HAZARDOUS WASTE LANDFILL
OPERATING LICENSE PERMIT APPLICATION RENEWAL

FORD RIVER RAISIN WAREHOUSE
3200 EAST ELM AVENUE
MONROE, MICHIGAN
MID 005 057 005

MAY 2017

PREPARED FOR:
FORD MOTOR COMPANY
290 TOWN CENTER DRIVE, SUITE 800
DEARBORN, MICHIGAN 48126

Mannik Smith GROUP

FORD MOTOR COMPANY FORD RIVER RAISIN WAREHOUSE
HAZARDOUS WASTE LANDFILL
OPERATING LICENSE PERMIT APPLICATION RENEWAL

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SECTION 1

DEQ APPLICATION FORM EQP 5111 (REV. 3 4/17/2017 AND CERTIFICATION
THE MANNIK & SMITH GROUP, INC.

Michigan Department of Environmental Quality – Office of Waste Management and Radiological Protection (OWMRP)

OPERATING LICENSE APPLICATION FORM FOR
HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

Required under authority of Part 111, Hazardous Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Failure to submit this information may result in civil or criminal penalties.

Note: Copies of the current DEQ Site Identification Form, EQP 5150, and the EPA Part A Permit Application Form, 8700-23, must be submitted with this application.

I. FACILITY SITE ID NUMBER	005057005										
II. FACILITY'S LEGAL OWNER											
A. Name	Ford Motor Company										
B. Street or P.O. Box	320 East Elm Avenue										
C. City/State/ZIP	Monroe, MI 48162										
D. Telephone Number (area code included)	734-243-4859										
E. Owner Type	P	F. Ownership Change?	Y	X	N		N/A		Date	10/2009	
III. FACILITY OPERATOR											
A. Name	Ford Motor Company										
B. Street or P.O. Box	320 East Elm Avenue										
C. City/State/ZIP	Monroe, MI 48162										
D. Telephone Number (area code included)	734-243-4859										
E. Operator Type	P	F. Operator Change?	Y	X	N		N/A		Date	10/2009	
IV. TITLEHOLDER OF LAND											
A. Name	Ford Motor Company										
B. Street or P.O. Box	320 East Elm Avenue										
C. City/State/ZIP	Monroe, MI 48162										
D. Telephone Number (area coded included)	734-243-4859										

V. OPERATING LICENSE APPLICATION		
Place an "X" in the appropriate box under either A or B (select only one box)		
A. Operating License Application		
☐	First Application for *Existing Facility	Place an "X" here if application is for a facility that has not been previously licensed in Michigan to treat, store, or dispose of hazardous waste and has interim status pursuant to 40 CFR §270.70.
☒	Renewal Application for *Existing Facility	Place an "X" here if renewal application for a facility that was previously licensed in Michigan to treat, store, or dispose hazardous waste and whose hazardous waste operations have not had any new construction or been altered, enlarged, or expanded.
☐	Application for Modification of License	Place an "X" here if application is for a license modification.
☐	First Application for Research, Development, and Demonstration (RDD) License	Place an "X" here if application for a temporary license for RDD.
☐	Renewal Application for RDD License	Place an "X" here if application for the renewal of a temporary license for RDD.
B. Operating License Application for New, Altered, Enlarged, or Expanded Facility		
☐	First Application	Place an "X" here if application is for a new facility or a facility that wishes to alter, enlarge, or expand its hazardous waste operations.

For existing facilities, provide date operation began.	Date	3/27/1995
For RDD activities, provide the date RDD began or expected to begin.	Date	NA
For new, altered, enlarged, or expanded facilities, provide date expected construction to begin.	Date	NA

***Existing Facility** means a hazardous waste treatment, storage, or disposal facility (TSDF) that either received all necessary state-issued environmental permits or licenses before January 1, 1980, or for which approval of construction was received from the Air Pollution Control Commission before November 19, 1980, or before promulgation of new federal rules that caused the facility to become subject to regulation as a TSDF. Existing facilities also include TSDFs that were operating before January 1, 1980, under existing authority, or before promulgation of new federal rules that caused the facility to become subject to regulation as a TSDF and that did not require state-issued environmental permits or licenses.

VI. OPERATING LICENSE APPLICATION FEES			
☒	A. Operating License Application Fixed Fee	$	500
☐	B. Additional License Application Fees for New, Altered, Enlarged, or Expanded Facility	$	25,000
	Check Type of Facility		
☐	Land Disposal ($9,000)	$	_____
☐	Incineration or Other Treatment ($7,200)	$	_____
☐	Storage ($500)	$	_____
Total Operating License Fee		$	_____

Note: Checks shall be made payable to the "State of Michigan" and the state accounting code "HWOL" written in the memo portion. Checks shall be mailed to DEQ, Cashier's Office, P.O. Box 30657, Lansing, Michigan 48909-8157, with a copy of payment included with application that is mailed to the DEQ, OWMRP, P.O. Box 30241, Lansing, Michigan 48909-7741.

VII. EXISTING ENVIRONMENTAL PERMITS (attach copies of each as proof of issuance)		
☐	A. NPDES (Discharges to Surface Water) Permit Number	
☐	B. UIC (Underground Injection of Fluids) Permit Number	
☒	C. RCRA (Hazardous Waste) Permit Number	MID005057005
☐	D. PSD (Air Emissions From Proposed Sources) Permit Number	
☒	E. Other (Specify below) Permit Number	City of Monroe Discharge Permit Nos: 1030-1 and 1030-2 (Attachment I)

VIII. NATURE OF BUSINESS (Provide a brief description)

Ford Motor Company Warehouse. Former Automotive Components Holdings, LLC automotive chassis plant. Former Visteon automotive chassis plant. Former Ford metal stamping and former electroplating operation.

(see other required attachment #, General Facility Description for more detailed information)

IX. MAP

Attach to this application a topographic map of the area extending at least one mile beyond the property boundaries. The map must show the legal boundaries of the facility; the location of each of its existing and proposed intake and discharge structures; each of its hazardous waste treatment, storage, or disposal facilities, including the location of all processes listed in Items XII and XIII identified by process code; and each well where it injects fluids underground. Include all springs, rivers, and other surface water bodies in the map area, plus all drinking water wells within a quarter mile of the facility that are identified in the public record or otherwise known to you. (see instructions for specific requirements)

X. FACILITY DRAWING

All existing facilities must include a scale drawing of the facility showing the property boundaries of the facility; the areas occupied by treatment, storage, or disposal operations that will be used during interim status; the name of each operation (drum storage area, etc.); areas of past TSD operations; areas of future TSD; and the approximate dimensions of the property boundaries and all TSD areas. Where applicable, use the process codes listed in Items XII and XIII to indicate the location of all TSD. This drawing should fit on an 8.5 by 11 inch sheet of paper.

XI. PHOTOGRAPHS

All existing facilities must include photographs that clearly delineate all existing structures; existing storage, treatment, and disposal areas; and sites of future storage, treatment, or disposal areas. Use the process codes and descriptions in Items XII and XIII to indicate the location of all TSD areas. Indicate the date of the photograph on the back of each photograph. Photographs may be in color or black and white, aerial or ground-level.

XII. PROCESS CODES AND DESIGN CAPACITIES (see instructions)

Line Number	A. Process Code (from list)	B. Process Design Capacity			Line Number	A. Process Code (from list)	B. Process Design Capacity		
		B.1. Quantity	B.2. Unit of Measure	For Official Use Only			B.1. Quantity	B.2. Unit of Measure	For Official Use Only
1.	D80	873	A		6.				
2.					7.				
3.					8.				
4.					9.				
5.					10.				

C. Additional Process Codes or Description of Nonlisted Processes (Codes "S99" and "T04").

XIII. DESCRIPTION OF HAZARDOUS WASTES

Line Number	A. Hazardous Waste Number (enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Processes				
				D.1 Process Codes (enter code)				D.2 Process Description (if no code entered in D.1)
1	F006	NA						

XIV. OTHER REQUIRED ATTACHMENTS

A. General Information (each item should be a separate attachment to the application)

1. General facility description
2. Chemical and physical analyses*
3. Waste Analysis Plan*
4. Security procedures and equipment
5. Inspection schedules*
6. Preparedness/prevention or waiver*
7. Contingency Plan*
8. Traffic information
9. Location information
10. Personnel training program*
11. Closure and Postclosure (C/PC) Plan*
12. C/PC cost estimates*
13. Topographic map
14. Liability mechanism
15. Financial assurance instrument

* Use template provided to complete application

B. Supplemental Information (each item, if needed, should be a separate attachment to the application)

1. Status of compliance with other federal laws
2. Corrective action information*
3. Hydrogeological Report*
4. Environmental Assessment*
5. Environmental monitoring Programs*
6. Engineering plans
7. Proof of issuance of other permits or licenses
8. Capability certification/compliance schedule
9. Restrictive covenant (landfills only)
10. Construction certification (new, altered, enlarged, or expanded)

* Use template provided to complete application

C. Facility Specific Information (each item, if needed, should be a separate attachment to the application)

1. Containers*
2. Tanks*
3. Incineration or thermal treatment
4. Treatment
5. Surface impoundments
6. Waste piles
7. Landfills
8. Land treatment
9. Miscellaneous units
10. Underground mines or caves
11. Drip pads
12. Boilers and industrial furnaces
13. Air emissions from process vents, equipment leaks, tanks, containers, and surface impoundments**

* Use template provided to complete application

** Use templates C.11-AA, C.11-BB, and C.11-CC provided to complete application

XV. CERTIFICATION		
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.		
OWNER NAME (type or print)	SIGNATURE	DATE SIGNED
OPERATOR NAME (type or print)	SIGNATURE	DATE SIGNED
TITLEHOLDEROF LAND NAME (type or print)	SIGNATURE	DATE SIGNED

SECTION 2

DEQ SITE IDENTIFICATION FORM EQP 5150
THE MANNIK & SMITH GROUP, INC.

Required under authority of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Failure to submit this information may result in civil or criminal penalties.

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
Office of Waste Management and Radiological Protection

SITE IDENTIFICATION VERIFICATION FORM

DEQ

I. The form is being submitted CHECK CORRECT BOX(ES)	[ ] **as initial notification:** to notify as a new site or new owner for the site: Mail this form and the user charge fee with either a receipt from paying the $50 fee on-line using a Master Card, VISA, or Discover Card (https://www.thepayplace.com/mi/deq/siteid) or by check made payable to the State of Michigan. Mail to MDEQ Revenue Office - HWCU, PO Box 30657, Lansing, MI 48909-8157 **OR** [X] **as subsequent notification:** to change, update, or verify site information for an existing owner of a site with a previously issued site ID number. Mail directly to OWMRP-MDEQ at OWMRP-MDEQ, Management & Tracking Unit, PO Box 30241, Lansing, MI 48909-7741 if a fee is not required. Otherwise submit to MDEQ Revenue Office (see above). **AND ANY OF THE FOLLOWING** [ ] as a component of a Hazardous Waste Permit Part A (submit to OWMRP-MDEQ) [ ] as a component of the Hazardous Waste (biennial) Report (submit to OWMRP-MDEQ)
II. Site's ID Number	A. Site's Identification (ID) Number: MID005057005
III. Name of Site	A. Legal company name: FORD RIVER RAISIN WAREHOUSE B. Site specific name (d/b/a): FORD RIVER RAISIN WAREHOUSE
III. Added or Corrected Legal Company Name	A. Legal company name:
III. Added or Corrected Site Specific Name	B. Site specific name (d/b/a):
IV. NAICS for this Site	A. 493190 B. C. D.
IV. Additional or Corrected NAICS for this Site	A. B. C. D.
V. Site Location Address and Other Site Information If there is a change in the site location address you must explain why in Section XII, Comments.	Street Address: 3200 E ELM AVE Address line 2: City, Town, or Village: MONROE State, Province, or Subdivision (2 letters): MI Country: UNITED STATES County Name (MI only): MONROE ZIP/Postal Code: 48162-1970 Tax Number: 38XXXXX90
V. Additional Site Location Address and Additional or Corrected Other Site Information TYPE OR PRINT CLEARLY	Street Address: Address line 2: City, Town, or Village: State, Province, or Subdivision (2 letters): Country: County Name (MI only): ZIP/Postal Code: Tax Number:

VI. Site Mailing Address	Address line 1 or PO Box: 290 TOWN CENTER DR - ENVIRONMENTAL OFC		
	Address line 2: FAIRLANE PLAZA N STE 800	City, Town, or Village: DEARBORN	
	State, Province, or Subdivision (2 letters): MI	Country: UNITED STATES	
	County Name (MI only): WAYNE	ZIP/Postal Code: 48126-	
VI. Additional or Corrected Site Mailing Address TYPE OR PRINT CLEARLY	Address line 1 or PO Box:		
	Address line 2:	City, Town, or Village:	
	State, Province, or Subdivision (2 letters):	Country:	
	County Name (MI only):	ZIP/Postal Code:	
VII. Site Contact Person	First Name: CHARLES	MI: H	Last Name: PINTER
	Phone Number: (313) 390-0875	Ext:	Alt. Phone Number: ( ) -
	Email Address: cpinter@ford.com		Fax Number: (734) 457-1843
VII. Additional or Corrected Site Contact Person TYPE OR PRINT CLEARLY	First Name:	MI:	Last Name:
	Phone Number: ( )	Ext:	Alt. Phone Number: ( )
	Email Address:		Fax Number: ( )
VIII. Indian Reservation	Facility on Indian Reservation Land: ☐ yes	☒ no	
VIII. Corrected Indian Reservation	Facility on Indian Reservation Land: ☐ yes	☐ no	
IX. Owner and/or Operator of Site	1. (check applicable box(es)) ☒ Owner ☒ Operator	Approx. date became owner &/or operator: 10/1/2009 Approx. date ceased as owner &/or operator:	
	Name: FORD MOTOR COMPANY		
	Type (check one): ☒ Private ☐ County ☐ District ☐ Federal ☐ Indian ☐ Municipal ☐ State ☐ Other		
IX. Additional or Corrected Owner of the Site and/or Operator of Site Add any additional owners or operators on the comment page. The property owner is not required unless said property owner also acts as the owner or operator of the activity that generates the waste	1. (check applicable box(es)) ☐ Owner ☐ Operator	Approx. date became owner &/or operator: Approx. date ceased as owner &/or operator:	
	Name:		
	Type (check one): ☐ Private ☐ County ☐ District ☐ Federal ☐ Indian ☐ Municipal ☐ State ☐ Other		
	2. (check applicable box(es)) ☐ Owner ☐ Operator	Approx. date became owner &/or operator: Approx. date ceased as owner &/or operator:	
	Name:		
	Type (check one): ☐ Private ☐ County ☐ District ☐ Federal ☐ Indian ☐ Municipal ☐ State ☐ Other		

X. Type of Regulated Waste Activity: **You must put an "X" in the appropriate box(es) for the current regulated waste activity.**

The date of the signature in Section XI will be used as the date the regulated waste activity(ies) you check below began. However, in Box A1, if the activity began earlier than the signature date, enter the correct date after "Date activity began" in (mm/dd/yyyy) format. If any other regulated waste activity(ies) in A.2 - A.8 or Box B-E began earlier, write in the correct date(s) in Section XII, Comments. The date a certain activity began can subject the site to different requirements, such as annual user charges. If your activity(ies) change during the year a 'Subsequent Site Identification' form should be submitted indicating the change.

A. Hazardous Waste Activity(ies) at this location

1. Generator of hazardous waste (choose one of the following three categories a-c) [see rules for limits on acute hazardous waste]
   - [ ] a. LQG: Greater than 1,000 kg/mo (2,200 lbs) of non-acute hazardous waste, or
   - [X] b. SQG: 100 to 1,000 kg/mo (220 - 2,200 lbs) of non-acute hazardous waste, or
   - [ ] c. CESQG: Less than 100 kg/mo of non-acute hazardous waste

   Date activity began (mm/dd/yyyy): 12/01/2014

For items 2 through 8, check all that apply

2. Transporter of hazardous waste [requires a permit & registration]
   - [ ] Transport hazardous waste
     - [ ] a. Transporter
     - [ ] b. Commingle waste
     - [ ] c. Offloads during transportation

3. Designated facility of hazardous waste at this location that requires(ed) the submittal of a Part A and a permit
   - [ ] a. Treats or treated hazardous waste on-site at this location and/or

     Stores or stored hazardous waste on-site at this location and/or

     Disposes or disposed hazardous waste on-site at this location
   - [ ] b. Recycles recyclable materials on-site at this location
4. [ ] Underground injection well on-site at this location
5. [ ] Import agent for hazardous waste
6. [ ] Generates mixed radioactive waste on-site at this location
7. [ ] Accepts waste from CESQG & accumulates over 1,000 kg on-site at this location
8. Exempt boiler and/or Industrial Furnace on-site at this location
   - [ ] a. Smelting, melting, and refining furnace exemption
   - [ ] b. Small quantity on-site burner exemption

B. Used Oil Activities at this location, check all that apply: (used oil generator only - go to D) [see comments for additional information]

1. Used Oil Fuel Marketer
   - [ ] a. Marketer who directs shipments of off-specification used oil to used oil burner.
   - [ ] b. Marketer who first claims the used oil meets the specifications
2. [ ] Off-specification Used Oil Burner
3. [ ] Used Oil Processor
4. [ ] Used Oil Re-refiner

Date activity began (mm/dd/yyyy): _____

5. Used Oil Transporter (check only one) [may require a permit & registration]
   - [ ] a. Transporter only
   - [ ] b. Transporter with transfer facility
6. [ ] Used Oil Collection or Aggregation Point
7. [ ] Collection Center or Aggregation Point that accepts DIY Used Oil

C. Universal Waste Activity(ies) at this location, check all that apply:

1. Large Quantity Handler: check the box(es) for the universal wastes generated or accumulated
   - [ ] a. Generates/accumulates batteries
   - [ ] b. Generates/accumulates thermostats
   - [ ] c. Generates/accumulates mercury thermometers
   - [ ] d. Generates/accumulates devices containing elemental mercury
   - [ ] e. Generates/accumulates mercury switches
   - [ ] f. Generates/accumulates pesticides
   - [ ] g. Generates/accumulates electric lamps
   - [ ] h. Generates/accumulates pharmaceuticals
   - [ ] i. Generates/accumulates consumer electronics
   - [ ] j. Generates/accumulates antifreeze
2. [ ] Destination Facility of Universal Waste [a hazardous waste permit may be required for this activity]

(Regulated Waste Activity section continues; see next page for Sections D and E)

X. Type of Regulated Waste Activity (continued):

D. Liquid Industrial Waste Activities **at this location** check all that apply: (not hazardous waste activity)

- [ ] 1. Liquid Industrial Waste Transporter **[requires a permit & registration]**
- [ ] 2. Transporting Own Waste
- [X] 3. Liquid Industrial Waste Generator
- [ ] 4. Liquid Industrial Waste Designated Facility

E. No longer generating waste or engaged in other regulated activity

- [ ] 1. The site is still in business at this location but generation of waste or any other regulated waste activity has ceased as of (date) (mm/dd/yyyy): _____
- [ ] 2. The site is out of business at this location and generation of waste or any other regulated waste activity has ceased as of (date) (mm/dd/yyyy): _____

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

Signature of owner, operator, or authorized representative	**Name and Official Title (type or print)**	**Date Signed (mm/dd/yyyy)**
	_____ Name _____ Title	

XII. Comments:

To review the current regulated waste activity at this location please log onto the internet at http://www.deq.state.mi.us/wdspi.

SECTION 3

EPA PART A PERMIT APPLICATION FORM 8700-23
THE MANNIK & SMITH GROUP, INC.

OMB# 2050-0024; Expires 01/31/2017

SEND COMPLETED FORM TO: The Appropriate State or Regional Office.

United States Environmental Protection Agency
RCRA SUBTITLE C SITE IDENTIFICATION FORM

1. Reason for Submittal

MARK ALL BOX(ES) THAT APPLY

Reason for Submittal:

- ☐ To provide an Initial Notification (first time submitting site identification information / to obtain an EPA ID number for this location)
- ☐ To provide a Subsequent Notification (to update site identification information for this location)
- ☐ As a component of a First RCRA Hazardous Waste Part A Permit Application
- ☐ As a component of a Revised RCRA Hazardous Waste Part A Permit Application (Amendment #_____)
- ☐ As a component of the Hazardous Waste Report (If marked, see sub-bullet below)
  - ☐ Site was a TSD facility and/or generator of >1,000 kg of hazardous waste, >1 kg of acute hazardous waste, or >100 kg of acute hazardous waste spill cleanup in one or more months of the report year (or State equivalent LQG regulations)

2. Site EPA ID Number

EPA ID Number MID005705005

3. Site Name

Name: Ford River Raisin Warehouse

4. Site Location Information

Street Address: 3200 East Elm Avenue

City, Town, or Village: Monroe | **County:** Monroe

State: Michigan | **Country:** USA | **Zip Code:** 48162

5. Site Land Type

☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other

6. NAICS Code(s) for the Site (at least 5-digit codes)

A.	336399	**C.**	336370
B.	336350	**D.**	

7. Site Mailing Address

Street or P.O. Box: 3200 East Elm Avenue

City, Town, or Village: Monroe

State: Michigan | **Country:** USA | **Zip Code:** 48162

8. Site Contact Person

First Name: Colleen | **MI:** S | **Last:** Liddell

Title: Senior Environmental Engineer

Street or P.O. Box: 290 Town Center Drive

City, Town or Village: Dearborn

State: Michigan | **Country:** USA | **Zip Code:** 48126

Email: ckoch1@ford.com

Phone: 313-322-9834 | **Ext.:** | **Fax:**

9. Legal Owner and Operator of the Site

A. Name of Site's Legal Owner: Ford Motor Company | **Date Became Owner:** 10/2009

Owner Type: ☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other

Street or P.O. Box: 3200 East Elm Avenue

City, Town, or Village: Monroe | **Phone:** 734-523-3248

State: Michigan | **Country:** USA | **Zip Code:** 48162

B. Name of Site's Operator: Ford Motor Company | **Date Became Operator:** 10/2009

Operator Type: ☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other

10. Type of Regulated Waste Activity (at your site)
Mark "Yes" or "No" for all current activities (as of the date submitting the form); complete any additional boxes as instructed.

A. Hazardous Waste Activities; Complete all parts 1-10.

Y ☐ N ☐ **1. Generator of Hazardous Waste**
If "Yes," mark only one of the following – a, b, or c.

☑ a. LQG: Generates, in any calendar month, 1,000 kg/mo (2,200 lbs/mo.) or more of hazardous waste; **or** Generates, in any calendar month, or accumulates at any time, more than 1 kg/mo (2.2 lbs/mo) of acute hazardous waste; **or** Generates, in any calendar month, **or** accumulates at any time, more than 100 kg/mo (220 lbs/mo) of acute hazardous spill cleanup material.

☐ b. SQG: 100 to 1,000 kg/mo (220 – 2,200 lbs/mo) of non-acute hazardous waste.

☐ c. CESQG: Less than 100 kg/mo (220 lbs/mo) of non-acute hazardous waste.

If "Yes" above, indicate other generator activities in 2-10.

Y ☐ N ☐ **2. Short-Term Generator** (generate from a short-term or one-time event and not from on-going processes). If "Yes," provide an explanation in the Comments section.

Y ☐ N ☐ **3. United States Importer of Hazardous Waste**

Y ☐ N ☐ **4. Mixed Waste (hazardous and radioactive) Generator**

Y ☐ N ☐ **5. Transporter of Hazardous Waste**
If "Yes," mark all that apply.

☐ a. Transporter

☐ b. Transfer Facility (at your site)

Y ☑ N ☐ **6. Treater, Storer, or Disposer of Hazardous Waste** Note: A hazardous waste Part B permit is required for these activities.

Y ☐ N ☐ **7. Recycler of Hazardous Waste**

Y ☐ N ☐ **8. Exempt Boiler and/or Industrial Furnace**
If "Yes," mark all that apply.

☐ a. Small Quantity On-site Burner Exemption

☐ b. Smelting, Melting, and Refining Furnace Exemption

Y ☐ N ☐ **9. Underground Injection Control**

Y ☐ N ☐ **10. Receives Hazardous Waste from Off-site**

B. Universal Waste Activities; Complete all parts 1-2.

Y ☐ N ☐ **1. Large Quantity Handler of Universal Waste (you accumulate 5,000 kg or more) [refer to your State regulations to determine what is regulated]. Indicate types of universal waste managed at your site. If "Yes," mark all that apply.**

a. Batteries ☐
b. Pesticides ☐
c. Mercury containing equipment ☐
d. Lamps ☐
e. Other (specify) _____ ☐
f. Other (specify) _____ ☐
g. Other (specify) _____ ☐

Y ☐ N ☐ **2. Destination Facility for Universal Waste**
Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities; Complete all parts 1-4.

Y ☐ N ☐ **1. Used Oil Transporter**
If "Yes," mark all that apply.

☐ a. Transporter

☐ b. Transfer Facility (at your site)

Y ☐ N ☐ **2. Used Oil Processor and/or Re-refiner**
If "Yes," mark all that apply.

☐ a. Processor

☐ b. Re-refiner

Y ☐ N ☐ **3. Off-Specification Used Oil Burner**

Y ☐ N ☐ **4. Used Oil Fuel Marketer**
If "Yes," mark all that apply.

☐ a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner

☐ b. Marketer Who First Claims the Used Oil Meets the Specifications

D. Eligible Academic Entities with Laboratories—Notification for opting into or withdrawing from managing laboratory hazardous wastes pursuant to 40 CFR Part 262 Subpart K

❖ You can ONLY Opt into Subpart K if:

- you are at least one of the following: a college or university; a teaching hospital that is owned by or has a formal affiliation agreement with a college or university; or a non-profit research institute that is owned by or has a formal affiliation agreement with a college or university; AND
- you have checked with your State to determine if 40 CFR Part 262 Subpart K is effective in your state

Y☐ N☐ 1. Opting into or currently operating under 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories **See the item-by-item instructions for definitions of types of eligible academic entities. Mark all that apply:**

☐ **a. College or University**

☐ **b. Teaching Hospital that is owned by or has a formal written affiliation agreement with a college or university**

☐ **c. Non-profit Institute that is owned by or has a formal written affiliation agreement with a college or university**

Y☐ N☐ 2. Withdrawing from 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories

11. Description of Hazardous Waste

A. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g., D001, D003, F007, U112). Use an additional page if more spaces are needed.

B. Waste Codes for State-Regulated (i.e., non-Federal) Hazardous Wastes. Please list the waste codes of the State-Regulated hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed.

12. Notification of Hazardous Secondary Material (HSM) Activity

Y ☐ N ☐ Are you notifying under 40 CFR 260.42 that you will begin managing, are managing, or will stop managing hazardous secondary material under 40 CFR 261.2(a)(2)(ii), 40 CFR 261.4(a)(23), (24), or (25)?

If "Yes," you must fill out the Addendum to the Site Identification Form: Notification for Managing Hazardous Secondary Material.

13. Comments

The EPA RCRA subtitle C Site Identification Form 8700-23 is provided in accordance with DEQ application Form EQP 5111

Operating License - Hazardous Waste Treatment, Storage and Disposal.

14. Certification. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. For the RCRA Hazardous Waste Part A Permit Application, all owner(s) and operator(s) must sign (see 40 CFR 270.10(b) and 270.11).

Signature of legal owner, operator, or an authorized representative	**Name and Official Title (type or print)**	**Date Signed (mm/dd/yyyy)**

EPA ID Number | M | I | D | 0 | 0 | 5 | 0 | 5 | 7 | 0 | 0 | 5 |

OMB#: 2050-0024; Expires 01/31/2017

ADDENDUM TO THE SITE IDENTIFICATION FORM: NOTIFICATION OF HAZARDOUS SECONDARY MATERIAL ACTIVITY

ONLY fill out this form if:

- ❖ You are located in a State that allows you to manage excluded hazardous secondary material (HSM) under 40 CFR 261.2(a)(2)(ii), 261.4(a)(23), (24), or (25) (or state equivalent). See http://www.epa.gov/epawaste/hazard/dsw/statespf.htm for a list of eligible states; **AND**
- ❖ You are or will be managing excluded HSM in compliance with 40 CFR 261.2(a)(2)(ii), 261.4(a)(23), (24), or (25) (or state equivalent) or you have stopped managing excluded HSM in compliance with the exclusion(s) and do not expect to manage any amount of excluded HSM under the exclusion(s) for at least one year. Do not include any information regarding your hazardous waste activities in this section.

1. Indicate reason for notification. Include dates where requested.

☐ Facility will begin managing excluded HSM as of _____ (mm/dd/yyyy).

☐ Facility is still managing excluded HSM/re-notifying as required by March 1 of each even-numbered year.

☐ Facility has stopped managing excluded HSM as of _____ (mm/dd/yyyy) and is notifying as required.

2. Description of excluded HSM activity. Please list the appropriate codes and quantities in **short tons** to describe your excluded HSM activity ONLY (do not include any information regarding your hazardous wastes). Use additional pages if more space is needed.

a. Facility code (answer using codes listed in the Code List section of the instructions)	**b. Waste code(s) for HSM**	**c. Estimated short tons of excluded HSM to be managed annually**	**d. Actual short tons of excluded HSM that was managed during the most recent odd-numbered year**	**e. Land-based unit code** (answer using codes listed in the Code List section of the instructions)

3. Facility has financial assurance pursuant to 40 CFR 261.4(a)(24)(vi). (Financial assurance is required for reclaimers and intermediate facilities managing excluded HSM under 40 CFR 261.4(a)(24) and (25))

Y ☐ N ☐ Does this facility have financial assurance pursuant to 40 CFR 261.4(a)(24)(vi)?

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EPA ID Number | M | I | D | 0 | 0 | 5 | 0 | 5 | 7 | 0 | 0 | 5 |

OMB#: 2050-0024; Expires 01/31/2017

United States Environmental Protection Agency

HAZARDOUS WASTE PERMIT INFORMATION FORM

1. Facility Permit Contact	**First Name:** Jeff	**MI:**	**Last Name:** Brown
	Contact Title: Plant Manager		
	Phone: 734-231-9598	**Ext.:**	**Email:** jbrow171@ford.com
2. Facility Permit Contact Mailing Address	**Street or P.O. Box:** 3200 East Elm Avenue		
	City, Town, or Village: Monroe		
	State: Michigan		
	Country: USA	**Zip Code:** 48162	
3. Operator Mailing Address and Telephone Number	**Street or P.O. Box:** 3200 East Elm Avenue		
	City, Town, or Village: Monroe		
	State: Michigan	**Phone:** 734-523-3248	
	Country: USA	**Zip Code:** 48162	
4. Facility Existence Date	**Facility Existence Date (mm/dd/yyyy):** 03/27/1995		

5. Other Environmental Permits

A. Facility Type *(Enter code)*	B. Permit Number													C. Description
R	M	I	D	0	0	5	0	5	7	0	0	5		RCRA Attachment #
E	1	0	3	0	-	1								City of Monroe Discharge Permit Attachment #
E	1	0	3	0	-	2								City of Monroe Discharge Permit Attachment #

6. Nature of Business: Ford Motor Company Warehouse, Former Automotive Components Holdings LLC, Chassis Plant, Former Visteon Automotive Chassis Plant. Former Ford Metal stamping and former electroplating operation (other required attachments #)

7. Process Codes and Design Capacities – Enter information in the Section on Form Page 3

A. PROCESS CODE – Enter the code from the list of process codes below that best describes each process to be used at the facility. If more lines are needed, attach a separate sheet of paper with the additional information. For "other" processes (i.e., D99, S99, T04 and X99), describe the process (including its design capacity) in the space provided in Item 8.

B. PROCESS DESIGN CAPACITY – For each code entered in Item 7.A; enter the capacity of the process.

1. **AMOUNT – Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process.**
2. **UNIT OF MEASURE – For each amount entered in Item 7.B(1), enter the code in Item 7.B(2) from the list of unit of measure codes below that describes the unit of measure used. Select only from the units of measure in this list.**

C. PROCESS TOTAL NUMBER OF UNITS – Enter the total number of units for each corresponding process code.

Process Code	Process	Appropriate Unit of Measure for Process Design Capacity
Disposal		
D79	Underground Injection Well Disposal	Gallons; Liters; Gallons Per Day; or Liters Per Day
D80	Landfill	Acre-feet; Hectares-meter; Acres; Cubic Meters; Hectares; Cubic Yards
D81	Land Treatment	Acres or Hectares
D82	Ocean Disposal	Gallons Per Day or Liters Per Day
D83	Surface Impoundment Disposal	Gallons; Liters; Cubic Meters; or Cubic Yards
D99	Other Disposal	Any Unit of Measure Listed Below
Storage		
S01	Container	Gallons; Liters; Cubic Meters; or Cubic Yards
S02	Tank Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S03	Waste Pile	Cubic Yards or Cubic Meters
S04	Surface Impoundment	Gallons; Liters; Cubic Meters; or Cubic Yards
S05	Drip Pad	Gallons; Liters; Cubic Meters; Hectares; or Cubic Yards
S06	Containment Building Storage	Cubic Yards or Cubic Meters
S99	Other Storage	Any Unit of Measure Listed Below
Treatment		
T01	Tank Treatment	Gallons Per Day; Liters Per Day
T02	Surface Impoundment	Gallons Per Day; Liters Per Day
T03	Incinerator	Short Tons Per Hour; Metric Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Gallons Per Day; Metric Tons Per Hour; or Million BTU Per Hour
T04	Other Treatment	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Short Tons Per Day; BTUs Per Hour; Gallons Per Day; Liters Per Hour; or Million BTU Per Hour
T80	Boiler	Gallons; Liters; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; or Million BTU Per Hour
T81	Cement Kiln	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; Liters Per Hour; Kilograms Per Hour; or Million BTU Per Hour
T82	Lime Kiln	
T83	Aggregate Kiln	
T84	Phosphate Kiln	
T85	Coke Oven	
T86	Blast Furnace	
T87	Smelting, Melting, or Refining Furnace	
T88	Titanium Dioxide Chloride Oxidation Reactor	
T89	Methane Reforming Furnace	
T90	Pulping Liquor Recovery Furnace	
T91	Combustion Device Used in the Recovery of Sulfur Values from Spent Sulfuric Acid	
T92	Halogen Acid Furnaces	
T93	Other Industrial Furnaces Listed in 40 CFR 260.10	
T94	Containment Building Treatment	Cubic Yards; Cubic Meters; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTU Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million BTU Per Hour
Miscellaneous (Subpart X)		
X01	Open Burning/Open Detonation	Any Unit of Measure Listed Below
X02	Mechanical Processing	Short Tons Per Hour; Metric Tons Per Hour; Short Tons Per Day; Metric Tons Per Day; Pounds Per Hour; Kilograms Per Hour; Gallons Per Hour; Liters Per Hour; or Gallons Per Day
X03	Thermal Unit	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; or Million BTU Per Hour
X04	Geologic Repository	Cubic Yards; Cubic Meters; Acre-feet; Hectare-meter; Gallons; or Liters
X99	Other Subpart X	Any Unit of Measure Listed Below

Unit of Measure	Unit of Measure Code
Gallons	G
Gallons Per Hour	E
Gallons Per Day	U
Liters	L
Liters Per Hour	H
Liters Per Day	V
Short Tons Per Hour	D
Short Tons Per Day	N
Metric Tons Per Hour	W
Metric Tons Per Day	S
Pounds Per Hour	J
Kilograms Per Hour	X
Million BTU Per Hour	X
Cubic Yards	Y
Cubic Meters	C
Acres	B
Acre-feet	A
Hectares	Q
Hectare-meter	F
BTU Per Hour	I

7. Process Codes and Design Capacities (Continued)

EXAMPLE FOR COMPLETING Item 7 (shown in line number X-1 below): A facility has a storage tank, which can hold 533.788 gallons.

Line Number		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY		C. Process Total Number of Units	For Official Use Only					
					(1) Amount (Specify)	(2) Unit of Measure							
X	1	S	0	2	533.788	G	001						
	1	D	8	0	B70	4	001						
	2												
	3												
	4												
	5												
	6												
	7												
	8												
	9												
1	0												
1	1												
1	2												
1	3												

Note: If you need to list more than 13 process codes, attach an additional sheet(s) with the information in the same format as above. Number the line sequentially, taking into account any lines that will be used for "other" process (i.e., D99, S99, T04, and X99) in Item 8.

8. Other Processes (Follow instructions from Item 7 for D99, S99, T04, and X99 process codes)

Line Number (Enter #s in sequence with Item 7)		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY		C. Process Total Number of Units	For Official Use Only					
					(1) Amount (Specify)	(2) Unit of Measure							
X	2	T	0	4	100.00	U	001						
					NA								

9. Description of Hazardous Wastes - Enter Information in the Sections on Form Page 5

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

B. ESTIMATED ANNUAL QUANTITY – For each listed waste entered in Item 9.A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in Item 9.A, estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE – For each quantity entered in Item 9.B, enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

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

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

D. PROCESSES

1. PROCESS CODES:

For listed hazardous waste: For each listed hazardous waste entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all listed hazardous wastes.

For non-listed waste: For each characteristic or toxic contaminant entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.

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

1. **Enter the first two as described above.**
2. **Enter "000" in the extreme right box of Item 9.D(1).**
3. **Use additional sheet, enter line number from previous sheet, and enter additional code(s) in Item 9.E.**

2. PROCESS DESCRIPTION: If code is not listed for a process that will be used, describe the process in Item 9.D(2) or in Item 9.E(2).

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

1. **Select one of the EPA Hazardous Waste Numbers and enter it in Item 9.A. On the same line complete Items 9.B, 9.C, and 9.D by estimating the total annual quantity of the waste and describing all the processes to be used to store, treat, and/or dispose of the waste.**
2. **In Item 9.A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In Item 9.D.2 on that line enter "included with above" and make no other entries on that line.**
3. **Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.**

EXAMPLE FOR COMPLETING Item 9 (shown in line numbers X-1, X-2, X-3, and X-4 below) – A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operations. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES									
								(1) PROCESS CODES (Enter Code)									(2) PROCESS DESCRIPTION (If code is not entered in 9.D(1))
X	1	K	0	5	4	900	P	T	0	3	D	8	0				
X	2	D	0	0	2	400	P	T	0	3	D	8	0				
X	3	D	0	0	1	100	P	T	0	3	D	8	0				
X	4	D	0	0	2												Included With Above

9. Description of Hazardous Wastes *(Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)*

Line Number		A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES	
					(1) PROCESS CODES (Enter Code)	(2) PROCESS DESCRIPTION (If code is not entered in 9.D(1))
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
1	0					
1	1					
1	2					
1	3					
1	4					
1	5					
1	6					
1	7					
1	8					
1	9					
2	0					
2	1					
2	2					
2	3					
2	4					
2	5					
2	6					
2	7					
2	8					
2	9					
3	0					
3	1					
3	2					
3	3					
3	4					
3	5					
3	6					

9. Description of Hazardous Wastes ***(Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)***

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES									
								(1) PROCESS CODES (Enter Code)									(2) PROCESS DESCRIPTION (If code is not entered in 9.D.1)

10. Map

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

11. Facility Drawing Attachment III

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

12. Photographs Attachment IV

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

13. Comments

ATTACHMENT I

COPIES OF EXISTING ENVIRONMENTAL PERMITS
THE MANNIK & SMITH GROUP, INC.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:
HRP-8J

MAR 27 1995

CERTIFIED MAIL: P 851 379 086
RETURN RECEIPT REQUESTED

Jerome S. Amber, P.E. Manager
Waste and Hazardous Substances
Environmental Quality Office
Ford Motor Company
15201 Century Drive
Suite 602
Dearborn, Michigan 48120

RE: Final RCRA Permit Decision
Ford Motor Company
Monroe Stamping Plant
MID 005 057 005

Dear Mr. Amber:

Enclosed is a copy of the Federal portion of the Resource Conservation and Recovery Act (RCRA) post-closure permit for the above referenced facility. The RCRA post-closure permit contains both Federal permit conditions (contained herein) and State permit conditions for which the Michigan Department of Natural Resources (MDNR) has been authorized under Title 40 Code of Federal Regulations (40 CFR) Part 271. Unless a review is requested under 40 CFR 124.19, the Federal portion shall become effective on the date indicated on the signature page of the post-closure permit. When both this portion of the permit and the State of Michigan's portion of the permit are effective, Ford Motor Company in Monroe, Michigan, has a RCRA post-closure permit authorizing those hazardous waste management activities specified in the RCRA post-closure permit.

The duration the post-closure permit is ten (10) years. However, the United States Environmental Protection Agency (U.S. EPA) may modify, revoke, reissue, or terminate this post-closure permit for cause specified in 40 CFR 270.41, 270.42, and 270.43.

This permit is effective on the date indicated on the signature page of the permit. Eligibility to appeal this permit is discussed further in 40 CFR 124.19. The original and one copy of the petition must be received by the U.S. EPA in Washington, D.C., at the address indicated below within 30 days after service of notice:

U.S. Environmental Protection Agency
Environmental Appeals Board (MC-1103B)
401 M Street, SW
Washington, D.C. 20460

Submissions made by hand-delivery (including overnight delivery) should be made at the following address:

U.S. Environmental Protection Agency
Environmental Appeals Board
Westory Building
607 14th Street, NW
Suite 500
Washington, D.C. 20005

A copy of the petition should also be sent to:

RCRA Permitting Branch, HRP-8J
Waste Management Division
U.S. Environmental Protection Agency, Region 5
77 W. Jackson Boulevard
Chicago, Illinois 60604

The procedures for filing an appeal are found in 40 CFR 124.19 (enclosed). The administrative appeal procedures must be completed prior to any action seeking judicial review.

Should you have any questions in this matter, please contact Shari Sutker at (312) 886-6151.

Sincerely yours,

Norman R. Niedergang
Associate Division Director
Office of RCRA
Waste Management Division

Enclosure

cc: Steven Sliver, MDNR
Michael Anastasio, EPA\ORC

§ 124.19 Appeal of RCRA, UIC, and PSD permits.

(a) Within 30 days after a RCRA, UIC, or PSD final permit decision (or a decision under § 270.29 to deny a permit for the active life of a RCRA hazardous waste management facility or unit) has been issued under § 124.15, any person who filed comments on that draft permit or participated in the public hearing may petition the Environmental Appeals Board to review any condition of the permit decision. Any person who failed to file comments or failed to participate in the public hearing on the draft permit may petition for administrative review only to the extent of the changes from the draft to the final permit decision. The 30-day period within which a person may request review under this section begins with the service of notice of the Regional Administrator's action unless a later date is specified in that notice. The petition shall include a statement of the reasons supporting that review, including a demonstration that any issues being raised were raised during the public comment period (including any public hearing) to the extent required by these regulations and when appropriate, a showing that the condition in question is based on:

(1) A finding of fact or conclusion of law which is clearly erroneous, or

(2) An exercise of discretion or an important policy consideration which the Environmental Appeals Board should, in its discretion, review.

(b) The Environmental Appeals Board may also decide on its initiative to review any condition of any RCRA, UIC, or PSD permit issued under this part. The Environmental Appeals Board must act under this paragraph within 30 days of the service date of notice of the Regional Administrator's action.

(c) Within a reasonable time following the filing of the petition for review, the Environmental Appeals Board shall issue an order granting or denying the petition for review. To the extent review is denied, the conditions of the final permit decision become final agency action. Public notice of any grant of review by the Environmental Appeals Board under paragraph (a) or (b) of this section shall be given as provided in § 124.10. Public notice shall set forth a briefing schedule for the appeal and shall state that any interested person may file an amicus brief. Notice of denial of review shall be sent only to the person(s) requesting review.

(d) The Environmental Appeals Board may defer consideration of an appeal of a RCRA or UIC permit under this section until the completion of formal proceedings under subpart E or F relating to an NPDES permit issued to the same facility or activity upon concluding that:

(1) The NPDES permit is likely to raise issues relevant to a decision of the RCRA or UIC appeals;

(2) The NPDES permit is likely to be appealed; and

(3) *Either* (i) The interests of both the facility or activity and the public are not likely to be materially adversely affected by the deferral; or

(ii) Any adverse effect is outw by the benefits likely to result consolidated decision on appeal.

(e) A petition to the Environ Appeals Board under paragraph this section is, under 5 U.S.C. prerequisite to the seeking of review of the final agency actio

(f)(1) For purposes of judicial under the appropriate Act, agency action occurs when RCRA, UIC, or PSD permit is or denied by EPA and agency procedures are exhausted. permit decision shall be issued Regional Administrator:

(i) When the Environmental Board issues notice to the parti review has been denied;

(ii) When the Environmen peals Board issues a decision merits of the appeal and the does not include a remand of t ceedings; or

(iii) Upon the completion of proceedings if the proceedings manded, unless the Environmen peals Board's remand order ex ly provides that appeal of the decision will be required to administrative remedies.

(2) Notice of any final agency regarding a PSD permit shall t ly be published in the Federal ter.

(g) Motions to reconsider order shall be filed within t days after service of the final Every such motion must set fo matters claimed to have been ously decided and the nature o legal errors. Motions for rec ation under this provision sha rected to, and decided by, the E mental Appeals Board. Motion consideration directed to the trator, rather than to the E mental Appeals Board, will not sidered, except in cases that t ronmental Appeals Board has to the Administrator pursu § 124.2 and in which the Admin has issued the final order. A for reconsideration shall not effective date of the final orde specifically so ordered by the E mental Appeals Board.

BASIS OF CAMU DECISION
FOR THE
FORD MOTOR COMPANY, MONROE STAMPING PLANT
MONROE, MICHIGAN, MID 005 057 005

Summary

The United States Environmental Protection Agency (U.S. EPA) is making a final decision, pursuant to 40 Code of Federal Regulations (40 CFR) 264.552(c), to approve the use of a Corrective Action Management Unit (CAMU) to facilitate the remediation of the hazardous waste surface impoundments at the Ford Motor Company, Monroe Stamping Plant in Monroe, Michigan. This Basis Of Decision fulfills U.S. EPA's requirement under 40 CFR 264.552(f) to provide the public with formal documentation of the basis for a CAMU decision.

Application History

On July 18, 1994, Ford Motor Company (Ford) submitted a CAMU Petition request (herein referred to as the "application") to use a CAMU at the Monroe Stamping Plant. The application was reviewed and determined to be incomplete since the application did not provide sufficient information to enable the U.S. EPA to make a CAMU determination. Based on an review and evaluation of Ford's revised application, dated November 10, 1994, the U.S. EPA determined that Ford's application was complete and satisfactorily met the seven criteria, outlined below, necessary for a CAMU determination under 40 CFR 264.552.

Basis of Decision

The U.S. EPA's basis for approving the CAMU at the Monroe Stamping Plant is that the CAMU will (1) facilitate the implementation of reliable and protective cleanup methods (2) not create unacceptable risks to human health and the environment (3) allow remediation waste management in uncontaminated areas while maintaining protection of human health and the environment (4) minimize future releases of hazardous remediation wastes into the environment (5) expedite the cleanup of remediation wastes (6) enhance the long-term effectiveness of the remedial actions and (7) minimize the land areas where wastes will remain in place after closure. A detailed discussion of each basis is provided below.

1. The CAMU shall facilitate the implementation of reliable, effective, protective and cost-effective remedies

The CAMU shall facilitate the implementation of reliable, effective, protective and cost-effective remedies in that it will allow wastes to be treated (stabilized) and consolidated into two on-site containment units which will be located within the CAMU boundary . Each containment unit will be constructed with protective features that includes a leachate collection and removal system, soil-bentonite perimeter cutoff wall, and a composite cover system.

The stabilization process has been used in numerous other remediation projects and has been proven to be an effective method for providing the physical

the U.S. EPA, to be disposed in the containment units from the following on-site Solid Waste Management Units (SWMUs): Salaried Parking Lot; Coal Pile; Former Coal Pile; Rifle Range Area; Demolition Disposal Area; Empty Drum Storage Area; Former Drum Storage Area; Current Drum Storage Area; Filter Press Area; Dead Tree Area; and NPDES Outfall 002. The location of these SWMUs, which are identified under the federal corrective action program, are also shown in Figure 1.

Synchronizing concurrent corrective action investigations with closure activities has the potential to address most efficiently, reliably, and comprehensively these other areas as well as to provide flexibility in attaining containment area final grades. Without a CAMU approval, wastes from the above areas would be required to be consolidated in the Disposal Area D impoundment. This would result in steeper final grades and a higher elevation which would be less aesthetically compatible with the surrounding topography. The Disposal Area A, B, C impoundment would be too flat to provide adequate surface drainage without substantial regrading of waste materials, creating the potential for greater exposure to waste materials during earthwork activities. The CAMU allows the waste volumes in each containment unit to be balanced to provide adequate slopes and configurations most compatible with the surrounding terrain.

2. Waste management activities associated with the CAMU shall not create unacceptable risks to humans or to the environment resulting from exposure to hazardous wastes or constituents

Waste management activities associated with the CAMU will not create unacceptable risks to humans or to the environment resulting from exposure to hazardous wastes or hazardous waste constituents. A Public Health and Environmental Risk Assessment was performed for the closure activities at the Monroe Stamping Plant. The human health and environmental assessment demonstrates that closure of the hazardous waste surface impoundments does not create an unacceptable risk to human health or the environment.

In addition, air and particulate emissions generated during closure activities will be monitored and site activities will be managed under strict controls to prevent unacceptable risks to human health and the environment. A dust control program will be established to minimize the generation of dust by keeping construction road surfaces wet, sweeping site entrance roads if necessary, and storing and mixing dry solidification additives such as fly ash and bentonite in enclosed containers. Air quality monitoring will be performed on a continuous basis at four fixed air monitoring stations located on the Monroe Stamping Plant and Sterling State Park properties. Each station will be operated daily to monitor emissions of total suspended particulates, Volatile Organic Compounds, and total chromium.

3. The CAMU shall include uncontaminated areas of the facility, only if including such areas for the purpose of managing remediation waste is

technologies (including innovative technologies) to enhance the long-term effectiveness of remedial actions by reducing the toxicity, mobility, or volume of wastes that will remain in place after closure of the CAMU

The CAMU will enable the use of treatment technologies to enhance the long-term effectiveness of closure by reducing the toxicity and mobility of wastes that will remain in place after closure of the CAMU as discussed in Basis #1 above.

7. The CAMU shall, to the extent practicable, minimize the land area of the facility upon which wastes will remain in place after closure of the CAMU

The CAMU will minimize the land area of the facility upon which wastes will remain in place after closure of the CAMU by consolidating wastes from other areas into the containment units. Thus, the CAMU will allow the consolidation and remediation of Disposal Area D-North, Area D-West, former West Lagoon, West Marsh, North Intake Canal, and a portion of the Process Canal for a total area of approximately 17 acres. In addition, the CAMU will also allow wastes from SWMUs to be consolidated into the containment units if approved by the U.S. EPA.

The CAMU will also allow the containment unit sizes to be minimized by allowing the surplus waste associated with Disposal Area D and its surrounding areas to be transported to Disposal Areas A, B, and C. Without the CAMU, there would be insufficient volume in Disposal Areas A, B, and C to establish minimum final grades needed for surface water drainage. In addition, Disposal Area D impoundment would be too small to contain its solidified waste at slopes compatible with the surrounding terrain. The CAMU provides the flexibility needed to balance the waste volumes between each containment unit thereby ensuring stable and compatible slopes at each unit.

RESPONSE TO COMMENTS AND FINAL CAMU DECISION
ON THE DRAFT FEDERAL POST-CLOSURE PERMIT
TO BE ISSUED TO
FORD MOTOR COMPANY, MONROE STAMPING PLANT
MONROE, MICHIGAN MID 005 057 005

I. Introduction

This response is issued pursuant to Title 40 Code of Federal Regulations (40 CFR) Part 124.17, which requires that any changes of the draft post-closure permit conditions be specified along with the reason for the change; that all significant comments be described and responded to; and that any documents cited in the response be included in the administrative record. In addition, the Basis for Corrective Action Management Unit (CAMU) Decision is also being issued pursuant to 40 CFR 264.552 (f). This Basis for Decision documents the rationale for approving a CAMU at the Ford Motor Company, Monroe Stamping Plant.

The public comment period commenced on January 20, 1995, with a public notice in the Monroe Evening News. The notice requested public comments on the draft Resource Conservation and Recovery Act post-closure permit for the Ford Motor Company, Monroe Stamping Plant. The public comment period ended March 9, 1995.

The written comments received by the United States Environmental Protection Agency (U.S. EPA) were from the Ford Motor Company (Ford), Lake Erie Cleanup Committee, and concerned citizens. The U.S. EPA's responses to Ford's comments are listed under Section II and U.S. EPA's response to comments from the Lake Erie Clean-Up Committee, Inc. and concerned citizens comments are listed under Section III.

II. Ford's Comments and U.S. EPA's Responses:

General Response

In Comments 2, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 16, 17, and 18, Ford has neither cited any reasons or justifications for its suggested language nor in any way cited, claimed, or demonstrated any deficiency, insufficiency, or inappropriateness in the proposed Permit language commented on or its intended or actual effect. This General Response is incorporated (without further reference) into each of the Responses to Comments 2, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 16, 17, and 18 below.

Comment 1

Effective Date. It is suggested that the title for this section read, "Expiration Date". It is suggested that the Permit be granted for a term of 10 years to avoid the cumbersome submittal and review process when little if any changes are required in the permit.

Response

Changing the title to "Expiration Date" would be inconsistent with the language and intent of this section. Therefore, the title of this

Response

The title for this section appears in the Code of Federal Regulations as "Transfer of Post-Closure Permits." Therefore, Post-Closure Permit Condition I.D.12. will not be changed.

Comment #5

Page 9 of 29, IV.A. It is suggested that the second sentence of the second paragraph read, "The Permittee shall remediate these areas, as necessitated by applicable requirements, in accordance with the terms and conditions specified in this post-closure permit and the State of Michigan's Post-Closure Operating License."

Response

The provisions of the Permit as well as RCRA and 40 CFR Parts 22 and 260-271 include appropriate and sufficient terms and conditions for remediation without the addition of the language suggested by Ford. Furthermore, the additional language suggested by Ford is unduly vague. Therefore, Post-Closure Permit Condition IV.A. will not be changed.

Comment #6

Page 9 of 29, IV.C. The title of this section should read, "Corrective Action Management Unit (CAMU)."

Response

The U.S. EPA concurs with Ford and will change Post-Closure Permit Condition IV.C. to read "Corrective Action Management Unit (CAMU)."

Comment #7

Page 10 of 29, IV.C.2. The title of this section should read, "Remediation Waste Management in A CAMU (40 CFR 264.552(e)(2)."

Response

The U.S. EPA concurs with Ford and will change Post-Closure Permit Condition IV.C.2. to read "Remediation Waste Management In A CAMU (40 CFR 264.552 (e)(2))."

Comment #8

Page 12 of 29, IV.C.2.c.(1). The last sentence of this paragraph should read, "The solidified wastes shall meet the performance criteria specified in Condition IV.C.2.b.(2) of this post-closure permit and in the State of Michigan Act 64 Post-Closure Operating License, as determined by final action of MDNR after considering comments or any appeals by Ford."

Comment 11

Page 24 of 29, IV.I. It is suggested that Dispute Resolution read as follows:

1. The permittee and U.S. EPA shall attempt to resolve expeditiously and informally any disagreements concerning implementation of this permit or any condition required hereunder.

2. In the event that any dispute arising under this permit is not resolved expeditiously through informal means, any party desiring dispute resolution under this Section shall give prompt written notice to the other party.

3. Within fourteen (14) calendar days of the service of notice of dispute pursuant to Paragraph 2 above, the party who gave notice shall serve on the other party to this order a written statement of the issues in dispute, the relevant facts upon which the dispute is based, and factual data, analysis or opinion supporting its position, and all supporting documentation on which such party relies (hereinafter the "Statement of Position"). The opposing party shall serve their Statement of Position, including supporting documentation, no later than fourteen (14) calendar days after receipt of the complaining party's Statement of Position. In the event that these 14 day time periods for exchange of Statements of Position may cause a delay in the work, they shall be shortened upon agreement between Permittee and U.S. EPA.

4. An administrative record of any dispute under this Section shall be maintained by U.S. EPA. The record shall include the written notification of such dispute, and the Statements of Position served pursuant to the preceding paragraphs.

5. Upon review of the administrative record, the Regional Administrator, Region 5, shall issue a decision consistent with the terms of this permit.

6. Notwithstanding the invocation of this dispute resolution procedure, the portions of the permit that are not affected by the dispute shall remain in effect.

