicals unsuitable for use or removed from the exchange program will be considered solid wastes, if appropriate. Based on the known composition and/or process generating the materials, a hazardous waste determination will then be made. All hazardous wastes will be subject to a land disposal restrictions determination prior to their being handled, e.g., lab packed, blended or consolidated. Whether the material is land disposal restricted will be noted in the operating record.

The hazardous wastes will typically be received in "lab pack quantities," i.e., five gallons or less, however, containers up to 55 gallons (or 85 gallons with recovery drum) may be accepted. General waste categories have been established for convenience of discussion and include:

- corrosives
- cyanides and sulfides
- organic solvents
- mixed wastes
- metals and metallic salts
- oxidizers
- pesticides
- reactives
- miscellaneous

Selected specific EPA codes, compatibility groups and chemical compounds or classes of compounds representing these categories are presented in Table 1. Descriptions of the chemical groups are presented below, and typical physical and chemical characteristics are presented in Table 2. This table is not intended to be exhaustive. These wastes may be received as liquids, solids or containerized gases, or various combinations of these phases. Asbestos-containing materials, polychlorinated biphenyls (PCBs), and nonhazardous wastes may also be accepted and, if accepted, stored and/or handled with compatible hazardous wastes.

Chemical Groups

Corrosives. This chemical group includes compounds, mixtures, or solutions with a pH <2.0 or >12.5. Those with the lower pHs are considered acids, and those with the higher pHs are considered caustics. Acids are referred to as strong or weak according to the concentration of hydrogen ion that results from ionization. HCl, HNO_3, and H_2SO_4 are strong or highly ionized acids; acetic acid and carbonic acid are weak acids. All mineral acids are highly irritating and corrosive to human tissue. Caustics are any strongly alkaline material which has a corrosive or irritating effect on living tissue. While most are inorganic compounds or inorganic aqueous solutions, some organic acids, such as acetic acid, and organic bases, such as amines,

Table 1
Baylor College of Medicine – Waste Analysis Plan
Representative Hazardous Waste List

Chemical Group	*Representative EPA Hazardous Waste Numbers*	*Representative Compatibility Groups*	*Representative Chemicals and/or Chemical Classes*
Corrosive	Includes D002 and /or and U wastes listed for corrosivity. (U006, U020, U023, U123, U134, etc.) Please refer to Table 1 in Section 6.	1 – Acids, mineral, non-oxidizing 2 – Acids, mineral, oxidizing 3 – Acids, organic 7 – Amines, aliphatic and aromatic 10 – Caustics 15 – Fluorides, inorganic	5 Acetic Acid, chromic acid, formic acid, hydrochloric acid, hydrofluoric acid, nitric acid, perchloric acid, sodium hydroxide, sodium carbonate, sulfuric acid, organic amines
Cyanides and Sulfides	Includes non-listed and P and U listed cyanides and sulfides. P listed cyanides (P013, P021, P029, etc.) P and U listed sulfides (P022, U205, U189, etc.) Please refer to Table 1 in Section 6.	11 – Cyanides 24 – Metals and metal compounds, toxic 33 – Sulfides, inorganic	Barium cyanide, copper cyanide, potassium cyanide, strontium sulfide, carbon disulfide, selenium sulfide, phosphorus sulfide
Organic Solvents	Includes D001, D018-D043 volatiles and semi-volatiles, F001-F005 solvents, and U listed for ignitability or with > 5,000 BTU's/lb. U listed waste (U002, U003, U007,U012, U017, U019, U023,U031, U037, U060, U070, U071, U072, U073, U074, U154, U0156, U188, U213, U220, U227, U239, U0247) Please refer to Table 1 in Section 6.	4 – Alcohols and glycols 5 – Aldehydes 7 – Amines, aliphatic and aromatic 13 – Esters 14 – Ethers 16 – Hydrocarbons, aliphatic 17 – Halogenated organics 10 – Keytones 28 – Hydrocarbons, aliphatic 28 – Hydrocarbons,	Amyl alcohol, methanol, acetaldehyde, ethyl ether, tetrahydrofuran, benzene, toluene, dichloromethane, carbon tetrachloride, acetone, methyl ethyl, ketone, pentene, cyclohexane, gasoline, kerosene, neutralized organic amines

Table 1
Baylor College of Medicine – Waste Analysis Plan
Representative Hazardous Waste List

Chemical Group	*Representative EPA Hazardous Waste Numbers*	*Representative Compatibility Groups*	*Representative Chemicals and/or Chemical Classes*
		aliphatic, saturated 101 – Combustible and flammable materials, miscellaneous	
Mixed Wastes	Includes D001, D018-D043 Volatiles and semi-volatiles, F001-F005 Solvents, and U Wastes Listed for Ignitability. U listed waste (U220,U239)	16 – Hydrocarbons, aromatic 19 – Ketones 114 – Ethers	Scintillation cocktail vials containing ethyl ether, toluene, methyl ethyl ketone
Metals and Metallic Salts	Includes D004 through D011 and/or P and U Listed Wastes containing metals. U listed waste containing metals (U151, U224, U249). P listed waste containing metals (P006)	15 – Fluorides, inorganics 24 – Metals and metal compounds, toxic 23 – Metals, other elemental and alloys as sheets, rods, drops, moldings, etc. 26 – Nitrites	Barium carbonate, cadmium sulfate, lead phosphate, mercury, mercuric chloride, selenium, silver chloride, lead acetate
Oxidizers	D001	24 – Metals and metal compounds, toxic 104 – Oxidizing agents, strong	Nitrates, chlorates, permanganates, peroxides
Pesticides	D002, D012, D016, D017, and/or P and U wastes that are pesticides. (P004, P037, P050, P051, P059, P123, U240, U233, U060, U061, etc.)	9 – Carbamates 12 – Dithiocarbamates 32 – Organophosphates, phosphorothioates, phosphorodithioates	2,4-Dichlorophenoxy-acetic acid, salts and esters, Silvex, DDD, DDT, Aldrin, Dieldrin, Endrin, Endosulfan, Toxaphene

Table 1
Baylor College of Medicine – Waste Analysis Plan
Representative Hazardous Waste List

Chemical Group	*Representative EPA Hazardous Waste Numbers*	*Representative Compatibility Groups*	*Representative Chemicals and/or Chemical Classes*
Reactives	Includes D003 and/or P and U wastes listed for reactivity. (U006, U133 ,P048,P063,P068)	8 – Azo compounds, diazo compounds and hydrazines 18 – Isocyanates, 21 – Metals, alkali and alkaline earth, elemental 22 – Metals, other elemental alloys as powders, vapors or sponges 25 – Nitrides 30 – Peroxides and hydroperoxides, organic 102 – Explosives 103 – Polymerizable compounds 104 – Oxidizing agents, strong 105 – Reducing agents, strong 107 – Water reactive compounds	Acetyl chloride, aluminum chloride, butyl lithium, chlorine dioxide, hydrogen cyanide, hydrogen sulfide, hydrides, hydrazine, thionyl chloride, benzoyl peroxide, 2,4-dinitrotoluene, sodium metal

Table 1
Baylor College of Medicine – Waste Analysis Plan
Representative Hazardous Waste List

Chemical Group	*Representative EPA Hazardous Waste Numbers*	*Representative Compatibility Groups*	*Representative Chemicals and/or Chemical Classes*
Miscella-neous Lab Pack Chemical s	**D Listed Waste** D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D012, D013, D014, D015, D016, D017, D018, D019, D020, D021, D022, D023, D024, D025, D026, D027, D028, D029, D030, D031, D032, D033, D034, D035, D036, D037, D038, D039, D040, D041, D042, D043 **F Listed Waste** **F001, F002, F003, F004, F005** **P Listed Waste** P001, P002, P003, P004, P005, P006, P007, P008, P009, P010, P011, P012, P013, P014, P015, P016, P017, P018, P020, P021, P022, P023, P024, P026, P027, P028, P029, P030, P031, P033, P034, P036, P037, P038, P039, P040, P041, P042, P043, P044, P045, P046, P047, P048, P049, P050, P051, P054, P056, P057, P058, P059, P060, P062, P063, P064, P065, P066, P067, P068, P069, P070, P071, P072, P073, P074, P075, P076, P077, P078, P081, P082, P084, P085, P087, P088, P089, P092, P093, P094, P095, P096, P097, P098, P099, P101, P102, P103, P104, P105, P106, P108, P109, P110, P111, P112, P113, P114, P115, P116, P118, P119, P120, P121, P122, P123, P127, P128, P185, P188, P189, P190, P191, P192, P194, P196, P197, P198, P199, P201, P202, P203, P204, P205 U Listed Waste U001, U002, U003, U004, U005, U006, U007, U008, U009, U010, U011, U012, U014, U015, U016, U017, U018, U019, U020, U021, U022, U023, U024, U025, U026, U027, U028, U029, U030, U031, U032, U033, U034, U035, U036, U037, U038, U039, U041, U042, U043, U044, U045, U046, U047, U048, U049, U050, U051, U052, U053, U055, U056, U057, U058, U059, U060, U061, U062, U063, U064, U066, U067, U068, U069, U070, U071, U072, U073, U074, U075, U076, U077, U078, U079, U080, U081, U082, U083, U084, U085, U086, U087, U088, U089, U090, U091, U092, U093, U094, U095,	**6 – Amides** **20 – Mercaptans and other organic sulfides** **25 – Nitrides** **27 – Nitro compounds** **31 – Phenols and cresols** **34 – Epoxides** **106 – Water and mixtures containing water**	**Fluoranthene, mitomycin C, maleic anhydride, phenol**

Table 1
Baylor College of Medicine – Waste Analysis Plan
Representative Hazardous Waste List

Chemical Group	*Representative EPA Hazardous Waste Numbers*	*Representative Compatibility Groups*	*Representative Chemicals and/or Chemical Classes*
	U096, U097, U098, U099, U101, U102, U103, U105, U106, U107, U108, U109, U110, U111, U112, U113, U114, U115, U116, U117, U118, U119, U120, U121, U122, U123, U124, U125, U126, U127, U128, U129, U130, U131, U132, U133, U134, U135, U136, U137, U138, U140, U141, U142, U143, U144, U145, U146, U147, U148, U149, U150, U151, U152, U153, U154, U155, U156, U157, U158, U159, U160, U161, U162, U163, U164, U165, U166, U167, U168, U169, U170, U171, U172, U173, U174, U176, U177, U178, U179, U180, U181, U182, U183, U184, U185, U186, U187, U188, U189, U190, U191, U192, U193, U194, U196, U197, U200, U201, U202, U203, U204, U205, U206, U207, U208, U209, U210, U211, U213, U214, U215, U216, U217, U218, U219, U220, U221, U222, U223, U225, U226, U227, U228, U234, U235, U236, U237, U238, U239, U240, U243, U244, U246, U247, U248, U249, U271, U278, U279, U280, U328, U353, U359, U364, U367, U372, U373, U387, U389, U394, U395, U404, U408, U409, U410, U411		

Table 2

Baylor College of Medicine - Waste Analysis Plan

Hazardous Waste Description and Typical Physical and Chemical Characteristics[1]

Chemical Group	Phase	pH	Specific Gravity	Solubility In Water	Flashpoint (°F)	Other
Corrosives	Liquid or Solid	<2 or >12.5	>1.0	Soluble	>200	
Cyanides and Sulfides	Solid	Nonaqueous	>1.5	Soluble to Insoluble	None	Poisonous by Ingestion
Organic Solvents	Liquid or Solid	Nonaqueous	Non-Halogenated < 1.0	Soluble to Insoluble	Non-Halogenated: <140 Halogenated: >140	< 5,000 Btu/lb Heat of combustion
Mixed Wastes	Liquid	Nonaqueous	<1.0	Soluble to Insoluble	<140	>5,000 Btu/lb Heat of combustion
Metals and Metallic Salts	Solid	Nonaqueous	>3.0	Soluble to Insoluble	None	Poisonous by Ingestion
Oxidizers	Solid	Nonaqueous	>2.0	Slightly Soluble to Soluble	>200	
Pesticides	Solid	Varies	>1.0	Soluble to Insoluble	>200	Poisonous by Ingestion
Reactives	Varies	Varies	>1.0 or <1.0	Decompose in Water	Inorganics - None Organics - <140	Water Reactive, Pyrophoric, or Shock
Miscellaneous	Solid	Nonaqueous	>1.0	Soluble to Insoluble	>200	

[1] While these physical and chemical characteristics are typical for the representative chemicals and/or chemical classes listed for each chemical group, they are only examples. Actual characteristics may fall outside the characteristics listed, especially for mixtures or solutions.

also exhibit extreme pHs. In some cases, the organics (especially amines) may also be ignitable due to flashpoint. Since pH is typically the only hazardous characteristic, neutralization is an effective treatment method.

Cyanides and Sulfides. This chemical group includes inorganic compounds containing the cyanide (CN^-) or sulfide (S^-) molecule. Other inorganic carbon-nitrogen species included in this group are cyanates and thiocyanates. Sulfides of many metals are only slightly soluble in water. The solubility of sulfides increases with increasing addition of the solution, leading to the evolution of hydrogen sulfide. These compounds are incompatible with acids, generating toxic hydrogen cyanide or hydrogen sulfide gas, but are typically compatible with alkaline materials. For purposes of the definition of this group, cyanides and sulfides are non-reactive, i.e., they do not react with water to generate toxic gases. Many of these compounds are insoluble in water, although some may be soluble. Treatment typically includes controlled oxidation, e.g., with calcium hypochlorite, to break down the $C{\equiv}N$ bond and to oxidize the S^- to sulfate.

Organic Solvents. This chemical group includes non-halogenated and halogenated hydrocarbons. Hydrocarbons are organic compounds consisting of the elements carbon and hydrogen. They are derived principally from petroleum, coal tar, and plant sources. The principal types include:

1. Aliphatic (straight-chain)
   - Paraffins (alkanes)
   - Olefins (alkenes and alkadienes)
   - Acetylenes
   - Acyclic terpenes
2. Cyclic (closed-ring)
   - Acyclic (cycloparaffins [naphthenes], cycloolefins, cycloacetylenes)
   - Aromatic (hexagonal structure with three double bonds)
     a. Benzenes (one ring)
     b. Naphthalenes (two rings)
     c. Cyclic terpenes

The non-halogenated hydrocarbons are typically liquids that are lighter than water, slightly soluble to soluble in water, and have a low flashpoint and high heat content of as much as 19,000 Btus/lb, making them excellent candidates for fuel blending. Halogenated hydrocarbons are those in which one or more of the hydrocarbon atoms has been replaced by fluorine, chlorine, bromine, or iodine. This greatly increases the anesthetic and narcotic action of aliphatic hydrocarbons. The halogenated hydrocarbons are typically liquids that are heavier than water, insoluble in water, and have high flashpoints (ethylene dichloride, flashpoint 56°F, is an example exception), low heat contents, and high halogen (chlorine, fluorine, bromine, iodine) content, making them typically poor candidates for fuel blending.

Mixed Wastes. These wastes are typically scintillation cocktail vials containing ethyl ether, toluene, or methyl ethyl ketone. Like the non-halogenated hydrocarbons, these are typically liquids that are lighter than water, slightly soluble to soluble in water and have low flashpoints and high heat contents of as much as 19,000 Btu/lb. These wastes are typically received in small vials, and may be considered low-level radioactiv

Metals and Metallic Salts. This chemical group includes metals and metallic salts that are typically solids (mercury is a notable exception) and have varying solubilites in water or, in some cases, are insoluble. They are typically inert, but may contain metals, causing them to be toxic.

Oxidizers. This group of chemicals includes compounds that spontaneously evolve oxygen under slight heating. These compounds can react vigorously at ambient temperature when stored near or in contact with reducing materials such as cellulosic an other organic compounds.

Pesticides. A pesticide is any substance, organic or inorganic, used to destroy or inhibit the action of plant or animal pests; the term thus includes insecticides, herbicides rodenticides, miticides, etc. Virtually all pesticides are toxic to man to a greater or lesser degree. They vary in biodegradability.

Reactives. Reactives are those compounds which have any of the following properties:

1. Normally unstable and readily undergoes violent change without detonating.
2. Reacts violently with water.
3. Forms potentially explosive mixtures with water.
4. When mixed with water, generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.
5. A cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.
6. Capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
7. Readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
8. Forbidden explosives as defined in 49 CFR 173.51, and the classification of explosives in 49 CFR 173.52, and 49 CFR 173. 53.

Miscellaneous. This chemical group represents compounds that do not meet the descriptions of the other waste categories, but are regulated because of the characteristics of toxicity or are listed as "P" or "U" wastes under 40 CFR 261.33.

Outgoing Wastes

Hazardous wastes received at the facility will be transported off-site for disposal. Prior to off-site shipment, the land disposal restrictions determination assessment

made on the incoming waste will be documented in the shipping papers in accord with regulatory requirements. In general, but not exclusively, hazardous wastes will be shipped off site in three configurations: lab packs, blended liquids, and consolidated solids (liquids may contain solids and solids nay contain liquids).

SAMPLING AND ANALYSIS

Figure 1 presents an overview of the waste analysis process for hazardous wastes stored at the facility. This process is described below, and utilizes a visual assessment as the test method for the incoming wastes, since they are of known composition.

40 CFR 264.13 (general waste analysis) states in Paragraph (a) (1) that before a hazardous waste is stored; a detailed chemical and physical analysis of a representative sample of the waste must be obtained. Paragraph (a) (2) states that this analysis may include data developed under 40 CFR 261 and existing published or documented data on the hazardous waste or on hazardous waste generated from similar processes. 40 CFR 261.10 (criteria for identifying the characteristics of hazardous waste) allows for characteristics to be measured by available standardized test methods or reasonably detected by generators through their knowledge of their waste. These provisions allow for the use of existing published data and generator process knowledge in lieu of laboratory analyses. Since the Baylor College of Medicine faculty will only accept waste generated by Baylor College of Medicine (or affiliated) researchers, generator process knowledge is excellent and will clearly meet this requirement. Use of the form illustrated in Figure 1 provides the documentation necessary to demonstrate compliance with 40 CFR 264.13. The form provides complete documentation of both the researcher and the chemical name or mixture of components, including percentages. As the following discussion indicates, this process knowledge, adequate in itself, will be chemical characteristics with labeled contents for incoming wastes. Control reference information will consist of reference sources and Material Safety Data Sheets (MSDSs). The latter constitute existing published data and are based on the analysis of the reagent-grade chemical. The MSDSs are thus applicable to Baylor College of Medicine's waste because wastes will be received as reagent-grade chemicals or as mixtures or reagent-grade chemicals.

Incoming Wastes

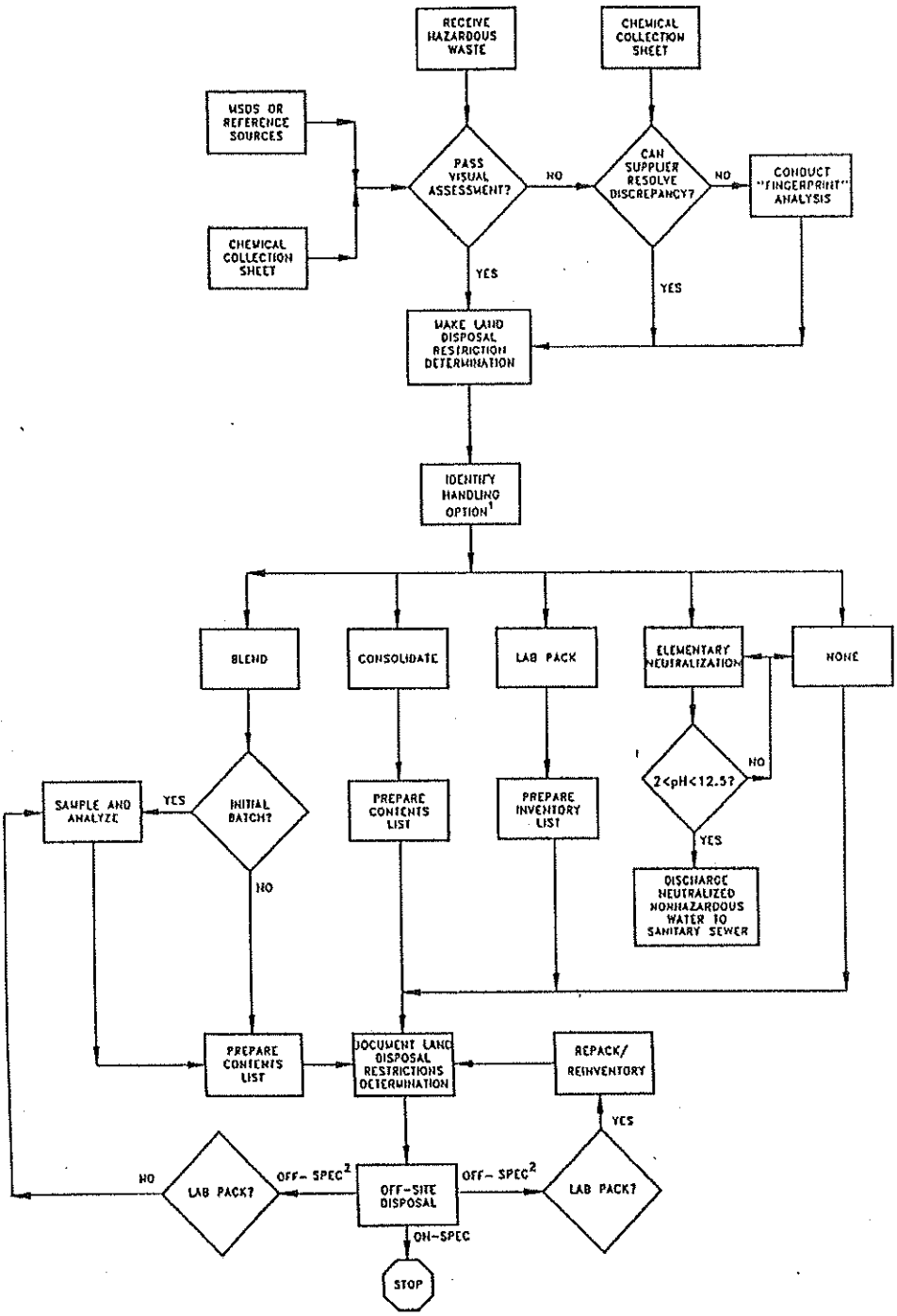
Parameters, Basis for Selection, Test Methods, Sampling Methods, and Frequency of Analysis

A visual assessment will be performed on a specific number of containers, which will represent a sample of these containers, based upon the number of containers received in a working day; however, no assessment will be conducted for chemicals received in their original manufacturer's container. The number of containers selected for the assessment will be based on the information provided in Table 3. For example, if 10 containers were received in a shipment, one would be selected for visual assessment. Each individual waste stream would be assessed according to this methodology. This assessment will include a comparison of the Material

FIGURE 1

BAYLOR COLLEGE OF MEDICINE WASTE ANALYSIS PLAN

WASTE ANALYSIS FLOW CHART



[1] The options listed (blend, consolidate, lab pack, elementary neutralization, none) are examples only.

[2] Assumes off- discrepancy not resolved over telephone.

ES ENGINEERING-SCIENCE

Table 3
Baylor College of Medicine - Waste Analysis Plan
Estimating Sampling Size[1]

Containers in Shipment	Containers Selected[2] For Sampling
1 to 20	1
21 to 40	2
41 to 60	3
61 to 80	4
81 to 125	5
126 to 216	6
217 to 343	7
344 to 513	8
513 to 729	9
730 to 1000	10
1001 to 1311	11

1 This information is a modification of sampling size estimates presented in *Waste Analysis Plans - A Guidance Manual,* EPA/530 - SW-84-012.

2 No assessment will be conducted for chemicals received in their original manufacturer's container.

Safety Data Sheet (MSDS) or equivalent reference source labeling, physical form, color and odor information to that of the container and its contents and the accompanying chemical collection form, which will contain information similar to the form presented in Figure 2. Details of the visual assessment for each of these items is provided below, followed by information on the resolution of discrepancies identified during the visual assessment. A description of the MSDS information system used as the source for physical form, color, and odor information is presented in a following subsection.

Labeling. The container labeling will be reviewed to determine whether the label provides sufficient composition information. Chemical formulas will be supplemented with chemical names, where available and as necessary for disposal purposes. The chemical names will be determined from reference sources, the chemical collection form, or the supplier. The physical characteristics of the listed contents will be compared with those of the actual contents.

Physical Form. Substantial variations in physical form may be acceptable in some cases. For example, if an adhesive material has partially or completely solidified, a solvent component has volatilized from a wax, or a compound has a freezing or melting point near ambient temperature, such variations are reasonably attributed to characteristics inherent to the compound.

Color. In assessing color, variations based on temperature, humidity, and for some chemicals, normal oxidation over time will be considered. Because of these potential variations, color will not be used as the sole characteristics for confirmation of labeling information.

Odor. For health and safety reasons, the container will not be opened to detect the odor of the contents. However, odor otherwise evident may confirm the information provided on the label, or in some cases, may indicate the presence of contaminants.

Visual Assessment Discrepancy Resolution. If the discrepancy in labeling, physical form, color, or odor cannot be reasonably attributed to characteristics of the compound, the researcher supplying the material may be asked to confirm the composition information provided. Researcher information is presented in the chemical collection form accompanying the material to the hazardous waste facility. Information from the chemical collection form may also be used to supplement the information provided on the label of the individual container.

If the discrepancy(ies) cannot be resolved, or there is no suitable reference source available for a particular compound, the material will be designated for further analysis sufficient to determine the characteristics allowing it to be disposed off-site. This "fingerprint" analysis will include testing sufficient to allow for off-site disposal and may include several basic tests, such as pH (using pH paper), water reactivity (by addition of water), ignitability (by introduction of a small flame above the sample, and by following the testing procedures in pages 22 and 23 in section 6 of the waste analysis section and Table IV.C.

Baylor College of Medicine
Office of Environmental Safety

One Baylor Plaza
1st Floor Garage 6, 798-4799

Figure 2
Baylor College of Medicine - Waste Analysis Plan
CHEMICAL COLLECTION FORM

Complete this form and return it to the above address to have chemicals removed. Do not bring chemicals to location.

Faculty Member or Supervisor		Department
Phone	Location	Date

I hereby declare that the contents of these chemicals are fully and accurately described below by proper chemical name and are labeled and in proper condition for packing and transport for appropriate disposal. I have noted any special precautions.

Name(Printed)	Signature

Instructions:

1. Describe chemicals below. Use complete names, not abbreviations or trade names.
2. For mixtures, indicate the name and percentage of each component.
3. Seal and label each container. Enter the total number of containers.
4. Contact the Chemical Hygiene Officer about unknown chemicals or consultation.

Chemical Name or Mixture of Components and Percentages	No. of Cont.	Amount lbs./gal.	Environmental Safety Use			
			BCM No. B1	Haz. Class	Storage Info	Code

Total Number of Containers to be Picked Up _____

(Note: Please specify if you need replacement Chemical Collection Containers, Chemical Collection Sheets, or Chemical Disposal Tags.)

Office of Environmental Safety Use

Dates: Form Received _____ Chemicals Picked Up _____

Most of the materials requiring this testing will either become the sample, if small in size, or will be sampled by dropper or by pouring the material from the container. If the waste material is drummed, it will be sampled in a manner similar to that described for blended liquids in the Outgoing Waste subsection.

Incoming wastes which fail the visual assessment and whose contents are apparently inconsistent with their labels will be stored for up to 90 days in a designated chemical cabinet pending the results of an investigation with the waste source or analysis, as required. If, after 90 days, the waste still fails the assessment and analysis does not adequately identify the material for EPA, DOT, and disposal site characterization purposes, it will be returned to the original source. If analysis is not complete or is inconclusive, by the 90-day period, a 30-day extension will be allowed and noted in the operating record. As long as analysis continues and documentation demonstrating that (1) analysis is being conducted, (2) the reasons for the delays, and (3) the dates of waste receipt and extensions are noted in the operating records, additional 30-day extensions will be allowed.

MSDS Information System

Facility personnel will have access to a number of chemical information sources, which will be used in conducting the visual assessment.

MSDS Information System. CCINFO®, a computerized chemical information service published by the Canadian Center of Occupational Health and Safety (CCOHS), or a similar system, manual or computerized, will be used to access MSDS and related information. Included as part of this particular service is MSDS,, a program with over 60,000 MSDSs for chemical compounds, including trade name materials. This compilation of MSDSs is supplemented with quarterly updates. Another aspect of the CCINFO® service is CHEMINFO,, a detailed textual chemical description program with a directory of chemical substances. An example of an MSDS generated by CCINFO® is presented as Figure 3.

Manufacturer MSDSs. In addition to the MSDSs available through CCINFO®, hard copies of all manufacturer-supplied MSDSs for chemicals purchased by Baylor College of Medicine may supplement this system.

Reference Sources. With these systems, facility personnel have access to detailed information, including composition and physical and chemical characteristics, for virtually every chemical waste and the components of every chemical waste mixture anticipated for receipt by the facility. Should these information sources prove inadequate, however, other chemical reference sources may be consulted.

Outgoing Wastes

Lab Packs

Those materials for which lab packing is the selected handling method will be packaged in a lab pack configuration. The lab packs may include any of the categories of hazardous wastes described above in the Incoming Wastes subsection, as well as nonhazardous wastes. The contents of the lab packs will be defined by

Figure 3
Baylor College of Medicine - Waste Analysis Plan
Example MSDS

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*                    T R A D E   N A M E S                          *
*                                                                   *
*      Canadian Centre for Occupational Health and Safety           *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
                        *** IDENTIFICATION ***

RECORD NUMBER                : 14105
LANGUAGE                     : ENGLISH
TRADE NAME(S)                : N-BUTYL ISOCYANATE
PRODUCT IDENTIFICATION DATA  : PRODUCT CODE F-303
DATE OF MSDS                 : 1984-11-20
MSDS CONFIRMED CURRENT       : This MSDS is currently under revision by Bayer
                               Canada Inc. and a more updated version is, or
                               may be, available from Bayer directly. Bayer
                               Canada Inc. will be updating their MSDS
                               collection in the CCOHS Trade Names data base in
                               the near future.

                     *** MANUFACTURER INFORMATION ***

MANUFACTURER                 : MOBAY CHEMICAL CORPORATION
                               ORGANIC AND RUBBER CHEMICALS DIVISION
ADDRESS                      : MOBAY ROAD
                               PITTSBURGH  PENNSYLVANIA
                               U.S.A.    15205
EMERGENCY TELEPHONE NO.(S)   : 412-923-1800  (MOBAY NON TRANSPORTATION)
                               800-424-9300  (CHEMTREC TOLL FREE)
                               202-483-7616  (CHEMTREC)
DISCLAIMER:
   NOTE FROM MOBAY: THIS INFORMATION IS FURNISHED WITHOUT WARRANTY, EXPRESSED
   OR IMPLIED, EXCEPT THAT IT IS ACCURATE TO THE BEST KNOWLEDGE OF MOBAY
   CHEMICAL CORPORATION. THE DATA ON THIS SHEET RELATES ONLY TO THE SPECIFIC
   MATERIAL DESIGNATED HEREIN. MOBAY CHEMICAL CORPORATION ASSUMES NO LEGAL
   RESPONSIBILITY FOR USE OR RELIANCE UPON THESE DATA

                    *** SUPPLIER INFORMATION ***

SUPPLIER/DISTRIBUTOR         : BAYER (CANADA) INC
ADDRESS                      : 7600 TRANS-CANADA HIGHWAY
                               POINTE CLAIRE  QUEBEC
                               CANADA    H9R 1C8
                               Telephone:  514-697-5550
                               Telex:  05-821635
                               1355 AEROWOOD DRIVE
                               MISSISSAUGA  ONTARIO
                               CANADA    L4W 1C2
                               Telephone:  416-625-6110