Response

The dispute resolution provision of the Permit as well as applicable Federal law, including RCRA and regulations promulgated pursuant thereto, including 40 CFR Parts 22 and 260-271, afford appropriate and sufficient procedures by which to resolve any disputes arising under the permit without the addition of the language suggested by Ford. Ford has neither cited any reasons or justifications for its suggested language nor claimed or demonstrated that the current permit together with applicable Federal law do not afford appropriate and sufficient

waste from the SWMUs may be incorporated into the containment units without the addition of the language suggested by Ford. However, for purposes of clarity, U.S. EPA will insert the phrase "and nature and extent" after the term "presence" in the first sentence under Item I. Therefore, the first sentence in Item I in Attachment I will read: "The purpose of the Release Assessment (RA) is to document the absence or presence and nature and extent of hazardous waste or hazardous constituents at each Solid Waste Management Unit identified in Post-Closure Permit Condition IV.D." In addition, the U.S. EPA will modify Post-Closure Permit Condition IV.G.1. by adding the phrase "and nature and extent." Therefore, this condition will read: "The Permittee shall conduct a RA to document the absence or presence and nature and extent of hazardous waste(s) or hazardous constituents(s) from all SWMUs identified in Condition IV.D. above except for AOC #1."

Comment 15

Attachment IV., page 2 of 5. The first paragraph should have a statement of purpose. It is suggested that a sentence be added to read, "An Ecological Assessment shall be performed to document that the ecological concerns at the facility are being addressed by the closure activities."

Response

The terms and conditions of the Permit, including Attachment IV, as well as applicable Federal law, including the Endangered Species Act, RCRA and regulations promulgated pursuant thereto, including 40 CFR Parts 260-271, sufficiently and appropriately make clear the purpose of the Ecological Assessment without the addition of the statement suggested by Ford. Therefore, the U.S. EPA will not change the first paragraph of Attachment IV.

Comment 16

Attachment VI, page 4 of 5, III. It is suggested that the paragraph read, "If the Permittee is not required to perform additional investigations because the exposure to ecological receptors is minimal, the Permittee shall resubmit the Preliminary Ecological Assessment Report in the form of a Draft Ecological Assessment Report. This report shall be submitted to both the U.S. EPA and the MDNR. If additional investigations are required, the following outline shall be modified to account for investigations actually undertaken at the facility as appropriate."

Response

The U.S. EPA concurs with Ford's suggested language with the exception of the phrases "because the exposure to ecological receptors is minimal" and "as appropriate" because these phrases are undefined and unduly vague. The U.S. EPA will modify Item III of Attachment IV to read: "If the Permittee is not required to perform additional investigations, the

2. Protective Measures Plan (PMP)

Within 30 days of the effective date of this post-closure permit and prior to initiation of closure activities specified in this post-closure permit, the Permittee shall implement the PMP for the bald eagle. The purpose of the PMP is to ensure that the bald eagle pair at the facility is protected during the post-closure permit activities.

The U.S. EPA will add an additional permit requirement to Post-Closure Condition VI. The new requirement, labeled Post-Closure Permit Condition VI.A.3., will require Ford to submit a Bald Eagle Management Plan and will read as follows:

3. Bald Eagle Management Plan

By November 1, 1995, the Permittee shall submit a Bald Eagle Management Plan. The Regional Administrator will approve, modify and approve, or disapprove and provide comments on the Bald Eagle Management Plan in writing to the Permittee. Within 30 days of receipt of such comments, the Permittee must modify the Plan to reflect changes required in the Regional Administrator's comments. The Bald Eagle Management Plan, as approved or as modified and approved, becomes an enforceable condition of this post-closure permit.

The U.S. EPA will delete Post-Closure Permit Condition VI.C.2. which requires Ford to submit bimonthly progress reports because the U.S. EPA has determined that this requirement is not necessary.

The U.S. EPA will modify the Schedule of Compliance in Post-Closure Permit Condition VII.E. as follows:

1. Delete the requirement to submit a PMP Report;
2. Delete the requirement to submit a Modified or New PMP Report;
3. Delete the requirement to submit Progress Reports;
4. Modify due date of the PMP Implementation from "Within 30 days of Regional Administrator's comments" to "Within 30 days of the effective date of post-closure permit and prior to initiation of closure activities";
5. Add the requirement to submit a Bald Eagle Management Plan by November 1, 1995; and
6. Add the requirement to submit a Modified or New Bald Eagle Management Plan within 30 days of receipt of Regional Administrator's comments.

The U.S. EPA will modify Item B.2. and Item B.3. of Attachment V based on Ford's suggestions discussed in Comment #17 above. In addition, the U.S. EPA shall add two additional requirements labeled Item B.4. and Item B.5. to Attachment V. Therefore, Item B.2. through Item B.5. of Attachment V will read as follows:

b. Schedule closure activities, that require walking and other out-of-vehicle activities, outside the critical zone during breeding season;

c. Insure that vehicle drivers stay in their vehicle while in the critical zone during the breeding season.

The U.S. EPA will delete Item C. of Attachment V since the requirement to submit progress reports for the Protective Measures Plan is not necessary.

III. Comments from Lake Erie Clean-Up Committee, Inc. and Concerned Citizens and U.S. EPA's Response

The U.S. EPA received the following comments from concerned citizens. Some of these comments were addressed by the MDNR since they related to specific conditions in the State of Michigan Act 64 Post-Closure Operating License. The MDNR responses to the following comments are listed below.

Comment 1

The plan to use the 40 mil plastic sheet liner made from ultra low density polyethylene rather that a 40 mil vinyl sheet liner should be reconsidered. A "dioctylphthalate plasticized polyvinyl chloride" liner is conventionally used for ponds to collect and treat oily waste water and has significantly better ultra violet resistance to sun light and general weathering properties better than the polyethylene materials. To contain the organic solvent content of this huge mass of chemical waste and associated heavy metal content for 30 years plus, much care and thought must be given to selection of the best liner material.

MDNR Response

The liner will be used in the cap, and will not be exposed to waste or weathering. The choice of liner is appropriate and consistent with manufacturer specifications and standard practice.

Comment 2

To stabilize the clay-bentonite entombment and to avoid high wind erosion and dust problems, a durable stone/rock support should be used, as in a nearby entombment at the Pointe Mouillee State Game Area.

MDNR Response

The perimeter of the containment units that would be exposed to wave action and other erosion problems are protected by stones.

Comment 6

Has there been any discussion of other contaminated areas at the Ford plant? Allegedly, there is a substantial quantity of industrial waste buried under the steel storage building near the plant.

Response

In accordance with Section 3004(u) of RCRA and the regulations promulgated pursuant thereto, Ford must institute Corrective Action as necessary to protect human health and environment for all releases of hazardous waste(s) or hazardous constituent(s) from any Solid Waste Management Units (SWMUs) at the facility, regardless of the time at which waste was placed in such units. If other contaminated areas, including the area where industrial wastes are allegedly buried, are within a SWMU, then those areas will be addressed pursuant to the terms of the Permit and applicable law.

Comment 7

The project, including the CAMU, is not consistent with an area-wide approach to cleaning up the entire harbor or future harbor development plans.

Response

Surrounding land use planning and area-wide cleanup issues are beyond the scope of the Federal permit. The authority under the Federal post-closure permit only applies to the cleanup of the hazardous waste surface impoundments, cleanup of solid waste management units, and cleanup of any past environmental contamination that has migrated beyond the facility boundary.

Comment 8

What form of mitigation has been suggested to compensate for the removal of wetlands from the ecosystem? A barrier or breakwall should be installed to allow regeneration of wetland landward, and all remaining wetlands in the vicinity of the CAMU should remain undisturbed and become part of Sterling State Park.

Response

The wetland restoration and mitigation are covered by the Inland Lakes and Streams Act and Wetlands Protection Act permit. The containment units will only cover the area occupied by the surface impoundments. Wetland mitigation is not required for these hazardous waste disposal areas. Hazardous waste that has migrated to the West Marsh will be removed and approximately 9.3 acres of that wetland will be restored. The 0.9 acres parcel in the East Marsh that is taken as part of the Edison Tower relocation, and a 0.1 acre parcel near the North Intake

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
HAZARDOUS WASTE MANAGEMENT POST-CLOSURE PERMIT

Name of Permittee: Ford Motor Company, Monroe Stamping Plant

Facility Location: Street Address: 3200 East Elm Street
City, State: Monroe, Michigan 48161

EPA Identification Number: MID 005 057 005

Effective Date: _____

Expiration Date: _____

Authorized Activities:

Pursuant to the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA) of 1976, and the Hazardous and Solid Waste Amendments (HSWA) of 1984, (42 U.S.C. §6901, et seq.), and regulations promulgated thereunder by the United States Environmental Protection Agency (U.S. EPA) (codified in Title 40 of the Code of Federal Regulations (40 CFR)), Federal post-closure permit conditions (hereinafter called the post-closure permit) of the RCRA post-closure permit are issued to Ford Motor Company (hereinafter called the Permittee), for the facility (Monroe Stamping Plant) located in Monroe, Michigan.

The RCRA permit contains both the effective Federal post-closure permit conditions (contained herein) and the effective State post-closure permit conditions issued by the State of Michigan's RCRA program authorized under 40 CFR Part 271 (hereinafter called the State post-closure license). The RCRA post-closure permit authorizes the Permittee to conduct post-closure activities as specified in the RCRA post-closure permit.

Post-Closure Permit Approval:

On October 30, 1986, the State of Michigan received final authorization pursuant to Section 3006 of RCRA, 42 U.S.C. §6926, and 40 CFR Part 271, to administer the pre-HSWA RCRA hazardous waste program. Because the State of Michigan has not yet received authorization to administer the entire hazardous waste program requirements of HSWA, certain post-closure permit conditions must be issued by the U.S. EPA to address these requirements. These conditions are contained in this post-closure permit.

The Permittee must comply with all terms and conditions of this post-closure permit. This post-closure permit consists of the conditions contained herein (including those in any attachments) and the applicable regulations contained in 40 CFR Parts 260, 261, 262, 264, 266, 268, 270, and 124, and applicable provisions of HSWA.

This post-closure permit is based on the assumption that the information submitted in the post-closure permit application, dated July 19, 1994, and in any subsequent amendments (hereinafter referred to as the application), is accurate. Any inaccuracies found in this information may be grounds for the termination, revocation and reissuance, or modification of this post-closure permit (see 40 CFR 270.41, 270.42 and 270.43) and potential enforcement action. The Permittee must inform the U.S. EPA of any deviation from or changes in the information in the submitted application and certification as soon as the Permittee becomes aware of such deviation or changes.

Opportunity to Appeal:

Petitions for review must be submitted within 30 days after service of notice of the final post-closure permit decision. Any person who filed comments on the draft post-closure permit or participated in the public hearing may petition the Environmental Appeals Board to review any condition of the post-closure permit decision. Any person who failed to file comments or failed to participate in the public hearing on the draft post-closure permit may petition the Environmental Appeals Board to review only to the extent of the changes from the draft to the final post-closure permit decision. The procedures for permit appeals are found in 40 CFR 124.19.

Effective Date:

This post-closure permit is effective as of _____, unless a review is requested under 40 CFR 124.19, and shall remain in effect for a fixed term not to exceed 10 years, unless revoked and reissued, or terminated (40 CFR 270.41, 270.43, 270.50) or continued in accordance with 40 CFR 270.51.

BY: _____

Norman R. Niedergang
Associate Division Director
Office of RCRA
Waste Management Division

DATE: 3/27/95

Ford Motor Company
Monroe Stamping Plant
Monroe, Michigan

POST-CLOSURE PERMIT INDEX

POST-CLOSURE PERMIT CONDITIONS:

ATTACHMENTS:

POST-CLOSURE PERMIT CONDITIONS

(Note: The regulatory citations in parentheses are incorporated by reference.)

I. STANDARD CONDITIONS

A. EFFECT OF POST-CLOSURE PERMIT (40 CFR 270.4 and 270.30(g))

The Permittee is allowed to manage hazardous waste in accordance with the conditions of the RCRA post-closure permit. Any unauthorized management of hazardous waste is prohibited.

Compliance with the RCRA post-closure permit during its term constitutes compliance, for the purposes of enforcement, with Subtitle C of RCRA, except for those requirements not included in the post-closure permit which become effective by statute, or which are promulgated under 40 CFR Part 268, restricting the placement of hazardous waste in or on the land. Issuance of this post-closure permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations. Compliance with the terms of this post-closure permit does not constitute a defense to any order issued or any action brought under Sections 3008(a), 3008(h), 3013, or 7003 of RCRA; Sections 104, 106(a), or 107 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (42 U.S.C. §9601 et seq., commonly known as CERCLA); or any other law providing for protection of public health or the environment.

B. POST-CLOSURE PERMIT ACTIONS (40 CFR 270.30(f))

This post-closure permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR 270.41, 270.42, and 270.43. This post-closure permit may also be reviewed and modified by the U.S. EPA, consistent with 40 CFR 270.41, to include any terms and conditions determined necessary to protect human health and the environment pursuant to Section 3005(c)(3) of RCRA. The filing of a request for a post-closure permit modification, revocation and reissuance, or termination, or the notification of planned changes, or anticipated noncompliance on the part of the Permittee does not stay the applicability or enforceability of any post-closure permit condition. The Permittee shall not perform any construction associated with a Class 3 permit modification request until such modification request is granted and the modification becomes effective.

C. SEVERABILITY (40 CFR 124.16)

The provisions of this post-closure permit are severable, and if any provision of this post-closure permit, or if the application of any provision

MODIFIED

of this post-closure permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this post-closure permit shall not be affected thereby.

D. DUTIES AND REQUIREMENTS

1. Duty to Comply. (40 CFR 270.30(a))

The Permittee shall comply with all conditions of this post-closure permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit (See 40 CFR 270.61). Any post-closure permit noncompliance, other than noncompliance authorized by an emergency permit, constitutes a violation of RCRA and HSWA and is grounds for enforcement action, post-closure permit termination, revocation and reissuance, modification, denial of a post-closure permit renewal application, or other appropriate action.

2. Duty to Reapply. (40 CFR 270.30(b) and 270.10(h))

The Permittee shall submit a complete application for a new post-closure permit at least 180 days before this post-closure permit expires unless: a) the Permittee no longer wishes to operate a hazardous waste management facility; b) the Permittee is no longer required to have a RCRA post-closure permit; or c) permission for a later date has been granted by the Regional Administrator. The Regional Administrator shall not grant permission for applications to be submitted later than the expiration date of the existing permit.

3. Post-Closure Permit Expiration. (40 CFR 270.13, 270.14, 270.50, and 270.51)

This post-closure permit and all conditions herein shall be effective for a fixed term not to exceed 10 years, and will remain in effect beyond the permit's expiration date only if the Permittee has submitted a timely, complete post-closure permit application (per 40 CFR 270.10 and applicable sections of 270.14 through 270.29): a) to both the U.S. EPA and the State; and b) through no fault of the Permittee, the Regional Administrator and the State have not issued a new post-closure permit, as set forth in 40 CFR 270.51.

4. Need to Halt or Reduce Activity Not a Defense. (40 CFR 270.30(c))

It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this post-closure permit.

5. Duty to Mitigate. (40 CFR 270.30(d))

In the event of releases or noncompliance with the post-closure permit, the Permittee shall take all reasonable steps to minimize releases to the environment and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health and the environment.

6. Proper Operation and Maintenance. (40 CFR 270.30(e))

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this post-closure permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality control/quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the post-closure permit.

7. Duty to Provide Information. (40 CFR 270.30(h) and 264.74)

The Permittee shall furnish to the Regional Administrator, within the time designated by the Regional Administrator, any relevant information which the Regional Administrator may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this post-closure permit, or to determine compliance with this post-closure permit. The Permittee shall also furnish to the Regional Administrator, upon request, copies of records required to be kept by this post-closure permit.

8. Inspection and Entry. (40 CFR 270.30(i))

The Permittee shall allow the Regional Administrator, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:

a. Enter at reasonable times upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this post-closure permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this post-closure permit;

c. Inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this post-closure permit; and

d. Sample or monitor, at reasonable times, for the purposes of assuring post-closure permit compliance, or as otherwise authorized by RCRA, any substances or parameters at any location.

9. Monitoring and Recordkeeping. (40 CFR 270.30(j), 270.31, 264.73, and 264.74)

The Permittee shall retain all reports, records, or other documents, required by this post-closure permit, and records of all data used to complete the application for this post-closure permit, for a period of at least 3 years from the date of the reports, records or other documents. Corrective Action records must be maintained at least 3 years after all Corrective Action activities have been completed. These periods may be extended by request of the Regional Administrator at any time and are automatically extended during the course of any unresolved enforcement action regarding this facility.

10. Reporting Planned Changes. (40 CFR 270.30(l)(1))

The Permittee shall give notice to the Regional Administrator of any planned physical alterations or additions to the permitted facility, as soon as possible, and at least 30 days before construction of such alteration or addition is commenced.

11. Anticipated Noncompliance. (40 CFR 270.30(l)(2))

The Permittee shall give advance notice to the Regional Administrator of any planned changes in the permitted facility or activity which may result in noncompliance with post-closure permit requirements. Such notice does not constitute a waiver of the Permittee's duty to comply with post-closure permit requirements.

12. Transfer of Post-Closure Permits. (40 CFR 270.30(l)(3), 270.40(a), and 264.12(c))

This post-closure permit may be transferred by the Permittee to a new owner or operator only after providing notice to the Regional Administrator and only if the post-closure permit is modified, or revoked and reissued, pursuant to 40 CFR 270.40(b), 270.41(b)(2), or 270.42(a). Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator in writing of the requirements of 40 CFR Parts 264, 268, and 270 (including all applicable corrective action requirements), and shall provide a copy of the RCRA post-closure permit to the new owner or operator.

13. Compliance Schedules. (40 CFR 270.30(l)(5) and 270.33)

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this post-closure permit shall be submitted to the Regional Administrator no later than 14 days following each scheduled date.

14. Twenty-four Hour Reporting. (40 CFR 270.30(l)(6) and 270.33)

The Permittee shall report to the Regional Administrator any noncompliance with this post-closure permit which may endanger human health or the environment. Any such information shall be reported orally within 24 hours from the time the Permittee becomes aware of the circumstances. This report shall include the following:

a. Information concerning the release of any hazardous waste which may endanger public drinking water supplies; and

b. Information concerning the release or discharge of any hazardous waste, or of a fire or explosion at the facility, which could threaten the environment or human health outside the facility. The description of the occurrence and its cause shall include:

(1) Name, address, and telephone number of the owner or operator;

(2) Name, address, and telephone number of the facility;

(3) Date, time, and type of incident;

(4) Name and quantity of material(s) involved;

(5) The extent of injuries, if any;

(6) An assessment of actual or potential hazard to the environment and human health outside the facility, where this is applicable; and

(7) Estimated quantity and disposition of recovered material that resulted from the incident.

A written submission shall also be provided within 5 days of the time the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period(s) of noncompliance (including exact dates and times); steps taken to minimize impact on the environment; whether the noncompliance has been corrected, and if not, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate and prevent recurrence of the noncompliance. The Permittee need not comply with the 5-day written notice requirement if the Regional

Administrator waives the requirement. Upon waiver of the 5-day requirement, the Permittee shall submit a written report within 15 days of the time the Permittee becomes aware of the circumstances.

15. Other Noncompliance. (40 CFR 270.30(l)(10))

The Permittee shall report all other instances of noncompliance not otherwise required to be reported above within 15 days of when the Permittee becomes aware of the noncompliance. The reports shall contain the information listed in Condition I.D.14.

16. Other Information. (40 CFR 270.30(l)(11))

Whenever the Permittee becomes aware that it failed to submit any relevant facts, or submitted incorrect information to the Regional Administrator in the post-closure permit application or in any reports, records, or other documentation provided to the Regional Administrator, the Permittee shall promptly submit such facts or information.

17. Submittal of Reports or Other Information. (40 CFR 270.30(l)(7), (8), and (9), and 270.31)

All reports or other information required to be submitted pursuant to this post-closure permit shall be sent to:

RCRA Permitting Branch, HRP-8J
Waste Management Division
U.S. EPA, Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604

Attention: Michigan Section

18. All other requirements contained in RCRA, as amended, and in 40 CFR 270.30 not set forth herein are hereby fully incorporated in this post-closure permit.

E. SIGNATORY REQUIREMENT (40 CFR 270.30(k))

All reports or other information submitted to or requested by the Regional Administrator, his designee, or authorized representative, shall be signed and certified as required by 40 CFR 270.11.

F. CONFIDENTIAL INFORMATION

In accordance with 40 CFR 270.12 and 40 CFR Part 2, Subpart B, any information submitted to the U.S. EPA pursuant to this post-closure permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the

application form or instructions, or, in the case of other submissions by marking the words "Confidential Business Information" on each page containing such information.

If no claim is made at time of submission, the U.S. EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR Part 2.

G. DOCUMENTS TO BE MAINTAINED AT THE FACILITY

The Permittee shall maintain at the facility, until completion of post-closure care under 40 CFR 264.120, is completed and certified by an independent registered professional engineer, all items required by 40 CFR 264.73, including the following documents and all amendments, revisions, and modification to these documents:

1. Waste Analysis Plan, as required by 40 CFR 264.13 and this post-closure permit;

2. Operating Record, as required by 40 CFR 264.73 and this post-closure permit;

3. Waste minimization certifications, as required by 40 CFR 264.73(b)(9); and

4. Corrective Action reports and records, as required by Conditions IV.G, VI, and VII. III.F. of this post-closure permit. These reports and records must be maintained for at least 3 years after all Corrective Action activities have been completed.

H. COMPLIANCE WITH OTHER FEDERAL LAWS (40 CFR 270.3)

The Permittee must comply with the following Federal Laws, if applicable;

1. The Wild and Scenic Rivers Act (16 U.S.C. 1273 et seq., Section 7);

2. The National Historic Preservation Act of 1986 (16 U.S.C. 470 et seq., Section 106, and implementing regulations 36 CFR Part 800);

3. The Endangered Species Act (16 U.S.C. 1531 et seq., Section 7, and implementing regulations 50 CFR Part 402);

4. The Coastal Zone Management Act (16 U.S.C. 1451 et seq., Section 307(c), and implementing regulations 15 CFR Part 930); and

5. The Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.).

If the Permittee finds that any of these laws may be applicable to the issuance, modification, or conditions of this post-closure permit, the Permittee must notify the Regional Administrator within 14 days of discovery. Any noncompliance with these other Federal Laws may be grounds for enforcement action, post-closure permit termination, revocation and reissuance, modification, denial of a post-closure permit renewal application, or other appropriate action.

II. GENERAL FACILITY CONDITIONS

A. WASTE ACCEPTANCE

1. The Permittee is prohibited from receiving any hazardous waste(s) or remediation waste(s), as defined in 40 CFR 260.10, from off-site sources and placing these waste(s) into the Western or Eastern containment units.

2. The Permittee is prohibited from placing any liquids into the Western or Eastern containment units.

I. LAND DISPOSAL REQUIREMENTS

A. GENERAL CONDITIONS

1. The Permittee shall comply with all the applicable self-implementing requirements of 40 CFR Part 268 and all applicable land disposal requirements which become effective by statute (Section 3004 of RCRA).

2. The Permittee must test, in accordance with 40 CFR 268.7(a), any waste generated at the facility, or use knowledge of the waste, to determine if the waste is restricted from land disposal.

3. For restricted wastes with treatment standards expressed as concentrations in the waste extract, as specified in 40 CFR 268.41, the Permittee shall test the wastes or waste treatment residues, or extracts of such residues developed using the test methods described in Appendix II of 40 CFR Part 261 (Toxicity Characteristic Leaching Procedure, or TCLP) to assure that the wastes or waste treatment residues or extracts meet the applicable treatment standards of 40 CFR Part 268, Subpart D. Such testing shall be performed as required by 40 CFR 264.13.

4. A restricted waste for which a treatment technology is specified under 40 CFR 268.42(a) may be land disposed after it is treated using that specified technology or an equivalent treatment method approved by the Administrator under the procedures set forth in 40 CFR 268.42(b).

5. For restricted wastes with treatment standards expressed as concentrations in the waste, as specified in 40 CFR 268.43, the Permittee shall test the wastes or waste treatment residues (not an

extract of such residues) to assure that the wastes or waste treatment residues meet the applicable treatment standards of 40 CFR Part 268, Subpart D. Such testing shall be performed as required by 40 CFR 264.13.

IV. CORRECTIVE ACTION REQUIREMENTS

A. CORRECTIVE ACTION AT THE FACILITY

In accordance with Section 3004(u) of RCRA and the regulations promulgated pursuant thereto, the Permittee must institute Corrective Action as necessary to protect human health and the environment for all releases of hazardous waste(s) or hazardous constituent(s) from any solid waste management units (SWMU) at the facility, regardless of the time at which waste was placed in such units. In addition, Section 3004(u) of RCRA allows RCRA facilities to use a Corrective Action Management Unit (CAMU), if approved by the Regional Administrator under 40 CFR 264.552 (c), to facilitate cleanup of past environmental contamination in a manner that is protective of human health and the environment.

For purposes of implementing corrective action, the Permittee shall use a single CAMU, as described in Condition IV.C. below, to facilitate cleanup of SWMUs, surface impoundments, and other disposal areas at the facility. The Permittee shall remediate these areas in accordance with the terms and conditions specified in this post-closure permit and the State of Michigan's Post-Closure Operating License. Corrective Action definitions and terms can be found in Attachment IV. to this post-closure permit.

B. CORRECTIVE ACTION BEYOND THE FACILITY BOUNDARY

In accordance with Section 3004(v) of RCRA and the regulations promulgated pursuant thereto, the Permittee must implement Corrective Action(s) beyond the facility property boundary, where necessary to protect human health and the environment, unless the Permittee demonstrates to the satisfaction of the Regional Administrator that, despite the Permittee's best efforts, the Permittee was unable to obtain the necessary permission to undertake such actions. The Permittee is not relieved of all responsibility to clean up a release that has migrated beyond the facility boundary where off-site access is denied. On-site measures to address such releases will be addressed under the Release Assessment, RCRA Facility Investigation, Corrective Measures Study, and Corrective Measures Implementation phases, as determined to be necessary on a case-by-case basis.

C. CORRECTIVE ACTION MANAGEMENT UNIT (CAMU)

The Permittee shall use a single CAMU at the facility, as defined in 40 CFR 260.10, pursuant to implementing corrective action requirements under 40 CFR 264.101 and Section 3004(u) of RCRA. The Permittee shall only use the CAMU

for the management of remediation wastes, as defined in 40 CFR 260.10 and for wastes managed under Section 3004(v) of RCRA for releases beyond the facility boundary. Since the Regional Administrator has designated the regulated units at the facility as part of the CAMU, in accordance with 40 CFR 264.552(b)(1), the Permittee may manage remediation wastes from SWMUs and regulated units in the CAMU.

1. Areal Configuration Of CAMU Boundary (40 CFR 264.552(e)(1))

The areal configuration of the CAMU boundary shall include regulated units and nonregulated units or SWMUs. The areal configuration of the CAMU shall include Disposal Areas A, B, C (including Polishing Lagoon), Area D, North Lagoon, Former West Lagoon, Process Canal, and areas occupied by the Wastewater Treatment Plant. The CAMU boundary shall be as shown in Attachment II (Plate A) to this post-closure permit and in Construction Drawing No. 2, Volume VI, of the RCRA Post-Closure Operating License Application.

The western portion of the CAMU boundary shall contain Disposal Area D (SWMU), North Lagoon (SWMU), and the Former West Lagoon (regulated unit). The western portion of the CAMU is bounded to the north by the North Intake Canal; to the West by Area D-West; to the south by the Ford-Monroe manufacturing building; and to the east by the North Marsh.

The eastern portion of the CAMU boundary shall contain Disposal Areas A and B (regulated units), Area C (SWMU) which includes the Polishing Lagoon (regulated unit), and the Process Canal (regulated unit). The eastern portion of the CAMU boundary is bounded to the north by the North Marsh; to the west by the Ford-Monroe manufacturing building; to the south by the River Raisin; and to the east by the East Marsh.

2. Remediation Waste Management In A CAMU (40 CFR 264.552(e)(2))

a. General Conditions

(1) The CAMU shall only be used for the management of remediation wastes, as defined in 40 CFR 260.10, pursuant to implementing corrective action requirements under 40 CFR 264.101 and Section 3004(v) of RCRA. The CAMU may also be used for implementing corrective action under RCRA Section 3004(u) for releases beyond the facility boundary.

(2) Placement of remediation wastes into or within the CAMU does not constitute land disposal of hazardous waste and is not subject to Land Disposal Restrictions (LDRs) under 40 CFR Part 268 and Section 3004(g) of RCRA.

MODIFIED

(3) Consolidation or placement of remediation wastes into or within a CAMU does not constitute creation of a unit subject to Minimum Technology Requirements (MTRs) under 40 CFR 264.301 and Section 3004(o) and Section 3015 of RCRA.

(4) Movement and placement of remediation wastes from SWMUs at the facility into the CAMU at the facility is not subject to LDRs or MTRs under Sections 3004(g) and 3004(o) of RCRA.

(5) Excavation of remediation wastes from a CAMU, treatment on-site in another unit (i.e., temporary tank or generator accumulation tank) and redeposition of those wastes or residuals into the CAMU, is not subject to LDRs or MTRs under Sections 3004(g) and 3004(o) of RCRA.

(6) Excavation of remediation wastes from areas outside the CAMU, treatment on-site either in-situ or ex-situ in another unit (i.e., temporary unit or a generator accumulation tank) and deposition of those wastes or residuals into the CAMU, is not subject to LDRs or MTRs under Section 3004(g) and Section 3004(o) of RCRA.

(7) Excavation of remediation wastes from a CAMU and placement of those wastes into a land-based unit that is not the CAMU (either at the facility or off-site) or part of the designated CAMU, is subject to applicable LDRs and MTRs under Sections 3004(g) and 3004(o) of RCRA.

(8) Excavation of remediation wastes from a CAMU, treatment off-site in another unit, and redeposition of those wastes into the CAMU is subject to LDRs and MTRs under Section 3004(g) and Section 3004(o) of RCRA.

b. Requirements For Areas Within CAMU Boundary

(1) Waste Management Within CAMU Boundary

The Permittee may manage remediation wastes in areas located within the CAMU boundary, as shown in Attachment II (Plate A), in accordance with this post-closure permit and the State of Michigan Act 64 Post-Closure Operating License. The areas located within the CAMU boundary include Disposal Areas A, B, C, D, North Lagoon, Process Canal, Former West Lagoon, and the area occupied by the Wastewater Treatment Plant. The Permittee may treat (solidify) remediation wastes in Disposal Areas A, B, C, D, North Lagoon, and the Process Canal in-situ. The Permittee shall solidify remediation wastes in areas within the CAMU boundary in accordance with the requirements of this post-closure permit and the State of Michigan Post-

Closure Operating License. If treatment is performed ex-situ, the Permittee shall comply with the generator accumulation tank requirements under 40 CFR Part 262 and the requirement of the State of Michigan Act 64 Post-Closure Operating License. The solidified wastes shall meet the performance criteria specified in Condition IV.C.2.b.(2) below and in the State of Michigan Act 64 Post-Closure Operating License.

(2) Performance Criteria

The Permittee shall comply with the following performance criteria for solidified remediation wastes: (1) solidified wastes shall have a minimum 28-day unconfined compressive strength of at least 25 pounds per square inch (2) solidified wastes shall not contain free liquids and (3) solidified wastes shall be fine-grained material capable of being excavated using ordinary excavation methods.

c. Requirements for Areas Outside CAMU Boundary

(1) Waste Management Outside CAMU Boundary

The Permittee may manage remediation wastes in areas located outside the CAMU boundary (Area D-North, D-West, North Intake Canal, and the West Marsh) in accordance with this post-closure permit and the State of Michigan Act 64 Post-Closure Operating License. The Permittee may either treat (solidify) wastes in-situ or ex-situ in generator accumulation tanks prior to disposal in the Western or Eastern containment units, as discussed in Post-Closure Permit Condition IV.C.3.a. If treatment is performed ex-situ, the Permittee shall comply with the generator accumulation requirements under 40 CFR Part 262 and the State of Michigan Act 64 Operating License. In addition, the Permittee shall solidify wastes in areas located outside the CAMU boundary in accordance with the requirements of this post-closure permit, and the State of Michigan Post-Closure Operating License. The solidified wastes shall meet the performance criteria specified in Condition IV.C.2.b.(2) of this post-closure permit and in the State of Michigan Act 64 Post-Closure Operating License.

3. Closure

The Permittee shall close the CAMU in a manner that controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous remediation waste, hazardous constituents, leachate, contaminated run-off, or hazardous remediation waste decomposition products to the groundwater or surface waters or to the atmosphere in accordance 40 CFR 264.110.

The Permittee shall close the CAMU by constructing two on-site containment units (Western and Eastern) for final disposal of on-site remediation wastes. The Western and Eastern containment units shall be constructed with a leachate collection and removal system, a perimeter cutoff wall, and composite cover in accordance with the requirements specified below and in the State of Michigan Act 64 Post-Closure Operating License.

a. Requirements For Containment Units (Western and Eastern)

(1) Design and Location of Containment Units

The Permittee shall construct two on-site containment units (Western and Eastern) within the CAMU boundary for final disposal of on-site remediation wastes. The Western containment unit shall be located in the area presently occupied by Disposal Area D and the North Lagoon. The Eastern containment unit shall be located in the area presently occupied by Disposal Areas A, B, C (includes the Polishing Lagoon), and a portion of the Process Canal. The location of the Western and Eastern containment units shall be as shown in Attachment II (Plate B) to this post-closure permit.

The Permittee shall construct the Western and Eastern containment units with a leachate collection and removal system, a perimeter cutoff wall, and a composite cover as specified below and in accordance with the State of Michigan Act 64 Post-Closure Operating License. In addition, the Permittee shall comply with the sequence for construction of each containment unit as specified in the State of Michigan Act 64 Post-Closure Operating License.

(a) Leachate Collection and Removal System (LCR)

After remediation wastes above the LCR zone have been solidified, as defined in the State of Michigan Act 64 Post-Closure Operating License, the Permittee shall install a leachate collection and removal system. The LCR system shall consist of an interior and perimeter collection system and a pressure conveyance system and be installed within the Western and Eastern containment units. The Permittee shall comply with the construction, operating, maintenance, monitoring, and reporting requirements for the leachate collection and removal system in accordance with this post-closure permit and the State of Michigan Act 64 Post-Closure Operating License. In addition, the Permittee shall manage leachate collected by the leachate collection and removal system within each containment unit in accordance with

the State of Michigan Act 64 Post-Closure Operating License.

(b) Cutoff Walls

As remediation wastes are solidified, the Permittee shall construct a cutoff wall around the perimeter of the Western and Eastern containment units. The Permittee shall comply with the construction, operating, maintenance, monitoring, and reporting requirements for the cutoff wall in accordance with this post-closure permit and the State of Michigan Act 64 Post-Closure Operating License.

(c) Composite Cover

After all treated remediation wastes have been placed into the containment units, the Permittee shall install a composite cover. The composite cover shall consist of a low permeability layer, a drainage layer, and a vegetated topsoil cover and be installed over the Western and Eastern containment units. The Permittee shall comply with the construction, maintenance, monitoring, and reporting requirements for the composite cover in accordance with the requirements of this post-closure permit and the State of Michigan Act 64 Post-Closure Operating License.

(2) Waste Identification and Disposal Capacity

The Western and Eastern containment units shall have a total disposal capacity of approximately 1,407,000 cubic yards or 873 acre-feet. These units shall contain approximately one million cubic yards of treated electroplating sludge (F006 waste) and contaminated soils from Disposal Areas A, B, C (includes Polishing Lagoon), Area D, D-North, D-West, North Lagoon, North Intake Canal, West Marsh, and the Process Canal. Remediation wastes from the Former West Lagoon, as discussed in Post-Closure Permit Condition IV.C.3.b., may also be placed in the Western or Eastern containment units. In addition, remediation wastes from SWMUs identified in Condition IV.D. may be placed into the containment units provided that the Regional Administrator makes a determination that remediation wastes can be placed into the containment units and approval is given in accordance with applicable law including 40 CFR 264.552. Other types of remediation wastes that may be placed into the units include drilling muds, demolition debris, and soils excavated during construction of the perimeter cutoff walls.

b. Confirmatory Sampling

The Permittee shall perform confirmatory sampling in areas outside the containment units, as shown in Attachment II (Plate B), where remediation wastes have been removed. The areas subject to confirmatory sampling include Disposal Areas D-North, D-West, North Intake Canal, West Marsh, and the western portion of the Process Canal. In addition, the Permittee shall sample the areas previously located within the CAMU boundary but not within the containment units. These areas include the Former West Lagoon and the area occupied by the Wastewater Treatment Plant. Since the Former West Lagoon has not been "clean closed" under current RCRA regulations, the Permittee shall comply with the sampling requirements for the Former West Lagoon as specified in the State of Michigan Act 64 Post-Closure Operating License. The Permittee shall ensure that the remaining soils in areas outside the containment units meet the cleanup levels specified in the State of Michigan Act 64 Post-Closure Operating License.

c. Decontamination

The Permittee shall properly dispose of or decontaminate all structures, equipment, tanks (i.e., generator accumulation tanks), and soils contaminated with hazardous remediation wastes after closure in accordance with the State of Michigan Act 64 Post-Closure Operating License.

4. Post-Closure Care

After completion of closure activities specified in Condition IV.C.3. above, the Permittee shall perform post-closure care of the Western and Eastern containment units for 30 years after closure unless the post-closure care period is shortened or extended under 40 CFR 264.117. The post-closure care requirements necessary to protect human health and the environment include performing groundwater monitoring and monitoring and maintaining the final composite cover, leachate collection and removal system, and the cutoff wall. The Permittee shall comply with the post-closure care groundwater monitoring, maintenance, and reporting requirements specified in this post-closure permit and the State of Michigan Act 64 Post-Closure Operating License.

a. Monitoring and Maintenance

The Permittee shall perform post-closure monitoring and maintenance of the Western and Eastern containment units to ensure integrity of the leachate collection and removal system, perimeter cutoff wall, and final composite cover in accordance with the activities and frequencies specified in the State of Michigan Act 64 Operating License. MODIFIED

d. Requirements For Sediment Containment Unit (SCU)

The Permittee may construct the SCU within the CAMU boundary for on-site disposal of PCB-contaminated River Raisin Sediments, identified in Condition IV.D., and other materials generated as a result of the U.S. EPA Superfund program's cleanup of the River Raisin Hot Spot Area and associated on-land sewers and impacted areas at the facility. This cleanup activity is authorized in an Administrative Consent Order between the Permittee and U.S. EPA Superfund program.

(1) Design and Location of SCU

The SCU shall be located and constructed within the CAMU in accordance with the SCU design plans and specifications, approved by the State of Michigan on June 7, 1996, and contained in Attachment 6 of State of Michigan's Part 111 Post-Closure Operating License.

b. Groundwater Monitoring

The Permittee shall conduct groundwater monitoring to monitor groundwater quality and groundwater flow around the Western and Eastern containment units. The Permittee shall conduct groundwater monitoring in accordance with the sampling frequency, methods, and reporting requirements specified in the State of Michigan Act 64 Post-Closure Operating License.

D. IDENTIFICATION OF SWMUs

A RCRA Facility Assessment (RFA), consisting of a record review, site visit, and a sampling visit, was conducted at the Ford Motor Company, Monroe Stamping Plant in 1987. Twenty-one Solid Waste Management Units (SWMUs) were identified during the RFA. Ten of the twenty-one SWMUs will be remediated using the CAMU as described in Condition IV.C. of this post-closure permit. The remaining 11 SWMUs will be investigated in accordance with the corrective action activities specified in Condition IV.G. below.

The 10 SWMUs that will be remediated using the CAMU are as follows: Disposal Areas A, B, C (includes the Polishing Lagoon), Area D, D-North, D-West, North Lagoon, Process Canal, and the Former West Lagoon. Since these SWMUs will be remediated using the CAMU under the requirements of this post-closure permit, the Permittee is not required to conduct a corrective action investigation at these 10 SWMUs under Post-Closure Permit Condition IV.G. at this time.

The remaining SWMUs will be investigated in accordance with the corrective action activities specified under Post-Closure Permit Condition IV.G. The 11 SWMUs are as follows: salaried parking lot; coal pile; former coal pile; rifle range area; demolition disposal area; empty drum storage area; former drum storage area; current drum storage area; filter press area; dead tree area; and the NPDES outfall 002. Although not listed in the RFA, the River Raisin sediments have been identified as an Area of Concern (AOC) which is subject to corrective action under Post-Closure Permit Condition IV.G. An AOC is an area or unit that does not meet the definition of a SWMU but may have released or have the potential to release hazardous constituents to the environment. However, since the River Raisin Sediments are currently being investigated under the U.S. EPA Superfund program, the Permittee is not required to perform corrective action investigations under Post-Closure Permit Condition IV.G. for this SWMU at this time.

The location of the 11 SWMUs and the River Raisin sediments can be found in Attachment II (Plate C) to this post-closure permit. A description of the SWMUs and the results of sampling during the RFA is provided below.

SWMU #	SWMU Identification	SWMU Description and RFA Sampling Results
1	Salaried Parking Lot	A 200 ft. by 300 ft. asphalt parking lot, constructed in 1971, with a 6-inch base reported to be composed of a mixture of F006 hazardous waste sludge and fly ash. Sampling indicated the presence of heavy metals in soil.
2	Coal Pile	A 175 ft. by 400 ft. area adjacent to the River Raisin and Dead Tree Area which is no longer used for coal storage. Previous coal piles were stored in this area with no containment or liners. Sampling in this area indicates the presence of heavy metals in soil.
3	Former Coal Pile	A 150 ft. by 400 ft. area adjacent to the Raisin River which is no longer used for coal storage. Coal residue is present in soils. No soil samples were taken during the RFA.
4	Rifle Range Area	A 34 ft. by 48 ft. area near the Raisin River and East Marsh. Reportedly, F006 hazardous waste sludge was stored in this area before it was removed and filled in with clay. Sampling indicates the presence of heavy metals in soil.
5	Demolition Disposal Area	A 50 ft. by 1000 ft. area along the River Raisin shoreline previously used to store demolition debris for erosion protection. Visual evidence of oil-like materials in this area was reported in the RFA. No soil samples were taken during the RFA.
6	Empty Drum Storage Area	A 39 ft. by 63 ft. area previously used for the storage of drums containing waste oil, solvents, paint wastes, and diesel fuel. Visual evidence of black-stained concrete and staining of adjacent soils was reported in the RFA. Sampling indicates the presence of heavy metal and organics in soils.

SWMU #	SWMU Identification	SWMU Description and RFA Sampling Results
7	Former Drum Storage Area	A 27 ft. by 51 ft. area previously used for less than 90-day storage of compactor waste, oil and coil spring dust, and slag. Oily waste from this area has been drained via a sump to storage tanks. No sampling was taken during the RFA.
8	Current Drum Storage Area	Area is presently used for less than 90 day storage of oily wastes, compactor waste, coil spring dust, and slag. This area has been active since 1987. No soil samples were taken during the RFA.
9	Filter Press Area	Area located within the wastewater treatment plant used for sludge dewatering. Visual evidence of staining in this area was reported in the RFA. Sampling indicates the presence of heavy metals and organics in soil.
10	Dead Tree Area	A 100 ft. by 585 ft. area adjacent to the River Raisin containing dead trees. Natural depressions in this area containing coal, construction debris, and fine-grained oily material were reported in the RFA. No soil samples were taken during the RFA.
11	NPDES Outfall 002	Used for the discharge of treated wastewater into the River Raisin. No sediment samples were taken during the RFA.

AOC #	AOC Identification	AOC Description
1	River Raisin Sediments	Sediments near Ford's two NPDES Outfall pipes contaminated with metals and polychlorinated biphenyls. Sediment investigation and potential removal actions currently being conducted under U.S. EPA's Superfund program.

E. NEWLY IDENTIFIED SWMUs OR RELEASES

1. General Information

The Permittee shall notify the Regional Administrator, within 30 days of discovery, of the following information requirements for any new SWMU identified at the facility, in accordance with 40 CFR 270.14(d):

a. The location of the unit on the site topographic map;

b. Designation of the type of unit;

c. General dimensions and structural description (supply any available drawings);

d. When the unit was operated; and

e. Specifications of all waste(s) that have been managed at the unit.

2. Release Information

The Permittee must submit to the Regional Administrator, within 30 days of discovery, all available information pertaining to any release of hazardous waste(s) or hazardous constituent(s) from any new or existing SWMU.

F. CORRECTIVE ACTION FOR NEWLY IDENTIFIED SWMUs AND RELEASES

The Regional Administrator will review the information provided in Condition IV.E. above, and may as necessary require further investigations or corrective measures. The Permittee shall submit a written RCRA Facility Investigation Workplan to the Regional Administrator within (90) days after written notification by the Regional Administrator that further investigation is necessary.

G. CORRECTIVE ACTION ACTIVITIES

1. Release Assessment (RA)

The Permittee shall conduct an RA to document the absence or presence and nature and extent of hazardous waste(s) or hazardous constituents(s) from all SWMUs identified in Condition IV.D. above except for AOC #1. The major tasks and required submittal dates for the RA are shown below. Additional tasks and associated submittal dates may also be specified in the Schedule of Compliance (Post-Closure Permit Condition VII). The scope of work for each of the tasks can be found in Attachment 1. (RCRA Corrective Action Plan).

MODIFIED

a. RA Workplan

The Permittee shall submit a written RA Workplan to the Regional Administrator within (90) days after the effective date of this post-closure permit.

The Regional Administrator will approve, modify and approve, or disapprove, and provide comments on the Workplan in writing to the Permittee. Within (60) days of receipt of such comments, the Permittee must modify the Workplan, so as to reflect the changes required in the Regional Administrator's comments, or submit a new workplan for the Regional Administrator's approval. The RA Workplan, as approved or as modified and approved, becomes an enforceable condition of this post-closure permit.

b. RA Implementation

Within (30) days of the Regional Administrator's written approval of the RA Workplan, the Permittee shall implement the workplan according to the terms and schedule in the approved RA Workplan.

c. RA Final Report

Within (60) days after the completion of the RA, the Permittee shall submit an RA Final Report to the Regional Administrator. The RA Final Report shall describe the procedures, methods, and results of the RA. The Final Report must contain adequate information to support further corrective action decisions at the facility.

After the Permittee submits the RA Final Report, the Regional Administrator shall either approve or disapprove the Report in writing. If the Regional Administrator disapproves the Report, the Regional Administrator shall notify the Permittee in writing of the deficiencies and specify a due date for submittal of a revised Report. The RA Final Report, as approved, becomes an enforceable condition of this post-closure permit.

2. RCRA Facility Investigation (RFI)

If the Regional Administrator determines, based on the results of the RA and other relevant information, that an RFI is necessary, the Regional Administrator will notify the Permittee in writing that the Permittee shall conduct an RFI. The purpose of the RFI is to evaluate thoroughly the nature and extent of the release of hazardous waste(s) and hazardous constituent(s) from all applicable SWMUs identified in Condition IV.D. or as identified by the Regional Administrator. The major tasks and required submittal dates are shown below. Additional tasks and associated submittal dates may also be specified in the Schedule of Compliance (Post-Closure Permit Condition VII.). The scope of work for

each of the tasks is found in Attachment I. (RCRA Corrective Action Plan).

a. RFI Workplan

The Permittee shall submit a written RFI Workplan to the Regional Administrator within (90) days from the notification of the requirement to conduct an RFI.

The Regional Administrator will approve, modify and approve, or disapprove, and provide comments on the Workplan in writing to the Permittee. Within (60) days of receipt of such comments, the Permittee must modify the Workplan, so as to reflect the changes required in the Regional Administrator's comments, or submit a new workplan for the Regional Administrator's approval. The RFI Workplan, as approved or as modified and approved, becomes an enforceable condition of this post-closure permit.

b. RFI Implementation

Within (30) days of the Regional Administrator's written approval of the RFI Workplan, the Permittee shall implement the RFI Workplan according to the terms and schedule in the approved RFI Workplan.

c. RFI Final Report

Within (60) days after the completion of the RFI, the Permittee shall submit an RFI Final Report to the Regional Administrator. The RFI Final Report shall describe the procedures, methods, and results of the RFI. The Final Report must contain adequate information to support further corrective action decisions at the facility.

After the Permittee submits the RFI Final Report, the Regional Administrator shall either approve or disapprove the Report in writing. If the Regional Administrator disapproves the Report, the Regional Administrator shall notify the Permittee in writing of the deficiencies and specify a due date for submittal of a revised Report. The RFI Final Report, as approved, becomes an enforceable condition of this post-closure permit.

3. Determination of No Further Action

The Regional Administrator will determine, based on the results of the RA or RFI, whether corrective measures are necessary. If the Regional Administrator determines that corrective measures are not necessary, no further action will be required at that time.

a. Periodic Monitoring

A determination of no further action shall not preclude the Regional Administrator from requiring continued or periodic monitoring of air, soil, ground water, or surface water, if necessary to protect human health and the environment, when site-specific circumstances indicate that potential or actual releases of hazardous waste(s) including hazardous constituents are likely to occur.

b. Further Investigations

A determination of no further action shall not preclude the Regional Administrator from requiring further investigations, studies, or remediation at a later date, if new information or subsequent analysis indicates that a release or likelihood of a release from a SWMU at the facility is likely to pose a threat to human health or the environment. Additionally, the Regional Administrator may determine that there is insufficient information on which to base a determination, and may require the Permittee to perform additional investigations as needed to generate the needed information.

4. Corrective Measures Study (CMS)

If the Regional Administrator determines, based on the results of the RA, RFI and other relevant information, that corrective measures are necessary, the Regional Administrator will notify the Permittee in writing that the Permittee shall conduct a CMS. The purpose of the CMS will be to develop and evaluate the corrective action alternative(s) and to outline one or more alternative corrective measure(s) which will satisfy the performance objectives specified by the Regional Administrator. The major tasks and required submittal dates are shown below. Additional tasks and associated submittal dates may also be specified in the Schedule of Compliance (Post-Closure Permit Condition VII.). The Scope of Work for each of the tasks is found in Attachment I.

a. CMS Workplan

The Permittee shall submit a written CMS Workplan to the Regional Administrator within (90) days from the notification of the requirement to conduct a CMS.

The Regional Administrator will approve, modify and approve, or disapprove and provide comments on the CMS Workplan in writing to the Permittee. Within (60) days of receipt of such comments, the Permittee must modify the Workplan, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. The CMS Workplan,

as approved or as modified and approved, becomes an enforceable condition of this post-closure permit.

b. CMS Workplan Implementation

Within (30) days of the Regional Administrator's written approval of the CMS Workplan, the Permittee shall implement the CMS Workplan according to the terms and schedule in the approved CMS Workplan.

c. CMS Final Report

Within (90) days after the completion of the CMS, the Permittee shall submit a CMS Final Report to the Regional Administrator. The CMS Final Report shall summarize the results of the investigations for each remedy studied and must include an evaluation of each remedial alternative.

After the Permittee submits the CMS Final Report, the Regional Administrator shall either approve or disapprove the Report in writing. If the Regional Administrator disapproves the Report, the Regional Administrator shall notify the Permittee in writing of the deficiencies and specify a due date for submittal of a revised Report. The CMS Final Report, as approved, becomes an enforceable condition of this post-closure permit.

5. Corrective Measures Implementation (CMI)

Based on the results of the CMS, the Regional Administrator shall select one or more of the Corrective Measures in the CMS, and shall notify the Permittee in writing of the decision. The Regional Administrator's selection will be based on the corrective measures' long-term reliability and effectiveness, short-term effectiveness, implementability, cost, reduction of toxicity, mobility, or volume.

a. Permit Modification

The Regional Administrator will initiate a major permit modification, as provided by 40 CFR 270.41, to require implementation of the corrective measure(s) selected.

b. Financial Assurance

As part of the permit modification of this permit to incorporate CMI, the Permittee shall provide financial assurance in the amount specified by the Regional Administrator for necessary corrective action activities as required by 40 CFR 264.101(b) and (c).

H. ECOLOGICAL ASSESSMENT

The Permittee shall submit to the Regional Administrator a Preliminary Ecological Assessment Report within 90 days after the effective date of this post-closure permit. The report shall be based on existing data and limited field work describing the environmental systems that are susceptible to contaminant exposure from the facility. The Permittee's report shall include the information specified in Section I of Attachment IV. (Ecological Assessment Plan).

Within 60 days of the Regional Administrator's written approval of the Preliminary Ecological Assessment Report, the Permittee shall submit a Draft Ecological Assessment Report which will include the information specified in Section III of Attachment IV.

The Regional Administrator will approve, modify and approve, or disapprove and provide comments on the Draft Ecological Assessment Report in writing to the Permittee. Within 30 days of receipt of such comments, the Permittee must modify the Draft Ecological Assessment Report, so as to reflect the changes required in the Regional Administrator's comments and submit a Final Ecological Assessment Report. The Final Report must contain adequate information to support further corrective action decisions at the facility.

I. DISPUTE RESOLUTION

1. If the Permittee disagrees, in whole or in part, with the U.S. EPA's disapproval or modification of any submission required by Condition IV.G. of the post-closure permit, the Permittee shall notify the U.S. EPA of its objections by providing the Region 5 Associate Division Director, Waste Management Division, Office of RCRA, with a written statement of position within 14 days of receipt of the U.S. EPA's disapproval or modification. The Permittee's statement of position shall set forth the specific matters in dispute, the position that the Permittee asserts should be adopted as consistent with the requirements of this post-closure permit, the basis for the Permittee's position, and shall include any supporting documentation.

2. The U.S. EPA and the Permittee shall have an additional 14 days from the U.S. EPA's receipt of the Permittee's statement of position to meet or confer to attempt to resolve the dispute. If agreement is reached, the Permittee shall submit a revised submission, if necessary, and shall implement the submission in accordance with such agreement.

3. If the U.S. EPA and the Permittee are not able to reach agreement within the 14-day period, the Regional Administrator, Region 5, or his or her delegate will thereafter issue a written decision resolving the dispute which shall become an enforceable condition of this post-closure permit, and the Permittee shall comply with the terms and conditions of the U.S. EPA's decision resolving the dispute.

4. Notwithstanding the invocation of this dispute resolution procedure, the Permittee shall proceed to take any action required by those portions of the modified and approved submission that the U.S. EPA determines are not substantially affected by the dispute according to the schedule contained in the submission.

V. TOXICITY CHARACTERISTIC

A. WASTE RESTRICTIONS

The Permittee is prohibited from accepting, storing, treating, or disposing of TC wastes from off-site sources.

B. WASTE CHARACTERIZATION

The Permittee must use the Toxicity Characteristic Leaching Procedure (TCLP) (Appendix II of 40 CFR Part 261), or use knowledge of the waste to determine whether a waste exhibits the characteristic of toxicity, as defined in 40 CFR 261.24. Use of the TCLP does not exempt the Permittee from also using the Extraction Procedure (EP) toxicity test if required by the State license conditions.

VI. ENDANGERED SPECIES ACT REQUIREMENTS

A. ENDANGERED SPECIES ACT COMPLIANCE

The Permittee shall comply with the requirements under Section 7 (a) and 7 (c) of the Endangered Species Act in accordance with the conditions specified in this post-closure permit. The conditions required by this post-closure permit include conducting a Biological Assessment (BA) and performing protective measures for the bald eagle pair which is known to be present at the facility. The purpose of the BA is to ensure that post-closure permit activities do not jeopardize the continued existence of any Federal or State proposed, listed, or candidate endangered or threatened species or adversely affect its critical habitat.

The requirements for the BA and Protective Measures Plan for the bald eagle can be found in Attachment V. to this post-closure permit. Additional requirements and associated submittal dates may also be specified in the Schedule of Compliance (Post-Closure Permit Condition VII).

1. Biological Assessment (BA)

Within 90 days of the effective date of this post-closure permit and prior to initiation of closure activities specified under the post-closure permit, the Permittee shall submit a BA. The purpose of the BA is to identify any Federal or State proposed, listed, or candidate endangered or threatened species at the facility which may be affected by post-closure permit activities.

The Regional Administrator will approve, modify and approve, or disapprove and provide comments on the BA in writing to the Permittee. Within 60 days of receipt of such comments, the Permittee must modify the BA to reflect changes required in the Regional Administrator's comments. The BA, as approved or as modified and approved, becomes an enforceable condition of this post-closure permit.

If, based on the results of the BA, the Regional Administrator determines that post-closure permit activities will likely affect species identified in the BA, then the Regional Administrator will enter into formal consultation with the U.S. Fish and Wildlife Service.

2. Protective Measures Plan (PMP)

Within 30 days of the effective date of this post-closure permit and prior to initiation of closure activities specified in this post-closure permit, the Permittee shall implement the PMP for the bald eagle. The purpose of the PMP is to ensure that the bald eagle pair at the facility is protected during the post-closure permit activities.

3. Bald Eagle Management Plan

By November 1, 1995, the Permittee shall submit a bald eagle management plan. The Regional Administrator will approve, modify and approve, or disapprove and provide comments on the Bald Eagle Management Plan in writing to the Permittee. Within 30 days of receipt of such comments, the Permittee must modify the Plan to reflect changes required in the Regional Administrator's comments. The Bald Eagle Management Plan, as approved or as modified and approved, becomes an enforceable condition of this post-closure permit.

B. NEWLY IDENTIFIED FEDERAL OR STATE SPECIES

If the post-closure activities specified in the post-closure permit are modified or if new information becomes available that indicates additional Federal or State proposed, listed, or candidate endangered or threatened species are present and/or affected, the Permittee shall notify the U.S. EPA and the U.S. Fish and Wildlife within 30 days of discovery.

If the Regional Administrator determines that a BA is necessary, the Regional Administrator will notify the Permittee in writing within 90 days of receipt of notification of discovery.

C. REPORTING REQUIREMENTS

1. Annual Report

The Permittee shall submit a signed annual report to the U.S. EPA which

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contains an updated list of Federal and State proposed, listed, or candidate endangered or threatened species which may be present at the facility. The Permittee may obtain a list of species by placing a request with the U.S. Fish and Wildlife Service, United States Department of the Interior, East Lansing Field Office, 1405 South Harrison Road, East Lansing, Michigan 48823.

VII. SCHEDULE OF COMPLIANCE

The required submittal dates for corrective action submittals including the Release Assessment (RA), RCRA Facility Investigation (RFI), Corrective Measures Study (CMS); Ecological Assessment; and Biological Assessment (BA) and Protective Measures Plan (PMP) are shown below.

A. RA (Attachment I)

Facility Submittal	Due Date
RA Workplan	Within 90 days of after effective date of post-closure permit
Modified or New RA Workplan, if necessary	Within 60 days of receipt of Regional Administrator's comments
RA Implementation	Within 30 days after Regional Administrator's written approval
RA Final Report	Within 60 days after completion of RA

B. RFI (Attachment I), if required

Facility Submittal	Due Date
RFI Workplan	Within 90 days of the notification of the requirement
Modified or New RFI Workplan, if necessary	Within 60 days of receipt of Regional Administrator's comments
RFI Implementation	Within 30 days of the Regional Administrator's written approval
RFI Final Report	Within 60 days after completion of RFI
Progress Reports	Bimonthly

C. CMS (Attachment I), if required

Facility Submittal	Due Date
CMS Workplan	Within 90 days of notification of requirement
Modified or New CMS Workplan, if necessary	Within 60 days of receipt of Regional Administrator's comments
CMS Workplan Implementation	Within 30 days of Regional Administrator's written approval
CMS Final Report	Within 90 days after completion of CMS
Progress Reports	Bimonthly

D. Ecological Assessment (Attachment IV)

Facility Submittal	Due Date
Preliminary Ecological Assessment	Within 90 days after effective date of post-closure permit
Draft Ecological Assessment	Within 60 days of Regional Administrator's written approval
Final Ecological Assessment	Within 30 days of receipt of Regional Administrator's comments

E. BA and PMP (Attachment V)

Facility Submittal	Due Date
BA Report	Within 90 days of effective date of post-closure permit and prior to initiation of post-closure activities
Modified or New BA, if necessary	Within 60 days of receipt of Regional Administrator's comments
PMP Implementation	Within 30 days of the effective date of post-closure permit and prior to initiation of closure activities
ald Eagle Management Plan	November 1, 1995
odified or New Bald Eagle Management Plan	Within 30 days of receipt of Regional Administrator's comments

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Attachment I

RCRA Corrective Action Plan

ATTACHMENT I
MID 005 057 005

RCRA CORRECTIVE ACTION PLAN
For
Ford Motor Company, Monroe Stamping Plant
Monroe, Michigan

Index

Corrective Action Scope of Work

The corrective action requirements for the Permittee are specified in Post-Closure Permit Condition IV. The corrective action for the facility includes discrete elements. The scope of work for each of the elements is specified below. All workplans and final reports are subject to approval by the U.S. EPA. Any of the information or documentation that has been submitted in the Post-Closure Permit Application may be incorporated by reference in the required workplans and reports.

I. Release Assessment (RA)

The purpose of the Release Assessment (RA) is to document the absence or presence and nature and extent of hazardous waste or hazardous constituents at each Solid Waste Management Unit identified in Post-Closure Permit Condition IV.D.

A. RA Workplan

The Permittee shall prepare a RA Workplan. During the RA Investigation, it may be necessary to revise the Workplan to increase or decrease the detail of information collected to accommodate site specific needs. The RA Workplan includes the following:

1. Project Management Plan

The Permittee shall prepare a Project Management Plan which shall include a discussion of the technical approach, schedules, and personnel. The Project Management Plan shall evaluate each SWMU based on its actual or potential threat to human health and the environment and prioritize the investigatory and/or remedial activities accordingly. The Project Management Plan shall also include a description of qualifications of personnel performing or directing the Release Assessment, including contractor personnel. This plan shall also document the overall management approach to the RA.

2. Data Collection Quality Assurance Plan

The Permittee shall prepare a plan to document all monitoring procedures including sampling, field measurements and sample analysis performed during the assessment to characterize the environmental setting, source and contamination, so as to ensure that all information, data and resulting decisions are technically sound, statistically valid, and properly documented. The Data Collection Quality Assurance Plan shall include, but not be limited to, the following:

a. Data Collection Strategy - This section shall include the

level of precision and accuracy for all data (factors which should be considered include the environmental conditions at the time of sampling, number of sampling points, and the representatives of selected media and selected analytical parameters), a description of methods and procedures to assess the precision, accuracy and completeness of the measurement data, a description of the measures to be taken to assure that data generated by the Permittee and outside laboratories or consultants during the Release Assessment can be compared to each other.

b. Sample Collection - This section shall include a discussion of; selecting appropriate sampling locations (depth, etc.), determining which media are to be sampled (e.g., groundwater, air, soil, sediment, etc.), determining which parameters are to be measured and where, selecting the frequency of sampling and length of sampling period, selecting the type of samples (e.g., composites versus grabs) and number of samples to be collected, measures to be taken to prevent contamination of the sampling equipment and cross contamination between sampling points, selecting appropriate sample containers, sample preservation, chain-of-custody (e.g., standardized field tracking reporting forms to establish sample custody in the field prior to and during shipment as well as prepared sample labels containing all information necessary for effective sample tracking), and documenting field sampling operations and procedures.

c. Field Measurements - This section shall include a discussion of; selecting appropriate field measurements (locations, depth, etc.), measuring all necessary ancillary data, determining conditions under which field measurements should be conducted, determining which media are to be addressed by appropriate field measurements (e.g., groundwater, air, soil, sediment, etc.), determining which parameters are to be measured and where, selecting the frequency of field measurements and length of field measurements period, and documenting field measurements and procedures.

d. Sample Analysis - This section shall specify chain-of-custody procedures, sample storage procedures and storage times; sample preparation methods; analytical procedures (i.e., scope and application of the procedure, sample matrix, potential interferences, precision and accuracy of the methodology, and method detection limits); calibration procedures and frequency; data reduction, validation and reporting; preventative maintenance procedures and schedules; corrective action (for laboratory problems); turnaround time; and internal quality control checks, laboratory performance and systems audits and frequency.

3. Data Management Plan

The Permittee shall develop and initiate a Data Management Plan to document and track assessment data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the assessment. The Data Management Plan shall include the following:

a. Data Records - This section shall include; unique sample or field measurement code, sampling or field measurement location and sample or measurement type, sampling or field measurement raw data, laboratory analysis ID number, and result of analysis.

b. Tabular Display - This section shall present; raw data, results from each medium or each constituent monitored, data reduction for statistical analysis, sorting of data by potential stratification factors (e.g., location, soil layer, topography), and summary data.

c. Graphical Format - This section shall describe: sampling location and sampling grid; boundaries of sampling area, and areas where additional data are required; levels and extent of contamination at each sampling location; contamination levels, averages, and maxima; changes in concentration in relation to distance from the source, time, depth, or other parameters; and features affecting intramedia transport and potential receptors.

4. Health and Safety Plan

The Permittee's Release assessment Workplan shall include a Health and Safety Plan covering activities to be conducted during the assessment. This plan shall be consistent with all applicable U.S. EPA, OSHA, NIOSH, State and local requirements and regulations, and the conditions of this permit.

5. Release Assessment

The Permittee shall conduct the necessary assessments to document the absence or presence of hazardous wastes or hazardous constituents at SWMUs identified in Condition IV.D. of the post-closure permit. The assessments shall result in data of adequate technical quality to support the determination of whether there is a need to implement a RCRA Facility Investigation.

The Release Assessment activities shall follow the plans set forth in Part I.A. of this Scope of Work. All sampling and analysis

shall be conducted in accordance with the Data Collection Quality Assurance Plan. All sampling locations shall be documented in a log and identified on a detailed site map.

6. Assessment Analysis

The Permittee shall prepare an analysis and summary of all facility assessments and results. The objective of this element shall be to ensure that the assessment data are sufficient in quality and quantity to support the determination of whether it is necessary to implement an RFI.

The Permittee shall analyze all release assessment data and prepare a report on the type and known extent of contamination at each solid waste management unit. The report shall describe the contamination (qualitative/quantitative) in relation to background levels indicative of the area.

7. Determination of Further Investigation

Based on the data analysis from the Release Assessment, the Permittee shall provide recommendations on which solid waste management units require further investigation under Part II.A. of this Scope of Work.

II. RCRA Facility Investigation (RFI) (if required)

If the Regional Administrator determines that additonal investigation is necessary, the Permittee shall prepare a RFI Workplan. The purpose of the RFI is to evaluate thoroughly the nature and extent of the release of hazardous waste and hazaroudous constitents and to gather additional screening data to support the corrective measures study.

A. RFI Workplan

The Permittee shall prepare an RFI Workplan. During the RFI, it may be necessary to revise the Workplan to increase or decrease the detail of information collected to accommodate site specific needs. The RFI Workplan includes the following:

1. Facility Background

The Permittee's RFI Workplan shall summarize existing information about the facility that will aid in determining the nature and extent of contamination at the facility and beyond the facility boundary. This information shall be used to develop a conceptual model that is a narrative and graphical description of the site, the pollutants and the behavior of the pollutants at the site. The model will help to visualize where the problem may exist and facilitate the selection of corrective measures, including the

remediation of existing contamination and the prevention of future contamination. The conceptual model shall address the release source(s), the release mechanism(s), specific contaminants and the distribution of contaminants, pathways of contamination migration, actual or potential receptors including on-site and adjacent ecosystems, and exposure routes. This model may be modified as additional information is collected.

The Permittee shall describe the following specific information:

a. A summary of the facility's regional location, pertinent boundary features, drainage basin and general facility physiography.

b. A summary of the environmental setting at and adjacent to the facility, including geology, hydrogeology, hydrology, and meteorology, wildlife and vegetative community.

c. Maps depicting the following:

(1) General geographic location;

(2) Property lines, with the owners of all adjacent property clearly indicated;

(3) Topography and surface drainage depicting all soil profiles, waterways, wetlands, floodplains, water features, drainage patterns, and surface water areas;

(4) All tanks, buildings, utilities, paved areas, easements, rights-of-way, and other features;

(5) All solid or hazardous waste treatment, storage or disposal units active after November 19, 1980;

(6) All known past solid or hazardous waste treatment, storage or disposal areas regardless of their dates of operation;

(7) All known past and present product and waste underground tanks or piping;

(8) Surrounding land uses;

(9) The location of all nearby production, recovery, and groundwater monitoring wells; and

(10) Terrestrial habitat cover - types (i.e., vegetation communities) with emphasis on locating natural (undisturbed) areas.

(11) Wildlife nesting and foraging locations for locally "uncommon" mammals, birds, fish, benthos, etc. Threatened and endangered species possibly on or near the site should be identified as early as possible.

All maps shall be consistent with the requirements of 40 CFR 270.14 and be of sufficient detail and accuracy to locate and report all current and future work performed at the site.

d. A history and description of ownership and operation, solid and hazardous waste generation, treatment, storage and disposal activities at the facility;

e. A summary of past permits requested and/or received, any enforcement actions and the subsequent responses and a list of documents and studies prepared for the facility along with a brief summary of their findings;

f. A summary of all possible source areas of contamination. At a minimum, this should include all regulated units, solid waste management units identified in Condition III.C. of the facility's permit, any additional solid waste management units, spill areas, and other suspected source areas of contamination including any observed effects to biota (i.e., fish kills, stressed vegetation, or other obvious impacts).

For each area the Permittee shall identify the following:

(1) Location of unit/area;

(2) Quantities of solid and hazardous wastes;

(3) Hazardous waste or constituents, to the extent known;

(4) Approximate dates or periods of past spills, identification of the materials spilled, the amount spilled, the location, and a description of the response actions, including any inspection reports or technical reports generated as a result of the spill;

(5) Available monitoring data and qualitative information on locations and levels of contamination at the facility; and

(6) Habitats and species (including threatened and endangered species) potentially exposed to contaminants, and any known or observed effects of site contaminants on biota, such as fish kills or other obvious impacts. Habitat description should be based on available information and

a field reconnaissance by a trained ecologist. Experts on local flora and fauna should also be consulted.

g. A report on all interim measures which were or are being undertaken at the facility. This shall include:

(1) Objectives of the interim measures: how the measure is mitigating a potential threat to human health and the environment and/or is consistent with and integrated into any long term solution at the facility;

(2) Design, construction, operation, and maintenance requirements;

(3) Schedules for design, construction and monitoring; and

(4) Schedule for progress reports.

2. Potential Corrective Measure Technologies

Based on the existing information in Part II.A.1. above, the Permittee's RFI Workplan shall identify:

a. The potential corrective measure technologies that may be used at the facility or beyond the boundaries of the facility to respond to releases of hazardous waste or hazardous constituents at or from the facility; and

b. Any field, laboratory, bench-scale or pilot-scale data that needs to be collected in the RFI to facilitate the evaluation and selection of the final corrective measure(s), if any, for releases at or from the facility (e.g., compatibility of waste and construction materials, information to evaluate effectiveness, treatability of waste, etc.).

3. Project Management Plan

The Permittee's RFI Workplan shall include a Project Management Plan which shall document the overall management approach to the RFI. The plan shall include:

a. A discussion of the technical approach;

b. Schedules of activities;

c. A description of the qualifications of personnel directing the RFI, including contractor personnel; and

d. Provision for submittal of periodic (e.g., monthly or quarterly progress reports, which shall, at a minimum,

include:

(1) A description and estimate of the percentage of the RFI completed;

(2) Summaries of all findings;

(3) Summaries of all changes made in the RFI during the reporting period;

(4) Summaries of all contacts with the public regarding the RFI;

(5) Summaries of all problems or potential problems encountered during the reporting period;

(6) Actions being taken to rectify problems;

(7) Changes in personnel during the reporting period;

(8) Projected work for the next reporting period; and

(9) Copies of daily reports, inspection reports, laboratory and monitoring data, etc.

4. Facility Investigation Plan

The Permittee's RFI Workplan shall include a Facility Investigation Plan which discusses those investigations necessary to: characterize the environmental setting at the facility; define the source; define the degree and extent of contamination; and identify actual or potential receptors.

This information shall be used to verify and further develop the conceptual model of the nature and extent of contamination at the facility.

The investigation should also result in data of adequate technical quality to support the development and evaluation of the corrective measures alternative(s). The Permittee shall collect information to supplement and verify the existing information described in Part II.A.1.b. above on the environmental setting at the facility. The Permittee shall characterize the following:

a. Environmental Setting Investigation

(1) Hydrogeology

The Permittee shall conduct a program to evaluate hydrogeologic conditions at the facility. This program

shall provide the following information, as appropriate:

(a) A description of the regional and facility-specific geologic and hydrogeologic characteristics affecting groundwater flow beneath the site, including:

(i) Regional and facility-specific stratigraphy;

(ii) Structural geology: description of local and regional structural features;

(iii) Depositional history;

(iv) Identification and characterization of areas and amount of recharge and discharge;

(v) Regional and facility-specific groundwater flow patterns; and

(vi) Temporal variations in the groundwater flow regime.

(b) An analysis of any topographic features that might influence the groundwater flow system;

(c) Based on field data, tests, and cores, a representative and accurate classification and description of the hydrogeologic units which may be part of the migration pathways at the facility, including:

(i) Hydraulic conductivity (horizontal and vertical) and porosity (total and effective);

(ii) Lithology, grain size, sorting, degree of cementation;

(iii) An interpretation of hydraulic interconnection between saturated zones; and

(iv) The attenuation capacity and mechanisms of the natural earth materials.

(d) Based on field studies and cores, structural geology and hydrogeologic cross sections showing the extent of hydrogeologic units which may be part of the migration pathways, identifying:

(i) Sand and gravel deposits in unconsolidated deposits;

(ii) Zones of fracturing or channeling in consolidated or unconsolidated deposits;

(iii) Zones of higher or lower permeability that might direct or restrict the flow of contaminants;

(iv) Aquifers: A geologic formation, group of formations, or part of a formation capable of yielding a significant amount of groundwater to wells or springs; and

(v) Water-bearing zones above the first confining layer that may serve as a pathway for contaminant migration including perched zones of saturation.

(e) Based on data obtained from groundwater monitoring wells and piezometers installed upgradient and downgradient of the potential contaminant source, a representative description of water level or fluid pressure monitoring including:

(i) Water level contour and/or potentiometric maps;

(ii) Hydrologic cross sections showing vertical gradients;

(iii) The flow system, including the vertical and horizontal components of flow; and

(iv) Any temporal changes in hydraulic gradients due to seasonal or other influences.

(f) A description of manmade influences that may affect the hydrogeology of the site, identifying:

(i) Active and inactive local water supply and production wells with an approximate schedule of pumping; and

(ii) Manmade hydraulic structures (pipelines, french drains, ditches, unlined ponds, septic tanks, NPDES outfalls, etc.).

(2) Soils

The Permittee shall conduct a program to characterize the soil and rock units above the water table in the vicinity of the contaminant release(s). Such characterization shall consider, but not be limited to, the following

information, as appropriate:

(a) SCS soil classification;
(b) Surface soil distribution;
(c) Soil profile, including ASTM classification of soils;
(d) Transects of soil stratigraphy;
(e) Hydraulic conductivity (saturated and unsaturated);
(f) Relative permeability;
(g) Bulk density;
(h) Porosity;
(i) Soil sorptive capacity;
(j) Cation exchange capacity (CEC);
(k) Soil organic content;
(l) Soil pH;
(m) Particle size distribution;
(n) Depth of water table;
(o) Moisture content;
(p) Effect of stratification on unsaturated flow;
(q) Infiltration;
(r) Evapotranspiration;
(s) Storage capacity;
(t) Vertical flow rate; and
(u) Mineral content.

(3) Surface Water and Sediment

The Permittee shall conduct a program to characterize the surface water bodies in the vicinity of the facility that may be affected by releases from the facility. Such characterization shall include, but not be limited to, the following activities and information:

(a) Description of the temporal and permanent surface water bodies including:

(i) For lakes and estuaries: location, elevation, surface area, inflow, outflow, depth, temperature or chemical stratification and volume;

(ii) For streams, ditches, drains, swamps and channels: location, elevation, flow, velocity, depth, width, seasonal fluctuations, and flooding tendencies;

(iii) Drainage patterns; and

(iv) Evapotranspiration.

(b) Description of the chemistry of the natural surface water and sediments; this includes determining the pH, total dissolved solids, total suspended solids, biological oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients, chemical oxygen demand, total organic carbon, specific contaminant concentrations, etc; and

(c) Description of sediment characteristics including the disposition area, thickness profile, physical and chemical parameters (e.g., grain size, density, organic carbon content, ion exchange capacity, pH, etc.), and specific contaminant concentrations.

(4) Air

The Permittee shall provide information characterizing the climate in the vicinity of the facility. Such information shall include, but not be limited to, as appropriate:

(a) A description of the following parameters:

(i) Annual and monthly rainfall averages;

(ii) Monthly temperature averages and extremes;

(iii) Wind speed and direction;

(iv) Relative humidity and dew point;

(v) Atmospheric pressure;

(vi) Evaporation data;

(vii) Development of inversions; and

(viii) Climate extremes that have been known to occur in the vicinity of the facility, and the frequency of occurrence.

(b) A description of topographic and manmade features which affect air flow and emission patterns, including:

(i) Ridges, hills or mountain areas;

(ii) Canyons or valleys;

(iii) Surface water bodies;

(iv) Wind breaks and forests; and

(v) Buildings.

b. Source/Waste Characterization

The Permittee shall collect analytical data to characterize the source(s) where wastes have been placed, and to describe the characteristics of the wastes. This shall include qualification of the following specific characteristics at each source area, as each source becomes identified during the facility investigation:

(1) Unit/Disposal Area Characteristics:

(a) Location of unit/disposal area;

(b) Type of unit/disposal area;

(c) Design features;

(d) Operating practices (past and present);

(e) Period of operation;

(f) Age of unit/disposal area;

(g) General physical conditions; and

(h) Method used to close the unit.

(2) Waste Characteristics:

(a) Type of waste placed in the units;

(i) Hazardous classification;

(ii) Quantity; and

(iii) Chemical composition.

(b) Physical and chemical characteristics;

(i) Physical form (solid, liquid, gas);
(ii) Physical description;
(iii) Temperature;
(iv) pH;
(v) General chemical class (e.g., acid, solvent);
(vi) Molecular weight;
(vii) Density;

(viii) Boiling point;
(ix) Viscosity;
(x) Solubility in water;
(xi) Cohesiveness of the waste;
(xii) Vapor pressure; and
(xiii) Flash point.

(c) Migration and dispersal characteristics of the waste.

(i) Sorption;
(ii) Biodegradability, bioconcentration;
(iii) Photodegradation rates;
(iv) Hydrolysis rates; and
(v) Chemical transformations.

The Permittee shall document the procedures used in making the above determinations.

c. Contamination Characterization

The Permittee shall collect analytical data on groundwater, soils, surface water, sediment, subsurface gas and air contamination in the vicinity of the facility. These data shall be sufficient to define the extent, origin, direction, and rate of movement of plumes of contamination. Data shall include time and location of sampling, media samples, concentrations found, conditions during sampling, and the identity of the individuals performing the sampling and analysis. In developing strategies for collecting these under Part I.B.4. a and b above, the Permittee shall address the following types of contamination at the facility, as appropriate:

(1) Groundwater Contamination

The Permittee shall conduct a Groundwater Investigation to characterize any plumes of contamination at or originating from the facility. This investigation shall at a minimum provide the following information:

(a) A description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the facility;

(b) The horizontal and vertical direction of contaminant movement;

(c) The velocity of contaminant movement;

(d) The horizontal and vertical concentration profiles of Appendix IX constituents in the plume(s);

(e) An evaluation of factors influencing the plume movement; and

(f) An extrapolation of future contaminant movement.

The Permittee shall document the procedures used in making the above determinations.

(2) Soil Contamination

The Permittee shall conduct an investigation to characterize the contamination of the soil and rock units above the water table in the vicinity of the contaminant release. The investigation shall include the following information:

(a) A description of the vertical and horizontal extent of contamination;

(b) A description of contaminant and soil chemical properties within the source area and contaminant plume. This includes physical and chemical properties that might affect contaminant migration and transformation;

(c) Specific contaminant concentrations;

(d) The velocity and direction of contaminant movement; and

(e) An extrapolation of future contaminant movement.

The Permittee shall document the procedures used in making the above determinations.

(3) Surface Water and Sediment Contamination

The Permittee shall conduct a surface water investigation to characterize contamination in surface water bodies resulting from contaminant releases at the facility. The investigation shall include, but not be limited to, the following:

(a) A description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the facility and the extent of contamination in underlying sediments;

(b) The horizontal and vertical direction of contaminant movement;

(c) The contaminant velocity;

(d) An evaluation of the physical, chemical, and biological factors influencing contaminant movement;

(e) An extrapolation of future contaminant movement taking into account times of flood; and

(f) A description of the chemistry of the contaminated surface waters and sediments. This includes determining the pH, total dissolved solids, specific contaminant concentrations, etc.

The Permittee shall document the procedures used to make the above determinations.

(4) Air Contamination

The Permittee shall conduct an investigation to characterize the particulate and gaseous contaminants released into the atmosphere. This investigation shall provide the following information:

(a) A description of the horizontal and vertical direction and velocity of contaminant movement;

(b) The rate and amount of release; and

(c) The chemical and physical composition of the contaminants released, including horizontal and vertical concentration profiles.

(5) Subsurface Gas Contamination

The Permittee shall conduct an investigation to characterize subsurface gases emitted from buried hazardous waste and hazardous constituents in the groundwater. This investigation shall include the following information:

(a) A description of the horizontal and vertical extent of subsurface gases mitigation;

(b) The chemical composition of the gases being emitted;

(c) The rate, amount, and density of the gases being emitted; and

(d) Horizontal and vertical concentration profiles of the subsurface gases emitted.

The Permittee shall document the procedures used in making the above determinations.

d. Potential Receptors

The Permittee shall collect data describing the human populations and environmental systems that are susceptible to contaminant exposure from the facility. Chemical analyses of biological samples may be needed. Data on observable effects in ecosystems or from bioassays may also be needed. The following characteristics shall be identified, as appropriate:

(1) Local uses and possible future uses of groundwater:

(a) Type of use (e.g., municipal or residential drinking water source, industrial, etc.); and

(b) Location of groundwater users including wells and discharge areas.

(2) Local uses and possible future uses of surface waters draining the facility:

(a) Domestic and municipal;

(b) Recreational;

(c) Agricultural;

(d) Industrial; and

(e) Environmental.

(3) Human use of, or access to, the facility and adjacent lands, including, but not limited to:

(a) Recreation;

(b) Agriculture;

(c) Residential;

(d) Commercial;

(e) Zoning; and

(f) Relationship between population locations and prevailing wind direction.

(4) A description of the biota in surface water bodies including benthic macroinvertebrates and fish communities on, adjacent to, or affected by the facility. The aquatic biota expected in these water bodies in the absence of site-related contamination, based on physical habitat characteristics, should also be described.

(5) A description of terrestrial habitats on or potentially affected by the site and a description of potential terrestrial animal receptors seen or expected in those habitats, including, birds, mammals, amphibians, and reptiles.

(6) A demographic profile of the people who use or have access to the facility and adjacent land, including, but not be limited to: age; sex; and sensitive subgroups.

(7) A description of any endangered or threatened species near the facility.

5. Quality Assurance Project Plan

The Permittee shall prepare a plan to document all monitoring procedures; sampling, field measurements and sample analysis performed during the investigation to characterize the environmental setting, source, and contamination, so as to ensure that all information, data and resulting decisions are technically sound, statistically valid, and properly documented.

a. For convenience in review, it is a requirement that Quality Assurance Project Plans (QAPjP) are to be prepared using the document control format consisting of the following information, placed in the upper right-hand corner of each document page:

- Project Name;
- Section Number;
- Revision Number;
- Date; and
- Section Page Number.

The Permittee can see the upper right-hand corner on each page of the guidance documents, QAMS-005/80 and "Content Requirements for the Preparation of RCRA QAPjPs," for an example of this format. This format provides for easy change of individual QAPjP element pages without rewriting the entire document.

A QAPjP meeting must be held prior to the preparation of the QAPjP and its supporting documents. During the meeting, U.S. EPA representatives will provide QAPjP preparation guidance and lead a discussion on the specific sampling and analysis issues for the project.

Four copies of the QAPjP must be submitted initially and for each required revision.

b. The QAPjP must include, but not be limited to, a discussion addressing each of the following items:

(1) TITLE PAGE AND QAPjP APPROVAL

The title page of the QAPjP should contain, at a minimum, provisions for approval by the following parties:

(a) The U.S. EPA Region 5 Permit Writer;

(b) The U.S. EPA Regional Quality Assurance Manager, Monitoring and Quality Assurance Branch (MQAB);

(c) The responsible Project Officer (PO) and Quality Assurance (QA) Officer for the contract engineering firm; and

(d) Subcontractors, as appropriate (i.e., laboratories, sampling, subcontractors, drillers, etc.).

After final approval of the QAPjP by the U.S. EPA Regional Quality Assurance Manager, the Project Coordinator will determine the distribution, and the responsibility for this distribution, of QAPjP copies to each person/organization having a major responsibility for the proposed environmental measurements. This includes, but is not limited to, contractors, subcontractors, and each laboratory.

(2) TABLE OF CONTENTS

The Table of Contents shall address each of the following items:

(a) Introduction;

(b) A serial listing of each of the 16 QAPjP elements shall be provided. Each section, subsection and page shall be clearly labelled and numbered properly;

(c) A listing of any appendices which are required to augment the QAPjP as presented (i.e., SOPs, summaries of past data, etc.) shall be provided;

(d) Following the list of appendices, a listing of any tables and figures which are required to augment the QAPjP shall be provided; and

(e) At the end of the Table of Contents, a listing of the Quality Assurance Section (QAS) officials and other individuals receiving official copies of the QAPjP and any subsequent revisions shall be provided.

(3) PROJECT DESCRIPTION

The purpose of the project description is to:

- Define the objectives (goal of the remedial activity);
- Describe how the project will be designed to obtain the information needed for these objectives; and
- Define the scope of the QAPjP for reviewers.

The project description element should include the following:

(a) Introduction

A succinct description of the project including a brief statement addressing the phase(s) of the work and general objectives of the investigation;

(b) Site Description

A description of site-specific features including location, size, borders, important physical features, topographic, geological and hydrogeologic information, etc., separate paragraphs/sections shall be used to clearly address each of these

items;

(c) Site History or Background

Chronological history of the site which led to its RCRA status; documentation of known chemicals dumped on site; summary of any previous sampling and analysis efforts; data with overview of these results or copy of previous data reports for the site can be appended to the QAPjP; a summary table of past data along with the analytical methodologies used and their method detection limits (if available) should be provided;

(d) Target Compounds

Discussion of important site contaminants or target compounds, including required detection limits (RDLs) for RFI/CMS;

(e) Project Objectives

The project objectives element should include the following:

(i) Specific objectives;

(ii) The intended data usages; and

The brief statement outlining the usages of all data including any data generated from field screening and or/field measurements. These may include, but not be limited to the following:

- Qualitative or semi-quantitative analyses for selection of sample and/or sampling locations;
- Future enforcement actions;
- Data for remedial action alternatives;
- Determination of hazardous waste characteristics for remedial removals;
- Protection of public health; and
- Definition of extent of environmental contamination.

(iii) Data Quality Objective (DQO) summaries from RCRA DQO preparation guidance.

(f) Sample Network and Rationale

A succinct description of the monitoring (sampling) network design and rationale. This may be referenced to readily available work and sampling plans. The following are minimum requirements:

(i) Diagrams or site maps of sampling locations;

(ii) Short rationale of selected sampling locations; and

(iii) Summary table listing matrices, parameters, and their frequency of collection.

NOTE: Parameters shall include both laboratory and field parameters. The field parameters may include the following field activities if they are applicable:

- Any field screening (i.e., screening of volatile organics using HNu, OVA, etc.);
- Any field measurements (i.e., pH, conductance, temperature, etc.); and
- Hydrogeologic investigations (i.e., soil permeability, particle size, etc.).

Sample matrices and parameters are best listed in groups for a remedial activity site as follows:

- On-site contaminated soils, sludges, barrels, liquids, or sediments. These types of sampling and analyses are often done to determine disposal methods;
- Ambient monitoring of air, groundwater, surface water, soils, drinking water, river sediments, fish;

Specifications of filtered or unfiltered sample aliquot for groundwater and surface water must be included as part of the definition of parameters. These types of analyses usually are intended to measure the extent of

environmental contamination and to assess public health risk; and

- Regulatory requirements: Appendix IX analyses may be required for certain projects.

(g) Project Schedule

A description of dates anticipated for start, milestones, and completion of the project and monitoring activities. A milestone table or a bar chart consisting of project tasks and time lines is appropriate.

(4) PROJECT ORGANIZATION AND RESPONSIBILITY

This element identifies key personnel organizations that are necessary for the remedial activity and apprises them of their responsibilities.

(a) Management Responsibilities

Operational responsibilities showing how execution and direct management of the technical and administrative aspects of this project have been assigned as shown in the following Table.

Quality Assurance Organization

Tasks	Responsible Organization/Personnel
Final review/approval of QAPjP	U.S. EPA Region 5 PO and U.S. EPA Region 5QA Officer
QA review and approval of reports, SOPs, and field activities; audits of reports, procedures, and activities for identifying, controlling nonconformance for corrective actions	Permittee's Contractor QA Manager
Evidence audits of field records	Permittee's Contractor
Data assessment	Permittee's Contractor

Tasks	Responsible Organization/Personnel
Performance and system audit of laboratories	U.S. EPA Region 5 Central Regional Laboratory (CRL)
Analysis	Contract Laboratory
Performance and system audits of field activities	U.S. EPA Region 5 CRL and/or Central District Office (CDO)
Approval of QA Program and laboratory test procedures	U.S. EPA Region 5 QA Section, U.S. EPA Region 5 CRL

Include a table, chart or figure showing the project organization and line authority for the Quality Assurance Organization described above.

(5) QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA IN TERMS OF PRECISION, ACCURACY, COMPLETENESS, REPRESENTATIVENESS AND COMPARABILITY

Clearly describe the quality assurance (QA) objectives of the project in terms of precision, accuracy, completeness, representativeness and comparability for both field activities (sampling, measurements and screening) and laboratory analyses, including the project required acceptance limits and means to achieve these QA objectives.

NOTE: Trip blanks are required at a frequency of one per cooler in which aqueous matrix VOC samples are shipped. Field blanks are required for all aqueous matrix parameters at a frequency of one for every ten or fewer investigative samples. Field duplicates are required at the same frequency as field blanks, while accounting for all parameters and matrices. These field QC samples must be treated as regular investigative samples concerning sample volume, containers and preservation. Field duplicates must not be composited prior to placing them in the sample containers.

(6) SAMPLING PROCEDURES

If a separate sampling plan (SP) will be written, then

the sampling procedures shall be referenced to the SP. Otherwise, the detailed sampling procedures shall be described under this QAPjP element. The description of sampling procedures shall include the following:

(a) Detailed procedures, criteria, or guidelines used for sampling point selection;

(b) Detailed procedures, criteria, or guidelines used for collecting background samples, if any; detailed procedures for preparing composite samples shall also be properly described if composite samples are to be collected;

(c) Detailed procedures for sample collection of each sample matrix or parameters;

(d) Detailed procedures for sample packaging, handling and shipment, including time consideration (i.e., shipped daily by overnight courier) and field filtration requirements and procedures;

(e) Samples containers, reagents, preservatives, and holding time requirements - a table is appropriate;

(f) Special conditions for the preparation of sampling containers, and time requirements - a table is appropriate;

(g) Chain-of-custody procedures - including an acceptable sample numbering system;

(h) Detailed procedures for preparing/collecting trip blank samples, field blank samples and field duplicate samples;

(i) Documentation of sampling activities - including forms, notebooks, bound logbook and procedures to record sample history, sampling conditions, etc., and analyses to be taken;

(j) Summary of sampling and analysis - using a table is appropriate;

(k) For ground and surface waters, both filtered and unfiltered samples must be submitted for analysis of dissolved and total metals, respectively; and

(l) Compositing of any samples is prohibited.

(7) SAMPLE CUSTODY

Sample custody consists of three major elements, namely the chain-of-custody procedure for field sampling and measurements; chain-of-custody procedure for laboratory analysis; and the final evidence file. All of these three elements shall be addressed clearly, and separately:

(a) Chain-of-custody procedure for field activities, including sampling, field measurement and screening.

(b) Chain-of-custody procedure for laboratory activities, including sample receiving, log-in, storage, and tracking of custody-transfer during sample preparation and analysis, etc.

(c) The final evidence file, including the description of file contents and specifying file custodian.

(8) CALIBRATION PROCEDURES AND FREQUENCY

Describe the calibration procedures and their frequency for both field and laboratory instruments. The description shall include the following:

(a) Field Instruments

(i) Initial calibration, including multilevel calibration for determination of usable range;

(ii) Continuing calibration check and acceptable control limits; and

(iii) Conditions to trigger recalibration.

(b) Laboratory Instruments

(i) Initial calibration for each instrument;

(ii) Initial calibration verification;

(iii) Continuing calibration check; and

(iv) Conditions to trigger the recalibration.

(9) ANALYTICAL PROCEDURES

SW-846 (third edition) methods are preferred. Other U.S. EPA methods from the Clean Water Act (CWA),

Superfund Contract Laboratory Program (CLP) Clean Air Act Program, or Safe Drinking Water Act (SDWA) are acceptable when appropriate for the constituent of interest. The following shall be properly addressed:

(a) For SW-846 (third edition) analytical method, the method for analysis (by number). For parameters to be analyzed by methods other than those found in SW-846, the following shall be provided:

(1) For nonstandard methods, an appropriate Standard Operating Procedure (SOP) shall be included as an integrated part of the QAPjP; and

(2) For modified SW-846 or other standard methods (i.e., Appendix IX or site-specific contaminants), the analytical procedure to be used shall be documented in the format of an SOP.

(b) For U.S. EPA or other standard methods not found in SW-846, a reference to the method manual and procedure number(s) is appropriate.

(c) Chain-of-custody procedure to be used/followed by analyst of the laboratory performing the analytical services shall be clearly addressed or properly referenced, provided the procedure is described elsewhere in the QAPjP.

(10) INTERNAL QUALITY CONTROL CHECKS

All specific quality control check methods to be followed for both laboratory and field activities should be described or properly referenced. Items to be considered include the following:

(a) Field Activities (Measurements and Screening)

(i) Continuing calibration check;

(ii) Replicate analyses;

(iii) Spike sample analyses;

(iv) Blank (trip blank, field blank, etc.);

(v) Quality Control (QC) samples;

(vi) Zero and Span gases (i.e., air monitoring); and

(vii) Calibration standards and devices, etc.

(b) Laboratory Analyses

(i) Method blanks;

(ii) Reagent/preparation blanks;

(iii) Matrix spike and matrix spike duplicates;

(iv) Calibration standards;

(v) Internal standards;

(vi) Surrogate standards;

(vii) Continuing calibration check;

(viii) Calibration check standards, etc.; and

(ix) Laboratory duplicate/replicate analysis, etc.

(11) DATA REDUCTION, VALIDATION AND REPORTING

(a) Methods to be used for reducing both field and laboratory data. For instance, reducing data from instrument printout to final reporting units using a calibration curve, and an average response factor or updated response factor, etc., shall be described.

(b) Criteria/guidelines/procedures to be used for data validation shall be described. This function must be performed independently of the laboratory.

(c) The data reporting format including all forms and reporting units shall be described. The description shall include the listing of data package contents (deliverables from the laboratory).

(12) PERFORMANCE AND SYSTEM AUDITS

This QAPjP element describes the procedures and mechanisms used to ensure that the sampling and analysis are performed per specifications of the QAPjP and that measurement data meet project requirements. A description of both the internal and external audits for the field activity as well as laboratory analysis shall be provided to address this QAPjP element.

(a) Internal Audits which can be implemented by contractor's site manager and/or QA officer. The description provided for this QAPjP element shall address the following:

- The responsible party for these audits shall be identified;
- The frequency of these audits to be conducted shall be specified; and
- Methods/procedures to be used for conducting these audits shall be described.

(b) External Audits

The external audits of laboratories selected for a specific monitoring activity are EPA's responsibility.

- Laboratory Scientific Support Section (LSSS), Central Regional Laboratory (CRL), Region 5 is responsible for these audits.

(13) PREVENTIVE MAINTENANCE

Preventive maintenance procedures to be used for both field and laboratory instruments shall be described. A table showing the type of maintenance to be performed and the frequency is appropriate.

For the maintenance of laboratory instruments used for the analysis of SW-846 methods, the analytical methods can be referenced.

(14) SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS

The procedures/equations to be used to aid in assessing the accuracy and precision of analytical data, and completeness of data collection shall be clearly documented or properly referenced.

(15) CORRECTIVE ACTION

In order to address this QAPjP element the following shall be provided:

(a) The mechanism of triggering the initiation of limitation of corrective actions;

(b) The proper procedures to be used for initiating, development, approval and implementation of the corrective actions. Parties for initiating, approval and implementation of the corrective actions shall be identified; and

(c) Alternate corrective actions to be taken.

(16) QUALITY ASSURANCE REPORTS TO MANAGEMENT

Quality assurance reports shall be submitted on a periodic basis to management. This shall be done to ensure that problems, if any, identified during the sampling and/or analysis are investigated, and corrective actions are properly taken. For a very simple project, a final report may be substituted for QA reports.

6. RFI Report

The Permittee's RFI Workplan shall include an outline of the contents of the RFI report. The RFI report shall include the following:

a. A summary of all facility investigations conducted during the RFI;

b. An analysis of all data developed during the RFI;

c. A description of the nature and extent of contamination at the facility, including:

(1) The release source(s);
(2) The release mechanism(s);
(3) Specific contaminant concentrations and the distribution of contamination;
(4) Pathways of contamination migration; and
(5) Actual or potential receptors including exposure routes.

d. Identification of all relevant and applicable standards, including background values, for the protection of human health and the environment, and comparison of those standards to the extent of contamination found at the facility; and

e. Recommendation of which SWMUs require a Corrective Measure Study, and the identification of those corrective action alternatives that will be further investigated.

7. Health and Safety Plan

The Permittee's RFI Workplan shall include a Health and Safety Plan covering activities to be conducted during the RFI. This Plan shall be consistent with all applicable U.S. EPA, OSHA, NIOSH, State and local requirements and regulations, and the conditions of this Permit.

8. Community Relations Plan

The Permittee's RFI Workplan shall include a plan for dissemination of information to the public regarding investigation activities and results.

C. RFI Implementation

The Permittee shall conduct the RCRA Facility Investigation according to terms and schedules in the RFI Workplan, as approved by the Regional Administrator. The RFI Workplan shall include the information required in Part II.A. of this Scope of Work.

D. RFI Reporting Requirements

The Permittee shall prepare and submit RFI progress reports and a draft and final RFI report.

1. Progress Reports

The Permittee shall submit progress reports according to the requirements of Part II.A.3.d. of this Scope of Work and the Post-Closure Permit Schedule of Compliance (Condition VII).

2. Draft Report

The Permittee shall submit a final RFI report according to the requirements of Part II.A.6. of this Scope of Work and Post-Closure Permit Schedule of Compliance (Condition VII).

3. Final Report

The Permittee shall submit a final RFI report according to the requirements of Part II.A.6. of this Scope of Work and Post-Closure Permit Schedule of Compliance (Condition VII).

III. Corrective Measures Study (CMS) (if required)

The purpose of a CMS is to develop and evaluate remedial alternative(s) and recommend the remedy(ies) to be taken.

A. CMS Workplan

If required under Post-Closure Permit Condition IV.G.5, the Permittee shall prepare a CMS Workplan. The Permittee may elect either to screen a number of potential remedies prior to evaluating a smaller number of potential remedies or, based on justification and prior approval by the U.S. EPA, delete the screening step and proceed with evaluation of the expected remedy(ies), including any specified by U.S. EPA. The CMS Workplan includes the following:

1. Findings of the RCRA Facility Investigation

The Permittee's CMS Workplan shall summarize the findings of the RFI, highlighting the description of the nature and extent of contamination, and the identification of SWMUs requiring corrective measures. Any updates to facility conditions since the RFI was conducted, including implementation of interim measures, shall be included in this section of the workplan.

2. Target Cleanup Levels and Media Cleanup Standards

The Permittee's CMS Workplan shall propose site-specific target cleanup levels for the corrective measures. These target cleanup levels shall be based on information gathered during the RFI, from U.S. EPA guidance, the requirements of any applicable Federal standards for protection of human health and the environment.

The Permittee shall recommend final media cleanup standards when the final remedy is selected. If the media cleanup standards differ from the target cleanup levels, the Permittee shall document the reasons for recommendation of different standards.

3. Screening of Corrective Measures Technologies

The Permittee shall screen corrective measures technologies to eliminate those that may prove infeasible to implement, or that rely on technologies unlikely to or that do not achieve the media cleanup standards within a reasonable period of time. This screening process focuses on eliminating those technologies which have severe limitations for a given set of waste and site-specific conditions. The screening step may also eliminate technologies based on inherent technology limitations.

The Permittee's CMS Workplan shall document the reasons for eliminating any technology, based on the following criteria:

a. Site Characteristics:

Site data should be reviewed to identify conditions that may limit or promote the use of certain technologies.

Technologies whose use is clearly precluded by site characteristics should be eliminated from further consideration;

b. Waste Characteristics; and

Technologies clearly limited by waste characteristics should be eliminated from consideration;

c. Technology Limitations

During the screening process, the level of technological development, performance record, and inherent construction, operation, and maintenance problems should be identified for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated may be eliminated in the screening process.

4. Identification of the Corrective Measures Alternative(s)

The Permittee's CMS Workplan shall identify the corrective measures alternative(s) based on the target cleanup levels and an analysis of available technologies. The Permittee shall rely on sound engineering practice to determine which of the previously identified technologies appear most suitable for the site. Technologies can be combined to form the overall corrective action alternative(s). The alternatives developed should represent a workable number of options that appear to adequately address all site problems and corrective action objectives. The Permittee shall document the reasons for excluding technologies that might be feasible alternatives.

5. Evaluation and Recommendation of the Corrective Measures Alternative(s)

The Permittee's CMS Workplan shall describe how each corrective measure alternative that passes through the initial screening process shall be evaluated. The evaluation shall be based on technical, environmental, human health and institutional concerns. The Permittee shall also develop cost estimates for each corrective measure.

a. Evaluation Criteria

The evaluation criteria shall include the following:

(1) Technical:

The Permittee shall evaluate each alternative based on performance, reliability, implementability and safety.

(a) The Permittee shall evaluate performance based on the effectiveness and useful life of the measure:

(i) Effectiveness shall be evaluated in terms of the ability to perform intended functions, such as containment, division, removal, destruction, or treatment. The effectiveness of each measure shall be determined either through design specifications or by performance evaluation. Any specific waste or site characteristics which could impede effectiveness shall be considered; and

(ii) Useful life is defined as the length of time the level of effectiveness can be maintained. Most corrective measure technologies deteriorate with time. Each measure shall be evaluated in terms of the projected service lives of its components.

(b) The Permittee shall provide information on the reliability of each corrective measure including its operation and maintenance requirement and its demonstrated reliability:

(i) Operation and maintenance requirements include the frequency and complexity of the operation and maintenance. Technologies requiring frequent or complex operation and maintenance should be regarded as less reliable. The availability of labor and materials to meet these requirements shall also be considered; and

(ii) Demonstrated reliability is a way of measuring the risk and effect of failure. The Permittee should evaluate the technology's reliability under analogous conditions, the flexibility to deal with uncontrollable changes at the site, and the impact on receptors of a failure.

(c) The Permittee shall describe the implementability of each alternative, including the ease of installation and the time required to achieve a given level of response:

(i) Constructability is determined by both internal and external facility conditions (e.g., location, depth to water table, availability of utilities, need for special permits, etc.).

The Permittee shall evaluate what measures will facilitate construction under these conditions; and

(ii) Time has two components that shall be addressed: the time it takes to implement a corrective measure, and the time it takes to see beneficial results.

(d) The Permittee shall evaluate each corrective measure alternative with regard to safety. This evaluation shall include threats to the safety of nearby communities and environments, as well as to workers during the implementation. Factors to consider are fire, explosion and exposure to hazardous substances.

(2) Environmental

The Permittee shall assess each alternative to determine its short- and long-term beneficial and adverse effects on the environment. Each alternative will be evaluated for its impact on habitat types and plant and animal receptors located in, adjacent to, or affected by the facility. Receptor impacts should include those occurring at the individual level (e.g., mortality, growth and reproductive impairments) and those occurring at higher levels of biological organization (i.e., at population, community, and ecosystem levels). The assessment should include proposed measures for mitigating adverse impacts.

(3) Human Health

The Permittee shall assess each alternative in terms of the extent to which it mitigates short- and long-term potential or actual exposure to any residual contamination and protects human health both during and after implementation of the corrective measure. Each alternative will be evaluated to determine the level of contaminants through various media, and the reduction over time. The residual levels from each alternative must be compared with target cleanup levels, including existing criteria, standards and guidelines acceptable to the U.S. EPA.

(4) Institutional

The Permittee shall assess relevant institutional needs for each alternative. Specifically, the effects of

Federal, State and local environmental and public health standards, regulations, guidance, advisories, ordinances, or community relations on the design, operations, and timing of each alternative.

b. Cost Estimate

The Permittee shall develop an estimate of the cost of each corrective measure alternative, and for all phases of the action. The cost estimate shall include both capital and operation and maintenance costs, as appropriate.

(1) Capital costs consist of direct (construction) and indirect (nonconstruction and overhead) costs.

(a) Direct capital costs include:

(i) Construction costs: Materials, labor and equipment required to install the corrective measure;

(ii) Equipment costs: Treatment, containment, disposal and/or service equipment necessary to implement the action;

(iii) Land site development costs: Expenses associated with the purchase of land and development of existing property; and

(iv) Buildings and service costs: Process and non-process buildings, utility connections, purchased services, and disposal costs.

(b) Indirect capital costs include:

(i) Engineering expenses: Costs of administration, design, construction supervision, drafting, and testing of corrective measure alternatives;

(ii) Legal fees and license or permit costs;

(iii) Startup and shakedown costs; and

(iv) Contingency allowances: Funds to cover costs resulting from unforeseen circumstances, such as adverse weather conditions, strikes, and inadequate facility characterization.

(2) Operation and maintenance costs are post-construction costs necessary to ensure continued effectiveness of a

corrective measure. The Permittee shall consider the following operation and maintenance cost components:

(a) Operating labor costs: Wages, salaries, training, overhead, and fringe benefits associated with the labor necessary for continued operation;

(b) Maintenance materials and labor costs: Costs for labor, parts, and other resources required for routine maintenance of facilities and equipment;

(c) Auxiliary materials and energy: Costs of items such as chemicals, electricity, water and sewer service, and fuel;

(d) Purchased services: Sampling costs, laboratory fees, and professional fees;

(e) Disposal and treatment costs: Costs of transporting, treating and disposing of waste materials and residues;

(f) Administrative costs;

(g) Insurance, taxes and licensing costs; and

(h) Other costs: Items that do not fit into any of the above categories.

c. Recommendation of the Corrective Measure Alternative(s)

The Permittee shall present a corrective measure alternative using technical, human health, and environmental criteria. This recommendation shall include summary tables which allow the alternative or alternatives to be understood easily. Tradeoffs among health risks, environmental effects, and other pertinent factors shall be highlighted. The U.S. EPA will select the corrective measure alternative or alternatives to be implemented based on the results of the Corrective Measure Study. At a minimum, the following criteria will be used to justify the final corrective measure or measures.

(1) Technical

(a) Performance - corrective measure or measures which are most effective at performing their intended functions and maintaining the performance over extended periods of time will be given preference;

(b) Reliability - corrective measure or measures which

do not require frequent or complex operation and maintenance activities and that have proven effective under waste and facility conditions similar to those anticipated will be given preference;

(c) Implementability - corrective measure or measures which can be constructed and operating to reduce levels of contamination to attain or exceed applicable standards in the shortest period of time will be preferred; and

(d) Safety - corrective measure or measures which pose the least threat to the safety of nearby residents and environments as well as workers during implementation will be preferred.

(2) Human Health

The corrective measure or measures must comply with existing U.S. EPA criteria, standards, or guidelines for the protection of human health. Corrective measures which provide the minimum level of exposure to contaminants and the maximum reduction in exposure with time are preferred.

(3) Environmental

The corrective measure or measures posing the least adverse impact (or greatest improvement) over the shortest period of time on the environment will be favored.

6. Reporting Requirements

a. The Permittee's CMS Workplan shall include provisions for the submittal of periodic progress reports. These progress reports shall contain:

(1) A description and estimate of the percentage of the CMS completed;

(2) Summaries of all findings;

(3) Summaries of all contacts with representatives of the local community, public interest groups, or State government during the reporting period;

(4) Summaries of all problems or potential problems encountered during the reporting period;

(5) Actions being taken to rectify problems;

(6) Changes in personnel during the reporting period; and

(7) Projected work for the next reporting period.

b. The Permittee's CMS Workplan shall include an outline of the contents of the CMS report. The CMS report shall include the following:

(1) An updated description of the findings of the RFI, highlighting the nature and extent of the contamination as documented by the RCRA Facility Investigation Report;

(2) Recommended target cleanup levels for corrective action for each SWMU, or group of SWMUs;

(3) A summary of the results of the screening of Corrective Measures Technologies;

(4) A description of the evaluation of corrective measure alternatives using the criteria in Section II.A.5. of this Scope of Work; this section shall include summary tables which allow the alternative(s) to be understood easily. Comparisons among health risks, environmental effects, and other pertinent factors among the alternatives evaluated shall be highlighted; information on all evaluated potential remedy(ies) shall be presented.

(5) A description and justification of the recommended remedy, including recommended media cleanup standards that can be achieved by the remedy;

(6) A description of design and implementation considerations for the recommended remedy(ies) including:

(a) Special technical problems;

(b) Additional engineering data required;

(c) Permits and regulatory requirements;

(d) Access, easements, rights-of-way;

(e) Health and safety requirements;

(f) Community relations activities; and

(g) Long-term monitoring requirements to assess

attainment of media cleanup standards (including ecological integrity).

(7) A description of the cost estimates and schedules for implementing the recommended remedy(ies) including:

(a) Capital cost estimates;

(b) Operation and maintenance cost estimates; and

(c) Project schedule for implementation.

7. Schedule for Completion of the CMS

The Permittee's CMS Workplan shall include a schedule for completion of all tasks described in Part III.A. of this Scope of Work.

B. CMS Implementation

The Permittee shall conduct the Corrective Measures Study according to the terms and schedules in the CMS Workplan, as approved by the Regional Administrator. The CMS Workplan shall include the information required in Part III.A. of this Scope of Work.

C. CMS Reporting Requirements

The Permittee shall prepare and submit CMS progress reports and a draft and final CMS report.

1. Progress Reports

The Permittee shall submit progress reports according to the requirements of Part III.A.6.a. of this Scope of Work and the Post-Closure Permit Schedule of Compliance.

2. Draft Report

The Permittee shall submit a draft CMS report according to the requirements of Part III.A.6.b. of this Scope of Work and the Post-Closure Permit Schedule of Compliance.

3. Final Report

The Permittee shall submit a final CMS report according to requirements of Part III.A.6.b. of this Scope of Work and the Post-Closure Permit Schedule of Compliance.