                    *** MATERIAL SAFETY DATA ***


DATE OF MSDS: 1984-11-20

PRODUCT TRADE NAME(S): N-BUTYL ISOCYANATE

CHEMICAL NAME:  N-BUTYL ISOCYANATE
CAS NO.:  111-36-4
T.S.C.A. STATUS:  ON INVENTORY
```

Figure 3
Baylor College of Medicine - Waste Analysis Plan
Example MSDS
(Continued)

CHEMICAL FORMULA: C5-H9-NO
MANUFACTURING PRODUCT CODE: F-303
PRODUCT DESCRIPTION: APPEARANCE: LIQUID; COLOR: COLORLESS TO YELLOW; ODOR: SHARP PUNGENT
CHEMICAL FAMILY: MONOISOCYANATE

INGREDIENTS

N-BUTYLISOCYANATE	100%	TLV: *NOT ESTABLISHED

*THE ACGIH (1984-85) HAS ESTABLISHED A TLV OF 0.005 PPM (0.04 MG/M3) TWA/CEILING FOR TOLUENE-2,4-DIISOCYANATE. THIS VALUE CAN BE USED AS A GUIDELINE FOR THIS PRODUCT.

PHYSICAL PROPERTIES OF PRODUCT

SOLUBILITY (%): SOLUBLE
BOILING POINT OF PRODUCT: 116 DEG C (240 DEG F)
MELTING POINT OF PRODUCT: -75 DEG C (-103 DEG F)
SPECIFIC GRAVITY OF PRODUCT: 0.889 AT 20 DEG C
FLASH POINT OF PRODUCT: 19 DEG C (66 DEG F) (C.C.)
MOLECULAR WEIGHT: 99.1

FIRE AND EXPLOSION HAZARD DATA

EXTINGUISHING MEDIA: WATER FOG, CO2, DRY CHEMICAL (E.G. MONOAMMONIUM PHOSPHATE, POTASSIUM SULFATE, AND POTASSIUM CHLORIDE)
SPECIAL FIRE FIGHTING PROCEDURES/UNUSUAL FIRE OR EXPLOSION HAZARDS: FIREFIGHTERS SHOULD WEAR FULL PROTECTIVE CLOTHING AND EQUIPMENT, INCLUDING A SELF-CONTAINED BREATHING APPARATUS. DURING A FIRE, ISOCYANATE VAPORS AND OTHER IRRITATING AND/OR HIGHLY TOXIC GASES MAY BE GENERATED BY THERMAL DECOMPOSITION OR COMBUSTION. AT ELEVATED TEMPERATURES, N-BUTYL ISOCYANATE CAN POLYMERIZE AND DECOMPOSE, WHICH CAN CAUSE PRESSURE BUILD UP IN CLOSED CONTAINERS. EXPLOSIVE RUPTURE IS POSSIBLE. USE COLD WATER TO COOL FIRE-EXPOSED CONTAINERS.

HEALTH HAZARD DATA

TLV'S: SEE HAZARDOUS INGREDIENTS SECTION
EYE CONTACT: N-BUTYL ISSOCYANATE CAN SERIOUSLY DAMAGE EYES
SKIN CONTACT: ISOCYANATES REACT WITH SKIN PROTEIN AND TISSUE MOISTURE AND CAN CAUSE LOCALIZED IRRITATION AS WELL AS DISCOLORATION. PROLONGED CONTACT COULD PRODUCE REDDENING, SWELLING OR BLISTERING AND IN SOME INDIVIDUALS, SKIN SENSITIZATION RESULTING IN DERMATITIS.
INHALATION: INHALATION OF N-BUTYL ISOCYANATE VAPORS IN CONCENTRATIONS ABOVE 0.005 PPM CAN PRODUCE IRRITATION OF THE MUCOUS MEMBRANES IN THE RESPIRATORY TRACT, RUNNING NOSE, SORE THROAT, PRODUCTIVE COUGH AND A REDUCTION IN LUNG FUNCTION. EXTENSIVE EXPOSURES TO CONCENTRATIONS WELL ABOVE THE TLV COULD LEAD TO BRONCHITIS, BRONCHIAL SPASM AND PULMONARY EDEMA. HYPERSENSITIVITY PNEUMONITIS, HYPERREACTIVITY OR HYPERSENSITIZATION MAY OCCUR. PERSONS WITH A PREEXISTING UNSPECIFIC BRONCHIAL HYPERREACTIVITY OR PERSONS WITH A SPECIFIC ISOCYANATE HYPERSENSITIVITY (AS A RESULT OF PREVIOUS REPEATED OVEREXPOSURE OR A SINGLE LARGE DOSAGE) WILL RESPOND TO SMALL ISOCYANATE CONCENTRATIONS AT LEVELS WELL BELOW THE TLV OF 0.005 PPM. SYMPTOMS COULD BE IMMEDIATE OR DELAYED AND INCLUDE CHEST TIGHTNESS, RESPIRATORY DISTRESS OR ASTHMATIC ATTACK.

INGESTION: CAN RESULT IRRITATION AND SOME CORROSIVE ACTION IN THE MOUTH, STOMACH TISSUE AND DIGESTIVE TRACT
ANIMAL TOXICITY: ORAL LD50 (INGESTION): 560 MG/KG (RAT); INHALATION LC50: IRRITATING TO UPPER RESPIRATORY TRACT.; EYE EFFECTS: IRRITATING; SKIN EFFECTS: IRRITATING

EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT: FLUSH EYES WITH LUKEWARM WATER (LOW PRESSURE) FOR AT LEAST 15 MINUTES; LIFT EYELIDS OCCASIONALLY. CONTACT A PHYSICIAN IMMEDIATELY.
SKIN CONTACT: WASH IMMEDIATELY WITH SOAP, TINCTURE OF GREEN SOAP AND WATER. FOR SEVERE EXPOSURE, GET UNDER SAFETY SHOWER AND REMOVE CONTAMINATED CLOTHING. CONTACT A PHYSICIAN.
INHALATION: REMOVE TO FRESH AIR. ADMINISTER OXYGEN IF NEEDED. CONTACT A PHYSICIAN.
INGESTION: DO NOT INDUCE VOMITING. DRINK LARGE AMOUNTS OF MILK OR WATER. DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.
NOTE TO PHYSICIAN: MEDICAL SURVEILLANCE OF ALL EMPLOYEES WHO HANDLE OR COME IN CONTACT WITH N-BUTYL ISOCYANATE IS RECOMMENDED. THIS SHOULD INCLUDE PREEMPLOYMENT AND PERIODIC MEDICAL EXAMINATIONS WITH RESPIRATORY FUNCTION TESTS (FEV, FVC AS A MINIMUM). PERSONS WITH ASTHMATIC TYPE CONDITIONS, CHRONIC BRONCHITIS, OTHER CHRONIC RESPIRATORY DISEASES OR RECURRENT SKIN ECZEMA OR SENSITIZATION SHOULD BE EXCLUDED FROM WORKING WITH N-BUTYL ISOCYANATE. ONCE A PERSON IS DIAGNOSED AS SENSITIZED TO N-BUTYL ISOCYANATE, NO FURTHER EXPOSURE CAN BE PERMITTED.

REACTIVITY DATA

PRODUCT STABILITY: STABLE
HAZARDOUS POLYMERIZATION: MAY OCCUR
INCOMPATIBILITY: (MATERIALS TO AVOID): WATER, ALCOHOLS, STRONG BASES, CARBOXYLIC ACIDS, METAL COMPOUNDS
HAZARDOUS DECOMPOSITION PRODUCTS: OXIDES OF NITROGEN, CARBON MONOXIDE, TRACES OF HYDROGEN CYANIDE

SPILL OR LEAK PROCEDURES

CLEANUP: COVER THE SPILL WITH SAWDUST, VERMICULITE, FULLER'S EARTH OR OTHER ABSORBENT MATERIAL. POUR DECONTAMINATION SOLUTION OVER SPILL AREA AND ALLOW TO REACT FOR AT LEAST TEN MINUTES. COLLECT MATERIAL IN OPEN CONTAINERS AND ADD FURTHER AMOUNTS OF DECONTAMINATION SOLUTION. REMOVE CONTAINERS TO A SAFE PLACE, COVER LOOSELY AND ALLOW TO STAND FOR 24 TO 48 HOURS.
DISPOSAL: WASH DOWN SPILL AREA WITH DECONTAMINATION SOLUTION. DECONTAMINATION SOLUTIONS: NON-IONIC SURFACTANT UNION CARBIDE'S TEGITOL TMN-10 (20%) AND WATER (80%); CONCENTRATED AMMONIA (3-8%), DETERGENT (2%) AND WATER (90-95%). RESPIRATORY PROTECTION IS RECOMMENDED DURING SPILL CLEAN UP. WASTE MATERIAL MUST BE DISPOSED OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL ENVIRONMENTAL CONTROL REGULATIONS. WASTE MATERIAL SHOULD BE INCINERATED IN AN APPROVED INCINCERATOR. ALL HANDLING PRECAUTIONS FOR FULL CONTAINERS THAT HAVE NOT BEEN PROPERLY CLEANED AND RECONDITIONED. WHEN CONTAINERS ARE PASSED ON FOR REUSE OR DISPOSAL, THE RECIPIENT MUST BE ADVISED OF THE PRODUCT'S HAZARDS.

PERSONAL PROTECTION

Figure 3
Baylor College of Medicine - Waste Analysis Plan
Example MSDS
(Continued)

EYE PROTECTION: PROTECTIVE GOGGLES
SKIN PROTECTION: RUBBER PROTECTIVE GLOVES
RESPIRATORY PROTECTION: POSITIVE PRESSURE AIR SUPPLIED RESPIRATOR
VENTILATION REQUIREMENTS: LOCAL EXHAUST VENTILATION SHOULD BE USED TO MAINTAIN LEVELS BELOW THE TLV WHENEVER N-BUTYL ISOCYANATE IS PROCESSED, HEATED OR SPRAY APPLIED
OTHER: SAFETY SHOWERS AND EYE WASH STATIONS SHOULD BE AVAILABLE. EDUCATE AND TRAIN EMPLOYEES IN SAFE USE OF THE PRODUCT. FOLLOW ALL LABEL INSTRUCTIONS.

STORAGE AND HANDLING

STORAGE AND HANDLING: AVOID WATER CONTAMINATION IN CLOSED CONTAINERS OR CONFINDED SPACES. STORAGE TEMPERATURE (MIN./MAX.): N.A./ 122 DEG F (50 DEG C). AVERAGE SHELF LIFE: 12 MONTHS. SPECIAL SENSITIVITY (HEAT, LIGHT, MOISTURE): MOISTURE.

ADDITIONAL INFORMATION

ANIMAL TOXICITY:
ORAL, LD50 (INGESTION): 360 MG/KG (RAT)
INHALATION, LC50: 80 MG/M3 (RAT)
EYE EFFECTS: STRONG CORROSIVE
SKIN EFFECTS: STRONG CORROSIVE
OTHER: POTENTIAL ALLERGIC SENSITIZER FROM SKIN CONTACT OR INHALATION
SHIPPING DATA:
D.O.T. SHIPPING NAME: N-BUTYL ISOCYANATE
TECHNICAL SHIPPING NAME: N-BUTYL ISOCYANATE
D.O.T. HAZARD CLASSIFICATION: FLAMMABLE LIQUID
UN/NA NO.: UN 2485
REPORTABLE QUANTITY: NONE
D.O.T. LABELS REQUIRED: FLAMMABLE LIQUID AND POISON
D.O.T. PLACARDS: FLAMMABLE
FRT. CLASS PKG.: CHEMICALS, NOI, NMFC 60000

Specific chemical compound and/or characteristics as listed on the inventory, thus analysis is not necessary.

Blended liquids

The blended liquids will typically include organic solvents and non-PCB oils. Sampling and analysis to be conducted on these wastes is described below.

Parameters, Test Methods, and Basis for Selection.
An initial analysis will be performed for each outgoing waste stream: (1) halogenated solvents, (2) non-halogenated solvents, and (3) oils. The initial analyses for the waste streams will include the parameters and test methods listed in Table 4. This table also includes the rationale for selection of these parameters and describes how the results of those tests will indicate waste stream variation in constituents. PCBs will only be run on oil waste streams since only these waste streams have the potential to be contaminated with PCBs (e.g., if the oil is from electrical transformers using PCBs). These parameters were selected in order to characterize the waste so that EPA hazardous waste segregation, e.g., halogenated versus non-halogenated, is being properly implemented, and to fulfill off-site disposal site requirements. Generators knowledge will be the method on determining which analysis to use. Typically (although not necessarily always), characteristics of blended liquids are expected to be as indicated in Table 5.

Frequency of Analysis.
The initial analysis will be used to confirm the composition and characteristics of the material based upon MSDS and equivalent reference source information. Additional analyses will be repeated as necessary to ensure that it is accurate and up-to-date. As a minimum, it will be reported when Baylor College of Medicine has reason to believe that the process or operation generating the hazardous waste had changed.

Sampling Method.
A containerized liquid waste sampler (COLIWASA) as described in the USEPA guidance document, Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods, SW-846, third addition, section 9.2.2.4, or an equivalent method, will be used to sample the waste. Alternately, glass tubes, which approximate the COLIWASA for obtaining liquid samples and also allow for a visual assessment of the layers within the drum, will be used. Samples may be collected from several drums within a waste stream and composite to obtain the sample most representative of the waste stream.

Consolidated Solids

Consolidated solids may include spill clean-up debris, spent personal protective equipment (PPE), contaminated packing media, and other chemical solids. Materials such as the spill clean-up debris, spent PPE, and spent packing media will not be analyzed since the composition and characteristics of the material will be

Table 4
Baylor College of Medicine - Waste Analysis Plan
Parameters and Test Methods

Parameter	Test Method	Rationale for Selection	Indication of Wastestream Variation in Constituents
BTU content	ASTM D-240	To determine whether wastestream has sufficient content for fuel blending or incineration.	For the non-halogenated solvents and oil waste streams, Btu content below 5,000 Btus per pound may indicate a deficiency in the waste segregation, blending, labeling, or identification scheme requiring correction.
Total Organic Halogens (TOX) or Chlorine	SW-846 9020; SM 407A (Cl)	To determine the concentration of halogens or chlorine in the wastestream, and thus the suitability for fuel blending or incineration, and to assist in the determination of whether the wastestream is DOT class ORM-A.	High TOX or Cl content in the oil or non-halogenated solvents wastestream may indicate a deficiency in the waste segregation, blending, labeling, or identification scheme requiring correction.
Flashpoint	SW-846 1010/1020	To determine whether the wastestream meets the EPA characteristic of ignitability or the DOT hazard classes, flammable and combustible.	Variations in flashpoint will reflect the particular mix of a blended container, and are only used for determination of EPA and DOT classifications.
pH	SW-846 9040/9045	To determine whether the wastestream meets the EPA characteristic of corrosivity, or the DOT hazard class, corrosive.	pHs less than 2.0 or greater than 12.5 or an extreme pH not indicative of the compounds blended may indicate a deficiency in the waste segregation, blending, labeling, or identification scheme requiring correction. Compatible solvents may be blended with a resultant pH variation.

TCLP - Toxicity Characteristic Leachate Procedure

ASTM-*American Society of Test Methods, Annual Book of Standards*, part 31.

SW-846-*Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, third edition.

SM-*Standard Methods for the Examination of Water and Wastewater*, 16th edition, 1986.

CFR-*Code of Federal Regulations*

Table 4
Baylor College of Medicine - Waste Analysis Plan
Parameters and Test Methods
(Continued)

Parameter	Test Method	Rationale for Selection	Indication of Wastestream Variation in Constituents
PCBs (oil wastestream only)	SW-846 3550/8080	To determine whether the oil waste streams have been contaminated with PCBs, thus requiring incineration at a TSCA-approved incinerator.	PCB concentrations in any amount, if not expected, may indicate a deficiency in the waste segregation, blending, labeling, or identification scheme requiring correction. Depending on the source and original PCB concentration, in some cases an amount of PCBs may require the use of a TSCA-approved incinerator. In other cases, PCB concentrations greater than 50 ppm will require the use of a TSCA-approved incinerator.
TCLP (As, Ba, Cd, Cr, Pb, Hg, Se, Ag and non-pesticide organics[1])	40 CFR 261, Appendix II, Method 1311	To determine whether the waste stream meets the EPA characteristic of toxicity or the DOT hazard class, ORM-E, and to identify and/or quantify trace contaminants.	High metals or organics concentrations not expected based on the compounds blended may indicate a deficiency in the waste segregation, blending, labeling, or identification scheme requiring correction.

1 TCLP non-pesticide organics include benzene; carbon tetrachloride; chlorobenzene; chloroform; o-, m-, p-cresol; 1,4-dichlorobenzene; 1,2-dichloroethane; 1,1-dichlorotehylene; 2,4-dinitrotoluene; methyl ethyl ketone; nitrobenzene; pyridine; tetrachloroethylene; trichloroethylene; 2,4,5-trichlorophenol; 2,4,6-trichlorophenol; and vinyl chloride.

Table 5
Baylor College of Medicine - Waste Analysis Plan
Typical Characteristics[1] of Blended Liquids

Parameter	Waste Stream Concentration or Characteristics		
	Non-halogenated Solvents	Halogenated Solvents	Oils
Btu content (Btu/lb)	>5,000	<5,000[2]	>5,000
TOX or Chlorine (%)	<1	>1	<1
Flashpoint (°F)	<140	>140	>140
pH (s.u.)	>2, <12.5	>2, <12.5	>2, <12.5
PCBs (mg/L)	0	0	<50
TCLP metals (mg/L)	<1,000	<1,000	<5,000
TCLP non-pesticide organics (mg/L)	<10,000	<10,000	<1,000

1 While these characteristics and concentrations are typical, they are not exclusive. For example, halogenated solvents may have a flashpoint less than 140°F.

2 May vary inversely to TOX or chlorine concentration.

based upon the material spilled, the contaminants for which protection was sought, and the material leaked, respectively.

Chemical solids from the consolidation of various compatible solids will not be analyzed since the chemical composition will be based upon a listing of items consolidated, and since an MSDS or equivalent reference source will be available for each item.

Off-Specification Wastes

In the event that the off-site disposal facility to which the waste is sent notifies Baylor College of Medicine that the material received does not match the waste designated on the hazardous waste manifest, analysis of the wastestream will be conducted. The parameters will be selected based upon the disposal site's analytical requirements and/or the apparent discrepancy. For lab packs, analysis may or may not be conducted. In some cases, the lab pack may be unpacked to identify and remove the off-specification waste. This item may be properly identified, or analyzed, as necessary.

Special Provisions for Reactive, Ignitable, or Incompatible Wastes

Reactive Wastes

Reactive wastes will typically be received in lab pack quantities, including containerized gas cylinders. These materials will not be blended, consolidated or commingled, and may not even be opened. In some cases, for example for nitro-compounds, water, or other compatible material may be added to the material to reduce or eliminate its reactive characteristic(s). They will be packaged as lab packs as soon as practical. An inert packing media will be used, which combined with the outside containerization, will afford protection beyond that provided by the chemical's original container. Prior to lab packing, the chemicals will be stored in chemical cabinets, shelves, or other areas designated for their storage.

Ignitable Wastes

The ignitable wastes handled may include ignitable oxidizers, ignitable solvents, ignitable reactives, and ignitable compressed gases. The oxidizers, reactives, and compressed gases will be handled in the manner described above for reactives, i.e., they will not be blended, consolidated or commingled and will be packaged as lab packs as soon as practical.

Ignitable solvents may be blended in grounded drums under fume hoods with filters. Non-sparking equipment (funnels, bung wrenches, etc.) will be used. Malodorous compounds such as pyridine, mercaptans, and acrylates will not be blended unless they are present in such insignificant concentrations that they cannot be detected by odor. Reactive compounds such as uninhibited acrolein, toluene diisocyanate and compounds listed by the DOT as "poison-inhalation hazard" will not be blended. In some instances, the trial test described in the following subsection may be used to ensure that incompatible materials are not blended together.

Incompatible Wastes

Incompatible wastes will not be blended, consolidated or otherwise commingled, unless such handling is conducted as acid-base neutralization under the RCRA exclusion for elementary neutralization. Any elementary neutralization conducted will be performed in a well-ventilated area to prevent any potential hydrogen gas build-up. The reaction product will be analyzed to verify that it has a pH greater than 2.0 and less than 12.5. If a pH between 2.0 and 12.5 is not achieved, the waste may be subjected to neutralization again or may be shipped off site as a hazardous waste.

In order to ensure that incompatible wastes are not commingled, the USEPA guidance document, *A Method for Determining the Compatibility of Hazardous Wastes,* EPA-600/2-80-076, will be consulted prior to conducting any blending or consolidation activities. As the commingling procedures are implemented, operating lists which identify compatible (and incompatible) materials may be prepared and updated. For those chemicals which have been handled previously, the operating list(s) may be consulted instead of the guidance document. Personnel training will include training on the use of this guidance document and, if applicable, the operating list(s).

For multicomponent wastes, use of the guidance document referenced above may not be practical. In such instances, a trial test may be performed. A sample from the existing drummed waste would be collected and combined with an aliquot of the waste material in question. The quantity of the sample to be used would be determined on a case-by-case basis. In general, the sample would be of sufficient size to produce clearly discernible effects, and small enough to ensure that any reaction which may occur can be controlled.

Since the intent of the trial test is to simulate conditions upon entry of the chemical into the existing drummed waste, sampling by specific EPA approved methods is not necessary. In most cases, a grab sample or COLIWASA equivalent sampler will be used for the drummed material. A dropper may be used to obtain the sample from the container of waste; the material may be poured from the container; or the container itself may be considered the sample.

In some cases, for instance if the mixture contains or is suspected to contain polymerizable components or concentrations of acetic anhydride, which has an initially slow rate of reaction, it may be prudent to assess the results after a 24-hour period has elapsed. For detection of toxic gases which may evolve during the trial test, a variety of detector tubes are commercially available and may be used. The mechanism by which these tubes work includes aspiration of the gas through a tube specific for the gas ingestion. A change in color in the tube media indicates the presence of the gas, the concentration of which is proportional to the length of the change of color in the tube.

QUALITY CONTROL

Quality control (QC) includes both field and analytical quality control. Field quality control includes field sampling activities while analytical quality control

consists of those measures taken to ensure that the laboratory data is of good quality.

Field Quality Control

Samples will be collected by Baylor personnel or contractors. These personnel will be trained to properly collect samples through the personnel training program. Facility personnel will also be trained in the use of this waste analysis plan. Upon determination that a material requires sampling and analysis, the individual will consult the waste analysis plan and determine the analytical parameters required, and the appropriate sampling methods and holding times, presented in Table 6. A chain-of-custody form such as the one presented in Figure 4 will also be completed.

Analytical Quality Control

The analysis of blended liquids will be performed by one or more outside commercial laboratories. The selected laboratories will have a written quality assurance/quality control (QA/QC) plan. Typical commercial laboratory QA/QC procedures are described briefly in the following section. This information is presented as an example only.

LABORATORY QA/QC OBJECTIVES FOR COMMERCIAL ANALYSES

The objectives of the laboratory's QA/QC plan are to implement specific procedures to obtain measurement data and to define the goals for the characteristics of these data which are:

- accuracy;
- precision;
- reliability; and
- credibility.

Accuracy is reported as the percent recovery of a parameter from a sample of known value with a given analytical procedure and analyst. Precision of analytical results may be established as the standard deviation from true values or from the mean of replicate analyses.

The reliability and credibility of analytical laboratory results are established by the inclusion, as an integral part of any analytical procedure, of a program or randomly selected replicate analyses and analysis of standards or spiked samples.

Analytical Procedures

All analytical methods are based on accepted government and industry standards and contain the following information:

- Scope - the procedure's applicability.
- Principle - the theoretical basis for the procedure.

Table 6
Baylor College of Medicine Waste Analysis Plan
Sample Preservation Methods and Sample Hold Times

Analysis	Type Container	Preservation	Hold Time[1]
BTU Content	not available	not specified	not specified
Total Chlorine	P,G	not required	not specified
Flashpoint		not specified	not specified
PCBs	G, Teflon-lined cap	Cool 4°C	7 days extract 40 days after extraction
pH	P, G	not required	analyze immediately
TOX	G, Teflon-lined cap	Cool 4°C, H_2SO_4	7 days
TCLP:	G, Teflon-lined cap	Cool 4°C	
Volatiles			14/28
Semivolatiles			14/61
Mercury			28/56
Metals, except mercury			180/360

G Glass

P Plastic

1 Where hold time is specified with two figures, the first represents the hold time from field collection to TCLP extraction, and the second total hold time.

FIGURE 4

BAYLOR COLLEGE OF MEDICINE – WASTE ANALYSIS PLAN
CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
SAMPLERS (SIGNATURE)	

STA. NO.	DATE	TIME	GRAB	COMP.	STATION LOCATION	NO. OF CONTAINERS																	NOTES

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS	
DISTRIBUTION: ORIGINAL ACCOMPANIES SHIPMENT; COPY TO COORDINATORS FIELD FILES.					

BAYCOC

- Interferences - known interfering agents which would cause difficulty in performing the laboratory analysis or would lead to erroneous results.
- Apparatus - equipment required to perform the laboratory analysis.
- Reagents - the reagents required, the steps involved in preparing the reagents, and instructions on storage requirements and retention times.
- Procedure - the sequence of activities to be followed, including sample preparation or pretreatment, sample storage requirements, instrument set-up, standardization or calibration, sample analysis, calculations, and glassware cleaning procedures.
- Quality Control Requirements - the QC checks to be performed and the acceptance criteria used to evaluate the QC data.
- References - the publications from which the information was derived, for example:

  1. *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association.
  2. *Annual Book of Standards*, American Society for Testing and Materials.
  3. *Methods for Chemical Analysis of Water and Waste*, Environmental Protection Agency.
  4. *Test Methods for Evaluating Solid Waste*, SW-846, Environmental Protection Agency.

Laboratory Sample Chain-of-Custody

After collection, identification, and shipment to the laboratory, samples will be maintained under the following chain-of-custody procedures.

- Identification of responsible party to act as sample custodian at the laboratory and authorized to sign for incoming field samples, obtain documents of shipment, and verify the data entered onto the sample custody records.
- Provision for a laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets.
- Assignment of a unique laboratory number to each sample received.
- Specification of laboratory sample custody procedures for sample handling, storage, and disbursement for analysis.

Laboratory Instrument Calibration Procedures

Balances, gauges, thermometers, instruments and other testing devices used in activities affecting sample analysis accuracy and precision will be calibrated, adjusted or controlled to maintain instrument reliability and detection limits specified in the testing procedures.

Sample analysis, testing, and measuring devices will be calibrated at scheduled intervals against certified standards which are traceable to recognized national

standards. The intervals between calibrations will be based on the type of equipment, frequency of use, and manufacturer's specifications or recommendations. Those testing and measuring devices which do not require calibration shall be checked periodically.

Calibration will be performed in an environment which will not effect calibration accuracy. Calibration standards will be controlled. All calibrations or calibration standards will be traceable to national standards. Newly acquired equipment will be calibrated before use. Equipment subject to repairs or modification which might affect calibration must be recalibrated before use.

A current record of all equipment calibrations will be maintained. This record will contain the identification of device or instrument; model number; manufacturer; calibration frequency; name of person performing calibration; and calibration date.

Data Reduction, Validation, and Reporting

The laboratory will use a bound logbook or a computerized system for sample check-in, tracking of samples through the laboratory, assignment of laboratory analyses, and sample check-out. The review is accomplished on two levels; review of raw data for each analysis and review of the final results to check for consistency or agreement of the results between all parameters.

Upon receipt of samples for analysis accompanied by a completed request for analysis form detailing the analytical parameters, the laboratory sample custodian will log in samples and assign identification numbers.

Data Reduction and Expression of Results

Raw data are generated in the laboratory in one of the following ways:

- Data from simple analytical procedures such as gravimetric and titrametric procedures are converted into final form by means of desk calculation. One or two step calculations are performed manually by the technician and final data are recorded in parameter notebooks (and stored on the computer, if applicable).
- Atomic absorption spectrophotometers are calibrated to display direct concentration whenever possible. Some analyses require the analyst to construct calibration curves using absorbance vs. concentration. Other analyses, such as those using the method of standard additions, require manual computation with desk calculators to obtain the final results.
- All liquid chromatographs, gas chromatographs, and gas chromatographs/mass spectrometers (GC/MS) are equipped with programmable data systems. These give automatic generation of parameter data in final reported form.

The final expression of a result is rounded off properly to contain only significant figures.

Validation of Results

The analysis assignment sheet is reviewed by the specific Laboratory Group Leader prior to its submittal to the data entry clerk. The review process includes a complete check of the analyst's calculations on both standards and samples. The analysis results are reviewed again by the Laboratory Supervisor and finally by the Laboratory Manager.

The data analysis assignment sheets are checked for completeness; correctness; appropriate significant figures; and credibility of analytical data based on past experience with similar samples.

Storage of Analytical Data

Current analytical data will be retained in the laboratory files and on the computer disks for a minimum of one year. The files will then be transferred to archives.

Laboratory Quality Control Checks

- Laboratory Duplicates - Laboratory duplicate samples will be analyzed to monitor for intralaboratory precision of data generated. These samples will be analyzed on no less that a five percent basis with at least one replicate if fewer than twenty samples are analyzed for any particular parameter.
- Spiked Samples - Spiked samples will be analyzed to monitor for accuracy of data due to interferences which may be present in the sample and thus influence the reported result. The spiked samples will be tested on no less than a five percent basis for any particular parameter. At least one spiked sample will be run if fewer than twenty samples are analyzed.
- Method Blanks - Method blanks are accomplished by treating purified water or ultra-cleaned sand in the same manner as samples to monitor potential contamination of samples due to contamination in solvents, reagents, glassware or laboratory equipment. Method blanks are included with each set of samples.
- Equipment Blanks - Equipment blanks will be taken to monitor potential contamination of samples due to improper or ineffective cleaning of equipment.
- Quality Control Samples - Quality control samples will be analyzed to monitor for accuracy of data generated. The source of these samples is the EPA whenever possible, otherwise samples will be purchased from a reputable independent source. The EPA check samples will be analyzed at the beginning of the project and also at regular intervals during the project.
- Surrogate Samples - Surrogate samples will be analyzed in accordance with EPA guidelines for GC/MS analysis. Deuterated standards are analyzed along with unknown samples to insure recovery of these compounds in analysis.

- DFTPP Criteria Test - This test will be utilized for the GC/MS instrument prior to Base/Neutral or Acid Fraction analyses. The GC/MS instrument is certified according to EPA protocol by injection with DFTPP (decafluorotriphenylphosphine) and comparing the relative ion abundances for key ions. The instrument is adjusted and calibrated until the criteria are met.
- BFB Criteria Test - This test will be utilized daily to check the performance of the GC/MS system for volatile organic analyses (VOA). The instrument is injected with BFB (bromofluorobenzene) and the relative abundances of key ions are compared. The instrument is adjusted until the prescribed criteria are met.
- Reagent Checks - Reagent checks are accomplished by treating known laboratory blanks in the same manner as samples and reviewing data to verify that no contamination has been introduced as a result of reagents.
- Internal Standards - Internal standards are prepared in the laboratory and are referenced against known external standards to insure their accuracy.
- Calibration Standards and Devices - Standards will be utilized according to the type and method analysis, in particular when instrumental methods are employed.
- Control Charts - Control charts will be utilized to effectively monitor and periodically review the precision and accuracy of the data generated as a result of duplicate and spike analyses. These charts also aid in observing trends in data so that corrective action may be taken before data generated are out of control.

Laboratory Preventive Maintenance

The laboratory utilizes a formal system to maintain control of all analytical instruments. The procedure details the steps to be taken to calibrate and standardize instrument to ensure that analytical data produced are accurate. Records of all calibrations, preventative maintenance, and service calls are readily available from laboratory quality assurance files.

Corrective Action

Control charts are used to monitor the day-to-day variations in the precision or accuracy of routine analyses and can detect trends in these variations. These control charts fall into two categories: precision control charts, and accuracy control charts. Data falling outside the upper control limit or the lower control limit of either of these charts indicate an "out-of-control" situation. Corrective actions will be taken to ascertain the cause of the out-of-control situation.

Should corrective action be necessary, the laboratory manager will notify the client. The laboratory manager will outline the corrective action taken and whether the problem has been corrected. Also, the client will be notified if constituents of concern are detected in the field blanks. Results of performance or systems audits or internal quality control analyses may trigger corrective action.

6 Contingency Plan

BAYLOR COLLEGE OF MEDICINE CONTINGENCY PLAN

REFERENCE: Section III.E. TCEQ Application

Introduction

This contingency plan has been prepared in accordance with the Environmental Protection Agency (EPA) rules and regulations specified in 40 CFR 264, Subpart D. The purpose of this plan is to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous constituents to air, soil, or surface water at Baylor's hazardous waste storage room and facility. This plan describes the actions Baylor personnel must take in response to any fires, explosions, or releases of hazardous waste or hazardous constituents in Baylor's hazardous waste storage room or facility, which could threaten human health or the environment. A copy of the plan will be maintained at both locations (3325 Yellowstone Blvd. and One Baylor Plaza).

In the unlikely event of a fire, explosion, or release of hazardous waste or hazardous waste constituents, which could threaten human health or the environment the provisions of this plan will be carried out immediately.

Emergency Coordinator

In accordance with the regulations, at least one employee either is on the facility premises or on call (i.e., available to respond to an emergency by reaching the facility within a short period of time) with the responsibility for coordinating all emergency response measures. This emergency coordinator is thoroughly familiar with all aspects of this contingency plan, all operations and activities at the facility, the location and characteristics of waste handled the location of all records within the facility, and the facility layout. In addition, the emergency coordinator has the authority to commit the resources needed to carry out this contingency plan.

A list of the names, addresses, and phone numbers (office and home) of all persons qualified to act as emergency coordinator as of January 2008, is presented in Table 1 of this plan. Specific individuals may change, however, at least one primary and one alternate emergency coordinator will be designated at all times. The Supervisor, Chemical Safety is the primary emergency coordinator. Alternate emergency coordinators will be dependent upon planning schedules.

Table 1
Baylor College of Medicine - Contingency Plan
Emergency Coordinator and Alternates as of January 2008

Title	Name and Address[a]	Office Phone Number	Home Phone Number	Cell Phone Number[b]
Supervisor, Chemical Safety	**William Davis** 1818 Castle Oaks Dr. Pearland, TX 77581	(713)798-3851	(281)648-1733	Cell# (713)515-7021
Hazardous Waste Manager	**David McCormick** 9800 Pagewood Lane Houston, Texas 77042	(713)798-1583	(713)972-9764	Cell# (713)398-7209
Director of Environmental Safety	**Paul Muraca** 9029 Rolling Oak Court Montgomery, TX 77316	(713)798-6617	(936) 588-3719	Cell# (713)591-8359

a Actual individuals may change, however, one primary and one alternate emergency coordinator will always be designated.
b Through the use of pagers, the emergency coordinator or designated alternate are available 24-hours a day.

Notification

Any personnel observing a fire, explosion, or an unplanned release of hazardous waste or hazardous waste constituents will immediately notify the emergency coordinator. To report an emergency situation during working hours (8:00 A.M. to 5:00 P.M.), personnel may call 713/798-4799. After working hours, personnel will call home phone numbers or pager numbers of the designated emergency coordinator or alternates. Personnel may obtain home phone numbers or pager numbers from the Baylor College of Medicine Security Department at 713/798-3000. After hours, the designated emergency coordinator or alternates should be contacted in the following order:

1. **William T. Davis, CHMM**, Supervisor, Chemical Safety
2. **David McCormick**, Hazardous Waste Manager
3. **Paul Muraca M.S.**, Director of Environmental Safety

General Procedures

In the unlikely event of an imminent or actual emergency situation at the facility, the emergency coordinator (or his designee, when the emergency coordinator is on call) will immediately take the following steps. These steps are general; more specific procedures are discussed in the emergency response section of this plan.

1. Immediately activate internal alarm/communication system utilizing a signal (fire alarm) to notify all facility personnel.
2. Initiate appropriate response actions and evacuate affected areas if necessary. Notify all appropriate state and/or local agencies with designated response roles if their help is needed. The appropriate agencies will be notified by telephone.
3. Identify the character, exact source, amount, and aerial extent of any released materials. This assessment may be conducted through observation, review of facility records or shipping manifest, and, if necessary chemical analysis. Determine if a reportable quantity has been exceeded. Please refer to Reportable Quantities of Hazardous Substances in Appendix A of this report. If it is determined that a reportable quantity has been exceeded then the necessary notification must be made. Please refer to SARA/CERCLA Notification Requirements in Appendix B of this plan.
4. Assess possible hazards to human health or the environment that may result from the release, fire, or explosion. This assessment must consider direct and indirect effects of the release, fire, or explosion, including the effects of any toxic, irritating, or asphyxiating gases that are generated. In addition, the effects of any hazardous surface water run-off from the water or chemical agents used to control fire and heat induced explosions must be included in this assessment.
5. If it has been determined that the facility has had a release, fire, or explosion which could threaten human health or the environment outside the facility the emergency coordinator will notify, by telephone, the appropriate local authorities. The emergency coordinator will be available to assist the appropriate officials to decide whether local areas should be evacuated. In addition, the emergency coordinator will immediately notify the TCEQ District Supervisor according to procedures set out in section 4.1 through 4.3 of the "State of Texas Oil and Hazardous Substances Spill Contingency Plan", revised May 1999. This report, submitted to the TCEQ District Supervisor, will include:

- The date and time of spill;
- The type of material spilled;
- An estimate of the quantity of material spilled;
- The exact location of the spill, including the name of the waters involved or threatened;
- The source of the spill;
- The name, address, and telephone number of the party in charge of, or responsible for, the facility or activity associated with the spill;
- The extent of actual and potential water pollution;
- The party at the spill site who is in charge of operations at the spill site and the telephone number of this party;
- The steps being taken or proposed to contain and clean up the spilled material;
- The extent of injuries, if any; and
- Possible hazards to human health and the environment (air, soil, water, wildlife, etc.).

When warranted, the emergency coordinator, owner, or operator will also notify the National Response Center at 800/424-8802, the Texas Commission on Environmental Quality at 800/832-8224, Texas Commission on Environmental Quality at 713/767-3500 (if the TCEQ cannot be reached, the EPA Emergency Response-Dallas at 800/887-6063 may be contacted), and the U.S. Coast Guard may be contacted, if nautical waters are involved, at 713-674-8488. Any reports which are submitted to the Texas Department of Health (TDH) and the National Response Center must include the following information:

- Name, address, and telephone number of the facility;
- Time and type of incident (e.g., fire, explosion);
- Name and quantity of released materials to the extent known;
- Extent of injuries, if any; and
- An assessment of possible hazards to human health or the environment, outside the facility.

6. Will take all reasonable measures to ensure that fires, explosions, and releases do not occur, recur, or spread to other hazardous waste at the facility. These measures include stopping processes and operations, collecting and containing released wastes, or removing or isolating containers.
7. If the facility (or portion of the facility) stops operations in response to a fire, explosion, or release, the emergency coordinator will monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment.
8. Immediately after an emergency, the emergency coordinator will take actions to provide for storing, processing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion.
9. Ensure that the area(s) affected by an environmental incident are properly secured. The storing, processing, or disposing of waste which may be incompatible with the released material must be prevented until cleanup procedures are completed. Before operations are resumed, ensure that in the affected area(s) of the facility all emergency equipment listed in this plan is cleaned and fit for its intended use. The Executive Director and the TCEQ District Office will be notified that the facility is in compliance with Subsection III.E.1.2.3 of this Part B permit application before operations are resumed in the affected area(s).

It will be noted in the facility's operating record the time, date, and details of any incident that requires implementation of this contingency plan. Within 15 days after the incident, a written report will be submitted to the Executive Director and the District Office. The following will be included in this report.

- Name, address, and telephone number of the owner or operator;
- Name, address, and telephone number of the facility;
- Date, time, and type of incident (e.g., fire, explosion);
- Name and quantity of material(s) involved;
- The extent of injuries, if any;
- An assessment of actual or potential hazardous to human health or the environment, where this is applicable; and
- Estimated quantity and disposition of recovered material that resulted from the incident.

Emergency Response

The emergency response procedures described below are designed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous constituents to air, soil, or surface water. These procedures are intended only as guidelines. Dependent upon the situation additional emergency response actions may be required.

Chemical Composition of Wastes

Wastes stored in the hazardous waste storage areas may include any of the following chemical groups, stored in ≤55 gallon containers.

* corrosives,
* oxidizers,
* poisons,
* reactives,
* flammable and combustible materials,
* pesticides,
* cyanides,
* sulfides, and
* other regulated materials in liquid, solid, and containerized gas forms.

The most probable emergency situations would include releases of liquids, fires, and/or possibly explosions. Emergency procedures will include, where applicable, stopping hazardous waste processes and operations, collecting and containing released waste, removing or isolating containers, and using other measures as needed.

Releases

An assessment of the type of material(s) released should be conducted utilizing analysis, knowledge of the waste, observation, Material Safety Data Sheets (MSDS), and/or, if applicable, shipping manifest or other facility records. This assessment should also include, exact source, amount, and extent of the released material.

In the unlikely event of a release, hazardous waste processes and operations will be stopped to ensure that waste(s) which may be incompatible with the released material(s) is not stored, processed, or disposed until clean up procedures are completed.