Attachment II

Facility Maps

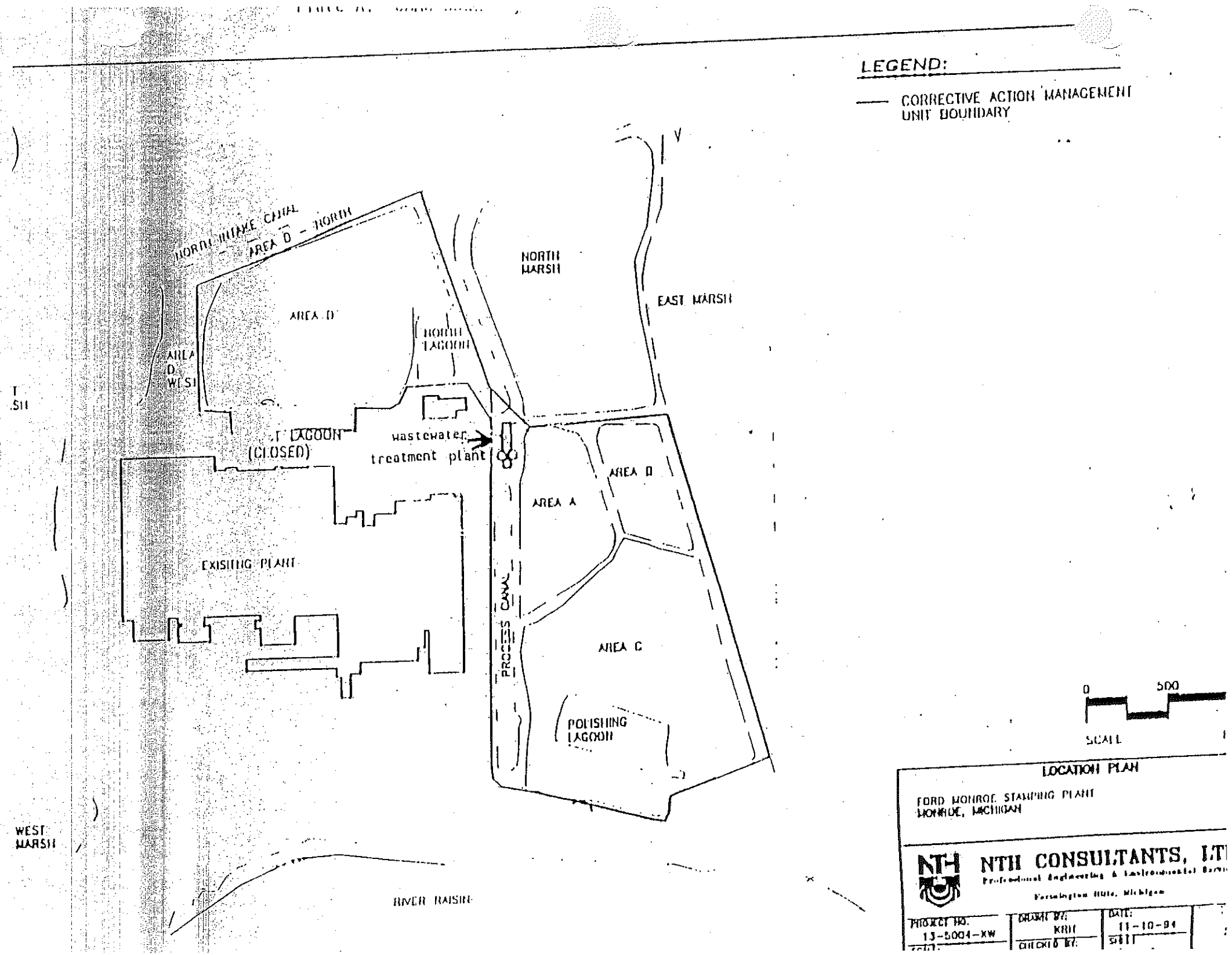
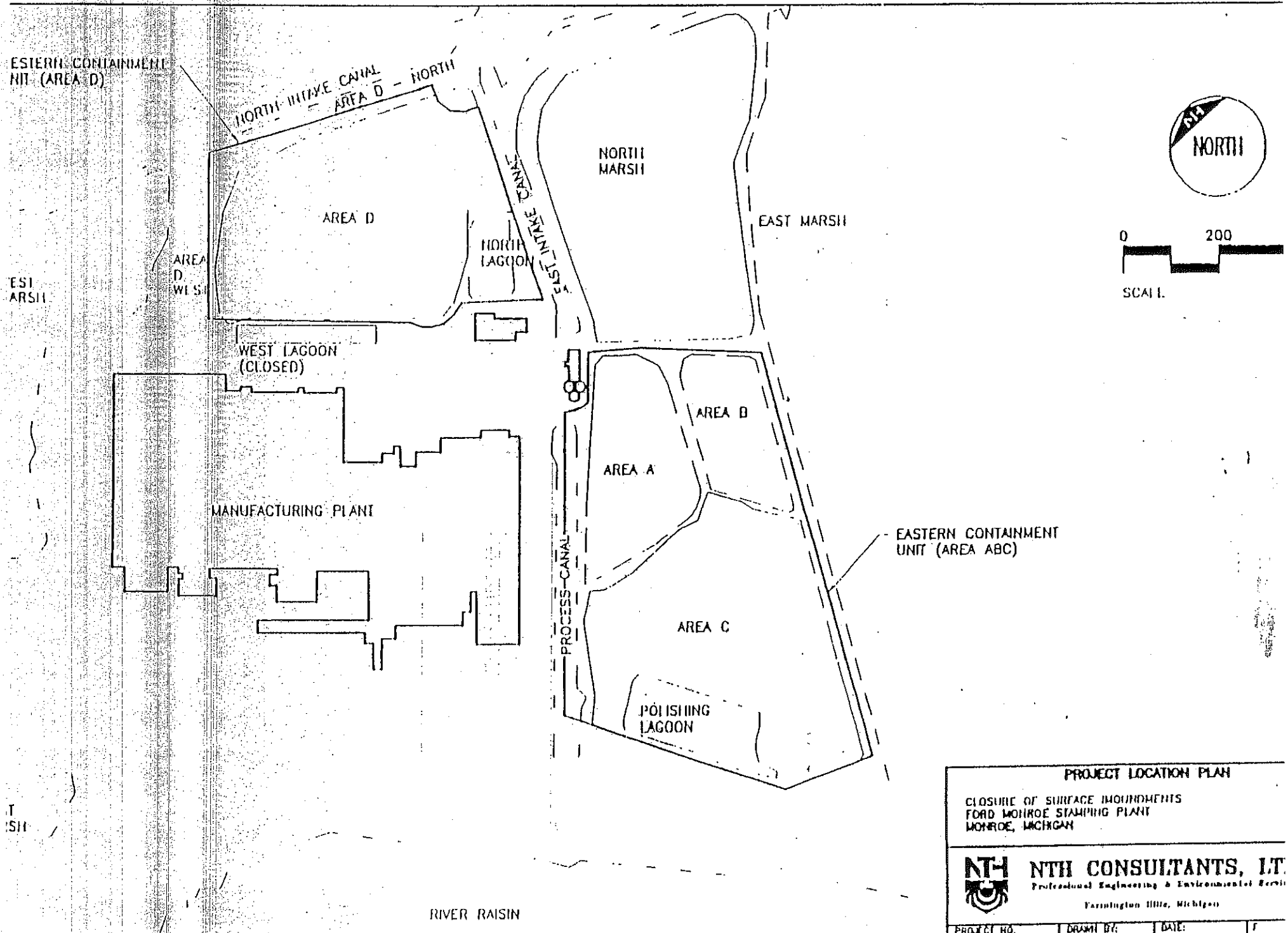

LEGEND:
CORRECTIVE ACTION MANAGEMENT UNIT BOUNDARY
NORTH INTAKE CANAL
AREA D - NORTH
AREA D
AREA D WEST
NORTH LAGOON
NORTH MARSH
EAST MARSH
LAGOON (CLOSED)
wastewater treatment plant
AREA A
AREA B
EXISTING PLANT
PROCESS CANAL
AREA C
POLISHING LAGOON
WEST MARSH
RIVER RAISIN
0
500
SCALE
LOCATION PLAN
FORD MONROE STAMPING PLANT
MONROE, MICHIGAN
NTH CONSULTANTS, LT
Professional Engineering & Environmental Servi
Farmington Hills, Michigan
PROJECT NO.
13-5004-XW
DRAWN BY:
KRH
CHECKED BY:
DATE:
11-10-94
SHEET

Plate B: Western and Eastern Co[illegible]ant Unit Location Map



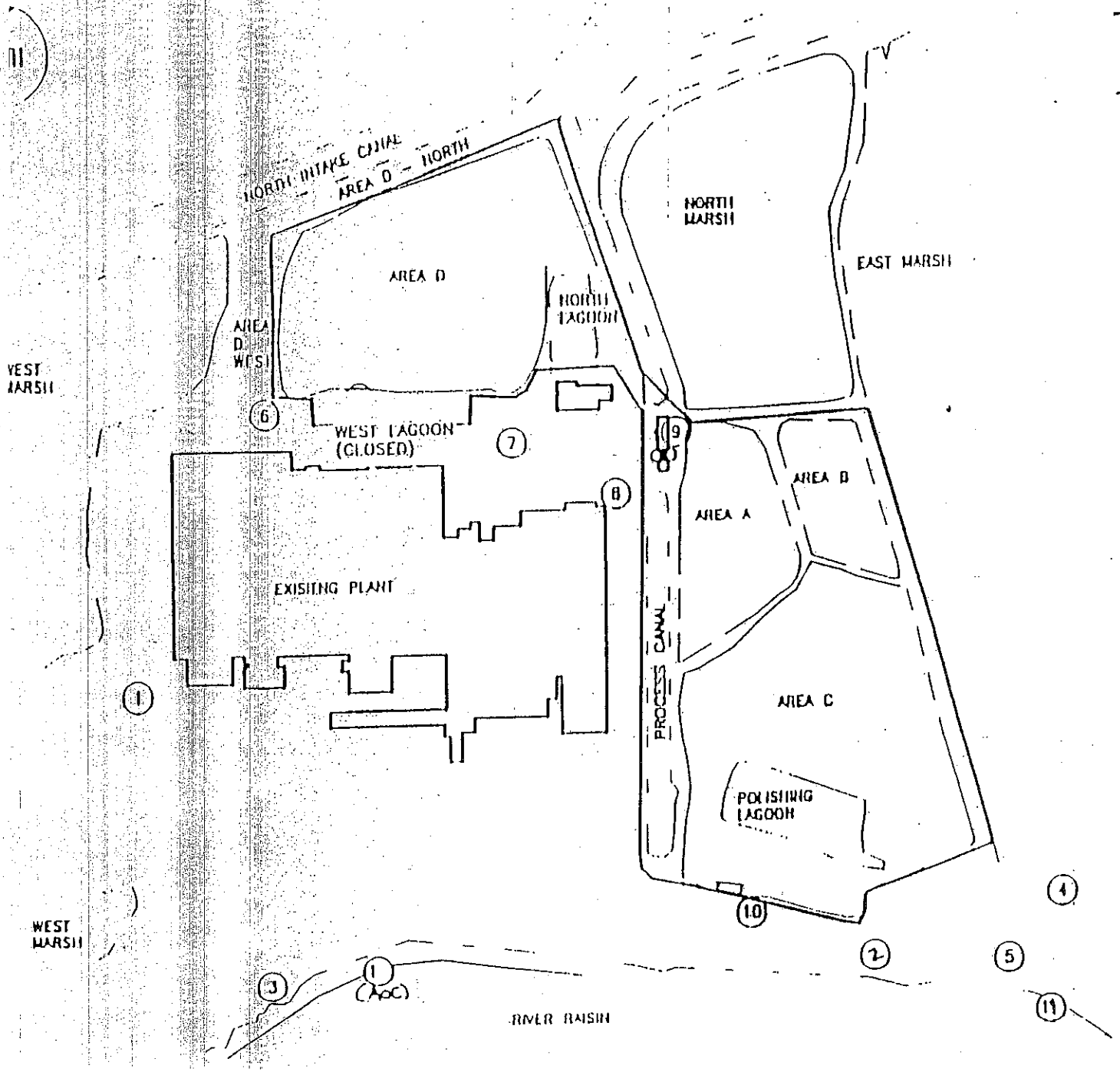
PROJECT LOCATION PLAN

CLOSURE OF SURFACE IMPOUNDMENTS
FORD MONROE STAMPING PLANT
MONROE, MICHIGAN

NTH CONSULTANTS, LT
Professional Engineering & Environmental Servi
Farmington Hills, Michigan

PROJECT NO.	DRAWN BY:	DATE:
[illegible]-5004-04	JD	02-17-94

Plate C: SWMU Location Map



LEGEND:

—— CORRECTIVE ACTION MANAGEMENT UNIT BOUNDARY

SOLID WASTE MANAGEMENT UN

1 SALARIED PARKING LOT
2 COAL PILE
3 FORMER COAL PILE
4 RIFLE RANGE AREA
5 DEMOLITION DISPOSAL AREA
6 EMPTY DRUM STORAGE AREA
7 FORMER DRUM STORAGE AREA
8 CURRENT DRUM STORAGE AREA
9 FILTER PRESS AREA
10 DEAD TREE AREA
11 NPDES OUTFALL 002

AREA OF CONCERN(AOC):

1 RIVER RAISIN SEDIMENTS

0 500

SCALE

LOCATION PLAN

FORD MONROE STAMPING PLANT
MONROE, MICHIGAN

NTH CONSULTANTS, L
Professional Engineering & Environmental Se
Farmington Hills, Michigan

PROJECT NO. | DRAWN BY | DATE:

Attachment III

Corrective Action Definitions

CORRECTIVE ACTION DEFINITIONS
FOR
Ford Motor Company, Monroe Stamping Plant
Monroe, Michigan

1. Facility: For the purpose of implementing corrective action under 40 CFR 264.101, all contiguous property under the control of the owner or operator seeking a permit under Subtitle C of RCRA. This definition also applies to facilities implementing corrective action under RCRA Section 3008(h).

2. Corrective Action Management Unit (CAMU): An area within a facility that is designated by the Regional Administrator under Part 264 Subpart S, for the purpose of implementing corrective action requirements under 40 CFR 264.101 and RCRA Section 3008(h). A CAMU shall only be used for the management of remediation wastes pursuant to implementing such corrective action requirements at the facility.

3. Remediation wastes: All solid and hazardous waste and all media (including groundwater, surface water, soils, and sediments) and debris, which contain listed hazardous wastes or which themselves exhibit a hazardous waste characteristic, that are managed for the purpose of implementing corrective action requirements under 40 CFR 264.101 and RCRA Section 3008(h). For a given facility, remediation wastes may originate only from within the facility boundary, but may include waste managed in implementing RCRA Sections 3004(v) or 3008(h) for releases beyond the facility boundary.

4. Solid Waste Management Unit: Any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous wastes. Such units include any area at a facility at which solid wastes have been routinely and systematically released.

5. Regulated Unit: Surface impoundments, waste piles, land treatment units, and landfills which received hazardous waste after July 26, 1982.

6. Release: Any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous wastes (including hazardous constituents) into the environment (including abandonment or discarding of barrels, containers, and other closed receptacles containing hazardous wastes or hazardous constituents).

7. Hazardous Waste: Means a hazardous waste as defined in 40 CFR 261.3. A hazardous waste is a solid waste, or combination of solid wastes which, because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. The term hazardous waste includes hazardous constituents defined below.

8. Hazardous Constituents: Any constituent identified in Appendix VIII of 40 CFR Part 261, or Appendix IX of 40 CFR Part 264.

Attachment IV

Ecological Assessment

ECOLOGICAL ASSESSMENT
For
Ford Motor Company, Monroe Stamping Plant
Monroe, Michigan

Index

ECOLOGICAL ASSESSMENT

The Preliminary, Draft, and Final Ecological Assessment Reports should be submitted for all sites. The Additional Investigations for Site Characterization Workplan may not be necessary for all sites. The need for this Workplan will be determined by the results of the Preliminary Ecological Assessment Report.

I. Preliminary Ecological Assessment Report

The Permittee shall characterize the facility based on existing data and limited field work. Two copies of the Preliminary Ecological Assessment Report shall be submitted to the U.S. EPA and the MDNR. This preliminary characterization shall include:

A. A description of the biota in surface water bodies on, adjacent to, or affected by the facility;

B. A description of the ecology overlying and adjacent to the facility;

C. A description of any endangered or threatened species near the facility;

D. Identification of facility-specific conditions pertinent to the evaluation of fate and transport processes occurring at the site, such as amount of soil erosion;

E. Identification of potential and probable exposure points for ecological receptors;

F. Identification of any known or observed effects of facility contaminants to biota, such as fish kills or other obvious impacts;

G. An initial toxicity assessment of facility contaminants. The potential for adverse ecological effects from contaminant exposure should be assessed. This preliminary assessment will necessarily contain much uncertainty; a conservative approach should be used; and

H. An evaluation of the need for more data and further investigations to complete the ecological assessment. Some facilities may not require additional investigations such as those where exposure to ecological receptors is known to be minimal. However when the initial toxicity assessment provides ambiguous or uncertain conclusions, additional field data are needed (Additional Investigations for Site Characterization Workplan).

If required by the Regional Administrator, the Permittee shall further characterize the site based on additional field investigations. The additional field investigations shall include:

1. Habitat identification and evaluation;

2. Qualitative and semiquantitative surveys of flora and fauna;

3. Toxicity tests; and

4. Additional sampling to define contamination.

II. Additional Investigations For Site Characterization Workplan

If it is determined that further site characterization is necessary to complete the ecological assessment, the Permittee shall prepare a detailed workplan for further facility investigations. The workplan shall include the following, as appropriate:

A. An identification of ecological assessment endpoints. Endpoint selection criteria must be clearly explained;

B. Qualitative, semiquantitative, and quantitative surveys of flora and fauna.

C. A description of chemical sampling in potentially exposed habitats and reference sites;

D. A description of laboratory and *in situ* toxicity testing; and

E. A description of tissue analyses.

For each proposed investigation above, the Permittee shall provide information regarding the following:

1. Study objectives and relevance to overall risk assessment objectives. Study objectives may include documentation of actual or potential endangerment or effects to the environment, the definition of spatial and temporal extent of contamination, development of remediation criteria, or evaluation of ecological effects of remedial alternatives;

2. Proposed field or laboratory methods, with appropriate reference to Agency guidelines or other source;

3. Expected sampling locations (including detailed maps), sampling dates, and sample size.

4. Statistical methods to be used and data quality objectives to meet statistical significance criteria; and

5. Quality control procedures.

III. Draft Ecological Assessment Report

The Permittee shall prepare a Draft Ecological Assessment Report and submit two copies of the Draft Ecological Assessment Report to the U.S. EPA and the MDNR. If the Permittee is not required to perform additional investigations, the Permittee shall resubmit the Preliminary Ecological Assessment Report in the form of a Draft Ecological Assessment Report. This report shall be submitted to the U.S. EPA and the MDNR. If additional investigations are required, the following outline shall be modified to account for investigations actually undertaken at the facility.

A. Facility Characterization and Identification of Potential Receptors (include detailed maps where appropriate).

1. Physical description of the facility;

2. Nature and extent of contamination by medium and contaminant type; and

3. Potentially exposed habitats and species.

B. Selection of Contaminants and Ecological Endpoints of Concern

1. Contaminants of concern and rationale for selection; and

2. Ecological endpoints of concern and rationale for selection.

C. Exposure Assessment

1. Sources and exposure pathways of contaminants of concern;

2. Fate and transport analysis, including possible food chain transport;

3. Estimation of exposure point concentrations by habitat, species, and exposure scenario; and

4. Uncertainty analysis.

D. Toxicity Assessment

1. Toxicological properties of contaminants of concern;

2. Facility-specific toxicity tests--laboratory and in situ;

3. Existing toxicity-based criteria and standards; and

4. Uncertainty analysis.

MODIFIED

E. Risk Characterization

1. Observed adverse effects in potentially exposed habitats compared to reference sites, such as (but not limited to) mortality (observed on-site or in toxicity tests), behavioral effects, presence or absence of key species, reproductive effects or altered community composition.

   a. Analysis of contaminant concentrations in relation to observed adverse effects; and

   b. Predicted (or observed) population-, community-, and ecosystem-level effects of observed effects.

2. Comparison of exposure point concentrations with relevant benchmark values. Possible additive, synergistic, or antagonistic effects or contaminant mixtures should be considered.

   a. Comparison with appropriate criteria (such as ambient Water Quality Criteria) and standards (such as State Water Quality Standards); and

   b. Comparison with contaminant levels known to cause effects from published or peer-reviewed literature. Possible population-, community-, and ecosystem-level effects should be predicted based on these comparisons.

3. Likely ecological risks associated with present and future land use scenarios.

4. Ecological considerations in selecting remedial alternatives (including no action).

5. Uncertainty analysis.

IV. Final Ecological Assessment Report

The Permittee shall modify the Draft Ecological Assessment Report to incorporate changes required in the Regional Administrator's comments and submit two copies of the Final Ecological Assessment Report to the U.S. EPA and the MDNR.

Attachment V

Biological Assessment and Protective Measures Plan

BIOLOGICAL ASSESSMENT AND PROTECTIVE MEASURES PLAN
For
Ford Motor Company, Monroe Stamping Plant
Monroe, Michigan

A. REQUIREMENTS FOR BIOLOGICAL ASSESSMENT (BA)

1. The Permittee shall contract a qualified biologist to conduct a survey of all areas at the facility which may be affected by the activities specified in the post-closure permit. The purpose of the survey is to determine if Federal or State listed, proposed, or candidate endangered or threatened species are present at the facility and whether the permitting activities may affected these species. If Federal or State proposed, listed, or candidate endangered or threatened species are found during the BA, the Permittee shall determine whether suitable habitat exists for either expanding the existing population or potential reintroduction of the species.

If Federal or State proposed, listed, or candidate endangered or threatened species are found in Item A.1. above, then the Permittee shall comply with the following.

2. The Permittee shall review scientific literature or data to determine species distribution, habitat needs, and other biological requirements. As part of this review, the Permittee shall also interview experts including those within the U.S. Fish and Wildlife Service, National Marine Fisheries Service, State of Michigan Conservation Departments, Universities, and others who may have data not yet published in scientific literature.

3. The Permittee shall review and analyze the effects of post-closure permit activities including consideration of cumulative effects of the post-closure permit activities on the species and its habitat.

4. The Permittee shall analyze alternative actions that may provide conservation measures for the species.

5. The Permittee shall prepare a written report documenting the results of the BA. This report shall include a discussion of the study methods used, identification of problems encountered, and other relevant information.

B. PROTECTIVE MEASURES PLAN FOR BALD EAGLE

1. The Permittee shall contract a bald eagle expert to identify the bald eagle pair and their nests at the facility. In addition, the bald eagle

expert shall assess/identify site-specific critical periods and zones, roosts and feeding sites, and activity patterns.

2. The Permittee shall retain the bald eagle expert to oversee on-site construction operations and monitor the bald eagles until December 1, 1995. If the bald eagle pair experiences early nest and renest failure during the breeding season, then the Permittee will not be required to implement the protective measures identified in Item B.6. below for that breeding season. During subsequent years of the closure construction activities, the bald eagle expert will not be required to be on-site, but will be required to review data provided from the video camera in Item 3 below to ensure that site activities do not disrupt normal behavior during the breeding season.

3. The Permittee shall install a video camera to monitor behavior of the bald eagle pair during the breeding season in response to on-the-ground construction activities specified in the Federal post-closure permit. Monitoring of the bald eagles using a video camera will enable the bald eagle expert to identify disruptive activities and determine respective distances to the nest so that critical zones may be adjusted accordingly. The Permittee shall use the video camera to monitor breeding behavior in subsequent years to ensure that on-site construction activities do not disrupt breeding behavior of the bald eagle pair. Field logs shall be kept of on-site construction activities so that activities can be correlated to the videotape.

4. If the eagle expert determines that remediation activities have an adverse impact on the bald eagles, then the Permittee shall notify the U.S. EPA and curtail site remediation activities until alternate protective measures can be implemented.

5. The Permittee shall submit a bald eagle management plan to the U.S. EPA by November 1, 1995, which will identify site specific critical periods and zones, roosts and feeding sites, and activity patterns.

6. The Permittee shall retain sufficient planning and contracting flexibility to schedule on-site field work in such a way as to eliminate any potential effects on the bald eagles. The Permittee shall organize construction activities associated with closure at the facility to minimize the impact to the bald eagle pair. During the breeding season, the Permittee shall implement the protective measures specified below.

   a. Schedule construction activities outside the critical zones, as defined by the bald eagle expert and in the bald eagle management plan developed for subsequent years;

   b. Schedule closure activities, that require walking and other out of vehicle activities, outside the critical zone during breeding season;

MODIFIED

c. Insure that vehicle drivers stay in their vehicle while in the critical zone during the breeding season; and

d. Phase in work to acclimate the bald eagle pair to construction during closure activities.

MODIFIED

Permit No. **1030**

MONROE METROPOLITAN WATER POLLUTION CONTROL FACILITY
INDUSTRIAL PRETREATMENT PROGRAM

INDUSTRIAL/NON-DOMESTIC USER DISCHARGE PERMIT

In compliance with certain provision of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 et seq; the "Act"), the Michigan Water Resources Act, (Act 245, Public Acts of 1929, as amended, the "Michigan Act") and the Sewer Use Ordinance of the Monroe Metropolitan Water Pollution Control System (Monroe Township, Frenchtown Township, and City of Monroe--administered by the City of Monroe):

Ford River Raisin Warehouse
3200 E. Elm Ave.
Monroe, Michigan 48162

is authorized to discharge from a facility located at:

3200 East Elm Avenue

to the sanitary sewer identified in the accepted permit application, in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof.

This permit is based on the company's application dated **January 28, 2015**

Issued **February 5, 2015** by the CITY OF MONROE.

This permit is valid for three year and will expire on **February 21, 2018**. A new application must be filed with the Monroe Metropolitan Wastewater Treatment Facility 30 days prior to the expiration date.

Spencer Manross
Superintendent of Wastewater Treatment

Permit No. **1030**
User: **Ford River Raisin Warehouse**
Address: **3200 East Elm Avenue**
Expiration Date: **February 21, 2018**

PART I

REPORTING FREQUENCY

A. DISCHARGE LIMITATIONS AND MONITORING REQUIREMENTS

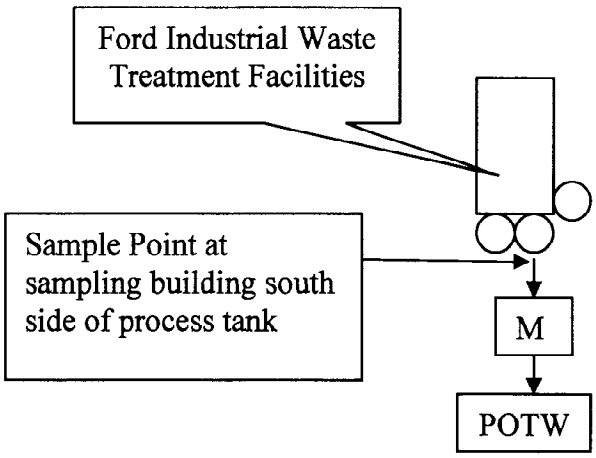
COMBINED DISCHARGE LIMITS

Parameter	Min. Daily mg/l	Max. Daily mg/l	Month Avg. mg/l	Sample		Instructions Miscellaneous
				Type	Freq	
pH	5.0	9.5		g	1	
Ammonia		65		g	1	
Phosphates		4.0		c	24 hr	
O & G		200.0		g	1	
Cd		0.04		c	24 hr	
Cu		2.0		c	24 hr	
Pb		0.75		c	24 hr	
Ag		1.0		c	24 hr	
CN^-		1.0		c	24 hr	
Hg		<0.0002		c	24 hr	
BOD		600		c	24 hr	
TSS *		2000		c	24 hr	

The limits are based on the Monroe Metropolitan sewer use ordinance.
*TSS Max. daily 2000 mg/L , but any discharge above 250 mg/L is still surcharged based on the sewer use ordinance.

c = composite g = grab

Sample Location as follows:



SELF-MONITORING PROGRAM

At least twice each year you are required to collect a composite/grab of your discharge and run the following laboratory analysis:

Analysis: All of the above

_____

_____

_____

All analysis must be run in accordance with procedures detailed in the latest version of "Standard Methods" (Standard Methods of the Examination of Water and Wastewaters, 16th Edition, 1985 American Public Health Association, New York, New York, 10019, as amended).

B. SELF-MONITORING AND REPORTING

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. Sampling shall be conducted in March and September of each year. **Flow proportional** sampling for 24 hr composite samples is **not required** since all wastewater generated is discharged to a holding tank before discharging to POTW sewers.

2. Reporting

The permittee shall effectively monitor the operation and efficiency of all processes comprising the treatment and control facility and the quantity and quality of the treated discharge. Monitoring data required by this permit shall be tabulated, summarized, and reported twice per year.

Semi-Annual Report

A signed, Semi-Annual Discharge Report shall be submitted to the permitting authority. The permitting authority may require a permit holder to submit more frequent reports if, in his judgement, the waste being discharged is possibly in violation of the applicable ordinance. The report shall include but not be limited to industrial address name and address of contact person, nature of process, volume, rate of flow, discharge monitoring data, production quantities, hours of operation, personnel or other information that relates to the generation, handling, and discharge of wastes. The report may also include the chemical constituents and quantity of liquid or gaseous materials stored on site. If insufficient data has been furnished, other information will be provided upon request of the permitting authority.

All Required Reports and Applications must include the following statement, per the Sewer Use Ordinance Section 4, part 6.

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

Semi-Annual Report Forms are available at the Wastewater Department. Call 241-5926 for more information. Reports shall be mailed to the address below, postmarked no later than the fifteenth of April and October each year.

Monroe Metropolitan Water Pollution Control Facility
City of Monroe Wastewater Department
2205 East Front Street
Monroe, MI 48161

3. Test Procedures

a. Methods - The analytical and sampling methods used shall conform to the latest edition of Standard Methods.
b. Sample Types
   1) Composite Sample: A series of samples taken over a specific time period whose volume is proportional to flow or time, which are combined into one sample. The sample must be representative of the waste stream sampled.

   2) Grab Sample: A sample which is taken from a waste stream without regard to the flow in the waste stream and over a period of time not to exceed fifteen (15) minutes. The sample must be representative of the waste stream sampled.

The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to insure accuracy of measurements.

4. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date, time of sampling, and by whom;
b. The dates the analyses were performed;
c. The results of all required analyses.

5. Records Retention

All records and information resulting from the monitoring activities required by this permit, including all records of analyses performed and calibration and maintenance of instrumentation, and recording from continuous monitoring instrumentation, shall be retained for a minimum of three (3) years, or longer if requested by the City of Monroe Director of Wastewater or his/her designee (permitting authority).

PART II

A. PERMIT PROGRAM ADMINISTRATION

City of Monroe for the Monroe Metropolitan Water Pollution Control System

B. MANAGEMENT REQUIREMENTS

1. Change in Discharge

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant or flow volume identified in this permit more frequently than, or at a level in excess of that authorized, shall constitute a violation of the permit. Any anticipated facility expansions or process modifications which will result in new, different, or increased discharges of pollutants or flow volumes must be reported by submission of a new Discharge Permit Application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the permitting authority of such changes. Following such notice, the permit may be modified to specify and limit any parameters not previously limited.

2. Operator Certification

The permittee may be required to have the pretreatment facility under the direct supervision of an operator certified by the Michigan Department of Environmental Quality as required by Regulations Governing the Certification of Industrial Waste Treatment Plant Operators in accordance with Act 98, Public Acts of 1913, as amended.

3. Facilities Operation

All waste collection, control, treatment, and disposal facilities shall be operated in a manner consistent with the following:

a. At all times, all facilities shall be operated as efficiently as possible, and in a manner which will minimize upsets and discharges of excessive pollutants.
b. The permittee shall provide an adequate operating staff which is duly qualified to carry out the operation, maintenance, and testing functions required to insure compliance with the conditions of this permit.
c. Maintenance of treatment facilities shall not result in degradation of effluent quality, or, if degradation of effluent is unavoidable, shall be scheduled during non-critical water quality periods and shall be carried out only if prior approval has been granted by the permitting authority.

4. Removed Substance and Leachates

Solids, sludges, filter backwash, leachates, or other pollutants removed from or resulting from treatment or control of wastewaters shall be controlled in accordance with a program approved under Act 98, Public Acts of 1913, as amended.

5. Containment Facilities

The permittee shall provide facilities approved under Act 98, Public Acts of 1913, as amended, and in accordance with the requirements of the Michigan Water Resources Commission Rules, Part 5, for containment of any accidental losses of concentrated solutions, acids, alkalies, salts, oils, or other toxic substances or prohibited discharges as defined in Sewer Use Ordinance of the Monroe Metropolitan Water Pollution Control System.

6. Accidental Discharge

In the case of an accidental discharge of toxic or prohibited substances to the sewage system, the permittee shall immediately telephone and notify the City of Monroe Wastewater Department at **241-5926** of the incident. The notification shall include location of discharge, type of waste, concentration, volume and corrective actions, including but not limited to containment. This is to be followed, within five (5) days, by a detailed, written report to the permitting authority describing the cause of the discharge and the measures to be taken by the permittee to prevent similar future occurrences. Such notification shall not relieve the

permittee of any expense, loss, damage, or other liability which may be incurred as a result of damage to the Publicly-Owned Treatment Works (POTW), fish kills, or any other damage to person or property; nor shall such notification relieve the permittee of any fines, civil penalties, or other liability which may be imposed pursuant to our Sewer Use Ordinance or other applicable law.

7. Notice to Employees

A notice shall be permanently posted on the permittee's bulletin board or other prominent place advising employees of emergency notification procedures in the event of an accidental discharge. Permittee shall insure that all employees who may cause or discover such a discharge are advised of the emergency notification procedure.

8. Operating Upsets

Any permittee which experiences an upset in operations which places the permittee in a temporary state of non-compliance with the requirements of this permit shall inform the permitting authority immediately upon the first awareness of the commencement of the upset. Where such information is given orally, a written follow-up report thereof shall be filed by the permittee with the permitting authority within five (5) days of the date of occurrence. The report shall specify:

a. Description of the upset, the cause thereof, and the upset's impact on a permittee's compliance status;
b. Duration of non-compliance, including exact date(s) and time(s) of non-compliance, and if the non-compliance continues, the time by which compliance is reasonably expected to occur;
c. All steps taken or to be taken to reduce, eliminate, and prevent recurrence of such an upset or other conditions of non-compliance.

C. RESPONSIBILITIES

1. Right of Entry

The permittee shall allow the Monroe Metropolitan Water Pollution Control Facility personnel, upon the presentation of credentials, access at all reasonable times to all parts of the premises for the purposes of inspection, sampling, records examination, and copying or in the performance of any of their duties related to the administration of the Industrial Pretreatment Program (IPP).

2. Transfer of Ownership or Control

In the event of any change in control or ownership at the facility from which the authorized discharge emanates, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the permitting authority (see previous address). The new owner shall then make application for transfer of

this permit through the permitting authority. Application for transfer shall be made within ten (10) days prior to operation of the business by a new owner or proprietor.

3. Federal Categorical Pretreatment Standards

Upon the promulgation of Federal Categorical Pretreatment Standards for a particular industrial subcategory, the Federal Standard, if more stringent than limitations imposed under this permit for sources in that subcategory, shall immediately supersede the limitations imposed under this permit. The permitting authority shall notify all affected permittees of the applicable pretreatment standards. More stringent standards may be applied by the permitting authority where necessary to achieve the goals of the IPP Program.

4. Permit Modification

This permit may be modified in whole or in part during its term in order to further the objectives of the IPP Program.

5. Revocation of Permit

The Superintendent of Wastewater may revoke a wastewater discharge permit for good cause, including, but not limited to, the following reasons:

a. Failure to notify the Superintendent of Wastewater of significant changes to the wastewater prior to the changed discharge;

b. Failure to provide prior notification to the Superintendent of Wastewater of changed conditions pursuant to Section 6.5 of this ordinance;

c. Misrepresentation or failure to fully disclose all relevant facts in the wastewater discharge permit application;

d. Falsifying self-monitoring reports;

e. Tampering with monitoring equipment;

f. Refusing to allow wastewater personnel timely access to the facility premises and records;

g. Failure to meet effluent limitations;

h. Failure to pay fines;

i. Failure to pay sewer charges;

j. Failure to meet compliance schedules;

k. Failure to complete a wastewater survey or the wastewater discharge permit application;

l. Failure to provide advance notice of the transfer of business ownership of a permitted facility; or

m. Violation of any pretreatment standard or requirement, or any terms of the wastewater discharge permit or this ordinance.

6. Remedies

When any user violates any provision in the approved sewer use ordinance, a wastewater discharge permit or order issued by the Superintendent of Wastewater, or any other pre-treatment standard or requirement, the Superintendent of Wastewater may utilize one or more of the following remedies:

a. Notification of Violation
b. Consent Order
c. Show Cause Hearing
d. Compliance Orders
e. Cease and Desist Orders
f. Administrative Fines not to exceed $500./occurrence/day
g. Emergency Suspension
h. Termination of Discharge
i. Injunctive Relief
j. Criminal Penalties
k. Civil Remedies
l. Other Actions as Deemed Necessary

A complete listing and description of the remedies can be found in the Sewer Use Ordinance, Section 10, and Section 11.

7. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor infringement of Federal, State, or local laws or regulations.

8. Severability

If any provisions, paragraph, word, or section of this permit is invalidated by any court of competent jurisdiction, the remaining provisions, paragraphs, words, and sections shall not be affected and shall continue in full force and effect.

PART III

SPECIAL CONDITIONS

1. Prohibited Discharges

   The permittee must comply with all the Local Limits and General and Specific Discharge Prohibitions contained in Section 2 of the Sewer Use Ordinance, however, specific effluent limitations for the permitted facility are contained in Part I, A of this permit.

2. Treatment Technology

   Incompatible pollutants shall be reduced to levels attainable through application of the best practicable control technology currently available as defined in Section 304(b) of the Act, unless otherwise indicated in the discharge permit. Necessary pretreatment requirements will be implemented (as provided for in 40 CFR, Part 128).

3. Periodic Compliance Reports

   Any permittee subject to an IPP Program shall, after the compliance date of such pretreatment standards, or, in the case of a new permittee, after commencement of the discharge to the POTW, submit to the permitting authority during the months of April and October, unless required more frequently by the permitting authority, a report indicating the nature and concentration of prohibited or regulated substances in the effluent which are limited by the pretreatment standards hereof. In addition, this report shall include a record of all measured or estimated average and maximum daily flows during the reporting period. Flow (if available) shall be reported on the basis of actual measurement, provided however, where cost of feasibility considerations justify, the permitting authority may accept reports of average and maximum flows estimated by verifiable techniques approved by the direction. The permitting authority, for good cause shown considering such factors as local high or low flow rates, holidays, budget cycles, or other extenuating factors, may authorize the submission of said reports on months other than those specified above.

4. Control Manholes

   The permittee may be required to provide control manhole(s) for the purpose of sampling, monitoring, and measuring. Location, location drawings, right of inspection, and facility drawings are to be provided in accordance with City of Monroe Ordinance 00-005. Specifications for the installation of control manholes shall be submitted to the permitting authority for review and approval prior to installation for all new significant industrial users.

Permit No. **1030-1**

MONROE METROPOLITAN WATER POLLUTION CONTROL FACILITY
INDUSTRIAL PRETREATMENT PROGRAM

INDUSTRIAL/NON-DOMESTIC USER DISCHARGE PERMIT

In compliance with certain provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 et seq; the "Act"), and the Sewer Use Ordinance of the Monroe Metropolitan Water Pollution Control System (Monroe Township, Frenchtown Township, and City of Monroe: administered by the City of Monroe):

Ford River Raisin Warehouse
3200 E. Elm Ave.
Monroe, Michigan 48162

is authorized to discharge from the **Surface Impoundment Closure Project** located at:

3200 East Elm Avenue

to the sanitary sewer identified in the accepted permit application, in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof.

This permit is based on the company's application dated 04-29-2015.

Categorical Statement, In accordance with the application and the evaluation of pertinent information, **Ford River Raisin Warehouse** is classified as a **non-categorical** user.

Issued **August 12, 2015** by the CITY OF MONROE.

This permit is valid for three years and will expire on **August 31, 2018**. A new application must be filed with the Monroe Metropolitan Wastewater Treatment Facility 30 days prior to the expiration date.

Superintendent of Wastewater Treatment

Permit No. **1030-1**
User: **Ford River Raisin Warehouse**
Address: **3200 East Elm Avenue**
Expiration Date: **August 31, 2018**

PART I

REPORTING FREQUENCY

A. DISCHARGE LIMITATIONS AND MONITORING REQUIREMENTS

SELF MONITORING & DAILY DISCHARGE LIMITS
*NOTE: DO NOT DISCHARGE IF ANY PARAMETER IS EXCEEDED.

Parameter	Max. Daily (ppm)	Max. Daily flow	Frequency	Sample		Instructions Miscellaneous
				Type	Freq.	
Cd	0.04	<0.5 MGD	Semi-annual	G	24 hr.	
Cu	1.0	<0.5 MGD	Semi-annual	G	24 hr.	
Cr	1.5	<0.5 MGD	Semi-annual	G	24 hr.	
Ni	4.0	<0.5 MGD	Semi-annual	G	24 hr.	
Zn	2.61	<0.5 MGD	Semi-annual	G	24 hr.	
S.S.	750	<0.5 MGD	Semi-annual	G	24 hr.	
pH	5.0-9.5	<0.5 MGD	Semi-annual	G	24 hr.	
CN	1.0		Semi-annual	G	24 hr.	
Hg	<Detectable		Quarterly	G	24 hr.	
PCB'S	<Detectable		Quarterly	G	24 hr.	

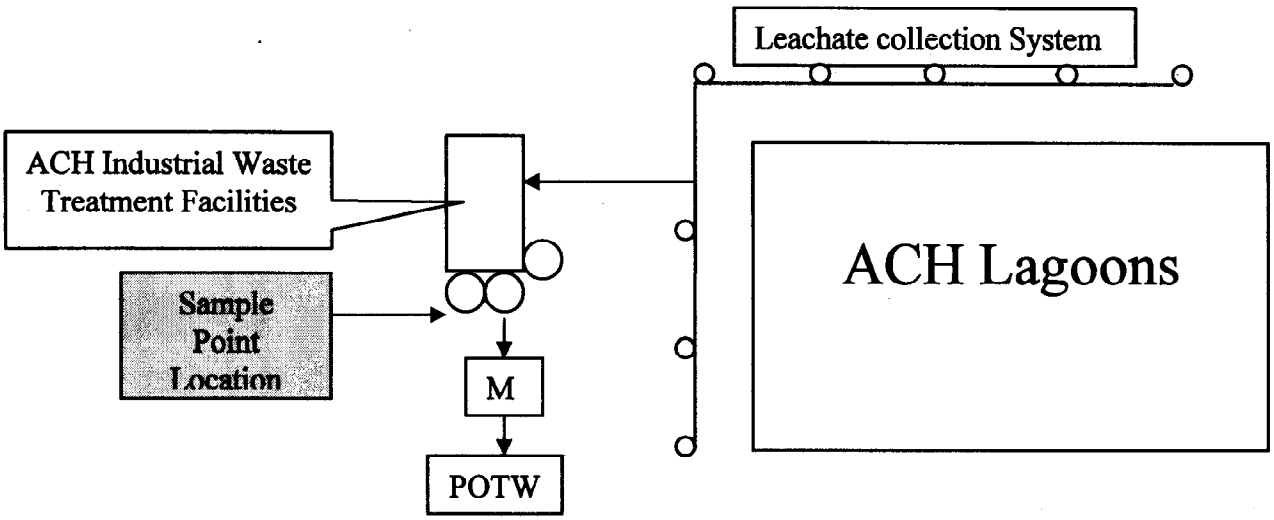
Grab samples from each batch tank in an equal portion. *c = composite g = grab*

1. PCB'S AND MERCURY REPORTING (Quarterly).
   If either PCB's or Mercury are reported in detectable amounts for the reporting period, Ford Motor Company will be required to go back to daily analysis for the item detected. Daily reports will be required for a minimum of a one month period. If these results prove less than detectable the superintendent may reduce the analysis back to quarterly.
2. SEMI-ANNUAL REPORTS.
   For all other parameters (metals, Cyanide, TSS, and pH) ACH used to submit monthly reports prior to discharge, this requirement has been reduced to semi-annual monitoring since 14 years (596 batch discharges) data has been well below permit limits. Reports may be faxed to the Monroe Metro WWTP at (734)-241-7780.

All reports must include:

a. Discharge time (the time frame that each process tank was discharged) and date.
b. Discharge volume.
c. Proportional grab sample must be taken from each process tank discharge, and combined to make one sample representative of the total discharge. This representative sample will be analyzed for the parameters listed above.

Sample location as follows:



B. SELF-MONITORING AND REPORTING

1. Representative Sampling
   Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Reporting
   The permittee shall effectively monitor the operation and efficiency of all processes comprising the treatment and control facility and the quantity and quality of the treated discharge. Monitoring data required by this permit shall be tabulated, summarized, and reported twice per year.

   Semi-Annual Report
   A signed, Semi-Annual Discharge Report shall be submitted to the permitting authority. The permitting authority may require a permit holder to submit more frequent reports if, in his judgement, the wastes being discharged are possibly in violation of the applicable ordinance. The report shall include but not be limited to industrial address name and address of contact person, nature of process, volume, rate of flow, discharge monitoring data, production quantities, hours of operation, personnel or other information that relates to the generation, handling, and discharge of wastes. The report may also include the chemical constituents and quantity of liquid or gaseous materials stored on site. If insufficient data has been furnished, other information will be provided upon request of the permitting authority.

All Required Reports and Applications must include the following statement, per the Sewer Use Ordinance Section 4, part 6.

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

Semi-Annual Report Forms are available at the Wastewater Department. Call 241-5926 for more information. Reports shall be mailed to the address below, postmarked no later than the fifteenth of April and October each year.

Monroe Metropolitan Water Pollution Control Facility
City of Monroe Wastewater Department
2205 East Front Street
Monroe, MI 48161

3. Test Procedures
   a. Methods - The analytical and sampling methods used shall conform to the latest edition of Standard Methods.
   b. Sample Types

      1) Composite Sample. A series of samples taken over a specific time period whose volume is proportional to flow or time, which are combined into one sample. The sample must be representative of the waste stream sampled.

      2) Grab Sample. A sample which is taken from a waste stream without regard to the flow in the waste stream and over a period of time not to exceed fifteen (15) minutes. The sample must be representative of the waste stream sampled.

   The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to insure accuracy of measurements.

4. Recording of Results
   For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

   a. The exact place, date, time of sampling, and by whom;
   b. The dates the analyses were performed;
   c. The results of all required analyses.

5. Records Retention

All records and information resulting from the monitoring activities required by this permit, including all records of analyses performed and calibration and maintenance of instrumentation, and recording from continuous monitoring instrumentation, shall be retained for a minimum of three (3) years, or longer if requested by the City of Monroe Superintendent of Wastewater or his designee (permitting authority).

PART II

A. PERMIT PROGRAM ADMINISTRATION

City of Monroe for the Monroe Metropolitan Water Pollution Control System

B. MANAGEMENT REQUIREMENTS

1. Change in Discharge

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant or flow volume identified in this permit more frequently than, or at a level in excess of that authorized, shall constitute a violation of the permit. Any anticipated facility expansions or process modifications which will result in new, different, or increased discharges of pollutants or flow volumes must be reported by submission of a new Discharge Permit Application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the permitting authority of such changes. Following such notice, the permit may be modified to specify and limit any parameters not previously limited.

2. Operator Certification

The permittee may be required to have the pretreatment facility under the direct supervision of an operator certified by the Michigan Department of Environmental Quality as required by Regulations Governing the Certification of Industrial Waste Treatment Plant Operators in accordance with Act 98, Public Acts of 1913, as amended.

3. Facilities Operation

All waste collection, control, treatment, and disposal facilities shall be operated in a manner consistent with the following:

a. At all times, all facilities shall be operated as efficiently as possible, and in a manner which will minimize upsets and discharges of excessive pollutants.
b. The permittee shall provide an adequate operating staff which is duly qualified to carry out the operation, maintenance, and testing functions required to insure compliance with the conditions of this permit.
c. Maintenance of treatment facilities shall not result in degradation of effluent quality, or, if degradation of effluent is unavoidable, shall be scheduled during non-critical water

quality periods and shall be carried out only if prior approval has been granted by the permitting authority.

4. Removed Substance and Leachates

Solids, sludges, filter backwash, leachates, or other pollutants removed from or resulting from treatment or control of wastewater shall be controlled in accordance with a program approved under Act 98, Public Acts of 1913, as amended.

5. Containment Facilities

The permittee shall provide facilities approved under Act 98, Public Acts of 1913, as amended, and in accordance with the requirements of the Michigan Water Resources Commission Rules, Part 5, for containment of any accidental losses of concentrated solutions, acids, alkalies, salts, oils, or other toxic substances or prohibited discharges as defined in Sewer Use Ordinance of the Monroe Metropolitan Water Pollution Control System.

6. Accidental Discharge

In the case of an accidental discharge of toxic or prohibited substances to the sewage system, the permittee shall immediately telephone and notify the City of Monroe Wastewater Department at **241-5926** of the incident. The notification shall include location of discharge, type of waste, concentration, volume and corrective actions, including but not limited to containment. This is to be followed, within five (5) days, by a detailed, written report to the permitting authority describing the cause of the discharge and the measures to be taken by the permittee to prevent similar future occurrences. Such notification shall not relieve the permittee of any expense, loss, damage, or other liability which may be incurred as a result of damage to the Publicly-Owned Treatment Works (POTW), fish kills, or any other damage to person or property; nor shall such notification relieve the permittee of any fines, civil penalties, or other liability which may be imposed pursuant to our Sewer Use Ordinance or other applicable law.

7. Notice to Employees

A notice shall be permanently posted on the permittee's bulletin board or other prominent place advising employees of emergency notification procedures in the event of an accidental discharge. Permittee shall insure that all employees who may cause or discover such a discharge are advised of the emergency notification procedure.

8. Operating Upsets

Any permittee which experiences an upset in operations which places the permittee in a temporary state of non-compliance with the requirements of this permit shall inform the permitting authority immediately upon the first awareness of the commencement of the upset. Where such information is given orally, a written follow-up report thereof shall be filed by the permittee with the permitting authority within five (5) days of the date of occurrence. The report shall specify:

a. Description of the upset, the cause thereof, and the upset's impact on a permittee's compliance status;
b. Duration of non-compliance, including exact date(s) and time(s) of non-compliance, and if the non-compliance continues, the time by which compliance is reasonably expected to occur;
c. All steps taken or to be taken to reduce, eliminate, and prevent recurrence of such an upset or other conditions of non-compliance.

C. RESPONSIBILITIES

1. Right of Entry

The permittee shall allow the Monroe Metropolitan Water Pollution Control Facility personnel, upon the presentation of credentials, access at all reasonable times to all parts of the premises for the purposes of inspection, sampling, records examination, and copying or in the performance of any of their duties related to the administration of the Industrial Pretreatment Program (IPP).

2. Transfer of Ownership or Control

In the event of any change in control or ownership at the facility from which the authorized discharge emanates, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the permitting authority (see previous address). The new owner shall then make application for transfer of this permit through the permitting authority. Application for transfer shall be made within ten (10) days prior to operation of the business by a new owner or proprietor.

3. Federal Categorical Pretreatment Standards

Upon the promulgation of Federal Categorical Pretreatment Standards for a particular industrial subcategory, the Federal Standard, if more stringent than limitations imposed under this permit for sources in that subcategory, shall immediately supersede the limitations imposed under this permit. The permitting authority shall notify all affected permittees of the applicable pretreatment standards. More stringent standards may be applied by the permitting authority where necessary to achieve the goals of the IPP Program.

4. Permit Modification

This permit may be modified in whole or in part during its term in order to further the objectives of the IPP Program.

5. Revocation of Permit

The Superintendent of Wastewater may revoke a wastewater discharge permit for good cause, including, but not limited to, the following reasons:

a. Failure to notify the Superintendent of Wastewater of significant changes to the wastewater prior to the changed discharge;

b. Failure to provide prior notification to the Superintendent of Wastewater of changed conditions pursuant to Section 6.5 of this ordinance;

c. Misrepresentation or failure to fully disclose all relevant facts in the wastewater discharge permit application;

d. Falsifying self-monitoring reports;

e. Tampering with monitoring equipment;

f. Refusing to allow the Superintendent of Wastewater timely access to the facility premises and records;

g. Failure to meet effluent limitations;

h. Failure to pay fines;

i. Failure to pay sewer charges;

j. Failure to meet compliance schedules;

k. Failure to complete a wastewater survey or the wastewater discharge permit application;

l. Failure to provide advance notice of the transfer of business ownership of a permitted facility; or

m. Violation of any pretreatment standard or requirement, or any terms of the wastewater discharge permit or this ordinance.

6. Remedies

When any user violates any provision in the approved sewer use ordinance, a wastewater discharge permit or order issued by the Superintendent of Wastewater, or any other pre-treatment standard or requirement. The Superintendent of Wastewater may utilize one or more of the following remedies:

a. Notification of Violation
b. Consent Order
c. Show Cause Hearing
d. Compliance Orders
e. Cease and Desist Orders
f. Administrative Fines not to exceed $500./occurrence/day
g. Emergency Suspension
h. Termination of Discharge
i. Injunctive Relief
j. Criminal Penalties
k. Civil Remedies
l. Other Actions as Deemed Necessary

A complete listing and description of the remedies can be found in the Sewer Use Ordinance, Section 10, and Section 11.

7. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor infringement of Federal, State, or local laws or regulations.

8. Severability

If any provisions, paragraph, word, or section of this permit is invalidated by any court of competent jurisdiction, the remaining provisions, paragraphs, words, and sections shall not be affected and shall continue in full force and effect.

PART III

SPECIAL CONDITIONS

1. Prohibited Discharges

The permittee must comply with all the Local Limits and General and Specific Discharge Prohibitions contained in Section 2 of the Sewer Use Ordinance, however, specific effluent limitations for the permitted facility are contained in Part I, A of this permit.

2. Treatment Technology

Incompatible pollutants shall be reduced to levels attainable through application of the best practicable control technology currently available as defined in Section 304(b) of the Act, unless otherwise indicated in the discharge permit. Necessary pretreatment requirements will be implemented (as provided for in 40 CFR, Part 128).

3. Periodic Compliance Reports

Any permittee subject to an IPP Program shall, after the compliance date of such pretreatment standards, or, in the case of a new permittee, after commencement of the discharge to the POTW, submit to the permitting authority during the months of April and October, unless required more frequently by the permitting authority, a report indicating the nature and concentration of prohibited or regulated substances in the effluent which are limited by the pretreatment standards hereof. In addition, this report shall include a record of all measured or estimated average and maximum daily flows during the reporting period. Flow (if available) shall be reported on the basis of actual measurement, provided however, where cost or feasibility considerations justify, the permitting authority may accept reports of average and maximum flows estimated by verifiable techniques approved by the superintendent. The permitting authority, for good cause shown considering such factors as local high or low flow rates, holidays, budget cycles, or other extenuating factors, may authorize the submission of said reports on months other than those specified above.

4. Control Manholes

The permittee may be required to provide control manhole(s) for the purpose of sampling, monitoring, and measuring. Location, location drawings, right of inspection, and facility drawings are to be provided in accordance with City of Monroe Ordinance 00-005. Specifications for the installation of control manholes shall be submitted to the permitting authority for review and approval prior to installation for all new significant industrial users.

5. Baseline Monitoring Reports

As required in 40 CFR 403.6(a)(4), all categorical industrial users must submit to the permitting authority a Baseline Monitoring Report (BMR). For additional information regarding this subject see section 6.1 of the Monroe Metro Sewer Use Ordinance or obtain the USEPA Guidance Manual for your categorical industry.

Permit No. **1030-1**
User: **Ford River Raisin Warehouse**
Address: **3200 East Elm Avenue**
Expiration Date: **August 31, 2018**

PART I

REPORTING FREQUENCY

A. DISCHARGE LIMITATIONS AND MONITORING REQUIREMENTS

SELF MONITORING & DAILY DISCHARGE LIMITS
*NOTE: DO NOT DISCHARGE IF ANY PARAMETER IS EXCEEDED.

Parameter	Max. Daily (ppm)	Max. Daily flow	Frequency	Sample		Instructions Miscellaneous
				Type	Freq.	
Cd	0.04	<0.5 MGD	Semi-annual	G	24 hr.	
Cu	1.0	<0.5 MGD	Semi-annual	G	24 hr.	
Cr	1.5	<0.5 MGD	Semi-annual	G	24 hr.	
Ni	4.0	<0.5 MGD	Semi-annual	G	24 hr.	
Zn	2.61	<0.5 MGD	Semi-annual	G	24 hr.	
S.S.	750	<0.5 MGD	Semi-annual	G	24 hr.	
pH	5.0-9.5	<0.5 MGD	Semi-annual	G	24 hr.	
CN	1.0		Semi-annual	G	24 hr.	
Hg	<Detectable		Semi-annual	G	24 hr.	
PCB'S	<Detectable		Semi-annual	G	24 hr.	

Grab samples from each batch tank in an equal portion. *c = composite g = grab*

1. PCB'S AND MERCURY REPORTING (Semi-annual).
   If either PCB's or Mercury are reported in detectable amounts for the reporting period, Ford Motor Company will be required to go back to daily analysis for the item detected. Daily reports will be required for a minimum of a one month period. If these results prove less than detectable the superintendent may reduce the analysis back to Semi-annual.
2. SEMI-ANNUAL REPORTS.
   For all other parameters (metals, Cyanide, TSS, and pH) ACH used to submit monthly reports prior to discharge, this requirement has been reduced to semi-annual monitoring since 14 years (596 batch discharges) data has been well below permit limits. Reports may be faxed to the Monroe Metro WWTP at (734)-241-7780.

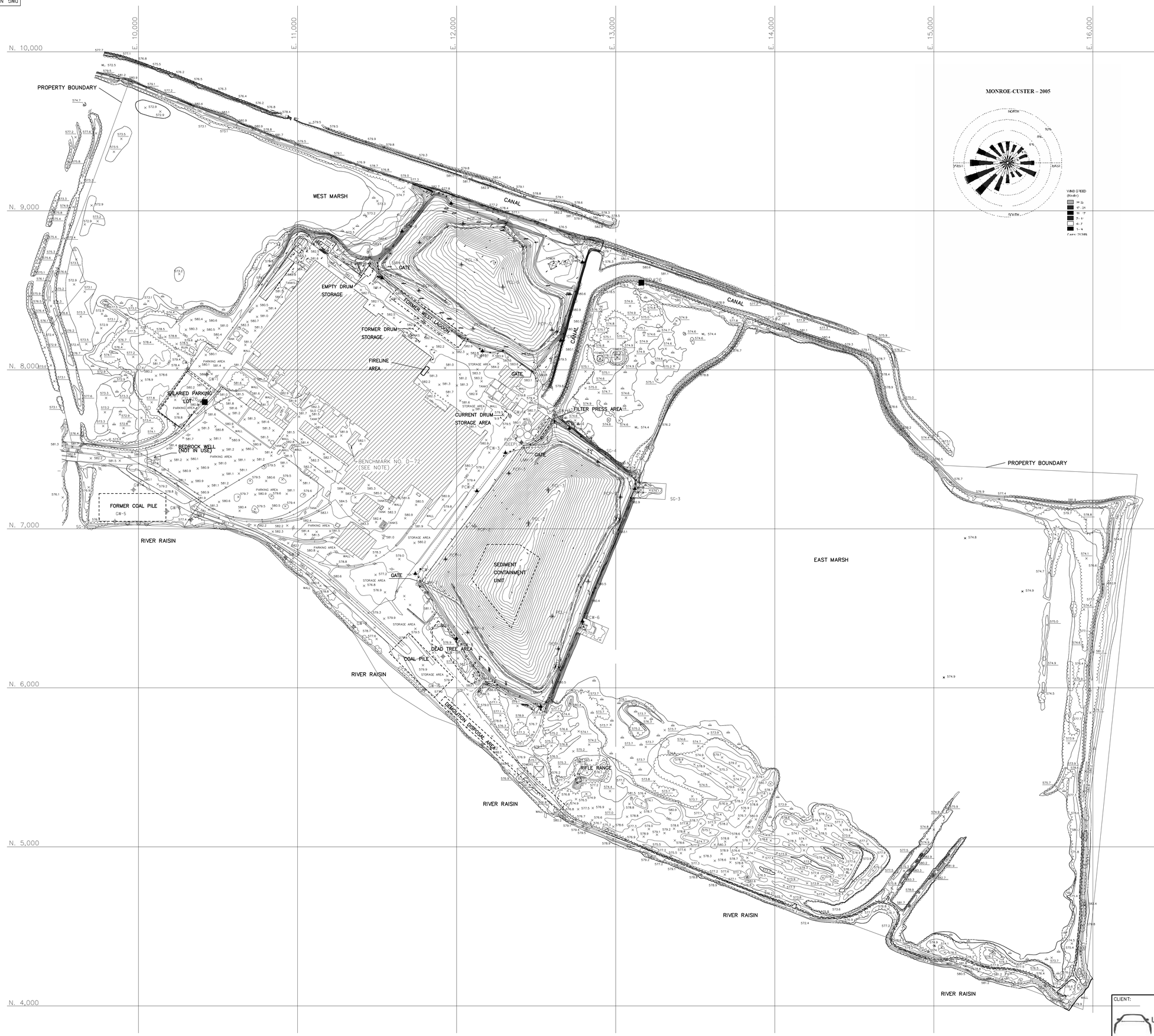
All reports must include:

a. Discharge time (the time frame that each process tank was discharged) and date.
b. Discharge volume.
c. Proportional grab sample must be taken from each process tank discharge, and combined to make one sample representative of the total discharge. This representative sample will be analyzed for the parameters listed above.

ATTACHMENT II

TOPOGRAPHIC MAP
THE MANNIK & SMITH GROUP, INC.

DWG. NO. Attachment II
PROJ. NO. FORDA1A



N

Scale 1"=200'
0' 100' 200' 400'

NOTES:

1. AERIAL PHOTOGRAPHY WAS COMPLETED ON NOVEMBER 24, 1995. UPDATES TO THE LANDFILL AREAS COMPLETED IN 2004.

2. ELEVATIONS ARE BASED ON USLS BENCHMARK NO. D-72 (1935) WHICH IS AT AN ELEVATION OF 585.282. THIS BENCHMARK IS A BRASS DISK IN THE SIDE OF THE PLANT BUILDING.

3. PLANT BOUNDARY SHOWN IS APPROXIMATE.

LEGEND:

(RL WELL) WELLS LOCATED WITHIN ONE MILE RADIUS OF SITE

REV.	BY	CHK'D	DESCRIPTION
	DATE	DATE	
.	.	.	.
.	.	.	.
2	LWB 9/06	TEP 9/06	PERMIT APPLICATION MODIFICATIONS
1	LWB 08/06	TEP 08/06	SUBMITTED WITH OPERATING LICENSE PERMIT APPLICATION RENEWAL

Mannik & Smith Group, Inc.
2365 Haggerty Road South Canton, Michigan 48188
Telephone: (734) 397-3100

CLIENT: AUTOMOTIVE COMPONENTS HOLDINGS, LLC

TITLE: TOPOGRAPHIC MAP

DRAWN: LWB 08/06	SCALE: AS NOTED	DRAWING NO.	REV. NO.
DESIGNED: LWB 08/06	REVIEWED: TEP 08/06	Attachment II	2
APPROVED: JSB 08/06	PROJECT NO. FORDA1A	CADD FILE: FORDA1A_A_EX01.DGN	

ATTACHMENT III

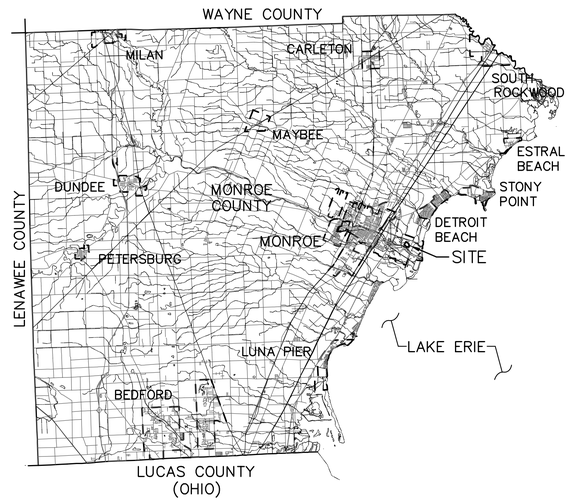
OTHER FACILITY DRAWINGS
THE MANNIK & SMITH GROUP, INC.

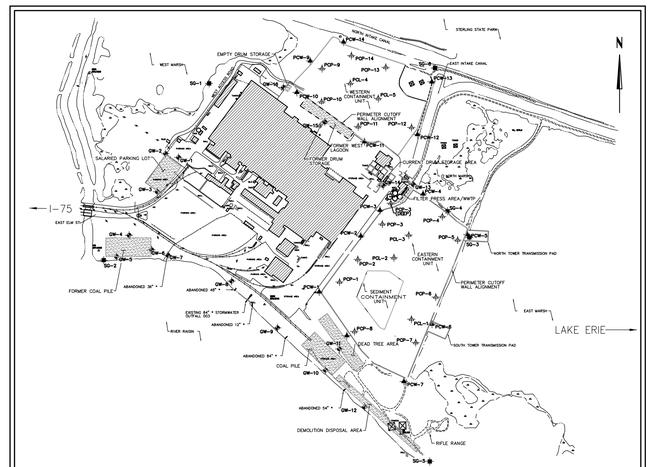
DRAWING NO. 1
PROJ. NO. FORD0112

FORD MOTOR COMPANY
MONROE PLANT

MID 005 057 005
MONROE, MICHIGAN

SITE LOCATION MAP





PREPARED FOR:

FORD MOTOR COMPANY
ENVIRONMENTAL QUALITY OFFICE

Suite 800, Fairlane Plaza North
290 Town Center Drive
Dearborn, Michigan 48126

PREPARED BY:

Mannik Smith GROUP
www.MannikSmithGroup.com

2365 HAGGERTY ROAD S.
CANTON, MICHIGAN 48188
TEL: (734) 397-3100
FAX: (734) 397-3131

INDEX OF DRAWINGS

DATE	SEP 2016
DRAWING NO.	1
PROJ. NO.	FORD0112

10/6/2016

W:\Projects\Projects F-J\FORD0136\CAD\BASE\Sep_2016\FORD0112_DW01_sep2016.dgn

NO.	DATE	BY	DESCRIPTION
	11/07/2011	HMW	TEP

PROJECT DATE: 11/07/2011
PROJECT NO.: FORD0102
DRAWN BY: HMW
CHECKED BY: TEP

Mannik Smith GROUP
TECHNICAL SKILL. CREATIVE SPIRIT.
www.MannikSmithGroup.com

PREPARED FOR:
FORD MOTOR COMPANY

MONROE PLANT
MONROE, MICHIGAN

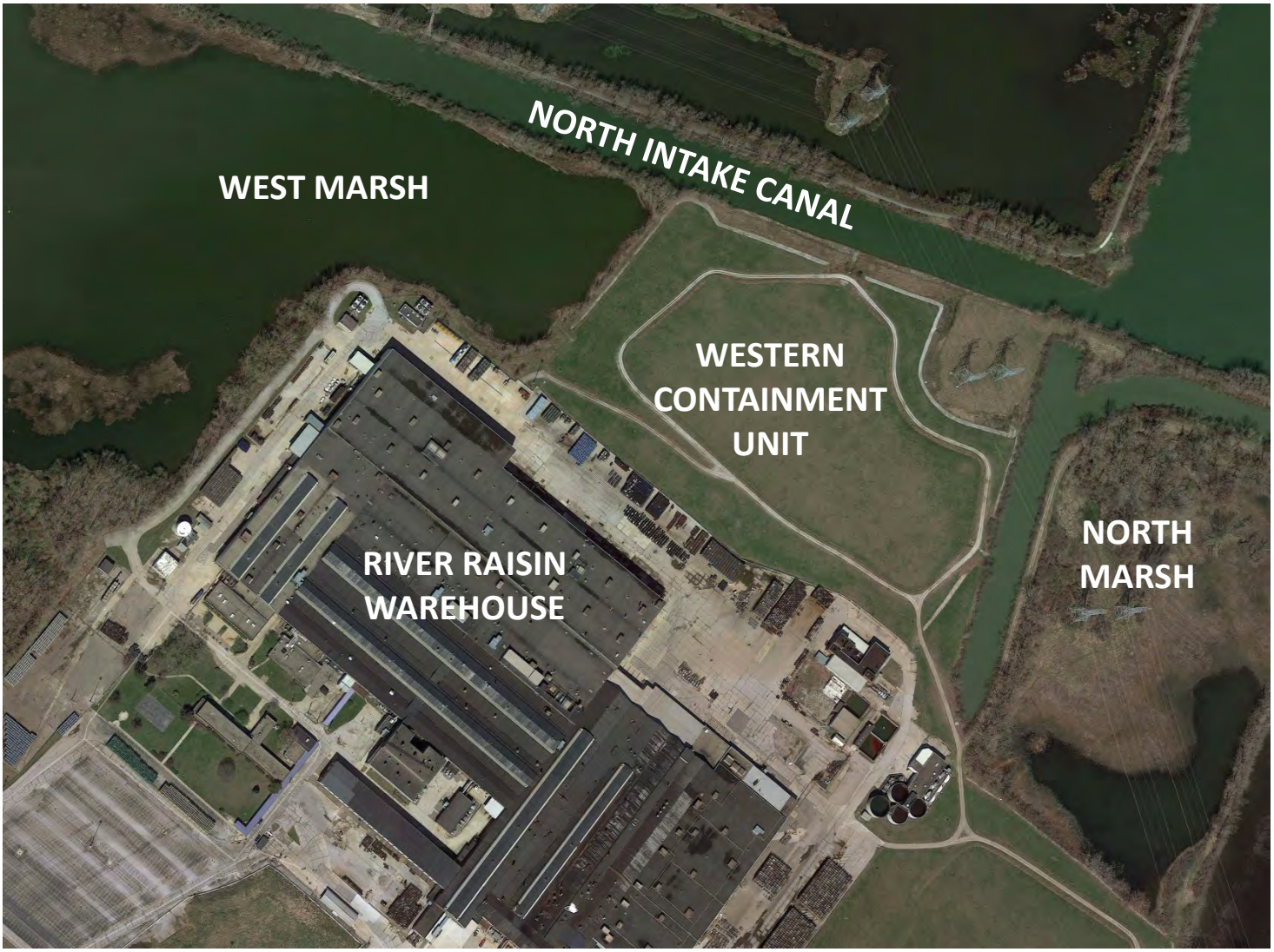
GENERAL LAYOUT

1 / 1

6/9/2017 8:38:14 AM
W:\Projects\Projects F-J\FORD0166\CAD\FORD0166_C_General Layout.dgn

ATTACHMENT IV

AERIAL PHOTOGRAPH
THE MANNIK & SMITH GROUP, INC.



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Approximate Scale 1"= 500'

0' 250 500' 1000'

Mannik Smith GROUP
TECHNICAL SKILL. CREATIVE SPIRIT.

ATTACHMENT IV
AERIAL PHOTOGRAPHS
FORD MOTOR COMPANY
FORD RIVER RAISIN WAREHOUSE
3200 EAST ELM AVENUE, CITY OF MONROE, MICHIGAN

Date	Drawn by	Design by	Project No
3/17	JPM	JPM	Ford0166

N

Approximate Scale 1"= 500'

0' 250 500' 1000'

Mannik Smith GROUP
TECHNICAL SKILL. CREATIVE SPIRIT.

ATTACHMENT IV
AERIAL PHOTOGRAPHS
FORD MOTOR COMPANY
FORD RIVER RAISIN WAREHOUSE
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Date	Drawn by	Design by	Project No
3/17	JPM	JPM	Ford0166

ATTACHMENT A1

GENERAL FACILITY DESCRIPTION
THE MANNIK & SMITH GROUP, INC.

OTHER REQUIRED ATTACHMENTS
A1 – GENERAL FACILITY DESCRIPTION

SITE LOCATION AND DESCRIPTION

The Ford Motor Company (Ford) Ford River Raisin Warehouse (RRW) is located in the City of Monroe, Monroe County, Michigan (See Attachment III, Site Location Map). The site is located approximately 0.75 miles west of the western shore of Lake Erie, north of the mouth of the River Raisin. The River Raisin forms the southern boundary of the property, while an intake canal forms the northern boundary. Sterling State Park is adjacent to the intake canal along the northern boundary. Wetlands border the site to the east and west. The site is located away from residential areas, with the nearest residences located approximately 0.5 miles to the north of the property boundary.

The area of the Lake Erie shoreline near the site has a history of industrial use. Several industries are located in the vicinity of the site, including the Detroit Edison Monroe Power Plant, which is located across the River Raisin to the south, and the former Monroe Paper Company, which is located along the River Raisin (upgradient) approximately one mile to the west. In addition, the Port of Monroe and the City of Monroe landfills are located across the River Raisin to the southwest of the site.

SITE BACKGROUND

The first industrial use of the property was for a plant built by Newton Steel Company. The plant was built from 1927 to 1931. Newton Steel and later Republic Steel operated the plant as a steel mill until 1938 when the plant was closed. During the 1940's the plant was operated first by the Aluminum Company of America and then by Kelsey-Hayes Wheel Company, apparently for metal stamping and forging. Ford Motor Company purchased the property from Kelsey Hayes in 1950 and converted the steel mill into an automobile parts manufacturing facility. During the period of Ford ownership, the facility has produced coil springs, wheels, stabilizer bars, catalytic converter assemblies, headlamp housings, and chrome plated bumpers. As part of these production activities, Ford conducted electroplating operations and disposed of the resulting electroplating sludge in the on-site surface impoundments.

On July 18, 1994, Ford submitted a petition to the United States Environmental Protection Agency (USEPA) to designate a Corrective Action Management Unit (CAMU) in accordance with 40 CFR 264.552, an application to USEPA for a Resource Conservation and Recovery Act (RCRA) Post-Closure Permit, and application to MDEQ for an Act 64 Post-Closure Operating License. Ford received an Act 64 Post-Closure Operating License and RCRA Post-Closure Permit on March 27, 1995. Construction activities for the CAMU were initiated in 1995 and completed in 1999. As a result, two on-site containment units were created, the Eastern Containment Unit (ECU) and Western Containment Unit (WCU). These units are closed and post-closure monitoring activities are currently being performed in accordance with the *June 26, 2000, Post Closure Operating Plan* and the Act 64 Post-Closure Operating License (MID 005 057 005).

Potential soil impacts from the identified on-site SWMUs were investigated in accordance with the RAW-QAPP dated June 27, 1995, and subsequently revised on February 25, 1998. Investigation and remediation results from this effort are presented in MSG's *SWMU Report*, dated October 1999.

Potential ground water impacts from the on-site SWMUs have been investigated in accordance with the MDEQ approved *GIWP*, dated September 1, 1998, and the Act 64 Post-Closure Operating License. This investigation effort is documented in the *Final Ground Water Investigation Report*, dated July 26, 2002.

In June 2000, Visteon, formerly an enterprise of Ford, became an independent entity and assumed ownership and responsibility for on-going environmental work at the RRW. In October 2005, ACH assumed ownership and responsibility for on-going environmental work at the RRW. In October 2009, Ford assumed ownership and responsibility for on-going environmental work at the RRW.

LIST OF PREVIOUS PERMITS, ENFORCEMENT ACTIONS AND FACILITY STUDIES

The Act 64 Post-Closure Operating License and RCRA Post-Closure Permit, (MID 005 057 005), are the primary permits for the site. Included below is a summary table of facility studies or reports that MSG is aware of that pertain to the RRW.

Author	Title	Date
USEPA	Memorandum Ford Monroe Stamping Plant Release Assessment	March 5, 1998
NTH	Investigation Report of Former West Lagoon	April 11, 1996
NTH	Permits Closure of Surface Impoundments	May 23, 1995
NTH	Post-Closure Operating License Application Volume II – Closure Plan	July 18, 1994
NTH	Volume 2 – Appendices Release Assessment Work Plan and Quality Assurance Project Plan	June 27, 1995 Revised February 25, 1998
MEC	Ground Water Investigation Work Plan - Ford Monroe Stamping Plant	September 1, 1998
MEC	Solid Waste Management Units (SWMU) Investigation Project Update	June 3, 1999
MEC	Report of the Ground Water Investigation Project at Monroe Stamping Plant – Volume I	August 6, 1999
MEC	Closure Certification Report, Surface Impoundment Closure Project	September 9, 1999
MEC	Interim Ground Water Investigation Report	August 24, 2000
MEC	Annual Ground Water Report	2001
IT	Storm Water Pollution Prevention Plan	January 27, 2000
HRC	RCRA Contingency/SPCC/PIPP Plan	October 4, 1994 Revised July 31, 2000
MSG	Soil Investigation Report of Solid Waste Management Units	October 1999
MSG	RCRA Facility Investigation Work Plan	August 28, 2000 Revised March 5, 2001
MSG	RCRA Facility Investigation Health & Safety Plan	April 30, 2001
MSG	RCRA Facility Investigation Report	February 28, 2002
MSG	RCRA Facility Investigation Attachments	July 26, 2002
MSG	Post-Closure & Corrective Action	July 9, 2003
MSG	Additional MDEQ Required RCRA Facility Investigation Activities	March 22, 2004
MSG	Supplemental RCRA Facility & Ground Water Investigation Work Plan	March 22, 2004
MSG	Quality Assurance Project Plan - RFI	August 28, 2000 Revised March 7, 2001
MSG	Conceptual Ground Water Flow Modeling Report	November 2, 2001
MSG	Final Ground Water Investigation Report	July 26, 2002
MSG	Ground Water Flow Model Report	December 17, 2002
MSG	Post-Closure Operating License Application, Volume III – Post-Closure Plan	June 26, 2000
MSG	Post-Closure Operating License Application, Volume III – Post-Closure Plan	June 30, 2003
MSG	Post-Closure Operating License Application Report	September 16, 2003
MSG	Interim Ground Water Investigation Report	August 24, 2000
MSG	Interim Ground Water Investigation Report 2	March 6, 2001
MSG	Interim Ground Water Investigation Report 3	April 12, 2001
MSG	Interim Ground Water Investigation Report 4	May 21, 2001
MSG	Interim Ground Water Investigation Report 5	August 1, 2001
MSG	Interim Ground Water Investigation Report 6	November 2, 2001
MSG	Interim Ground Water Investigation Report 7	January 24, 2002
MSG	Interim Ground Water Investigation Report 8	February 28, 2002
MSG	Hydraulic Monitoring Report – February 2002	April 16, 2002
MSG	Hydraulic Monitoring Report – June 2002	July 23, 2002
MSG	Hydraulic Monitoring Report – September 2002	November 22, 2002
MSG	Hydraulic Monitoring Report – December 2002	February 11, 2003
MSG	Hydraulic Monitoring Report – March 2003	May 28, 2003
MSG	Hydraulic Monitoring Report – June 2003	August 5, 2003
MSG	Hydraulic Monitoring Report – September 2003	September 30, 2003
MSG	Hydraulic Monitoring Report – November 2003	February 18, 2004
MSG	Hydraulic Monitoring Report – February 2004	June 4, 2004
MSG	Hydraulic Monitoring Report – June 2004	July 27, 2004

MSG	Hydraulic Monitoring Report – September 2004	November 10, 2004
MSG	Hydraulic Monitoring Report – December 2004	February 14, 2005
MSG	Hydraulic Monitoring Report – March 2005	May 31, 2005
MSG	Hydraulic Monitoring Report – June 2005	July 28, 2005
MSG	Hydraulic Monitoring Report – September 2005	December 30, 2005
MSG	Hydraulic Monitoring Report – December 2005	February 6, 2006
MSG	Hydraulic Monitoring Report – March 2006	May 25, 2006
MSG	Hydraulic Monitoring Report – June 2006	August 14, 2006
MSG	Hydraulic Monitoring Report – September 2006	January 17, 2007
MSG	Hydraulic Monitoring Report – December 2006	February 23, 2007
MSG	Hydraulic Monitoring Report – March 2007	July 27, 2007
MSG	Hydraulic Monitoring Report – June 2007	November 5, 2007
MSG	Hydraulic Monitoring Report – September 2007	October 8, 2007
MSG	Hydraulic Monitoring Report – December 2007	February 29, 2008
MSG	Hydraulic Monitoring Report – March 2008	May 27, 2008
MSG	Hydraulic Monitoring Report – June 2008	September 17, 2008
MSG	Hydraulic Monitoring Report – September 2008	November 12, 2008
MSG	Hydraulic Monitoring Report – December 2008	January 30, 2009
MSG	Hydraulic Monitoring Report – March 2009	April 13, 2009
MSG	Hydraulic Monitoring Report – June 2009	August 31, 2009
MSG	Hydraulic Monitoring Report – September 2009	December 31, 2009
MSG	Hydraulic Monitoring Report – December 2009	February 11, 2010
MSG	Hydraulic Monitoring Report – March 2010	May 7, 2010
MSG	Hydraulic Monitoring Report – May 2010	July 12, 2010
MSG	Hydraulic Monitoring Report – September 2010	November 2, 2010
MSG	Hydraulic Monitoring Report – December 2010	February 15, 2011
MSG	Hydraulic Monitoring Report – March 2011	May 12, 2011
MSG	Hydraulic Monitoring Report – June 2011	July 29, 2011
MSG	Hydraulic Monitoring Report – September 2011	November 15, 2011
MSG	Hydraulic Monitoring Report – December 2011	February 1, 2012
MSG	Hydraulic Monitoring Report – March 2012	May 30, 2012
MSG	Hydraulic Monitoring Report – June 2012	August 8, 2012
MSG	Hydraulic Monitoring Report – October 2012	December 11, 2012
MSG	Hydraulic Monitoring Report – December 2012	January 25, 2013
MSG	Hydraulic Monitoring Report – March 2013	March 26, 2013
MSG	Hydraulic Monitoring Report – June 2013	August 6, 2013
MSG	Hydraulic Monitoring Report – September 2013	October 25, 2013
MSG	Hydraulic Monitoring Report – December 2013	January 31, 2014
MSG	Hydraulic Monitoring Report – March 2014	April 30, 2014
MSG	Hydraulic Monitoring Report – June 2014	July 25, 2014
MSG	Hydraulic Monitoring Report – September 2014	October 24, 2014
MSG	Hydraulic Monitoring Report – December 2014	February 6, 2015
MSG	Hydraulic Monitoring Report – March 2015	April 27, 2015
MSG	Hydraulic Monitoring Report – May 2015	July 24, 2015
MSG	Hydraulic Monitoring Report – September 2015	October 5, 2015
MSG	Hydraulic Monitoring Report – November 2015	December 3, 2015
MSG	Hydraulic Monitoring Report – March 2016	May 10, 2016
MSG	Hydraulic Monitoring Report – June 2016	July 25, 2016
MSG	Hydraulic Monitoring Report – September 2016	November 7, 2016
MSG	Hydraulic Monitoring Report – December 2016	January 24, 2017
MSG	Environmental Monitoring Report – Round 1	April 28, 2000
MSG	Environmental Monitoring Report – Round 2	October 25, 2000
MSG	Environmental Monitoring Report – Round 3	February 16, 2001
MSG	Environmental Monitoring Report – Round 4	July 12, 2001
MSG	Environmental Monitoring Report – Round 5	November 2, 2001
MSG	Environmental Monitoring Report – Round 6	April 8, 2002
MSG	Environmental Monitoring Report – Round 7	April 29, 2002
MSG	Environmental Monitoring Report – Round 8	July 12, 2002

MSG	Environmental Monitoring Report – Round 9	February 28, 2003
MSG	Environmental Monitoring Report – Round 10	August 13, 2003
MSG	Environmental Monitoring Report – Round 11	February 18, 2004
MSG	Environmental Monitoring Report – Round 12	July 30, 2004
MSG	Environmental Monitoring Report – Round 13	January 17, 2005
MSG	Environmental Monitoring Report – Round 14	July 28, 2005
MSG	Environmental Monitoring Report – Round 15	February 6, 2006
MSG	Environmental Monitoring Report – Round 16	August 12, 2006
MSG	Environmental Monitoring Report – Round 17	February 23, 2007
MSG	Environmental Monitoring Report – Round 18	September 10, 2007
MSG	Environmental Monitoring Report – Round 19	February 29, 2008 Revised June 17, 2008
MSG	Environmental Monitoring Report – Round 20	September 30, 2008
MSG	Environmental Monitoring Report – Round 21	February 25, 2009
MSG	Environmental Monitoring Report – Round 22	November 18, 2009
MSG	Environmental Monitoring Report – Round 23	February 11, 2010
MSG	Environmental Monitoring Report – Round 24	August 12, 2010
MSG	Environmental Monitoring Report – Round 25	February 18, 2011
MSG	Environmental Monitoring Report – Round 26	August 18, 2011
MSG	Environmental Monitoring Report – Round 27	February 22, 2012
MSG	Environmental Monitoring Report – Round 28	September 26, 2012
MSG	Environmental Monitoring Report – Round 29	February 20, 2013
MSG	Environmental Monitoring Report – Round 30	September 12, 2013
MSG	Environmental Monitoring Report – Round 31	February 2, 2014
MSG	Environmental Monitoring Report – Round 32	September 26, 2014
MSG	Environmental Monitoring Report – Round 33	February 20, 2015
MSG	Environmental Monitoring Report – Round 34	July 20, 2015
MSG	Environmental Monitoring Report – Round 35	January 26, 2016
MSG	Environmental Monitoring Report – Round 36	September 16, 2016
MSG	Environmental Monitoring Report – Round 37	January 27, 2017
MSG	Annual Ground Water Report – 2000 (Year 1)	February 28, 2001
MSG	Annual Ground Water Report – 2001 (Year 2)	February 28, 2002, Revised May 31, 2002
MSG	Annual Ground Water Report – 2002 (Year 3)	February 26, 2003
MSG	Annual Ground Water Report – 2003 (Year 4)	February 27, 2004
MSG	Annual Ground Water Report – 2004 (Year 5)	February 28, 2005
MSG	Annual Ground Water Report – 2005 (Year 6)	February 23, 2006
MSG	Annual Ground Water Report – 2006 (Year 7)	February 23, 2007
MSG	Annual Ground Water Report – 2007 (Year 8)	February 29, 2008
MSG	Annual Ground Water Report – 2008 (Year 9)	February 25, 2009
MSG	Annual Ground Water Report – 2009 (Year 10)	February 11, 2010
MSG	Annual Ground Water Report – 2010 (Year 11)	February 28, 2011
MSG	Annual Ground Water Report – 2011 (Year 12)	February 24, 2012
MSG	Annual Ground Water Report – 2012 (Year 13)	March 1, 2013
MSG	Annual Ground Water Report – 2013 (Year 14)	February 21, 2014
MSG	Annual Ground Water Report – 2014 (Year 15)	February 20, 2015
MSG	Annual Ground Water Report – 2015 (Year 16)	February 17, 2016
MSG	Annual Ground Water Report – 2016 (Year 17)	January 24, 2017
MSG	Annual Inspection and Maintenance Report 2000	August 15, 2000
MSG	Annual Inspection and Maintenance Report 2001	January 4, 2002
MSG	Annual Inspection and Maintenance Report 2002	August 12, 2002
MSG	Annual Inspection and Maintenance Report 2003	August 13, 2003
MSG	Annual Inspection and Maintenance Report 2004	July 30, 2004
MSG	Annual Inspection and Maintenance Report 2005	August 10, 2005
MSG	Annual Inspection and Maintenance Report 2006	August 10, 2006
MSG	Annual Inspection and Maintenance Report 2007	June 17, 2008
MSG	Annual Inspection and Maintenance Report 2008	February 25, 2009
MSG	Annual Inspection and Maintenance Report 2009	February 11, 2010

MSG	Annual Inspection and Maintenance Report 2010	February 28, 2011
MSG	Annual Inspection and Maintenance Report 2011	January 31, 2012
MSG	Annual Inspection and Maintenance Report 2012	March 7, 2013
MSG	Annual Inspection and Maintenance Report 2013	February 21, 2014
MSG	Annual Inspection and Maintenance Report 2014	February 20, 2015
MSG	Annual Inspection and Maintenance Report 2015	February 17, 2016
MSG	Annual Inspection and Maintenance Report 2016	January 24, 2017
MSG	Annual Leachate Monitoring Report 2000	August 15, 2000
MSG	Annual Leachate Monitoring Report 2001	January 4, 2002
MSG	Annual Leachate Monitoring Report 2002	August 12, 2002
MSG	Annual Leachate Monitoring Report 2003	August 5, 2003
MSG	Annual Leachate Monitoring Report 2004	July 27, 2004
MSG	Annual Leachate Monitoring Report 2005	August 8, 2005
MSG	Annual Leachate Monitoring Report 2006	August 10, 2006
MSG	Annual Leachate Monitoring Report 2007	February 29, 2008
MSG	Annual Leachate Monitoring Report 2008	February 25, 2009
MSG	Annual Leachate Monitoring Report 2009	February 1, 2010
MSG	Annual Leachate Monitoring Report 2010	February 28, 2011
MSG	Annual Leachate Monitoring Report 2011	January 31, 2012
MSG	Annual Leachate Monitoring Report 2012	February 20, 2013
MSG	Annual Leachate Monitoring Report 2013	February 21, 2014
MSG	Annual Leachate Monitoring Report 2014	February 20, 2015
MSG	Annual Leachate Monitoring Report 2015	February 26, 2016
MSG	Annual Leachate Monitoring Report 2016	January 24, 2017
MSG	2000 Annual Certification of Post-Closure Care	January 2001
MSG	2001 Annual Certification of Post-Closure Care	January 2002
MSG	2002 Annual Certification of Post-Closure Care	January 23, 2003
MSG	2003 Annual Certification of Post-Closure Care	January 28, 2004
MSG	2004 Annual Certification of Post-Closure Care	March 17, 2005
MSG	2005 Annual Certification of Post-Closure Care	February 7, 2006
MSG	2006 Annual Certification of Post-Closure Care	January 22, 2007
MSG	2007 Annual Certification of Post-Closure Care	February 1, 2008
MSG	2008 Annual Certification of Post-Closure Care	December 31, 2008
MSG	2009 Annual Certification of Post-Closure Care	February 8, 2010
MSG	2010 Annual Certification of Post-Closure Care	March 11, 2011
MSG	2011 Annual Certification of Post-Closure Care	February 15, 2012
MSG	2012 Annual Certification of Post-Closure Care	January 28, 2013
MSG	2013 Annual Certification of Post-Closure Care	April 16, 2013
MSG	2014 Annual Certification of Post-Closure Care	April 17, 2015
MSG	2015 Annual Certification of Post-Closure Care	January 27, 2016
MSG	2016 Annual Certification of Post-Closure Care	January 27, 2017
MSG	Integrity Verification Report for Year 1 of Post-Closure Monitoring	March 21, 2001
MSG	Follow-up Integrity Verification Report for Year 1 of Post-Closure Monitoring	January 31, 2002
MSG	Integrity Verification Report for Year 2 of Post-Closure Monitoring	July 23, 2002
MSG	Integrity Verification Report for Year 3 of Post-Closure Monitoring	August 1, 2003
MSG	Integrity Verification Report for Year 4 of Post-Closure Monitoring	July 27, 2004
MSG	Integrity Verification Report for Year 5 of Post-Closure Monitoring	October 31, 2005
MSG	Integrity Verification Report for Year 6 of Post-Closure Monitoring	2006
MSG	Integrity Verification Report for Year 7 of Post-Closure Monitoring	February 23, 2007
MSG	Integrity Verification Report for Year 8 of Post-Closure Monitoring	February 28, 2008
MSG	Integrity Verification Report for Year 9 of Post-Closure Monitoring	November 21, 2009
MSG	Integrity Verification Report for Year 10 of Post-Closure Monitoring	2010
MSG	Integrity Verification Report for Year 11 of Post-Closure Monitoring	February 15, 2011
MSG	Integrity Verification Report for Year 12 of Post-Closure Monitoring	December 15, 2012
MSG	Integrity Verification Report for Year 13 of Post-Closure Monitoring	November 9, 2012 Addendum December 5, 2005
MSG	Integrity Verification Report for Year 14 of Post-Closure Monitoring	September 16, 2013
MSG	Integrity Verification Report for Year 15 of Post-Closure Monitoring	October 9, 2014

MSG	Integrity Verification Report for Year 16 of Post-Closure Monitoring	September 21, 2015
MSG	Integrity Verification Report for Year 17 of Post-Closure Monitoring	October 21, 2016
MSG	Removal of Sediment from Leachate Manholes	September 1, 2003
MSG	Removal of Sediment from Leachate Manholes	July 22, 2004
MSG	Second Biennial Final Cover and Benchmark Survey	June 23, 2003
MSG	Vegetative Control Measures Letter	August 28, 2003
MSG	SCU Leachate Removal Letter	September 30, 2003
MSG	Erosion Repair Activities – Burrow Holes Letter	September 30, 2003
MSG	Ground Water Monitor Well Abandonment	November 3, 2003
MSG	CQA Plan for Interim Response Activities for the Empty Drum Storage Area	December 9, 2003
MSG	Interim Bid Package for the Empty Drum Storage Area	December 15, 2003
MSG	Fourth Biennial Final Cover and Benchmark Survey	May 8, 2008
MSG	Fifth Biennial Final Cover and Benchmark Survey	October 2012
MSG	Additional Environmental Sampling Ford Motor Company, Monroe Plant	April 25, 2011
MSG	Post-Closure Leachate Sampling	June 17, 2011
MSG	Ground Water Operation and Maintenance (O&M) Inspection Report	April 28, 2014
MSG	Post-Closure Leachate Sampling	September 26, 2016 Revised January 17, 2017
MSG	Additional Environmental Sampling Ford Motor Company, Monroe Plant	September 10, 2015
MSG	Additional Environmental Sampling Ford Motor Company, Monroe Plant	March 16, 2016
MSG	Additional Environmental Sampling Ford Motor Company, Monroe Plant	January 18, 2017

- R-1A Single Family Residential
- R-1B Single Family Residential
- R-1C Single Family Residential
- R-2 Two Family Residential
- RM Multiple Family Residential
- C-O Office
- C-1 Local Commercial
- C-2 General Commercial
- WC Waterfront Commercial
- CBD Central Business District
- I-1 Light Industrial
- I-2 General Industrial
- P-1 Vehicular Parking
- AP Airport
- PUD Planned Unit Development
- PROS Public Recreation and Open Space

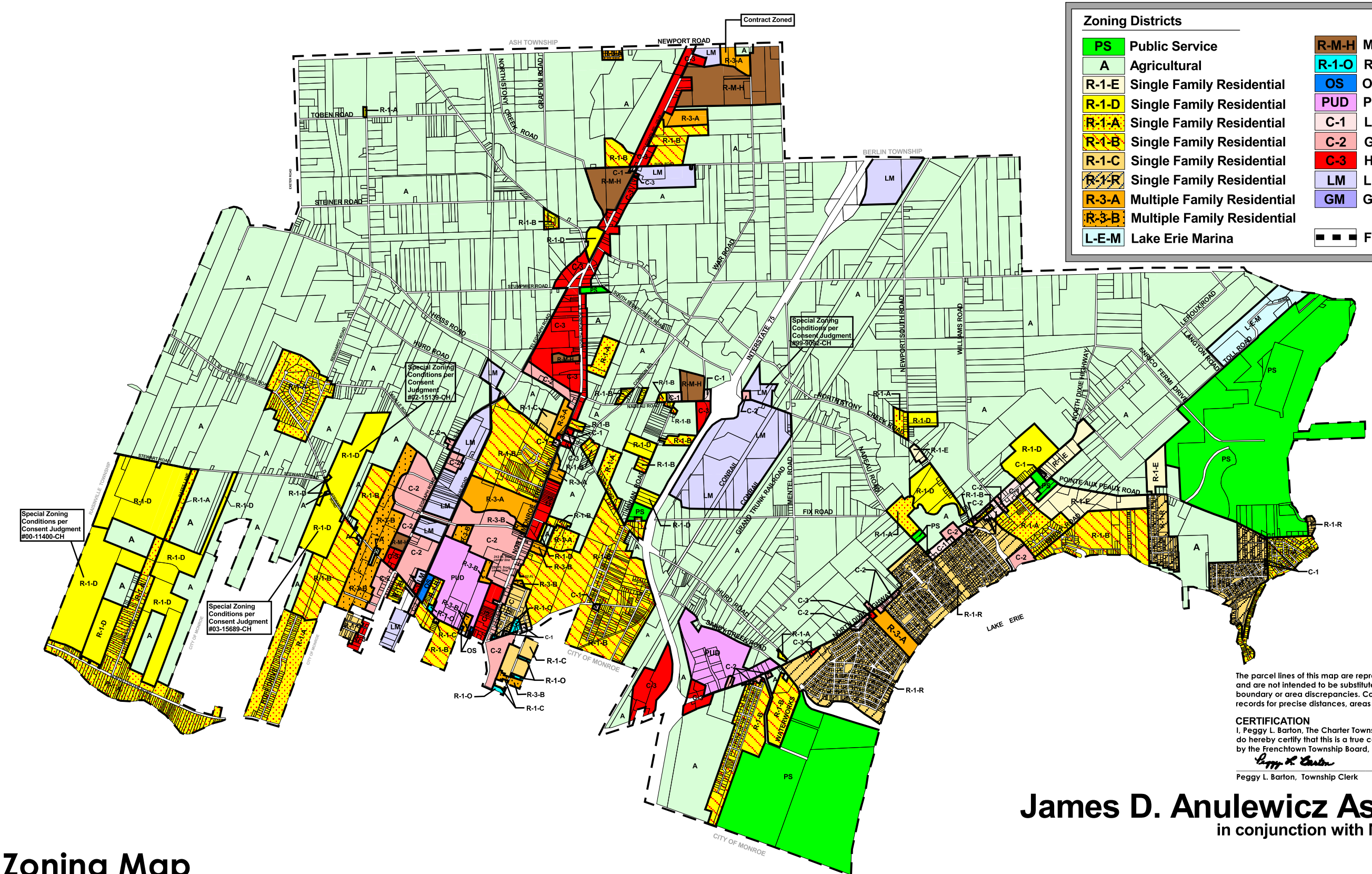
Disclaimer: This zoning map features a representative scale and is not intended to be substituted for an official survey or used to resolve boundary or area issues. Consult official City of Monroe records for dimensions and areas of parcels and boundaries.

Date: 19 September 2016
Sources: City of Monroe Assessor's Office, MCGI

1 inch = 1,000 feet

Official Zoning Map
City of Monroe

Frenchtown Charter Township, Monroe County, Michigan



Zoning Districts

PS	Public Service	R-M-H	Mobile Home Park
A	Agricultural	R-1-O	Restricted Office
R-1-E	Single Family Residential	OS	Office Service
R-1-D	Single Family Residential	PUD	Planned Unit Development
R-1-A	Single Family Residential	C-1	Local Commercial
R-1-B	Single Family Residential	C-2	General Commercial
R-1-C	Single Family Residential	C-3	Highway Commercial
R-1-R	Single Family Residential	LM	Light Manufacturing
R-3-A	Multiple Family Residential	GM	General Manufacturing
R-3-B	Multiple Family Residential		
L-E-M	Lake Erie Marina		Frenchtown Boundary

The parcel lines of this map are representational of the actual parcel lines and are not intended to be substituted for an official survey or used to resolve boundary or area discrepancies. Consult official Charter Township of Frenchtown records for precise distances, areas of parcels and boundaries.

CERTIFICATION

I, Peggy L. Barton, The Charter Township of Frenchtown Clerk, do hereby certify that this is a true copy of the map adopted by the Frenchtown Township Board, on the 10th day of November, 2003

Peggy L. Barton

Peggy L. Barton, Township Clerk

James D. Anulewicz Associates Inc.

in conjunction with McKenna Associates, Inc.

Zoning Map

Basemap Source: McKenna Associates, Inc. 4/2002
Data Source: Frenchtown Township

0 Ft. — 2250 Ft. — 4500 Ft.

Revision date 1/19/06 illustrates all approved amendments to the official Zoning Map as of this date up to and including amendment map number 17-05.

ATTACHMENT A2

CHEMICAL AND PHYSICAL ANALYSIS
THE MANNIK & SMITH GROUP, INC.

FORM EQP 5111 ATTACHMENT TEMPLATE A2
CHEMICAL AND PHYSICAL ANALYSES

This document is an attachment to the Michigan Department of Environmental Quality's *Instructions for Completing Form EQP 5111, Operating License Application Form for Hazardous Waste Treatment, Storage, and Disposal Facilities*. See Form EQP 5111 for details on how to use this attachment.

The administrative rules promulgated pursuant to Part 111, Hazardous Waste Management, of Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451), being R 299.9504, R 299.9508, and R 299.9605, and Title 40 of the Code of Federal Regulations (CFR) §§264.13(a) and 270.14(b)(2), establish requirements for chemical and physical analyses at hazardous waste management facilities. All references to the 40 CFR citations specified herein are adopted by reference in R 299.11003

This license application template addresses requirements for chemical and physical analyses at the hazardous waste management facility for the *River Raisin Warehouse* in *Monroe*, Michigan. The information included in the template demonstrates how the facility meets the chemical and physical analyses requirements for hazardous waste management facilities.

Type of applicant: *(Check as appropriate)*

- ☒ Applicant for Operating License for Existing Facility
- ☐ Applicant for Operating License for New, Altered, Enlarged, or Expanded Facility

Type of Facility: *(Check as appropriate)*

- ☒ On-site Facility (generates hazardous waste)
- ☐ Off-site Facility (accepts hazardous waste from other generators)

Type of Units to be Constructed or Operated at the Facility: *(Check as appropriate)*

- ☐ Containers
- ☐ Tank(s)
- ☐ Waste Pile(s)
- ☒ Landfilled Waste
- ☐ Waste Incineration
- ☐ Land Treatment
- ☐ Miscellaneous Unit(s)
- ☐ Boilers and Industrial Furnaces

This template is organized as follows:

A2.A WASTE DESCRIPTION
- A2.A.1 Waste Description *(generate on-site wastes)*
- A2.A.2 Waste Description *(receive wastes from off-site generators)*
  - A2.A.2(a) Procedures for Obtaining Chemical and Physical Analyses from Off-Site Generators
- Table A2.A.1 Hazardous Waste Generated at the Facility
- Attachment A2.A.1 Laboratory Report Detailing Chemical and Physical Analyses of Representative Samples
- Table A2.A.2 Hazardous Wastes Accepted at the Facility

A2.B CONTAINERIZED WASTE
- A2.B.1 Wastes Compatible with Container
- A2.B.2 Containers without Secondary Containment System

A2.C WASTE IN TANK SYSTEMS
- A2.C.1 Wastes Compatible with Tanks
- A2.C.2 Tanks without Secondary Containment System

A2.D WASTE IN PILES
- A2.D.1 Waiver from Waste Pile Requirements

A2.E LANDFILLED WASTES
- A2.E.1 Containerized or Bulk Wastes
- A2.E.2 Procedures to Determine Addition of Biodegradable Sorbent

A2.F WASTES INCINERATED AND WASTES USED IN PERFORMANCE TESTS
- Attachment A2.F.1 Analyses of Wastes Incinerated and Used in Performance Tests

A2.G WASTES TO BE LAND TREATED
- A2.G.1 Treatment Zone Demonstration
- A2.G.2 Food Chain Crops Grown In or On Treatment Zone

A2.H WASTE IN MISCELLANEOUS UNITS

A2.I WASTE IN BOILERS AND INDUSTRIAL FURNACES
- Table A2.I.1 Waste Feed Streams: Hazardous Waste, Other Fuels, and Industrial Furnace Feed Stocks
- Table A2.I.2 Hazardous Waste Feed Streams
- Attachment A2.I.1 Blending Prior to Firing

A2.A WASTE DESCRIPTION
[R 299.9504(1)(c) and 40 CFR §270.14(b)(2)]

A2.A.1 Waste Description (generate on-site wastes)
[R 299.9504(1)(c) and 40 CFR §270.14(b)(2)]

F006 is the type of waste disposed of at the facility. Due to the closed status of the two on-site containment units (Eastern Containment Unit and Western Containment Unit), this facility does not accept waste. See Post Closure Operating License Application, Vol.2 – Closure Plan, Section 2.0, Description of Facility and Closure, NTH Consultants, LTD, July 18, 1994.

A2.A.2 Waste Description (receive wastes from off-site generators)
[R 299.9504(1)(c) and 40 CFR §270.14(b)(2)]

A2.A.2(a) Procedures for Obtaining Chemical and Physical Analyses from Off-Site Generators
Not applicable.

Table A2.A.1 Hazardous Waste Generated at the Facility (page 7)

Attachment A2.A.1 Laboratory Report Detailing Chemical and Physical Analyses of Representative Samples

See Post Closure Operating License Application, Vol.2 – Closure Plan, Section 2.0, Description of Facility and Closure, NTH Consultants, LTD, July 18, 1994.

Table A2.A.2 Hazardous Wastes Accepted at the Facility (page 8)

A2.B CONTAINERIZED WASTE
[R 299.9504(1)(c) and 40 CFR §264.172]

A2.B.1 Wastes Compatible with Container

Not applicable.

A2.B.2 Containers without Secondary Containment System

Not applicable.

A2.C WASTE IN TANK SYSTEMS
[R 299.9504(1)(c) and 40 CFR §§264.190(a), 264.191(b)(2), 264.192(a)(2)]

A2.C.1 Wastes Compatible with Tanks

Not applicable.

A2.C.2 Tanks without Secondary Containment System

Not applicable.

A2.D WASTE IN PILES

[R 299.9504(1)(c) and 40 CFR §264.250(c)(1) and (4)]

A2.D.1 Waiver from Waste Pile Requirements

Not applicable.

A2.E LANDFILLED WASTES

[R 99.9504(1)(c) and 40 CFR §§264.13(c)(3) and 264.314]

A2.E.1 Containerized or Bulk Wastes

Not applicable.

A2.E.2 Procedures to Determine Addition of Biodegradable Sorbent

Not applicable.

A2.F WASTES INCINERATED AND WASTES USED IN PERFORMANCE TESTS

[R 299.9504(1)(c) and 40 CFR §264.341]

Attachment A2.F.1 Analyses of Wastes Incinerated and Used in Performance Tests

Not applicable.

A2.G WASTES TO BE LAND TREATED

[R 299.9504(1)(c) and 40 CFR §§264. 271(a)(1) and (2), 264.272, and 264.276]

A2.G.1 Treatment Zone Demonstration

Not applicable.

A2.G.2 Food Chain Crops Grown In or On Treatment Zone

Not applicable.

A2.H WASTE IN MISCELLANEOUS UNITS

[R 299.9504(1)(c) and 40 CFR §270.13(d)]

Not applicable.

A2.I WASTE IN BOILERS AND INDUSTRIAL FURNACES

Table A2.I.1 Waste Feed Streams: Hazardous Waste, Other Fuels, and Industrial Furnace Feed Stocks

Table A2.I.2 Hazardous Waste Feed Streams (page 10)

Attachment A2.I.1 Blending Prior to Firing

Not applicable.

TABLE A2.A.1 HAZARDOUS WASTE GENERATED AT THE FACILITY

Hazardous Waste Code	Waste Description	Hazardous Waste Characteristics	Basis for Hazardous Designation	Hazardous Waste Management Unit
F006	Electroplating Sludge	Toxic	Toxic	ECU &WCU

TABLE A2.A.2 HAZARDOUS WASTES ACCEPTED AT THE FACILITY

Hazardous Waste Code	Waste Description	Hazardous Waste Characteristics	Basis for Hazardous Designation	Hazardous Waste Management Unit
NA	NA	NA	NA	NA

TABLE A2.I.1 WASTE FEED STREAMS: HAZARDOUS WASTE, OTHER FUELS, AND INDUSTRIAL FURNACE FEED STOCKS

Hazardous Waste Code	Heating Value	Level of Antimony/ Arsenic	Level of Barium/ Beryllium	Level of Cadmium/ Chromium	Level of Lead/ Mercury	Level of Silver/ Thallium	Total Chlorine/ Chloride	Ash	Viscosity or Description of Physical Form of the Feed Stream
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE A2.I.2 HAZARDOUS WASTE FEED STREAMS

Hazardous Waste Code	Appendix VIII Constituents Reasonably Expected	Approximate Quantification of Hazardous Constituents Identified
NA	NA	NA

ATTACHMENT A3

WASTE AND ANALYSIS PLAN
THE MANNIK & SMITH GROUP, INC.

WASTE ANALYSIS PLAN

Attachment A3 is not applicable due to the closed status of the two on-site containment units (Eastern Containment Unit and Western Containment Unit). This facility does not accept waste.

See Post Closure Operating License Application, Vol.2 – Closure Plan, Section 2.0, Description of Facility and Closure, NTH Consultants, LTD, July 18, 1994.

ATTACHMENT A4

SECURITY PROCEDURES & EQUIPMENT
THE MANNIK & SMITH GROUP, INC.

SECURITY PROCEDURES AND EQUIPMENT

Existing security measures at the Ford River Raisin Warehouse (RRW) site will be continued during the post-closure period to minimize the possibility of unauthorized entry or activity in the containment unit areas. Refer to Attachment III for figures depicting the current security features at the facility. The security system consists of a combination of the following measures:

1. Surveillance - A 24-hour surveillance system, comprised of facility guards, continuously monitors and controls entry into the facility.

2. Barriers - The facility is located on a peninsula such that open water and marshes form a natural barrier around most of the facility. A chain-link fence extends along the west side of the facility and forms a barrier across the neck of the peninsula.

3. Access Control - The facility is accessed at the main RRW gate, which is manned by a 24-hour security guard. A strict check-in procedure is enforced and only employees and other personnel performing required activities at the facility are admitted.

4. General Facility Warning Signs - Warning signs to deter unauthorized persons from the RRW property are posted at the gate and at other locations around the property perimeter in sufficient numbers to be seen from any approach to the facility. The legend "Private Property - No Trespassing" is legible from a distance of at least 25 feet.

5. Containment Unit Warning Signs - To ensure that unauthorized personnel or visitors do not disturb the containment units, signs are posted at regular intervals along the perimeter of each containment unit. These signs bear the legend "Restricted Area, Unauthorized Personnel Keep Out", which is legible from a distance of 25 feet. In addition, on-site SWMUs are also clearly identified with warning signs posted.

6. Monitoring Well/Piezometer Security - A steel cover with a padlock was placed over the top of each monitoring well or piezometer casing and cemented into place. Prior to each well being sampled or each piezometer being measured, the well/piezometer is inspected for damage or signs of attempted access. In the unlikely event that such is the case, the source of the problem will be immediately investigated and steps will be taken to correct the situation. Problems discovered and the corrective measures taken will be documented on the facility operating log.

7. Preventative Measures - The facility security measures, containment unity, and ground water monitoring system will be properly maintained, and any inadequacies detected during scheduled inspections or at any other time will be required in a timely manner. Signs will be replaced as they become illegible. Soil at the base of the fence will be re-graded as needed to maintain a maximum gap of 12 inches. The fence will be repaired or replaced as necessary to maintain adequate facility security. Access to monitoring wells, piezometers, benchmarks and other site areas will be maintained by mowing and grading access roads as necessary.

ATTACHMENT A5

INSPECTION SCHEDULE
THE MANNIK & SMITH GROUP, INC.

FORM EQP 5111 ATTACHMENT TEMPLATE A5
INSPECTION REQUIREMENTS

This document is an attachment to the Michigan Department of Environmental Quality's *Instructions for Completing Form EQP 5111, Operating License Application Form for Hazardous Waste Treatment, Storage, and Disposal Facilities.* See Form EQP 5111 for details on how to use this attachment.

The administrative rules promulgated pursuant to Part 111, Hazardous Waste Management, of Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451), being R 299.9504, R 299.9508, R 299.9605 and Title 40 of the Code of Federal Regulations (CFR) §§264.15 and 270.14(b)(5), establish requirements for inspections at hazardous waste management facilities. All references to 40 CFR citations specified herein are adopted by reference in R 299.11003

This license application template addresses requirements for inspections at the following hazardous waste management facility: *River Raisin Warehouse* in *Monroe*, Michigan. (Check as appropriate)

☒ Applicant for Operating License for Existing Facility

☐ Applicant for Operating License for New, Altered, Enlarged, or Expanded Facility

This template is organized as follows:

INTRODUCTION
[R 299.9605 and 40 CFR §264.15(a)].

This section presents information pertaining to inspection and maintenance performed for the Western Containment Unit (WCU) and the Eastern Containment Unit (ECU) at the Ford River Raisin Warehouse (RRW). Post-closure monitoring activities were initiated on March 15, 2000 and were conducted in accordance with procedures specified in the Post-Closure Operating License Application, Volume III - Post Closure Plan, dated June 26, 2000.

Information regarding detailed inspection activities is contained in the Post Closure Plan, which is included as Attachment A11 of this application.

A5.A WRITTEN SCHEDULE
[R 299.9605 and 40 CFR §264.15(b)(1)]

The Post-Closure Plan identifies four types of inspections to be performed: weekly, monthly, semi-annual and annual. During weekly inspections, a general visual inspection of the containment units and selected leachate collection system components will be performed. The containment units will be checked for general operation and function. If any items are found to be deficient, they are noted on the inspection log and described further at the end of the log.

The monthly and semi-annual inspections will include all items checked during the weekly inspections in addition to a detailed inspection of the post-closure groundwater monitoring system, further items of the leachate collection system, and a measurement of the sediment containment unit (SCU) leachate level. The annual inspections will include all items checked during the monthly or semi-annual inspections in addition to the confirmation that integrity verification of leachate collection piping has been within the last 12 months for the ECU and WCU. Just as with the weekly inspections, any deficient items will be described at the end of the log. The weekly, monthly, semi-annual, and annual inspection logs are attached.

Additional specific detailed information regarding inspection schedules is contained in the Post Closure Plan, which is included as an Attachment A11 of this application.

A5.A.1 Types of Problems
[R 299.9605 and 40 CFR §264.15(b)(3)]

Inspections of the cover system in place on the ECU and WCU will be completed on a weekly, monthly, semi-annual and annual basis. Qualified personnel will visually inspect both the ECU and WCU by traversing the units on foot and by driving along the access road along the perimeter of the units. Inspection personnel will observe the current conditions and address any changes in the appearance of the cover system. Issues and concerns will be addressed either by RRW staff or inspection personnel. Provided below is a brief summary of inspection activities that will be conducted for the WCU and ECU, including detailed cover system integrity inspection procedures. The cover system visual inspections include the following twelve items:

1. Vegetative cover maintained (mowed) and free of bare spots

Inspection personnel will observe that the vegetative cover located on the WCU and ECU is maintained and free of bare spots. Inspection personnel will make these observations by traversing the cover system on foot and by driving along the access road. If the vegetative cover is not mowed to an acceptable length (less than 6") at the time of the inspection, it is noted on the Inspection Log and given to the RRW Representative. If an area of the cover system needs to be mowed, the task will be completed by a RRW Employee. If bare spots are noted during the inspection, top soil is placed in the area and vegetation established. Bare spots maybe addressed at the time of the inspection or prior to the next inspection by inspection personnel. The vegetative cover is routinely mowed and maintained by a RRW employee. All activities regarding the vegetative cover will be documented on the Inspection Log.