Releases should be prevented from spreading to other hazardous wastes. Releases can be contained by placing a leaking drum/container in a salvage drum and spreading appropriate absorbent on the spill. Any absorbent or other materials used to clean up the spill should be placed in a properly marked hazardous waste drum until it can be analyzed and disposed. Equipment used during the clean up process will be properly decontaminated prior to return to storage. When clean up procedures are completed, the recovered materials and the drummed clean up materials will be properly stored and/or processed until disposed.

During the clean up process, personnel should be using the appropriate personnel protective equipment. An evaluation should be conducted to determine the proper level of personal protective equipment.

Fire or Explosion

An assessment of the character, exact source, amount, and extent of the fire or explosion should be conducted immediately using observation, analysis, knowledge of the waste, shipping manifests, MSDS's, or facility records. Any fire or explosion in the hazardous waste storage facility or room has the potential for releasing toxic gases, vapors, or fumes; therefore, monitoring should be conducted for gas generation.
A visual assessment will be conducted for the release of toxic gases, vapors, or fumes. Actions should be taken to ensure that all personnel are utilizing the appropriate level of personnel protective equipment.

The fire should be controlled using the proper extinguishing agent for the burning material. If other drums or containers in the area present an explosive risk, then action should be taken to keep these drums or containers cool, unless this action would present another hazard. For example, water may be used if there are no chemicals in the area, which react with water, or drums/containers could be removed or isolated.

Pressure buildup in drums, and thus explosions caused by pressure buildup, will be prevented and detected through the following operating procedures:

1. Since 55-gallon drums of liquid are not typically received at the facility, buildup can be prevented through facility operations and container management.
2. Drum bungs will not be sealed tightly. This will allow breathing room and prevent drum expansion.1
3. All drums will be opened slowly and in a manner so as to allow for the controlled release of pressure buildup.
4. The heating and cooling system for the facility will be maintained so as to ensure any temperature changes are effected incrementally and to prevent drastic temperature changes over brief periods of time.
5. Approximately 2 inches of headspace or freeboard will be maintained in each drum to allow for liquid/vapor expansion.
6. Inspections will include observing the containers for drum or lid deformities or other indications of pressure buildup, such as pings or other sounds caused by drum expansion.

Assessment of Possible Hazards

---

1 For containers inside the facility, the ventilation system will duct and release vapors through an activated carbon filter prior to release to the atmosphere.

In the unlikely event of a sudden release, fire, or explosion the materials that are stored in the facility or room may present possible hazards to human health and the environment. Please note that any possible effects on the environment and human health will be dependent upon the specific chemical. The human health and environmental effects that are described below are very general.

All of the waste stored at the Yellowstone Blvd. Facility will be stored in an enclosed building with a secondary containment system. Further, the ignitable wastes are stored in a special vault equipped with a blow-out panel and other features noted in the engineering report. All ignitable and reactive chemicals are stored at least 50 feet from the property line. If suddenly released, the drummed solvents may present a fire and explosion hazard; however, in consideration that these drums will be stored inside an enclosed vault, the effect on the environment is expected to be minimal. Any sudden release from the lab packs to the environment is highly unlikely. If a release does occur, it will most likely be a very small quantity and, therefore, the effect on the environment is considered to be very minimal.

The possible human health effects for each of the chemical groups that may be stored in the facility are described below.

Corrosives

Upon contact with liquids or solids, corrosive material may cause pain, severe irritation to the skin, second to third degree burns on tissue, and severe injury to the eyes. Inhalation of dust or fumes may cause damage to the upper respiratory tract and lungs, coughing, a choking sensation, and irritation to the nose and lungs. Ingestion of corrosive material may cause severe gastrointestinal irritation and severe scar formation or perforation.

Oxidizers

Upon contact, oxidizers may cause burns to skin and tissue. Ingestion may cause severe distress to the gastrointestinal system, and possibly death.

Poisons

Upon ingestion, poisons may cause severe distress to the gastrointestinal system, pain, and possibly death. Upon contact, poisons may cause irritation to the skin and tissue. Inhalation may cause choking, irritation to the respiratory tract and lungs, and possibly death.

Reactives

Exposure to reactives may cause irritation and burns to the skin and tissue. Inhalation of fumes may cause irritation to the respiratory tract and lungs. Ingestion may cause vomiting.

Flammable and Combustible Material

Upon contact, flammable and combustible material may cause irritation to the skin and eyes. Inhalation of fumes may cause a narcotic effect, irritation to the nose, respiratory tract and lungs, dizziness, excitation, pallor, followed by flushing, weakness, headache, breathlessness, chest constriction, coma, and possibly death.

Pesticides

Upon ingestion, pesticides may cause severe distress to the gastrointestinal system, pain, and possibly death. Upon contact, pesticides may cause irritation to the skin and tissue. Inhalation of fumes may cause choking, irritation to the respiratory tract and lungs.

Cyanides

Upon contact, cyanide will be readily absorbed through the skin. Vapors containing cyanide may be inhaled. Symptoms of exposure include salivation, nausea without vomiting, a bitter, almond odor on breath of person exposed, anxiety, confusion, vertigo, giddiness, lower jaw stiffness, convulsions, opisthotonos, paralysis, coma, cardiac arrhythmias, and transient respiratory stimulation followed by respiratory failure. Inhalation of high concentrations of hydrogen cyanide gas may cause respiratory arrest resulting in death. Ingestion of cyanide salts may eventually cause death.

Sulfides

Upon contact, sulfides may cause softening and irritation to the skin. If ingested, hydrogen sulfide and free alkali may be liberated causing corrosion and irritation to tissue. If heated, sulfides may decompose into toxic and flammable vapors of hydrogen sulfide. Hydrogen sulfide is an irritant to the upper respiratory tract and an asphyxiant.

Containerized Gas

Any human health effects from exposure to a containerized gas will be dependent upon the gas.

EMERGENCY EQUIPMENT

A list of available emergency equipment is presented in Table 2 of this plan. If necessary, additional equipment will be obtained through rental.

In the unlikely event of an accidental spill or release outside the containment system, the release or spill will occur on either concrete (inside the facility building) or asphalt (outside the facility building). A spill or release to these areas will be absorbed with calcium bentonite or other spill control absorbents or pillows. The area will be washed with a surfactant (such as Alconox,) and water. The wash water will be removed with sorbent pads. If a spill or release of organics onto the asphalt pad occurs, and cannot be cleaned, the asphalt and any affected underlying fill will be removed and replaced/repaired.

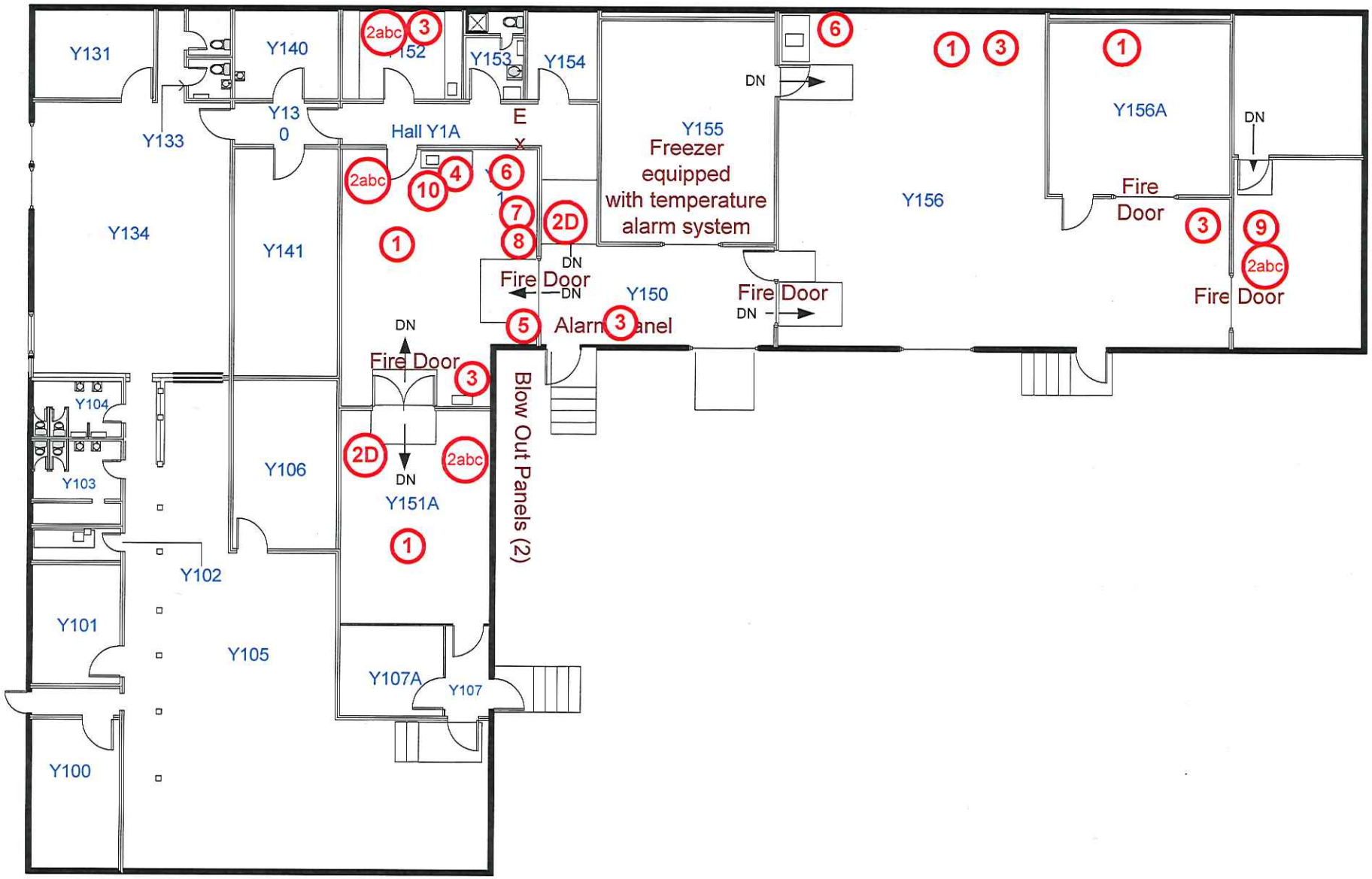
All equipment utilized to contain a hazardous waste release must be thoroughly decontaminated prior to return to storage. Equipment or supplies which are needed and can not be reused will be replaced. Sampling equipment is decontaminated with water and a phosphate-free detergent such as Alconox,. Heavy equipment is decontaminated by using water and, if needed, a phosphate-free detergent such as Alconox,. All materials used to decontaminate equipment must be placed in drums and properly stored until disposal can be arranged.

Table 2
Baylor College of Medicine - Contingency Plan
Emergency Equipment

Floor Plan Number	Equipment	Location	Physical Description
1	Fire Suppression System	2 zones; Flammable Liquid storage area, and Chemical Waste storage area	"Rate-of-Use" (thermal) heat detectors with 2 manual overrides on wall, no water due to water reactives
2(ABC)	Fire Extinguishers	Various Locations in storage areas and throughout the building	Four portable, 10-lb. dry chemical, Class A-B-C
2(D)			Two 30-lb. Class D
3	Emergency Communication System	Throughout the building	Fire alarm is connected with Yellowstone security and One Baylor Plaza security and engineer's monitor plus UL-rated remote monitor
4	Spill Control Equipment	Chemical Storage Area	Absorbents, wipes, pads, Spill VBS blankets, Hazorb spill control pillows, calcium bentonite, pH paper, mercury absorb powder, Box mercury sponges, "Danger Chemical Spill" signs, "Danger Do Not Enter" signs
5	First Aid Kit	Chemical Storage Area	Standard first aid materials
6	Safety Shower and Eyewash	Chemical Storage Area	Standard
7	Personal Protective Equipment	Chemical Storage Area	Goggles, safety glasses, face shields, and chemical resistant gloves, coveralls, gowns, aprons, splash suits, and over boots
8	Cleaning Equipment	Chemical Storage Area	Acid clean-up kit, Caustic clean-up kit, Flammable Solvents clean-up kit, surfactant (e.g., Alconox,), pH paper, Fighting 114 kit, Mercury clean-up kit, brooms, mops, dustpans, shovels, sets of long handled tongs, 15 gal. Open head drum, and bottle carriers
9	Other Equipment	Environmental Safety Office at One Baylor Plaza	High efficiency particle filter vacuum cleaner and a mercury vacuum cleaner for cleaning toxic powders and mercury
10	Neutralizers/Spill Related Chemicals	Chemical Storage Area	Sodium Bicarbonate (acid neutralization), Calcium Hydroxide (inorganic acid neutralization), Sulfur (metallic mercury cleanup), Sodium Bisulfite (oxidizer spill cleanup), Sodium Thiosulfate (bromine spills), Calcium Hypochlorite (mercaptans/organic sulfide spills), Copper Sulfate (identification of White Phosphorus on skin), Ceric Ammonium Citrate (decontamination of Azo compounds and Azides), Sodium bisulfate (aliphatic amine spills)

Appendix E

Baylor College of Medicine
Yellowstone Facility
Fire Protection Facilities



Decontaminated emergency equipment will be determined to be clean by visual observation of the rinsate. When no sheen or color is observed in the rinsate, and, for equipment contaminated with inorganics, when the pH paper indicates a neutral range (about 4.0 to 9.0), the equipment will be deemed clean.

The 3325 Yellowstone Blvd. Location has two fire hydrants near the facility. These fire hydrants are depicted on the map presented in Appendix D of the Contingency Plan (Section 5). A flow test for the two hydrants, one located at the intersection of Allegheny Street and Yellowstone Boulevard, and the other at the intersection of Highway 288 and Yellowstone Boulevard, was conducted by the city's Public Works Department on December 2, 1992. These data, summarized below, indicate that there is water of sufficient volume and adequate pressure to supply water hose streams and foam-producing equipment in the event the use of such equipment becomes necessary.

Fire Hydrant Location	Static Pressure (psi)	Residual Pressure (psi)	Flow at Residual Pressure (gpm)
Yellowstone at Allegheny	46	42	1,087
Yellowstone at Hwy. 288 Service Road	49	39	1,047

The city of Houston water supply is also the source of water used in the facility's plumbing system. As a minimum, this water is of sufficient volume and pressure to meet OSHA requirements for safety showers and eye wash stations, and to supply the fire suppression system.

ARRANGEMENTS WITH LOCAL AUTHORITIES

Arrangements have been made to familiarize local response agencies with the layout of the facility, properties of hazardous waste handled at the facility and associated hazards, places where facility personnel would normally be working, entrances to and roads inside the facility, and possible evacuation routes.

In the unlikely event of an injury, personnel will call the security office using the following 713/798-3000 number to request transportation for the injured party. BCM Security will notify College Administration Officials which are available 24 hours per day, 7 days per week.

Arrangements have been made to familiarize local fire departments and hospitals with the types of injuries or illnesses which could result from fires, explosions, or releases. **Appendix C** contains a listing of the local fire departments, police departments, and hospitals, which have been contacted. Correspondence documenting these contacts is available in the facility records. A pay-for-use contract with Garner Environmental Services, Inc. has been established for on-call emergency response.

6.1

EVACUATION PLAN

If an event occurs which requires facility evacuation, the emergency coordinator will implement the following procedures.

- Notify all facility personnel, by a signal (fire alarm may be activated), to immediately stop all processing and operations and evacuate the facility (processing and operations will be safely concluded). If possible, all open drums and exposed hazardous waste will be covered. As each situation will be unique additional instructions may be given.
- If warranted, the security officers on the premises may be dispatched to assist in the evacuation.
- Personnel will evacuate the facility using the primary route. If the primary route is blocked, by releases, fire, or explosion, the secondary or tertiary routes will be used. In the event the Yellowstone Blvd. Waste Facility location gate depicted in Appendix D is blocked, personnel will evacuate to the northwest corner of the property on which the facility is located, about 645 feet from the facility. The primary, secondary, and tertiary evacuation routes and meeting areas are presented on the evacuation route maps in Appendix D of this section.
- The emergency coordinator will account for all facility personnel.

As an added safety precaution, the fire alarm signal is connected to the facility's security office and the One Baylor Plaza security office.

In the unlikely event that a release, fire, or explosion could threaten human health or the environment, outside the facility, then evacuation of local areas may be advisable. The emergency coordinator will contact the local police by telephone to request assistance. The local fire department will also be notified of the situation by telephone.

The Emergency Coordinator will notify Baylor College of Medicine's Security office. BCM security office can be contacted at 713-798-3000. BCM Security will notify College Administration Officials which are available 24 hours per day, 7 days per week. The Director of Environmental Safety Office or the Public Affairs Office will make all public comments regarding the nature of the incident.

Appendix A

Baylor College of Medicine

Contingency Plan

Reportable Quantities of Hazardous Substances

Appendix B

Baylor College of Medicine

Contingency Plan

SARA/CERCLA Notification Requirements

Baylor College of Medicine-Contingency Plan

SARA/CERCLA Notification Requirements

Procedures are in place for reporting oil, chemical, or hazardous waste spills to the Texas Commission on Environmental Quality, State Emergency Response Center and the National Response Center.

This SARA/CERCLA procedure covers the required notification for releases of specific hazardous substances under the superfund law (the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 [CERCLA], Sections 102 and 103) and listed extremely hazardous substances under the superfund reauthorization law (the Superfund Amendments and Reauthorization Act of 1986 [SARA], Sections 302 and 304). This procedure does not in any way change or alter existing telephone or written notification procedures. However, when this procedure is used to notify an agency of a specific chemical release (see Attachment 1), duplicate reporting to the same agency for the same release under another procedure is not required.

Chemicals which are listed in the CERCLA list of "hazardous" chemicals and the SARA list of "extremely hazardous" chemicals are included in the attached Appendix A. If a release of any of the chemicals listed in Appendix A occurs in a quantity above the Reportable Quantity and which crosses the facility boundaries, then the release requires "immediate" telephone notification to the community emergency coordinator of the Local Emergency Planning Committee (LEPC), the Texas Commission on Environmental Quality (TCEQ), and the U.S. Coast Guard National Response Center. (See Attachment 1 for a list of telephone numbers to call). Telephone notification must be followed with a written report to the agencies. See attachment 2 and Attachment 2 Form for the telephone and written information required.

Baylor College of Medicine internal spill notification will occur in the event a SARA/CERCLA release is reported to the above agencies. The Baylor College of Medicine telephone notification may be followed with a written report similar to Attachment 3.

Procedure for SARA/CERCLA Notification

General Personnel

When an environmental release occurs, personnel will immediately notify the Emergency Coordinator (EC) of the details surrounding the release (chemical released, time, duration, amount, equipment involved, etc.).

Emergency Coordinator

Upon receiving the environmental release information, the EC or designated personnel must complete an environmental release/spill reporting form, similar to Attachment 3. The EC will determine if the TCEQ or other agency reporting is required by the existing procedures. The EC will review Appendix A-Reportable Quantities of Hazardous Substances or current list to determine if the release is greater than the reportable quantity for a listed SARA/CERCLA chemical. If so, the EC will contact the agencies marked in Attachment 1, starting with the fire department and continuing with the TCEQ, and the NRC. Finally, the EC will perform the Baylor College of Medicine's notification requirements. The form in Attachment 2 or a similar form will be used to record the information. The reported information should be brief, unless the situation warrants extensive information, such as required community evacuation. A copy

of the recorded information should be forwarded, by telephone, to the Director of Environmental Safety so that a written report for the agencies may be reported.

Attachment 1

Baylor College of Medicine

Emergency Spill Notifications

Agency Contacts

1. Fire Department
   Designated Contact: City of Houston Fire Department
   24-hour number: 911

   District Chief #46
   A, B, C, and D Shifts
   24-hour number: (713) 247-5000

   Hazardous Materials Chief
   Station 22
   24-hour number: (713) 928-6152

2. TCEQ-State Emergency Response Center
   Designated Contact: Texas Commission on Environmental Quality
   Emergency Response Unit
   24 Hour Hotline: (800) 832-8224
   Business Hours: (512) 239-2507
   Alternate Contact: EPA Emergency Response-Dallas
   24 Hour Hotline: (214) 665-2222

3. NRC-National Response Center
   24 Hour Number: (800) 424-8802

Attachment 2

Baylor College of Medicine-Contingency Plan

SARA/CERCLA Spill Report Information Required

When a spill occurs, check Appendix A to determine if the reportable quantity has been exceeded. If it has, immediately call the agencies listed in the order specified, starting with the Fire Department.

Telephone notification will include the following:

1. Name and telephone number of person reporting the release.
2. Chemical name of substance released.
3. Specify if chemical is on the SARA extremely hazardous substance list. See Appendix A.
4. Estimate of quantity of substance released.
5. Time and duration of release.
6. Give the media (air, water, or ground) into which release occurred.
7. Report any known or anticipated acute or chronic health risks associated with the release. If detail is requested, this type of information is available on MSDS sheets.
8. Where appropriate, advice regarding medical attention (for exposure to outside parties) may also be necessary. This information, also available from MSDS sheets, is only required when an outside party is exposed as a result of a spill or leak.
9. Give precautions taken as a result of the release (include evacuation, if required). This information is not required if it is contained in the local emergency plan.

In the written report, items can be clarified. The written follow-up report is required as soon as practical. Contents of the written report should include the information listed above including any updated information on the following:

1. Actions taken to abate and contain the release.
2. Known or anticipated acute or chronic health risks.
3. Advice regarding medical attention, where appropriate.

Attachment 2 form
Baylor College of Medicine-Contingency Plan
Record of Spill Notification by Telephone (Form is Optional)

Check Contacts		Person Contacted
☐	Fire Department Emergency: 911 District #46 (713) 247-5000 Hazardous Materials (713) 928-6152	
☐	TCEQ-Air Program (888) 777-3186	
☐	TCEQ Emergency Response Unit (800) 832-8224 Alternate 24 Hour: (512) 239-2507	
☐	If TCEQ cannot be reached, may contact EPA Emergency Response in Dallas (214) 665-2222	
☐	NRC (National Response Center) (800) 424-8802	
☐	U.S. Coast Guard (if applicable) (713) 671-5104 or (800) 424-8802	
☐	City of Houston Police Department Emergency: 911	

Information Reported

1. Chemical released/spilled: _____
2. Source of release/spill: _____
3. Chemical on SARA list of Extremely Hazardous substances: Yes or No
4. Estimate of amount released/spill: _____
5. Time and date release started: _____
6. Time and date release stopped: _____
7. Media release/spill entered: ____ Air ____ Water ____ Ground

8. Steps being taken or proposed to contain or clean up released/spilled material:

_____

_____

9. Give known or anticipated acute or chronic health risks, if known:

_____

_____

10. Advise regarding medical attention (for outside parties):

_____

_____

11. Precautions given (evacuation):

_____

_____

12. For later follow-up, ask agency to contact Director of Environmental Safety. Give your name and telephone number also for immediate agency follow-up.

Send copies to: Director of Environmental Safety and Chemical Hygiene officer.

Attachment 3
Baylor College of Medicine-Contingency Plan

Environmental Release/Spill Reporting Form (Form is Optional)

Area of spill: _____
Equipment identification where spill occurred: _____
_____
Chemical/material spilled: _____
Quantity released: _____
Reasons why spill occurred: _____
Probable contamination to environment (soil, water, air, etc.): _____
Type of clean-up (use of absorbent and off-site disposal, use of vacuum truck and off-site disposal, recovery into original equipment, etc.): _____
_____

Date and time when spill was discovered: _____
Date and time when clean-up started: _____
Date and time when clean-up was completed: _____
Summary (provide a brief description of the sequence of events-spill discovery, containment, clean-up or recovery, disposal, etc. Note any environmental contamination):
_____
_____
_____

Name: _____
Signature: _____
Date: _____
Time: _____

Forward completed form to: Director of Environmental Safety, Office of Environmental Safety.

Appendix C

Baylor College of Medicine-Contingency Plan

Arrangements with Local Authorities

Appendix C

Arrangements With Local Authorities

Following is a list of local fire departments, police departments, hospitals, and as emergency response company which have been contacted:

Rick Flanagan, Acting Fire Chief
City of Houston Fire Department
1205 Dart Street
Houston, TX 77007

District Chief D.G. Snell
Hazardous Materials Chief
City of Houston Fire Department
7825 Harrisburg, Station 22
Houston, TX 77012

City of Houston Fire Department
District Chief #46 (Suppression Division)
A, B, C, and D Shifts
3902 Corder Street
Houston, TX 77021

Joe Breshears, Acting Police Chief
Chief of Police
City of Houston Police Department
61 Reisner Street
Houston, TX 77002

Ben Taub Hospital
Emergency Room
1504 Taub Loop
Houston, TX 77030

The Methodist Hospital
Emergency Room
6565 Fannin Street
Houston, TX 77030

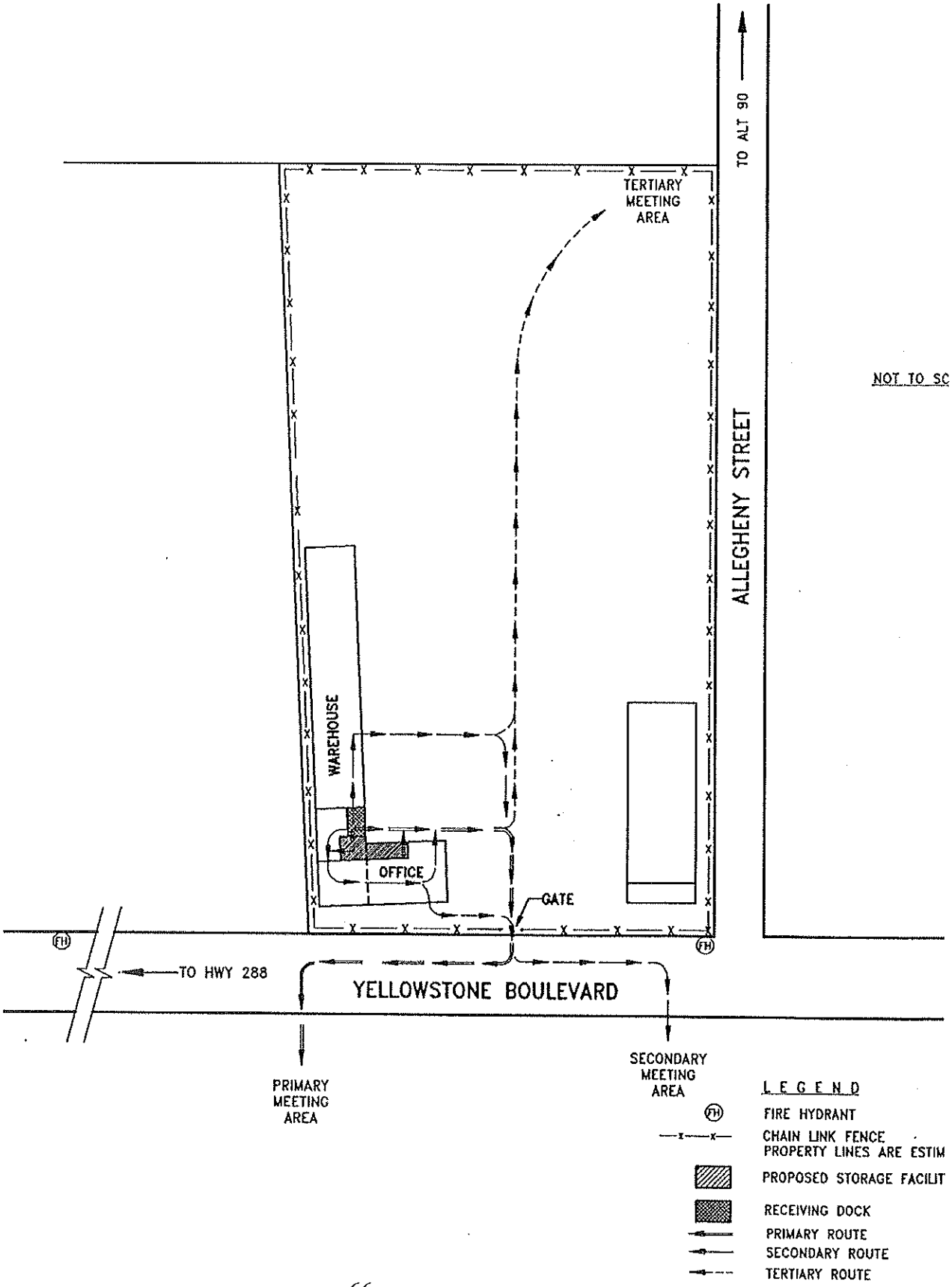
Garner Environmental
1717 West 13th Street
Deer Park, TX 77536

Appendix D

Baylor College of Medicine-Contingency Plan

Evacuation Plan

BAYLOR COLLEGE OF MEDICINE – CONTINGENCY PLAN
EVACUATION ROUTE MAP


TO ALT 90
TERTIARY MEETING AREA
NOT TO SC
ALLEGHENY STREET
WAREHOUSE
OFFICE
GATE
FH
TO HWY 288
YELLOWSTONE BOULEVARD
PRIMARY MEETING AREA
SECONDARY MEETING AREA
LEGEND
FIRE HYDRANT
CHAIN LINK FENCE
PROPERTY LINES ARE ESTIM
PROPOSED STORAGE FACILIT
RECEIVING DOCK
PRIMARY ROUTE
SECONDARY ROUTE
TERTIARY ROUTE

Health and Safety Plan
Baylor College of Medicine
Office of Environmental Safety
24-Hour Hazardous Waste Operations and TSDF Workers

I. Introduction

This document is the Health and Safety Program for the Baylor College of Medicine Treatment, Storage and Disposal Facility (TSDF) located at 3325 Yellowstone Blvd. in Houston, Texas and all current waste operations as listed below. This manual is intended to meet the requirements of the OSHA Hazardous Waste Operations and Emergency Response Standard for operations conducted under the Resource Conservation and Recovery Act (29 CFR 1910.120(p). The act requires employers to develop and implement a written safety and health plan designated to identify, evaluate, and control health and safety hazards for those employees involved in operations at treatment, storage and disposal facilities.

Current Waste Operations:

1. Yellowstone (Permitted Facility)
2. Other Waste Accumulation Areas (WAA's)

These requirements are achieved through the establishment and implementation of the following key elements that create the foundation of Baylor College of Medicine's Health and Safety Program:

- Management's commitment to safety;
- Establishing safety as a job performance issue;
- Issuing responsibilities under the Health and Safety Program; and
- Creating a process to hazard recognition, evaluation, and control that involves all employees in the continuing development of the Health and Safety Program.

In addition to the above elements, specific programs outlined below have been developed to meet The Occupational Health and Safety (OSHA) requirements and Baylor's goal to provide a safe and healthful work place.

- Organizational Structure
- Hazard Communication Program
- Medical Surveillance Program
- Personnel Training Program
- Personal Protective Equipment Program
- Decontamination Program
- New Technology Program
- Material Handling Program

II. Health and Safety Program Objectives/Key Personnel

The objective of Baylor College of Medicine's Health and Safety Program is to:

1. Train and educate employees in safe and efficient operating procedures;
2. Motivate, train, and educate management and employees to recognize, correct, and report hazards in the workplace;
3. Comply with established safety and health standards; and

4. Provide a workplace that is free from recognized hazards that have a potential of causing serious physical harm.
5. Train employees to be aware of terrorist's activities.

Baylor's Commitment to Safety

To achieve the above objectives, each member of Baylor's environmental safety team must enthusiastically support excellence and directly participate in the development and maintenance of the Health and Safety Program. By making health and safety a top priority and by working together each and every day to achieve our health and safety objectives, the program will be successful.
The following is a description of the general responsibilities under the Health and Safety Program for each member involved with Baylor's hazardous waste storage facility activities.

Hazardous Waste Manager

The Hazardous Waste Manager is responsible for the daily waste operations. It is critical for this individual to report any hazards or breeches in standard operating procedures the Supervisor of Chemical Safety.

The Hazardous Waste Manager is responsible to:

- Make certain that equipment and operations conducted under their jurisdiction are free from hazards or that adequate control measures are provided;
- Make certain that equipment is used and maintained properly;
- Keep abreast of accident and injury trends occurring and take proper corrective actions to reverse those trends;
- See to it that all safety rules, regulations, and procedures are enforced;
- Require that hazard control information is incorporated into training;
- Make certain that accidents are investigated promptly; and
- Observe all Health and Safety Program rules.

Health and Safety Officer

The safety officer provides and important link in the Health and Safety Program by tying together management's requirements and the needs of the employees.

The Supervisor, Chemical Safety has the responsibility to:

- See that each employee is provided with the training required to perform ones job efficiently and safely;
- Listen to and act upon the request of each employee in regard to health and safety;
- Develop accident prevention and loss control methods, procedures, and programs necessary to provide a safe and healthful work environment;
- Prohibit any operation that poses imminent danger;
- Ensure that health and safety programs are understood and followed;
- Identify and remedy any unsafe work practices or conditions;
- Ensure that hazard control is incorporated into all aspects of facility operations;
- Keep management informed of the effectiveness of hazard control measures;
- Monitor each operation and access the adequacy and effectiveness of hazard control measures;

- Observe all Health and Safety Program rules;
- Inspect protective equipment and supplies to ensure adequate supply, maintenance, availability, and usage;
- Maintain the integrity of the waste facilities and vehicles;
- Report any unusual activities by suspicious individuals to security.

Safety Specialist, Assistant, and Technicians.

Only with the support of every employee can the safety and Health Program succeed. It is the responsibility for each employee to:

- Observe health and safety rules and regulations and work according to standard procedures and practices;
- Report unsafe conditions or work practices to your supervisor;
- Practice good habits of hygiene and housekeeping;
- Participate in the development of safe work procedures and make recommendations for improvements;
- Report all injuries of hazardous exposures immediately;
- Maintain and use the appropriate safety equipment prescribed for each process;
- Encourage fellow workers to follow safety and health rules, regulations, and procedures;
- Report any defective equipment to your supervisor;
- Maintain and clean all waste facilities and vehicles;
- Keep exits and access to emergency equipment free from obstruction at all times;
- Report any unusual activities by suspicious individuals.

Housekeeping and Maintenance

Good housekeeping reduces accidents, improves moral, and increases efficiency. It also is a continuous process that involves both workers and custodial personnel. When housekeeping becomes a standard part of daily operations, fewer job related injuries will be incurred.
It is the responsibility of OES staff to:

- Assure that access to emergency equipment is unobstructed at all times;
- Make sure that walking and working surfaces are free from standing water, oils, debris, and other objects that may cause slips, trips, or falls;
- Ensure that mechanical equipment is working properly, and if not, make certain that it is replaced or repaired as soon as possible;
- Remove from service any defective equipment that may cause injury;
- Calibrate and certify all sensitive equipment annually;
- Ensure that personal hygiene facilities are kept clean and sanitized;
- Ensure that the facilities are clean and free of any contamination;
- Observe all company health and safety program rules.

III. Task/Safety and Health Risk Analysis

Baylor College of Medicine is a private Medical School that awards MD, Ph.D., and allied health degrees, and is one the nation's leading biomedical research institutions. The faculty, residents, and students provide medical services to six affiliated hospitals: , The Baylor Clinic, The Methodist Hospital, Texas Children's Hospital, Texas Institution for Rehabilitation for Research, St. Lukes Episcopal Hospital, Ben Taub General Hospital, and the Veterans Affairs Medical Center.

Baylor College of Medicines permitted hazardous waste storage facility is utilized for the storage, consolidation, and elementary neutralization of hazardous wastes from the above listed locations. This section is designed to identify the hazards associated with each job task and provide the recommended procedure to eliminate or control the hazard. These procedures are followed at all Waste Accumulation Areas (WAA) in the above locations.

The following sections provide job task descriptions, potential hazards, and required personnel protective equipment.

1. Task Description (Lab Packing)

Lab packs are consolidated on main campus as well as other generator sites throughout the BCM system and manifested into the permitted facility (TSDF). Lab packs are composed of 5, 30 and 55 gallon containers. The containers are open, closed and screw heads. The containers also could be metal, polyethylene or fiber. The waste is packaged according to RCRA and DOT requirements.

- **Personal Protective Equipment**
    - On a routine basis the employee will be required to wear a half- face or full- face respirator equipped with organic vapor and HEPA cartridges, protective gloves, lab coat, safety goggles, and steel toed boots. Depending on the hazardous materials the individual is working with will determine the type of personal protective equipment.

- **Packing and unpacking lab packs**

  - The persons packing or unpacking lab packs could potentially be exposed to a wide variety of flammable, toxic, reactive, and corrosive chemicals. There is also exposure to various mixtures of organic fuel blend chemicals that are received at the facility.

  - The following information listed below enables OES to determine the method of packing and handling hazardous materials. It is also a list of the types of chemicals that the employee may be exposed to. The list is not all inclusive, but does cover a majority of the chemicals handled in the process of packing and unpacking chemicals at the each facility.

- **Lab packing guidelines for BCM Chemist**
  Chemist are required to make a waste determination on the BCM waste in order to properly identify there means of disposal. By using ***generators knowledge***, the chemist can use the techniques below to help them determine how there waste will be classified according to its hazard class. If an unwanted substance is the sole active agredient, look a see it is ***listed***. If the compound is not the sole active agredient then research to see if it is ***characteristic*** of being a hazardous waste. For items not listed or characteristic of being hazardous, please check the ***non-hazardous waste list (NRT)*** for municipal waste disposal. If a chemical is not on the non-hazardous list or is characteristic of waste or listed, the item will be packed as a ***Control Non-Regulated material (CNR)***. For unknowns, the chemist can use the haz-scan kit or get a third party analysis.

Characteristic Waste

Ignitability

- A liquid, other than an aqueous solution containing less than 24 percent alcohol by volume, and has a flash point less than 60 degrees Centigrade (140 degrees Fahrenheit); or
- Not a liquid but is capable under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes, and when ignited burns vigorously an persistently that it creates a hazard; or
- An ignitable compressed gas as described in 49 CFR 173.300 and as determined by the test methods described in that regulation; or
- An oxidizer as defined in 49 CFR 173.151
- Examples are Ethanol, Sodium Nitrite and Hydrogen Gas.

Corrosivity

- An aqueous liquid that has a pH less than or equal to 2 or greater than or equal to 12.5; or
- A liquid that corrodes steel at a rate greater than 6.35mm per year at a temperature of 55 degrees Centigrade (130 degrees Fahrenheit) as specified in the appropriate test method.
- Examples are Hydrochloric Acid, Perchloric Acid and Ammonium Hydroxide.

Reactivity

- Any hazardous material that is normally unstable and readily undergoes violent change without detonating; or
- It reacts violently or forms potentially explosive mixtures with water; or Any cyanide or sulfide bearing waste that when exposed to pH between 2 and 12.5, can generate toxic gases, vapors or fumes in at quantity sufficient to present a danger to human health or the environment; or
- It is capable of detonation or explosive reaction if it is subjected to at strong initiating source or if heated under confinement; or
- It is readily capable of detonation or explosive decomposition or reaction as standard temperature or pressure; or
- An explosive as defined in 49 CFR 173. 51, 49 CFR 173.53, or 49 CFR173.88.
- Examples are Potassium Metal, Picric Acid and Ether (non-stabilized).

Toxicity

- The criteria for toxicity may be fulfilled it one or more of the following chemicals are present in at solution or compound at a concentration at or above the specified regulatory level: D-Codes

EPA Hazardous Waste Code	Contaminant	Regulatory Level (mg/L) (mg/kg)
D004	Arsenic	5
D005	Barium	100
D018	Benzene	0.5
D006	Cadmium	1
D019	Carbon Tetrachloride	0.5
D020	Chlordane	0.03
D021	Chlorobenzene	100
D022	Chloroform	6
D007	Chromium	5
D026	Cresol	200
D016	2,4, D	10
D027	1,4-Dichlorobenzene	7.5
D029	1,1-Dichloroethylene	0.7
D028	1,2-Dichloroethane	0.5
D030	2,4-Dinitrotoluene	0.13
D012	Endrin	0.02
D031	Heptachlor	0.008
D032	Hexachlorobenzene	0.13
D033	Hexachlorobutadienee	0.02
D034	Hexachloroethane	3

D008	Lead	5
D013	Lindane	0.4
D024	M-CRESOL	200
D009	Mercury	0.2
D014	Methoxychlor	10
D035	Methyl Ethyl Ketone	200
D036	Nitrobenzene	2
D023	o-CRESOL	200
D025	p-CRESOL	200
D037	Pentachlorophenol	100
D038	Pyridine	5
D010	Selenium	1
D011	Silver	5
D039	Tetrachloroethylene	0.7
D017	2,4,5-TP (Silvex)	1
D041	2,4,5-Trichlorophenol	400
D042	2,4,6-Trichlorophenol	2
D015	Toxaphene	0.5
D040	Trichloroethylene	0.5
D043	Vinyl Chloride	0.2

F-Listed Hazardous Waste

EPA Hazardous Waste Code	Contaminant Description
Generic:F001	The following spent halogenated solvents used in degreasing: Tetrachlorethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F002	The following spent halogenated solvents: Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro- 1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above

	halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F003	The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvent; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F004	The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F005	The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) Sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3)zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum

P-Listed Hazardous Waste

EPA Hazardous Waste Code	Contaminant
P092	Acetato-O-phenylmercury
P069	Acetone cyanohydrin
P002	Acetyl-2-thiourea, 1-
P003	Acrolein
P007	Agarin
P092	Agrosan GN 5
P070	Aldicarb
P048	Aldifen
P004	Aldrin
P092	Alginycin
P005	Allyl alcohol
P006	Aluminum phosphide
P037	ALVIT
P054	Aminoethylene
P007	Aminomethyl-3-isoxaolol, 5-
P008	Aminopyridine, 4-
P002	Aminothioxomethyl)-acetamide, N-(
P119	Ammonium metavanadate
P009	Ammonium picrate
P119	Ammonium vanadate
P092	ANTIMUCIN WDR
P073	ANTURAT
P088	AQUATHOL
P020	ARETIT
P099	Argentate(1-), bis(cyano-C), potassium
P010	Arsenic acid
P011	Arsenic pentoxide
P012	Arsenic trioxide
P001	Athrombin
P008	AVITROL
P054	Aziridene
P061	AZOFOS
P061	Azophos

P072	BANTU
P013	Barium cyanide
P020	BASENITE
P016	BCME
P014	Benzenethiol
P050	Benzoepin
P028	Benzyl chloride
P015	Berylium
P015	Beryllium dust
P016	Bis(chloromethyl)ether
P071	BLADAN-M
P017	Bromo-2-propanone, 1-
P017	Bromoacetone
P018	Brucine
P092	BUFEN
P020	Butaphene
P020	Butyl-4,6-dinitrophenol, 2-sec-,
P021	Calcium cyanide
P020	CALDON
P022	Carbon bisulfide
P095	Carbonic dichloride
P092	CERESAN
P092	CERESAN UNIVERSAL
P020	CHEMOX GENERAL
P020	CHEMOX P.E.
P090	CHEM-TOL
P024	Chloeoaniline, p-
P023	Chloroacetaldehyde
P024	Chlorobenzenamine, 4-
P028	Chloromethylbenzene
P026	Chlorophenylthiourea,1,o-
P027	Chloropropanenitrile,3-
P027	Chloropropionitrile, 3-
P028	Chlorotoluene, alpha
P029	Copper cyanide
P001	Coumadin
P001	Coumafen

P108	CRETOX
P030	Cyanides (soluble cyadide salts)
P031	Cyanogen
P033	Cyanogen chloride
P050	Cyclodan
P034	Cyclohexyl-4,6-dinitrophenol, 2-
P001	DETHMOR
P001	DETHNEL
P043	DFP
P016	Dichloromethyl ether
P036	Dichlorophenylarsine
P031	Dicyanogen
P037	DIELDREX
P037	Dieldrin
P041	Diethyl 4-nitrophenyl ester phosphoric acid, O,O-
P041	Diethyl phosphoric acid, O-p-nitrophenyl ester, O,O-
P038	Diethylarsine
P040	Diethyl-O-(2-pyrazinyl) phosphorothioate, O,O-
P041	Diethyl-p-nitrophenyl phosphate
P039	Diethyl-S-(2-ethylthioethyl) ester of phosphorothioic acid, O,O-
P042	Dihydroxy-alpha-(methylamino)-methyl,3,4-,benzyl alcohol
P043	Diisopropylfluorophosphate (DFP)
P044	DIMETANE
P060	Dimethanonaphthalene,1,4:5,8-,1,2,3,4,10,10,hexachloro-hexahydroendo,endo
P044	Dimethoate
P018	Dimethoxystrychnidin-10-one, 2,3-
P045	Dimethyl-1-(methylthio)-2-butanone-O-(methylaminocarbonyl) oxime, 3,3-
P046	Dimethylbenzeneethanamine, alpha, alpha-
P046	Dimethylphenethylamine, alpha, alpha-
P034	Dinitrocyclohexyphenol
P047	Dinitro-o-cresol, 4,6- and salts
P048	Dinitrophenol, 2,4-
P020	DINOSEB
P020	DINOSEBE

P111	Diphosphoric acid, tetraethyl ester
P039	Disulfoton
P049	Dithiobiuret
P020	DNBP
P108	DOLCO MOUSE CEREAL
P020	DOW GENERAL
P020	DOW GENERAL WEED KILLER
P020	DOW SELECTIVE WEED KILLER
P090	DOWICIDE G
P092	DYANACIDE
P001	EASTERN STATES DUOCIDE
P020	ELGETOL
P050	Endosulfan
P088	Endothall
P051	Endrin and metabolites
P042	Epinephrine
P031	Ethanedinitrile
P101	Ethyl cyanide
P054	Ethyleneimine
P097	Famphur
P001	FASCO FASCRAT POWDER
P091	FEMMA
P056	Fluorine
P057	Fluoroacetamide, 2-
P058	Fluoroacetic acid, sodium salt
P071	FOLODOL M
P071	FOLODOL-80
P071	FOSFERNO M 50
P058	FRATOL
P065	Fulminate of mercury
P065	Fulminic acid, mercury salt
P092	FUNGITOX OR
P057	FUSSOF
P092	GALLOTOX
P071	GEARPHOS
P020	GERUTOX
P059	Heptachlor

P059	Heptachloro-3a,4,7,7a-tetrahydro-4,7-Methano-1H-indene,1,4,5,6,7,8,8-
P060	Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4:5,8-endo,endodimethanonaphthalene
P050	Hexachloro-1,5,5a,6,9,9a-hexahydro-6,9-methano-2,4,3-benzodioxathiepin-3-oxide, 6,7,8,9,10,10-
P051	Hexachloro-1a,2,2a,6,6a,7,7a-octahydro-2,7:3,6-dimethanonaphth (2,3-b) oxirene (1aalpha, 2beta, 2aalpha, 3aalpha, 6beta, 6aalpha, 7beta,7aalpha),3,4,5,6,9,9 and metabolites
P037	Hexachloro-1a,2,2a,6,6a,7,7a-octahydro-2,7:3,6-dimethanonaphth (2,3-b) oxirene (1aalpha, 2beta, 2aalpha, 3beta, 6beta, 6aalpha, 7beta,7aalpha), 3,4,5,6,9,9-
P050	Hexachloro-cyclic-5-norbornene-2,3-dimethanol,1,4,5,6,7,7-, sulfite
P062	Hexaethyl tetraphosphate
P092	HOSTAQUICK
P092	HOSTAQUIK
P116	Hydrazinecarbothioamide
P068	Hydrazomethane
P063	Hydrocyanic acid
P063	Hydrogen cyanide
P096	Hydrogen phosphide
P042	Hydroxy-2-(methylamino)ethyl)-1,2-benzenediol, (R)-4-(1-
P069	Hydroxy-2-methylpropanenitrile, 2-
P001	Hydroxy-3-(3-oxo-1-phenyl-butyl)-2H-1-benzopyran-2-one and salts greater than .3%
P037	ILLOXOL
P025	INDOCI(Registered)
P025	Indomethacin
P050	INSECTOPHENE
P064	Isocyanatomethane
P064	Isocyanic acid, methyl ester
P060	Isodrin
P020	KILOSEB
P050	KOP-THIODAN
P001	KUMADER

P108	KWIK-KIL
P092	KWIKSAN
P001	KYPFARIN
P092	LEYTOSAN
P092	LIQUIPHENE
P050	MALIK
P001	MAREVAN
P001	MAR-FRIN
P001	MARTIN'D MAR-FRIN
P001	MAVERAN
P005	MEGATOX
P065	Mercury fulminate
P092	MERSOLITE
P071	METACID 50
P071	METAFOS
P071	METAPHOR
P071	METAPHOS
P092	METASOL 30
P066	Methomyl
P068	Methyl hydrazine
P064	Methyl isocyanate
P071	Methyl parathion liquid
P071	Methyl parathion solid
P070	Methyl-2-(methylthio) propionaldehyde-o-(methylcarbonyl)oxime, 2-
P075	Methyl-2-pyrrolidinyl)-pyridine, 3-(1- and salts
P047	Methyl-4,6-dinitrophenol, 2- and salts
P066	Methylamino) carbonyl) oxy]-ethanimidothioic acid, methyl ester, N-[((-
P067	Methylaziridine, 2-
P071	METHYL-E 605
P069	Methyllactonitrile, 2-
P082	Methyl-N-nitroso-methanamine, N-
P084	Methyl-N-notrosovinylamine, N-
P020	Methylpropyl)-4,6-dinitrophenol, 2-(1-
P071	METRON
P108	MOLE DEATH
P108	MOUSE TOX

P108	MOUSE-NOTS
P108	MOUSE-RID
P007	MUSCIMOL
P072	Naphthalenylthiourea, 1-
P072	Naphthylthiourea, alpha- or 1-Naphthyl-2-thiourea
P073	Nickel carbonyl
P074	Nickel cyanide
P075	Nicotine and salts
P076	Nitric oxide
P077	Nitroaniline, p-
P077	Nitrobenzenamine, 4-
P078	Nitrogen dioxide
P076	Nitrogen oxide
P081	Nitroglycerine
P082	Nitrosodimethylamine, N-
P084	Nitrosomethylvinylamine, N-
P092	NYLMERATE
P037	OCTALOX
P085	Octamethyldiphosphoramide
P085	Octamethylpyrophosphoramide
P092	OCTAN
P085	OMPA
P085	OMPACIDE
P085	OMPAX
P087	Osmium tetroxide
P088	Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid, 7-
P016	Oxybis(chloromethane)
P001	PANIVARFIN
P037	PANORAM D-31
P007	PANTHERINE
P001	PANWARFIN
P089	Parathion
P090	PCP
P071	PENNCAP-M
P048	PENOXYL CARBON N
P090	PENTA KILL
P090	Pentachlorophenate

P090	PENTASOL
P090	PENWAR
P090	PERMAGUARD
P090	PERMATOX
P090	PERMICIDE
P090	PERMITE
P090	PERTOX
P085	PESTOX III
P092	PHENMAD
P020	PHENOTAN
P014	Phenyl mercaptan
P036	Phenylarsonous dichloride
P092	Phenylmercuric acetate
P092	Phenylmercury acetate
P093	Phenylthiourea, N-
P008	PHILIPS 1861
P092	PHIX
P094	Phorate
P095	Phosgene
P096	Phosphine
P094	Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester
P039	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester
P044	Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester
P043	Phosphorofluoridic acid, bis(1-methylethyl)ester
P097	Phosphorothioic acid, O,[4-[(dimethylamino) sulfonyl]phenyl] O,O-dimethyl ester
P089	Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester
P040	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester
P071	Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester
P108	PIED PIPER MOUSE SEED
P098	Potassium cyanide
P099	Potassium silver cyanide
P020	PREMERGE

P101	Propanenitrile
P081	propanetriol, Trinitrate, 1,2,3-
P102	Propargyl aclohol
P005	Propen-1-ol, 2-
P003	Propenal, 2-
P101	Propionitrile
P067	Propylenimine, 1,2-
P102	Propyn-1-ol, 2-
P001	PROTHROMADIN
P008	Pyridinamine, 4-
P092	QUICKSAM
P037	QUINTOX
P001	RAT AND MICE BAIT
P001	RAT-A-WAY
P001	RAT-B-GON
P001	RAT-GUARD
P001	RAT-KILL
P001	RAT-MIX
P001	RAT-O-CIDE Number 2
P001	RAT-OLA
P001	RATOREX
P001	RATS-NO-MORE
P001	RAT-TROL
P001	RATTUNAL
P001	RO-DETH
P108	RO-DEX
P001	ROSEX
P001	ROUGH & READY MOUSE MIX
P108	SANASEED
P090	SANTOBRITE
P090	SANTOPHEN
P090	SANTOPHEN 20
P085	SCHRADAN
P103	Selenourea
P104	Silver cyanide
P105	SMITE
P105	Sodium azide

P001	Sodium coumadin
P106	Sodium cyanide
P058	Sodium fluoroacetate
P001	SODIUM WARFARIN
P001	SOLFARIN
P048	SOLFOBLACK BB
P048	SOLFOBLACK SB
P020	SPARIC
P092	SPOR-KIL
P001	SPRAY-TROL BRAND RODEN-TROL
P020	SPURGE
P108	Strychnidin-10-one and salts
P108	Strychnine and salts
P020	SUBTEX
P115	Sulfuric acid, dithallium(1+) salt
P085	SYSTAM
P092	TAG FUNGICIDE
P071	TEKWAISA
P070	TEMIC
P070	TEMIK
P090	TERM-I-TROL
P109	Terraethyldithiopyrophosphate
P111	Tertaethyl pyrophosphate
P110	Tertaethylplumbane
P110	Tetraethyl lead
P109	Tetraethyldithiopyrophosphate
P110	Tetraethylplumbane
P112	Tetranitromethane
P062	Tetraphosphoric acid, hexaethyl ester
P048	TETROSULPHUR PBR
P048	TETRSULPHUR BLACK PB
P113	Thallic acid
P113	Thallium oxide T1203
P114	Thallium selenite
P115	Thallium sulfate
P092	THIFOR
P045	Thilfanox

P092	THIMUL
P050	THIODAN
P109	Thiodiphosphoric acid, tetraethyl ester
P045	Thiofanox
P050	THIOFOR
P049	Thioimidodicarbonic diamide
P050	THIOMUL
P050	THIONEX
P071	THIOPHENIT
P014	Thiophenol
P116	Thiosemicarbazide
P050	Thiosulfan tionel
P090	THOMPSON'S WOOD FIX
P050	TIOVEL
P123	Toxaphene
P118	Trichloromethanethiol
P081	Trinitrate 1,2,3-propanetriol
P009	Trinitrophenol ammonium salt, 2,4,6-
P001	TWIN LIGHT RAT AWAY
P002	USAF EK-4890
P069	USAF RH-8
P119	Vanadic acid ammonium salt
P120	Vanadium oxide
P120	Vanadium pentoxide
P071	VOFATOX
P120	WANADU
P001	WARCOUMIN
P001	Warfarin and salts GREATER THAN .3%
P001	WARFARIN SODIUM
P001	WARFICIDE
P072	WOFOTOX
P057	YANOCK
P058	YASOKNOCK
P092	ZIARNIK
P121	Zinc cyanide
P122	Zinc phosphide GREATER THAN 10%
P001	ZOOCOUMARIN

U-Listed Hazardous Waste

EPA Hazardous Waste Code	Contaminant
U005	AAF
U001	Acetaldehyde
U112	Acetic acid, ethyl ester
U144	Acetic acid, lead(2+) salt
U214	Acetic acid, thallium(1+) salt
U002	Acetone
U003	Acetonitrile
U004	Acetophenone
U006	Acetyl chloride
U059	Acetyl-10-[(3-amino-2,3,6-trideoxy)-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10- tetrahydro-6,8,11-trihydroxy-1-methoxy-5,12-naphthacenedione, (8S-cis)-8-
U005	Acetylaminofluorene, 2-
U209	Acetylene tetrachloride
U228	Acetylene trichloride
U007	Acrylamide
U008	Acrylic acid
U009	Acrylonitrile
U226	AEROTHENE IT
U167	Alphanaphthylamine
U010	Amino-1,1a,2,8,8a,8b-hexahydro-8-(hydroxymethyl)-8-methoxy-5-methylcarbamate azirino (2',3':3,4) pyrrolo (1,2-a) indole-4,7-dione (ester), 6-
U328	Amino-1-methylbenzene,2-
U353	Amino-1-methylbenzene,4-
U011	Amino-5-(p-acetamidophenyl) 1H-1,2,4-triazole hydrate, 3-
U010	Amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-azirino (2',3':3,4) pyrrolo (1,2-a) indole-4,7-dione, [1aS-(1aalpha,8beta,8aalpha,8baalpha)]-6-
U011	Amitrole
U012	Aniline
U221	AR-Methylbenzenediamine
U014	Auramine
U015	Azaserine

U015	Azirino[2',3':3,4]pyrrolo[1,2-a]indole-4,7-dione,6-amino-8-[[(aminocarbonly)oxy]methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-,[1aS-(1aalpha,8beta,8aalpha,8balpha)]-
U018	Benz[a]anthrancene
U016	Benz[c]acridine
U017	Benzal chloride
U012	Benzenamine
U019	Benzene
U028	Benzenedicarboxylic acid, 1,2-, Bis(2-ethylhexyl) ester
U069	Benzenedicarboxylic acid, 1,2-, dibutyl ester
U088	Benzenedicarboxylic acid, 1,2-, diethyl ester
U102	Benzenedicarboxylic acid, 1,2-, dimethyl ester
U107	Benzenedicarboxylic acid, 1,2-, dioctyl ester
U201	Benzenediol, 1,3-
U020	Benzenesulfonic acid chloride
U020	Benzenesulfonyl chloride
U021	Benzidine
U202	Benzisothioazolin-3-one,1,1-dioxide, 1,2-
U018	Benzo[a]anthracene
U022	Benzo[a]pyrene
U064	Benzo[rst]pentaphene
U197	Benzoquinone, p-
U023	Benzotrichloride
U168	Betanaphthylamine
U085	Bioxirane, 2,2'-
U021	Biphenyl-4,4'-diamine, 1,1'-
U062	Bis(1-methylethyl)-carbamothioic acid, S-(2,3-dichloro-v 2-propenyl) ester
U024	Bis(2-chloroethoxy)methane
U025	Bis(2-chloroethyl) ether
U026	Bis(2-chloroethyl)-2-naphthalenamine, N,N'-
U026	Bis(2-chloroethyl)-2-naphthylamine, N,N-
U237	Bis(2-chloroethyl)amino]-2,4-(1H,3H)-pyrimidinedione, 5-
U035	Bis(2-chloroethyl)amino]-benzenebutanoic acid, 4-
U150	Bis(2-chloroethyl)amino]-L-phenylalanine, 4-
U058	Bis(2-chloroethyl)tetrahydro-2H-1,3,2-oxazaphosphorin-2-amine, 2-oxide, N,N'-
U027	Bis(2-chloroisopropyl) ether

U028	Bis(2-ethylhexyl)phthalate
U146	Bis(acetato-O)tetrahydroxytri-lead
U030	Bromo-4-phenoxybenzene, 1-
U225	Bromoform
U029	Bromomethane
U030	Bromophenyl phenyl ether, 4-
U031	Butanol, 1-
U160	Butanone peroxide, 2-
U159	Butanone, 2-
U053	Butenal,2-
U031	Butyl alcohol, N-
U172	Butyl-N-nitroso-1-butanamine, N-
U136	Cacodylic acid
U032	Calcium chromate
U238	Carbamic acid, ethyl ester
U188	Carbolic acid
U033	Carbon oxyfluoride
U211	Carbon tetrachloride
U215	Carbonic acid, dithallium (1+) salt
U033	Carbonic difluoride
U014	Carbonimidoylbis[N,N-dimethylbenzenamine], 4,4'-
U156	Carbonochloridic acid, methyl ester
U033	Carbonyl fluoride
U034	Chloral
U035	Chlorambucil
U036	Chlordane
U026	Chlornaphazin
U041	Chloro-2,3-epoxypropane,1-
U049	Chloro-2-methylbenzenamine hydrochloride, 4-
U039	Chloro-3-methylphenol, 4-,
U038	Chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-benzeneacetic acid, 4-, ethyl ester
U037	Chlorobenzene
U038	Chlorobenzilate
U245	Chlorobenzoyl)-5-methoxy-2-methylindole-3-acetic acid, 1-(p-
U043	Chloroethene
U226	CHLOROETHENE NU
U042	Chloroethoxyethene,2- or beta-chloronaphthalene

U042	Chloroethyl vinyl ether, 2-
U044	Chloroform
U039	Chloro-m-cresol, p-
U045	Chloromethane
U046	Chloromethoxymethane
U046	Chloromethyl methyl ether
U041	Chloromethyloxirane
U047	Chloronaphthalene, 2- or
U049	Chloro-o-toluidine hydrochloride, 4-
U048	Chlorophenol, 2- or o-Chlorophenol
U032	Chromic acid, calcium salt
U050	Chrysene
U051	Creosote
U052	Cresol (cresylic acid)
U052	Cresylic acid
U053	Crotonaldehyde
U055	Cumene
U246	Cyanogen bromide
U003	Cyanomethane
U197	Cyclohexadiene-1,4-dione, 2,5-
U056	Cyclohexane
U057	Cyclohexanone
U058	Cyclophosphamide
U240	D, 2,4-, salts & esters
U059	Daunomycin
U001	D-CON
U060	DDD,4,4'-
U061	DDT,4,4'-
U142	Decachlorooctachydro-1,3,4-metheno-2H-cyclobuta [cd]pentalen-2-one, 1,1a,3,3a,4,5,5a,5b,6-
U206	Deoxy-2-(3-methyl-3-nitrosoureido)-D-glucopyranose, 2-
U206	Deoxy-2-[[(methylnitrosoamino)carbonyl]amino]-D-glucose, 2-
U062	Diallate
U063	Dibenz[a,h]anthracene or Dibenzo[a,h]anthracene
U064	Dibenzo[a,i]pyrene
U235	Dibromo-1-Propanol phosphate(3:1), 2,3-
U066	Dibromo-3-chloropropane, 1,2-
U065	Dibromochloromethane

U067	Dibromoethane 1,2-
U068	Dibromomethane
U069	Dibutyl phthalate
U017	Dichlormethylbenzene
U073	Dichloro-[1,1'-biphenyl]-4,4'-diamine, 3,3'-
U084	Dichloro-1-Propene, 1,3-
U074	Dichloro-2-butene,1,4-
U073	Dichloro-4,4'-diaminobiphenyl, 3,3'-
U070	Dichlorobenzene, 1,2- or o-Dichlorobenzene
U071	Dichlorobenzene, 1,3- or m-Dichlorobenzene
U072	Dichlorobenzene, 1,4- or p-Dichlorobenzene
U073	Dichlorobenzidine, 3,3'-
U075	Dichlorodifluoromethane, R12
U076	Dichloroethane, 1,1-
U077	Dichloroethane, 1,2-
U078	Dichloroethene, 1,1-
U079	Dichloroethene, 1,2-
U025	Dichloroethyl ether
U078	Dichloroethylene, 1,1-
U079	Dichloroethylene, 1,2-
U060	Dichloroethylidenebis[4-chloro]-benzene, 1,1'-
U027	Dichloroisopropyl ether
U080	Dichloromethane
U024	Dichloromethoxy ethane
U192	Dichloro-N-(1,1-dimethyl-2-propynyl)-benzamide, 3,5-
U081	Dichlorophenol, 2,4-
U082	Dichlorophenol, 2,6-
U240	Dichlorophenoxy-acetic acid, 2,4- salts & esters
U083	Dichloropropane, 1,2-
U084	Dichloropropene 1,3-
U085	Diepoxybutane 1,2:3,4-
U088	Diethyl phthalate
U089	Diethyl-1,2-ethenediyl)bisphenol, 4,4'-(1,2-
U108	Diethyleneoxide 1,4-
U028	Diethylhexyl phthalate
U086	Diethylhydrazine 1,2- or Diethylhydrazine, N,N'-
U087	Diethyl-S-methyl ester of phosphorodithioic acid, O,O-

U089	Diethylstilbesterol
U148	Dihydro-3,6-Pyridazinedione, 1,2-
U157	Dihydro-3-methylbenz[j]aceanthryene, 1,2-
U164	Dihydro-6-methyl-2-thioxo-4(1H)-Pyrimidinone, 2,3-
U090	Dihydrosafrole
U223	Diisocyanatomethylbenzene, 1,3-
U091	Dimethoxy-[1,1'-biphenyl]-4,4'-diamine, 3,3'-
U200	Dimethoxy-18-[93,4,5-trimethoxybenzoyl)oxy]-yohimban-16-carboxylic acid methyl ester, (3beta,16beta, 17alpha, 18beta, 20alpha) 11,17-
U091	Dimethoxybenzidine 3,3'-
U236	Dimethyl [1,1'-diphenyl]-4,4'-diyl) bis (azo) bis [5-amino-4-hydroxy] 2,7-naphthalenedisulfonic acid tetrasodium salt, 3,3'-[3,3'-tetrasodium salt, 3,3'-[(3,3'-
U102	Dimethyl phthalate
U103	Dimethyl sulfate
U095	Dimethyl-[1,1'-biphenyl]-4,4'-diamine, 3,3'-
U236	Dimethyl[1,1'-biphenyl]-4,4'--diyl)bis(azo)bis [5-amino-hydroxy]-2,7-naphthalenedisulfonic acid
U093	Dimethyl-4-(phenylazo)-benzenamine, N,N-
U092	Dimethylamine
U093	Dimethylaminoazobenzene
U136	Dimethylarsinic acid
U094	Dimethylbenz[a]anthracene 7,12-
U239	Dimethylbenzene
U095	Dimethylbenzidine 3,3'-
U096	Dimethylbenzylhydroperoxide alpha, alpha-
U097	Dimethylcarbamic chloride
U097	Dimethylcarbamoyl chloride
U098	Dimethylhydrazine 1,1-
U099	Dimethylhydrazine 1,2-
U155	Dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-1,2-ethanediamine, N,N-
U101	Dimethylphenol, 2,4-
U069	Di-n-butyl phthalate
U105	Dinitrotoluene 2,4-
U106	Dinitrotoluene 2,6
U107	Di-n-octyl phthalate
U111	Di-n-propylnitrosamine
U108	Dioxane 1,4-

U202	Dioxide 1,2-benzisothiazol-3(2H)-one, 1,1- and salts
U109	Diphenylhydrazine, 1,2-
U110	Dipropylamine
U114	EBDC
U041	Epichlorohydrin
U001	Ethanal
U114	Ethanediylbiscarbamodithioic acid, 1,2-, salts & esters
U218	Ethanethioamide
U359	Ethoxyethanol 2-
U187	Ethoxyphenyl)-acetamide, N-(4-
U112	Ethyl acetate
U113	Ethyl acrylate
U238	Ethyl carbamate (urethane)
U117	Ethyl ether, see Diethyl ether
U067	Ethylene dibromide
U077	Ethylene dichloride
U359	Ethylene glycol monoethyl ether
U115	Ethylene oxide
U114	Ethylenebisdithiocarbamic acid, salts& esters
U116	Ethylenethiourea
U076	Ethylidene dichloride
U118	Ethylmethacrylate
U119	Ethylmethanesulfonate
U003	Ethylnitrile
U174	Ethyl-N-nitroso-ethanamine
U176	Ethyl-N-nitrosourea, N-
U235	FIREMASTER T23P
U005	Flouren-2-YL-acetamide, N-9H-
U121	Flourotrichloromethane
U120	Fluoranthene
U122	Formaldehyde
U123	Formic acid
U124	Furan
U125	Furancarboxaldehyde, 2-
U147	Furandione, 2,5-
U125	Furfural
U124	Furfuran

U126	Glycidylaldehyde
U129	Hexachloro-(1alpha,2alpha,3alpha,4alpha,5alpha,6beta)-cyclohexane, 1,2,3,4,5,6-
U128	Hexachloro-1,3-butadiene, 1,1,2,3,4,4-
U130	Hexachloro-1,3-cyclopentadiene, 1,2,3,4,5,5-
U243	Hexachloro-1-Propene, 1,1,2,3,3,3-
U127	Hexachlorobenzene
U128	Hexachlorobutadiene
U130	Hexachlorocyclopentadiene
U131	Hexachloroethane
U132	Hexachlorophene
U243	Hexachloropropene
U056	Hexahydrobenzene
U133	Hydrazine
U134	Hydrofluoric acid
U134	Hydrogen fluoride
U135	Hydrogen sulfide
U248	Hydroxy-3-(3-oxo-1-phenyl-butyl)-2H-1-1benzopyran-2-one, 4- LESS THAN 0.3%
U188	Hydroxybenzene
U136	Hydroxydimethyl arsine oxide
U116	Imidazolidinethione 2-
U014	Imidocarbonyl)bis(N,N-dimethyl)aniline, 4,4'-
U137	Indeno[1,2,3-cd]pyrene
U138	Iodomethane
U190	Isobenzofurandione 1,3-
U140	Isobutyl alcohol, or Isobutanol
U141	Isosafrole
U142	Kepone
U143	Lasiocarpine
U144	Lead acetate
U144	Lead acetic acid and salts
U145	Lead phosphate
U146	Lead subacetate
U129	Lindane
U147	Maleic anhydride
U148	Maleic hydrazide
U149	Malononitrile

U150	Melphalan
U151	Mercury
U152	Methacrylonitrile
U119	Methanesulfonic acid, ethyl ester
U153	Methanethiol
U154	Methanol, or methyl alcohol
U155	Methapyrilene
U247	Methoxychlor
U154	Methyl alcohol
U029	Methyl bromide
U045	Methyl chloride
U156	Methyl chlorocarbonate
U226	Methyl chloroform
U156	Methyl chloroformate
U159	Methyl ethyl ketone (MEK)
U160	Methyl ethyl ketone peroxide
U138	Methyl iodide
U161	Methyl isobutyl ketone
U162	Methyl methacrylate monomer
U106	Methyl-1,3-dinitrobenzene, 2-
U096	Methyl-1-phenylethylhydroperoxide, 1
U140	Methyl-1-propanol, 2-
U105	Methyl-2,4-dinirtobenzene, 1-
U143	Methyl-2-butenoic acid 7-[[2,3-dihydroxy-2(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl] 2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester, 2-
U161	Methyl-2-pentanone, 4-
U152	Methyl-2-Propenenitrile, 2-
U118	Methyl-2-Propenoic acid,2-, ethyl ester
U162	Methyl-2-Propenoic acid,2-, methyl ester
U181	Methyl-5-nitrobenzenenamine, 2-
U222	Methylbenzenamine Hydrochloride, 2-
U328	Methylbenzenamine, 2-
U353	Methylbenzenamine, 4-
U220	Methylbenzene
U186	Methylbutadiene
U157	Methylchlolanthrene
U068	Methylene bromide
U080	Methylene chloride,see Dichloromethane

U158	Methylenebis(2-chloroaniline) 4,4'
U024	Methylenebis(oxy)]bis[2-chloro]ethane 1,1'-
U158	Methylenebis[2-Chloro]benzeneamine, 4,4'-
U132	Methylenebis[3,4,6-trichloro]phenol, 2,2'-
U055	Methylethylbenzene, 1-
U092	Methylmethanamine, N-
U178	Methylnitrosocarbamic acid, ethyl ester
U163	Methyl-N'-nitro-N-nitrosoguanidine, N-
U177	Methyl-N-nitrosourea, N-
U161	Methylpentanol, 4-
U052	Methylphenol
U191	Methylpyridine, 2-
U164	Methylthiouracil
U010	Mitomycin C
U163	MNNG
U167	Naphthalenamine, 1-
U168	Naphthalenamine, 2-
U165	Naphthalene
U166	Naphthalenedione, 1,4-
U166	Naphthoquinone, 1,4-
U217	Nitric acid, thallium(1+)salt
U169	Nitrobenzene
U169	Nitrobenzol
U181	Nitro-o-toluidine, 5-
U170	Nitrophenol, 4- or Nitrophenol, p-
U171	Nitropropane, 2-
U173	Nitrosodiethanolamine, N-
U174	Nitrosodiethylamine, N-
U172	Nitrosodi-n-butylamine, N-
U173	Nitrosoimino-bisethanol, 2,2'-
U176	Nitroso-N-ethylurea, N-
U177	Nitroso-N-methylurea, N-
U178	Nitroso-N-methylurethane, N-
U111	Nitroso-Npropylpropanamine, 1-N-
U179	Nitrosopiperidine, 1- or Nitrosopiperidine, N-
U180	Nitrosopyrrolidine, 1- or Nitrosopyrrolidine, N-
U087	O,O-Diethyl S-methyl dithiophosphate

U036	Octachloro-2,3,3a,4,7,7a-hexahydro-4,7methano-1H-indene1,2,4,5,6,7,8,8-
U193	Oxathiolane, 2,2-dioxide, 1,2-
U115	Oxirane
U126	Oxiranecarboxyaldehyde
U025	Oxybis[2-chloro]ethane 1,1'-
U027	Oxybis[2-chloro]propane, 2,2'-
U117	Oxybisethane 1,1'-
U182	Paraldehyde
U185	PCNB
U183	Pentachlorobenzene
U184	Pentachloroethane
U185	Pentachloronitrobenzene (PCNB)
U242	Pentachlorophenol
U186	Pentadiene, 1,3-
U210	PERC
U210	Perchlorethylene
U187	Phenacetin
U188	Phenol
U004	Phenylethanone 1-
U145	Phosphoric acid, lead(2+) salt (2:3)
U087	Phosphorodithioic acid, O,O-diethyl S-methyl ester
U189	Phosphorus pentasulfide
U189	Phosphorus sulfide
U190	Phthalic anhydride
U191	Picoline,2-
U192	Pronamide
U194	Propanamine, 1-
U193	Propane sultone, 1,3-
U149	Propanedinitrile
U002	Propanone,2-
U007	Propenamide,2-
U009	Propenenitrile,2-
U008	Propenoic acid,2-
U113	Propenoic acid,2-, ethyl ester
U141	Propenyl)-1,3-benzoioxole, 5-(1-
U203	Propenyl)-1,3-benzoioxole, 5-(2-
U090	Propyl-1,3-benzodioxole, 5-

U194	Propylamine,n-
U083	Propylene dichloride
U110	Propylpropanamine, 1-N-
U196	Pyridine
U200	Reserpine
U201	Resorcinol
U202	Saccharin, & salts
U203	Safrole
U204	Selenious acid
U204	Selenium dioxide
U205	Selenium disulfide
U205	Selenium sulfide
U015	Serine, L-, diazoacetate(ester)
U206	Streptozotocin
U189	Sulfur phosphide
U103	Sulfuric acid, dimethyl ester
U207	Tertachlorobenzene, 1,2,4,5-
U209	Tetrachloroethane 1,1,2,2-
U208	Tetrachloroethane, 1,1,1,2-
U210	Tetrachloroethene
U210	Tetrachloroethylene
U211	Tetrachloromethane
U213	Tetrahydrofuran
U244	Tetramethylthioperoxydicarbonicdiamide
U214	Thallium (I) acetate
U215	Thallium (I) carbonate
U216	Thallium (I) chloride
U217	Thallium (I) nitrate
U214	Thallium acetic acid and salts
U216	Thallium chloride
U217	Thallium nitrate
U218	Thioacetamide
U153	Thiomethanol
U244	Thioperoxydicarbonic diamide [(H2N)C(S)2S2, tetramethyl-
U219	Thiourea
U244	Thiram
U220	Toluene

U223	Toluene diisocyanate(R,T)
U221	Toluenediamine
U328	Toluidine, o-
U222	Toluidine, o-, hydrochloride
U353	Toluidine, p-
U011	Triazol-3-amine, 1-H,1,2,4-
U225	Tribromomethane
U034	Trichloroacetaldehyde
U226	Trichloroethane, 1,1,1-
U227	Trichloroethane, 1,1,2-
U228	Trichloroethene
U061	Trichloroethylidenebis[4-chloro]-benzene, 1,1'-
U247	Trichloroethylidenebis[4-methoxy]-benzene, 1,1'-
U121	Trichlorofluoromethane
U044	Trichloromethane
U203	Trichloromethylbenzene
U121	Trichloromonofluoromethane
U023	Trichlorotoluene, alapha, alpha, alpha-
U228	Trichoroethylene
U228	TRI-CLENE
U182	Trimethyl-1,3,5-trioxane, 2,4,6-
U234	Trinitrobenzene, 1,3,5-
U235	Tris(2,3-dibromopropyl) phosphate
U236	Trypan blue
U237	Uracil mustard
U238	Urethane
U043	Vinyl chloride
U078	Vinylidene chloride
U248	Warfarin, & salts LESS THAN 0.3%
U239	Xylene m-; o-; p-
U200	Yohimban-16-carboxylic acid, 11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoly)oxy]-, methyl ester, (3beta,16beta,17alpha, 18beta, 20alpha)-
U249	Zinc phosphide LESS THAN 10%

MT01 Polychlorinated biphenyls or PCB (50 to 500ppm)

2. Task Description (Fuel Blending)

Flammable Toxic Waste is consolidated on main campus as well as other generator sites throughout the BCM system and manifested into the permitted facility (TSDF). Fuel Blended wastes is bulked in 55 gallon closed head metal containers. Occasionally 55-gallon polyethylene closed top containers are used to bulk waste. Always use copper grounding rods that are connected to grounding cables. The waste is packaged according to RCRA and DOT requirements.

The fuel blending process consists of consolidating halogenated and non-halogenated chemical solvents into 55- gallon tight head drums. The consolidation process takes place designated area with two vent snorkels that pull vapors away from the employees breathing zone that then pass through a carbon filtration unit. Some facilities may not have a snorkel system available and appropriate PPE will prevent exposure from vapors.

Another activity of the fuel blender is to manipulate or move drums. While automated or equipment assisted manipulation is the method most commonly used (i.e. forklift, drum dollies, etc.), the employee may at times be required to manually place drums on or remove drums from pallets. Drums typically weigh 400 to 500 pounds.

- **Personal Protective Equipment**

  On a routine basis the employee will be required to wear a half- face or full- face respirator equipped with organic vapor and HEPA cartridges, protective gloves, nitrile lab coat, safety goggles, and steel toed boots. The preferred types of respiratory protection includes Air Purifying Respirators (APR's) or Supplied Air Lines.

  - **Required PPE:**

    - Respiratory protection;
    - Eye and face protection;
    - Gloves-inner and outer (Nitrile or Neoprene);
    - Nitrile lab apron;
    - Tape;
    - Steel toed boots.

<u>Fuel Blending</u>

- The person(s) fuel blending could potentially be exposed to a wide variety of flammable and poisonous chemicals due to the fact that various mixtures of fuel blended chemicals are received by the facility. All fuel blended waste will be blended at their respectable generator sites and only stored at the permitted faculty (TSDF).

- The fuel blending process consists of consolidating halogenated and non-halogenated chemical solvents into 55- gallon tight head drums. The consolidation process takes place in a walk in fume hood that pulls vapors away from the employees breathing zone that then pass through a carbon filtration unit.

- Another activity of the fuel blender is to manipulate or move drums. While automated or equipment assisted manipulation is the method most commonly used (i.e. forklift, drum dollies,

etc.), the employee may at times be required to manually place drums on or remove drums from pallets. Drums typically weigh 400 to 500 pounds.

- The following table is a list of chemicals that the employee may be exposed to. The list is not all inclusive, but does cover a majority of the chemicals to be fuel blended at the facility.

Acetone	Formalin	Iodine
Acetonitrile	Pyridine	Methanol
Acrylamide	Dimethylformamide	Mercaptoethanol
Benzene	Xylene	Ninhydrin
Butonal	Formaldehyde	Osmium Tetroxide
Chloroform	Ether	Phenol
Dichloromethane	Glyclerol	Toluene
Ethanol	Hexane	Trizol

3. Task Description (Compacting Radioactive Solid Waste)

Compacting consists of removing bags of solid paper an plastic waste contaminated with radioactive isotopes from transpacks and compacting them in a self contained compacting unit. The manipulation of waste is done solely in a roped off area with "Radioactive Materials" posted around the area. After compacting is complete, the employee removes personal protective clothing within the confined area and uses a Geiger Counter to inspect for any contamination on his/her body and clothing.

Another activity of the compactor is to manipulate drums. While automated or equipment assisted manipulation is the method most commonly used (i.e., forklifts, drum dollies, etc.) the employee may at times be required to manually place the drums on or remove drums from pallets. Drums typically weigh 100 to 200 pounds.

Compacting Radioactive Solid Waste

The person(s) compacting Radioactive Solid Wastes run the risk of being exposed to low level radioactive isotopes. The following lists are items commonly compacted:

- **Solid Debris**
    1. Paper Towels;
    2. Glass Pippetts;
    3. Metal Containers;
    4. Diapers.

Personal Protective Equipment

- On a routine basis the employee will be required to wear a lab coat. Tyvek sleeve covers, gloves, safety glasses, steel toed shoes, sleeve covers and plastic boot covers.
- All PPE shall be removed from body as exiting out of the radioactive perimeter outlined on the floor. No contaminated PPE shall be permitted out the the hot zone.

4. Task Description (Processing Animal Carcassas)

Processing animal carcasses consists of packing slightly thawed laboratory animals into 55 gallon open head drums. Processing is done in an open area of the facility on a large canvass tarp. Animals are placed into poly lined drums and lime is added to aid in the decomposition process.

Another activity of the processor is to manipulate drums. While automated or equipment assisted manipulation is the method most commonly used. (i.e., forklifts, drum dollies, etc.) the employees may at times be required to manually place the drums or remove drums from pallets. Drums typically weigh 100 to 200 pounds.

Processing Animal Carcasses

- The person(s) processing animal carcasses could potentially have a biological or radioactive exposure to animal blood, etc. Also, the fine lime dust presents an inhalation hazard.

Personal Protective Equipment

- On a routine basis workers will be required to wear a dust mask or (N95) (3M 6200) half faced respirator with HEPA filters, lab coat, gloves, safety goggles and steel toed shoes.

Required PPE:

- Gloves
- Lab coat
- Steel toed shoes
- Face shield
- Respirator (N95) (3M 6200) (3M 6800) (3M 7800)

4. Task Description (Emergency Response and Spill Clean up)

OES is responsible for emergency response for all BCM facilities. OES staff responding to spill clean up will be provided with the proper training required by 29 CFR 1910.120 for clean up operations. Each employee is provided with 40 Hour Hazwhoper training.

In the event of a spill requiring more assistance, BCM has a retainer for Garner Environmental. The Houston Fire Department (HFD) will provide fire fighting assistance. OES is equipped to clean up small scale spills and is equipped with only up to level C PPE. Anything requiring level A or B PPE, would have to be responded by Garner Environmental and the Houston HazMat (HFD).

Emergency Response and Spill Clean Up

- OES staff responding to spills involving hazardous materials will be provided with the proper Personal Protective Equipment to protect themselves. In any response situation, A buddy system will be used. Responders will review the Material Safety Data Sheets for all hazardous spills.
- OES will report to BCM security and Risk Management
- If necessary, Occupational Health Program will be notified for assistance.
- Please follow SPCC plan for any unplanned release of hydrocarbons from above ground storage tanks throughout college grounds.

Required PPE:

- Review section IV of the Personal Protection Equipment Program;
- Spill absorbent, neutralizers, and monitoring equipment available.

Disposal of Spill Debris

- Make sure all spills pads, diapers, booms, empty containers and all other items are properly disposed of after spill clean ups.

Personal Protection Equipment Program

The purpose of personal protective clothing and equipment (PPE) is to shield or isolate individuals from the chemical, physical, and biological hazards that may be encountered at the Baylor College of Medicine hazardous waste storage facility. Personal protective equipment is to be chosen as the method of protecting the employee from hazards only after feasible engineering controls are considered and implemented. No single combination of protective equipment and **clothing is capable** of protecting against all hazards. PPE should be used in conjunction with other protective methods and its effectiveness evaluated periodically. The use of PPE can itself create significant worker hazards, such as heat stress, physical and psychological stress, impaired vision, mobility, and communication. For any given situation, equipment and clothing should be selected which provide an adequate level of protection. However, over protection, as well as under protection can be hazardous and should be avoided where possible.

The goal of this program is to protect the wearer from safety and health hazards, and to prevent injury to the wearer from incorrect use and/or malfunction of the PPE. To accomplish these goals, the PPE program includes provisions for:

- **Hazard identification;**
- **Medical Monitoring;**
- **Selection;**
- **Use;**
- **Maintenance; and**
- **Training**

Hazard Identification

Identification of hazards associated with each step in a particular tasks are identified and evaluated. Once a hazard is identified the most reasonably effective control of that hazard must be implemented. The primary objective shall be to eliminate the hazard so that personal protective equipment is not required. When the hazard cannot be eliminated through other means, personal protective equipment will be selected based on the hazards identified. The hazard assessment must be completed to conform with the requirements of 29 CFR 1910.132 (d).

Medical Monitoring

All Baylor College of Medicine employees who work at the hazardous waste facility are covered under Baylor's Occupational Safety and Health Program. Among other required topics, this program specifies covered employees, the frequency, and the content of medical evaluations. There are two primary reasons for implementing an effective medical surveillance program as it pertains to the use of personal protective equipment:

1. The physician must make a determination of whether or not the employee is fit to wear various personal protective equipment under the range of work conditions which are anticipated at the hazardous waste facility. This includes an evaluation of whether or not the **employee is fit to wear** a respirator and if the employee is physically fit to wear personal protective equipment under heavy work loads.
2. The second is to determine if the employee health is impaired during the course of work due to exposure to chemical and physical hazards. Health impairment due to work environment exposures shall be considered an indication that the PPE program is effective.

Use

The section Task/Safety and Health Risk Analysis identifies which PPE is required to be used for each task at the hazardous waste facility.

Selection

Selection of appropriate personal protection equipment is made while analyzing the hazards involved with the job task. Selection of PPE (other than respiratory protection which is covered later) must be based on at least the following criteria:

1. Chemical constituents and concentration;
2. Duration of exposure;
3. Degree of physical exertion;
4. Work conditions such as ambient temperature;
5. PPE performance as indicated by the temperature;
6. Cost; and
7. OSHA standards;

1910.133	**Eye and Face Protection**
1910.134	**Respiratory Protection**
1910.135	**Head Protection**
1910.136	**Foot Protection**

Maintenance

The only PPE used at Baylor's Hazardous Waste Storage Facility that requires maintenance are respiratory protection devices and safety glasses. Maintenance procedures for respiratory protection equipment are specified in the Respiratory Program. If other non-disposable equipment is used then specific maintenance procedures must be established and communication to employees before their use is authorized.
Safety glasses shall be cleaned once each week, unless they become contaminated in which case they shall be decontaminated immediately. Safety glasses that have become dulled or scratched to the point where vision is obscured shall not be used. The employee shall immediately notify their supervisor if their safety glasses become damaged and receive a new pair.
Please see attached Respiratory Protection Program. Respirators will be cleaned after each use. If employee notices respiratory protection is not working properly, new equipment will be provided.

Training (OSHA Technical Manual)

Baylor College of medicine shall provide its employees involved in hazardous waste operations information and training on personal protective equipment used at the site. This information shall include but not limited to:

1. When PPE is necessary (PPE to be used based upon known or anticipated site hazards).
2. What PPE is necessary?
3. How to properly don, don-off adjust, and wear PPE

4. PPE limitations of materials and construction; limitations during temperature extremes, heat stress, and other appropriate medical considerations; use and limitations of respirator equipment as well as documentation procedures.
5. The proper care, decontamination, storage, maintenance, useful life and disposal of the PPE.
6. PPE inspection procedures prior to, during, and after use.
7. BCM employees will follow the BCM Respiratory Fit Testing Manual.

On scene incident commander. Incident commanders, who will assume control of the incident scene beyond the first responder awareness level, shall receive at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

- Know and be able to implement the employer's incident command system.
- Know how to implement the employer's emergency response plan.
- Know and understand the hazards and risks associated with employees working in chemical protective clothing.
- Know how to implement the local emergency response plan.
- Know of the state emergency response plan and of the Federal Regional Response Team.
- Know and understand the importance of decontamination procedures.

First responder operations level. First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the operational level shall have received at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level and the employer shall so certify

- Know how to implement the employer's emergency response plan.
- Know the classification, identification and verification of known and unknown materials by using field survey instruments and equipment.
- Be able to function within an assigned role in the Incident Command System.
- Know how to select and use proper specialized chemical personal protective equipment provided to the hazardous materials technician.
- Understand hazard and risk assessment techniques.
- Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit
- Understand and implement decontamination procedures.
- Understand termination procedures.
- Understand basic chemical and toxicological terminology and behavior.

Hazardous materials technician. Hazardous materials technicians are individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch or otherwise stop the release of a hazardous substance. Hazardous materials technicians shall have

received at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

- Know how to implement the employer's emergency response plan
- Know the classification, identification and verification of known and unknown materials by using field survey instruments and equipment.
- Be able to function within an assigned role in the Incident Command System.
- Know how to select and use proper specialized chemical personal protective equipment provided to the hazardous materials technician.
- Understand hazard and risk assessment techniques.
- Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit.
- Understand and implement decontamination procedures
- Understand termination procedures.
- Understand basic chemical and toxicological terminology and behavior.

Levels of Protection and Protective Gear (29 CFR 1910.120 Appendix B)

The following information is extracted from Appendix B of 29 CFR 1910.120 and is a nationally recognized system defining levels of protection and conditions when it is recommended. This system shall be used for emergency response operations at the facility and shall be used as a general guide in selecting appropriate PPE for routine tasks.
The following are guidelines that an employer can use to begin the selection of the appropriate PPE. Site information may suggest the use of combinations of PPE selected from the different protection levels (i.e., A, B, C, D) as being more suitable to the hazards of the work. It should be cautioned that the listing below does not fully address the performance of the specific, evaluation and re-selection is an ongoing process until sufficient information about the hazards and PPE performance is obtained.

This appendix sets forth information about personal protective equipment (PPE) protection levels which may be used to assist employers in complying with the PPE requirements of this section.

As required by the standard, PPE must be selected which will protect employees from the specific hazards which they are likely to encounter during their work on-site.

Selection of the appropriate PPE is a complex process which should take into consideration a variety of factors. Key factors involved in this process are identification of the hazards, or suspected hazards; their routes of potential hazard to employees (inhalation, skin absorption, ingestion, and eye or skin contact); and the performance of the PPE materials (and seams) in providing a barrier to these hazards. The amount of protection provided by PPE is material-hazard specific. That is, protective equipment materials will protect well against some hazardous substances and poorly, or not at all, against others. In many instances, protective equipment materials cannot be found which will provide continuous protection from the particular hazardous substance. In these cases the breakthrough time of the protective material should exceed the work durations.(end of sentence deleted - FR 14074, Apr 13. 1990)

Other factors in this selection process to be considered are matching the PPE to the employee's work requirements and task-specific conditions. The durability of PPE materials, such as tear strength and seam

strength, should be considered in relation to the employee's tasks . The effects of PPE in relation to heat stress and task duration are a factor in selecting and using PPE. In some cases layers of PPE may be necessary to provide sufficient protection, or to protect expensive PPE inner garments, suits or equipment.

The more that is known about the hazards at the site, the easier the job of PPE selection becomes. As more information about the hazards and conditions at the site becomes available, the site supervisor can make decisions to up-grade or down-grade the level of PPE protection to match the tasks at hand.

The following are guidelines which an employer can use to begin the selection of the appropriate PPE. As noted above, the site information may suggest the use of combinations of PPE selected from the different protection levels (i.e., A, B, C, or D) as being more suitable to the hazards of the work. It should be cautioned that the listing below does not fully address the performance of the specific PPE material in relation to the specific hazards at the job site, and that PPE selection, evaluation and re-selection is an ongoing process until sufficient information about the hazards and PPE performance is obtained.

Personal Protective Equipment (PPE) is divided into four categories based on the degree of protection afforded. (See Part B of this appendix for further explanation of Levels A, B, C, and D hazards.)

I. Level A - To be selected when the greatest level of skin, respiratory, and eye protection is required.

The following constitute Level A equipment; it may be used as appropriate;

1. Positive pressure, full face-piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH).

2. Totally-encapsulating chemical-protective suit.

3. Coveralls.(1)

4. Long underwear.(1)

5. Gloves, outer, chemical-resistant.

6. Gloves, inner, chemical-resistant.

7. Boots, chemical-resistant, steel toe and shank.

8. Hard hat (under suit).(1)

9. Disposable protective suit, gloves and boots (depending on suit construction, may be worn over totally-encapsulating suit).

Footnote(1) Optional, as applicable.

II. Level B - The highest level of protection is necessary but a lesser level of skin protection is needed.

The following constitute Level B equipment; it may be used as appropriate.

1. Positive pressure, full-facepiece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH approved).

2. Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls).

3. Coveralls.(1)

4. Gloves, outer, chemical-resistant.

5. Gloves, inner, chemical-resistant.

6. Boots, outer, chemical-resistant steel toe and shank.

7. Boot-covers, outer, chemical-resistant (disposable).(1)

8. Hard hat.(1)

9. [Reserved]

10. Face shield.(1)

Footnote(1) Optional, as applicable.

III. Level C - The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air purifying respirators are met.

The following constitute Level C equipment; it may be used as appropriate.

1. Full-face or half-mask, air purifying respirators (NIOSH approved).

2. Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls).

3. Coveralls.(1)

4. Gloves, outer, chemical-resistant.

5. Gloves, inner, chemical-resistant.

6. Boots (outer), chemical-resistant steel toe and shank.(1)

7. Boot-covers, outer, chemical-resistant (disposable).(1)

8. Hard hat.(1)

9. Escape mask.(1)

10. Face shield.(1)

Footnote(1) Optional, as applicable.

IV. Level D - A work uniform affording minimal protection: used for nuisance contamination only.

The following constitute Level D equipment; it may be used as appropriate:

1. Coveralls.

2. Gloves.(1)

3. Boots/shoes, chemical-resistant steel toe and shank.

4. Boots, outer, chemical-resistant (disposable).(1)

5. Safety glasses or chemical splash goggles.(1)

6. Hard hat.(1)

7. Escape mask.(1)

8. Face shield.(1)

Footnote(1) Optional, as applicable.

Part B. The types of hazards for which levels A, B, C, and D protection are appropriate are described below:

I. Level A - Level A protection should be used when:

1. The hazardous substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on either the measured (or potential for) high concentration of atmospheric vapors, gases, or particulates; or the site operations and work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the skin,

2. Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible; or

3. Operations must be conducted in confined, poorly ventilated areas, and the absence of conditions requiring Level A have not yet been determined.

II. Level B protection should be used when:

1. The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection.

2. The atmosphere contains less than 19.5 percent oxygen; or

3. The presence of incompletely identified vapors or gases is indicated by a direct-reading organic vapor detection instrument, but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the skin.

Note: This involves atmospheres with IDLH concentrations of specific substances that present severe inhalation hazards and that do not represent a severe skin hazard; or that do not meet the criteria for use of air-purifying respirators.

III. Level C - Level C protection should be used when:

1. The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin;

2. The types of air contaminants have been identified, concentrations measured, and an air-purifying respirator is available that can remove the contaminants; and

3. All criteria for the use of air-purifying respirators are met.

IV. Level D - Level D protection should be used when:

1. The atmosphere contains no known hazard; and

2. Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

Note: As stated before, combinations of personal protective equipment other than those described for Levels A, B, C, and D protection may be more appropriate and may be used to provide the proper level of protection.

As an aid in selecting suitable chemical protective clothing, it should be noted that the National Fire Protection Association (NFPA) has developed standards on chemical protective clothing. The standards that have been adopted by include:

NFPA 1991 - Standard on Vapor-Protective Suits for Hazardous Chemical Emergencies (EPA Level A Protective Clothing)

NFPA 1992 - Standard on Liquid Splash-Protective Suits for Hazardous Chemical Emergencies (EPA Level B Protective Clothing)

NFPA 1993 - Standard on Liquid Splash-Protective Suits for Non-emergency, Non-flammable Hazardous Chemical Situations (EPA Level B Protective Clothing)

These standards apply documentation and performance requirements to the manufacture of chemical protective suits. Chemical protective suits meeting these requirements are labeled as compliant with the appropriate standard. It is recommended that chemical protective suits that meet these standards be used.

V. Decontamination Program

The purpose of Baylor College of Medicine's Decontamination Program is to prevent the spread of contamination outside the boundaries of the waste management units. Specific areas for waste processing have been designated as described below:

1. **Solid waste compacting area (Yellowstone)**
This area is used for compacting solid waste which is contaminated with radioactive isotopes. The area is roped off and labeled to prevent accidental or unauthorized entry. Any equipment (i.e., tools, containers, PPE) used in the area, which becomes contaminated, must be either decontaminated prior to exiting the area or containerized so that contamination cannot be spread outside this area. Wipe test and a Geiger counter will be used to determine the spread of contamination.

2. **Organic/Inorganic liquid consolidation**

Yellowstone Flammable Storage Area
Halogenated and Non-Halogenated solvents are received in 55-gallon drums in Flammable Storage Area (FSA). Lab packs are processed and received in Chemical Storagee Area (CSA)containers that have been manifested, inventoried and are kiln ready for treatment at approved third party TSDF's.

Other Waste Accumulation Areas (WAA)
Halogenated and Non Halogenated solvents are consolidated into 55-gallon drums in This process occurs within two snorkel vents that disperse any hazardous fumes from the employee. Lab pack items are consolidated in containers and labeled according the there hazard class. Employees are to remove all PPE after waste has been processed and dispose of according BCM guidelines.

General Decontamination Procedures

The following decontamination procedures must be followed while conducting waste handling procedures in each of the designated waste management areas:

- Personal Protective Equipment is to be worn during all waste processing operations which consist of atleast: chemical resistant inner an outer gloves; boot covers; protective suit, (i.e., lab coat, Tyvek, Saranex); eye protection; and respirator.
- Prior to leaving a chemical waste processing area, personal protective equipment shall be removed and containerized.
- Non-disposable equipment such as respirators must be cleaned and disinfected as detailed in the respiratory protection program.
- Employees whose permeable clothing becomes contaminated with hazardous substances shall immediately remove that clothing and shower. The clothing shall be disposed of or decontaminated before it is removed from the work **zone.**
- Each employee must wash their hands after conducting any waste handling activity.
- Prior to container movement, inspections will be conducted to assess the integrity of the container. Any containers found to be of questionable integrity must be immediately overpacked or reconditioned.
- Decontamination procedures shall be monitored by the designated Health and Safety Officer to determine the effectiveness. When procedures are found to be ineffective, appropriate steps shall be taken to correct any deficiencies.

- Safety, health, and general company image are all measured by a commitment to good housekeeping. The professionalism of every Baylor employee is reflected in a neat, orderly and will kept work area.

VI. New Technology Program

Baylor College of Medicine is committed to providing all employees with the best available personal protective equipment.This is accomplished by identifying hazards and testing new products. Personal protective equipment is evaluated by the department supervisor's before allowing any employees' utilize the product. Approved vendors are always updating OES of new technology.

VII. Material Handling Program

Baylor College of Medicine generates a variety of hazardous and non-hazardous chemicals in the workplace. The known existence of hazardous materials in BCM facilities requires OES to prepare for worst case scenarios. All OES staff are trained to handle any material that there job task descriptions list. In the event that a staff member is put in a situation of not being familiar with handling a certain compound the individual is ask to contact a Supervisor immediately. Employees are required to follow standard protocol in managing hazardous waste. It is the responsibility of the employee to follow standard protocol when handling hazardous materials.
All hazardous and non-hazardous materials that are generated in BCM facilities are properly handled according the OSHA, DOT and EPA guidelines. Employees are trained to make the generator's assumption on how to properly dispose of waste, packaging and safety guidelines. Material Safety Data Sheets are accessible to review by each employee before handling waste.

Baylor College of Medicine
Office of Environmental Safety
Training Sign in Sheet

	BCM Staff	BCM ID#	Date
1	[illegible]	070703	8/7/14
2	[illegible] McCormick	161587	8/7/14
3	[illegible]	168390	8-7-14
4	[illegible]	036529	8.7.14
5	[illegible]	19127	8-7-14
6	BRIAN GAZAWAY	155988	7 AUG 14
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			

Baylor College of Medicine
Office of Environmental Safety
Training Sign in Sheet

	BCM Staff	BCM ID#	Date
1	KEVIN MINOR	19127	5-23-13
2	David McCormick	161587	5-23-13
3	Joseph Hatch	168390	10/9/2013
4	Will Dan	040700	5/10/13
5	BRIAN GAZAWAY	155988	28 MAY 13
6	Stacy L. Strickland	036529	5-23-13
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			

Baylor College of Medicine
Office of Environmental Safety
Training Sign in Sheet

	BCM Staff	BCM ID#	Date
1	Brian Gazaway	155988	6 Sept 12
2	Stacy L. Stricklin	036529	9.6.2012
3	Kevin Minor	19127	9.6.12
4	Darrell Smith	159132	9-6-2012
5	David McCormick	161587	9-6-12
6	Slacker Rodney Baker	165352	9-6-12
7	Will Dani	040700	9/6/12
8	Joseph Hatch	168390	10-30-12
9	David McCormick	161587	10-30-12
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			

TE

Documentation of Environmental Indicator Determination

Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRAInfo code (CA725)

Current Human Exposures Under Control

Facility Name:	Baylor College of Medicine
Facility Address:	3325 Yellowstone Boulevard, Houston, Texas
Facility EPA ID #:	TXD988070082

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

X If yes - check here and continue with #2 below.

If no - re-evaluate existing data, or

if data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRAInfo national database ONLY as long as they remain true (i.e., RCRAInfo status codes must be changed when the regulatory authorities become aware of contrary

information).

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be "**contaminated**"[1] above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	Yes	No	?	Rationale / Key Contaminants
Groundwater		X		No impacts reported
Air (indoors)[2]		X		No impacts reported
Surface Soil (e.g., <2 ft)		X		No impacts reported
Surface Water		X		No impacts reported
Sediment		X		No impacts reported
Subsurf. Soil (e.g., >2 ft)		X		No impacts reported
Air (outdoors)		X		No impacts reported

X If no (for all media) - skip to #6, and enter "YE" status code after providing or citing appropriate "levels", and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

__ If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

__ If unknown (for any media) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

Site Background:

Baylor College of Medicine is a private medical school that provides medical services to the college's six affiliated teaching hospitals. Various research projects are also conducted. The college generates various hazardous wastes through medical laboratory research activities, associated support activities (e.g. Maintenance), and surplus chemical exchange program. Historically, Baylor has managed the wastes generated from the research activities under the exclusion for "Accumulation Time" found in 31 TAC 335.69 (40 CFR 262.34). The college has retrofitted a 0.042-acre section of an existing building on its property at 3325 Yellowstone Boulevard to be used as a container storage

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

area. The unit has a capacity to store up to the equivalent of 200, 55-gallon drums that contain various types of hazardous waste, primarily lab packs and flammable liquids, as well as other chemical wastes from laboratory research activities. Baylor is considered a small quantity generator. No waste management activity was previously conducted in this unit prior to 1994 (Reference 1).

The container storage area for Baylor College of Medicine is located in the southeastern section of Houston, Harris County, Texas, one block east of the 288 South Freeway and the Yellowstone Boulevard intersection. The facility lies within the area known as the Gulf Costal Basin and on the Beaumont Formation, which is approximately 1.2 miles north of the facility. Baylor is currently operating as a Small Quantity Generator as well as a storage facility under Hazardous Waste Permit No. 50354 (References 9 and 10).

Regulatory History:

Baylor began operating under Hazardous Waste Permit No. 50354 in January 1994. Baylor's permit was originally issued July 28, 1993, renewed on March 5, 2004 and modified with a Class 1 Permit Modification on February 6, 2006. Baylor has been regularly inspected during this period of operation. Minor and moderate violations have been noted but all violations have been resolved. While operating, Baylor has not reported any spills or releases.

A RCRA Facility Assessment (RFA), which included a visual site inspection, reported no impacts in the nearby ground and surface waters (Reference 1). This conclusion was confirmed by TNRCC in a 1998 file review (Reference 5).

References:

1. Interoffice Memorandum to Baylor Files; from Enoch Johnbull; Re RCRA Facility Assessment Executive Summary; dated March 17, 1993.
2. Hazardous Waste Permit No. HW 505354; Baylor College of Medicine, Hazardous Waste Storage – offsite; Texas Water Commission; issued July 28, 1993.
3. Letter to Charles Finley, Baylor; from Patti Peterson, TNRCC; Re: Clarification of Generator Status; dated May 20, 1996.
4. Letter to Mr. Doyle, Baylor, from Nicole Bealle, TNRCC; Re: CEI Conducted December 18, 1997; dated January 16, 1998.
5. Interoffice Memorandum to Baylor Files; from Catherine Sherman, TNRCC; Re: Baylor, Summary of Regional File Information; dated November 6, 1998.
6. Compliance History Report; Prepared by Steve Reynolds; dated October 30, 2003.
7. Letter Transmittal to William T. Davis, Baylor, from Wade Wheatley, TCEQ; Re: Baylor Permit Number 50354 – Permit Renewal; dated March 19, 2004.
8. Portions of Parts A and B Permit Application for Hazardous Waste; Submitted by Baylor; signed October 18, 2005.
9. Letter Transmittal to Paul W. Muraca, Baylor, from Mark L. Shannon, TCEQ; Re: Class 1 Permit Modification; dated February 6, 2006.
10. Communication Log; Andrew Dorn, TechLaw with Mark Shannon, TCEQ; RE: Status of Baylor Facility; dated May 24, 2006.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

"Contaminated" Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
Groundwater							
Air (indoors)							
Soil (surface, e.g., <2 ft)							
Surface Water							
Sediment							
Soil (subsurface e.g., >2 ft)							
Air (outdoors)							

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors spaces for Media which are not "contaminated" as identified in #2 above.

2. enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have check spaces ("___"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

___ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

___ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

[3] Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be "**significant**"[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

   If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

   If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

   If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

[4] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

5. Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s):

6. Check the appropriate RCRAInfo status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

YE — YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Baylor College of Medicine facility, EPA ID # TXD988070082, located at 3325 Yellowstone Boulevard, Houston, Texas under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

NO - "Current Human Exposures" are NOT "Under Control."

IN - More information is needed to make a determination.

Completed by	(signature)		Date
	(print)		
	(title)		
Researched by	(signature)		Date May 15, 2006
	(print)	Andrew Dorn	
	(title)	TechLaw, Inc. (U.S. EPA Contractor)	
Supervisor	(signature)		Date
	(print)		
	(title)		
	(EPA Region or State)		

Locations where References may be found:

Texas Commission of Environmental Quality
File Room, Building E
12118 N IH 35
Austin, TX 78753

Filed under:
SWR78297
Hazardous Waste Permit No. 50354

Contact telephone and e-mail numbers

(name)	Mark Shannon
(phone #)	512/239-0944
(e-mail)	

final Note: The Human Exposures EI is a Qualitative Screening of exposures and the determinations within this document should not be used as the sole basis for restricting the scope of more detailed (e.g., site-specific) assessments of risk.

Recommended Action Items:

None.

BCM
Baylor College of Medicine

Baylor College of Medicine
Hazardous Waste Training Manual
3325 Yellowstone Blvd.
Houston, Texas 77030

Prepared By William T. Davis, CHMM

Contact	Office Number	Home Phone Number	Cell Phone Number
William T. Davis, CHMM Supervisor, Chemical Safety	**713-798-3851**	281-648-1733	**713-515-7021**
Paul Muraca, Director, Environmental Safety	**713-798-6617**	**936-588-3719**	**713-591-8359**
David McCormick Environmental Safety Specialist	713-798-1583		713-398-7209

Employment Manual Version Control

Version	Date	Author	Change Description
2	11-1-2005	William T. Davis, CHMM	Updated Contingency Plan
3	11-3-2007	William T. Davis	Updated Contingency Plan
4	11-1-2008	William T. Davis	Updated Contingency Plan
5	3/25/2010	William T. Davis	Updated Alarm Equipment
6	1/2014	William T. Davis	Updated Contingency Plan & Waste Analysis Plan (Permit Renewal)

1 Facility Safety

The Baylor College of Medicine (BCM) Hazardous Waste Storage Facility is permitted for waste accumulation for up to one year of receipt. The facility is managed and maintained according to 40 CFR 264 and 265. All regulations pertaining to the permit are adhered by BCM. Waste is picked up and processed by BCM safety personnel at specific waste accumulation areas and transported to the facility for storage. The waste is then processed for transportation and disposal method by preferred waste vendor.

.

1.1 Security

General Security

The entire property is provided with ample security to prevent the unknowing or unauthorized entry of persons or livestock onto the active portion of the facility. Surrounding the property is an eight-foot, chain-link, wire fence that is topped with three-stand barbed wire. The perimeter of the property is monitored with high resolution, pan, tilt, zoom capable cameras from a permanently staffed command center. All surveillance is recorded via digital recordings maintained for approximately eight weeks before write over. The interior of the buildings are also monitored and recorded in the same fashion with high resolution, fixed, cameras.

1.2 Restricted Access

Access onto the property is controlled twenty-four hours a day by security personnel at the command center. Authorizations are approved based on departmentally defined need to enter and is limited to the duration of the defined need. Visitors are not authorized entry unless escorted by an approved employee. Visitors can contact the command center via intercom located at the entrance of the gate. There is also an key access card locked in a fire box for the emergency response personnel to gain access at any time. The entrance gate is the only gate in the fence. The entrance gate is closed when not in use and only authorized personnel have access to the gate opening system.
Entry into the property does not allow entry into the building structures on the property. The existing building that will store hazardous waste is locked when personnel are not present in the building. Access to keys for this building is restricted to authorized personnel.

1.3 Warning Signs

Warning signs in **English** and **Spanish** stating "**Danger-Unauthorized Personnel Keep Out**" are posted in the gate entrance and other locations near the active portion of the facility. At a minimum, these signs are legible up to twenty-five feet and are present in sufficient quantities to be seen from any approach to the active portion of the facility.

1.4 Storage Areas

The Chemical Storage Area (CSA) and the Flammable Storage Area (FSA) are bermed and will contain a spill equal to ≥10 % of that area's storage capacity. Spill control equipment is located in the CSA and on the mobile spill cart. The CSA has a laboratory fume hood and a canopy exhaust hood for additional temporary storage. The FSA is equipped with explosion proof wiring and blow out panels, for the unlikely event of an accident. All ignitable and reactive chemicals must be placed on the left side of the fume hood (near the FSA doors) to comply with the requirements that ignitable materials be stored (50) feet from the property line (see appendix A).

1.5 Hazardous and Solid Waste Containers

All waste received at the facility are kiln ready. The only time containers are opened shall be in the event that compatible waste is consolidated together. Some containers are opened in order to meet the requirements of the waste analysis plan.

1.6 Waste Analysis Plan

OES is required to follow the waste analysis plan developed in accordance with 40 CFR 264.13, which requires a representative sample of the incoming liquid wastes, based on the number of containers received. To comply with the permit, a binder in which all samples must be recorded. The sampling parameters are based on visual assessment (i.e. labeling, color, and physical form) of the contents of the container. See (Appendix B).

1.7 Hazardous and Solid Waste Containers

All waste received at the facility are kiln ready. The only time containers are opened shall be in the event that compatible waste is consolidated together. Some containers are opened in order to meet the requirements of the waste analysis plan.

2 Fire Suppression System

2.1 Fire Suppression System and Extinguishers

The Yellowstone Facility was renovated to meet the requirements of the City of Houston building codes and the Houston Fire Department. The facility meets all requirements listed in 40 CFR 264 and 265. Review Appendix C for schematics of fire safety equipment. The primary concerns are containment and segregation of potential hazardous releases. Fire safety equipment within the facility (portable and fixed) is designed to complement the containment features of the facility. (i.e. there are no sprinklers or suppression system which uses water as the primary extinguishing agent). The use of water would contribute to "run off" or have an adverse effect on reactives which may be stored within the facility, should a fire occur.

The extinguishing agent used for the fire suppression system is Foray Dry Chemical provided by Ansul Fire Protection Co., which has a yellow pigment, no odor, and contains 75% monoammonium phosphate. By OSHA standards monoammonium phosphate. By OSHA standards monoammonium phosphate is considered a nuisance dust and will mildly irritate the eyes and the respiratory system. Use a full face respirator equipped with particulate filters or half faced respirator with safety goggles. In the event that overexposure occurs, the symptoms related are coughing, and shortness of breath. If problems persist, please seek immediate medical attention. Use soap and water to clean affected areas.

All overheads doors within the facility are installed with an electromagnetic release mechanism. The doors close if a fire alarm is initiated in any of the storage/processing rooms. This feature is also a means of containment during a emergency.

The radioactive and chemical storage areas have 1,450 lbs. of dry chemical extinguishing agent to suppress or contain a fire. This system is actuated in the chemical storage area by UV flame detection devices and or several rates of rise heat detectors.

All fire alarms are monitored off site remote be ADT and BCM security on main campus. The actuation of a fire alarm would be received in all or at least one of (3) different locations.

The actuation of a fire alarm initiates several processes:

1. All HVAC and ventilation processes will stop;
2. Overhead and double doors will close;
3. A (90) decibel alarm/gong will sound for (60) seconds;
4. ADT, BCM security is alerted;
5. The HFD is notified by ADT and BCM security;
6. If actual fire occurs, the fire suppression system will dump.
7. Key card is located in the fire lock box in front of gate.

All systems, extinguishers, doors and other fire equipment is checked by certified contractors on a routine schedule. Records are maintained by OES.

The facility has (7) fire extinguishers located throughout the facility, two are Class D rated for metal fires and five (5) are dry chemical. The two Class D are located in the CSA and the FSA. The dry chemical extinguishers are located in the CSA (1), the office (1), the radioactive processing area (2), and the long term storage area (1).

3 Exhaust System (Design specifications, Emission Point Parameters, and Emission Control, Reliability Demonstration)

The design specifications for each emission control device, emission point parameters, and emission control system reliability demonstration are as follows:

3.1 Chemical Storage Room

Fan Design Specifications

A two speed floor mounted exhaust fan located in the mechanical room adjacent to the chemical storage room will provide continuous exhaust from this area. The exhaust fan will be utility vent set type with steel housing, air foil centrifugal wheel and a 7.5 horsepower (hp) two speed motor. The entire unit will be coated with a 4 to 6 mil (dry film thickness) here site coating. The fan will exhaust in up-blast arrangement. The air quality at low speed will be 2,500 cubic feet per minute (cfm) at 2.75 inches standard pressure, and the air quality at high speed will be 3,750 (cfm)at 6.25 inches standard pressure.

3.2 Exhaust Duct

The exhaust fan duct for the chemical storage room will be approximately 18 inches in diameter reduced to approximately 16 inches in diameter above the finished roof. The exhaust duct will be terminated at approximately 24 inches above the roof level exhausting in straight up arrangement. The low speed flow and velocity will be 2,500 cfm at approximately 1800 feet per minute (fpm). The high speed flow and velocity will be 3,750 cfm at approximately 2700 fpm. The temperature will be approximately 70 to 80 degrees Fahrenheit.

3.3 Control Technology

All exhaust air from the chemical storage room will be filtered through two- inch thick pre-filters and charcoal activated carbon filters with 360 pounds of type 787 FVI carbon. The filters will be located in draw-through configuration with respect to the fan.
OES is required by the permit to monitor the carbon absorption system for breakthrough once a month. A organic vapor analyzer is used to test for Total Hydrocarbons (TOTH).

3.4 Fan Controls

The fan will be manually started and stopped from a two- speed low/high/stop switch located at the entrance of the chemical storage room. The exhaust fan will be equipped with a suitable means of automatically starting the generator set and transferring power to the exhaust fan upon failure of the normal electrical power source.

3.5 Flammable Storage Area

Fan Design Specifications

A single speed floor mounted exhaust fan located in the mechanical room adjacent to the flammable storage area will provide continuous exhaust from this area. The exhaust fan will be utility vent set type with steel housing, airfoil centrifugal wheel and 1.5 hp motor. The entire unit will be coated with a 4 to 6 mil (dry film thickness) here site coating. The fan will be in up-blast arrangement. The air quality will be 1,400 cfm at 3.0 inches standard pressure.

3.6 Exhaust Duct

The exhaust fan duct for the flammable storage room will be approximately 14 inches in diameter reduced to approximately 12 inches in diameter above the finished roof. The exhaust duct will be terminated at approximately 24 inches above the roof level exhausting in straight up arrangement. The flow type and velocity will be 1,400 cfm at approximately 1,800 fpm. The temperature will be approximately 70 to 80 degrees Fahrenheit.

3.7 Control Technology

All exhaust air from the flammable storage room will be filtered through two -inch thick pre-filters and charcoal activated carbon filters with 95 pounds of type 787 FVI carbon. The filters will e located in draw-through configuration with respect to the fan. OES is required by the permit to monitor the carbon absorption system for breakthrough once a month. A organic vapor analyzer is used to test for Total Hydrocarbons (TOTH).

3.8 Fan Controls

The fan will be manually started and stopped from a start/stop switch located at the entrance of the flammable storage room. The exhaust fan will be provided with standby power of 24-hour duration. The standby power system will be equipped with a suitable means of automatically starting the generator set and transferring power to the exhaust fan upon failure of the normal electrical power source.

3.9 Emission Points

The last diagram in this section identifies the two emission points from the facility: All air is exhausted through charcoal filter system in the permitted hazardous waste storage area. The exhaust fans have a back up emergency generator. The air condition system is 100% fresh from the outside.

(17) Flammable storage room exhaust duct.
(19) Chemical storage room exhaust duct.

4 Facility Records

The facility records including manifest, inspections, permits, and all applicable records are kept in Y1521.

4.1 Hazardous Waste Permit # 50354 – Issued by TCEQ on 3-05-2004 (Permit Renewal submittal 2013)

A copy of the permit is kept at the facility at all times, it is to be mad e available at the request of personnel from the Texas Commission on Environmental Quality (TCEQ-Region 12) and the Environmental Protection Agency (EPA-Region 6).

The operating record consists of information and data concerning the date, type and quantity of wastes managed, waste analysis, facility inspections, operating hours, sampling, and monitoring data shall be maintained in the operating record at the site upon the request of the site an made jurisdiction under the TCEQ. The operating records consisting of the weekly inspections and monthly inspections.

The facility inspections consist of the following:

- The chemical storage area (CSA) shall be inspected weekly,
- Emergency equipment (i.e. fire extinguishers, safety showers) are inspected weekly and/or monthly (see Appendix D), and
- The receiving dock is inspected for at least three years following the date that the information or data is obtained.

Manifests are required for shipments received at the facility and sent from the facility. Since the facility receives waste for storage only, a waste receipt summary for each month is reported by STEERS to the TCEQ. The monthly waste receipts are filed with the supporting manifest.

Discrepancy reports are required if a significant discrepancy in a manifest is discovered, OES is required to attempt to reconcile the discrepancy. If it is not resolved within 15 days, we are required to submit a letter, including a copy of the manifest, to the Executive Director of the TCEQ.

Documentation of equipment maintenance is located in the file cabinet in the office. The tow motor and hand jack are inspected quarterly (i.e. every four months)

The bulletin board contains employee information and numbers which may be needed to contact other essential personnel. The information on the board consists of a contact list for employee problems, OES list of emergency numbers, SET Environmental and other supporting the emergency responder to clean up spills, the evacuation plan for Yellowstone, and the list of personnel qualified to operate the forklift.

4.2 Wastes Authorized in Table IV.B shall not contain any of the following:

- Polychlorinated biphenyls (PCB's), as defined by the EPA in regulations issued pursuant to the Toxic Substances Control Act under Title 40 Code of Federal Regulations (CFR) Part 761 , unless the permit tee is compliant with the federal requirements for PCB storage as specified in 40 CFR Part 761;
- Radioactive waste unless the permit tee is authorized to store, process and dispose of these waste in compliance with specific licensing and permitting requirements under Chapter 401 of the Texas Health and Safety Code and the rules of the Texas Commission on Environmental Quality or Texas Department of Health of Texas Railroad Commission, and/or any other rules state or federal authorities;
- Explosive material, as defined by the Department of Transportation under 49 CFR Part 173;
- Dioxin-containing wastes, identified by EPA as F020, F021, F022, F023, F026, and F027 wastes in 40 CFR 261.31;
- Ignitable compressed gas;
- Municipal garbage;
- Special waste from the Health-Care Related Facilities subject to 25 TAC Chapter 1 or 30 TAC Chapter 330.

4.3 Information Sources and Materials

Environmental Safety network access is available through the computer in the office at Yellowstone in Y152. The T1 cable is connected by a router to the BCM server. All Material Safety Data Sheets (MSDS's) can be retrieved by using OES network or the MSDS Online web based site also the (https://intranet.bcm.edu/index.cfm?tmp=research/enviro_safety/chemsafety/msds) hard copies of MSDS's have been organized in a binder located in the office for review.

Unless otherwise specified, regular full-time employees are expected to work at least forty (40) hours per workweek.

4.4 Waste Analysis Plan

Baylor College of Medicine

Waste Analysis Plan

Reference: Section IV.D, TCEQ Application

Introduction

The analysis philosophy for this plan is based upon the fact that the Baylor College of Medicine hazardous waste program will receive and store primarily very small quantities of waste, many of the containers received ranging from one pound to one gallon in size. In addition, the source of the wastes received is well documented and in many instances, the chemicals within the containers have not been used or, if used, have been contaminated with chemicals for which the composition and quantity is known. Given the excellent process and component knowledge available on these compounds, minimal analysis is required.

This waste analysis plan includes a description of the wastes expected to be received, the parameters for which each hazardous waste will be analyzed, the rationale for selection of these parameters, the sampling methods and test methods to be used, and the frequency of analysis. A copy of this plan will be maintained at the facility.

Waste Description

The types of hazardous wastes entering and exiting the facility are described below. Since the facility will operate only as a hazardous waste storage facility, no RCRA regulated treatment or processing will be performed on site. Incoming wastes may be handled by various methods intended to reduce their volume. The categories of incoming wastes are thus defined by general chemical characteristics while the outgoing waste categories are established by the waste's ultimate packaging configuration.

Incoming Waste

The hazardous waste to be stored will be generated from three general processes: (1) clinical, medical and research laboratory activities, (2) associated support services (e.g., maintenance) activities, and (3) the surplus chemicals exchange program. Surplus chemicals are made available for use by other researchers via an exchange program. Not all surplus chemicals are suitable for recycling due to contamination, lack of demand, age or other reasons; In addition, some surplus chemicals listed in the exchange program are not successfully placed with users and thus are removed from the program.

Those surplus chemicals unsuitable for use or removed from the exchange program will be considered solid waste, if appropriate. Based on the known composition and /or process generating the materials, a hazardous waste determination will then be made. All hazardous waste will be subject to a land disposal restrictions determination prior to their being handled, e.g. lab packed, fuel blended or consolidated. Whether the material is land disposal restricted will be noted in the operating record.

The hazardous waste will typically be received in "lab pack quantities," i.e. 5 gallons or less, however, containers up to 55 gallons (or 85 gallons with recovery drum) may be accepted. General waste categories have been established for convenience of discussion and include:

- Corrosives
- Cyanides and sulfides
- Organic solvents
- Mixed waste
- Metals and metallic salts
- Oxidizers
- Pesticides
- Reactives
- Miscellaneous

Selected specific EPA codes, compatibility groups and chemical compounds or classes of compounds representing these categories are presented in **Table 1**. Descriptions of the chemical groups are presented below, and typical physical and chemical characteristics are presented in **Table 2**. This table is not intended to be exhaustive. These wastes may be received as liquids, solids, or containerized gases, or various combinations of these phases. Asbestos containing materials, polychlorinated biphenyls (PCB's), and nonhazardous waste may also be accepted and, if accepted, stored and/or handled with compatible hazardous waste.

Chemical Groups

Corrosives. This chemical group includes compounds, mixtures, or solutions with a pH <2.0 or >12.5. Those with the lower pH's are considered acids, and those with the higher pH's are considered caustics. Acids are referred to as strong or weak according to the concentration of hydrogen ion that results from ionization. HCL, HNO_3, and H_2SO_4 are strong or highly ionized acids; acetic acid an carbonic acid are weak acids. All mineral acids are highly irritating and corrosive to human tissue. Caustics are any strongly alkaline material which has a corrosive or irritating effect on living tissue. While most are inorganic compounds or inorganic aqueous solutions, some organic acids, such as acetic acid, and organic bases, such as amines, also exhibit extreme pH's. In some cases, the organics (especially amines) may also be ignitable due to flashpoint. Since pH is typically the only hazardous characteristic, neutralization is an effective treatment method.

Cyanides and Sulfides. This chemical group includes inorganic compounds containing the cyanide (CN) or sulfide (S) molecule. Other inorganic carbon-nitrogen species include in this group are cyanates an thiocyanates. Sulfides of many metals are only slightly soluble in water.

The solubility of sulfides increases with increasing addition of the solution, leading to the evolution of hydrogen sulfide. These compounds are incompatible with acids, generating toxic hydrogen cyanide for hydrogen sulfide gas, but are typically compatible with alkaline materials. For purposes of the definition of this group, cyanides and sulfides are non-reactive, i.e., they do not react with water to generate toxic gases. Many of these compounds are insoluble in water, although some may be soluble. Treatment

typically includes controlled oxidation, e.g., with calcium hypochlorite, to break down the C=N Bond and to oxidize the S^{-} to sulfate.

Organic Solvents. This chemical group includes non-halogenated and halogenated hydrocarbons. Hydrocarbons are organic compounds consisting of the elements and hydrogen. They are derived principally from petroleum, coal, tar, and plant sources. The principal types include:

1. Aliphatic (straight chain)
   - Paraffins (alkanes)
   - Olefins (alkenes and alkadienes)
   - Acetylenes
   - Acyclic terpenes

2. Cyclic (closed ring)
   - Acyclic (cycloparafins[naphthenes], cycloolefins, cycloacetylenes)
   - Aromatic (hexagonal structure with three double bonds)
     a. Benzenes (one ring)
     b. Naphthalene (two rings)
     c. Cyclic terpenes

The non-halogenated hydrocarbons are typically liquids that are lighter that water, slightly soluble to soluble in water, and have a low flashpoint and high heat content of as much as 19,000 Btu's/lb, making them excellent candidates for fuel blending. Halogenated hydrocarbons are those in which one or more of the hydrocarbon atoms has been replaced by fluorine, chlorine, bromine or iodine. This greatly increases the anesthetic and narcotic action of aliphatic hydrocarbons. The halogenated hydrocarbons are typically liquids that are heavier than water, insoluble in water, and have high flashpoints (ethylene dichloride, flashpoint 56 °F, is an example exception), low heat contents, and high halogen (chlorine, fluorine, bromine, iodine) content, making them typically poor candidates for fuel blending.

Mixed Waste. These wastes are typically scintillation cocktail vials containing ethyl ether, toluene, or methyl ethyl ketone. Like the non-halogenated hydrocarbons, these are typically liquids that are lighter than water, slightly soluble to soluble in water and have low flashpoints and higher heat contents of as much as 19,0000 Btu/lb. These waste are typically received in small vials, and may be considered low-level radioactive.

Metals and Metallic Salts. This chemical group includes metals and metallic salts that are typically solids (mercury is a notable exception) and have varying solubilities in water or, in some cases, are insoluble. They are typically inert, but may contain metals, causing them to be toxic.

Oxidizers. This group of chemicals includes compounds that spontaneously evolve oxygen under slight heating. These compounds can react vigorously at ambient temperature when stored near or in contact with reducing materials such as cellulose and other organic compounds.

Pesticides. A pesticide is any substance, organic or inorganic, used to destroy or inhibit the action of plant or animal pests: the term thus includes insecticides, herbicides, rodenticides, miticides, etc. Virtually all pesticides are toxic to man to a greater or lesser degree. They may vary in biodegradability.

Reactives are those compounds which have any of the following properties.

1. Normally unstable and readily undergoes violent change without detonating.
2. Reacts violently with water.

3. Forms potentially explosive mixtures with water.
4. When mixed with water, generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.
5. A cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.
6. Capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
7. Readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
8. Forbidden explosives as defined in 49 CFR 173.51 and the classification of explosives in 49 CFR 173.52 and 49 CFR 173.53.

Miscellaneous. This chemical group represents compounds that do not meet the descriptions of other waste categories, but are regulated because of the characteristics of toxicity or are listed as "P" or "U" waste under 40 CFR 261.33.

Outgoing Waste

Hazardous waste received at the facility will be transported permitted off-site facility for disposal. Prior to off-site shipment, the land disposal restrictions determination assessment made on the incoming waste will be documented in the shipping papers in accord with regulatory requirements. In general, but not exclusively, hazardous wastes will be shipped off site in three configurations: lab packs, blended liquids, and consolidated solids (liquids may contain solids and solids may contain liquids).

SAMPLING AND ANALYSIS

Figure 1 presents an overview of the waste analysis process for hazardous wastes stored at the facility. This process is described below, and utilizes a visual assessment as the test method for the incoming wastes, since they are of known composition.

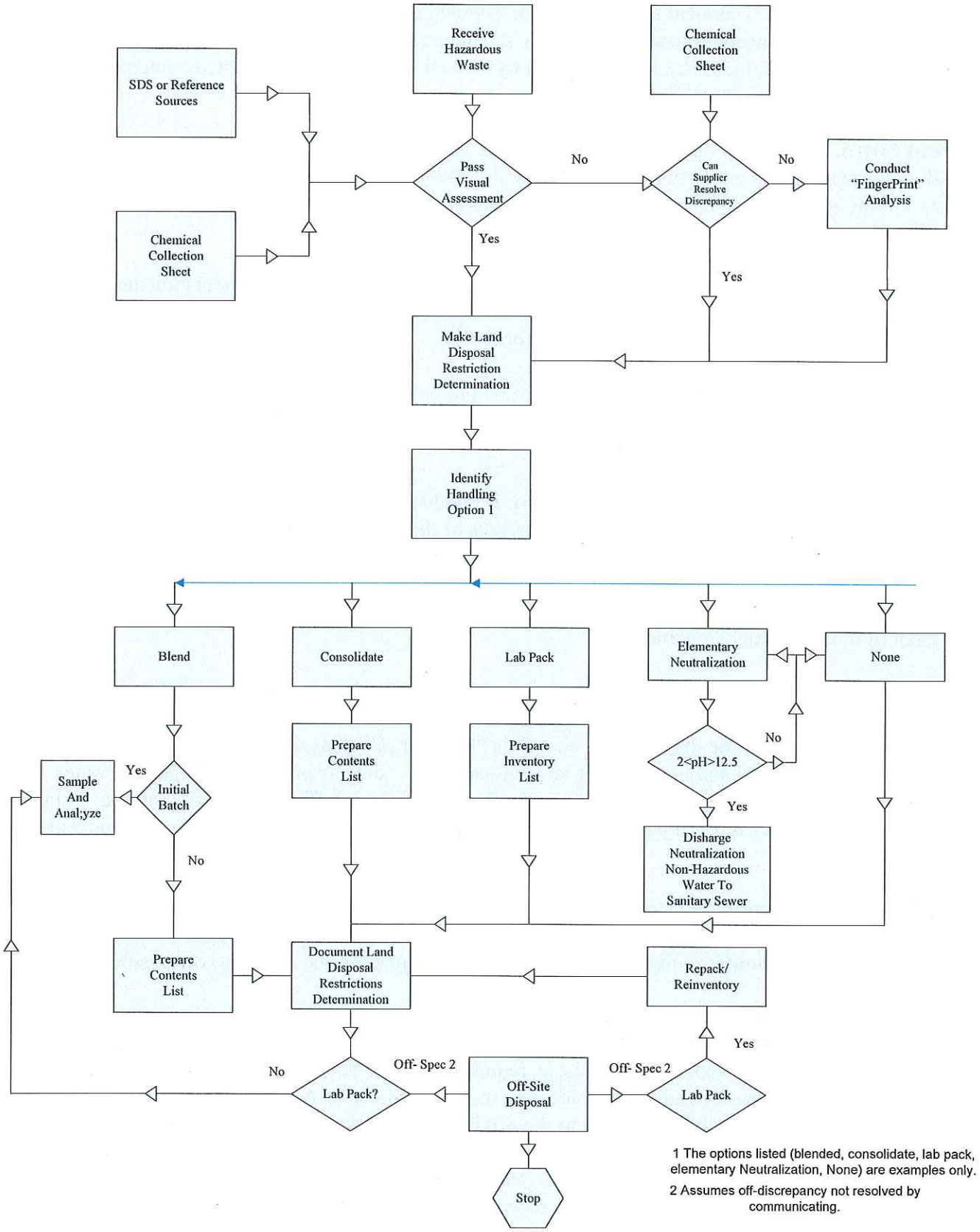
40 CFR 264.13 (general waste analysis) states in Paragraph (a) (1) that before a hazardous waste is stored; a detailed chemical and physical analysis of a representative sample of the waste must be obtained. Paragraph (a)(2) states that this analysis may include data developed under 40 CFR 261 and existing published or documented data on the hazardous waste or on hazardous waste generated from similar processes. 40 CFR 261.10 (criteria for identifying the characteristics of hazardous waste) allows for characteristics to be measured by available standardized test methods or reasonably detected by generators through their knowledge of their waste. These provisions allow for the use of existing published data and generator process knowledge in lieu of laboratory analyses. Since the Baylor College of Medicine faculty will only accept waste generated by Baylor College of Medicine (or affiliated) clinicians and researchers, generator process knowledge is excellent and will clearly meet this requirement. Use of the form illustrated in **Figure 1** provides the documentation necessary to demonstrate compliance with 40 CFR 264.13. The form provides complete documentation of both the researcher and the chemical name or mixture of components, including percentages. As the following discussion indicates, this process knowledge, adequate in itself, will be chemical characteristics with labeled contents for incoming wastes. Control reference information will consist of reference sources and Safety Data Sheets (SDSs). The latter constitute existing published data and are based on the analysis of the reagent-grade chemical. The SDS's are thus applicable to Baylor College of Medicine's waste because wastes will be received as reagent-grade chemicals or as mixtures or reagent-grade chemicals.

I

Incoming Wastes
Parameters, Basis for Selection, Test Methods, Sampling Methods, and Frequency of Analysis

A visual assessment will be performed on a specific number of containers, which will represent a sample of these containers, based upon the number of containers received in a working day; however, no assessment will be conducted for chemicals received in their original manufacturer's container. The number of containers selected for the assessment will be based on the information provided in **Table 3**. For example, if 10 containers were received in a shipment, one would be selected for visual assessment. Each individual waste stream would be assessed according to this methodology. This assessment will include a comparison of the Safety Data Sheet (SDS) or equivalent reference source labeling, physical form, color and odor information to that of the container and its contents and the accompanying chemical collection form, which will contain information similar to the form presented in **Figure 2**. Details of the visual assessment for each of these items are provided below, followed by information on the resolution of discrepancies identified during the visual assessment. A description of the SDS information system used as the source for physical form, color, and odor information is presented in a following subsection.

Figure 1
Baylor College of Medicine-Waste Analysis Plan
Waste Analysis Flow Chart



1 The options listed (blended, consolidate, lab pack, elementary Neutralization, None) are examples only.

2 Assumes off-discrepancy not resolved by communicating.

Labeling. The container labeling will be reviewed to determine whether the label provides sufficient composition information. Chemical formulas will be supplemented with chemical names, where available and as necessary for disposal purposes. The chemical names will be determined from reference sources, the chemical collection form, or the supplier. The physical characteristics of the listed contents will be compared with those of the actual contents.

Physical Form. Substantial variations in physical form may be acceptable in some cases. For example, if an adhesive material has partially or completely solidified, a solvent component has volatilized from a wax, or a compound has a freezing or melting point near ambient temperature, such variations are reasonably attributed to characteristics inherent to the compound.

Color. In assessing color, variations based on temperature, humidity, and for some chemicals, normal oxidation over time will be considered. Because of these potential variations, color will not be used as the sole characteristics for confirmation of labeling information.

Odor. For health and safety reasons, the container will not be opened to detect the odor of the contents. However, odor otherwise evident may confirm the information provided on the label, or in some cases, may indicate the presence of contaminants.

Visual Assessment Discrepancy Resolution. If the discrepancy in labeling, physical form, color, or odor cannot be reasonably attributed to characteristics of the compound, the researcher supplying the material may be asked to confirm the composition information provided. Researcher information is presented in the chemical collection form accompanying the material to the hazardous waste facility. Information from the chemical collection form may also be used to supplement the information provided on the label of the individual container.

If the discrepancy (ies) cannot be resolved, or there is no suitable reference source available for a particular compound, the material will be designated for further analysis sufficient to determine the characteristics allowing it to be disposed off-site. This "fingerprint" analysis will include testing sufficient to allow for off-site disposal and may include several basic tests, such as pH (using pH paper), water reactivity (by addition of water), ignitability (by introduction of a small flame above the sample, and by following the testing procedures in pages 18 and 19 in section 6 of the waste analysis section and **Table IV.C.**

Most of the materials requiring this testing will either become the sample, if small in size, or will be sampled by dripper or by pouring the material from the container. If the waste material is drummed, it will be sampled in a manner similar to that described for blended liquids in the outgoing waste subsection.

Incoming waste which fail the visual assessment and whose contents are apparently inconsistent with their labels will be stored for up to 90 days in a designated chemical cabinet pending the results of the investigation with the waste source or analysis, as required. If, after 90 days, the waste still fails the assessment and analysis does not adequately identify the material for EPA, DOT and disposal site characterization purposes, it will be returned to the original source. If analysis is not complete or is inconclusive by the 90 day period, a 30 day extension will be allowed and noted in the operating record. As long as analysis continues and documentation demonstrating that (1) analysis is being conducted, (2) the reason for delays, and (3) the dates of waste receipt and extensions are noted in the operating records, additional 30 day extension will be allowed.