2. Cover free of undesirable plant species.

Inspection personnel will observe that the cover system is free of undesirable plant species by traversing the cover system on foot and by driving along designated access roads. Undesirable plants include noxious weeds and tree species. If undesirable plant species are observed during the site inspection, inspection personnel will spray the undesirable plant with an appropriate herbicide. All undesirable plants and removal of these plants will be documented on the Inspection Log. Weed growth is also maintained during routine mowing of the cover system by RRW personnel.

3. No evidence of burrowing animals.

The cover system will be observed each week for the presence of burrowing animals. Inspection personnel will make these observations by traversing the ECU and WCU on foot and by observations made from the access road. The presence of any burrowing animals within the cover system is unacceptable. Burrow holes will be addressed by utilizing the mud-packing method, which is an MDEQ approved method for rodent control. This method can be accomplished by placing one or two lengths of metal stove or vent pipe in a vertical position over the entrance of the den. The mud-packing mixture is then poured into the pipe until the burrow and pipe are filled with the earth-water mixture. The pipe is removed and dry earth is tamped into the entrance. The mud-pack is made by adding water to a 90 percent earth and 10 percent cement mixture until a slurry or thin cement consistency is attained. All entrances will be plugged with the well-compacted earth and vegetation re-established. Burrow holes will be addresses by inspection personnel during the inspection or prior to the next inspection.

4. No visible surface erosion, soft, wet or unstable areas noted on cover

Inspection personnel will observe the cover system for areas of erosion, soft, wet or unstable areas during each inspection. Inspection personnel will make these observations by traversing the ECU and WCU on foot and by observations made from the access road. Any areas of erosion, soft, wet or unstable areas within the cover system are unacceptable. Inspection personnel will document any areas of standing water on the Inspection Log and address the issues prior to the next inspection. Inspection personnel will address the area of concern by filling in any erosional features and establishing acceptable vegetation. When filling in the areas inspection personnel will maintain an acceptable drainage pattern to address and

prevent the formation of further erosion or soft, wet or unstable areas within the cover system. All activities regarding repairs will be documented on the Maintenance Log.

5. No evidence of standing surface water.

Inspection personnel will observe the cover system for areas of standing surface water during each inspection. Inspection personnel will make these observations by traversing the ECU and WCU on foot and by observations made from the access road. Standing surface water is unacceptable on the landfill cover system. If standing surface water is observed, the area will be filled and vegetation established in order to create an acceptable drainage pattern on the cover system. Inspection personnel will document any areas of standing water on the Inspection Log and address the issues prior to the next inspection.

6. No areas of settlement/subsidence noted.

Inspection personnel will observe the cover system for areas of settlement and subsidence. Inspection personnel will make these observations by traversing the ECU and WCU on foot and by observations made from the access road. Any area of subsidence or settlement located within the cover system is unacceptable. If these areas are observed, inspection personnel will address the areas by be filling the area with topsoil and will establish acceptable vegetation in order to prevent low-lying areas and maintain the drainage pattern of the cover system. Inspection personnel will document any areas of standing water on the Inspection Log and address the issues prior to the next inspection.

7. No cracks in cover soils.

Inspection personnel will observe the cover system for cracks in the cover soils. Inspection personnel will make these observations by traversing the ECU and WCU on foot and by observations made from the access road. Any area of cracks located within the cover system is unacceptable. If cracks are observed in the cover soils, inspection personnel will address the areas by be filling the cracks with topsoil and establishing vegetation. Inspection personnel will document any areas of cracking on the Inspection Log and address the issues prior to the next inspection.

8. Cover free of any other apparent problems which may lead to malfunction

Inspection personnel will observe the cover system for any other apparent problems which may lead to malfunction. Inspection personnel will make these observations by traversing the ECU and WCU on foot and by observations made from the access road. Any observation made by inspection personnel during the site inspections that may lead to malfunction will be documented on the Inspection Log and addressed by either inspection personnel or RRW employees in a time frame appropriate to the situation.

9. Gravel toe drain stable and free of clogging vegetation.

Observations will be made of the gravel toe drain during each of the site inspections. Observations will be made by inspecting the gravel toe drains on foot and by car

along the access road. Vegetation observed in the growing in the gravel toes drains will be removed by either spraying with an herbicide or by physically removing the plant. Inspection personnel will spray small areas of vegetation within the gravel to drain during the site inspection or prior to the next inspection. However, when larger growth areas are observed inspection personnel will inform a RRW representative who will obtain a commercial lawn service to spray the gravel toe trains with an herbicide. In addition, if trees or other large plants are observed, the RRW representative may appoint RRW employees to remove large trees or plants from the gravel toe drains. Inspection personnel will document all spraying and plant removal on the Maintenance Log.

10. Stormwater inlets/outlets are free of sediment and debris and are functional.

During the site inspection stormwater outlets are observed for the presence of sediment and debris which may block flow. Any sediment or debris that may potentially block flow is considered unacceptable and will be removed by inspection personnel during the inspection. Any sediment or debris removal will be documented on the Maintenance Log.

11. Access road intact and functional.

Observations will be made of the access road during each of the site inspections. Observations will be made by driving along the access road. The road will be observed for any holes, washout areas or any physical obstructions that would limit travel on the access road. Any factor that would limit the ability to travel the access road is unacceptable. Inspection personnel will document unacceptable areas of the access road areas on the Inspection Log and inform a RRW Representative. The access road will be repaired or in the process of repair prior to the next inspection. The access road is maintained and repaired by RRW personnel. All areas in need of repair will be documented on the Inspection Log and repaired areas will be documented on the Maintenance Log.

12. Asphalt pavement above cover intact and functional.

Observations will be made of the asphalt pavement cover during each of the site inspections to insure that it is intact and functional. Observations will be made on foot and by driving along the access road. Inspection personnel will document any areas in need of repair on the Inspection Log. Any repairs made to the asphalt pavement cover will be made by RRW personnel prior to the next inspection. All areas repaired will be documented on the Maintenance Log.

The leachate collection system was designed with pump system warning lights. On a weekly basis during the post-closure period, the warning lights on the leachate collection system manholes will be checked for indications of pump system failure. This will be recorded on the Inspection Log

On a monthly basis, leachate sediment within the manholes will be measured for indications of leachate volume and monitoring for storage capacity. In addition, the Sediment Containment Unit (SCU) leachate level will be measured and compared to the as-built elevations for indications of leachate accumulation within the SCU. Measurements will be recorded on the Inspection Log.

On an annual basis, the leachate collection and removal system (LCRS), specifically, the 6" perforated corrugated polyethylene (CPE) pipe will be completely inspected to ensure that the integrity and capacity of the systems are being maintained. The LCRS inspection is limited to those components of the system that can be observed without damage to the structure.

Benchmarks and final cover configuration surveys will be performed every five years.

Additional specific detailed information regarding inspection schedules is contained in the Post Closure Plan, which is included as an Attachment A11 of this application.

A5.A.2 Frequency of Inspection
[R 299.9605 and 40 CFR §§264.15(b)(4), 264.174, 264.193, 264.195, 264.226, 264.254, 264.278, 264.303, 264.347, 264.602, 264.1033, 264.1052, 264.1053, 264.1058, and 264.1083 through 264.1089, where applicable]

The Post-Closure Plan identifies four types of inspections to be performed: weekly, monthly, semi-annual and annual. During weekly inspections, a general visual inspection of the units and selected leachate collection system components will be performed. The monthly and semi-annual inspections will include all items checked during the weekly inspections in addition to a detailed inspection of the post-closure groundwater monitoring system.

A5.B REMEDY SCHEDULE
[R 299.9605 and 40 CFR §264.15(c)]

The Post-Closure Plan (Attachment A11) includes procedures for rectifying system failures and correcting items that are damaged or nonfunctional that the inspections reveal. Maintenance Logs are attached.

A5.C INSPECTION LOG OR SUMMARY
[R 299.9605 and 40 CFR §264.15(d)]

The owner or operator must record inspections in an inspection log or summary. Copies of these records must be kept for at least three years from the date of inspection. At a minimum, these records must include the date and time of the inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions taken. Inspection personnel will record all of findings on the attached Inspection Log. Each Inspection Log is given to a RRW representative for a signature. Maintenance logs will be created when maintenance is performed to mend failures, damaged and or nonfunctional items. The weekly, monthly, semi-annual, and annual inspection logs and maintenance logs are attached.

ATTACHMENT A6

PREPAREDNESS/PREVENTION OR WAIVER
THE MANNIK & SMITH GROUP, INC.

FORM EQP 5111 ATTACHMENT TEMPLATE A6
PREPAREDNESS AND PREVENTION

This document is an attachment to the Michigan Department of Environmental Quality's *Instructions for Completing Form EQP 5111, Operating License Application Form for Hazardous Waste Treatment, Storage, and Disposal Facilities.* See Form EQP 5111 for details on how to use this attachment.

The administrative rules promulgated pursuant to Part 111, Hazardous Waste Management, of Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451), R 299.9504, R 299.9508, and R 299.9606 and Title 40 of the Code of Federal Regulations (CFR) §§264.30 through 264.37 establish requirements for preparedness for and prevention of releases of hazardous wastes or constituents at hazardous waste management facilities. All references to 40 CFR citations specified herein are adopted by reference in R 299.11003.

This license application template addresses requirements for preparedness for and prevention of releases of hazardous wastes or constituents at the following hazardous waste management facility for the River Raisin Warehouse in Monroe, Michigan.

(Check as appropriate)

Applicant for Operating License for Existing Facility:

- ☐ No waiver requested
- ☒ Waiver requested for one or more units for required equipment
- ☐ Waiver requested for one or more units for required aisle space

Applicant for Operating License for New, Altered, Enlarged, or Expanded Facility:

- ☐ No waiver requested
- ☐ Waiver requested for one or more units for required equipment
- ☐ Waiver requested for one or more units for required aisle space

This template is organized as follows:

INTRODUCTION
R 299.9606 and 40 CFR §264.31).

This section is not applicable due to the closed status of the two on-site containment units (Eastern Containment Unit and Western Containment Unit).

A6.A REQUIRED EQUIPMENT
[R 299.9606 and 40 CFR §264.32]

Since the two on-site containment units are closed and no wastes or constituents are handled at the facility, any equipment related such operations do not exist.

A6.A.1 Internal Communication System
[R 299.9606 and 40 CFR §264.32(a)]

Not applicable.

A6.A.2 Emergency Response Communication System
[R 299.9606 and 40 CFR §264.32(b)]

Not applicable.

A6.A.3 Fire, Spill, and Decontamination Equipment
[R 299.9606 and 40 CFR §264.32(c)]

Not applicable.

A6.A.4 Adequate Water Volume
[R 299.9606 and 40 CFR §264.32(d)]

Not applicable.

A6.B TESTING AND MAINTENANCE OF EQUIPMENT
[R 299.9606 and 40 CFR §264.33]

Not applicable.

ATTACHMENT A7

CONTINGENCY PLAN
THE MANNIK & SMITH GROUP, INC.

CONTINGENCY PLAN

Attachment A7 is not applicable due to the closed status of the two on-site containment units (Eastern Containment Unit and Western Containment Unit).

ATTACHMENT A8

TRAFFIC INFORMATION
THE MANNIK & SMITH GROUP, INC.

TRAFFIC INFORMATION

Traffic at the facility is restricted to authorized personnel only. Traffic on the closed ECU and WCU is limited to authorized maintenance vehicles only.

See Other Required Attachments (A4) for traffic provisions and restrictions.

ATTACHMENT A9

LOCATION INFORMATION
THE MANNIK & SMITH GROUP, INC.

LOCATION INFORMATION

See Attachments (II, III and IV) for site location and facility details.

ATTACHMENT A10

PERSONNEL TRAINING PROGRAM
THE MANNIK & SMITH GROUP, INC.

FORM EQP 5111 ATTACHMENT TEMPLATE A10
PERSONNEL TRAINING

This document is an attachment to the Michigan Department of Environmental Quality's *Instructions for Completing Form EQP 5111, Operating License Application Form for Hazardous Waste Treatment, Storage, and Disposal Facilities.* See Form EQP 5111 for details on how to use this attachment.

The administrative rules promulgated pursuant to Part 111, Hazardous Waste Management, of the Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451), R 299.9501, R 299.9605 and Title 40 Code of Federal Regulations (CFR) §§264.16 and 270.14(b)(12), establish requirements for personnel training programs at hazardous waste management facilities. All references to 40 CFR citations specified herein are adopted by reference in R 299.11003.

This license application template addresses requirements for a personnel training program at the hazardous waste management facility for the River Raisin Warehouse in Monroe, Michigan. The information included in the template demonstrates how the facility meets the personnel training requirements for hazardous waste management facilities.

This template is organized as follows:

A10.A CONTENT OF INTRODUCTORY AND CONTINUING EDUCATION TRAINING PROGRAMS

[R 299.9605 and 40 CFR §264.16(a)]

Personnel associated with Post-Closure tasks will successfully complete a training program consisting of site-specific document review and on-the-job training for all personnel involved with containment unit inspections and environmental monitoring activities at the Ford River Raisin Warehouse (RRW). All personnel are trained on site under the direct supervision of senior staff members familiar with current status of on-site hazards, and the post-closure care activities are

directed by a State of Michigan Registered Professional Engineer and a Certified Hazardous Materials Manager.

A10.A.1 Outline for Introductory Training Program
[R 299.9605 and 40 CFR §§264.16(a)(1) and 264.16(d)(3)]

Prior to conducting any on-site activities, personnel associated with Post-Closure tasks will receive site specific introductory training and specialized certified training. The training consists of the following topics:

- HAZWOPER
- Review of background information of site environmental conditions and general construction and configuration of containment units
- Review of Health and Safety Plan (HASP)
- Job Specific Training

A10.A.2 Outline for Continuing Education
[R 299.9605 and 40 CFR §§264.16(a)(1) and 264.16(d)(3)]

Continuing education is implemented as needed. The training director administers the continuing education requirements. Annual HAZWOPER refresher trainings along with job specific trainings will be conducted pursuant to each job description.

A10.B PERSONNEL SUBJECT TO TRAINING REQUIREMENTS
[R 299.9605 and 40 CFR §§264.16(a),(d)]

A10.B.1 Job Titles and Job Descriptions
[R 299.9605 and 40 CFR §§264.16(d)(1),(2)]

Environmental Scientist and or Technicians will be conducting tasks associate with Post-Closure activities. Below are the general job descriptions for each.

Environmental Scientist Job Description

General Characteristics:
• Applies standard techniques, procedures and criteria to perform assigned tasks as part of a broader assignment.
• Exercises judgment on details of work and in application of standard methods for conventional work.

Technical Responsibilities:
• Collects data, gathers information or documents and prepares simple reports required for project permits.
• Performs standard computations or analysis.
• Prepares drawings and visual aids.
• Performs a variety of routine tasks, which provide experience and familiarity with methods, practices

Direction Received:
• Receives close supervision on unusual or difficult problems, and general review of all aspects of work.

Communication Skills:
• Possesses basic oral and written communication skills.
• Interacts with other staff.

Technician Job Description

General Characteristics:
• Applies standard techniques, procedures and criteria to perform assigned tasks as part of a broader assignment.
• Exercises judgment on details of work and in application of standard methods for conventional work.

Technical Responsibilities:
• Coordinates, produces, completes and analyzes sketches, layouts, graphs, charts and drawings required for specific projects and reports.
• Understands the CADD system, procedures and coordinates layout details and dimensions (as applicable).
• Performs non-routine and complex assignments involving responsibility for planning and conducting a complete project of relatively limited scope or a portion of a large and more diverse project; may include budget management.
• Performs quality assurance checks.
• Manages material and field equipment.
• Performs routine tasks, which provide experience and familiarity with the technical staff, methods and practices.

Direction Received:
• Independently maintains accuracy, quality, and completeness and schedule adherence.

Communication Skills:
• Possesses basic oral and written communication skills.

A10.B.2 Description of How Training is Designed to Meet Actual Job Tasks
[R 299.9605 and 40 CFR §§264.16(a)(1) and (d)(3)]

The senior staff members assigned to instruct proposed inspection personnel familiarize the personnel with the site, introduce them to the RRW staff and safety procedures, and provide the personnel with a line-by-line presentation of the inspection components contained within the inspection logs. These items include inspection components of the containment unit cover, the leachate collection systems components, and monitoring wells and piezometers. Personnel are instructed to follow up on maintenance issues that are the responsibility of the RRW, and to conduct other maintenance activities such as erosion control, well maintenance, access road maintenance, the clearing of unwanted vegetation, and to mitigate damage created by burrowing animals. Personnel are instructed on the completion of the weekly, monthly, semi-annual, and annual inspection logs, and the completion of maintenance logs for any maintenance activity conducted at the RRW.

A10.C FREQUENCY OF REQUIRED TRAINING
[R 299.9605 and 40 CFR §§264.16(b), (c)]

A10.C.1 Initial Training
[R 299.9605 and 40 CFR §264.16(b)]

Each employee completes the site specific training within six months of their assignment to the facility. Employees undergoing initial training are not allowed to work in unsupervised positions until the required training is completed.

A10.C.2 Continuing Education
[R 299.9605 and 40 CFR §264.16(c)]

Annual HAZWOPER refresher trainings will be conducted. Other job specific trainings will be conducted pursuant to each job description on an as need basis.

A10.D TRAINING DIRECTOR
[R 299.9605 and 40 CFR §264.16(a)(2)]

All personnel are trained on site and off site under the direct supervision of senior staff members familiar with current status of on-site hazards. The post-closure care activities are directed by a State of Michigan Registered Professional Engineer and a Certified Hazardous Materials Manager.

A10.E DOCUMENTATION AND RECORD KEEPING REQUIREMENTS
[R 299.9605 and 40 CFR §§264.16(d) and (e)]

A10.E.1 Documentation
[R 299.9605 and 40 CFR §264.16(d)]

A10.E.1(a) Job Titles and Names of Employees Filling Each Job
[R 299.9605 and 40 CFR §264.16(d)(1)]

Job titles and employee names conducting post-closure activities are maintained at the facility in paper form. This form may be updated regularly as needed.

A10.E.1(b) Written Job Descriptions
[R 299.9605 and 40 CFR §264.16(d)(2)]

Written job descriptions for the jobs titles listed above are maintained at the facility in paper form. Job descriptions may be updated regularly as needed.

A10.E.1(c) Written Description of Type and Amount of Training Given to Each Position
[R 299.9605 and 40 CFR §264.16(d)(3)]

Written description of the type and amount of the training given to each employee is maintained at the facility. Written description of the type and amount of the trainings may be updated as needed.

A10.E.1(d) Documentation That Training Has Been Given to and Completed by Facility Personnel
[R 299.9605 and 40 CFR §264.16(d)(4)]

Documentation that training has been given to and completed by each employee is maintained at the facility.

A10.E.2 Record Keeping

[R 299.9605 and 40 CFR §264.16(e)]

Training records for current employees will be kept at the facility and will be updated as needed.

ATTACHMENT A11

POST-CLOSURE PLAN
THE MANNIK & SMITH GROUP, INC.

FORM EQP 5111 ATTACHMENT TEMPLATE A11
CLOSURE AND POSTCLOSURE CARE PLANS

This document is an attachment to the Michigan Department of Environmental Quality's (DEQ) *Instructions for Completing Form EQP 5111, Operating License Application Form for Hazardous Waste Treatment, Storage, and Disposal Facilities.* See Form EQP 5111 for details on how to use this attachment.

The administrative rules promulgated pursuant to Part 111, Hazardous Waste Management, of Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, (Act 451), R 299.9613 and Title 40 of the Code of Federal Regulations (CFR), Part 264, Subpart G, establishes requirements for the closure and, if necessary, postclosure care of hazardous waste management facilities. All references to 40 CFR citations specified herein are adopted by reference in R 299.11003. This license application template addresses requirements for the proper closure and, if necessary, postclosure care of the hazardous waste management units and the hazardous waste management facility for the *River Raisin Warehouse* in Monroe, Michigan. The information provided in this template was used to prepare the closure and postclosure care cost estimate provided in Template A12, "Closure and Postclosure Care Cost Estimates."

Ensure that all samples collected for waste characterization and environmental monitoring during closure and postclosure care activities are collected, transported, analyzed, stored, and disposed by trained and qualified individuals in accordance with the QA/QC Plan. The QA/QC Plan should, at a minimum, include the written procedures outlined in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, Third Edition, Chapter 1 (November 1986), and its Updates.

A11 POSTCLOSURE PLAN

[R 299.9613 and 40 CFR §264.118]

A11.1 Applicability

(Check as appropriate)

☐ **Not applicable**: Hazardous waste will not be left behind at closure. A survey plat, postclosure care, postclosure certifications, and other notices are not required.

☒ **Applicable**:

☐ Contingent plan
☒ Landfill unit

A11.2 Postclosure Care Objectives

The River Raisin Warehouse facility will complete the activities listed in Table A11.1 in order to achieve the following:

1. Maintain the integrity and effectiveness of the final cover, including making repairs to the cap as necessary to correct the effects of settling, subsidence, erosion, or other events;
2. Operate the leachate collection and removal system until leachate is no longer detected;
3. Maintain and monitor the leak detection system in accordance with R 299.9613 and 40 CFR §§264.301(c)(3)(iv) and (4) and 264.303(c), and comply with all other applicable leak detection system requirements of this part;
4. Maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of R 299.9612 and 40 CFR, Part 264, Subpart F;
5. Prevent run-on and run-off from eroding or otherwise damaging the final cover; and
6. Protect and maintain surveyed benchmarks used in complying with R 299.9613 and 40 CFR §264.309.

Note: For detailed information for how the above activities are to be completed, please see the attached Post-Closure Operating License Post-Closure Plan revised may 2017.

A11.3 Postclosure Care Period Point of Contact

The planned monitoring and maintenance activities and the associated frequencies are designed to ensure the integrity of the cap and final cover system and the proper functioning of the monitoring system for each unit listed in Table A11.1. The point of contact for ensuring the performance of these activities is listed below.

Name and/or Title	Thomas E. Peters, CPG, CHMM
Address	2365 Haggerty Road South, Canton, MI 48188
Telephone	734-397-3100

A11.4 Postclosure Care Activities

Table A11.1 Postclosure Monitoring and maintenance

The following table identifies, for each unit requiring postclosure care, planned monitoring and maintenance activities and the frequency at which these activities will be performed.

Unit	Planned Monitoring Activities	Frequency	Planned Maintenance Activities	Frequency
Western Containment Unit	See attached Post-Closure Plan	See attached Post-Closure Plan	See attached Post-Closure Plan	See attached Post-Closure Plan
Eastern Containment Unit	See attached Post-Closure Plan	See attached Post-Closure Plan	See attached Post-Closure Plan	See attached Post-Closure Plan

Sediment Containment Unit	See attached Post-Closure Plan	See attached Post-Closure Plan	See attached Post-Closure Plan	See attached Post-Closure Plan

A11.5 Postclosure Care Plan Amendment
[R 299.9613 and 40 CFR §264.118(d)]

The Postclosure Care Plan will be amended whenever:

1. Changes in the operations or facility design will affect closure and postclosure care; or
2. There is a change in the expected year of closure, if applicable; or
3. Unexpected events during closure require a modification to the plan.

A11.6 Certification of Postclosure
[R 299.9613]

Within 60 days of completion of postclosure care Ford will submit to the Director, by registered mail, a certification that postclosure care for the hazardous waste management unit or facility, as applicable, has been completed in accordance with the specifications in the approved postclosure plan. The certification will be signed by the owner/operator of River Raising Warehouse and by an independent registered professional engineer. Documentation supporting the independent registered engineer's certification will be furnished to the Director in accordance with R 299.9613(5). The River Raisin Warehouse facility will maintain financial assurance for postclosure until the Director releases the River Raisin Warehouse facility from the financial assurance requirements for postclosure under R 299.9703 and 40 CFR §264.143(i).

The certification must be worded as follows:

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

RESOURCE CONSERVATION AND RECOVERY ACT
MICHIGAN PUBLIC ACT 451,
ARTICLE II, CHAPTER 3
PART 111 – HAZARDOUS WASTE MANAGEMENT

POST CLOSURE OPERATING LICENSE POST CLOSURE PLAN

WASTE DISPOSAL SURFACE IMPOUNDMENTS FOR
FORD RIVER RAISIN WAREHOUSE
MONROE, MICHIGAN
MID 005 057 005

MAY 2017

(REVISION TO OCTOBER 9, 2012 POST-CLOSURE PLAN PREPARED FOR FORD MOTOR COMPANY)

PREPARED FOR:
FORD MOTOR COMPANY
290 TOWN CENTER DRIVE, SUITE 800
DEARBORN, MICHIGAN 48126

Mannik Smith GROUP

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APPENDICES

1.0 INTRODUCTION AND SITE DESCRIPTION

This document describes the monitoring and maintenance activities following closure of the surface impoundments and associated areas at the Ford Motor Company (Ford) Ford River Raisin Warehouse (RRW). This plan is prepared in accordance with the requirements of 40 §265.188. The activities described in this plan are performed in accordance with the requirements of 40 CFR §117 through §120.

The RRW is located at 3200 East Elm Avenue in Monroe, Michigan. The site lies adjacent to marshy areas near the shore of Lake Erie, north of the mouth of the River Raisin, as shown on Figure 1, Site Location Map.

Several studies have been performed prior to the final closure of the surface impoundments. The investigations provide information on geology and hydrogeology of the site, as well as the characteristics of the impounded waters. The results of these studies are presented in the following reports and are summarized in the following reports.

- Phase I – Feasibility Study, Closure of Disposal Area, prepared by NTH Consultants, Ltd., March 1987;
- Supplemental Waste Characterization Study, prepared by NTH Consultants, Ltd., August 1987; and
- Report on Phase II, Preliminary Field Investigation, prepared by NTH Consultants, Ltd., August 1988.

The findings of these studies are summarized in the Closure Plan.

The site includes two containment units that contain electroplating wastes (F006) and impacted soils that have been solidified by addition of a fly ash/cement kiln dust/lime kiln dust/cement mixture. The location of the containment units are shown on Figure 2, Site Plan. The containment system of each unit consists of a native clay base, a cutoff wall surrounding each unit keyed into the underlying clay, and a clay/flexible membrane composite cover. Leachate collection systems collect leachate from the interior of the containment units. Leachate is pumped to the on-site wastewater treatment plant and from there to the local publicly owned treatment works (POTW) via the sanitary system. All discharges to the POTW are made in accordance with the RRW's sewer discharge permit and local sewer use ordinance.

A containment unit to store sediments impacted with polychlorinated biphenyl compounds (PCBs) was constructed within the southern half of the Eastern Containment Unit (ECU), see Figure 2. The Sediment Containment Unit (SCU) has a separate leachate collection system, which is accessed by a large diameter pipe on the south side of the SCU. When required, this leachate is characterized in a batch process before hauling it to the appropriate treatment/disposal facility.

The natural artesian ground water conditions at the site along with the leachate collection system maintain an inward and upward hydraulic gradient at the two containment units. Greater detail regarding the containment unit's design and construction can be found in the Closure Plan.

The post-closure care period began in September 1999 and will extend for 30 years following closure. The post-closure ground water monitoring program consists of a hydraulic monitoring component and a ground water quality monitoring component. The hydraulic monitoring system documents the inward hydraulic gradient across the cut off wall, the upward artesian bedrock gradient, and the effectiveness of the leachate collection system and cutoff wall barrier. The ground water quality monitoring determines whether chemical constituents are impacting ground water outside the containment units. Further detail is presented in Section 3.2.

A copy of the current approved Post-Closure Plan will be kept at the RRW for the duration of the post-closure period and the office to be contacted regarding the post-closure monitoring and maintenance activities during the post-closure care period is:

Ford Motor Company – Environmental Quality Office
Fairlane Plaza North - 290 Town Center Drive, Suite 800
Dearborn, Michigan 48126

2.0 MONITORING AND REPORTING

2.1 PREVIOUS GROUND WATER MONITORING

Previous studies of ground water quality at the RRW have considered both water quality beneath the impoundments and water quality outside the impoundments.

A limited evaluation of ground water beneath the impoundments was conducted in 1988 by NTH Consultants (Report on Phase II, Preliminary Field Investigation, August 1988). A number of wells were installed near the future locations of both the Western Containment Unit (WCU) and Eastern Containment Unit (ECU). Wells were installed and sampled in both the shallow marsh sequence deposit and in the confined bedrock aquifer. Concentrations of metals observed in samples collected from the wells in each ground water zone did not indicate vertical migration of waste constituents from the impoundments. Three well water samples collected from marsh sequence soils beneath Area C did contain detectable amounts of cyanide as well as several organic compounds.

Three phenolic compounds (phenol, 2-methyl phenol and 4-methyl phenol) were found in one sample from the bedrock aquifer under the ECU. One phthalate compound (2-ethyl hexylphthalate) was observed in the water sample from the bedrock under the ECU. No organic compounds were observed in the water samples taken from the WCU.

Evaluation of ground water outside the impoundments has been conducted since 1983. The interim ground water monitoring program was designed to detect migration of any chemical constituents from the two RCRA regulated impoundments (now part of the ECU). The interim ground water monitoring system consisted of five monitoring wells (designated MW-1, 2, 3, 5, and 6) located along the northeast side of the ECU and one well (MW-8) located on the west side of the WCU. Based on comparison of historic surface water levels at the impoundments with water levels in the monitoring wells inside the impoundments, all wells were considered downgradient of the impoundments.

The interim monitoring wells were screened in the uppermost saturated soil unit (marsh deposits, shallow sands, or clay). This shallow unit was believed to be the most likely pathway for migration of chemical constituents from the regulated units because of the protection offered to the bedrock aquifer by the overlying clay and a prevailing upward vertical hydraulic gradient. Each monitoring well was installed to a depth of approximately 20 feet below ground surface.

Statistically significant increases in indicator parameter levels have been noted at several times during the course of the monitoring program. In general, the detected concentrations of these parameters have been lower than health-based criteria or the concentrations have not been confirmed during subsequent sampling events. For instance, in December 1993 dissolved cadmium was detected in a ground water sample from MW-8 at a concentration slightly higher than the health-based drinking water criterion developed by the Michigan Department of Environmental Quality, or subsequent authority (MDEQ). However, no dissolved cadmium was detected in a duplicate ground water sample collected from MW-8 during the same sampling event. Similar sporadic occurrences of dissolved nickel, dissolved hexavalent chromium, and total cyanide

have been noted. None of these three parameters have been detected at concentrations greater than health-based criteria.

As part of construction of the containment units, all monitoring wells associated with the interim ground water monitoring program were abandoned. These former well locations were situated in the area of the now-existing containment units. Accordingly, this data is no longer applicable. During the licensing process, the issue of low level phenols detected at a single bedrock well location was addressed. An independent technical evaluation was prepared by Professor Don Gray of the University of Michigan documenting the effectiveness of the subsurface underlying clay and the artesian bedrock aquifer in preventing downward chemical migration. This study was accepted by MDEQ and investigation of the bedrock aquifer was confirmed to be unnecessary.

3.0 POST-CLOSURE GROUND WATER MONITORING SYSTEM

The post-closure care period will extend for 30 years following closure. The post-closure ground water monitoring program consists of a hydraulic monitoring component and a ground water quality monitoring component. The hydraulic monitoring system documents the upward artesian bedrock gradient and the effectiveness of the leachate collection system and cutoff wall barrier, while the ground water quality monitoring determines whether chemical constituents within the closed containment units are impacting ground water outside the containment units.

3.1 HYDRAULIC MONITORING

The Final Hazardous Waste Management Facility Postclosure Operating License (License) requires that an inward and upward hydraulic gradient be maintained. Ford will conduct post-closure hydraulic gradient monitoring at the site. The focus of post-closure hydraulic gradient monitoring will be confirmation of the existing inward and upward hydraulic gradient for both the Eastern Containment Unit (ECU) and Western Containment Unit (WCU). Seven separate elements, listed below, will be included within the hydraulic monitoring program.

- Containment Unit As-Built Configuration
- Leachate Collection System Operation
- Leachate Collection System Integrity Verification
- Leachate Collection System Observation Points
- Post-Closure Monitor Well/Piezometer Network
- Ground Water Investigation Monitor Well and Surface Water Points

Independently, each of these elements provides an important component of information concerning subsurface water levels and the ground water flow regime around both the ECU and WCU. Collectively, these elements can conclusively demonstrate that the inward and upward hydraulic gradient is present.

3.1.1 Containment Unit As-Built Configuration

The containment units include four key components to influence subsurface ground water flow: cover system; cutoff wall; solidified sludge and leachate collection and removal system (LCRS). Each of these components was incorporated into construction to create a containment unit configuration that, when coupled with the underlying confined bedrock aquifer, produces an inward and upward gradient.

Cover - A cover system was constructed to seal each containment unit. The composite cover consists of a series of layers including a composite low permeability layer (geomembrane and compacted clay), a drainage layer (sand) and a vegetated soil layer (topsoil). The cover system provides long-term restriction of infiltration of precipitation, mitigating precipitation recharge into the

containment units, thereby reducing leachate generation and promoting lower hydraulic head within the containment units.

Cutoff Wall - A subsurface low permeability barrier (i.e., cutoff wall) was constructed around the perimeter of each containment unit, within the existing perimeter containment dikes. The cutoff wall was constructed by replacing a three feet wide section of the containment dike with a low permeability soil-fly ash-bentonite mixture. The three feet wide cutoff wall was keyed a minimum of three feet into the underlying clay till. Field testing during construction indicated that the average permeability of the cutoff wall was 6.6×10^{-8} centimeters/second (cm/sec) for the ECU and 8.7×10^{-8} cm/sec for the WCU. The cutoff wall restricts the flow of ground water into the containment unit, and combined with internal dewatering of the containment units by the leachate collection system, produces higher hydraulic head outside of the containment units.

Solidified Sludge - Sludge within the containment units was solidified as part of the construction. The main focus of solidification was creation of a material capable of meeting the physical performance criteria necessary to ensure stability of the containment units. Multiple additives were utilized for solidification with the primary additives being cement and fly ash and with additional additives such as chip sand, calciment, etc. being incorporated into the mixture in different quantities for various on-site areas of solidification. During the solidification process significant quantities of underlying clay and clay within perimeter dikes was mixed into the solidified matrix. As a result of this solidification, monolithic blocks of solidified sludge were created within the containment units. Field testing during construction indicated that the permeability of the solidified blocks varied significantly with the range being between approximately 1×10^{-4} and 1×10^{-8} cm/sec. This wide range in permeability of the solidified sludge has promoted leachate level variations within the containment units since some of the sludge behaves in a clay-like manner while some behaves in a sand-like manner.

Leachate Collection and Removal System (LCRS) - A LCRS was constructed within the containment units. The LCRS included lateral collection trenches and pipes sloped at approximately one percent towards the perimeter of the containment units and spaced at a maximum of 150 feet intervals. These lateral collection trenches convey leachate by gravity flow from the interior to the perimeter of the containment units. The lateral collection trenches and piping are connected directly (i.e., hard plumbed) to perimeter collection trenches and piping. The perimeter collection trenches and pipes, which are located twenty-five feet inside of the cutoff wall, are sloped at approximately one half percent towards the manholes and convey leachate by gravity flow to the manholes. Leachate is then conveyed from the manholes, via pumping, to the on-site waste water treatment facility. Cleanouts were provided for each piping run to enable maintenance and visual inspection. For the WCU, flow line elevations of the laterals are generally 570 in the interior and 565 at the perimeter and flow line elevations of the perimeter lines are generally 567 at the high end and vary from 565 to 560 at the collection manholes. For the ECU, flow line elevations of the laterals are generally 570 in the interior and 565 at the perimeter and flow line elevations of the perimeter lines are generally 565 at the high end and approximately 558 to 561 at the collection manholes.

Configuration of the LCRS is reflected on Figure 3, Leachate Collection System - WCU and Figure 4, Leachate Collection System – ECU (WCU and ECU Pipe Integrity Verification – October 2011). The LCRS provides internal dewatering of the containment units. The design of the LCRS effectively maintains an inward hydraulic gradient within the containment units by keeping the water level lower than both the surrounding ground water and surface water levels.

Representation of the interaction of the components of the containment units is included as Figure 5, Generalized Containment Unit Subsurface. This graphic representation includes typical leachate, ground water and surface water levels encountered and shows the impact of each separate construction component.

3.1.2 Leachate Collection System Operation

Ford provides continuous operation of the LCRS for the containment units. Leachate within the ECU and WCU is collected by an internal leachate collection system. The system consists of gravel collection trenches, with a 6" corrugated polyethylene pipe at the base. Lateral trenches, roughly perpendicular to the containment unit perimeter, convey leachate from the interior to the perimeter. Perimeter collection trenches direct leachate to collection manholes (LMH-1 through LMH-7). Leachate within the manholes is transferred, via submersible pumps, to leachate pumping station, LPS-1. From LPS-1, leachate is transferred to the existing plant waste water treatment facility (WWTF) for ultimate discharge to the City of Monroe POTW (Permit No. 1030-1).

Final drawdown of the leachate within the containment units was completed in February 1999. Since that date, approximately 27,503,428 gallons of leachate have been treated and sent to the City of Monroe POTW through December of 2016. The monthly leachate generation totals from the containment units are shown on Figure 6. The cumulative leachate generation from the containment units is shown on Figure 7.

The variation in monthly leachate generation is attributed to three separate possible causes. First, initial leachate present within the containment units after closure would tend to increase monthly leachate generation with leachate generation decreasing over time. Second, fluctuations in Lake Erie water levels would tend to impact leachate generation since ground water levels can be expected to mimic Lake Erie water levels. As average Lake Erie water levels increase ground water inflow would increase resulting in higher leachate generation. Likewise, when average Lake Erie water levels decrease ground water inflow would decrease resulting in decreased leachate generation. Finally, fluctuations in precipitation would impact ground water levels by increasing or decreasing ground water recharge.

Ford will continue to monitor operation of the LCRS, in accordance with the License. This monitoring includes monthly volume of leachate pumped from each containment unit, graphical presentation of monthly and annual quantities of leachate generated and comparison of leachate generation over time. This monitoring will be enhanced to include thorough assessment of possible factors that would impact leachate generation, and potentially ground water levels. Leachate generation rates will be evaluated with respect to average Lake Erie water levels, monthly precipitation, and average ground water levels to improve understanding of the interrelationship between these elements. Significant fluctuations in leachate generation will be identified along with possible reasons for the fluctuation. This evaluation and comparison of leachate generation will be utilized to support demonstration of an inward gradient. Ford will calculate leachate generation from each separate unit (ECU and WCU) and note of any significant changes in leachate generation observed at individual manholes within the two containment units.

3.1.3 Leachate Collection System Integrity Verification

In accordance with the License and Post-Closure Plan, Ford has performed annual integrity verification testing for the 6" perforated corrugated polyethylene (CPE) pipe installed within the LCRS trenches. Pipe integrity verification testing has been performed annually from 2000 to 2016. Reports documenting pipe integrity verification testing were prepared and submitted to MDEQ.

Water jet testing of perimeter and lateral collection pipes has been performed using a ¾-inch diameter water jet at 1,000 psi pressure to verify pipe integrity. Additional specialized evaluation of the pipes has been performed on multiple occasions to ensure accurate identification of problem sections. Additional testing has included using higher pressure (up to 2,000 psi) and ¾-inch jet head, using a 4-inch diameter mandrel pulled through the pipe, and using a small video camera.

During the yearly pipe integrity testing, the perimeter lines (between the manholes and their respective terminal cleanouts) will be inspected to document free-flow conditions. Listed below are the manholes and their respective terminal cleanouts:

LMH-1
South Perimeter (East)
East Perimeter (South)
LMH-2
South Perimeter (West)
West Perimeter (South)
LMH-3
Northwest Perimeter (North)
Northwest Perimeter (South)
LMH-4
North Perimeter (East)
East Perimeter (North)
LMH-5
West Perimeter
South Perimeter (West)
LMH-6
North Perimeter (West)
North Perimeter (East)
LMH-7
East Perimeter
South Perimeter (East)

3.1.4 Leachate Collection System Observation Points

The LCRS was constructed to include cleanouts for performance of routine maintenance activities. Each of these cleanouts plus the LCRS manholes provides an observation point for inspection and determination of leachate levels within the containment units. The WCU includes twenty cleanouts and six pipe entry points within three manholes (26 total observation points) while the ECU includes twenty-nine cleanouts and nine pipe entry points within four manholes (38 total observation points).

Inspection of LCS observation points will be performed quarterly. During the yearly pipe integrity testing, the perimeter lines (between the manholes and their respective terminal cleanouts) will be inspected to document free-flow conditions. On a quarterly basis (during the hydraulic monitoring events), leachate free-flow conditions will be confirmed by: a) leachate elevations will be below the inlets in the manholes; and b) the associated terminal cleanouts for each manhole will be checked with a water level meter to ensure that they are dry. If the associated terminal cleanouts are not dry, additional inspections will be implemented within 30 days to determine if the line (or a portion of it) is blocked and not in a free-flow condition.

The elevations for the inlets in the manholes and the associated terminal cleanouts will be based on the as-built elevations, not a water level meter measurement. Additionally, during weekly inspections, the leachate manholes will be observed to ensure that leachate levels within the manholes have not reached a high level condition. The purpose of the inspection will be determination of leachate levels within LCS piping, and whether the pipes are in a free-flow condition. Observations of leachate levels within the LCS pipes will be recorded, along with associated elevations and measurement, and utilized for demonstration of an inward gradient.

3.1.5 Post-Closure Monitor Well/Piezometer Network

The post-closure monitor well/piezometer network includes fourteen separate shallow monitor wells around the perimeter of the containment units. Eight of the post-closure monitor wells (PCW) are associated with the ECU. Six of the PCW's are associated with the WCU. These wells were installed outside of the cutoff wall around the perimeter of each containment unit. PCWs were installed with the tip elevation at the top of the lacustrine clay (or glacial till clay, if lacustrine clay is not present). ECU bottom of well screen elevations vary from approximately 554 to 556 and WCU bottom of well screen elevations vary from approximately 554 to 560.

The post-closure monitor well/piezometer network also includes twenty separate piezometers. Eleven of the post-closure piezometers (PCP) are associated with the ECU. Eight of the PCPs are associated with the WCU. These piezometers were installed with the bottom of screen elevation five feet below the level of the leachate collection system, which is an elevation of approximately 553 to 554 for the ECU and approximately 556 for the WCU. The twentieth PCP was installed outside of the containment units in bedrock, with a bottom of screen elevation of approximately 486, to identify the general bedrock aquifer elevation. Each piezometer was installed in accordance with the Post Closure Groundwater Sampling and Analysis (SAP).

The general layout of the post-closure monitor well/piezometer network is reflected on Figure 2, Site Plan. Post-closure monitor wells PCW-1 through PCW-8 are associated with the ECU while PCW-9 through PCW-14 are associated with the WCU. Piezometers PCP-1 through PCP-8, PCP-15 through PCP-17, and PCL-1 through PCL-3 are associated with the ECU while PCP-9 through PCP-14, PCL-4 and PCL-5 are associated with the WCU. Piezometer PCP-3(Deep) is the bedrock piezometer. Hydraulic monitoring data collected from the post-closure monitor well/piezometer network will be utilized for demonstration of an inward and upward gradient.

3.1.6 Ground Water Investigation Monitoring Well

Monitor wells were installed as part of the ground water investigation required by the License in accordance with the SAP (Appendix A). The purpose of the ground water investigation was to characterize ground water beneath the facility and identify sources of impact to ground water. The focus of the investigation was on the additional solid waste management units (SWMUs) identified at the site. A total of twenty monitor wells were installed as part of this effort and remedial investigation activities. The location of the ground water investigation wells (GW) is reflected on Figure 2, Site Plan.

Ford will measure static water level in monitor wells GW-1 through GW-20, and surface water monitor stations, on a quarterly basis. Hydraulic monitoring data collected from the GW wells will be used for demonstration of an inward gradient.

3.1.7 Ground Water Model

Ford has performed comprehensive ground water modeling for the facility. This modeling is documented within the December 17, 2002, *Ground Water Flow Model Report*. The ground water model (Model) was developed utilizing historic data contained within the License and the construction certification report and was calibrated against fourteen quarterly monitoring events of data collected from the post-closure monitor well/piezometer network and the ground water investigation monitor well and surface water points. The Model successfully predicts an inward and upward gradient for both of the containment units.

A total of fifty-two points were identified for calibration purposes. These points included post-closure wells (PCW-1 through PCW-4 and PCW-6 through PCW-14), piezometers (PCP-1 through PCP-14 and PCL-1 through PCL-5), ground water investigation wells (GW-1 through GW-7, GW-9 and GW-12 through GW-16), and surface gauges (SG-1 through SG-6). The Model predicted ground water or leachate level was compared to the average level encountered as determined from the fourteen separate quarterly monitoring events. The calibration target, identified by the MDEQ, was for the Model predicted ground water or leachate level to be within one standard deviation of the average for the fourteen quarterly monitoring events. The calibration target was achieved for fifty of the fifty-two points, a success rate of 96%. For two points where the calibration target was not achieved the ground water level predicted by the Model was within 1½ inches of the calibration target. The reason the target was not achieved for the two points was attributed to the scarcity of historic information within the area of the North Marsh and along the western side of the WWTF.

Ford proposes to utilize the Model to support the demonstration of an inward gradient. Subsequent quarterly data collected from the fifty-two calibration points will be incorporated into the existing data and the average and standard deviation will be recalculated. The Model output will then be compared to the revised calibration target (i.e., the new average and standard deviation). Demonstration that the Model remains in calibration will be valuable support for the demonstration of an inward hydraulic gradient.

3.1.8 Demonstration Of Compliance For Inward and Upward Gradient

In order to demonstrate compliance with the License for inward and upward gradients, hydraulic monitoring will include quarterly measurement of ground water elevations at the existing post-closure ground water monitoring network, observation points for the LCRS within the containment units, as well as the monitoring wells and surface water monitoring stations dedicated to SWMU ground water quality assessment. Specifically, the points of measurement will include the following:

- Ground water elevations at monitoring wells PCW-1 through PCW-14, and piezometers PCP-1 through PCP-14, PCP-3 (deep) and PCL-1 through PCL-5.
- Ground water elevations at monitoring wells GW-1 through GW-20.
- Water levels in leachate collection system manholes for the ECU (LMH-1 through LMH-4) and WCU (LMH-5 through LMH-7).
- Water levels within leachate collection system cleanouts for the ECU and WCU.

<u>Inward Hydraulic Gradient</u>

Demonstration of an inward gradient is contingent upon the leachate collection system being in a free flow condition as demonstrated by the inspection and maintenance requirements specified in this Post-Closure Plan. Table 1, Hydraulic Monitoring Locations, lists all of the aforementioned hydraulic monitoring locations, including their horizontal coordinates. Table 2, Gradient

Compliance Points, details the individual monitoring points, to which comparisons will be made to the post-closure monitoring well locations at the ECU and WCU that will be used to demonstrate inward gradients. Additional monitoring locations, if deemed necessary, will be identified and proposed for mutual agreement between MDEQ and Ford. Also, Table 3, Leachate System Elevation Calculations, is an example showing how the interpolated leachate elevations will be calculated during each hydraulic monitoring event, and how these elevations will be used to verify inward gradients at the ECU and WCU. Table 4 is the Field Sheet used for collecting hydraulic monitoring data.

Upward Hydraulic Gradient

For demonstration of an upward gradient at the ECU and WCU, the level in the bedrock piezometer, PCP-3(Deep), will be compared to the leachate collection system elevation. The License requires the potentiometric surface of the bedrock aquifer to be above the leachate collection system elevation to demonstrate the presence of an upward gradient. The base leachate collection system elevation for the ECU is 558.1 and for the WCU it is 560.1. The highest point of the leachate collection system within either of the units will be used to compare to PCP-3(Deep).

3.1.9 Hydraulic Monitoring Reporting

To date, Ford has provided hydraulic monitoring reports to document the existing inward and upward hydraulic gradient and to document compliance with the license. For future hydraulic monitoring, Ford will provide a hydraulic monitoring report on a quarterly basis to the Michigan Department of Environmental Quality (MDEQ), Office of Waste Management and Radiological Protection within 60 days of the hydraulic monitoring. This report will document whether an inward hydraulic gradient is being maintained and whether an upward gradient continues to exist in the bedrock aquifer beneath the containment units. The report will incorporate all of the hydraulic monitoring elements presented herein. Specifically, the report contents will include those items listed below:

a) Report text
b) As-built documentation of containment units
c) Updated leachate generation records
d) Graphical comparison of leachate generation rates and ground water levels
e) Leachate levels in perimeter and lateral leachate collection pipes
f) Leachate levels in post-closure piezometers
g) Ground water levels in post-closure wells and ground water investigation wells
h) Ground water contour maps developed using all collected information
i) Ground Water Model comparison to collected historic data to confirm calibration
j) Conclusions regarding the hydraulic gradient conditions present
k) Certification of review and evaluation by a Certified Professional Geologist
l) Certification of review and evaluation by a State of Michigan Licensed Professional Engineer

If hydraulic monitoring indicates that an inward gradient is not being contained at the either of the containment units, and or that an upward gradient no longer exists in the bedrock aquifer beneath the containment unit(s), then Ford will do the following take the necessary actions as described in section 2.1 of the SAP.

3.2 GROUND WATER QUALITY MONITORING

The post-closure monitoring program includes sampling of the 14 monitoring wells (PCW-1 through PCW-14). Sampling began immediately upon installation of the wells. During the first two years, all 14 monitoring wells were sampled quarterly with replicate samples taken during each event. The resulting 16 samples at each location were used to establish base line conditions of water quality. Because the leachate collection system and cutoff wall significantly altered ground water flow conditions in the vicinity of the containment units, a two-year background period was necessary to adequately characterize natural variation in ground water quality.

The RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (September 1986) recommends establishing background concentrations by sampling quarterly for a period of one year and obtaining four replicate samples for each sampling event. The two-year background period was selected to obtain a better representation of the impacts of seasonal variations and changes in flow direction as steady-state ground water flow conditions were re-established following facility closure. Two replicate samples were collected during each sampling event to provide a sample population size equal to that recommended by the EPA and large enough to perform statistical analyses. The background data was evaluated to determine if variability in site ground water conditions is adequately addressed.

After completion of the baseline period, a detection monitoring program was instituted. During detection monitoring, ground water samples are collected from the wells on a semi-annual basis (i.e., two sets of samples per year) in accordance with the SAP and the resulting data will be analyzed according to the statistical procedure described in SAP.

3.2.1 Ground Water Quality Reporting

To date, Ford has provided an Environmental Monitoring Report to document compliance with the License. For future detection monitoring, Ford will provide an Environmental Monitoring report to the MDEQ, Office of Waste Management and Radiological Protection within 90 days after sample collection. The report will incorporate analytical data from the sampled wells and a statistical evaluation of monitoring parameters as specified in the SAP. Specifically, the report contents will include those items listed below:

a) Report text including procedure
b) Laboratory Analytical Results
c) Summary of Group I Analytes
d) Shewart CUSUM Charts/Parametric Prediction Interval Analysis Charts
e) Statistical evaluation conclusion

Within 90 days after each sampling of each monitoring well, Ford will determine if a statistically significant increase has occurred compared to background levels for each parameter listed in Tables 1 and 2 of the SAP. For Group 1 ground water monitoring parameters determined from the Detection Monitoring Phase (Section 8.1.2 of the SAP), any occurrence above the laboratory detection limit(s) for the parameter(s) will be considered statistically significant. If ground water quality monitoring evaluation results in a statistically significant increase, then Ford will take the necessary actions as described in section 8.2 of the SAP.

3.3 LEACHATE COLLECTION AND REMOVAL SYSTEM (LRCS)

3.3.1 Sediment Containment Unit (Scu)

3.3.1.1 Leachate Management

Leachate level monitoring in the SCU has been performed monthly since the final drawdown was completed in February 1999. Post-closure leachate monitoring began on March 15, 2000. Annual leachate monitoring reports have been submitted to the MDEQ. On a monthly basis, the elevation of leachate in the sump is determined using a water probe by measuring from the lower edge of the riser pipe down. The known elevation of the lower edge of the riser pipe is 600.7. The water probe reading can be converted to a sump water level elevation using the sump sketch (Figure 8, Sediment Containment Unit – Details, Drawing 63 of 65 from As-Built Details). Using Figure 8, the leachate elevation can be utilized to determine the quantity of leachate present in the sump. Leachate levels are maintained so that the leachate head above the geomembrane liner does not exceed one foot. The results of leachate level monitoring are maintained in the on-site post-closure monitoring file.

3.3.1.2 Analytical Monitoring

In order to define and characterize the chemical constituents of the leachate in the SCU over time and insure that the detection monitoring parameters are appropriate, analysis for VOCs, SVOCs, Part 201 regulated metals, cyanide, and hexavalent chromium will be conducted every five (5) years. In addition, the field parameters of pH, sulfate, and conductivity will be measured. This analysis will be used to determine whether adding or removing testing parameters for the post-closure well sampling is justified.

3.3.1.3 Leachate Treatment and Disposal

A leachate sample will be collected for analytical testing for off-site disposal or discharge to the POTW of all parameters required by the treatment and disposal facility or POTW, including polychlorinated biphenyls, during each pumping event (if necessary). The leachate sample is collected from the sump using a sampling pump or bailer. Associated chain of custody and analytical test results are kept in the on-site post-closure monitoring file. Results of leachate analysis will be included in the Annual Leachate Monitoring Reports (if conducted).

If required, leachate is treated and disposed of at an appropriate on-site or off-site treatment and disposal facility. If polychlorinated biphenyls are detected the leachate is transported to an off-site treatment and disposal facility. If polychlorinated biphenyls are not detected the leachate is transported to the on-site wastewater treatment plant for treatment and disposal in accordance with the City of Monroe sewer discharge permit or transported to an off-site treatment and disposal facility. The leachate volume treated and disposed of and the treatment/disposal location are maintained in the on-site post-closure monitoring file. Ford will continue to monitor operation of the LCRS as described above, in accordance with the License.

3.3.2 Eastern & Western Containment Unit

3.3.2.1 Leachate Management

The closure design requires the continuous collection and disposal of leachate during the post-closure period. The design consists of a network of slotted piping, which collects leachate and ground water flow in the eastern and western containment units, and

conveys it to collection manholes. Collected liquids are pumped from the manholes to the on-site wastewater treatment plant prior to discharge to the POTW. All sewer discharges are made in accordance with the RRW sewer discharge permit and local sewer use ordinance. On-site personnel will monitor the volume of leachate discharged from the containment units at the site. A monthly summary of the discharge volumes will be maintained in the on-site post-closure monitoring file. On an annual basis, the leachate collection and removal system (LCRS), specifically, the 6" perforated corrugated polyethylene (CPE) pipe will be completely inspected to ensure that the integrity and capacity of the systems are being maintained. The LCRS inspection is limited to those components of the system that can be observed without damage to the structure. Potential items of concern include the manholes (pumps, wiring, piping, etc.), insulation or heating coils (where appropriate), and perimeter and lateral collection piping.

Water jet testing of perimeter and lateral collection pipes (described in section 3.1.3 of this plan) will be performed using a ¾-inch diameter water jet at 1,000 psi pressure to verify pipe integrity and free flow conditions.

3.3.2.2 Analytical Monitoring

In order to define and characterize the chemical constituents of the leachate in the ECU and WCU over time and insure that the detection monitoring parameters are appropriate, analysis for VOCs, SVOCs, Part 201 regulated metals, cyanide, and hexavalent chromium will be conducted every five (5) years. In addition, the field parameters of pH, sulfate, and conductivity will be measured. This analysis will be used to determine whether adding or removing testing parameters for the post-closure well sampling is justified.

3.3.2.3 Leachate Treatment and Disposal

To determine the appropriate level of pretreatment required, if any, prior to discharge to the City of Monroe POTW, a composite leachate sample from the two containment units will be analyzed for the applicable parameters as listed in the RRW sewer discharge permit, cyanide, mercury and PCBs. Testing frequency will be in accordance with the RRW sewer discharge permit. Following each sampling round, the analytical results will be compared with the requirements of the RRW sewer discharge permit and with local sewer use ordinance and the need for pretreatment of the leachate will be addressed.