Safety Data Sheet Information System

Facility personnel will have access to a number of chemical information sources, which will be used in conducting the visual assessment.

Safety Data Sheet can be accessed on the BCM intranet by utilizing the MSDS Online safety data sheet information system. This program is a web based system that can be accessed by BCM facility faculty and Staff 24 hour's day 7 days a week. The program occupies over a million safety data sheets. Safety Data Sheets that are not readily accessible can be requested by BCM and put online immediately. An example of and SDS generated by MSDS online is presented in **Figure 3**.

Reference Sources. With multiple sources for facility personnel to have access to detailed information, including chemical and physical characteristics, for virtually every chemical waste and the components of every chemical waste mixture anticipated fro receipt by the facility. Should these information sources prove inadequate, however, other chemical reference sources may be consulted.

Outgoing Waste

Lab Packs

Those materials for which lab packaging is the selected handling method will be packaged in a lab pack configuration. The lab packs may include any of the categories of hazardous waste described above in the Incoming Waste subsection, as well as non-hazardous or municipal exempt wastes. The contents of the lab packs will be defined by specific chemical compound and/or characteristics as listed on the inventory, thus analysis is not necessary.

Blended liquids

The blended liquids will typically include organic solvents and non-PCB oils. Sampling and analysis to be conducted on these wastes is described below.

Parameters, Test Methods, and Basis for Selection.

An initial analysis will be performed for each outgoing waste stream: (1) halogenated solvents, (2) non-halogenated solvents, and (3) oils. The initial analyses for the waste streams will include the parameters and test methods listed in **Table 4**. This table also includes the rationale for selection of these parameters and describes how the results of those tests will indicate waste stream variation in constituents. PCBs will only be run on oil waste streams since only these waste streams have the potential to be contaminated with PCBs (e.g., if the oil is from electrical transformers using PCBs). These parameters were selected in order to characterize the waste so that EPA hazardous waste segregation, e.g., halogenated versus non-halogenated, is being properly implemented, and to fulfill off-site disposal site requirements. Generators knowledge will be the method on determining which analysis to use. Typically (although not necessarily always), characteristics of blended liquids are expected to be as indicated in **Table 5**.

Frequency of Analysis.

The initial analysis will be used to confirm the composition and characteristics of the material based upon SDS and equivalent reference source information. Additional analyses will be repeated as necessary to ensure that it is accurate and up-to-date. As a minimum, it will be reported when Baylor College of Medicine has reason to believe that the process or operation generating the hazardous waste had changed.

Sampling Method.

A containerized liquid waste sampler (COLIWASA) as described in the USEPA guidance document, Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods, SW-846, third addition, section 9.2.2.4, or an equivalent method, will be used to sample the waste. Alternately, glass tubes, which approximate the COLIWASA for obtaining liquid samples and also allow for a visual assessment of the layers within the drum, will be used. Samples may be collected from several drums within a waste stream and composited to obtain the sample most representative of the waste stream.

Consolidated Solids

Consolidated solids may include spill clean-up debris, spent personal protective equipment (PPE), contaminated packing media, and other chemical solids. Materials such as the spill clean-up debris, spent PPE, and spent packing media will not be analyzed since the composition and characteristics of the material will be based upon the material spilled, the contaminants for which protection was sought, and the material leaked, respectively.

Chemical solids from the consolidation for various compatible solids will not be analyzed since the chemical composition will be based on listing of items consolidated, and since an SDS or equivalent reference source will be available for each item.

Off Specification Wastes

In the event that the off-site disposal facility to which the waste is sent notifies Baylor College of Medicine that the material received does not match the waste designated on the hazardous waste manifest, analysis of the waste stream will be conducted. The parameters will be selected based upon the disposal site's analytical profile, requirements or the apparent discrepancy. For lab packs, analysis may or may not be conducted. In some cases, the lab pack may be unpacked to identify and remove the off-specification waste. This item may be properly identified, or analyzed, as necessary.

Special Provisions for Reactive, Ignitable, or Incompatible Wastes

Reactive Wastes

Reactive wastes will typically be received in the lab pack quantities, including containerized gas cylinders. These materials will not be blended, consolidated or commingled, and may not even be opened. In some cases, for example for nitro compounds, water, and other compatible material may be added to the material to reduce or eliminate its reactive characteristics. They will be packaged as lab packs as soon as practical. An inert packing media will be used, which combined with the outside containerization will afford protection beyond that provided by the chemicals original container. All waste will be lab packed in facility that waste was generated and would be kiln ready. If multiple kiln ready lab packs that are compatible and can be commingled with other waste, then container would be opened to consolidate waste.

Ignitable Waste

The ignitable wastes handled may include ignitable oxidizers, ignitable solvents, ignitable reactives, and ignitable compressed gases. The oxidizers, reactives, and compressed gases will be handled in the manner described above for reactives, i.e., they will not be blended, consolidated or commingled and will be packaged as lab packs as soon as practical.

Ignitable solvents may be blended in grounded drums under fume hoods with filters. Non-sparking equipment (funnels, bung wrenches) will be used. Malodorous compounds such as pyridine, mercaptans, and acrylates will not be blended unless they are present in such significant concentrations that they cannot be detected by odor. Reactive compounds such as uninhibited acrolein, toluene diisocyanate and compounds listed by the DOT as "poison-inhalation hazard" will not be blended. In some instances, the

trial test described in the following subsection may be used to ensure the incompatible materials are not blended together.

Incompatible Waste

Incompatible wastes will not be blended, consolidated or otherwise commingled, unless such handling is conducted as acid-base neutralization under the RCRA exclusion for elementary neutralization. Any elementary neutralization conducted will be performed in a well ventilated area to prevent any potential hydrogen gas build up. The reaction product will be analyzed to verify that it has a pH greater than 2.0 and less than 12.5. If a pH between 2.0 and 12.5 is not achieved, the waste may be subjected to neutralization again and may be shipped off-site as a hazardous waste.

In order to ensure that incompatible waste are not commingled, the EPA guidance document, A Method for Determining the Compatibility of Hazardous Waste, EPA-600/2-80-076, will be consulted prior to conducting any blending or consolidation activities. As the commingling procedures are implemented, operating lists which identify compatible (and incompatible) materials may be prepared and updated. For those chemicals which have been handled previously, the operating list(s) may be consulted instead of the guidance document and, if applicable, the operating list(s).

For mulitcomponent wastes, use of the guidance document referenced above may not be practical. In such instances, a trial test may be performed. A sample from the existing drummed waste would be collected and combined with and aliquot of the waste material in question. The quantity of the sample to be used would be determined on a case-by-case basis. In general, the sample would be small enough to ensure that any reaction which may occur can be controlled.

Since the intent of the trial test is to simulate conditions upon entry of the chemical into the existing drummed waste, sampling by specific EPA approved methods is not necessary. In most cases, a grab sample or COLIWASA equivalent sampler will not be used for the drummed material. A dropper may be used to obtain the sample from the container or waste; the material may be poured from the container; or the container itself may be considered the sample.

In some cases, for instance if the mixture contains or is suspected to contain polymerizable components or concentrations of acetic anhydride, which has an initially slow rate of reaction, it may be prudent to assess the results after a 24 hour period has elapsed. For detection of toxic gases which may evolve during the trial test, varieties of detection tubes are commercially available and may be used. The mechanism by which these tubes work includes aspiration of the gas through a tube specific for the gas ingestion. A change in color in the tube media indicates the presence of the gas, the concentration of which is proportional to the length of the change in color in the tube.

Quality Control

Quality Control (QC) includes both field and analytical quality control. Field quality control includes field sampling activities while analytical control consists of those measures taken to ensure that the laboratory data is of good quality.

Field Quality Control

Samples will be collected by Baylor College of Medicine personnel or third party. These personnel will be trained to properly collect samples through the personnel training program. Facility personnel will also be trained in the use of this waste analysis plan. Upon determination that a material requires sampling and analysis, the individual will consult the waste analysis plan and determine the analytical parameters required, and the appropriate sampling methods and holding times, presented in **Table 6**. A chain of custody form, such as the one presented in **Figure 4** will also be completed.

Analytical Quality Control

The analysis of blended liquids will be performed by one or more outside commercial laboratories. The selected laboratories will have a written quality assurance/quality control (QA/QC) plan. Typically commercial laboratory QA/QC procedures are described briefly in the following section. This information is presented as an example only.

Laboratory QA/QC Objectives for Commercial Analysis

The objectives of the laboratory's QA/AC plan are to implement specific procedures to obtain measurement data and to define the goals for the characteristics of these data which are:

- Accuracy
- Precision
- Reliability; and
- Credibility

Accuracy is reported as the percent recovery of a parameter from a sample of known value with a given analytical procedure, and analyst. Precision of analytical results may be established as the standard deviation from true values or from the mean of replicate analysis.

The reliability and credibility of analytical laboratory results are established by the inclusion, as an integral part of any analytical procedure, of a program or randomly selected replicate analyses and analysis of standards or spiked samples.

Analytical Procedures

All analytical methods are based on accepted government and industry standards and contain the following information:

- Scope-the procedure's applicability
- Principle-the theoretical basis for the procedure.
- Interferences-known interfering agents which would cause difficulty in performing the laboratory analysis or would lead to erroneous results.
- Apparatus-equipment required to perform the laboratory analysis.
- Reagents-the reagents required, the steps involved in preparing the reagents, and instructions on storage requirements and retention times.
- Procedure-the sequence of activities to be followed, including sample preparation or pretreatment, sample storage requirements, instrument set-up, standardization or calibration, sample analysis, calculations, and glassware cleaning facility.
- Quality Control Requirements-the QC checks to be performed and the acceptance criteria used to evaluate the QC data.
- References-the publications from which the information was derived, for example:
    - Standard Methods for the Examination of Water and Waste Water, American Public Health Association
    - Annual Book of Standards, American Society for Testing and Materials
    - Methods for Chemical Analysis of Water and Waste, Environmental Protections Agency.
    - Test Methods for Evaluating Solid Waste, SW-846, Environmental Protection Agency.

Laboratory Sample Chain of Custody

After collection, identification, and shipment to the laboratory, samples will be maintained under the following chain of custody procedures.

- Identification of responsible party to act as sample custodian at the laboratory and authorized to sign for incoming field samples, obtain documents of shipment and verify the data entered into the sample custody records.

- Provision for a laboratory sample custody log consisting of serially numbered standard lab tracking report sheets.
- Assignment of a unique laboratory number to each sample received.
- Specification of laboratory sample custody procedures for sampling, handling, storage, and disbursement for analysis.

Laboratory Instrument Calibration Procedures

Balances, gauges, thermometers, instruments and other testing devices used in activities affecting sample analysis accuracy and precision will be calibrated, adjusted or controlled to maintain instrument reliability and detection limits specified in the testing procedures.

Sample analysis, testing, and measuring devices will be calibrated at scheduled intervals against certified standards which are traceable rot recognized national standards. The intervals between calibrations will be based on the type of equipment, frequency of use, and manufacturer's specifications or recommendations. Those testing and measuring devices which do not require calibration shall be checked periodically.

Calibration will be performed in an environment which will not affect calibration accuracy. Calibration standards will be controlled. All calibrations or calibration standards will be traceable to national standards. Newly acquired equipment will be calibrated before use. Equipment subject to repairs or modification which might affect calibration must be recalibrated before use.

A current record of all equipment calibrations will be maintained. This record will contain the identification of device or instrument; model number; manufacturer; calibration frequency; name of person performing calibration, and calibration date.

Data Reduction, Validation, and Reporting

The laboratory will use a bound logbook or a computerized system for sample check-in, tracking of samples, through the laboratory, assignment of laboratory analyses, and sample check-out. The review is accomplished on two levels; review of raw data for each analysis and review of the final results to check for consistency or agreement of the results between all parameters.

Data Reduction and Expression of Results

Raw data are generated in the laboratory in one of the following ways:

- Data from simple analytical procedures such as gravimetric and titrametric procedures are converted into final form by means of desk calculation. One or two step calculations are performed manually by the technician and final data are recorded in parameter notebooks (and stored on the computer, if applicable).
- Atomic absorption spectrophotometers are calibrated to display direct concentration whenever possible. Some analyses require the analyst to construct calibration curves using absorbance vs. concentration. Other analyses, such as those using the method of standard additions, require manual computation with desk calculators to obtain the final results.
- All liquid chromatographs, gas chromatographs, and gas chromatographs/mass spectrometers (GC/MS) are equipped with programmable data systems. These give automatic generation of parameter data in final reported form.

The final expression of a result is rounded off properly to contain only significant figures.

Validation of Results

The analysis assignment sheet is reviewed by the specific Laboratory Group Leader prior to its submittal to the data entry clerk. The review process includes a complete check of the analyst's calculations on both standards and samples. The analysis results are reviewed again by the Laboratory Supervisor and finally by the Laboratory Manager.

The data analysis assignment sheets are checked for completeness; correctness; appropriate significant figures; and credibility of analytical data based on past experience with similar samples.

Storage of Analytical Data

Current analytical data will be retained in the laboratory files and on the computer disks for a minimum of one year. The files will then be transferred to archives.

Laboratory Quality Control Checks

- Laboratory Duplicates - Laboratory duplicate samples will be analyzed to monitor for intra-laboratory precision of data generated. These samples will be analyzed on no less than a five percent basis with at least one replicate if fewer than twenty samples are analyzed for any particular parameter.
- Spiked Samples - Spiked samples will be analyzed to monitor for accuracy of data due to interferences which may be present in the sample and thus influence the reported result. The spiked samples will be tested on no less than a five percent basis for any particular parameter. At least one spiked sample will be run if fewer than twenty samples are analyzed.
- Method Blanks - Method blanks are accomplished by treating purified water or ultra-cleaned sand in the same manner as samples to monitor potential contamination of samples due to contamination in solvents, reagents, and glassware or laboratory equipment. Method blanks are included with each set of samples.
- Equipment Blanks - Equipment blanks will be taken to monitor potential contamination of samples due to improper or ineffective cleaning of equipment.
- Quality Control Samples - Quality control samples will be analyzed to monitor for accuracy of data generated. The source of theses samples is the EPA whenever possible; otherwise, samples will be purchased from a reputable independent source. The EPA check samples will be analyzed at the beginning of the project and also at regular intervals during the project.
- Surrogate Samples - Surrogate samples will be analyzed in accordance with EPA guidelines for GC/MS analysis. Deut rated standards are analyzed along with unknown samples to insure recovery of these compounds in analysis.

- DFTPP Criteria Test-This test will be utilizing for the GC/MS instrument prior to Base/Neutral or Acid Fraction analyses. The GC/MS instrument is certified according to EPA protocol by injection with DFTPP (decafluorotripphenylphosphine) and comparing the relative ion abundances for key ions. This instrument is adjusted and calibrated until the criteria are met.
- BFB Criteria Test-This test will be utilized daily to check the performance of the GC.MS system for volatile organic analyses (VOA). The instrument is injected with BFB (bromofluorobenzene) and the relative abundances of key ions are compared. The instrument

is adjusted until the prescribed criteria are met.

- Reagent Checks-Reagent checks are accomplished by treating known laboratory blanks in the same manner as samples and reviewing data to verify that no contamination has been introduced as a result of reagents.
- Internal Standards-Internal standards are prepared in the laboratory and are referenced against known external standards to insure their accuracy.
- Calibration Standards are Devices-Standards will be utilized according to the type and method analysis, in particular when instrumental methods are employed.
- Control Charts-Control charts will be utilized to effectively monitor and periodically review the precision and accuracy of the data generated as a result of duplicate and spike analysis. These charts also aid in observing trends in data so that corrective action may be taken before data generated are out of control.

Laboratory Preventive Maintenance

The laboratory utilizes a formal system to maintain control of all analytical instruments, The procedure details the steps to be taken to calibrate and standardize instruments to ensure the analytical data produced are accurate. Records of all calibrations, preventative maintenance, and service calls are readily available from laboratory quality assurance files.

Corrective Action

Control charts are used to monitor the day to day variations in the precision or accuracy of routine analyses and can detect trends in these variations. These control charts fall into two categories: precision control charts, and accuracy control charts. Data falling outside the upper control limit or the lower control limit if either of these charts indicate and out of control situation. Corrective actions will be taken to ascertain the cause of the out of control situation.

Should corrective action be necessary, the laboratory manager will notify het client. The laboratory manager will outline he corrective action taken and whether the problem has been corrected. Also, the client will be notified if constituents of the concern are detected in the field blanks. Results of performance or system audits or internal quality control analyses may trigger corrective action.

Table 1
Baylor College of Medicine – Waste Analysis Plan
Representative Hazardous Waste List

Chemical Group	*Representative EPA Hazardous Waste Numbers*	*Representative Compatibility Groups*	*Representative Chemicals and/or Chemical Classes*
Corrosive	Includes D002 and /or and U wastes listed for corrosivity. (U006, U020, U023, U123, U134, etc.) Please refer to Table 1 in Section 6.	1 – Acids, mineral, non-oxidizing 2 – Acids, mineral, oxidizing 3 – Acids, organic 7 – Amines, aliphatic and aromatic 10 – Caustics 15 – Fluorides, inorganic	5 Acetic Acid, chromic acid, formic acid, hydrochloric acid, hydrofluoric acid, nitric acid, perchloric acid, sodium hydroxide, sodium carbonate, sulfuric acid, organic amines
Cyanides and Sulfides	Includes non-listed and P and U listed cyanides and sulfides. P listed cyanides (P013, P021, P029, etc.) P and U listed sulfides (P022, U205, U189, etc.) Please refer to Table 1 in Section 6.	11 – Cyanides 24 – Metals and metal compounds, toxic 33 – Sulfides, inorganic	Barium cyanide, copper cyanide, potassium cyanide, strontium sulfide, carbon disulfide, selenium sulfide, phosphorus sulfide
Organic Solvents	Includes D001, D018-D043 volatiles and semi-volatiles, F001-F005 solvents, and U listed for ignitability or with > 5,000 BTU's/lb. U listed U001, U002, U003, U004, U005, U006, U007, U008, U009, U010, U011, U012, U014, U015, U016, U017, U018, U019, U020, U021, U022, U023, U024, U025, U026, U027, U028, U029, U030, U031, U032, U033, U034, U035, U036, U037, U038, U039, U041, U042, U043, U044, U045, U046, U047, U048, U049, U050, U051, U052, U053, U055, U056, U057, U058, U059, U060, U061, U062, U063, U064, U066, U067, U068, U069, U070, U071, U072, U073, U074, U075, U076, U077, U078, U079, U080, U081, U082, U083, U084, U085, U086, U087, U088, U089, U090, U091, U092, U093, U094, U095, U096, U097, U098, U099, U101, U102, U103, U105, U106, U107, U108, U109, U110, U111, U112, U113, U114, U115, U116, U117, U118, U119, U120, U121, U122, U123, U124, U125, U126, U127, U128, U129, U130, U131, U132, U133, U134, U135, U136, U137, U138, U140, U141, U142, U143, U144, U145, U146, U147, U148, U149, U150, U151, U152, U153, U154, U155, U156, U157, U158, U159, U160, U161, U162, U163, U164, U165, U166, U167, U168, U169, U170, U171, U172, U173, U174,	4 – Alcohols and glycols 5 – Aldehydes 7 – Amines, aliphatic and aromatic 13 – Esters 14 – Ethers 16 – Hydrocarbons, aliphatic 17 – Halogenated organics 10 – Keytones 28 – Hydrocarbons, aliphatic 28 – Hydrocarbons, aliphatic, saturated 101 – Combustible and flammable materials, miscellaneous	Amyl alcohol, methanol, acetaldehyde, ethyl ether, tetrahydrofuran, benzene, toluene, dichloromethane, carbon tetrachloride, acetone, methyl ethyl, ketone, pentene, cyclohexane, gasoline, kerosene, neutralized organic amines

Table 1
Baylor College of Medicine – Waste Analysis Plan
Representative Hazardous Waste List

Chemical Group	*Representative EPA Hazardous Waste Numbers*	*Representative Compatibility Groups*	*Representative Chemicals and/or Chemical Classes*
	U176, U177, U178, U179, U180, U181, U182, U183, U184, U185, U186, U187, U188, U189, U190 U191, U192, U193, U194, U196, U197, U200, U201, U203, U204, U205, U206, U207, U208, U209, U210, U211, U213, U214, U215, U216, U217, U218, U219, U220, U221, U222, U223, U225, U226, U227, U228, U234, U235, U236, U237, U238, U239, U240, U243, U244, U246, U247, U248, U249, U271, U278, U279, U280, U328, U353, U359, U364, U367, U372, U373, U387, U389, U394, U395, U404, U409, U410, U411 Please refer to Table 1 in Section 6.		
Mixed Wastes	Includes D001, D018-D043 Volatiles and semi-volatiles, F001-F005 Solvents, and U Wastes Listed for Ignitability. U listed waste (U220,U239)	16 – Hydrocarbons, aromatic 19 – Ketones 114 – Ethers	Scintillation cocktail vials containing ethyl ether, toluene, methyl ethyl ketone
Metals and Metallic Salts	Includes D004 through D011 and/or P and U Listed Wastes containing metals. U listed waste containing metals (U151, U224, and U249). P listed waste containing metals (P006)	15 – Fluorides, inorganics 24 – Metals and metal compounds, toxic 23 – Metals, other elemental and alloys as sheets, rods, drops, moldings, etc. 26 – Nitrites	Barium carbonate, cadmium sulfate, lead phosphate, mercury, mercuric chloride, selenium, silver chloride, lead acetate
Oxidizers	D001	24 – Metals and metal compounds, toxic 104 – Oxidizing agents, strong	Nitrates, chlorates, permanganates, peroxides
Pesticides	D002, D012, D016, D017, and/or P and U wastes that are pesticides. (P004, P037, P050, P051, P059, P123, U240, U233, U060, U061, etc.)	9 – Carbamates 12 – Dithiocarbamates 32 – Organophosphates, phosphorothioates, phosphorodithioates	2,4-Dichlorophenoxy-acetic acid, salts and esters, Silvex, DDD, DDT, Aldrin, Dieldrin, Endrin, Endosulfan, Toxaphene

Table 1
Baylor College of Medicine – Waste Analysis Plan
Representative Hazardous Waste List

Chemical Group	*Representative EPA Hazardous Waste Numbers*	*Representative Compatibility Groups*	*Representative Chemicals and/or Chemical Classes*
Reactives	Includes D003 and/or P and U wastes listed for reactivity. (U006, U133,U133,P048,P063,P068)	8 – Azo compounds, diazo compounds and hydrazines 18 – Isocyanates, 21 – Metals, alkali and alkaline earth, elemental 22 – Metals, other elemental alloys as powders, vapors or sponges 25 – Nitrides 30 – Peroxides and hydroperoxides, organic 102 – Explosives 103 – Polymerizable compounds 104 – Oxidizing agents, strong 105 – Reducing agents, strong 107 – Water reactive compounds	Acetyl chloride, aluminum chloride, butyl lithium, chlorine dioxide, hydrogen cyanide, hydrogen sulfide, hydrides, hydrazine, thionyl chloride, benzoyl peroxide, 2,4-dinitrotoluene, sodium metal

Table 1
Baylor College of Medicine – Waste Analysis Plan
Representative Hazardous Waste List

Chemical Group	*Representative EPA Hazardous Waste Numbers*	*Representative Compatibility Groups*	*Representative Chemicals and/or Chemical Classes*
Miscellaneous Lab Pack Chemicals	**D Listed Waste** D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D012, D013, D014, D015, D016, D017, D018, D019, D020, D021, D022, D023, D024, D025, D026, D027, D028, D029, D030, D031, D032, D033, D034, D035, D036, D037, D038, D039, D040, D041, D042, D043 **F Listed Waste** F001, F002, F003, F004, F005 **P Listed Waste** P001, P002, P003, P004, P005, P006, P007, P008, P009, P010, P011, P012, P013, P014, P015, P016, P017, P018, P020, P021, P022, P023, P024, P026, P027, P028, P029, P030, P031, P033, P034, P036, P037, P038, P039, P040, P041, P042, P043, P044, P045, P046, P047, P048, P049, P050, P051, P054, P056, P057, P058, P059, P060, P062, P063, P064, P065, P066, P067, P068, P069, P070, P071, P072, P073, P074, P075, P076, P077, P078, P081, P082, P084, P085, P087, P088, P089, P092, P093, P094, P095, P096, P097, P098, P099, P101, P102, P103, P104, P105, P106, P108, P109, P110, P111, P112, P113, P114, P115, P116, P118, P119, P120, P121, P122, P123, P127, P128, P185, P188, P189, P190, P191, P192, P194, P196, P197, P198, P199, P201, P202, P203, P204, P205 **U Listed Waste** U001, U002, U003, U004, U005, U006, U007, U008, U009, U010, U011, U012, U014, U015, U016, U017, U018, U019, U020, U021, U022, U023, U024, U025, U026, U027, U028, U029, U030, U031, U032, U033, U034, U035, U036, U037, U038, U039, U041, U042, U043, U044, U045, U046, U047, U048, U049, U050, U051, U052, U053, U055, U056, U057, U058, U059, U060, U061, U062, U063, U064, U066, U067, U068, U069, U070, U071, U072, U073, U074, U075, U076, U077, U078, U079, U080, U081, U082, U083, U084, U085, U086, U087, U088, U089, U090, U091, U092, U093, U094, U095, U096, U097, U098, U099, U101, U102, U103, U105, U106, U107, U108, U109, U110, U111, U112, U113, U114, U115, U116, U117, U118, U119, U120, U121, U122, U123, U124, U125, U126, U127, U128, U129, U130, U131, U132, U133, U134, U135, U136, U137, U138, U140, U141, U142, U143, U144, U145, U146, U147, U148, U149, U150, U151, U152, U153, U154, U155, U156, U157, U158, U159, U160, U161, U162, U163, U164, U165, U166, U167, U168, U169, U170, U171, U172, U173, U174, U176, U177, U178, U179, U180, U181, U182, U183, U184, U185, U186, U187, U188, U189, U190 U191, U192, U193, U194, U196, U197, U200, U201, U203, U204, U205, U206, U207, U208, U209, U210, U211, U213, U214, U215, U216, U217, U218, U219, U220, U221,	6 – Amides 20 – Mercaptan and other organic sulfides 25 – Nitrides 27 – Nitro compounds 31 – Phenols and cresols 34 – Epoxides 106 – Water and mixtures containing water	Fluoranthene, mitomycin C, maleic anhydride, phenol

Table 1
Baylor College of Medicine – Waste Analysis Plan
Representative Hazardous Waste List

Chemical Group	*Representative EPA Hazardous Waste Numbers*	*Representative Compatibility Groups*	*Representative Chemicals and/or Chemical Classes*
	U222, U223, U225, U226, U227, U228, U234, U235, U236, U237, U238, U239, U240, U243, U244, U246, U247, U248, U249, U271, U278, U279, U280, U328, U353, U359, U364, U367, U372, U373, U387, U389, U394, U395, U404, U409, U410		

Section 5
Baylor College of Medicine
Contingency Plan

BAYLOR COLLEGE OF MEDICINE CONTINGENCY PLAN

REFERENCE: Section III.E. TCEQ Application

Introduction

This contingency plan has been prepared in accordance with the Environmental Protection Agency (EPA) rules and regulations specified in 40 CFR 264, Subpart D. The purpose of this plan is to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous constituents to air, soil, or surface water at Baylor's hazardous waste storage room and facility. This plan describes the actions Baylor personnel must take in response to any fires, explosions, or releases of hazardous waste or hazardous constituents in Baylor's hazardous waste storage room or facility, which could threaten human health or the environment. A copy of the plan will be maintained at both locations.

In the unlikely event of a fire, explosion, or release of hazardous waste or hazardous waste constituents, which could threaten human health or the environment the provisions of this plan will be carried out immediately.

Emergency Coordinator

In accordance with the regulations, at least one employee either is on the facility premises or on call (i.e., available to respond to an emergency by reaching the facility within a short period of time) with the responsibility for coordinating all emergency response measures. This emergency coordinator is thoroughly familiar with all aspects of this contingency plan, all operations and activities at the facility, the location and characteristics of waste handled the location of all records within the facility, and the facility layout. In addition, the emergency coordinator has the authority to commit the resources needed to carry out this contingency plan.

A list of the names, addresses, and phone numbers (office and home) of all persons qualified to act as emergency coordinator as of August 2013, is presented in Table 1 of this plan. Specific individuals may change, however, at least one primary and one alternate emergency coordinator will be designated at all times. The Supervisor, Environmental Safety is the primary emergency coordinator. Alternate emergency coordinators will be dependent upon planning schedules.

Table 1
Baylor College of Medicine - Contingency Plan
Emergency Coordinator and Alternates as of August 2013

Title	Name and Address[a]	Office Phone Number	Home Phone Number	Pager Phone Number[b]
Supervisor, Environmental Safety	William Davis 1818 Castle Oaks Dr. Pearland, TX 77581	(713) 798-3851	(281) 648-1733	(281) 278-2915
Hazardous Waste Manager	David McCormick 9800 Pagewood Lane #3004 Houston, Texas 77042	(713) 798-1583		Cell # (713) 398-7209
Director of Environmental Safety	Paul Muraca 9029 Rolling Oak Court Montgomery, TX 77316	(713) 798-6617	(936) 588-3719	Cell # (713) 591-8359

a Actual individuals may change, however, one primary and one alternate emergency coordinator will always be designated.
b Through the use of pagers, the emergency coordinator or designated alternate are available 24-hours a day.

Notification

Any personnel observing a fire, explosion, or an unplanned release of hazardous waste or hazardous waste constituents will immediately notify the emergency coordinator. To report an emergency situation during working hours (8:00 A.M. to 5:00 P.M.), personnel may call 713/798-4799. After working hours, personnel will call home phone numbers or cell numbers of the designated emergency coordinator or alternates. Personnel may obtain home phone numbers or cell phones from the Baylor College of Medicine Security Department at 713/798-3000. After hours, the designated emergency coordinator or alternates should be contacted in the following order:

1. William T. Davis, CHMM, Supervisor, Environmental Safety
2. David McCormick, Hazardous Waste Manager
3. Paul Muraca, M.S., Director of Environmental Safety

General Procedures

In the unlikely event of an imminent or actual emergency situation at the facility, the emergency coordinator (or his designee, when the emergency coordinator is on call) will immediately take the following steps. These steps are general; more specific procedures are discussed in the emergency response section of this plan.

1. Immediately activate internal alarm/communication system utilizing a signal (fire alarm) to notify all facility personnel.
2. Initiate appropriate response actions and evacuate affected areas if necessary. Notify all appropriate state and/or local agencies with designated response roles if their help is needed. The appropriate agencies will be notified by telephone.
3. Identify the character, exact source, amount, and areal extent of any released materials. This assessment may be conducted through observation, review of facility records or shipping manifest, and, if necessary chemical analysis. Determine if a reportable quantity has been exceeded. Please refer to Reportable Quantities of Hazardous Substances in Appendix A of this report. If it is determined that a reportable quantity has been exceeded then the necessary notification must be made. Please refer to SARA/CERCLA Notification Requirements in Appendix B of this plan.
4. Assess possible hazards to human health or the environment that may result from the release, fire, or explosion. This assessment must consider direct and indirect effects of the release, fire, or explosion, including the effects of any toxic, irritating, or asphyxiating gases that are generated. In addition, the effects of any hazardous surface water run-off from the water or chemical agents used to control fire and heat induced explosions must be included in this assessment.
5. If it has been determined that the facility has had a release, fire, or explosion which could threaten human health or the environment outside the facility the emergency coordinator will notify, by telephone, the appropriate local authorities. The emergency coordinator will be available to assist the appropriate officials to decide whether local areas should be evacuated. In addition, the emergency coordinator will immediately notify the TCEQ District Supervisor according to procedures set out in section 4.1 through 4.3 of the "State of Texas Oil and Hazardous Substances Spill Contingency Plan". This report, submitted to the TCEQ District Supervisor, will include:
   - The date and time of spill;
   - The type of material spilled;
   - An estimate of the quantity of material spilled;
   - The exact location of the spill, including the name of the waters involved or threatened;

- The source of the spill;
- The name, address, and telephone number of the party in charge of, or responsible for, the facility or activity associated with the spill;
- The extent of actual and potential water pollution;
- The party at the spill site who is in charge of operations at the spill site and the telephone number of this party;
- The steps being taken or proposed to contain and clean up the spilled material;
- The extent of injuries, if any; and
- Possible hazards to human health and the environment (air, soil, water, wildlife, etc.).

When warranted, the emergency coordinator, owner, or operator will also notify the National Response Center at 800/424-8802, the Texas Commission on Environmental Quality at 800/832-8224, Texas Commission on Environmental Quality at 713/767-3500 (if the TCEQ cannot be reached, the EPA Emergency Response-Dallas at 800/887-6063 may be contacted), and the U.S. Coast Guard may be contacted, if nautical waters are involved, at 713-674-8488. Any reports which are submitted to the Texas Department of Health (TDH) and the National Response Center must include the following information:

- Name, address, and telephone number of the facility;
- Time and type of incident (e.g., fire, explosion);
- Name and quantity of released materials to the extent known;
- Extent of injuries, if any; and
- An assessment of possible hazards to human health or the environment, outside the facility.

6. Will take all reasonable measures to ensure that fires, explosions, and releases do not occur, recur, or spread to other hazardous waste at the facility. These measures include stopping processes and operations, collecting and containing released wastes, or removing or isolating containers.
7. If the facility (or portion of the facility) stops operations in response to a fire, explosion, or release, the emergency coordinator will monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment.
8. Immediately after an emergency, the emergency coordinator will take actions to provide for storing, processing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion.
9. Ensure that the area(s) affected by an environmental incident are properly secured. The storing, processing, or disposing of waste which may be incompatible with the released material must be prevented until cleanup procedures are completed. Before operations are resumed, ensure that in the affected area(s) of the facility all emergency equipment listed in this plan is cleaned and fit for its intended use. The Executive Director and the TCEQ District Office will be notified that the facility is in compliance with Subsection III.E.1.2.3 of this Part B permit application before operations are resumed in the affected area(s).

10. It will be noted in the facility's operating record the time, date, and details of any incident that requires implementation of this contingency plan. Within 15 days after the incident, a written report will be submitted to the Executive Director and the District Office. The following will be included in this report.

11.

- Name, address, and telephone number of the owner or operator;
- Name, address, and telephone number of the facility;

- Date, time, and type of incident (e.g., fire, explosion);
- Name and quantity of material(s) involved;
- The extent of injuries, if any;
- An assessment of actual or potential hazardous to human health or the environment, where this is applicable; and
- Estimated quantity and disposition of recovered material that resulted from the incident.

Emergency Response

The emergency response procedures described below are designed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous constituents to air, soil, or surface water. These procedures are intended only as guidelines. Dependent upon the situation additional emergency response actions may be required.

Chemical Composition of Wastes

Wastes stored in the hazardous waste storage areas may include any of the following chemical groups, stored in ≤55 gallon containers.

- corrosives,
- oxidizers,
- poisons,
- reactives,
- flammable and combustible materials,
- pesticides,
- cyanides,
- sulfides, and other regulated materials in liquid, solid, and containerized gas forms.

The most probable emergency situations would include releases of liquids, fires, and/or possibly explosions. Emergency procedures will include, where applicable, stopping hazardous waste processes and operations, collecting and containing released waste, removing or isolating containers, and using other measures as needed.

Releases

An assessment of the type of material(s) released should be conducted utilizing analysis, knowledge of the waste, observation, Safety Data Sheets (SDS), and/or, if applicable, shipping manifest or other facility records. This assessment should also include, exact source, amount, and extent of the released material.

In the unlikely event of a release, hazardous waste processes and operations will be stopped to ensure that waste(s) which may be incompatible with the released material(s) is not stored, processed, or disposed until clean up procedures are completed.

Releases should be prevented from spreading to other hazardous wastes. Releases can be contained by placing a leaking drum/container in a salvage drum and spreading appropriate absorbent on the spill. Any absorbent or other materials used to clean up the spill should be placed in a properly marked hazardous waste drum until it can be analyzed and disposed. Equipment used during the clean up process will be properly decontaminated prior to return to storage. When clean up procedures are completed, the recovered materials and the drummed clean up materials will be properly stored and/or processed until disposed.

During the clean up process, personnel should be using the appropriate personnel protective equipment. An evaluation should be conducted to determine the proper level of personal protective equipment.

Fire or Explosion

An assessment of the character, exact source, amount, and extent of the fire or explosion should be conducted immediately using observation, analysis, knowledge of the waste, shipping manifests, SDS's, or facility records. Any fire or explosion in the hazardous waste storage facility or room has the potential for releasing toxic gases, vapors, or fumes; therefore, monitoring should be conducted for gas generation. A visual assessment will be conducted for the release of toxic gases, vapors, or fumes. Actions should be taken to ensure that all personnel are utilizing the appropriate level of personnel protective equipment.

The fire should be controlled using the proper extinguishing agent for the burning material. If other drums or containers in the area present an explosive risk, then action should be taken to keep these drums or containers cool, unless this action would present another hazard. For example, water may be used if there are no chemicals in the area, which react with water, or drums/containers could be removed or isolated.

Pressure buildup in drums, and thus explosions caused by pressure buildup, will be prevented and detected through the following operating procedures:

1. Since 55-gallon drums of liquid are not typically received at the facility, buildup can be prevented through facility operations and container management.
2. Drum bungs will not be sealed tightly. This will allow breathing room and prevent drum expansion[1].
3. All drums will be opened slowly and in a manner so as to allow for the controlled release of pressure buildup.
4. The heating and cooling system for the facility will be maintained so as to ensure any temperature changes are effected incrementally and to prevent drastic temperature changes over brief periods of time.
5. Approximately 2 inches of headspace or freeboard will be maintained in each drum to allow for liquid/vapor expansion.
6. Inspections will include observing the containers for drum or lid deformities or other indications of pressure buildup, such as pings or other sounds caused by drum expansion.

Assessment of Possible Hazards

In the unlikely event of a sudden release, fire, or explosion the materials that are stored in the facility or room may present possible hazards to human health and the environment. Please note that any possible effects on the environment and human health will be dependent upon the specific chemical. The human health and environmental effects that are described below are very general.

All of the waste stored at the Yellowstone Blvd. Facility will be stored in an enclosed building with a secondary containment system. Further, the ignitable wastes are stored in a special vault equipped with a blow-out panel and other features noted in the engineering report. All ignitable and reactive chemicals are stored at least 50 feet from the property line. If suddenly released, the drummed solvents may present a fire and explosion hazard; however, in consideration that these drums will be stored inside an enclosed vault, the effect on the environment is expected to be minimal. Any sudden release from the lab packs to the environment is highly unlikely. If a release does occur, it will most likely be a very small quantity and, therefore, the effect on the environment is considered to be very minimal.

The possible human health effects for each of the chemical groups that may be stored in the facility are described below.

Corrosives

Upon contact with liquids or solids, corrosive material may cause pain, severe irritation to the skin, second to third degree burns on tissue, and severe injury to the eyes. Inhalation of dust or fumes may cause damage to the upper respiratory tract and lungs, coughing, a choking sensation, and irritation to the nose and lungs. Ingestion of corrosive material may cause severe gastrointestinal irritation and severe scar formation or perforation.

Oxidizers

Upon contact, oxidizers may cause burns to skin and tissue. Ingestion may cause severe distress to the gastrointestinal system, and possibly death.

Poisons

Upon ingestion, poisons may cause severe distress to the gastrointestinal system, pain, and possibly death. Upon contact, poisons may cause irritation to the skin and tissue. Inhalation may cause choking, irritation to the respiratory tract and lungs, and possibly death.

Reactives

Exposure to reactives may cause irritation and burns to the skin and tissue. Inhalation of fumes may cause irritation to the respiratory tract and lungs. Ingestion may cause vomiting.

Flammable and Combustible Material

Upon contact, flammable and combustible material may cause irritation to the skin and eyes. Inhalation of fumes may cause a narcotic effect, irritation to the nose, respiratory tract and lungs, dizziness, excitation, pallor, followed by flushing, weakness, headache, breathlessness, chest constriction, coma, and possibly death.

Pesticides

Upon ingestion, pesticides may cause severe distress to the gastrointestinal system, pain, and possibly death. Upon contact, pesticides may cause irritation to the skin and tissue. Inhalation of fumes may cause choking, irritation to the respiratory tract and lungs.

Cyanides

Upon contact, cyanide will be readily absorbed through the skin. Vapors containing cyanide may be inhaled. Symptoms of exposure include salivation, nausea without vomiting, a bitter, almond odor on breath of person exposed, anxiety, confusion, vertigo, giddiness, lower jaw stiffness, convulsions, opisthotonos, paralysis, coma, cardiac arrhythmias, and transient respiratory stimulation followed by respiratory failure. Inhalation of a high concentrations of hydrogen cyanide gas may cause respiratory arrest resulting in death. Ingestion of cyanide salts may eventually cause death.

Sulfides

Upon contact, sulfides may cause softening and irritation to the skin. If ingested, hydrogen sulfide and free alkali may be liberated causing corrosion and irritation to tissue. If heated, sulfides may decompose into toxic and flammable vapors of hydrogen sulfide. Hydrogen sulfide is an irritant to the upper respiratory tract and an asphyxiant.

Containerized Gas

Any human health effects from exposure to a containerized gas will be dependent upon the gas.

Emergency Equipment

A list of available emergency equipment is presented in Table 2 of this plan. If necessary, additional equipment will be obtained through rental.

In the unlikely event of an accidental spill or release outside the containment system, the release or spill will occur on either concrete (inside the facility building) or asphalt (outside the facility building). A spill or release to these areas will be absorbed with calcium bentonite or other spill control absorbents or pillows. The area will be washed with a surfactant (such as Alconox or PetroClean) and water. The wash water will be removed with sorbent pads. If a spill or release of organics onto the asphalt pad occurs, and cannot be cleaned, the asphalt and any affected underlying fill will be removed and replaced/repaired.

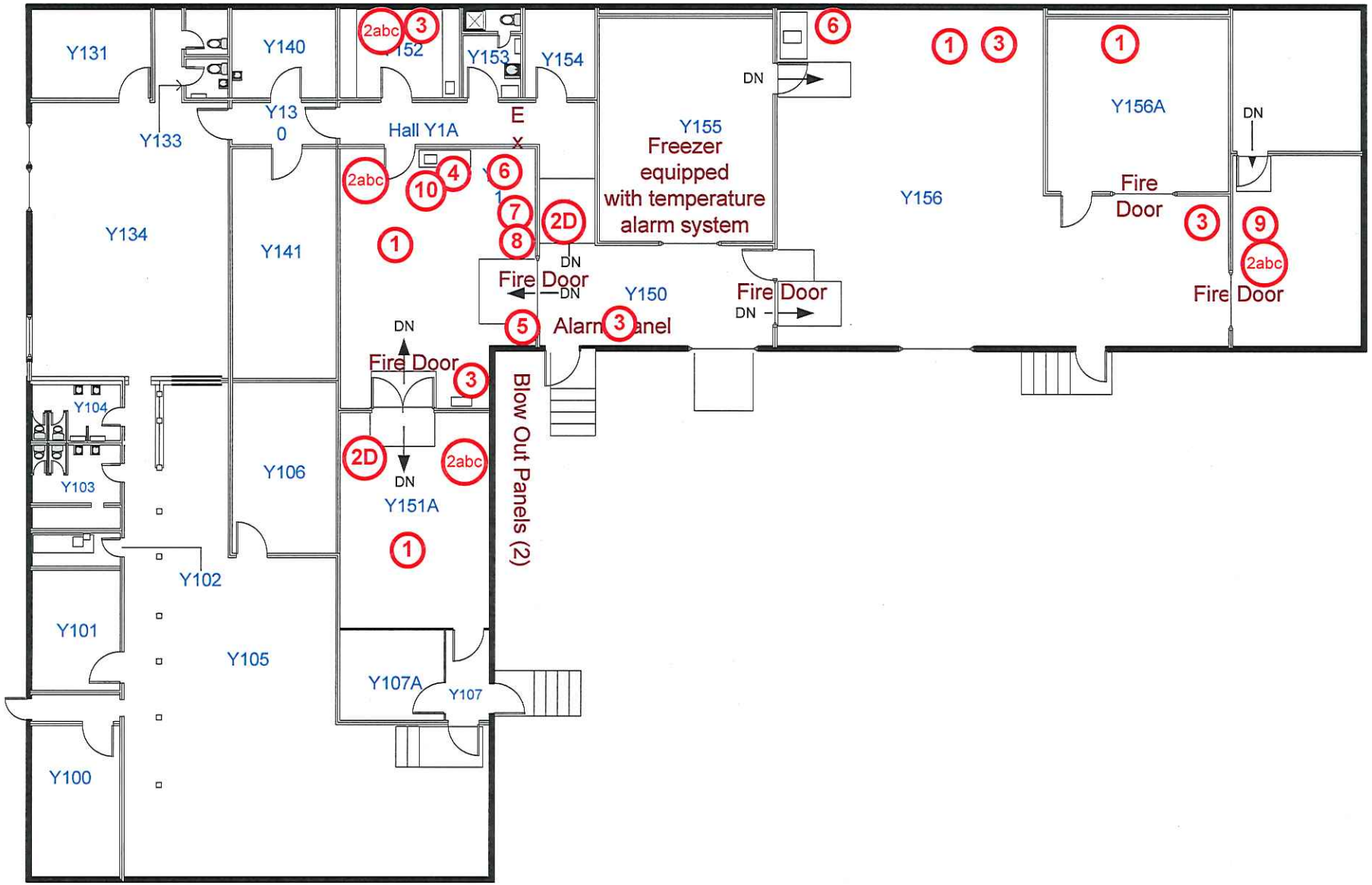
All equipment utilized to contain a hazardous waste release must be thoroughly decontaminated prior to return to storage. Equipment or supplies which are needed and can not be reused will be replaced. Sampling equipment is decontaminated with water and a phosphate-free detergent such as Alconox,. Heavy equipment is decontaminated by using water and, if needed, a phosphate-free detergent such as Alconox,. All materials used to decontaminate equipment must be placed in drums and properly stored until disposal can be arranged.

Table 2
Baylor College of Medicine - Contingency Plan
Emergency Equipment

Floor Plan Number	Equipment	Location	Physical Description
1	Fire Suppression System	2 zones; Flammable Liquid storage area, and Chemical Waste storage area	"Rate-of-Use" (thermal) heat detectors with 2 manual overrides on wall, no water due to water reactives
2(ABC)	Fire Extinguishers	Various Locations in storage areas and throughout the building	5.1.1.1.1.1.1.1.1 Four portable, 10-lb. dry chemical, Class 5.1.1.1.1.1.1.1.2 A-B-C
2(D)			5.1.1.1.1.1.1.1.3 Two 30-lb. Class D
3	Emergency Communication System	Throughout the building	Fire alarm is connected with Yellowstone security and One Baylor Plaza security and engineer's monitor plus UL-rated remote monitor
4	Spill Control Equipment	Chemical Storage Area	Absorbents, wipes, pads, Spill VBS blankets, Hazorb spill control pillows, calcium bentonite, pH paper, mercury absorb powder, Box mercury sponges, "Danger Chemical Spill" signs, "Danger Do Not Enter" signs
5	First Aid Kit	Chemical Storage Area	Standard first aid materials
6	Safety Shower and Eyewash	Chemical Storage Area	Standard
7	Personal Protective Equipment	Chemical Storage Area	Goggles, safety glasses, face shields, and chemical resistant gloves, coveralls, gowns, aprons, splash suits, and over boots
8	Cleaning Equipment	Chemical Storage Area	Acid clean-up kit, Caustic clean-up kit, Flammable Solvents clean-up kit, surfactant (e.g., Alconox,), pH paper, PetroClean, Mercury clean-up kit, brooms, mops, dustpans, shovels, sets of long handled tongs, 15 gal. Open head drum, and bottle carriers
9	Other Equipment	Environmental Safety Office at One Baylor Plaza	High efficiency particle filter vacuum cleaner and a mercury vacuum cleaner for cleaning toxic powders and mercury
10	Neutralizers/Spill Related Chemicals	Chemical Storage Area	Sodium Bicarbonate (acid neutralization), Calcium Hydroxide (inorganic acid neutralization), Sulfur (metallic mercury cleanup), Sodium Bisulfite (oxidizer spill cleanup), Sodium Thiosulfate (bromine spills), Calcium Hypochlorite (mercaptans/organic sulfide spills), Copper Sulfate (identification of White Phosphorus on skin) Ammonium Citrate (decontamination of Azo compounds and Azides), Sodium bisulfate (aliphatic amine spills)

Appendix E

Baylor College of Medicine
Yellowstone Facility
Fire Protection Facilities



Decontaminated emergency equipment will be determined to be clean by visual observation of the rinsate. When no sheen or color is observed in the rinsate, and, for equipment contaminated with inorganics, when the pH paper indicates a neutral range (about 4.0 to 9.0), the equipment will be deemed clean.

The 3325 Yellowstone Blvd. Location has two fire hydrants near the facility. These fire hydrants are depicted on the map presented in Appendix D of the Contingency Plan (Section 5). Flow test for the two hydrants, one located at the intersection of Allegheny Street and Yellowstone Boulevard, and the other at the intersection of Highway 288 and Yellowstone Boulevard are conducted by the City of Houston-Public Works Department. This data, summarized below, indicate that there is water of sufficient volume and adequate pressure to supply water hose streams and foam-producing equipment in the event the use of such equipment becomes necessary.

Fire Hydrant Location	Static Pressure (psi)	Residual Pressure (psi)	Flow at Residual Pressure (gpm)
Yellowstone at Allegheny	46	42	1,087
Yellowstone at Hwy. 288 Service Road	49	39	1,047

The city of Houston water supply is also the source of water used in the facility's plumbing system. As a minimum, this water is of sufficient volume and pressure to meet OSHA requirements for safety showers and eye wash stations, and to supply the fire suppression system.

ARRANGEMENTS WITH LOCAL AUTHORITIES

Arrangements have been made to familiarize local response agencies with the layout of the facility, properties of hazardous waste handled at the facility and associated hazards, places where facility personnel would normally be working, entrances to and roads inside the facility, and possible evacuation routes.

In the unlikely event of an injury, personnel will call the security office using the following 713/798-3000 number to request transportation for the injured party. BCM Security will notify College Administration Officials which are available 24 hours per day, 7 days per week.

Arrangements have been made to familiarize local fire departments and hospitals with the types of injuries or illnesses which could result from fires, explosions, or releases. Appendix C contains a listing of the local fire departments, police departments, and hospitals, which have been contacted. Correspondence documenting these contacts is available in the facility records. A pay-for-use contract with SET Environmental and Phoenix Environmental has been established for on-call emergency response.

EVACUATION PLAN

If an event occurs which requires facility evacuation, the emergency coordinator will implement the following procedures.

- Notify all facility personnel, by a signal (fire alarm may be activated), to immediately stop all processing and operations and evacuate the facility (processing and operations will be safely concluded). If possible, all open drums and exposed hazardous waste will be covered. As each situation will be unique additional instructions may be given.
- If warranted, the security officers on the premises may be dispatched to assist in the evacuation.
- Personnel will evacuate the facility using the primary route. If the primary route is blocked, by releases, fire, or explosion, the secondary or tertiary routes will be used. In the event the Yellowstone Blvd. Waste Facility location gate depicted in Appendix D is blocked, personnel will evacuate to the northwest corner of the property on which the facility is located, about 645 feet from the facility. The primary, secondary, and tertiary evacuation routes and meeting areas are presented on the evacuation route maps in Appendix D of this section.
- The emergency coordinator will account for all facility personnel.

As an added safety precaution, the fire alarm signal is connected to the facility's security office and the One Baylor Plaza security office.

In the unlikely event that a release, fire, or explosion could threaten human health or the environment, outside the facility, then evacuation of local areas may be advisable. The emergency coordinator will contact the local police by telephone to request assistance. The local fire department will also be notified of the situation by telephone. The Director of Environmental Safety Office or the Public Affairs Office will make all public comments regarding the nature of the incident.

Appendix A
Baylor College of Medicine
Contingency Plan
Reportable Quantities of Hazardous Substances

Appendix B

Baylor College of Medicine

Contingency Plan

SARA/CERCLA Notification Requirements

Baylor College of Medicine-Contingency Plan

SARA/CERCLA Notification Requirements

Procedures are in place for reporting oil, chemical, or hazardous waste spills to the Texas Commission on Environmental Quality, State Emergency Response Center and the National Response Center.

This SARA/CERCLA procedure covers the required notification for releases of specific hazardous substances under the superfund law (the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 [CERCLA], Sections 102 and 103) and listed extremely hazardous substances under the superfund reauthorization law (the Superfund Amendments and Reauthorization Act of 1986 [SARA], Sections 302 and 304). This procedure does not in any way change or alter existing telephone or written notification procedures. However, when this procedure is used to notify an agency of a specific chemical release (see Attachment 1), duplicate reporting to the same agency for the same release under another procedure is not required.

Chemicals which are listed in the CERCLA list of "hazardous" chemicals and the SARA list of "extremely hazardous" chemicals are included in the attached Appendix A. If a release of any of the chemicals listed in Appendix A occurs in a quantity above the Reportable Quantity and which crosses the facility boundaries, then the release requires "immediate" telephone notification to the community emergency coordinator of the Local Emergency Planning Committee (LEPC), the Texas Commission on Environmental Quality (TCEQ), and the U.S. Coast Guard National Response Center. (See Attachment 1 for a list of telephone numbers to call). Telephone notification must be followed with a written report to the agencies. See attachment 2 and Attachment 2 Form for the telephone and written information required.

Baylor College of Medicine internal spill notification will occur in the event a SARA/CERCLA release is reported to the above agencies. The Baylor College of Medicine telephone notification may be followed with a written report similar to Attachment 3.

Procedure for SARA/CERCLA Notification

General Personnel

When an environmental release occurs, personnel will immediately notify the Emergency Coordinator (EC) of the details surrounding the release (chemical released, time, duration, amount, equipment involved, etc.).

Emergency Coordinator

Upon receiving the environmental release information, the EC or designated personnel must complete an environmental release/spill reporting form, similar to Attachment 3. The EC will determine if the TCEQ or other agency reporting is required by the existing procedures. The EC will review Appendix A-Reportable Quantities of Hazardous Substances or current list to determine if the release is greater than the reportable quantity for a listed SARA/CERCLA chemical. If so, the EC will contact the agencies marked in Attachment 1, starting with the fire department and continuing with the TCEQ, and the NRC. Finally, the EC will perform the Baylor College of Medicine's notification requirements. The form in Attachment 2 or a similar form will be used to record the information. The reported information should be brief, unless the situation warrants extensive information, such as required community evacuation. A copy of the recorded information should be forwarded, by telephone, to the Director of Environmental Safety so that a written report for the agencies may be reported.

*A*ttachment 1

Baylor College of Medicine

Emergency Spill Notifications

Agency Contacts

1. Fire Department
   Designated Contact: City of Houston Fire Department
   24-hour number: 911

   District Chief #46
   A, B, C, and D Shifts
   24-hour number: (713) 247-5000

   Hazardous Materials Chief
   Station 22
   24-hour number: (713) 928-6152

2. TCEQ-State Emergency Response Center
   Designated Contact: Texas Commission on Environmental Quality
   SERC; Emergency Response Unit
   24 Hour Hotline: (800) 832-8224
   Business Hours: (512) 834-6603
   Alternate Contact: EPA Emergency Response-Dallas
   24 Hour Hotline: (214) 665-6428
   (866) 372-7745

3. NRC-National Response Center
   24 Hour Number: (800) 424-8802

Attachment 2

Baylor College of Medicine-Contingency Plan

SARA/CERCLA Spill Report Information Required

When a spill occurs, check Appendix A to determine if the reportable quantity has been exceeded. If it has, immediately call the agencies listed in the order specified, starting with the Fire Department.

Telephone notification will include the following:

1. Name and telephone number of person reporting the release.
2. Chemical name of substance released.
3. Specify if chemical is on the SARA extremely hazardous substance list. See Appendix A.
4. Estimate of quantity of substance released.
5. Time and duration of release.
6. Give the media (air, water, or ground) into which release occurred.
7. Report any known or anticipated acute or chronic health risks associated with the release. If detail is requested, this type of information is available on MSDS sheets.
8. Where appropriate, advice regarding medical attention (for exposure to outside parties) may also be necessary. This information, also available from safety data sheet sheets, is only required when an outside party is exposed as a result of a spill or leak.
9. Give precautions taken as a result of the release (include evacuation, if required). This information is not required if it is contained in the local emergency plan.
10. In the written report, items can be clarified. The written follow-up report is required as soon as practical. Contents of the written report should include the information listed above including any updated information on the following:
11. Actions taken to abate and contain the release.
12. Known or anticipated acute or chronic health risks.
13. Advice regarding medical attention, where appropriate.

Attachment 2 form
Baylor College of Medicine-Contingency Plan
Record of Spill Notification by Telephone (Form is Optional)

Check Contacts		Person Contacted
☐	Fire Department Emergency: 911 District #46 (713) 884-3144 Hazardous Materials (713) 884-3144	
☐	TCEQ-Air Program (888) 777-3186	
☐	TCEQ Emergency Response Unit (800) 832-8224 Alternate 24 Hour: (512) 834-6603	
☐	If TCEQ cannot be reached, may contact EPA Emergency Response in Dallas (866) 372-7745 or (214) 665-6428	
☐	NRC (National Response Center) (800) 424-8802	
☐	U.S. Coast Guard (if applicable) (713) 671-5104 or (800) 424-8802	
☐	City of Houston Police Department Emergency: 911	

Information Reported

1. Chemical released/spilled: _____
2. Source of release/spill: _____
3. Chemical on SARA list of Extremely Hazardous substances: Yes or No
4. Estimate of amount released/spill: _____
5. Time and date release started: _____
6. Time and date release stopped: _____
7. Media release/spill entered: Air Water Ground

8. Steps being taken or proposed to contain or clean up released/spilled material:

_____

_____

9. Give known or anticipated acute or chronic health risks, if known:

10. Advise regarding medical attention (for outside parties):

_____

_____

11. Precautions given (evacuation):

_____

_____

12. For later follow-up, ask agency to contact Director of Environmental Safety. Give your name and telephone number also for immediate agency follow-up.

Send copies to: Director of Environmental Safety and Chemical Hygiene officer.

Attachment 3
Baylor College of Medicine-Contingency Plan

Environmental Release/Spill Reporting Form (Form is Optional)

Area of spill: _____
Equipment identification where spill occurred: _____
_____
Chemical/material spilled: _____
Quantity released: _____
Reasons why spill occurred: _____
Probable contamination to environment (soil, water, air, etc.): _____
Type of clean-up (use of absorbent and off-site disposal, use of vacuum truck and off-site disposal, recovery into original equipment, etc.): _____
_____

Date and time when spill was discovered: _____
Date and time when clean-up started: _____
Date and time when clean-up was completed: _____
Summary (provide a brief description of the sequence of events-spill discovery, containment, clean-up or recovery, disposal, etc. Note any environmental contamination):

_____
_____
_____

Name: _____
Signature: _____
Date: _____
Time: _____

Forward completed form to: Director of Environmental Safety, Office of Environmental Safety.

Appendix C

Baylor College of Medicine-Contingency Plan

Arrangements with Local Authorities

Appendix C

Arrangements with Local Authorities

Following is a list of local fire departments, police departments, hospitals, and as emergency response company which have been contacted:

Terry A. Garrison
City of Houston Fire Department
1205 Dart Street
Houston, TX 77007

District Chief D.G. Snell
Hazardous Materials Chief
City of Houston Fire Department
7825 Harrisburg, Station 22
Houston, TX 77012

City of Houston Fire Department
District Chief #46 (Suppression Division)
A, B, C, and D Shifts
3902 Corder Street
Houston, TX 77021

Charles A. McClelland, Jr
Chief of Police
City of Houston Police Department
61 Reisner Street
Houston, TX 77002

Ben Taub Hospital
Emergency Room
1504 Taub Loop
Houston, TX 77030

The Methodist Hospital
Emergency Room
6565 Fannin Street
Houston, TX 77030

Phoenix Environmental
711 Decker Dr.
Baytown, Texas 77520
(281) 838-3400

SET Environmental
14010 Interdrive West
Houston, Texas 77032
(877) 447-7455

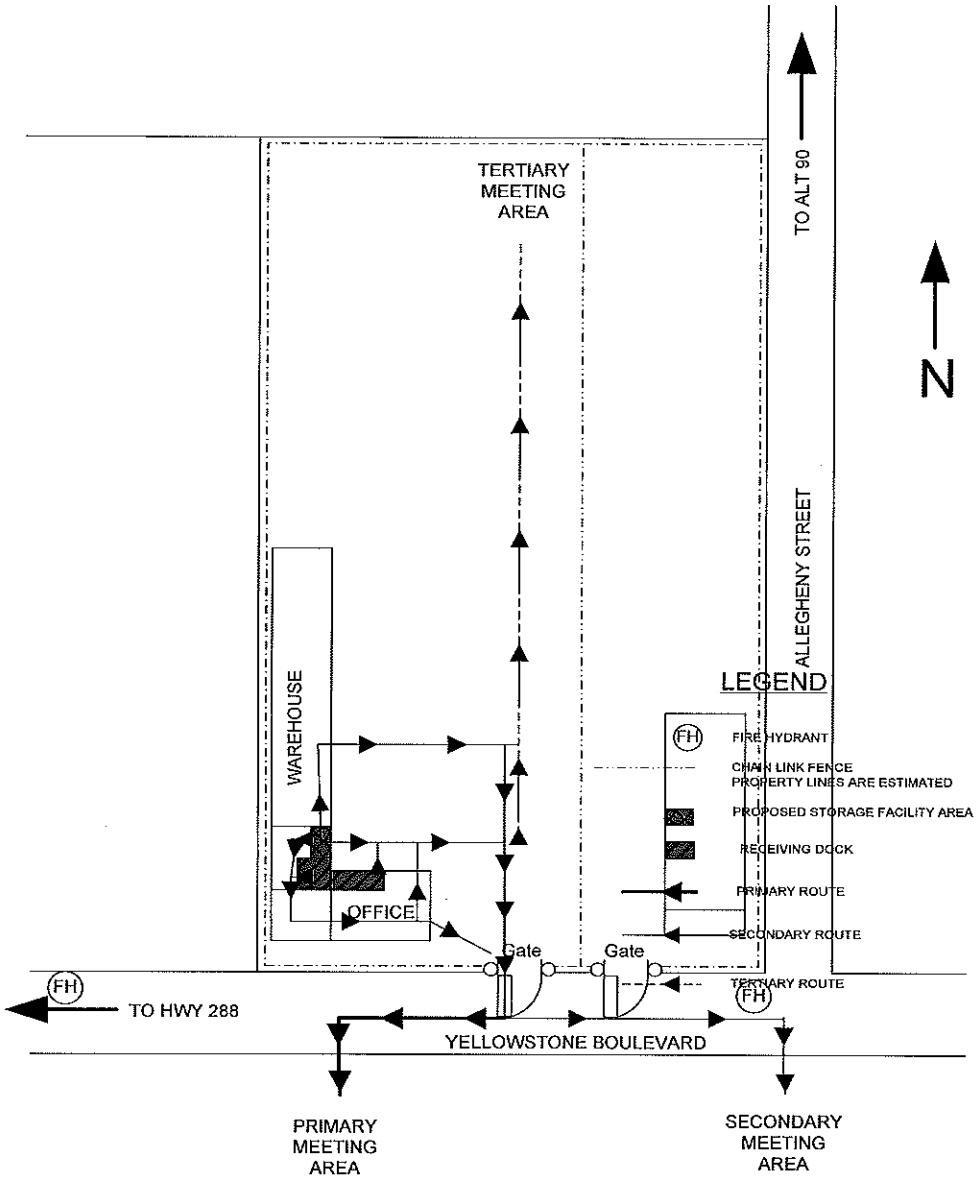
Garner Environmental
1717 West 13th Street
Deer Park, Texas 77536
(800) 424-1716

Appendix D

Baylor College of Medicine-Contingency Plan

Evacuation Plan

BAYLOR COLLEGE OF MEDICINE – CONTIGENCY PLAN
EVACUATION ROUTE MAP



Baylor College of Medicine Security Plan for Transporting Hazardous Materials

Baylor College of Medicine Office of Environmental Safety

William T Davis, CHMM
Supervisor, Chemical Safety
Baylor College of Medicine

Revised March 2011(2)
Revised November 2011(3)
Revised March 2013 (3)

Table of Contents

Objective 3
BCM Security 1Plan for Transporting Hazardous Materials Compliance Review.....4
Applicability.....5
Facility Risk Assessment.....7
Hazardous Materials Security Incidents Report.....8
Personnel Security.....9
Unauthorized Access.....9
En Route Security.....11
Training.....12
Responsibilities.....13
Notification and Reporting.....14
Emergency Contacts.....15
Appendix A.....16
Appendix B.....20
Appendix C.....23
Appendix D.....24

Objective

Avoid any regulated hazardous materials from unauthorized use, access or removal.

BCM Security Plan for Transporting Hazardous Materials Compliance Review

Baylor College of Medicine is required to develop a security plan under the Hazardous Materials Regulations HMR; 49 CFR 172.802(b). The regulations require that you must develop and implement a security plan if you offer for transportation or transport the following types and quantities of hazardous materials in commerce as listed below:

The security plan requirements in Subpart I of Part 172 of the HMR apply to persons who offer for transportation or transport:

1. A highway-route controlled quantity of a Class 7 (radioactive) material;
2. More than 25 kg (55 lbs.) of a Division 1.1, 1.2, or 1.3 (explosive) material;
3. More than 1 L (1.06 qt.) per package of a material poisonous by inhalation in Hazard Zone A;
4. A shipment in a bulk packaging with a capacity equal to or greater than 13,248 L (3,500 gallons) for liquids or gases or greater than 13.24 cubic meters (468 cubic feet) for solids;
5. A shipment in other than a bulk packaging of 2,268 kg (5,000 lbs.) gross weight or more of one class of hazardous materials for which placarding is required;
6. A select agent or toxin regulated by the Centers for Disease Control and Prevention under 42 CFR Part 73 or a select agent or toxin regulated by the U.S. Department of Agriculture under 9 CFR Part 121 or;
7. A shipment that requires placarding under Subpart F of Part 172 of the HMR.

The plan must be reviewed at least annually and revised and/or updated as circumstances change according to 49 CFR 172.802(c). In the event that an incident occurs during transit, the security plan will be advised by incorporating (1) description of the event (2) what caused the event (3) corrective actions to prevent the event from happening again. Implementing changes to security plan will require review from the Office of Environmental Safety (OES).

Review Date	Printed Name & Title	Signature
March 2011	William T. Davis, Admin Supervisor, OES Director Paul Muraca OES	
March 2012	William T. Davis, Admin Supervisor, OES Paul Muraca Director - OES	
March 2013	William T. Davis Paul Muraca	
March 2015		

Updates and changes to Security Plan:

Date	Sections Updated	Summary of Changes	Signature
MARCH 2011	Training	Reviewed questions	
November 2011	En Route Security	Removed cell phones from use in Vehicles	
MARCH 2013	Waste Vendor	Removed Clean Harbors Env. and replaced with SET Env.	

Review Date	Printed Name & Title	Signature
March 2011		
March 2012		
March 2013		
March 2014	William T. Davis Paul Muraca	William T. Davis Paul Muraca
March 2015		

Updates and changes to Security Plan:

Date	Sections Updated	Summary of Changes	Signature
March 2011	Training	Reviewed Questions	William T. Davis
November 2011	EnRoute Security	Removed cell Phone from use in vehicles	William T. Davis
March 2013	Waste Vendor	Removed Clean Harbors Env, and replaced them with SET Env.	William T. Davis

Applicability

Each person who offers for transportation in commerce or transports in commerce one or more of the following hazardous materials must develop and adhere to a transportation security plan for hazardous materials that conforms to the requirements of this subpart. As used in this section, "**large bulk quantity,**" as used in the following table, refers to a quantity greater than **3,000 kg (6,614 pounds)** for solids or **3,000 liters (792 gallons)** for liquids and gases in a single packaging such as a cargo tank motor vehicle, portable tank, tank car, or other bulk container.

The new rules remove certain classes of materials from the list and raise the threshold quantity that would trigger security planning requirements for other classes of materials, specifically cover only those materials that pose a significant security risk in transportation. Thus, this update retains the security plan requirement for any quantity of Division 1.1, 1.2, 1.3 explosive materials; 2.3 poison gases; 4.3 dangerous when wet material; 5.2 Type B organic peroxides, liquid or solid, temperature controlled; and 6.1 materials poisonous by inhalation. The new rule requires security plans for any quantity of certain Division 1.4 materials, Division 1.5 explosives, Class 3 and Division 4.1 desensitized explosives, and 6.1 materials assigned to Packing Group I.

Table 1 below summarizes hazardous materials that conform to the requirements.

Table 1

Hazard Class	Threshold
1.1, 1.2, or 1.3	Any quantity
1.4, 1.5, or 1.6	A quantity of material requiring placarding in accordance with §172.504(c)
2.1	Large bulk quantity
2.2	Large bulk quantity with a subsidiary hazard of 5.1
2.3	Any quantity of a material poisonous by inhalation
3	Large bulk quantity of a Class 3 material meeting the criteria for Packing Group I or II
4.1 or 3	A quantity of a desensitized explosives meeting the definition of a Division 4.1 or Class 3 material requiring placarding in accordance with §172.504(c)
4.2	A large bulk quantity of a material meeting the criteria for Packing Group I or II
4.3	Any quantity
5.1	A large bulk quantity in Packing Groups I and II; perchlorates; or ammonium nitrate, ammonium nitrate fertilizers, or ammonium nitrate emulsions, suspensions, or gels
5.2	Any quantity of organic peroxide, Type B, liquid or solid, temperature controlled
6.1	A large bulk quantity (for a material poisonous by inhalation see paragraph above)
6.2	A select agent or toxin regulated by the Centers for Disease Control and Prevention under 42 CFR part 73 or the United States Department of Agriculture under 9 CFR part 121
7	A quantity of uranium hexafluoride requiring placarding under §172.505(b)
7	International Atomic Energy Agency (IAEA) Code of Conduct Category 1 and 2 materials including Highway Route Controlled quantities as defined in 49 CFR 173.403 or known as radionuclide's in forms listed as RAM–QC by the Nuclear Regulatory Commission
8	A large bulk quantity meeting the criteria for Packing Group I

Facility Risk Assessment

Baylor College of Medicine generates and transports hazardous, non-hazardous, and low level radioactive waste from multiple generator sites within the Texas Medical Center and surrounding Houston area. The threat of a terrorist attack or random act of violence is considered a low risk as discussed below:

1. Due to the small quantities and restricted access to hazardous materials within the Texas Medical Center (TMC), Baylor College of Medicine is a less likely target than the petrochemical industry.

2. The majority of chemicals utilized in research are in small quantities and some can be purchased over the counter at home improvement stores.

3. Most of the radioactive materials used in research or clinical applications are of short half lives and have low activities.

4. Select agents are secured and destroyed immediately after use.

5. The risk associated with all hazardous materials transported by BCM or third parties are listed in the Appendix A, B & C.

Hazardous Materials Security Incidents Report

Table 2

Year	Reported DOT Incidents
2003	No incidents have been reported for transporting hazardous materials during 2003.
2004	No incidents have been reported for transporting hazardous materials during 2004.
2005	No incidents have been reported for transporting hazardous materials during 2005.
2006	No incidents have been reported for transporting hazardous materials during 2006.
2007	No incidents have been reported for transporting hazardous materials during 2007.
2008	No incidents have been reported for transporting hazardous materials during 2008.
2009	No incidents have been reported for transporting hazardous materials during 2009.
2010	No incidents have been reported for transporting hazardous materials during 2010.
2011	No incidents have been reported for transporting hazardous materials during 2011.
2012	No incidents have been reported for transporting hazardous materials during 2012.
2013	No incidents have been reported for transporting hazardous materials during 2013.
2014	No incidents have been reported for transporting hazardous materials during 2014.
2015	Not reported

Personal Security

1. All hazardous materials shipments in commerce are required to be packaged, labeled, marked, and sealed in accordance with 49 CFR Part 172 requirements.

2. A properly trained hazardous materials employee must prepare, package, label, mark, and attest that the hazardous materials were properly integrated. New additional training requirements for hazardous materials must include security training as outlined in this plan.

3. Increased controls for licensees that possess sources containing radioactive material quantities of concern.

4. **Background Checks**: Employees who have access to and handle hazardous materials, radioactive materials or select agents or toxins for transport occupy security sensitive positions. BCM background checks are required for all new employees: **02.6.22 - Human Resources**: Employment or must meet the requirements for **select agent security under 42 CFR 73.** See **Appendix D** BCM Background Checks

Unauthorized Access

1. Once the regulated hazardous material is prepared for transport in commerce, the following measures must be taken to minimize unauthorized access and removal:

2. In accordance with general radiation safety policy, all areas where radioactive materials are used and stored are required to be maintained to prevent unauthorized access, use, and removal.

3. In accordance with BCM's site-specific biosafety, containment, and security plans, all areas where select agents or toxins are used and stored are required to be maintained to prevent unauthorized access, use, and removal.

4. **Preventing unauthorized access**: Hazardous materials awaiting transportation shall be stored in a locked storage area or room, a locked departmental vehicle or be under the physical control of a properly trained hazardous material employee preparing the shipment for transport. These controls must be commensurate with the risk posed by the shipment. Select agents are maintained under the control for U.S. Department of Justice CDC/DSAT Security Risk Assessments approved individuals until released for shipment.

5. Only authorized and trained BCM employees are allowed to handle, load or transport hazardous and non-hazardous waste.

6. All waste accumulation areas are accessed electronically or manually.

7. Most sites are also remotely reviewed security cameras.

8. While loading vehicles, the engine must be turned off and driver must maintain the keys with them at all times.

9. Vehicles should not be left unattended while waste is being loaded or is being unloaded.

10. During transport the any material should be properly segregated according to DOT regulations as well as secured.

11. Truck box will be locked with pad lock during transport.

12. All manifest or bill of laden will be kept with driver in the vehicle at all times.

13. Pre-trip inspections of vehicle will be performed by driver.

14. Communication system will be available to driver during transportation at all times (cell phone or radio)

15. No less than two BCM employees will be responsible for loading and unloading.

16. All third party waste transporters (SET Environmental, Bionomics) have there own written DOT security plan in place.

a. Waste Contractors

i. All offsite hazardous and radioactive waste shipments shall be through a Contractor authorized by BCM. An important aspect of this contractual agreement is the acceptable demonstration of an "en route" transportation security plan by the Contractor. Regulated hazardous materials shipments after September 25, 2003 can only be conducted by Contractors with a demonstrated commitment to hazardous materials transportation security.

Table 3

Vendor	Waste Stream	Meet Requirments for HM-232
SET Environmental	Hazardous/ Non-Hazardous	Yes
Bionomics	Radioactive Waste/ Low Level Waste	Yes
Stericycle	Biological Waste	Yes

ii. Shipments shall be scheduled directly with the Contractor.

iii. Waste shall only be transferred to known Contractor personnel on scheduled dates. If an unknown individual arrives in the name of the Contractor, telephone verification of the individual being authorized by the Contractor shall occur prior to transferring any waste for shipment.

iv. Unauthorized access during loading of hazardous and/or radioactive waste is minimized by requiring an OES staff person be present during the loading of any waste shipments. Any suspicious or unauthorized individuals will be asked to leave the vicinity of the loading area, temporarily suspend loading if deemed necessary, and contact BCM Security at 713-798-3000 as soon as possible. If a hazardous material security incident occurs, the transport vehicle must be secured and monitored by the Contractor and appropriate BCM personnel (BCM security and/or OES staff), or external authority, if external assistance if necessary.

v. The waste contractor must complete a hazardous waste manifest indicating itemized possession of the regulated hazardous materials.

Unauthorized access during loading of hazardous and/or radioactive waste is minimized by requiring an OES staff person be present during the loading of any waste shipments. Any suspicious or unauthorized individuals will be asked to leave the vicinity of the loading area, temporarily suspend loading if deemed necessary, and contact BCM Security. at 713-798-3000 as soon as possible. If a hazardous material security incident occurs.

En route security

Measures to address the security risks of shipments of hazardous materials covered by the security plan en route from origin to destination, including shipments stored incidental to movement.

BCM staff en-route security measures:

- Any Baylor College of Medicine employee responsible to transport any required material listed above will have sufficient training and understanding of BCM security plan and institutional policies.
- This plan does not cover intra- and intercampus pickups or shipments of hazardous materials.
- All BCM employees involved in shipping hazardous materials are required to have proper identification while loading or unloading hazardous materials (BCM Identification and Texas Drivers license)
- During transport any material should be properly segregated according to DOT regulations as well as secured.
- Truck box will be locked with pad lock during transport.
- All manifest or bill of laden will be kept with driver in the vehicle at all times. BCM Security will have copy of manifest located in room H112.
- Communication system will be available to driver during transportation at all times (radio). ***Texting or talking on a cell phone is not allowed while driving BCM commercial motor vehicle. It is a $2,750 fine or up to $11,000 fine for BCM.***

- During loading, unloading or transporting waste if BCM Staff become suspicious about unwanted activities they are required to immediately contact BCM Security 713-798-3000 or call 911.
- All third party contractors responsible for transporting hazardous, radioactive or select agents are required to follow there security plan. This includes overnight storage while in transit and 10 day holding facilities.
- In the event that a vehicle is stopped by a local, state or federal licensed police officer, proper identification must be presented before entry into back of vehicle.
- Third party contractors are required to notify BCM in the event that there is any incident while transporting.
- All hazardous and radioactive waste transported from BCM faculties are accompanied by DOT shipping papers (manifest), which includes 24 hour emergency number, description of waste, and the vehicles are placarded according to 49 CFR 172.

Training

1. DOT/PSHMA Security Awareness Training:
   Hazardous Materials: Security Requirements for Offerors and Transporters of Hazardous Materials (49 CFR 172.800).
2. DOT Hazardous Materials Transportation:
   DOT Carrier Requirements (Highway) : These requirements are found in Part 177 of the in the Hazardous Materials Regulations, (HIVIR; 49 CFR Parts 100-185) and the Federal Motor Carrier Safety Regulations
   (FMCSR; Parts 300- 399).
3. DOT Radioactive Materials Transportation: These requirements are found in part 49 CFR 172.704.
4. 40 Hour Hazardous Materials Technician: Provided within 90 days of employment.
5. 8 Hour Hazardous Materials Refresher Training: Provided internally annually by BCM staff and occasional third party guest speaker.
6. Refresher Training: BCM staff that offeror hazardous materials for transportation are required to review the Hazardous Materials Security Plan every three years.

Responsibilities

All BCM employees responsible for transporting hazardous materials in commerce are required to follow the items as listed below:

1. Understand and apply all regulatory requirements for preparing, packaging, labeling, marking, and identifying hazardous material shipments.
2. Attend and participate in mandatory hazardous material and security plan training and successive retraining every three years (DOT training).
3. Immediately reporting potential security concerns or incidents regarding hazardous materials first to BCM security and then supervisors.

4. Employ all necessary controls to prevent the unauthorized access, use or removal of hazardous material shipments.
5. Documenting the transfer of hazardous material shipment to an approved common carrier. (Via manifest or bill of laden)
6. Ask questions when material is unclear and informing management of potential safety and security concerns.
7. Ensure only approved hazardous materials transporter is utilized for shipments of hazardous materials.

Any **BCM supervisors whose employees are** engaged in transporting hazardous materials in commerce have the following responsibilities:

1. Identify employees who ship hazardous materials and notify OES to coordinate employees training.
2. Send employees who work with hazardous materials to required training and ensure retraining occurs every three years.
3. Ensure employee have proper background security clearance prior to unsupervised handling of hazardous materials, radioactive materials or select agents.
4. Ensure employee(s) report potential security concerns and incidents regarding hazardous materials to BCM Security. Select agents incidents are reported to the CDC.

The **Office of Environmental Safety (OES)** has the responsibility to:

1. Maintain and review this plan.
2. Work with BCM Police to identify potential hazardous material transportation security improvements on the BCM campus.
3. Report hazardous materials incidents in transit to the governing authority and to BCM Leadership.
4. Provide hazardous material transportation security training.
5. Maintain Chain shipping papers for the required retention period.
6. Confirm all common carriers utilized by BCM for the transport of hazardous material have an implemented security plan.
7. Request background checks on all BCM employees handling and preparing regulated hazardous materials.
8. Facilitate with Human Resources Department to complete background checks on hazardous material employees in compliance with 49 CFR § 172.802 (a) (1).

The **Office of Environmental Safety (OES) Leadership** has the responsibility to:

1. Report hazardous materials incidents to regulatory agencies.
2. Report hazardous materials incidents that occur on the BCM campus to BCM Police.
3. Provide hazardous material transportation security training.

4. Provide a secure area to store regulated hazardous materials prior to pickup.
5. Ensure select agents, radioactive waste, and hazardous waste shipments are in accordance with DOT regulations.
6. Utilize BCM Security investigation/report to determine root cause of the security event regarding hazardous materials and resolve with documented corrective action or CDC Form 3.

The **BCM Security** has the responsibility to:

1. Respond to and resolve reported security concerns and incidents regarding hazardous materials.
2. Participate in security inspections of all BCM properties.
3. Investigate all hazardous material transportation security incidents on campus and report to OES.
4. Provide OES with information necessary to improve this plan.
5. Work with departments to identify necessary controls to prevent unauthorized use or removal of hazardous materials packages.

Notifications and Reporting

Notifications

For a known security breach, hijacked hazardous or radioactive waste shipment, the Contractor or employee shall notify BCM Security at 713-798-3000. BCM Security will notify the Office of Environmental Safety Director. The OES Safety Director and will ensure appropriate notifications are made within the College leadership. BCM Security and OES will work with the Contractor to ensure all necessary external notifications are made.

For lost, misplaced, or unaccounted regulated hazardous materials, the BCM contractor shall immediately notify BCM OES of the potential loss. OES will notify the BCM Security, and initiate the investigation into the details surrounding the potential loss. These results will dictate any necessary external notifications.

For suspicious persons involving regulated hazardous materials, the employee shall contact BCM Security at 713-798-3000. BCM Security will then initiate an investigation into the details surrounding the suspicious person and the regulated hazardous materials. The results of the BCM Security investigation will then dictate any necessary external notifications.

For all other circumstances involving regulated hazardous materials, the involved parties must notify BCM Security at 713-798-3000.