3.3.3 LRCS Reporting

The licensee shall submit an annual leachate monitoring report to the MDEQ, Office of Waste Management and Radiological Protection by March 1 of the following years for each year during the post-closure care period. The annual leachate monitoring report will include results from the LCRS pipe integrity inspection and specifically include:

1. Leachate volume calculations;
2. Graphical presentation of the monthly and yearly quantities of leachate being generated and pumped from the containment units;
3. Graphical comparison of leachate quantities pumped/generated during the reported year and quantities pumped/generated from previous years;
4. Calculated leachate generation from each separate unit (ECU and WCU) and notation of any significant changes in leachate generation observed at individual manholes within the two containment units.
5. Possible reasons for leachate quantity increases/decreases; and

6. Historical pipe integrity verification summary
7. Results of current year's water jet testing
8. An evaluation of the status of the leachate collection and removal system
9. Summary of analytical results of leachate monitoring and recommendations for additions or deletions of testing parameters.

Annual leachate monitoring reports and LCRS pipe Integrity Reports have previously been submitted to the MDEQ since the March 15, 2000 commencement of post-closure leachate monitoring activities. Future annual leachate reports will incorporate the LCRS pipe integrity monitoring results and evaluation.

The licensee shall submit a leachate characterization report to the MDEQ, Office of Waste Management and Radiological Protection every five years during the post-closure care period, 90 days after the completion of leachate characterization sampling. The leachate characterization report shall include:

1. Report Text
2. Leachate Summary Analytical Results
3. Conclusions of monitoring and recommendations for additions or deletions of monitoring parameters.

Any parameter that is detected at an elevated concentration during leachate monitoring will be evaluated as to whether or not is should be included on the list of groundwater monitoring parameters specified in the SAP.

3.4 INSPECTION ACTIVITIES

3.4.1 Leachate Collection System

The leachate collection system was designed with pump system warning lights. On a weekly basis during the post-closure period, the warning lights on the leachate collection system manholes will be checked for indications of pump system failure. This will be recorded on the Inspection Log (Attachment C). The weekly frequency will detect system failure before accumulated leachate volume exceeds the storage capacity of the manholes and piping. If the light indicates a failure, the pump system will be inspected immediately and repaired to bring the system back to full operation as soon as possible. The licensee will retain these records on-site throughout the post-closure period.

On a monthly basis, leachate sediment within the manholes will be measured for indications of leachate volume and monitoring for storage capacity. In addition, the Sediment Containment Unit (SCU) leachate level will be measured and compared to the as-built elevations for indications of leachate accumulation within the SCU. Measurements will be recorded on the Inspection Log (Attachment C).

These and other items to be inspected are included on an Inspection Log to be filled out by the person performing the inspection. The licensee will retain these records on site throughout the post-closure period.

If during the semi-annual or annual inspections, any items that are found to be damaged or otherwise nonfunctional, corrections will be conducted in accordance with sound engineering practice. Maintenance activities will be recorded on the Maintenance Log, a copy of which is attached in Attachment C. Also included in Attachment C is a schedule that details the date and type of each inspection, as well as other post-closure deliverables.

3.4.2 Inspection Reporting

The licensee shall submit an annual inspection and maintenance report to the MDEQ, Office of Waste Management and Radiological Protection by March 1 of the following year for each year during the post-closure care period, in accordance the License. The annual inspection and maintenance report shall include:

a) Weekly and monthly inspection logs
b) Semi-Annual and annual Inspection logs
c) Maintenance logs
d) Summary of maintenance items performed to maintain the integrity of the landfill and to maintain the final cover such as erosion repair.

Annual inspection and maintenance reports which include the above items have been submitted to the MDEQ, Office of Waste Management and Radiological Protection since the 2000 commencement of post-closure monitoring activities.

3.4.3 Surveys

Benchmarks and final cover configuration surveys will be performed every five years. Ford has submitted three reports, the latest biennial final cover and benchmark survey was submitted to the MDEQ in 2012. Each survey report will be submitted to the MDEQ 90 days after the completion of the survey.

3.4.4 Cover System Integrity

Inspections on a weekly basis ensure the cover system is properly maintained. Items to be inspected are listed in Attachment C and include surface water drainage ways, access roads, and vegetative cover. Inspection logs will be submitted in an annual inspection and maintenance report as described in section 3.4.1 of this plan.

4.0 POST-CLOSURE NOTICES

In accordance with the requirements of 40 CFR §265.119, within 60 days of certified closure the licensee submitted certification that the RRW was closed in accordance with the previously approved Closure Plan to the Director of the MDEQ. Also within 60 days of certified closure, the license submitted to the local zoning authority a survey plat showing the locations and dimensions of the containment units at the site and containing a note stating the licensee's obligation to restrict the disturbance of the containment units. Within 60 days of certified closure, the licensee submitted to the local zoning authority and to the Director of the MDEQ a record of the type, location, and quantity of wastes disposed of on the property. Also within 60 days of certified closure, the licensee recorded a notation on the property deed stating that hazardous waste has been disposed of on the property and future use is restricted.

5.0 DOCUMENTS TO BE MAINTAINED AT THE FACILITY

Ford will maintain at the facility the following documents and amendments required by the license, until post closure is completed, certified by an independent registered professional engineer, and the facility is released from financial assurance requirements for post closure by the director:

- Hazardous Waste Management Facility Operating License
- Post Closure Plan
- Sampling and Analysis Plan
- Facility Engineering Plans and Specifications
- Site Security Plan

- Record Keeping Procedures
- Environmental Monitoring Data and Statistical Records including Reports
- Post Closure Notices

6.0 FINANCIAL ASSURANCE MECHANISM

A copy of the licensee's financial assurance mechanism is located in Attachment D.

7.0 POST-CLOSURE COST ESTIMATE

A copy of the licensee's post-closure estimate is located in Attachment E.

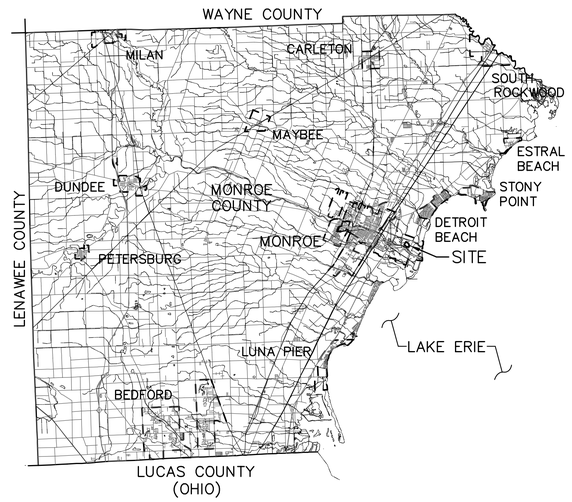
FIGURES

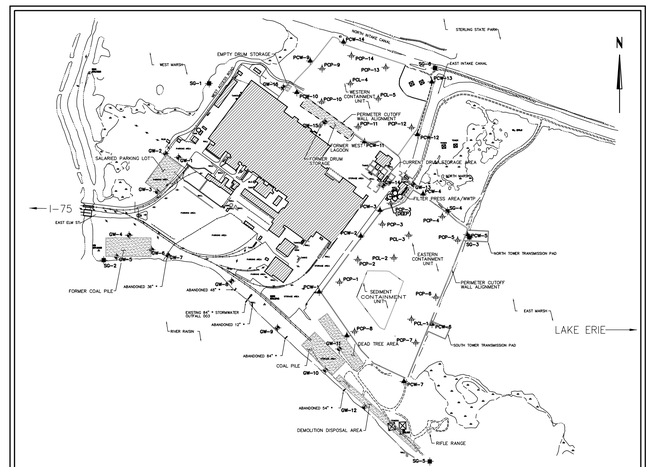
DRAWING NO. 1
PROJ. NO. FORD0112

FORD MOTOR COMPANY
MONROE PLANT

MID 005 057 005
MONROE, MICHIGAN

SITE LOCATION MAP





PREPARED FOR:

FORD MOTOR COMPANY
ENVIRONMENTAL QUALITY OFFICE

Suite 800, Fairlane Plaza North
290 Town Center Drive
Dearborn, Michigan 48126

PREPARED BY:

Mannik Smith GROUP
www.MannikSmithGroup.com

2365 HAGGERTY ROAD S.
CANTON, MICHIGAN 48188
TEL: (734) 397-3100
FAX: (734) 397-3131

INDEX OF DRAWINGS

DATE	SEP 2016
DRAWING NO.	1
PROJ. NO.	FORD0112

10/6/2016

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PROJECT DATE: 11/07/2011
PROJECT NO.: FORD0102
DRAWN BY: HMW
CHECKED BY: TEP

TECHNICAL SKILL. CREATIVE SPIRIT.

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PREPARED FOR:

FORD MOTOR COMPANY

MONROE PLANT
MONROE, MICHIGAN

GENERAL LAYOUT

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LEGEND:

- LCRS MANHOLE
- CUTOFF WALL
- DAMAGED PIPE SECTION
- 624' (624') PIPE LENGTH FROM INSTALLATION (VERIFIED IN 2016)

NOTES:

1) 6" PIPE, 3" PIPE, MANHOLES AND FRENCH DRAINS INSTALLED FROM MARCH 1997 TO OCTOBER 1997 AND JANUARY 1998 TO OCTOBER 1998.
2) FOR ADDITIONAL INFORMATION ON FRENCH DRAINS AND INOPERABLE LENGTHS OF PIPE REFER TO THE RESPECTIVE CORRECTIVE MEASURE REPORT (CMR) REFERENCED.
3) LCRS PIPE INTEGRITY VERIFICATION PERFORMED ON 9/22/16 AND 9/23/16.

NO.	DATE	BY	DESCRIPTION
1	10/09/2014	CJB	FILE UPDATES

PROJECT DATE: 9/29/2016
PROJECT NO.: FORD0136
DRAWN BY: SAH
CHECKED BY: TEP

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FORD MOTOR COMPANY

EASTERN CONTAINMENT UNIT PIPE INTEGRITY VERIFICATION 2016

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LEGEND:

- LCRS MANHOLE
- CUTOFF WALL
- DAMAGED PIPE SECTION
- 624' (624') PIPE LENGTH FROM INSTALLATION (VERIFIED IN 2016)

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NO.	DATE	BY	DESCRIPTION
1	10/09/2014	CJB	FILE UPDATES

PROJECT DATE: 9/29/2016
PROJECT NO.: FORD0136
DRAWN BY: SAH
CHECKED BY: TEP

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FORD MOTOR COMPANY

WESTERN CONTAINMENT UNIT PIPE INTEGRITY VERIFICATION 2016

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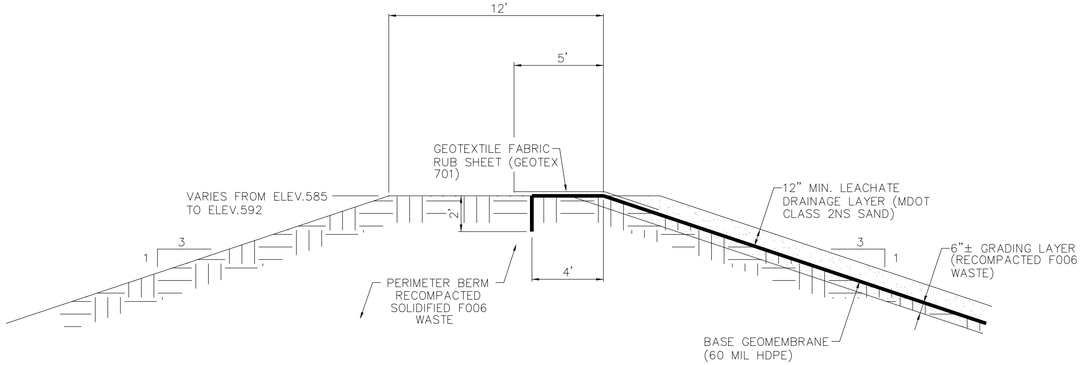
DWG. NO. 63 OF 65
PROJ. NO. F66A3N



BASE GEOMEMBRANE PROTECTION
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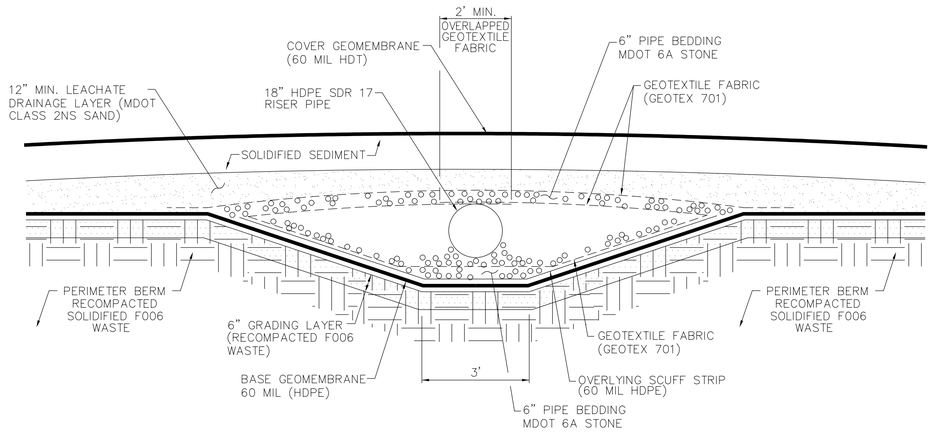

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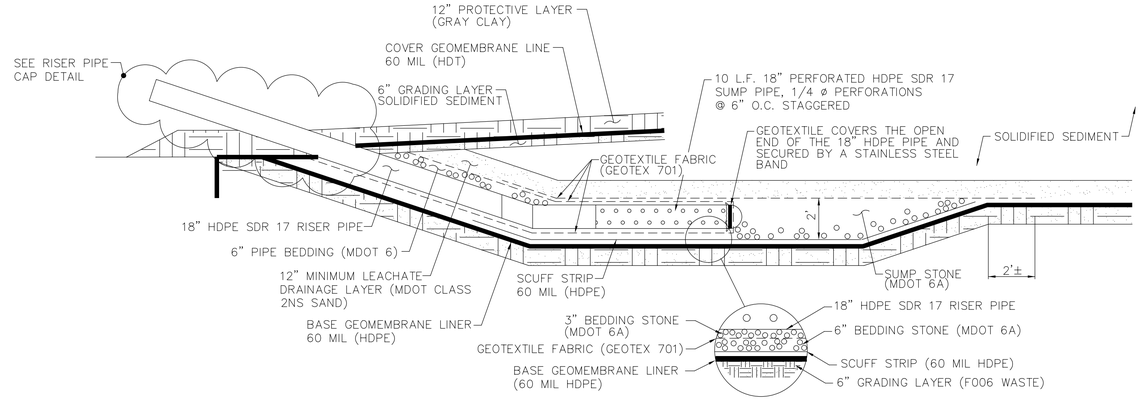

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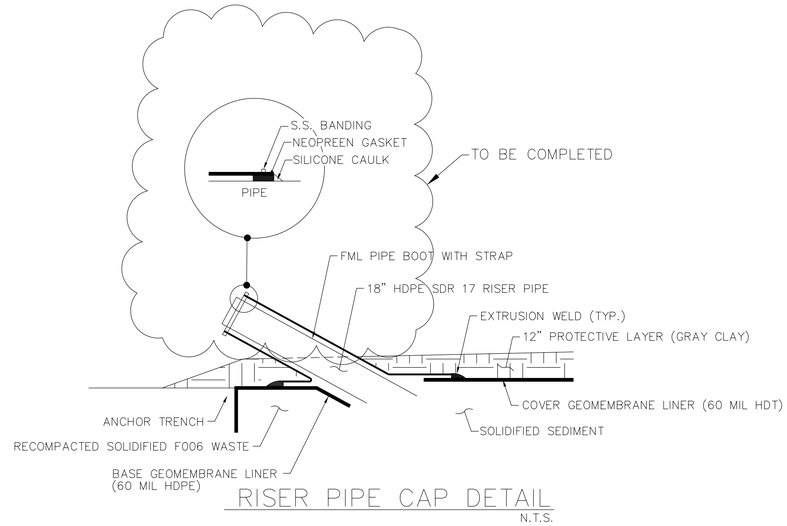

RISER PIPE CAP DETAIL
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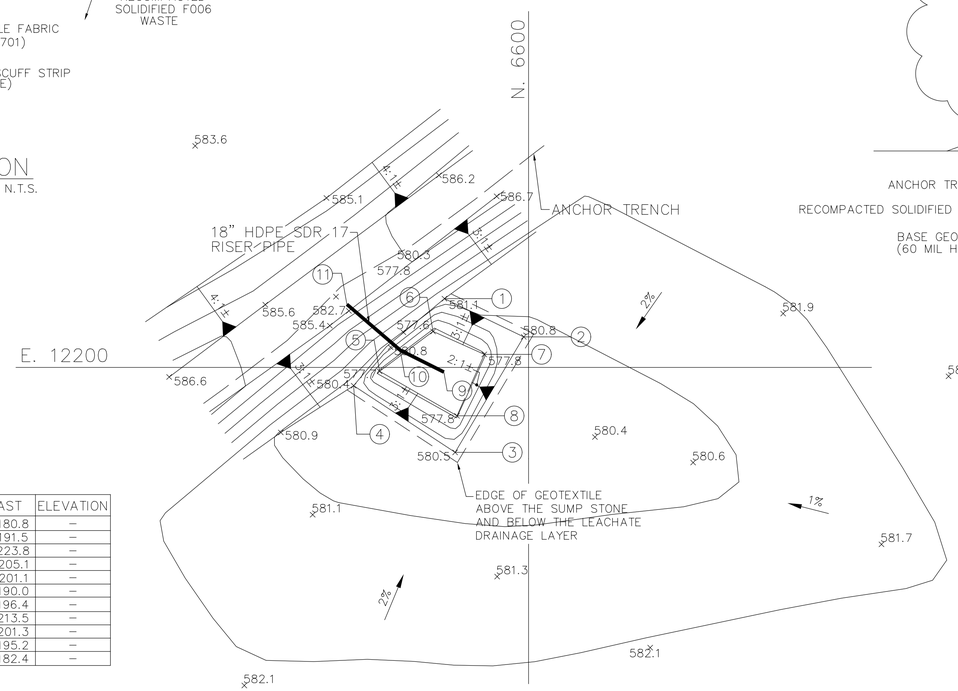


POINT NO.	NORTH	EAST	ELEVATION
1	6576.5	12180.8	–
2	6598.6	12191.5	–
3	6579.5	12223.8	–
4	6551.1	12205.1	–
5	6558.4	12201.1	–
6	6573.3	12190.0	–
7	6587.6	12196.4	–
8	6580.0	12213.5	–
9	6576.3	12201.3	–
10	6564.1	12195.2	–
11	6549.2	12182.4	–

SUMP PLAN VIEW
SCALE: 1"=20'

REV.	BY DATE	CHK'D DATE	DESCRIPTION
1			AS-BUILT DETAILS NTH PLATE 4

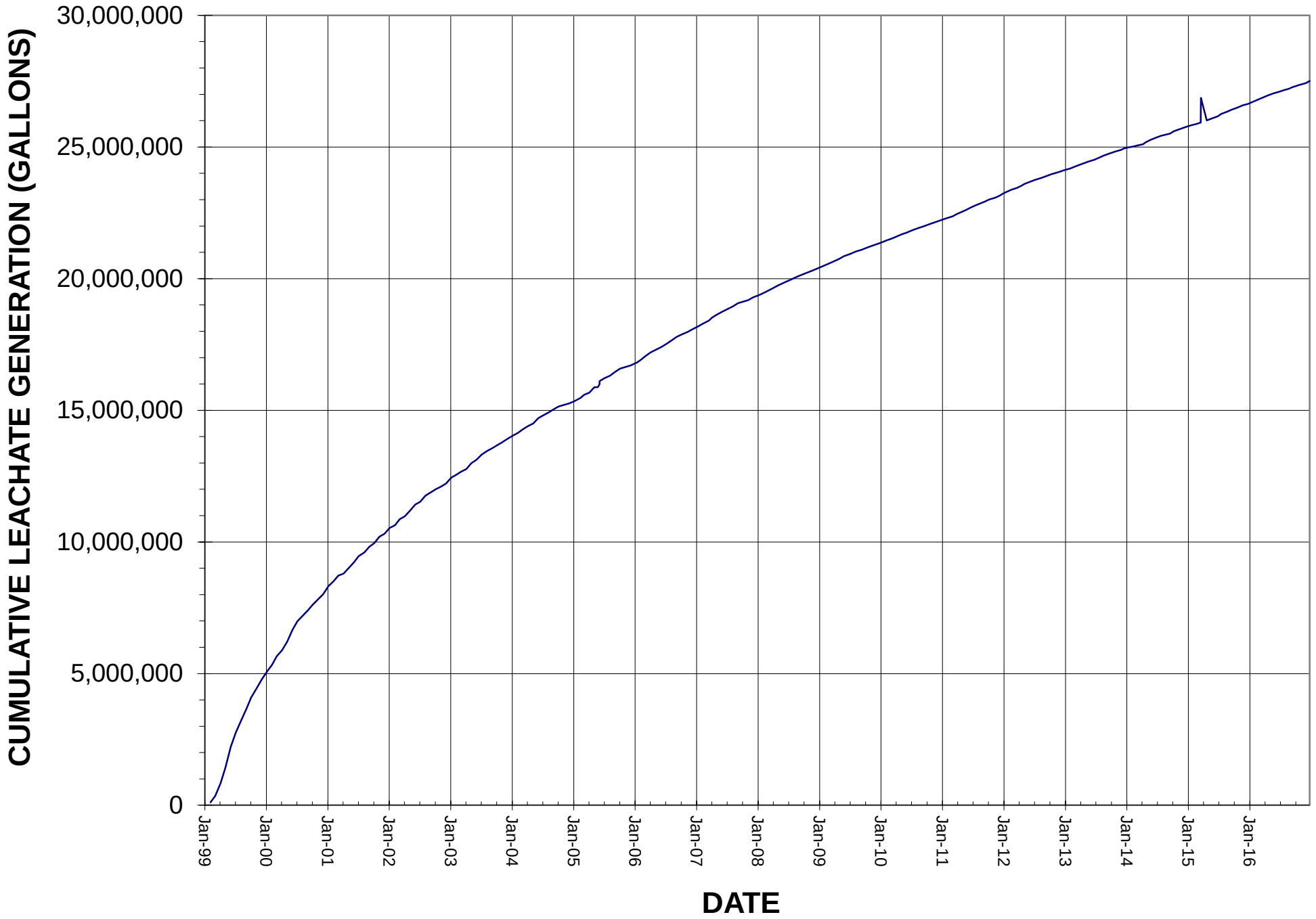
MIDWEST ENVIRONMENTAL CONSULTANTS, INC.
(313) 563-6326
DEARBORN, MICHIGAN

TITLE: VISTEON CORPORATION – MONROE PLANT

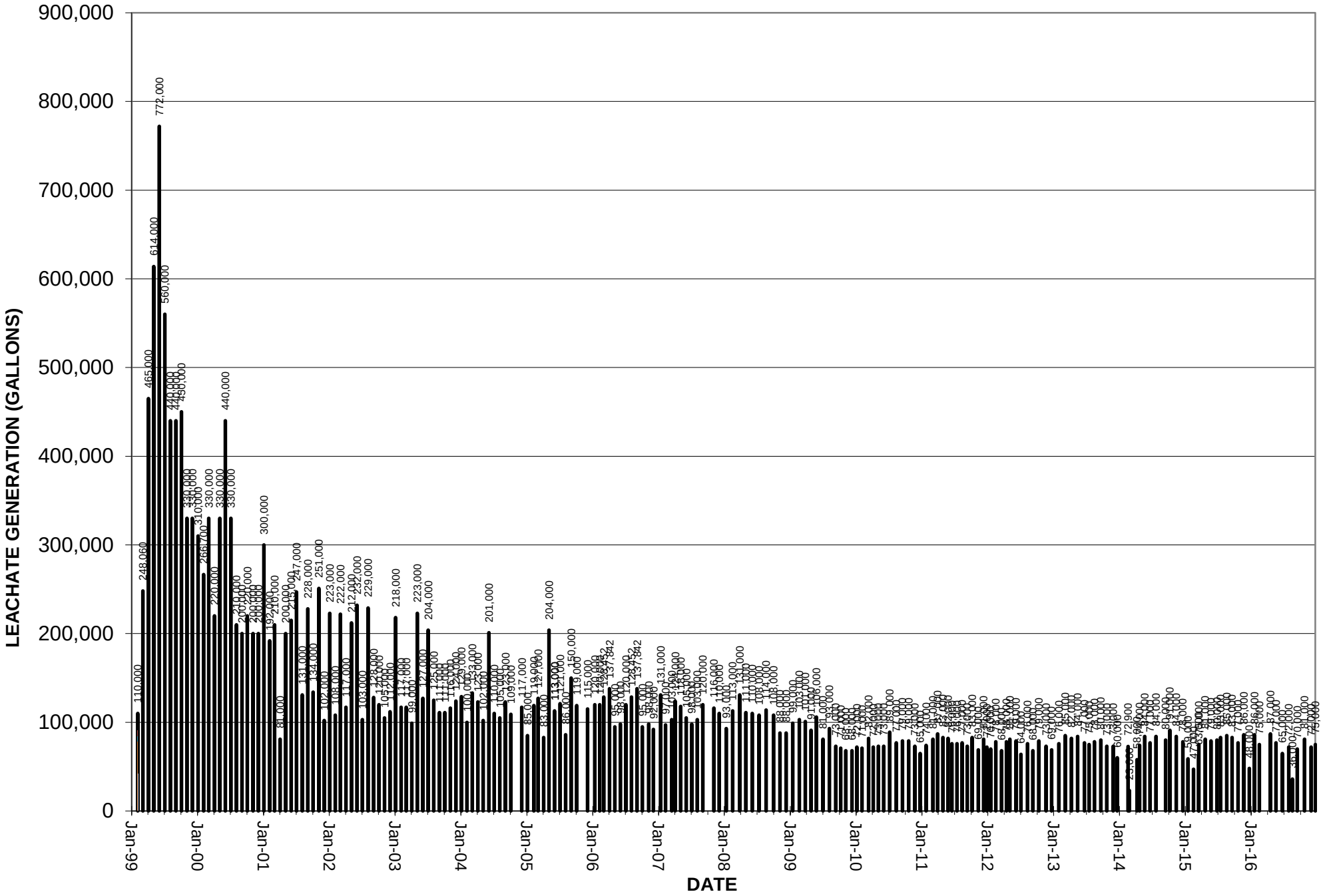
SEDIMENT CONTAINMENT UNIT DETAILS

DRAWN: BMC DATE 2/98	SCALE: AS NOTED	DRAWING NO. 63 OF 65	REV. NO. 1
DESIGNED: BMC DATE 2/98	REVIEWED: BMC DATE 2/98		
APPROVED: DATE	PROJECT NO. F66A3N	CADD FILE: F66A3N06	

ECU/WCU CUMULATIVE LEACHATE GENERATION (Total)



ECU/WCU MONTHLY LEACHATE GENERATED (Total)



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TABLES

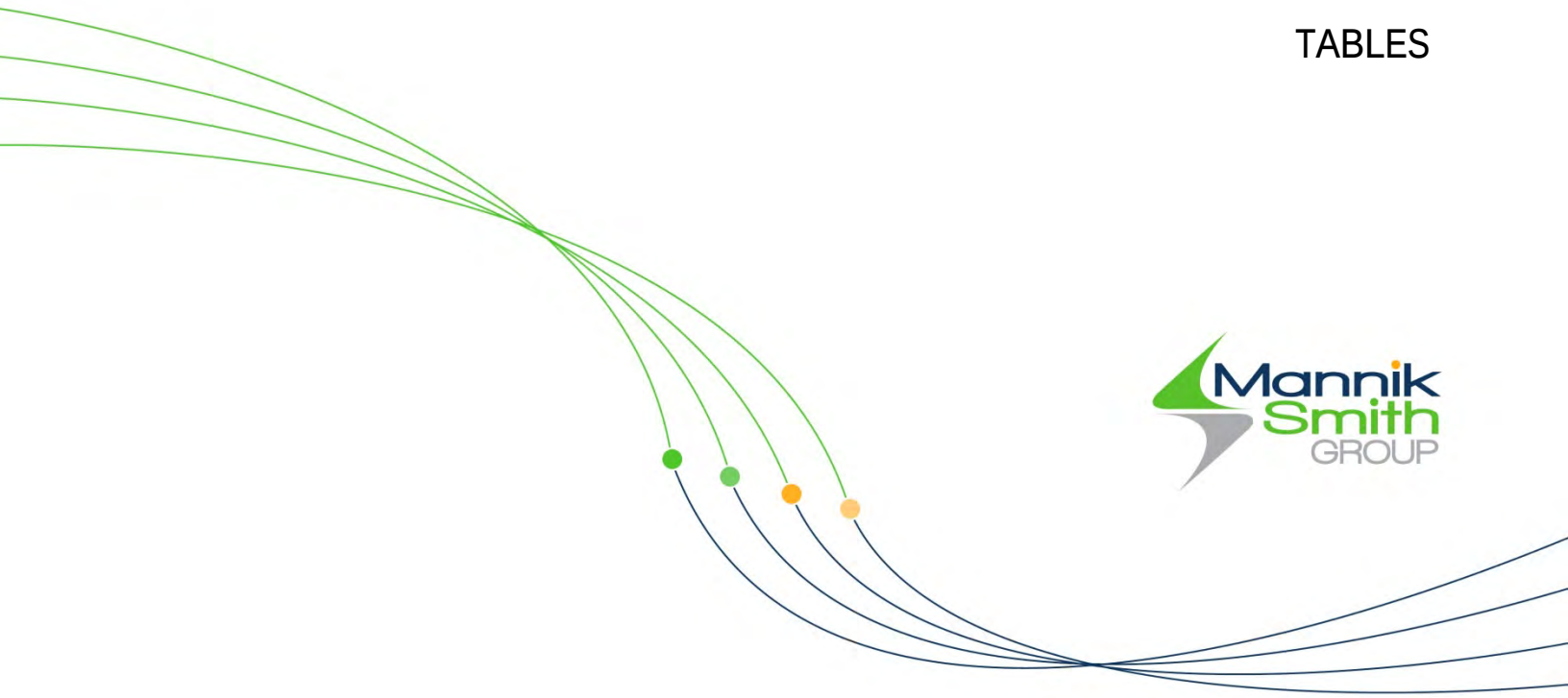

TABLE 1
HYDRAULIC MONITORING LOCATIONS
FORD RIVER RAISING WAREHOUSE

NORTH	EAST	PIEZOMETER
6,809.70	11,930.10	PCP-1
7,020.10	12,100.10	PCP-2
7,349.70	12,328.70	PCP-3
7,421.00	12,887.90	PCP-4
7,201.00	13,030.10	PCP-5
6,669.70	12,827.00	PCP-6
6,246.00	12,639.70	PCP-7
6,349.30	12,069.70	PCP-8
8,800.30	11,766.80	PCP-9
8,498.20	11,762.70	PCP-10
8,258.40	12,102.90	PCP-11
8,250.90	12,600.20	PCP-12
8,811.10	12,360.50	PCP-13
8,920.40	12,040.60	PCP-14
6,755.88	11,764.97	PCP-15
7,198.93	13,099.87	PCP-16
6,301.91	11,999.35	PCP-17
7,544.40	12,407.30	PCP-3 (DEEP)
6,450.50	12,600.20	PCL-1
7,036.90	12,451.70	PCL-2
7,247.10	12,575.10	PCL-3
8,661.11	12,030.17	PCL-4
8,520.90	12,290.54	PCL-5
7,238.60	12,127.60	PCW-2
7,488.00	12,317.00	PCW-3R
7,630.80	12,708.40	PCW-4
6,418.30	12,791.70	PCW-6
5,882.80	12,529.50	PCW-7
8,870.90	11,656.80	PCW-9
8,577.50	11,531.60	PCW-10
8,117.80	12,162.30	PCW-11
8,184.80	12,654.50	PCW-12
8,676.00	12,789.80	PCW-13
9,046.90	11,965.90	PCW-14
7,971.40	10,429.60	GW-1
8,006.40	10,308.60	GW-2
7,652.20	10,230.90	GW-3
7,246.00	9,969.10	GW-4
7,046.20	9,851.80	GW-5
7,110.20	10,179.20	GW-6
7,059.10	10,331.30	GW-7
6,818.20	10,924.70	GW-8
6,383.10	11,351.70	GW-9
5,988.30	11,798.20	GW-10
6,186.00	11,928.10	GW-11R
5,645.90	12,163.20	GW-12
7,718.60	12,617.20	GW-13
7,709.50	12,336.30	GW-14
8,301.70	11,793.30	GW-15
8,666.71	11,453.80	GW-16R
7,021.65	9,683.75	SG-1
7,021.65	9,683.75	SG-2
7,226.10	13,139.30	SG-3
7,469.40	12,935.60	SG-4
5,139.10	12,770.80	SG-5
8,803.60	12,819.60	SG-6
5,944.50	12,542.70	LMH-1
6,690.80	11,803.90	LMH-2
7,464.70	12,402.20	LMH-3

TABLE 1
HYDRAULIC MONITORING LOCATIONS
FORD RIVER RAISING WAREHOUSE

7,299.00	13,093.50	LMH-4
8,649.60	11,561.80	LMH-5
8,798.80	12,495.00	LMH-6
8,046.80	12,483.60	LMH-7
7,538.40	12,554.60	A-1
line empties directly into manhole		A-2
7,346.60	12,316.70	A-3
7,236.80	12,235.10	A-4
7,132.80	12,160.10	A-5
7,273.00	13,077.70	B-1
7,135.80	13,022.80	B-2
6,993.10	12,972.30	B-3
6,849.50	12,913.60	B-4
7,008.10	12,072.10	C1-1
6,889.90	11,977.50	C1-2
6,776.20	11,896.40	C1-3
6,694.50	11,807.90	C1-4
6,194.40	12,156.80	C1-5
6,137.70	12,203.00	C1-6
6,739.70	12,873.90	C2-1
6,611.20	12,820.00	C2-2
6,469.70	12,764.00	C2-3
6,333.60	12,703.60	C2-4
6,194.30	12,647.50	C2-5
6,053.10	12,591.00	C2-6
7,498.90	12,829.50	AN
7,039.70	12,093.60	AW (S)
7,634.30	12,625.20	AW (N)
7,503.20	12,830.40	BN
6,776.80	12,885.90	BE
6,759.90	12,883.30	C2E
6,044.70	12,313.70	C2S
6,130.10	12,203.60	C1S
7,022.60	12,082.30	C1W
8,551.60	11,660.10	D1-1
8,455.90	11,774.20	D1-2
8,367.00	11,892.80	D1-3
8,275.30	12,018.90	D2-1
8,182.00	12,133.60	D2-2
8,149.20	12,299.60	D2-3
8,104.10	12,408.20	D2-4
8,819.00	12,428.10	D3-1
8,610.20	12,462.10	D3-2
8,516.50	12,555.40	D3-3
8,482.10	12,685.80	D3-4
8,968.60	11,974.50	D4-1
8,918.60	12,125.90	D4-2
8,866.70	12,276.50	D4-3
8,981.40	11,908.00	DN (W)
8,482.10	12,690.80	DN (E)
9,004.90	11,906.90	DW
8,330.30	11,940.80	DS (W)
8,315.20	11,962.10	DS (E)
8,469.30	12,688.10	DE

TABLE 2
GRADIENT COMPLIANCE POINTS
FORD RIVER RAISIN WAREHOUSE

Post-Closure Compliance Point	Northing	Easting	Water Elevation	Compliance Point	As-Built Elevation or Liquid Level Measurement	Northing	Easting	Verified at this Monitoring Location?
PCP-15	6756	11765	585.03	CI-4*	563	6694.5	11807.9	YES
PCW-2	7238.6	12127.6	580.87	A-5*	564.8	7133	12160	YES
PCW-3R	7478.4	12307	572.54	A-1*	565.9	7538	12555	YES
PCW-4	7630.8	12708.4	579.8	AN*	565.1	7499	12830	YES
PCP-16	7199	13100	578.53	B-1*	566.3	7273	13077.7	YES
PCW-6	6418.3	12791.7	575.71	C2-3*	565.8	6470	12764	YES
PCW-7	5882.8	12529.5	572.93	C2-6*	565.6	6053	12591	YES
PCP-17	6302	11999	581.57	C1-5*	566.1	6194	12157	YES
PCW-9	8870.9	11656.8	572.81	DN(W)*	566	8981	11908	YES
PCW-10	8577.5	11531.6	579.26	D1-1*	565.6	8552	11660	YES
PCW-11	8117.8	12162.3	579.2	D2-2*	567.1	8182	12134	YES
PCW-12	8184.8	12654.5	577.59	DE**	566.1	8469	12688	YES
PCW-13	8676	12789.8	576.16	D3-2*	567.4	8610.2	12462.1	YES
PCW-14	9046.9	11965.9	571.95	D4-1*	567.6	8969	11975	YES
Post-Closure Compliance Point***	Northing	Easting	Water Elevation	Compliance Point	Ground Water Elevation	Northing	Easting	Verified at this Monitoring Location?
PCL-1	6450.5	12600.2	568.4	PCP-3 (Deep)	579.96	7544.4	12407.3	YES
PCL-2	7036.9	12451.7	571.41	PCP-3 (Deep)	579.96	7544.4	12407.3	YES
PCL-3	7247.1	12575.1	571.25	PCP-3 (Deep)	579.96	7544.4	12407.3	YES
PCL-4	8661.11	12030.17	572.34	PCP-3 (Deep)	579.96	7544.4	12407.3	YES
PCL-5	8520.9	12290.54	579.95	PCP-3 (Deep)	579.96	7544.4	12407.3	YES

* Leachate elevation based on as-built documentation
** Leachate elevation based on liquid measurement
*** The ground water elevation of PCP-3 (deep) will be compared to PCL-1 through PCL-5

TABLE 3
HYDRAULIC MONITORING FIELD SHEET
FORD RIVER RAISIN WAREHOUSE

Post-Closure Piezometers	Top of Casing Elevation (Feet)	Bottom of Screen Elevation (Feet)	Total Depth (Feet TOC)	Depth to Water (feet)	Water Elevation (Feet)	Notes
PCP-1	585.94	554.00				
PCP-2	586.48	553.30				
PCP-3	586.33	553.00				
PCP-4	589.99	553.20				
PCP-5	588.54	552.90				
PCP-6	587.45	553.00				
PCP-7	588.09	552.50				
PCP-8	589.14	554.20				
PCP-9	592.65	556.00				
PCP-10	590.19	555.90				
PCP-11	590.37	555.70				
PCP-12	590.56	555.80				
PCP-13	592.92	556.00				
PCP-14	592.64	555.80				
PCP-15	585.98	585.98				Flush-mount
PCP-16	588.64	588.64				
PCP-17	588.76	588.76				
PCP-3 (DEEP)	582.24	486.50				
PCL-1	595.45	553.30				
PCL-2	612.63	552.90				
PCL-3	609.25	553.00				
PCL-4	601.62	556.00				
PCL-5	601.98	555.80				
Post-Closure Wells	**Top of Casing Elevation (Feet)**	**Bottom of Screen Elevation (Feet)**	**Total Depth (Feet TOC)**	**Depth to Water (feet)**	**Water Elevation (Feet)**	**Notes**
PCW-2	580.97	555.70				Flush-mount
PCW-3R	580.38	555.90				Flush-mount
PCW-4	583.45	555.70				
PCW-6	582.52	553.90				
PCW-7	582.24	555.20				
PCW-9	578.44	555.80				
PCW-10	582.89	560.40				Flush-mount
PCW-11	582.60	556.10				Flush-mount
PCW-12	584.08	556.10				
PCW-13	582.74	554.40				
PCW-14	582.77	556.40				
GW Wells	**Top of Casing Elevation (Feet)**	**Bottom of Screen Elevation (Feet)**	**Total Depth (Feet TOC)**	**Depth to Water (feet)**	**Water Elevation (Feet)**	**Notes**
GW-1	580.53	571.60				Flush-mount
GW-2	582.31	571.30				
GW-3	581.41	570.90				
GW-4	581.40	571.90				
GW-5	580.15	570.80				
GW-6	579.74	570.20				
GW-7	580.52	570.90				
GW-8	583.07	572.50				
GW-9	580.44	569.80				
GW-10	582.48	569.80				
GW-11R	580.23	569.70				Flush-mount
GW-12	580.87	566.10				
GW-13	583.70	564.10				
GW-14	578.48	559.90				Flush-mount
GW-15	582.69	570.00				Flush-mount
GW-16R	583.35	565.30				
GW-17	574.81	567.11				
GW-18	578.40	565.11				
GW-19	575.93	566.93				
GW-20	582.08	547.08				Flush-mount
LCS Components	**Top of Clean Out Elevation (Feet)**	**Bottom of LCS Component Elevation (Feet)**	**Total Depth (Feet)**	**Depth to Liquid (feet)**	**Water Elevation (Feet)**	**Notes**
A-1	588.55	565.90				
A-3	582.45	563.50				
A-4	581.94	564.20				
A-5	583.33	564.80				
AN	585.30	565.10				North Perimeter (West)
AW(N)	588.15	563.10				Northwest Perimeter (North)
AW(S)	582.69	565.00				Northwest Perimeter (South)
B-1	585.00	566.30				
B-2	584.80	565.80				
B-3	586.40	566.80				
B-4	586.20	568.10				
BE	586.30	567.40				East Perimeter (North)
BN	584.80	564.90				North Perimeter (East)
C1-1	584.10	566.00				
C1-2	584.10	565.80				
C1-3	583.23	565.80				
C1-4	583.13	563.00				
C1-5	586.89	566.10				
C1-6	586.20	566.30				
C1S	586.00	566.30				South Perimeter (West)
C1W	582.90	564.70				West Perimeter (South)
C2-1	586.28	566.00				
C2-2	586.35	565.80				
C2-3	586.53	565.80				
C2-4	586.12	567.60				
C2-5	586.61	563.80				
C2-6	585.85	565.60				
C2E	586.10	565.00				East Perimeter (South)
C2S	585.40	563.00				South Perimeter (East)
D1-1	588.95	565.60				
D1-2	588.40	567.00				
D1-3	588.73	567.00				
D2-1	587.75	567.10				
D2-2	586.18	567.10				
D2-3	588.00	566.90				
D2-4	589.30	566.10				
D3-1	587.35	564.40				
D3-2	589.30	567.40				
D3-3	593.38	566.60				See above - level is 7.68 ft below PCW-13 and 9.112 ft below PCW-12
D3-4	587.95	567.50				
D4-1	589.85	567.60				
D4-2	589.53	565.30				
D4-3	590.05	565.60				See above - level is .78 ft below PCW-14 and 4.99 ft below PCW-13
DE	589.25	566.10				
DN(E)	588.53	564.90				North Perimeter (East)
DN(W)	590.69	566.00				North Perimeter (West)
DS(E)	587.95	567.10				South Perimeter (East)
DS(W)	588.50	565.00				South Perimeter (West)
DW	588.47	565.00				West Perimeter

APPENDIX A

POST-CLOSURE GROUND WATER SAMPLING AND ANALYSIS PLAN

POST CLOSURE GROUNDWATER SAMPLING AND ANALYSIS PLAN

FORD RIVER RAISIN WAREHOUSE
3200 EAST ELM AVENUE
MONROE, MICHIGAN
MID 005 057 005

MAY 2017

(REVISION TO JULY, 2006 POST-CLOSURE GROUNDWATER SAMPLING AND ANALYSIS PLAN PREPARED FOR FORD MOTOR COMPANY)

PREPARED FOR:
FORD MOTOR COMPANY
290 TOWN CENTER DRIVE, SUITE 800
DEARBORN, MICHIGAN 48126

Mannik Smith GROUP

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1.0 MONITORING WELL AND PIEZOMETER INSTALLATION PROCEDURES

All drilling operations will be performed by an experienced drilling subcontractor, with the full-time supervision of a field engineer/geologist. All wells will be installed and abandoned (when appropriate and approved by Michigan Department of Environmental Quality (MDEQ)) in accordance with procedures specified in R299.9612(1)(b). Prior to arrival on site, the drill rig, drill rods, augers, tools, and equipment will be thoroughly steam-cleaned. The sampling and drilling equipment will also be steamed-cleaned between borings to minimize the potential for cross-contamination.

Under this program, the licensee shall operate and maintain a groundwater monitoring system consisting of monitoring wells labeled PCW-1 through PCW-14, and piezometers labeled PCP-1 through PCP-14, PCL-1 through PCL-5, & PCP-3 Deep, and ground water monitor wells labeled GW-1 through GW-20 as shown on *Figure 1, General Layout*. The monitoring wells were installed at the base of the near-surface groundwater unit, which is approximately the top of the lacustrine clay deposit. The monitoring wells were expected to be between 10 and 25 feet deep.

To install future monitoring wells, a soil boring will be advanced with 8-inch outside-diameter hollow-stem augers to the top of the first clay layer. After reaching the clay, a well assembly consisting of 2-inch diameter PVC casing equipped with a 5-foot PVC, 10-slot screen will be lowered to the bottom of the boring through the center of the auger. At this point, the augers will be withdrawn from the shallow boring as the annular space between the well casing and the borehole is filled with silica sand to an elevation approximately one foot above the top of the well screen. A bentonite seal will be placed above the sandpack, and a non-shrinking cement-bentonite grout backfilled to ground surface.

For protection a steel cover secured with a padlock will be placed over the top of each well casing and cemented in place. A label designating the well number and top of PVC elevation shall be placed near each monitoring well. Prior to undertaking monitoring well and piezometer replacement or repair, written approval of the Waste Management Division shall be obtained. Polyvinyl chloride (PVC) was selected as the well screen and well casing material due to its relatively low cost and structural strength. PVC has been used extensively in groundwater wells, in many instances for 30 or more years, and has proved to be a durable well material. PVC is also expected to be the most suitable casing material with respect to the chemical parameters of concern in post-closure groundwater monitoring for the subject site.

A number of researchers have investigated the sorptive and/or desorptive potentials of various well casing materials such as PVC, stainless steel and tetrafluoroethylene (Teflon).

Sykes et al[1] concluded that there was no statistically significant difference in the degree of absorption of organic compounds between PVC, Teflon of stainless steel. Parker et al[2], examined the sorption/desorption differences of PVC, Teflon, and two stainless steel materials with respect to both inorganic and organic analytes. They concluded that in cases where groundwater samples are to be analyzed for both metals and organic compounds, PVC would be the most suitable well material.

1 Sykes, A.L., R.A. Mc Allister, and J.B. Homolya. 1986 Sorption of Organics by Monitoring Well Construction Materials. Groundwater Monitoring Review, Fall 1986.

2 Parker, Louise V., Allan D. Hewitt and Thomas F Jenkins. 1990 Influence of Casing Materials on Trace–Level Chemicals on Well water. Groundwater Monitoring Review, Spring 1990.

In accordance with the RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (Sept. 1986), the monitoring wells will be developed to restore the natural hydraulic conductivity of the formation and to remove all foreign sediment to ensure turbid-free groundwater samples. Development will be performed using a clean, disposable, plastic bailer to purge the well. This technique involves alternately agitating the water in the well to suspend the sediment and then removing water from the well along with the suspended sediment.

Development will be considered complete when samples obtained are relatively sediment-free and register stable pH and specific conductance measurements, which will be obtained with calibrated field instruments. Monitoring well sampling procedures are described below in Section 3.0.

A total of 14 piezometers were installed within the interior of the closure units, across the cutoff wall from each monitoring well. In addition, five leachate piezometers were installed in the interior of the containment units and one bedrock piezometer outside the cutoff. The interior piezometers are set at a depth approximately 5 feet below the lowest point in the leachate collection system of each respective closure unit. All piezometers can be viewed in *Figure 1, General Layout*.

For installation of each piezometer, a boring was advanced through the stabilized sludge with an 8-inch outside-diameter hollow-stem auger. Note that the drill cuttings generated during piezometer installation were left within the limits of the respective closure unit.

After drilling to approximately 1 foot below the desired tip placement elevation, the augers were partially retracted and silica sand was poured into the bottom of the borehole until the sand backfill reached the desired tip elevation. The piezometer was then inserted through the auger, and the screened annulus of the borehole was filled with sand as the augers were withdrawn from the boring.

A bentonite seal was placed above the sand, and the remainder of the bore hole annulus was grouted to the top of the solidified sludge with non-shrinking cement-bentonite grout. For protection, a steel cover secured with a padlock was placed over the top of each piezometer casing and cemented in place. A label designating the identification number and top of PVC elevation was placed near each piezometer.

Following installation of all on-site monitoring wells and piezometers, the top-of-casing elevations were determined by a registered land surveyor. These elevations are referenced to the nearest USGS datum.

2.0 MONITORING FREQUENCY

2.1 HYDRAULIC MONITORING

The licensee shall measure static water levels in post-closure monitor wells PCW-1 through PCW-14, shallow piezometers PCP-1 through PCP-14, PCL-1 through PCL-5, ground water monitor wells GW-1 through GW-20 and Leachate Collection System (LCS) components excluding the leachate manholes on a quarterly basis. Static water elevations will be measured to the nearest 0.01 foot, using a water level indicator, and will be measured from a reference point on the rim of the well casing established during the top-of-casing survey. These water levels will then be referenced to the USGS datum for use in assessing the groundwater flow behavior. If hydraulic monitoring indicates that an inward gradient is not being maintained at the containment unit(s), and/or that the artesian condition no longer exists in the bedrock aquifer beneath the containment unit(s) for the potentionmetric surface to be above the leachate collection system elevation, then the licensee shall do all of the following:

a) Immediately notify the MDEQ, Office of Waste Management and Radiological Protection, or, in the event of their unavailability, the Department of Natural Resources 24-hour emergency response operator at 1-800-292-4706.

b) Provide follow-up notification to the MDEQ, Office of Waste Management and Radiological Protection in writing within five calendar days of the telephone call in accordance with Condition I.E.13 of this license. The notification shall include the monitor well(s), piezometer(s), and area(s) of the containment unit(s) at which the inward gradient is not detected.

c) Adjust the detection monitoring frequency at the affected containment unit(s) to quarterly.

d) Confirm the static water level in the bedrock aquifer within 30 days of the measurement that indicates the artesian condition no longer exists. If the loss of the artesian condition is confirmed, submit a bedrock aquifer groundwater monitoring plan (chemical and hydraulic) to the MDEQ, Office of Waste Management and Radiological Protection within 90 days of the confirmation, and upon approval, implement the bedrock aquifer groundwater monitoring plan.

If measurements indicate that an inward hydraulic gradient is not being maintained for the containment unit(s), appropriate corrective action will be taken to correct the situation.

2.2 ANALYTICAL MONITORING

The post-closure monitoring program will include sampling of the 14 monitoring wells (designated PCW-1 through PCW-14) installed as described in the previous section. Sampling began immediately upon installation of the wells. During the first two years, all 14 monitoring wells were sampled quarterly with replicate samples taken during each event. The resulting 16 samples at each location were used to establish base line conditions of water quality. Because groundwater flow conditions in the vicinity of the containment units will be significantly altered by the leachate collection system and cutoff wall, a two-year background period was necessary to adequately characterize natural variation in groundwater quality.

The RCRA Ground-water Monitoring Technical Enforcement Guidance Document (September 1986) recommends establishing background concentrations by sampling quarterly for a period of one year and obtaining four replicate samples for each sampling event. The two-year background period was selected to obtain a better representation of the impacts of seasonal variations and changes in flow direction as steady-state groundwater flow conditions are re-established following facility closure. Two replicate samples were collected during each sampling event to provide a sample population size equal to that recommended by the EPA and large enough to perform the statistical analyses described in Section 8.0. The background data was evaluated to determine of variability in site groundwater conditions are adequately addressed.

After completion of the two-year baseline period, the detection monitoring program was instituted. During detection monitoring, groundwater samples are collected from the wells on a semi-annual basis (i.e., two sets of samples per year) and the resulting data is analyzed according to the statistical procedure described below in Section 8.0.

2.2.1 ANALYTICAL REQUIREMENTS

The purpose of obtaining and analyzing groundwater samples from the shallow groundwater unit is to provide early detection of potential migration of hazardous waste constituents from the containment units. Analytical test parameters have therefore been selected based upon previous sampling data and general knowledge of the waste present in the containment units. Accordingly, samples collected from the wells adjacent to the Eastern Containment Unit (PCW-1 through PCW-8) will be analyzed for the parameters listed on (Table 1).

Samples collected from wells adjacent to the Western Containment Unit (PCW- 9 through PCW-14) will be analyzed for the parameters listed in (Table 1).

3.0 GROUNDWATER SAMPLE COLLECTION

3.1 WATER LEVEL MEASUREMENT

During each sampling event, the water level in each monitoring well will be measured before the well is purged. The water level will be measured to the nearest 0.01 foot, using a water level indicator, and will be measured from a reference point on the rim of the well casing established during the top-of-casing survey. These water levels will then be referenced to the USGS datum for use in assessing the groundwater flow behavior and the performance of the containment unit leachate collection systems. Additionally, water levels in each well will be measured after purging (described below) to evaluate the capacity of each well for recharge.

3.2 WELL PURGING

At least three well volumes will be purged from each well with a Submersible sampling pump or a polyethylene bailer prior to sample collection. If using a pump, the pump and discharge tubing will be thoroughly cleaned and rinsed before use in each PCW to minimize the potential for cross-contamination. Water purged from the monitoring wells will be discharged to the ground away from the well to avoid recycling of the flow.

During purging, the pH and specific conductance of the pump discharge will be measured using calibrated field instruments. When three well volumes have been purged, and measurements of pH and specific conductance have stabilized, or when the well is dry, the samples will be collected into laboratory-prepared sample containers. The field pH will be considered stable when three consecutive pH readings within ± 0.1 standard units are achieved. The specific conductance will be considered stabilized when three consecutive readings are within 3%. The collected samples will be field tested for pH using an Orion Research model SA 230 pH/temperature meter or equivalent (EPA SW-846 Method 150.1) and for specific conductance using a Cole-Palmer model 1481-60 meter or equivalent (EPA SW-846 Method 9050/120.1)

The field measurement devices will be rinsed with deionized water and calibrated at the beginning of each day in the field prior to use. Additionally, each field measurement device will be rinsed with deionized water prior to sampling at each individual monitoring well. The pH and specific conductance meters will be calibrated according to manufacturer's specified procedures. In general, the pH meter is calibrated at two points that bracket the expected pH of the groundwater samples. The specific conductance meter is calibrated by checking the conductance of a standard. These calibration points are produced using stock calibrant solutions of known pH or conductance. Calibration data for the pH and specific conductance meters will be recorded in a site-specific field book. Field parameters will be measured in a sample container separate from the laboratory containers. All field measurements, purging, and sampling information will be recorded on a Field Sampling Form – an example is included in Appendix A1.

3.3 GROUNDWATER SAMPLING

Groundwater samples will be collected directly after the water pH and specific conductance has stabilized. In case of low-yield wells that are incapable of yielding three casing volumes, the wells will be evacuated to dryness once. Wells that are purged to dryness will be left to sufficiently recover and sampled as soon as possible (i.e. when sufficient ground water is available for sampling). If possible, this period will not exceed

24 hours. The groundwater samples will be collected and containerized in the order of parameter stability and volatilization sensitivity. The samples will be collected in the following order:

a) volatile organic compounds;
b) base neutral PNAs;
c) cyanides;
d) sulfates; and
e) dissolved metals (Field-filtered using a 0.45 um filter)

The groundwater samples will be withdrawn from each of the monitoring wells using disposable polyethylene bailers with polypropylene rope, or a peristaltic pump with disposable polyethylene tubing. This standard sampling equipment is consistent with industry protocols and previous MDEQ recommendations. If non-disposable sampling equipment is utilized, field blanks will be collected at a rate of 1 per 20 samples. After cleaning with an Alconox® or equivalent soap solution, the equipment will be rinsed to remove all soap, and a sample of a second rinse will be submitted to the laboratory as the field blank sample.

Groundwater samples to be analyzed for volatile organic compounds will be collected first after all appropriate field measurements have been completed. The bailer or dedicated sampling device will be gently lowered into the water; and samples collected for volatile analysis will be gently poured into glass vials, filled just to overflowing, insuring that no air bubbles pass through the sample as the vial is being filled. A peristaltic pump will not be used to collect ground water samples for volatile analysis due to the de-gassing effects that may occur using this device. Random duplicate samples will be collected during the sampling events at a rate of 1 per 20 samples, and analyzed for the full set of parameters.

3.4 LEACHATE SAMPLING

In order to define and characterize the chemical constituents of the leachate over time and insure that the detection monitoring parameters are appropriate, an analysis of the leachate for VOCs, SVOCs, Part 201 regulated metals, cyanide, and hexavalent chromium will be conducted every five (5) years. In addition, the field parameters of pH, sulfate, and conductivity will be measured. This analysis will be used to determine whether adding or removing testing parameters for the post-closure well sampling is justified.