Regulatory Notifications

External authorities could include: Houston Police Department, the Harris County Sheriff Department, the Texas Department of Public Safety, the Federal Bureau of Investigation, Health and Human Services, Centers

for Disease Control and Prevention, Division of Select Agent and Toxins, and the Department of Homeland Security depending on the level of risk involved with the situation. Please see **Table 4** for internal and external contacts.

Regulatory authorities could include the U.S. Coast Guard, U.S. Department of Transportation, U.S. Environmental Protection Agency, Texas Commission on Environmental Quality, Texas Department of State Health Services Radiation Control Program, and U.S. Nuclear Regulatory Commission.

Table 4

Emergency Contacts	Contact Numbers
Emergency	911
Baylor security	713-798-3000
Office of Environmental Safety	713-798-4799
National Response Center (DOT)	800-424-8802
FBI Division Field Office	713-693-5000
Houston Police Department	713-308-1500
Texas Medical Center Police	713-795-0000
TCEQ	800-832-8224
EPA	800-887-6063
U.S. Coast Guard	713-674-8488
Centers for Disease Control	404-639-0385
Nuclear Regulatory Commission	800-695-7403
SET Emvironmental	877-447-7455
Garner Environmental	800-424-1716

Internal Notifications

Due to the highly publicized nature of this type of event, the Office of Public Affairs should be contacted.

Reports

Some incidents require additional information not originally included in the notification process. This information is generally required by the regulatory authority. These reports include a description of the incident, circumstances leading up to the incident, and process improvements necessary to prevent a recurrence of the incident. Reporting requirements should be discussed during the regulatory notification.

Appendix "A"

	Hazardous Materials	Frequency of Shipment/Year	Quantity and Type of Containers shipped	Typical Radioactivity Level or Chemical Substance	Transportation of Generator Site to TSDF/Transportation Routes	Employee/Positions that Handle the material	Specific Risk Controls (e.g. Secured access fencing, bobwire, cameras,onsite guard	Risk Assessment Rating (low, medium, high)
	Hazardous Waste						All facilities storing hazardous waste are secured form unauthorized entrance.	
1	Main Campus 1 Baylor Plaza Houston, Texas 77030	Weekly to BCM permitted TSDF	1-10 (Solvent Waste) 55 gallon TH containers; 1-10 30 gallon lab packs, 1-10 5 gallon, 1-10 1.5 gallon labpacks.	Solvents, lab packs hazardous & non-hazardous waste	BCM transports waste 2.2 miles to BCM permitted TSDF.	Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk
2	Yellowstone Treatment Storage and Disposal Facility (TSDF) 3325 Yellowstone Blvd. Houston, Texas 77021	Monthly/Quarterly to Clean Harbors TSDF.	1-90 (Solvent Waste) 55 gallon TH containers, 1-40 30 gallon lab packs, 1-25 5 gallon, 1-10 1.5 gallon labpacks.	Solvents, lab packs hazardous & non-hazardous waste	Waste contractor (Clean Harbors) transports waste to permitted TSDF.	Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk
3	McGovern Campus 2450 Holcomb Blvd. Houston, Texas 77030	Weekly/Monthly to BCM permitted TSDF	1-2 (Solvent Waste) 55 gallon TH containers, 1-10 30 gallon lab packs, 1-10 5 gallon, 1-10 1.5 gallon labpacks.	Solvents, lab packs hazardous & non-hazardous waste	BCM transports waste 2.2 miles to BCM permitted TSDF.	Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk

	Hazardous Materials	Frequency of Shipment/Year	Quantity and Type of Containers shipped	Typical Radioactivity Level or Chemical Substance	Transportation of Generator Site to TSDF/Transportation Routes	Employee/Positions that Handle the material	Specific Risk Controls (e.g. Secured access fencing, bobwire, cameras,onsite guard	Risk Assessment Rating (low, medium, high)
4	Feign Center 1102 Bates Houston, Texas 77030	Weekly/Monthly to BCM permitted TSDF	1-2 (Solvent Waste) 55 gallon TH containers, 1-10 30 gallon lab packs, 1-10 5 gallon, 1-10 1.5 gallon labpacks.	Solvents, lab packs hazardous & non-hazardous waste		Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk
5	Children's Nutrition Research Center (CNRC) 1101 Bates Houston, Texas 77030	Weekly/Monthly to BCM permitted TSDF	1-2 (Solvent Waste) 55 gallon TH containers, 1-5 30 gallon lab packs, 1-5 5 gallon, 1-5 1.5 gallon labpacks.	Solvents, lab packs hazardous & non-hazardous waste	BCM transports waste 2.2 miles to BCM permitted TSDF.	Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk
6	Baylor Clinic 6620 Main Houston, Texas 77030	Weekly/Monthly to BCM permitted TSDF or Clean Harbors TSDF	1 55 gallon fiber (Pharmaceutical Waste) 1-4 15 gallon bulk chemotherapy RCRA containers, 1 5 gallon (Solvent waste)	Solvents, lab packs hazardous & non-hazardous waste	Waste contractor (Clean Harbors) transports waste to permitted TSDF.	Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk
7	Texas Heart Institute 6770 Bertner Avenue Houston, Texas 77030		1-2 (Solvent Waste) 55 gallon TH containers, 1-5 30 gallon lab packs, 1-5 5 gallon, 1-5 1.5 gallon labpacks.	Solvents, lab packs hazardous & non-hazardous waste	BCM transports waste 2.2 miles to BCM permitted TSDF.	Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk

	Hazardous Materials	Frequency of Shipment/Year	Quantity and Type of Containers shipped	Typical Radioactivity Level or Chemical Substance	Transportation of Generator Site to TSDF/Transportation Routes	Employee/Positions that Handle the material	Specific Risk Controls (e.g. Secured access fencing, bobwire, cameras,onsite guard	Risk Assessment Rating (low, medium, high)
8	Baylor Pathology 2525 West Belfort Houston, Texas 77054	Weekly to BCM permitted TSDF or Clean Harbors TSDF	1-2 (Solvent Waste) 55 gallon TH containers, 1-5 30 gallon lab packs, 1-5 5 gallon, 1-5 1.5 gallon labpacks.	Solvents, lab packs hazardous & non-hazardous waste	Waste contractor (Clean Harbors) transports waste to permitted TSDF.	Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk
9	Baylor Pathology Medical Center of South East Texas Regional Professional Building 2501 Jimmy Johnson BLVD. Suite 208 Port Arthur, Texas 77640	Weekly to BCM permitted TSDF or Clean Harbors TSDF	1 15 (Solvent Waste) gallon TH containers	Solvents, lab packs hazardous & non-hazardous waste	Waste contractor (Clean Harbors) transports waste to permitted TSDF.	Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk
11	Baylor Pathology Conroe/Sadler 300 Medical Center Blvd. Suite 360 A Conroe, Texas 77304	Weekly to BCM permitted TSDF or Clean Harbors TSDF	1-2 (Solvent Waste) 55 gallon TH containers, 1-5 30 gallon lab packs, 1-5 5 gallon, 1-5 1.5 gallon labpacks.	Solvents, lab packs hazardous & non-hazardous waste	Waste contractor (Clean Harbors) transports waste to permitted TSDF.	Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk
12	Baylor Ophthalmology Baylor College of Medicine Baylor Eye Clinic 7200B Cambridge Houston, Texas 77030	Weekly to BCM permitted TSDF or Clean Harbors TSDF	1-5 30 gallon lab packs, 1-5 5 gallon, 1-5 1.5 gallon labpacks.	Solvents, lab packs hazardous & non-hazardous waste	BCM transports waste 2.2 miles to BCM permitted TSDF.	Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk

	Hazardous Materials	Frequency of Shipment/Year	Quantity and Type of Containers shipped	Typical Radioactivity Level or Chemical Substance	Transportation of Generator Site to TSDF/Transportation Routes	Employee/Positions that Handle the material	Specific Risk Controls (e.g. Secured access fencing, bobwire, cameras,onsite guard	Risk Assessment Rating (low, medium, high)
13	Baylor Neurology Smith Tower 6550 Fannin, Suite 1801 Houston, Texas 77030	Once a year to BCM TSDF		Solvents, lab packs hazardous & non-hazardous waste	BCM transports waste 2.2 miles to BCM permitted TSDF.	Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk
14	Ophthalmology Medical Office Building 1977 Butler Avenue Houston, Texas 77030	Weekly to BCM permitted TSDF or Clean Harbors TSDF	1-2 (Solvent Waste) 55 gallon TH containers, 1-5 30 gallon lab packs, 1-5 5 gallon, 1-5 1.5 gallon labpacks.	Solvents, lab packs hazardous & non-hazardous waste	BCM transports waste 2.2 miles to BCM permitted TSDF.	Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk
15	Ambulatory Surgery Care (ASC) Medical Office Building 1977 Butler Avenue Houston, Texas 77030	Weekly to BCM permitted TSDF or Clean Harbors TSDF	1-2 (Solvent Waste) 55 gallon TH containers, 1-5 30 gallon lab packs, 1-5 5 gallon, 1-5 1.5 gallon labpacks.	Solvents, lab packs hazardous & non-hazardous waste	BCM transports waste 2.2 miles to BCM permitted TSDF.	Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk
16	Texas Children's Neurological Research Institute 1250 Moursond Houston, Texas 77030	Weekly to BCM permitted TSDF or Clean Harbors TSDF	1-2 (Solvent Waste) 55 gallon TH containers, 1-5 30 gallon lab packs, 1-5 5 gallon, 1-5 1.5 gallon labpacks.	Solvents, lab packs hazardous & non-hazardous waste	BCM transports waste 2.2 miles to BCM permitted TSDF.	Employees handling hazardous materials have either had background checks or are trust worthy by BCM.	All facilities storing hazardous waste are secured form unauthorized entrance.	low risk

Appendix "B"

	Radioactive Waste	Frequency of Shipment/Year	Quantity and Type of Containers shipped	Typical Radioactivity Level or Chemical Substance	Transportation of Generator Site to TSDF/Transportation Routes	Employee/Positions that Handle the material	Specific Risk Controls (e.g. Secured access fencing, bobwire, cameras,onsite guard	Risk Assessment Rating (low, medium, high)
1	Main Campus 1 Baylor Plaza Houston, Texas 77030	Monthly shipments to BCM long term radioactive storage facility.	1-10 (radioactive/solid waste) 85 gallon over packs; 1-5 (animal carcasses)	Solid radioactive waste, with less than <500MCi per drum.	BCM transports waste 2.2 miles to BCM long term radioactive waste facility.	Restricted access to authorized entrance.	Facilities are secured from authorized entrance.	Low
2	Yellowstone Treatment Storage and Disposal Facility (TSDF) 3325 Yellowstone Blvd. Houston, Texas 77021	Quarterly shipments to permitted landfill and Bionomics.	1-25 (radioactive solids waste) 55 gallon drums; 1-10 (animal carcasses) to Bionomics. 1 (uranyl acetate) 5 gallon container in concrete to Bionomics.	Solid radioactive waste, with less than <500MCi per drum.	BCM transports solid radioactive waste to permitted landfill. Other radioactive waste is transported by Bionomics to Oakridge, Tennessee.	Restricted access to authorized entrance.	Facilities are secured from authorized entrance.	Low
3	McGovern Campus 2450 Holcomb Blvd. Houston, Texas 77030	Monthly shipments to BCM long term radioactive storage facility.	1-10 (radioactive/solid waste) 85 gallon over packs; 1-5 (animal carcasses)	Solid radioactive waste, with less than <500MCi per drum.	BCM transports waste 2.2 miles to BCM long term radioactive waste facility, or back to main campus if needed.	Restricted access to authorized entrance.	Facilities are secured from authorized entrance.	Low
4	Feign Center 1102 Bates Houston, Texas 77030	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

	Radioactive Waste	Frequency of Shipment/Year	Quantity and Type of Containers shipped	Typical Radioactivity Level or Chemical Substance	Transportation of Generator Site to TSDF/Transportation Routes	Employee/Positions that Handle the material	Specific Risk Controls (e.g. Secured access fencing, bobwire, cameras,onsite guard	Risk Assessment Rating (low, medium, high)
5	Children's Nutrition Research Center (CNRC) 1101 Bates Houston, Texas 77030	Monthly shipments to BCM long term radioactive storage facility.	1-10 (radioactive/solid waste) 85 gallon over packs; 1-5 (animal carcasses)	Solid radioactive waste, with less than <500MCi per drum.	BCM transports waste 2.2 miles to BCM long term radioactive waste facility, or back to main campus if needed.	Restricted access to authorized entrance.	Facilities are secured from authorized entrance.	Low
6	Baylor Clinic 6620 Main Houston, Texas 77030	1-10 (radioactive/solid waste) 85 gallon over packs; 1-5 (animal carcasses)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
7	Texas Heart Institute 6770 Bertner Avenue Houston, Texas 77030	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
8	Baylor Pathology 2525 West Belfort Houston, Texas 77054	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
9	Baylor Pathology Medical Center of South East Texas Regional Professional Building 2501 Jimmy Johnson BLVD. Suite 208 Port Arthur, Texas 77640	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
10	Baylor Pathology Conroe/Sadler 300 Medical Center Blvd. Suite 360 A Conroe, Texas 77304	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

	Radioactive Waste	Frequency of Shipment/Year	Quantity and Type of Containers shipped	Typical Radioactivity Level or Chemical Substance	Transportation of Generator Site to TSDF/Transportation Routes	Employee/Positions that Handle the material	Specific Risk Controls (e.g. Secured access fencing, bobwire, cameras,onsite guard	Risk Assessment Rating (low, medium, high)
11	Baylor Ophthalmology Baylor College of Medicine Baylor Eye Clinic 7200B Cambridge Houston, Texas 77030	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
12	Baylor Neurology Smith Tower 6550 Fannin, Suite 1801 Houston, Texas 77030	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
13	Ophthalmology Medical Office Building 1977 Butler Avenue Houston, Texas 77030	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
14	Ambulatory Surgery Care (ASC) Medical Office Building 1977 Butler Avenue Houston, Texas 77030	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
15	Texas Children's Neurological Research Institute 1250 Moursond Houston, Texas 77030	Quarterly shipments to permitted landfill and Bionomics.	1 (radioactive solid waste) to BCM long term storage)	Solid radioactive waste, with less than <500MCi per drum.	BCM transports waste 2.2 miles to BCM long term radioactive waste facility, or back to main campus if needed.	Restricted access to authorized entrance.	Facilities are secured from authorized entrance.	Low

Appendix "C"

	Selct Agents	Frequency of Shipment/Year	Quantity and Type of Containers shipped	Typical Radioactivity Level or Chemical Substance	Transportation of Generator Site to TSDF/Transportation Routes	Employee/Positions that Handle the material	Specific Risk Controls (e.g. Secured access fencing, bobwire, cameras,onsite guard	Risk Assessment Rating (low, medium, high)
1	Select Agent Samples	1-2 times year	varies	Not applicable	Ships with OES oversight	DOJ/SRA clearance	Facilities are secured from unauthorized entrance.	low

Appendix D

Baylor College of Medicine (Background Checks)
To provide guidance on conducting thorough and legally compliant background checks on faculty and staff applicants who are considered serious candidates.

(1) It is the policy of Baylor College of Medicine to hire the best-qualified applicant for any available position. This policy is consistent with our commitment to provide the highest level of research, education and service and to take reasonable measures to ensure the safety of our faculty, staff, students, visitors, and property.

(2) All applicants must complete an Authorization to Release Information form. If the applicant refuses to complete the form, omits material facts, or provides false information on the form, the applicant will not be considered for employment.

(3) Applicants may not be offered a position until Baylor receives a background check that meets Baylor's hiring criteria unless there is a substantial delay in obtaining a portion of the background check.

(4) In circumstances where Baylor has received partial information on a perspective employee's background check that meets Baylor's hiring criteria, but there is a substantial delay in receiving a portion of the background check, departments may be given the option to hire the prospective employee on a contingent basis. Prospective employees hired on a contingent basis must sign a statement indicating that their continued employment at Baylor is dependent upon the completion of the background check process with a "meets criteria" result. The contingent hire form must be signed and returned to Human Resources before the perspective employee can be scheduled for new employee orientation. The decision to hire an employee on a contingent basis will be made on a case-by-case basis taking into account the nature of the position and the background information that has not yet been received.

(5) The degree to which references are checked on any candidate depends upon the nature of the position for which the individual is being considered and the emergence of any issues that may arise during the application process.

(6) Due to the sensitive nature of the information obtained through a background investigation, only people with a legitimate business need shall have access to the information.

Section 5
Baylor College of Medicine
Contingency Plan

BAYLOR COLLEGE OF MEDICINE CONTINGENCY PLAN

REFERENCE: Section III.E. TCEQ Application

Introduction

This contingency plan has been prepared in accordance with the Environmental Protection Agency (EPA) rules and regulations specified in 40 CFR 264, Subpart D. The purpose of this plan is to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous constituents to air, soil, or surface water at Baylor's hazardous waste storage room and facility. This plan describes the actions Baylor personnel must take in response to any fires, explosions, or releases of hazardous waste or hazardous constituents in Baylor's hazardous waste storage room or facility, which could threaten human health or the environment. A copy of the plan will be maintained at both locations.

In the unlikely event of a fire, explosion, or release of hazardous waste or hazardous waste constituents, which could threaten human health or the environment the provisions of this plan will be carried out immediately.

Emergency Coordinator

In accordance with the regulations, at least one employee either is on the facility premises or on call (i.e., available to respond to an emergency by reaching the facility within a short period of time) with the responsibility for coordinating all emergency response measures. This emergency coordinator is thoroughly familiar with all aspects of this contingency plan, all operations and activities at the facility, the location and characteristics of waste handled the location of all records within the facility, and the facility layout. In addition, the emergency coordinator has the authority to commit the resources needed to carry out this contingency plan.

A list of the names, addresses, and phone numbers (office and home) of all persons qualified to act as emergency coordinator as of August 2013, is presented in Table 1 of this plan. Specific individuals may change, however, at least one primary and one alternate emergency coordinator will be designated at all times. The Supervisor, Environmental Safety is the primary emergency coordinator. Alternate emergency coordinators will be dependent upon planning schedules.

Table 1
Baylor College of Medicine - Contingency Plan
Emergency Coordinator and Alternates as of August 2013

Title	Name and Address[a]	Office Phone Number	Home Phone Number	Pager Phone Number[b]
Supervisor, Environmental Safety	William Davis 1818 Castle Oaks Dr. Pearland, TX 77581	(713) 798-3851	(281) 648-1733	(281) 278-2915
Hazardous Waste Manager	David McCormick 9800 Pagewood Lane #3004 Houston, Texas 77042	(713) 798-1583		Cell # (713) 398-7209
Director of Environmental Safety	Paul Muraca 9029 Rolling Oak Court Montgomery, TX 77316	(713) 798-6617	(936) 588-3719	Cell # (713) 591-8359

a Actual individuals may change, however, one primary and one alternate emergency coordinator will always be designated.
b Through the use of pagers, the emergency coordinator or designated alternate are available 24-hours a day.

Notification

Any personnel observing a fire, explosion, or an unplanned release of hazardous waste or hazardous waste constituents will immediately notify the emergency coordinator. To report an emergency situation during working hours (8:00 A.M. to 5:00 P.M.), personnel may call 713/798-4799. After working hours, personnel will call home phone numbers or cell numbers of the designated emergency coordinator or alternates. Personnel may obtain home phone numbers or cell phones from the Baylor College of Medicine Security Department at 713/798-3000. After hours, the designated emergency coordinator or alternates should be contacted in the following order:

1. William T. Davis, CHMM, Supervisor, Environmental Safety
2. David McCormick, Hazardous Waste Manager
3. Paul Muraca, M.S., Director of Environmental Safety

General Procedures

In the unlikely event of an imminent or actual emergency situation at the facility, the emergency coordinator (or his designee, when the emergency coordinator is on call) will immediately take the following steps. These steps are general; more specific procedures are discussed in the emergency response section of this plan.

1. Immediately activate internal alarm/communication system utilizing a signal (fire alarm) to notify all facility personnel.
2. Initiate appropriate response actions and evacuate affected areas if necessary. Notify all appropriate state and/or local agencies with designated response roles if their help is needed. The appropriate agencies will be notified by telephone.
3. Identify the character, exact source, amount, and areal extent of any released materials. This assessment may be conducted through observation, review of facility records or shipping manifest, and, if necessary chemical analysis. Determine if a reportable quantity has been exceeded. Please refer to Reportable Quantities of Hazardous Substances in Appendix A of this report. If it is determined that a reportable quantity has been exceeded then the necessary notification must be made. Please refer to SARA/CERCLA Notification Requirements in Appendix B of this plan.
4. Assess possible hazards to human health or the environment that may result from the release, fire, or explosion. This assessment must consider direct and indirect effects of the release, fire, or explosion, including the effects of any toxic, irritating, or asphyxiating gases that are generated. In addition, the effects of any hazardous surface water run-off from the water or chemical agents used to control fire and heat induced explosions must be included in this assessment.
5. If it has been determined that the facility has had a release, fire, or explosion which could threaten human health or the environment outside the facility the emergency coordinator will notify, by telephone, the appropriate local authorities. The emergency coordinator will be available to assist the appropriate officials to decide whether local areas should be evacuated. In addition, the emergency coordinator will immediately notify the TCEQ District Supervisor according to procedures set out in section 4.1 through 4.3 of the "State of Texas Oil and Hazardous Substances Spill Contingency Plan". This report, submitted to the TCEQ District Supervisor, will include:
   - The date and time of spill;
   - The type of material spilled;
   - An estimate of the quantity of material spilled;

- The exact location of the spill, including the name of the waters involved or threatened;
- The source of the spill;
- The name, address, and telephone number of the party in charge of, or responsible for, the facility or activity associated with the spill;
- The extent of actual and potential water pollution;
- The party at the spill site who is in charge of operations at the spill site and the telephone number of this party;
- The steps being taken or proposed to contain and clean up the spilled material;
- The extent of injuries, if any; and
- Possible hazards to human health and the environment (air, soil, water, wildlife, etc.).

When warranted, the emergency coordinator, owner, or operator will also notify the National Response Center at 800/424-8802, the Texas Commission on Environmental Quality at 800/832-8224, Texas Commission on Environmental Quality at 713/767-3500 (if the TCEQ cannot be reached, the EPA Emergency Response-Dallas at 800/887-6063 may be contacted), and the U.S. Coast Guard may be contacted, if nautical waters are involved, at 713-674-8488. Any reports which are submitted to the Texas Department of Health (TDH) and the National Response Center must include the following information:

- Name, address, and telephone number of the facility;
- Time and type of incident (e.g., fire, explosion);
- Name and quantity of released materials to the extent known;
- Extent of injuries, if any; and
- An assessment of possible hazards to human health or the environment, outside the facility.

6. Will take all reasonable measures to ensure that fires, explosions, and releases do not occur, recur, or spread to other hazardous waste at the facility. These measures include stopping processes and operations, collecting and containing released wastes, or removing or isolating containers.

7. If the facility (or portion of the facility) stops operations in response to a fire, explosion, or release, the emergency coordinator will monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment.

8. Immediately after an emergency, the emergency coordinator will take actions to provide for storing, processing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion.

9. Ensure that the area(s) affected by an environmental incident are properly secured. The storing, processing, or disposing of waste which may be incompatible with the released material must be prevented until cleanup procedures are completed. Before operations are resumed, ensure that in the affected area(s) of the facility all emergency equipment listed in this plan is cleaned and fit for its intended use. The Executive Director and the TCEQ District Office will be notified that the facility is in compliance with Subsection III.E.1.2.3 of this Part B permit application before operations are resumed in the affected area(s).

   It will be noted in the facility's operating record the time, date, and details of any incident that requires implementation of this contingency plan. Within 15 days after the incident, a written report will be submitted to the Executive Director and the District Office. The following will be included in this report.

- Name, address, and telephone number of the owner or operator;
- Name, address, and telephone number of the facility;
- Date, time, and type of incident (e.g., fire, explosion);
- Name and quantity of material(s) involved;
- The extent of injuries, if any;
- An assessment of actual or potential hazardous to human health or the environment, where this is applicable; and
- Estimated quantity and disposition of recovered material that resulted from the incident.

Emergency Response

The emergency response procedures described below are designed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous constituents to air, soil, or surface water. These procedures are intended only as guidelines. Dependent upon the situation additional emergency response actions may be required.

Chemical Composition of Wastes

Wastes stored in the hazardous waste storage areas may include any of the following chemical groups, stored in ≤55 gallon containers.

- corrosives,
- oxidizers,
- poisons,
- reactives,
- flammable and combustible materials,
- pesticides,
- cyanides,
- sulfides, and other regulated materials in liquid, solid, and containerized gas forms.

The most probable emergency situations would include releases of liquids, fires, and/or possibly explosions. Emergency procedures will include, where applicable, stopping hazardous waste processes and operations, collecting and containing released waste, removing or isolating containers, and using other measures as needed.

Releases

An assessment of the type of material(s) released should be conducted utilizing analysis, knowledge of the waste, observation, Safety Data Sheets (SDS), and/or, if applicable, shipping manifest or other facility records. This assessment should also include, exact source, amount, and extent of the released material.

In the unlikely event of a release, hazardous waste processes and operations will be stopped to ensure that waste(s) which may be incompatible with the released material(s) is not stored, processed, or disposed until clean up procedures are completed.

Releases should be prevented from spreading to other hazardous wastes. Releases can be contained by placing a leaking drum/container in a salvage drum and spreading appropriate absorbent on the spill. Any absorbent or other materials used to clean up the spill should be placed in a properly marked hazardous waste drum until it can be analyzed and disposed. Equipment used during the clean up process will be properly decontaminated prior to return to storage. When clean up procedures are completed, the recovered materials and the drummed clean up materials will be properly stored and/or processed until disposed.

During the clean up process, personnel should be using the appropriate personnel protective equipment. An evaluation should be conducted to determine the proper level of personal protective equipment.

Fire or Explosion

An assessment of the character, exact source, amount, and extent of the fire or explosion should be conducted immediately using observation, analysis, knowledge of the waste, shipping manifests, SDS's, or facility records. Any fire or explosion in the hazardous waste storage facility or room has the potential for releasing toxic gases, vapors, or fumes; therefore, monitoring should be conducted for gas generation. A visual assessment will be conducted for the release of toxic gases, vapors, or fumes. Actions should be taken to ensure that all personnel are utilizing the appropriate level of personnel protective equipment.

The fire should be controlled using the proper extinguishing agent for the burning material. If other drums or containers in the area present an explosive risk, then action should be taken to keep these drums or containers cool, unless this action would present another hazard. For example, water may be used if there are no chemicals in the area, which react with water, or drums/containers could be removed or isolated.

Pressure buildup in drums, and thus explosions caused by pressure buildup, will be prevented and detected through the following operating procedures:

1. Since 55-gallon drums of liquid are not typically received at the facility, buildup can be prevented through facility operations and container management.
2. Drum bungs will not be sealed tightly. This will allow breathing room and prevent drum expansion[1].
3. All drums will be opened slowly and in a manner so as to allow for the controlled release of pressure buildup.
4. The heating and cooling system for the facility will be maintained so as to ensure any temperature changes are effected incrementally and to prevent drastic temperature changes over brief periods of time.
5. Approximately 2 inches of headspace or freeboard will be maintained in each drum to allow for liquid/vapor expansion.
6. Inspections will include observing the containers for drum or lid deformities or other indications of pressure buildup, such as pings or other sounds caused by drum expansion.

Assessment of Possible Hazards

In the unlikely event of a sudden release, fire, or explosion the materials that are stored in the facility or room may present possible hazards to human health and the environment. Please note that any possible effects on the environment and human health will be dependent upon the specific chemical. The human health and environmental effects that are described below are very general.

All of the waste stored at the Yellowstone Blvd. Facility will be stored in an enclosed building with a secondary containment system. Further, the ignitable wastes are stored in a special vault equipped with a blow-out panel and other features noted in the engineering report. All ignitable and reactive chemicals are stored at least 50 feet from the property line. If suddenly released, the drummed solvents may present a fire and explosion hazard; however, in consideration that these drums will be stored inside an enclosed vault, the effect on the environment is expected to be minimal. Any sudden release from the lab packs to the environment is highly unlikely. If a release does occur, it will most likely be a very small quantity and, therefore, the effect on the environment is considered to be very minimal.

The possible human health effects for each of the chemical groups that may be stored in the facility are described below.

Corrosives

Upon contact with liquids or solids, corrosive material may cause pain, severe irritation to the skin, second to third degree burns on tissue, and severe injury to the eyes. Inhalation of dust or fumes may cause damage to the upper respiratory tract and lungs, coughing, a choking sensation, and irritation to the nose and lungs. Ingestion of corrosive material may cause severe gastrointestinal irritation and severe scar formation or perforation.

Oxidizers

Upon contact, oxidizers may cause burns to skin and tissue. Ingestion may cause severe distress to the gastrointestinal system, and possibly death.

Poisons

Upon ingestion, poisons may cause severe distress to the gastrointestinal system, pain, and possibly death. Upon contact, poisons may cause irritation to the skin and tissue. Inhalation may cause choking, irritation to the respiratory tract and lungs, and possibly death.

Reactives

Exposure to reactives may cause irritation and burns to the skin and tissue. Inhalation of fumes may cause irritation to the respiratory tract and lungs. Ingestion may cause vomiting.

Flammable and Combustible Material

Upon contact, flammable and combustible material may cause irritation to the skin and eyes. Inhalation of fumes may cause a narcotic effect, irritation to the nose, respiratory tract and lungs, dizziness, excitation, pallor, followed by flushing, weakness, headache, breathlessness, chest constriction, coma, and possibly death.

Pesticides

Upon ingestion, pesticides may cause severe distress to the gastrointestinal system, pain, and possibly death. Upon contact, pesticides may cause irritation to the skin and tissue. Inhalation of fumes may cause choking, irritation to the respiratory tract and lungs.

Cyanides

Upon contact, cyanide will be readily absorbed through the skin. Vapors containing cyanide may be inhaled. Symptoms of exposure include salivation, nausea without vomiting, a bitter, almond odor on breath of person exposed, anxiety, confusion, vertigo, giddiness, lower jaw stiffness, convulsions, opisthotonos, paralysis, coma, cardiac arrhythmias, and transient respiratory stimulation followed by respiratory failure. Inhalation of a high concentrations of hydrogen cyanide gas may cause respiratory arrest resulting in death. Ingestion of cyanide salts may eventually cause death.

Sulfides

Upon contact, sulfides may cause softening and irritation to the skin. If ingested, hydrogen sulfide and free alkali may be liberated causing corrosion and irritation to tissue. If heated, sulfides may decompose into toxic and flammable vapors of hydrogen sulfide. Hydrogen sulfide is an irritant to the upper respiratory tract and an asphyxiant.

Containerized Gas

Any human health effects from exposure to a containerized gas will be dependent upon the gas.

Emergency Equipment

A list of available emergency equipment is presented in Table 2 of this plan. If necessary, additional equipment will be obtained through rental.

In the unlikely event of an accidental spill or release outside the containment system, the release or spill will occur on either concrete (inside the facility building) or asphalt (outside the facility building). A spill or release to these areas will be absorbed with calcium bentonite or other spill control absorbents or pillows. The area will be washed with a surfactant (such as Alconox or PetroClean) and water. The wash water will be removed with sorbent pads. If a spill or release of organics onto the asphalt pad occurs, and cannot be cleaned, the asphalt and any affected underlying fill will be removed and replaced/repaired.

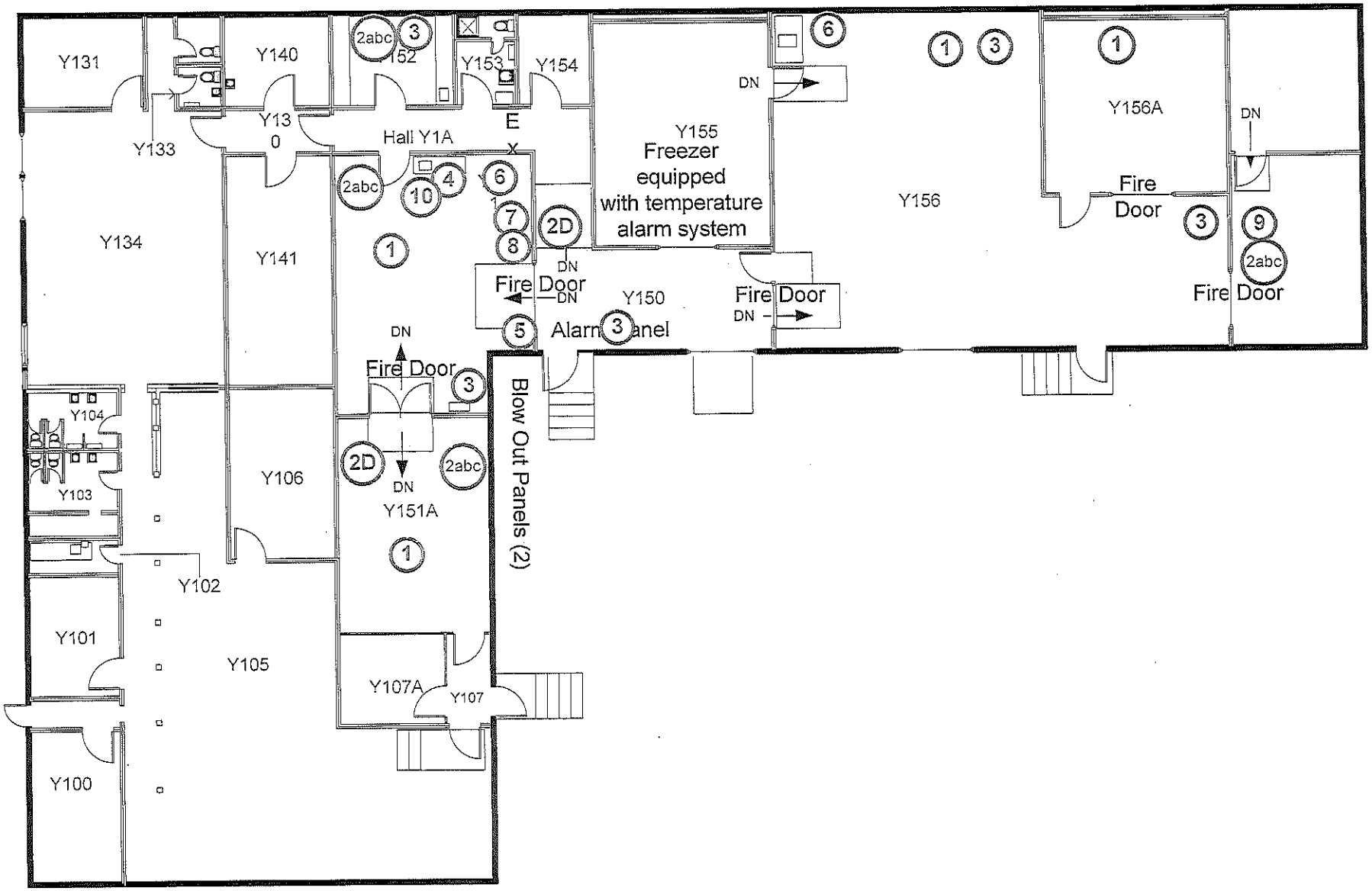
All equipment utilized to contain a hazardous waste release must be thoroughly decontaminated prior to return to storage. Equipment or supplies which are needed and can not be reused will be replaced. Sampling equipment is decontaminated with water and a phosphate-free detergent such as Alconox,. Heavy equipment is decontaminated by using water and, if needed, a phosphate-free detergent such as Alconox,. All materials used to decontaminate equipment must be placed in drums and properly stored until disposal can be arranged.

Table 2
Baylor College of Medicine - Contingency Plan
Emergency Equipment

Floor Plan Number	Equipment	Location	Physical Description
1	Fire Suppression System	2 zones; Flammable Liquid storage area, and Chemical Waste storage area	"Rate-of-Use" (thermal) heat detectors with 2 manual overrides on wall, no water due to water reactives
2(ABC)	Fire Extinguishers	Various Locations in storage areas and throughout the building	Four portable, 10-lb. dry chemical, Class A-B-C
2(D)			Two 30-lb. Class D
3	Emergency Communication System	Throughout the building	Fire alarm is connected with Yellowstone security and One Baylor Plaza security and engineer's monitor plus UL-rated remote monitor
4	Spill Control Equipment	Chemical Storage Area	Absorbents, wipes, pads, Spill VBS blankets, Hazorb spill control pillows, calcium bentonite, pH paper, mercury absorb powder, Box mercury sponges, "Danger Chemical Spill" signs, "Danger Do Not Enter" signs
5	First Aid Kit	Chemical Storage Area	Standard first aid materials
6	Safety Shower and Eyewash	Chemical Storage Area	Standard
7	Personal Protective Equipment	Chemical Storage Area	Goggles, safety glasses, face shields, and chemical resistant gloves, coveralls, gowns, aprons, splash suits, and over boots
8	Cleaning Equipment	Chemical Storage Area	Acid clean-up kit, Caustic clean-up kit, Flammable Solvents clean-up kit, surfactant (e.g., Alconox,), pH paper, PetroClean, Mercury clean-up kit, brooms, mops, dustpans, shovels, sets of long handled tongs, 15 gal. Open head drum, and bottle carriers
9	Other Equipment	Environmental Safety Office at One Baylor Plaza	High efficiency particle filter vacuum cleaner and a mercury vacuum cleaner for cleaning toxic powders and mercury
10	Neutralizers/Spill Related Chemicals	Chemical Storage Area	Sodium Bicarbonate (acid neutralization), Calcium Hydroxide (inorganic acid neutralization), Sulfur (metallic mercury cleanup), Sodium Bisulfite (oxidizer spill cleanup), Sodium Thiosulfate (bromine spills), Calcium Hypochlorite (mercaptans/organic sulfide spills), Copper Sulfate (identification of White Phosphorus on skin) Ammonium Citrate (decontamination of Azo compounds and Azides), Sodium bisulfate (aliphatic amine spills)

Appendix E

Baylor College of Medicine
Yellowstone Facility
Fire Protection Facilities



Decontaminated emergency equipment will be determined to be clean by visual observation of the rinsate. When no sheen or color is observed in the rinsate, and, for equipment contaminated with inorganics, when the pH paper indicates a neutral range (about 4.0 to 9.0), the equipment will be deemed clean.

The 3325 Yellowstone Blvd. Location has two fire hydrants near the facility. These fire hydrants are depicted on the map presented in Appendix D of the Contingency Plan (Section 5). Flow test for the two hydrants, one located at the intersection of Allegheny Street and Yellowstone Boulevard, and the other at the intersection of Highway 288 and Yellowstone Boulevard are conducted by the City of Houston-Public Works Department. This data, summarized below, indicate that there is water of sufficient volume and adequate pressure to supply water hose streams and foam-producing equipment in the event the use of such equipment becomes necessary.

Fire Hydrant Location	Static Pressure (psi)	Residual Pressure (psi)	Flow at Residual Pressure (gpm)
Yellowstone at Allegheny	46	42	1,087
Yellowstone at Hwy. 288 Service Road	49	39	1,047

The city of Houston water supply is also the source of water used in the facility's plumbing system. As a minimum, this water is of sufficient volume and pressure to meet OSHA requirements for safety showers and eye wash stations, and to supply the fire suppression system.

ARRANGEMENTS WITH LOCAL AUTHORITIES

Arrangements have been made to familiarize local response agencies with the layout of the facility, properties of hazardous waste handled at the facility and associated hazards, places where facility personnel would normally be working, entrances to and roads inside the facility, and possible evacuation routes.

In the unlikely event of an injury, personnel will call the security office using the following 713/798-3000 number to request transportation for the injured party. BCM Security will notify College Administration Officials which are available 24 hours per day, 7 days per week.

Arrangements have been made to familiarize local fire departments and hospitals with the types of injuries or illnesses which could result from fires, explosions, or releases. Appendix C contains a listing of the local fire departments, police departments, and hospitals, which have been contacted. Correspondence documenting these contacts is available in the facility records. A pay-for-use contract with SET Environmental and Phoenix Environmental has been established for on-call emergency response.

EVACUATION PLAN

If an event occurs which requires facility evacuation, the emergency coordinator will implement the following procedures.

- Notify all facility personnel, by a signal (fire alarm may be activated), to immediately stop all processing and operations and evacuate the facility (processing and operations will be safely concluded). If possible, all open drums and exposed hazardous waste will be covered. As each situation will be unique additional instructions may be given.
- If warranted, the security officers on the premises may be dispatched to assist in the evacuation.
- Personnel will evacuate the facility using the primary route. If the primary route is blocked, by releases, fire, or explosion, the secondary or tertiary routes will be used. In the event the Yellowstone Blvd. Waste Facility location gate depicted in Appendix D is blocked, personnel will evacuate to the northwest corner of the property on which the facility is located, about 645 feet from the facility. The primary, secondary, and tertiary evacuation routes and meeting areas are presented on the evacuation route maps in Appendix D of this section.
- The emergency coordinator will account for all facility personnel.

As an added safety precaution, the fire alarm signal is connected to the facility's security office and the One Baylor Plaza security office.

In the unlikely event that a release, fire, or explosion could threaten human health or the environment, outside the facility, then evacuation of local areas may be advisable. The emergency coordinator will contact the local police by telephone to request assistance. The local fire department will also be notified of the situation by telephone. The Director of Environmental Safety Office or the Public Affairs Office will make all public comments regarding the nature of the incident.

Appendix C

Baylor College of Medicine-Contingency Plan

Arrangements with Local Authorities

Appendix C
Arrangements with Local Authorities

Following is a list of local fire departments, police departments, hospitals, and as emergency response company which have been contacted:

Terry A. Garrison
City of Houston Fire Department
1205 Dart Street
Houston, TX 77007

District Chief D.G. Snell
Hazardous Materials Chief
City of Houston Fire Department
7825 Harrisburg, Station 22
Houston, TX 77012

City of Houston Fire Department
District Chief #46 (Suppression Division)
A, B, C, and D Shifts
3902 Corder Street
Houston, TX 77021

Charles A. McClelland, Jr
Chief of Police
City of Houston Police Department
61 Reisner Street
Houston, TX 77002

Ben Taub Hospital
Emergency Room
1504 Taub Loop
Houston, TX 77030

The Methodist Hospital
Emergency Room
6565 Fannin Street
Houston, TX 77030

Phoenix Environmental
711 Decker Dr.
Baytown, Texas 77520
(281) 838-3400

SET Environmental
14010 Interdrive West
Houston, Texas 77032
(877) 447-7455

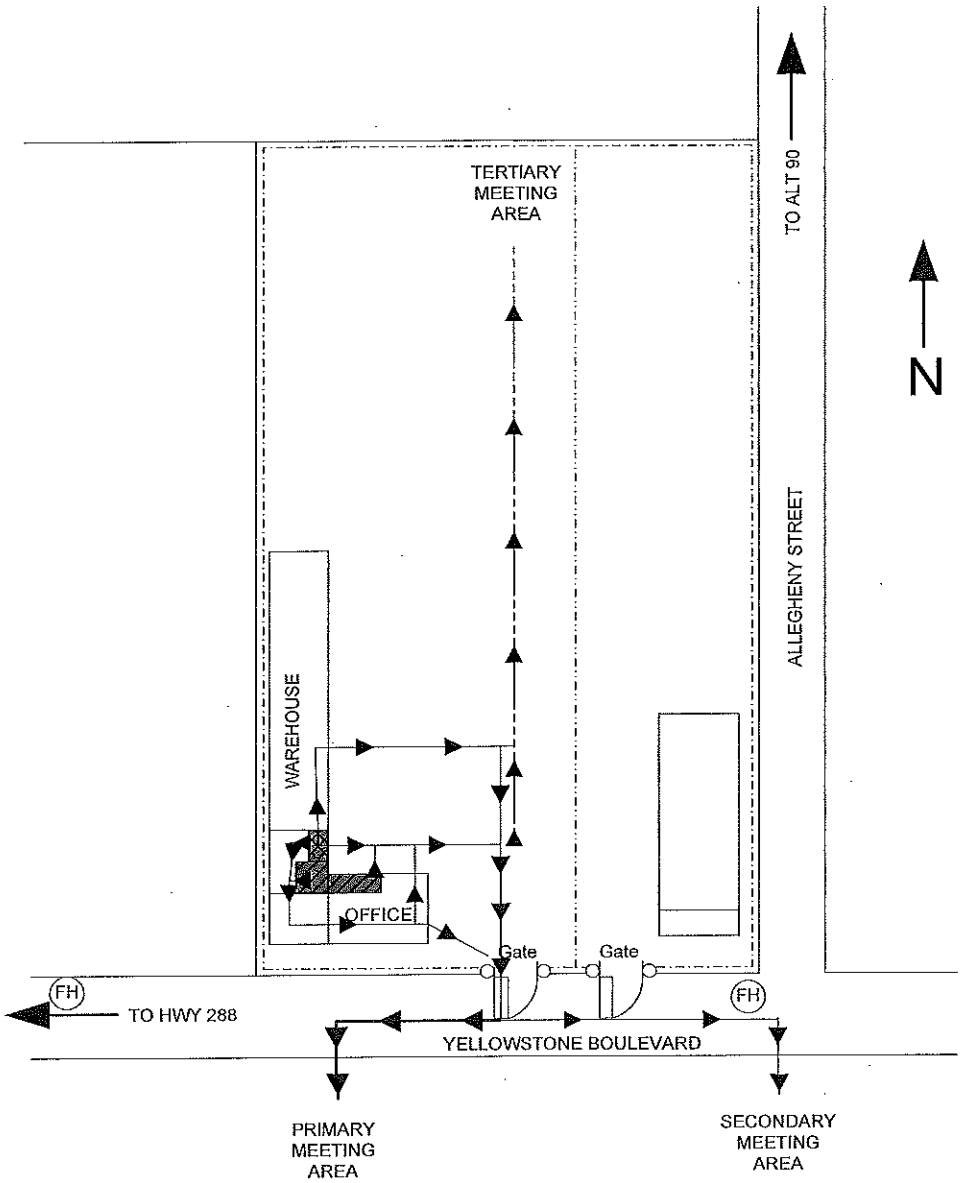
Garner Environmental
1717 West 13th Street
Deer Park, Texas 77536
(800) 424-1716

Appendix D

Baylor College of Medicine-Contingency Plan

Evacuation Plan

BAYLOR COLLEGE OF MEDICINE – CONTIGENCY PLAN
EVACUATION ROUTE MAP



LEGEND

- FH — FIRE HYDRANT
- CHAIN LINK FENCE PROPERTY LINES ARE ESTIMATED
- PROPOSED STORAGE FACILITY AREA
- RECEIVING DOCK
- PRIMARY ROUTE
- SECONDARY ROUTE
- TERTIARY ROUTE