4.0 SAMPLE PRESERVATION AND SHIPMENT

Samples collected as part of post-closure monitoring will be stored in containers and with preservatives as specified by 40 CFR Part 136.3. The preservation and storage requirements related to the parameters specific to this post-closure groundwater monitoring program are identified on (Table 2).

Samples will be stored in an iced cooler (or refrigerator) until delivery to the analytical laboratory. Groundwater samples will be delivered to the analytical laboratory within 24 hours after collection.

In order to minimize the possibility of misidentification of the samples, identification labels will be affixed to the sample containers. All sample labels will be filled out with indelible ink to prevent sample information loss. The labels include the following information:

- sample identification number
- sample location
- date and time of collection
- parameters to be analyzed

- type of preservative (if any)

Other information pertinent to the sample being collected will be noted by the sampler on the field sampling record, a copy of which will be maintained in the on-site post-closure monitoring file.

5.0 ANALYTICAL PROCEDURES

The groundwater samples will be analyzed in accordance with the appropriate EPA approved methods. The analytical methods are summarized on (Table 3). All methods and associated detection limits for the USEPA analytical methods shown on Table 3 will be in compliance with WHMD Operational Memo Gen-8, Rev 7, November 21, 2005 (or more recent updates).

6.0 CHAIN-OF-CUSTODY

Sample custody will be controlled using strict chain-of-custody procedures. Prior to submittal of the sample to the analytical laboratory, custody of the samples will be the responsibility of the sampler. Custody will become the responsibility of the analytical laboratory upon receipt of the samples. The original chain-of-custody record will remain with the sample; the copies will be retained by the sampler and by Ford.

Information recorded on the Chain-of-Custody form will include:

- unique Chain-of-Custody number;
- sample identification number and location of sample;
- number of samples for each sample ID number;
- sampler's signature;
- sampling date and time;
- laboratory receipt date; and
- signature of laboratory clerk

In addition, the requested analyses for each sample are recorded on this form.

7.0 QUALITY ASSURANCE/QUALITY CONTROL PROGRAMS

7.1 QUALITY ASSURANCE/QUALITY CONTROL – FIELD PROCEDURES

For quality control during groundwater sampling, a pump blank (if necessary) will be submitted for analysis along with each set of water samples. The pump blank is prepared by passing deionized water through the decontaminated silicone pump tubing. The water is then transferred into laboratory-prepared containers and stored in the iced cooler along with other samples. This pump blank assures the compatibility of the sampling materials with the parameters to be analyzed and verifies that no cross-contamination occurs. The pump blank is to be analyzed for the same parameters as the groundwater samples. As stated above, if non-disposable sampling equipment is utilized, field blanks will be collected at a rate of 1 per 20 samples. After cleaning with an Alconox® or equivalent soap solution, the equipment will be rinsed to remove all soap, and a sample of a second rinse will be submitted to the laboratory as the field blank sample.

7.2 QUALITY ASSURANCE/QUALITY CONTROL – LABORATORY PROCEDURES

As an additional quality control procedure, the analytical laboratory will furnish quality assurance/quality control (QA/QC) data with all chemical analysis reports. The data supplied by the analytical laboratory includes information on blanks, laboratory duplicates, spike recoveries, and parameter control limits.

The laboratory QA/QC data will be evaluated to determine the acceptability of results. The laboratory results are considered acceptable if the following conditions hold:

a) Reported method blank results are not higher than reported detection limits;
b) Laboratory duplicates have a relative percent difference of 20% or less; and
c) Results of recovery analyses have a percent recovery of between 80% and 120%

8.0 RATIONALE FOR STATISTICAL PROCEDURE SELECTION

The selection of the statistical procedure described below has taken into account the inherent characteristics of the groundwater data collected since 1982 from the surface impoundment monitoring well network. Analysis of the existing groundwater data indicated two factors which must be considered in selecting a statistical procedure: The distribution of the data and the extent of censorship (i.e., number of values below detection limit) in the data set for each parameter. The effects of these two factors on the statistical procedure selection process are described in the following paragraphs.

As in all statistical evaluations, the underlying distribution of the data is an important consideration. In order to use parametric statistics, the underlying population must be normally distributed. In other cases, the lack of an underlying normal distribution for the data may force the use of non-parametric statistical techniques, which do not assume an underlying distribution.

Review of the groundwater monitoring data collected since 1982 indicates that the amount of censored data is significant. In general, individual organic parameters and some of the dissolved metals have been repeatedly non-detectable. Other parameters have been intermittently detected during the monitoring period. In addition, certain groundwater monitoring analytes that have been selected for post-closure monitoring (Tables 1) such as sulfate and pH, have been consistently detected during the interim monitoring program.

Based on the percentage of the values measured in the past which have been reported as below the detection limits (i.e., the degree of censorship), three probable groups of parameters have been identified. The first group is heavily censored; i.e., 98 to 100% of the values measured were reported as below the detection limit (BDL). This group will be referred to as Group I and will likely include some of the heavy metals and the organic compounds. The second group (Group II) may include parameters whose percentage of BDL values ranges from approximately 50 to 98%. The last group (Group III) includes parameters that are rarely BDL. This includes parameters like pH, specific conductance and sulfate, which are commonly found in groundwater. An initial review of available statistical methods indicates that the applicability of the various tests is highly dependent on the degree to which the data set being analyzed is censored. Therefore, separate tests were considered for each of the three parameter groups described above.

Another important consideration when selecting an appropriate statistical procedure is a proper balance between the rate of false positives (detecting a significant increase when none has occurred) and the rate of false negatives (failing to detect a significant increase when it has occurred). The power of a statistical test is defined as the probability of correctly identifying a significant increase. The optimum statistical test is one that maintains power while yielding a low rate of false positives. The rate of false positives is theoretically chosen by the investigator (i.e., 1% or 5%), but in reality depends on the applicability of the data for the statistical test. Ford has attempted to choose statistical procedures that are applicable to the various monitoring parameters and that minimize false positives, while maintaining good power to detect significant changes in the monitoring parameters. Ford has also utilized the collection of a baseline data set large enough to maintain proper power.

8.1 SUMMARY OF STATISTICAL PROCEDURE

Groundwater quality data collected during the post-closure monitoring period has been analyzed in two phases. The initial phase involved establishing baseline water quality conditions at each monitoring well. The second phase involves routine sampling and analysis to detect significant deviations from baseline conditions using an intra-well comparison procedure.

The rationale for using the intra-well procedure is based on the groundwater flow behavior that is expected to develop around the containment units. As explained in the Post-Closure Plan, the leachate collection systems are designed to maintain leachate levels within the containment units lower than the water levels in the surrounding natural groundwater strata. Because the potential for inward flow will be induced by the leachate collection systems, all the monitoring wells are installed to be up gradient of the enclosed waste. This configuration precludes the traditional use of an upgradient well for background groundwater quality comparison. A description if this procedure is described below and presented in Appendices 2 through 7.

Each of the two data analysis phases is discussed in the following subsections.

8.1.1 BASELINE DATA COLLECTION PHASE

The statistical analysis procedures for the baseline data collection phase are summarized in the seven separate steps given below.

STEP 1 Baseline Groundwater Sampling – To establish baseline groundwater quality data for the monitoring system, samples from the fourteen monitoring wells on a quarterly basis for a period of two years were collected. This sampling schedule yielded a total of 16 samples for each sampling location. Samples from wells PCW-1 through PCW-8 will be analyzed for the parameters listed on Table 1. Samples from wells PCW-9 through PCW-14 will be analyzed for the parameters listed on Table 1. A two-year baseline data collection period is necessary to have sufficient data to properly characterize the underlying statistical distribution and to select the proper statistical method for data analysis during detection monitoring. Use of a two-year baseline period will provide more inclusive data accounting for seasonal variations or variations based on differing rainfall conditions in the two-year period. In addition, by collecting replicate samples on a quarterly basis for two years, the possibility for time dependence between samples should be less than if quadruplicate samples were tested quarterly for one year.

STEP 2 Evaluation of Degree of Censorship – In order to determine the most appropriate statistical procedure, determine determination of the degree of censorship within the baseline data set for each parameter will occur at the end of the two-year period. This was determined by evaluating the percentage of each of the parameter's values which are BDL. This information is used as the basis for selecting the appropriate statistical procedure, as described in the next subsection.

STEP 3 Determination of Underlying Statistical Distribution – For each parameter found to be in Group II or Group III, a determination as to whether the baseline data is drawn from a normally distributed population. This determination was conducted by a two-step procedure. First, the coefficient of variation will be computed and then a normal probability plot was constructed. If the coefficient of variation and normal probability plot regression analysis strongly suggests that the background data set is not normally distributed, the data will be transformed to determine if the data is log-

normally distributed. If the data is normally or log-normally distributed, Ford will evaluate the data using the Shewhart-CUSUM Control Charts to determine whether or not a statistically significant increase has occurred at each monitoring well (see 8.2). If the data is not normally or log-normally distributed, Ford will use non-parametric statistical analysis to evaluate the data.

STEP 4 Inspection of the Baseline Data Set for Outliers – Identified erroneous values (i.e., outliers) within the baseline data set for any parameter with less than 50% of its values BDL and a known distribution. An outlier will be defined as a value for any parameter, which is more than three standard deviations smaller or larger than the mean value for the parameter. The mean and standard deviation values of the baseline data collected at each well will recomputed after all corrections, as described above, have been made.

STEP 5 Establishment of Analytical Precision for the Detection Limits – At the conclusion of the baseline monitoring period, an analytical precision was established for the detection limit of any of the monitoring parameters which are found to be heavily censored (Group I). This analytical precision was based on the laboratory quality control information, which will be the collected by the laboratory at each quarterly sampling during the baseline period. This analytical precision is critically important in statistically evaluating the Group I data sets.

STEP 6 Identification of Seasonal Cycles, Long-term Trends, and Serial Correlation – The baseline data was analyzed to determine whether or not a serial dependence or seasonal trend exists in the data. This was determined by examining a graph of the concentration of each parameter plotted as a function of time. The data was considered to have a seasonal trend if the concentration values for any parameter show a repetitive periodicity during the baseline period. If a seasonal influence was indicated in the baseline data, the removal of the seasonal effect was completed.

STEP 7 Calculation of Means and Standard Deviations - At the conclusion of the baseline monitoring period, a mean and standard deviation for each monitoring parameter at each individual monitoring well was established.

8.1.2 DETECTION MONITORING PHASE

The detection monitoring program began after the completion of the 2-year baseline data collection period. During detection monitoring, samples are and will continue to be collected on a semi-annual basis, as described in the Post-Closure Plan. For each sampling event intra-well statistical comparisons using the methods described below is and will be made for each monitoring parameter at each monitoring well.

The statistical procedures described below are keyed to the percentage of BDL values in the baseline data collection period. The parameters will be separated into three groups based on the percentage of BDL values. The statistical test, which will be used to determine whether or not a statistically significant increase has occurred at a monitoring well for each sampling event, will be different for each of the three groups. Each of the three statistical methods is described below.

GROUP I Procedures When All Baseline Data Are Below the Detection Limit – For Group I parameters, evaluation as to whether or not a statistically significant increase has occurred at each well if the value for the parameter at the well in question is

above the MDEQ-approved detection limit. If it is not, Ford will conclude that no increase has occurred.

GROUP II Procedures When More Than 50% of the Baseline Data Are Below the Detection Limit

and

GROUP III Procedures When Less Than 50% of the Baseline Data Are Below the Detection Limit – For Group II and III parameters, Ford will construct combined Shewhart-CUSUM Control Charts to determine whether or not a statistically significant increase has occurred at each monitoring well. The Shewhart Control chart is a graph of time of sampling versus the sample mean for the parameter being monitored. An upper control limit is established based on a selected level of significance and on the standard deviation of the baseline data. When a point falls above an upper control limit the increase is regarded as significant. The CUSUM (for cumulative summation) Control Chart makes use of the information in the present sample, as well as previous samples, in reaching decisions as to whether the parameter has undergone a significant change. The combined procedure takes advantage of the Shewhart chart's ability to detect large shifts from the mean and the CUSUM chart's ability to detect small but persistent changes.

Group II and III will be individually evaluated to determine the underlying data distribution. As recommended by USEPA, Shewhart-CUSUM Control Charts are ideally used for data that is normally distributed. However transformation of the data (log-transformation or square-root transformation) is recommended for data that is not normally distributed. If the results of the transformation does not indicate a normal distribution, and the Shewhart-CUSUM Control Chart procedure cannot be applied, the critical value for exceedance will be the highest concentration of the given parameter for that well

Data collected during the detection monitoring period will be managed using the commercially-available software CHEMPOINT and CHEMSTAT. CHEMPOINT is an environmental sampling database management application developed to track ground-water data and CHEMSTAT is used for statistical analysis of ground-water monitoring data at RCRA subtitle C and D sites. Analysis methods in CHEMSTAT comply with 1989 and 1992 US EPA statistical guidance documents (Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities).

8.2 MEASURES TO BE INSTITUTED OF STATISTICALLY SIGNIFICANT CHANGE IS DETECTED

If a statistically significant increase (and/or pH decrease) is detected at any time in any monitoring well, the licensee shall notify the MDEQ, Office of Waste Management and Radiological Protection by telephone within one working day and arrange a re-sampling as soon as possible to confirm a statistically significant increase (and/or pH decrease). Resampling must include not less than four replicate samples at the well(s) for the parameter in question. For data collected from non-parametric tests, if 2 of the 4 replicate samples are detected over the MDEQ-approved detection limit (Group 1) or highest previous detection (Group II), or if 1 of 4 is detected at 5 times the MDEQ-approved detection limit or previous detection, then the exceedance is confirmed. For confirming exceedances using the Shewhart-CUSUM control charts, the mean of the 4 replicate samples will be used as the concentration to be evaluated for confirmation.

If the licensee determines that a statistically significant increase (and/or pH decrease) has occurred, the licensee shall do all of the following:

A. Notify the Director within one working day by calling the MDEQ, Office of Waste Management and Radiological Protection, or in the event of unavailability, the MDEQ 24-hour emergency response operator at 1-800-292-4706.

B. Provide follow-up notification to the MDEQ, Office of Waste Management and Radiological Protection in writing with seven calendar days of the telephone call. The notification shall indicate what parameters or constituents have shown statistically significant changes and the well(s) in which the changes have occurred.

C. As soon as possible, sample the groundwater in all monitoring wells located at the same containment unit as the monitor well that had the statistically significant increase and determine the concentration of all constituents identified in Appendix IX of 40 CFR Part 264 that are present in groundwater and for which approved analysis methods exist. The licensee may resample within one month and repeat the analysis for those Appendix IX compounds that were detected. Constituents detected in the first Appendix IX sampling or confirmed by the resampling will form the basis for compliance monitoring.

D. Immediately take steps to determine the cause of the change and eliminate the source of discharge.

E. Within 90 days of the determination, submit to the MDEQ an application for a license modification to establish a compliance monitoring and corrective action program meeting the requirements of R 299.9612 and 40 CFR §264.99, which is adopted by reference in R 299.11003. The application shall include the following information:

    a) An identification of the concentration of all Appendix IX constituents found in the groundwater.
    b) Any proposed changes to the groundwater monitoring system at the facility necessary to meet the requirements of R 299.9612 and 40 CFR §264.99.
    c) Any proposed changes to the monitoring frequency, sampling and analysis procedures or methods, or statistical procedures used at the facility necessary to meet the requirements of R 299.9612 and 40 CFR §264.99.

F. Within 180 days, submit to the MDEQ a detailed description of corrective actions that will achieve compliance with applicable laws and rules, including a schedule of implementation. Corrective action must also meet the requirements of 40 CFR §264.100, which is adopted by reference in R 299.11003, and include a plan for a groundwater monitoring program that will demonstrate the effectiveness of the corrective action. Such a groundwater-monitoring program may be based on a compliance-monitoring program developed to meet the requirements of 40 CFR §26499. Nothing in this condition shall be construed as prohibiting the licensee from requesting an alternate or maximum concentration limit under R 299.9612.

G. During the period prior to a license modification requiring a compliance monitoring and corrective action program, the licensee shall provide the MDEQ, Office of Waste Management and Radiological Protection, or his or her designee, with weekly telephone updates and written reports every two weeks regarding the progress to date in determining the cause of contamination and eliminating the discharge. The licensee shall include in the written report the results of all samples from environmental monitoring conducted by the licensee.

If the licensee determines pursuant to Conditions III.A.6. and 7. of the existing license that a statistically significant increase (and/or pH decrease) in hazardous constituents has occurred in groundwater, the licensee may demonstrate that a source other than the licensed facility caused the increase (and/or pH decrease) or that the increase (and/or pH decrease) resulted from error in sampling, analysis or evaluation. Although the licensee may make a demonstration under this condition in addition to, or in lieu of, submitting a license modification application within the time specified in Condition III.A.8. (e) of this existing license, the licensee is not relieved of the requirement to submit a license modification application within the time specified unless the demonstration made under this condition successfully shows that a source other than the licensed facility caused the increase (and/pH decrease) resulted from error in sampling, analysis, or evaluation. In making a demonstration under this condition, the licensee shall:

a) Notify the MDEQ within seven days of the determination that it intends to make a demonstration under this condition.
b) Within 90 days of the determination, submit a report to the MDEQ that demonstrates that a source other than the licensed facility solely caused the increase (and/or pH decrease), or that the increase (and/or pH decrease) was caused by error in sampling, analysis, or evaluation.
c) Within 90 days of the determination, submit to the MDEQ an application for a license modification to make any appropriate changes to the groundwater monitoring program at the facility.
d) Continue to monitor groundwater in compliance with this license.

9.0 RECORDKEEPING AND REPORTING

During the first two years of detection monitoring, results of the quarterly sampling used to establish baseline groundwater quality were reported to the MDEQ, Office of Waste Management and Radiological Protection. These reports include tables showing the analytical results and groundwater elevations.

Throughout the post-closure care period, Ford will maintain records of the groundwater analyses, the associated groundwater surface elevations, statistical analyses, and interpretations. These records are to be maintained as part of the facility operating record, and will be submitted for review, as specified by the MDEQ, Office of Waste Management and Radiological Protection. During each semi-annual monitoring event, a semi-annual report of monitoring activities including the following information will be submitted to the MDEQ, Office of Waste Management and Radiological Protection.

- Certification statement
- A brief narrative of the sampling event; difficulties, etc.
- The results of the statistical evaluation of the data and reporting of any significant increase
- Copies of all field sampling forms
- A copy of the analytical laboratory data report that should include the following
    - Sample identification
    - Detection Limits
    - Date samples were received, analyzed, and reported
    - Methods used for laboratory analysis for each parameter
- Tabular data summaries
- A brief descriptive summary of the overall quality of the analytical data and QA/QC results, including:
    - Holding time requirements
    - Matrix interference occurrences

    - Detection limit issues
    - Surrogate recovery quality
    - Matrix spike/matrix spike duplicate (MS/MSD) data relative to method requirements
    - Any other significant problems
- A summary of on-going Operation and Maintenance issues related to the ground water monitoring program

The licensee shall submit the results of all environmental monitoring required by this license in the form of an Environmental Monitoring Report to the MDEQ, Office of Waste Management and Radiological Protection within 90 days of the sample collection or within 7 days of receipt of the analytical results, whichever is sooner.

FIGURES

NO.	DATE	BY	DESCRIPTION
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PROJECT DATE: 11/07/2011
PROJECT NO.: FORD0102
DRAWN BY: HMW
CHECKED BY: TEP

TECHNICAL SKILL. CREATIVE SPIRIT.

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MONROE, MICHIGAN

GENERAL LAYOUT

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TABLES

Table 1
Groundwater Sample Test Parameters

Monitoring Wells PCW-1 Through PCW-8	
pH	Specific Conductance
Sulfate	Total Cyanide
Cadmium(Dissolved)	Chromium (Dissolved)
Chromium VI (Dissolved)	Copper (Dissolved)
Lead (Dissolved)	Nickel (Dissolved)
Halogenated Volatile Organic Compounds	Volatile Aromatic Organic Compounds
Base Neutral PNA's	
Monitoring Wells PCW-9 Through PCW-14	
pH	Specific Conductance
Sulfate	Total Cyanide
Cadmium(Dissolved)	Chromium (Dissolved)
Chromium VI (Dissolved)	Copper (Dissolved)
Halogenated Volatile Organic Compounds	Nickel (Dissolved)
Base Neutral PNA's	Volatile Aromatic Organic Compounds

Table 2
Sample Container and Preservation Requirements

Parameter	Container[1]	Preservative	Holding Time
Dissolved Metals	HDPE	No Preservative[2], 4ºC	6 Months
Dissolved Cr VI	HDPE	No Preservative[2], 4ºC	24 Hours
Sulfate	HDPE	No Preservative, 4ºC	28 Days
Total Cyanide	HDPE	NaOH to pH>12, 4ºC	14 Days
Volatile Organic Compounds	Glass VOA Vial with Teflon Lined Septa	HCl to pH <2, 4ºC	14 Days
Base Neutral PNA's	Glass Amber	No Preservative, 4ºC	7 Days

Notes 1: Size of Container to be determined by analytical laboratory
2: Filtering Will be accomplished using a 0.45 µm filter at the lab then preservative to be added if necessary.

Table 3
Analytical Methods

Parameter	EPA Analytical Method
Cadmium	6020
Chromium	6020
Hexavalent Chromium	7196A
Copper	6020
Lead	6020
Nickel	6020
Total Cyanide	9010B
pH	*
Specific Conductance	*
Sulfate	9038
Halogenated Volatile Organic Compounds	8260
Aromatic Volatile Organic Compounds	8260
Base Neutral PNA's	8270

* Field measurement, performed according to manufacturer's application

APPENDICES

DATE:_____ PROJECT:

SAMPLE LOCATION:

PERSONNEL: _____

AMBIENT TEMPERATURE: ____ ºF ºC (Circle One)

SITE NAME: FORD - Monroe Plant

SITE ADDRESS: **3200 E. Elm Avenue, Monroe, MI, 48162**

OBSERVER(S): _____

WEATHER CONDITIONS: _____

SAMPLING EQUIPMENT:

- ☐ PVC bailer
- ☐ Dedicated PVC Bailer
- ☐ Stainless-Steel Bailer
- ☐ Dedicated Pump System
- ☐ Submersible Pump
- ■ Other: **Dedicated Disposable Polyethylene Bailer**

FIELD MEASUREMENTS:

TOP OF CASING (TOC) ELEVATION: _____ Date & Time Purged (EST)

DATUM: **USGS (mean sea level)**

A _____ Depth to Water (feet) from TOC

B _____ Total Depth of Well (feet) from TOC

C _____ Water Volume in Well (gallons-see below)

D _____ Actual Volume Removed (gallons)

E _____ Well Volumes Removed (D / C)

DISPOSAL METHOD FOR PURGED WATER:

- ☐ On-Site 55 Gallon Drum
- ■ Ground Surface
- ☐ Sanitary Sewer
- ☐ Subsurface Drain System

LAB SAMPLE PARAMETERS	DATE & TIME COLLECTED
Dissolved Metals	
Sulfate / Hexavalent Chromium	
Total Cyanide	
VOCs	
SVOCs	

FIELD PARAMETERS:

		Replicate I
pH (Standard Units):	_____	_____
Specific Conductivity (µs):	_____	_____
Temperature: º C º F (Circle One)	_____	_____

Calculate Volume of Water in Well:
(Depth of Well - Depth to Water) x 0.17 gallon/foot

(-) x 0.17 = _____ gallons
Well Volume

COMMENTS: _____

FIELD SAMPLING RECORD

2365 Haggerty Road South, Canton, MI 48188
(734) 397-3100

APPENDIX 1.0 METHOD FOR DETERMINING WHETHER THE BACKGROUND DATA WAS DRAWN FROM A NORMAL OR LOGNORMAL DISTRIBUTION AND ADJUSTMENTS FOR LOGNORMAL CHARACTER

A. TESTING FOR NORMALITY

Case I. No Background Data are Below the Detection Limit

If none of the data are BDL the evaluation of the distribution of background data will be conducted by a two step procedure. The first step is to compute the coefficient of variation (COV) which is the standard deviation divided by the mean:

$$s_b/\bar{x}_b$$

where for each parameter, s_b = the standard deviation of the background
$\bar{x}_b$ = the mean of the background

The analysis of the COV calculations are divided into three categories, which are detailed below.

I) If the COV is > 1.0, then it is very unlikely that the data came from a normal distribution and some adjustment of the data for the non-normality must be undertaken before the data is used in statistical procedures. In this situation the data should be examined for lognormal character (see below). If the mean and variance can be adjusted for lognormality, these values can be used in a parametric statistical procedure.

II) If the COV is > 0.50 and < 1.0, the data should be further examined to determine whether it comes from a normal distribution. If the covariance is in this range, then a normal probability plot will be constructed and regression analysis will be performed. The regression analysis must include the calculation of the standard parameters such as the correlation coefficient, the slope and intercept, and the corrected sum of the squares. The normal probability plot is constructed by the following steps:

1. Rank order the data (x_i) from smallest to largest.

2. Assign the (x_i) values ranks (r_i) from 1 to N, where N is the number of independent background observations.

3. Divide the ranks (r_i) by the total sample size (N) plus one (i.e. N + 1) to obtain the plotting positions F. For example:

$$F_1 = r_1 / (N + 1), \quad F_2 = r_2 / (N + 1)$$

4. Compute the normal score (Z) corresponding to each value of F by the following equation (Gilliam and Helsel, 1986):

$$Z_i = 4.91 * [F_i^{.14} - (1 - F_i)^{.14}]$$

5. Plot the ordered data values (x_i) as a function of the normal scores (Z_i), with the normal scores on the x-axis. Then perform a linear regression analysis of the x_i values on the Z_i values. Obtain the value for the correlation coefficient, ^r, for the line fitted to the data.

The plot of x as a function of Z is a normal probability plot which can be examined visually to determine if the data points approximate a straight line relationship. A straight line indicates normality and, conversely, a highly non-linear relationship is an indication of non-normality.

If the linearity of the normal probability plot is questionable, the probability that the data are from a normal distribution can be tested by comparing the correlation coefficient (^r) to a critical value, ^r_c, from table 1., using the following steps:

6. For the desired level of alpha (such as 0.05), enter the table at N, the number of values in the data set, and determine the critical value, ^r_c.

7. The correlation coefficient from the regression, ^r, is compared to the critical value ^r. The possible results are:

   i. $^r > ^r_c$. In this case the hypothesis that the data is normally distributed is accepted for the significance level chosen (ie. alpha = 0.05).

   ii. $^r_c > ^r$. In this case there is reason to question the hypothesis that the data are normal. The deviation from normality is not serious enough to prevent the use of this data in parametric statistics, as there is some tolerance for non-normality. However, the data should be checked for lognormal character, and if there is strong evidence for lognormal character, the data should be adjusted appropriately (see Part B., below).

III) If the COV is less than 0.5, the data should be regarded as coming from a normal distribution and can be used in parametric statistical procedures.

Case II. The Data Contain Below Detection Limit Values

In the case where there are below detection limit values in the background data set, the coefficient of variation should not be calculated because the mean and variance can be calculated only from the ADL data and thus are only estimates. The distribution should be determined from a regression analysis of the above detection limit (ADL) data.

The steps in this procedure is as follows:

1. Identify the number of BDL values. Label this quantity n_1.

2. Rank order the above detection level data (x_2) from smallest to largest.

3. Assign the ADL values ranks (r_i) using a method which accounts for the n_1 values of the data set that are below detection. The values for r are calculated by the following equation:

$$r_1 = n_1 + 1,\ r_2 = n_1 + 2,\ \ldots\ldots\ r_N = N$$

4. Divide the ranks (r_i) by the total sample size (N) plus one (i.e. N + 1 = ADL + BDL + 1) to obtain the plotting positions F. For example:

$$F_1 = r_1 / (N + 1),\ F_2 = r_2 / (N + 1)$$

5. Compute the normal score (Z) corresponding to each value of F by the equation:

$$Z_i = 4.91 * [\ F_i^{.14} - (1 - F_i)^{.14}\ ]$$

6. Plot the ordered ADL values (x_2) as a funtion of the normal scores (Z_i), with the normal scores on the x-axis. Perform a regression analysis of the x_2 values on the Z values. Obtain the value of the correlation coefficient, ^r, for the line fitted to the data.

The determination of normality is then made using visual inspection, and if necessary, the correlation coefficient test as in steps 6 and 7 above (except that the value of N in step 6 is the number of ADL values). If the data are found to be non-normally distributed, they should then be checked for a lognormal distribution using the steps below.

B. TRANSFORMATION OF LOGNORMAL DATA TO NORMALITY

If the coefficient of variation or normal probability plot regression analysis strongly suggest that a background data set was not normally distributed, the data should be evaluated for lognormal character. The lognormal distribution is apparently a common distribution for groundwater data. The check for lognormality is conducted as follows:

1. Transform the above detection limit (ADL) data, x_i, to natural logarithms: $y_i = \ln(x_i)$

2. The transformed data, y_i, are then used in steps 1-5 above for the appropriate case (I or II), to construct a normal probability plot and perform a linear regression analysis of y_i on Z_i.

3. The normal probability plot is then analyzed visually for a linear trend of the data, and the correlation coefficient can be tested at the significance level chosen (i.e. alpha = 0.05) as described above.

If the results of this test indicate the log-transformed data are now normally distributed, an adjustment of the mean and variance must be made to take into account the lognormal character. Because power is lost by use of log-transformed data, and because the use of transformed data can result in difficulty in understanding the results of a statistical test, the direct use of log-transformed data in a parametric statistical test is not recommended. However an adjusted mean and variance can be calculated from the log-transformed data. The sequence of calculations depend on whether the data is censored or not, and hence the adjustment for lognormality is given for each case separately.

Case I. No BDL Data

When there is no BDL data, a non-log mean and variance can be estimated from the log-transformed data with the following equations:

$$4) \quad \bar{x}_{yb} = \exp(\bar{y}_b + ((w_{yb})^2/2))$$

$$5) \quad s^2_{yb} = (\bar{x}_{yb})^2(\exp(w_{yb})^2 - 1)$$

where $\bar{x}_{yb}$ = mean of lognormal distribution estimated from the log-tranformed values
s^2_{yb} = variance of lognormal distribution estimated from the log-transformed values
$\bar{y}_b$ = mean of log-transformed values
w_{yb} = standard deviation of log transformed values

These non-log parameters, $\bar{x}_{yb}$ and s_{yb}^2 represent the estimate of the mean and variance of the data which take into consideration the lognormal character. Because this is not the same as transforming the data to normality, it should be understood that if there is a very large deviation from normality, it still may not be entirely appropriate to use parametric statistics.

Case II. Data Contain BDL Values

If the data contain BDL values (i.e. the data are censored) the mean and variance of the log-transformed data must be adjusted using the methods in Appendix 2.0. Once the new mean ($\bar{y}_b'$) and variance $(w_{yb}')^2$ have been estimated, they can be used in the equations in steps 6 and 7 below:

$$6)\ \bar{x}_{yb}' = \exp(\bar{y}_b' + ((w_{yb}')^2/2))$$

$$7)\ s^2_{yb}' = (\bar{x}_{yb}')^2\ (\exp(w_{yb}')^2 - 1)$$

where $\bar{x}_{yb}'$ = the mean of the lognormal distribution estimated from the adjusted log-transformed values.

s^2_{yb}' = the variance of the lognormal distribution estimated from the adjusted log-transformed values.

$\bar{y}_b'$ = the mean of the adjusted log-transformed values

w_{yb}' = the standard deviation of the adjusted log-transformed values

In this case the values for the parameters $\bar{x}_{yb}'$ and s_{yb}' are now suitably adjusted for use in parametric statistical procedures.

APPENDIX 2.0 METHOD FOR ESTIMATING THE MEAN AND VARIANCE OF CENSORED DATA

If the background data set contains below detection level (BDL) data, the mean and variance of the above detection level (ADL) data must be adjusted, or estimated to account for the proportion BDL. Also, the sample size of the background data (N) must be adjusted to an effective sample size (N_{eff}), which takes into consideration the lack of information due to the BDL values. The following procedure may be used on either raw or log-transformed ADL data.

A. Estimation of Mean and Standard Deviation

The estimation of the mean and standard deviation of censored data can be obtained from the regression analysis of the ADL data described in Case II, Part A., Appendix 1.0, in the following steps:

1. Use steps 1-5 from Case II, Part A., Appendix 1.0 to perform the regression of x_i (or the log-transformed values, y_i) on Z_i.

2. From the regression analysis, the y-intercept (value of x_i (or y_i) where Z=0) is the new estimate of the mean, called $\bar{x}_b'$ (or $\bar{y}_b'$ if the data were log-transformed). The slope of the regression line is the estimate for the standard deviation, s_b' (or w_b' if the data were log-transformed).

The regression estimates, $\bar{x}_b'$ and s_b', are parameters suitable for use in parametric statistical procedures. If the regression was performed on log-transformed data, these values of $\bar{y}_b'$ and w_b' must be used to estimate non-log parameters by the use of the equations in steps 6 and 7 in Case II, Part B, Appendix 1.0.

B. Estimation of Effective Sample Size

The effective sample size, N_{eff} can be estimated by the following procedure. The first step is the calculation of the variance of the mean [VARX]. This is accomplished in the following steps:

3. calculate the mean of the normal scores, $\bar{z}$, which were computed in steps 1-4 in Case II, Part A., of Appendix 1.0.

4. perform another regression analysis of the normal scores, Z_i, on the plotting positions, F_i, (computed in steps 1-3, Case II, Part A., Appendix 1.0). The purpose of this regression analysis is to obtain a term called the total corrected sum of the squares, $s(z^2)$ which is defined as:

$$s(z^2) = \sum z_i^2 - n_2\bar{z}^2$$

where: $\sum z_i^2$ = the sum of the squares of the normal scores

n_2 = the number of ADL values

$\bar{z}^2$ = the mean of the normal scores squared

5. calculate the standard deviation of the ADL values, s_2, by the standard equation for standard deviation:

$$s_2 = [\{ \sum (x_i - x_2)^2 \} / (n_2 - 1)]^{0.5}$$

where: $\bar{x}_2$ = the mean of the ADL values

n_2 = the number of ADL values

If the data have been log-transformed, the equation is:

$$s_2 = [\{ \sum (y_i - y_2)^2 \} / (n_2 - 1)]^{0.5}$$

where: $\bar{y}_2$ = the mean of the log-transformed ADL values

6. calculate [VARX] from the equation:

$$[VARX] = [(1/n_2) + (\bar{z}^2/s(z^2)] s_2^2$$

where: n_2 = number of ADL values

$\bar{z}$ = the mean of the normal scores, z (step 3 above)

$s(z^2)$ = corrected sum of the squares (step 4 above)

s_2 = standard deviation of ADL values (step 5)

7. the effective sample size, N_{eff}, is then calculated from the equation:

$$N_{eff} = s^2{}_b'/[VARX]$$

where: s_b' = the estimated standard deviation (step 2 above). This is w_b' if the data were log-transformed.

[VARX] = variance of the mean (step 6 above)

The effective sample size N_{eff} is the value which represents the number of independent background observations in the average replicate t-test and should be used to calculate the degrees of freedom. Because the regression method is a means of estimating the variance of the mean, [VARX], and assumes the data are normally distributed, the parameter N_{eff} is also only an estimate. In general, N_{eff} should not be larger than the total sample size or smaller than the number of ADL values. If N_{eff} exceeds the upper limit, N_{eff} will be set to the total sample size. If N_{eff} is smaller than the number of ADL values, it will be set at the number of ADL values.

EXAMPLE OF ADJUSTING BACKGROUND MEAN AND VARIANCE FOR DEVIATION TO NORMAL DISTRIBUTION AND CENSORSHIP

In the following example a statistical software package was used which contained the following features: 1) a data editor which has rank ordering capabilities, 2) a summary statistics routine which includes mean and standard deviation, and 3) a linear regression routine which includes plotting capabilities and can produce a printout of parameters such as slope, intercept, correlation coefficient and the total corrected sum of the squares. A package of this type greatly facilitates the implementation of the statistical procedures.

Example Adjustment of Background Data: Iron

To date, 5 quarters of background data for iron has been collected at upgradient wells OB-18, OB-19 and OB-31. These 15 independent observations will be used as a completed background data set in this example.

A. Testing for Normality

Because 2 of the 15 background values were below detection, case II from Appendix 1.0 is applicable to this example. Thus the first step is the regression of the ADL data on the normal scores. This is done in the following steps:

1. The ADL data, x_2, are rank ordered from smallest to largest. This is shown on figure 1.

2. The ADL data are assigned ranks (R_i), taking into account the 2 BDL values. Thus x_1 has a rank of 3, x_2 has a rank of 4, etc. This data is shown in figure 1, second column.

3. The plotting positions (F_i) are calculated by dividing each value (R_i) by N + 1, which in this example is 16. The plotting positions are shown in column 3, figure 1.

4. The normal scores (z_i) are calculated from the F_i values with the equation:

$$z_i = 4.91 * (F_i^{.14} - (1 - F_i)^{.14})$$

5. The ordered ADL values, x_2, are then regressed on the normal scores. The probability plot and regression results are shown on figure 2.

6. The plot is then visually examined for linearity. As seen from figure 2, the data plot in a highly non-linear manner suggesting the data are not normally distributed.

7. This subjective interpretation is then checked by comparing the correlation coefficient from the regresssion ($\hat{r} = 0.766$), to a critical value from table 1. From the table, using $\alpha = 0.05$ and $N = 15$, the critical value ($\hat{r}_c$) is 0.938. Since $\hat{r}_c >> \hat{r}$ the data do not appear to have been drawn from a normal distribution (i.e. hypothesis of normality is rejected).

The next step is to evaluate the possibility that the data are lognormally distributed.

B. Testing for Lognormality

To test for an underlying lognormal distribution, the ordered ADL data is first log-transformed:

$$y_i = \ln(x_i)$$

Then steps 2-4 above are repeated to prepare for the regression of y on z (i.e. columns 2-4 on figure 1 are also used in the present regression analysis). The columns 1-4 for the current regression analysis are shown in figure 4.

The log-transformed values, y_i, are then regressed on the normal scores, z_i. The resulting probability plot and regression parameters are shown on figure 5. From this normal probability plot it can be seen the the log-transformed data now have a strong linear trend. This is good evidence for a lognormal distribution. The correlation coefficient, $\hat{r}$, is 0.987, which is greater than the critical value of 0.938 (see above). Thus the hypothesis that the log-transformed values are normally distributed cannot be rejected. In other words, the data appear to have been drawn from a lognormal distribution.

Before estimating the mean and variance of the lognormal distribution, the data must be adjusted for censorship, as there were 2 BDL values in the iron example.

C. Adjustment of Mean and Variance for Censored Data

From the regression analysis of y_i on z_i completed above, a new estimate of the mean and variance has been determined which take into account the BDL values. The estimate of the mean, labelled $\bar{y}_b'$, is the y-intercept of this regression analysis, -0.963 (from figure 5). The estimate of the standard deviation, labelled w_{yb}', is the slope of the regression analysis, 1.912 (from figure 5).

The remaining step is the calculation of the effective sample size, N_{eff}. This requires the calculation of the standard deviation of the ADL values and an estimate of the

variance of the mean [VARX]. The standard deviation of the log-tranformed ADL values is 1.41 (shown in figure 6). The calculation of [VARX] is done with the following equation:

$$[VARX] = \{(1/n_2) + (\bar{z}^2/s(z^2))\}\ s_2^2$$

where: n_2 = number of samples above the detection limit
$\bar{z}^2$ = square of the average normal score (from figure 7)
$s(z^2)$ = corrected sum of the squares from the regression of z on F (from figure 8)
s_2 = standard deviation calculated from the log-transformed ADL values (computed in the summary statistics shown on figure 6)

In this example:

$$[VARX] = \{(1/13) + (.207^2/6.319)\}\ 1.405^2$$
$$= 0.1653$$

The effective sample size is then calculated from:

$$N_{eff} = (w_{yb}')^2/[VARX]$$

where: w_{yb}' = the estimated standard deviation from the regression of y_i on z shown above.

In the iron example, w_{yb}' was 1.912 (see figure 5). Thus:

$$N_{eff} = 1.912^2/\ 0.1635$$
$$= 22$$

Since 22 is greater than the total sample size of 15, N_{eff} is assigned the value of 15. The adjusted log-transformed parameters are:

$\bar{y}_b' = -.963$
$w_{yb}' = 1.912$
$N_{eff} = 15$

D. Estimation of Mean and Variance of Lognormal Distibution

The above log-transformed parameters should not be used in a statistical test. A new mean and variance based on the above log-transformed estimates must first be computed. In this final step, an estimate of the mean and variance that are not log-transformed, but take into account the lognormal character of the data, are computed. This is done in the following equations:

$$\bar{x}_{yb}' = \exp(\bar{y}_b' + ((w_{yb}')^2/2))$$

$$s^2_{yb}' = (\bar{x}_{yb}')^2(\exp(w_{yb}')^2 - 1)$$

So in this example:

$$\bar{x}_{yb}' = \exp(-.963 + (1.912^2/2)) = 2.37 \text{ mg/l}$$

$$s^2_{yb}' = 2.37^2 \, (\exp(1.912^2) - 1) = 211.6$$

$$s_{yb}' = 14.5 \text{ mg/l}$$

The resulting mean and standard deviation to be used in the average replicate t-test are:

$$\bar{x}_{yb}' = 2.37 \text{ mg/l}$$

$$s_{yb}' = 14.5 \text{ mg/l}$$

Figure 1.

x	R	F	z
0.06	3	0.1875	-0.885123
0.13	4	0.25	-0.672345
0.15	5	0.3125	-0.486919
0.29	6	0.375	-0.317299
0.34	7	0.4375	-0.156612
0.36	8	0.5	0
0.37	9	0.5625	0.156612
0.52	10	0.625	0.317299
0.83	11	0.6875	0.486919
1.5	12	0.75	0.672345
2.4	13	0.8125	0.885123
2.7	14	0.875	1.14921
9.6	15	0.9375	1.53537

Figure 3.

NUMBER OF OBSERVATIONS = 15
SAMPLE AVERAGE = 1.48077
SAMPLE VARIANCE = 6.70197
SAMPLE STANDARD DEVIATION = 2.58882

MINIMUM VALUE = 0.06 MAXIMUM = 9.6
LOWER AND UPPER QUARTILES = 0.29 1.5
INTERQUARTILE RANGE = 1.21
MEDIAN = 0.37

Figure 2.

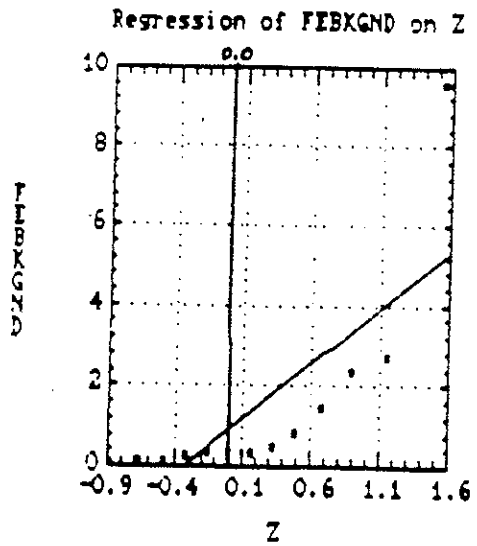
Simple Regression of FEBKGND on Z

Parameter	Estimate	Standard Error	T Value	Prob. Level
Intercept	0.91646	0.502798	1.82272	0.0956151
Slope	2.73265	0.691469	3.95195	2.2651E-3

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio
Model	47.188181	1	47.188181	15.617933
Error	33.235511	11	3.021410	
Total (Corr.)	80.423692	12		

Correlation Coefficient = 0.765993
Stnd. Error of Est. = 1.73822



DETERMINATION OF LOGNORMALITY

Figure 4.

y	R	F	z
-2.81341	3	0.1875	-0.8851
-2.04022	4	0.25	-0.6723
-1.89712	5	0.3125	-0.4869
-1.23787	6	0.375	-0.3172
-1.07881	7	0.4375	-0.1566
-1.02165	8	0.5	
-0.994252	9	0.5625	0.1566
-0.653926	10	0.625	0.3172
-0.18633	11	0.6875	0.4869
0.405465	12	0.75	0.6723
0.875469	13	0.8125	0.8851
0.993252	14	0.875	1.1492
2.26176	15	0.9375	1.5353

Figure 6.

UMBER OF OBSERVATIONS = 15
SAMPLE AVERAGE = -0.56828
SAMPLE VARIANCE = 1.9752
SAMPLE STANDARD DEVIATION = 1.40542

MINIMUM VALUE = -2.81341 MAXIMUM = 2.26176
LOWER AND UPPER QUARTILES = -1.23787 0.405465
INTERQUARTILE RANGE = 1.64334
MEDIAN = -0.994252

Figure 5.

Simple Regression of LOGFE on Z

Parameter	Estimate	Standard Error	T Value	Prob. Level
Intercept	-0.963065	0.0679662	-14.1698	2.07216E-8
Slope	1.91173	0.09347	20.4529	4.20246E-10

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio
Model	23.09507	1	23.09507	418.32156
Error	.607298	11	.055209	
Total (Corr.)	23.702369	12		

Correlation Coefficient = 0.987106
Stnd. Error of Est. = 0.234966

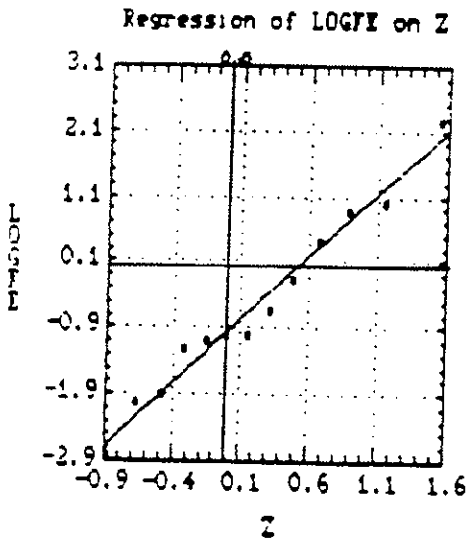


Figure 7.

ENTER THE NAME OF THE VARIABLE CONTAINING YOUR DATA: Z
NUMBER OF OBSERVATIONS = 13 (0 MISSING VALUES EXCLUDED)
SAMPLE AVERAGE = 0.206506
SAMPLE VARIANCE = 0.526603
SAMPLE STANDARD DEVIATION = 0.725674

MINIMUM VALUE = -0.885123 MAXIMUM = 1.53537 RANGE = 2.42049
LOWER AND UPPER QUARTILES = -0.317299 0.672345
INTERQUARTILE RANGE = 0.989644
MEDIAN = 0.156612

COEFF. OF SKEWNESS = 0.251442 STANDARDIZED VALUE = 0.370113
COEFF. OF KURTOSIS = 2.12124 STANDARDIZED VALUE = -0.646749

Figure 8.

Simple Regression of Z on F

Parameter	Estimate	Standard Error	T Value	Prob. Level
Intercept	-1.45959	0.0624062	-23.3886	9.91074E-11
Slope	2.96195	0.102444	28.9129	9.95892E-12

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio
Model	6.23716	1	6.23716	835.95705
Error	.082072	11	.007461	
Total (Corr.)	6.319237	12		

Correlation Coefficient = 0.993485
Stnd. Error of Est. = 0.0863777

APPENDIX 3.0 METHODS FOR REDUCING THE EFFECT OF SEASONALITY, TREND AND SERIALLY INFLUENCED DATA

After the background data for a group III parameter has been collected, it must be evaluated for seasonal cycles, long term trends and serial dependence as any of these properties can result in an increased rate of false positives, and may hinder the ability of the statistical program to detect real changes in groundwater quality. If any of these properties can be shown to occur, steps must be taken to reduce their effects on the statistical procedures. Because two years of data represents a minimum time period for detecting seasonality, trends or serial correlation, the analysis presented below should continue throughout the detection monitoring program as the background is updated. Steps for determining and correcting for these properties are given below.

A. DETERMINING AND CORRECTING FOR SEASONALITY

To determine whether the data show seasonal cycles, the background data are plotted as a function of time (i.e. a time series plot) and examined for repeated cycles. If there are recurrent highs or lows during one or more particular season (quarter), it is concluded that a seasonal cycle may exist. An adjustment for seasonality can be attained by the following correction to the background data set:

1. Average the quarterly values for the two years of background collection (i.e. the 1st quarter of year one, plus the 1st quarter of year two, divided by 2). This is the quarterly mean, $\bar{x}_q$.

2. Compute a seasonally corrected value, x_s, by subtracting the appropriate quarterly mean from each quarterly value and adding on the mean for the entire data set $\bar{x}_b$. For adjusting the first quarter of data the equation is:

$$x_{s1} = x_1 - \bar{x}_q + \bar{x}_b$$

3. Use these seasonally corrected values to perform a trend analysis (see below).

If the background data are adjusted for seasonality, then all of the values of the parameter in question must also be corrected using the approriate seasonal correction. During detection monitoring, the semi-annual samples are adjusted for the appropriate season. This seasonal correction will be most valid if these semi-annual samples are collected on dates corresponding to two of the quarterly dates used to establish background.

B. DETERMINING AND CORRECTING TRENDS

From the time series plot from part A above, any pattern of decreasing or increasing concentration with time should be evident. If there is an indication of such a trend, the strength of the trend can be determined with the following test:

1. Perform a linear regression of the time series plot (ie. regression of concentration on time).

2. From the regression analysis determine the F statistic which is defined as:

$$F = MSR/MSE$$

where: MSR = Regression Mean Square
MSE = Error Mean Square

3. Compare this F statistic to a critical value, F_c, at a chosen significance level (0.05), which is determined from Table 2. This critical value is determined from $\nu_1 = 1$ and $\nu_2 = n-2$ where n is the number of independent observations. If $F > F_c$ the hypothesis that the slope of the regression line is zero is rejected, hence a trend exists in the data.

If the data is shown to contain a trend, the trend can be removed by subtracting the regression line equation out of the data and adding the resulting value to the overall mean. For example, the first quarter data is adjusted as follows:

$$x_{t1} = x_1 - (y + mt) + \bar{x}_b$$

where: x_{t1} = trend corrected first quarter data
x_1 = original first quarter data
y = intercept of regression line
m = slope of regression line
t = time (such as the number of quarterly samples since the trend began)
$\bar{x}_b$ = overall mean of the data set

Each parameter sampled during detection monitoring which has a trend in the background data, must also be adjusted with the above equation, if the trend is shown to continue. It is very important to re-evaluate the trend in the background data with each sampling subsequent to background.

C. DETERMINING AND CORRECTING FOR SERIAL CORRELATION

The test for serial correlation is an autocorrelation function. This process requires a computer package to implement. It is not a powerful technique unless many years

of data have been collected. Fortunately, published analyses have shown that serial correlation is unlikely in samples collected on a quarterly basis. The adjustment for serial correlation is complex. The easiest remedy is to use data collected at larger time intervals.

APPENDIX 4.0 THE CRITICAL VALUE METHOD

The critical value method is for evaluating Group I parameters (i.e. parameters with background data all below detection limit) in cases where the concentration is above the detection limit in a downgradient well during routine semi-annual detection monitoring. The "critical value" method is a test of confidence that any measured value is actually above the detection limit. The critical value represents an estimate of the 95th percentile for a laboratory analysis of a sample which is at the detection limit. Hence, the critical value is a kind of tolerance limit which will be established based on the detection limit of the lab method used to measure the concentration and the analytical precision, rather than by the population distribution. When a measured value exceeds the critical value, it is concluded that the increase is significant and is not due to lab error. If the precision of the analytical method is very good, the critical value will be very close to the detection limit.

The critical value (CV) is given by:

$$CV = DL + S_p Z$$

where: DL = method detection limit
S_p = standard error of lab analysis representing the test precision
Z = normal variate corresponding to the pth percentile (eg for p=95, Z=1.645)

The "test" consists of comparing the downgradient value with the critical value. If the critical value is exceeded, then it is concluded that the detection limit has been exceeded and indicates that a significant increase in concentration has occurred at the downgradient well. This method assumes only that the laboratory errors are normally distributed, but requires no information on the distribution of the parameter data.

EXAMPLE OF CRITICAL VALUE METHOD

As a first approximation, it was recommended that analytical precision be assigned a value of one-half the detection limit.

Example: The critical value of Benzene

Necessary information:

Method Detection Limit (DL) = 5.0 ppb
Analytical Precision (S_p) = 2.5 ppb
Normal Variate for 95th Percentile (Z) = 1.645

Equation for Critical Value (CV):

$$CV = DL + S_pZ$$

Results:

$$CV = 5.0 + (2.5)(1.645)$$
$$= 9.1 \text{ ppb}$$

Any measured concentration of benzene over 9 ppb would be considered a significant increase over upgradient background where the detection limit for benzene was 5.0 ppb.

APPENDIX 5.0 THE PROPORTIONS TEST WITH THE TOLERANCE LIMITS DEFAULT

The proportions test with the tolerance limits default is a two-step procedure for testing for a significant increase in Group II parameters (parameters with a high proportion of below detection limit data). Step 1 is the proportions test and step 2 is a tolerance limit comparison test. Both tests should be performed during detection monitoring. A failure of either test results in the conclusion that a significant increase has occurred.

A. The Proportions Test

The proportions test is a non-parametric procedure to be used on Group II parameters. This test addresses the following question: are the concentrations in the downgradient well more likely to be above the detection limits than the concentrations in the background well(s). In this relatively simple procedure, the first step is to compute the proportion of the above detection level (ADL) values, P_b of the background data. After establishment of background, the proportion of ADL values, P_m, is tabulated for each downgradient well, throughout the detection monitoring program. Thus, the downgradient proportions are cumulative and several measurements are required before the test becomes applicable.

The statistical test is performed as follows:

1. the Z^* statistic is computed from the equation:

$$Z^* = \frac{P_m - P_b}{[\, p(1-p)(1/N_m + 1/N_b)\,]^{.5}}$$

where:
- P_m = proportion of ADL values since background (i.e. downgradient)
- P_b = proportion of background ADL values
- N_m = total number of samples since background (i.e. downgradient)
- N_b = total number of background samples
- p = a weighted proportion, defined as:

$$p = \frac{n_m + n_b}{N_m + N_b}$$

where:
- n_m = number of ADL downgradient
- n_b = number of ADL background

2. The approximation is made that Z^* is normally distributed (i.e. the estimates of the proportions are normally distributed, not the actual data set) and then Z^* is

compared to a critical value, Z_c, corresponding to the desired level of significance (e.g. $Z_c = 1.645$ for 0.05 level of significance). The hypothesis states that if the computed value $Z^* > Z_c$, then it is concluded that the higher proportion of downgradient ADL values is significant.

The strength of this test is that it does not require that the data follow any particular distribution. The weaknesses of this method are that several detection monitoring measurements are necessary before the test is valid, and if an extremely high concentration of the parameter were to appear, the concentration itself is not evaluated, only the fact that it is ADL.

B. The Tolerance Limit Default

To guard against these problems, a tolerance limit will be established for each parameter in this category. It must be noted that this a parametric statistical method which requires the condition of normality. Hence the proper adjustments for non-normality (Appendix 1.0) and the adjustment of the mean and variance of censored data (Appendix 2.0) must be implemeted before the tolerance limit can be calculated. The tolerance limit (TL) is established by the equation:

$$TL = \bar{x}_b + Ks_b$$

where: $\bar{x}_b$ = the estimated background mean
s_b = the estimated background standard deviation
K = a tolerance factor

The tolerance factor, K, depends on the desired percentile of background distribution (e.g. 95th percentile) and the number of independent background samples. For the 95% confidence limit, K can be determined from Table 3. The test is then very simple: if the downgradient concentration exceeds the tolerance limit, then the concentration at the downgradient well represents a significant increase over the background concentration.

The tolerance limit default takes care of both weaknesses in the proportions test in that the tolerance limit is established upon completion of background and will pick up very high values as they occur.

EXAMPLE OF PROPORTIONS TEST WITH TOLERANCE LIMITS DEFAULT

For an example of the proportions test with the tolerance limits default, the background data for nitrate was used because 67% of the 12 background samples (4 each from wells OB-18, OB-19 and OB-31) were below detection levels; hence nitrate is a group II parameter.

A. Proportions Test

Because the proportions test is non-parametric, the only information required is as follows:

Proportion of backgound samples ADL (P_b) = 0.33
Proportion of downgradient samples ADL (P_m) = .50 to 1.0
Number of background samples (N_b) = 12
Number of downgradient samples since background (N_m) = 4

It is assumed that 4 downgradient samples have been taken since the establishment of background and the test will be conducted assuming 2, 3 and 4 of these samples are above the detection limit.

For $P_m = 2/4 = 0.5$, the Z statistic is calculated as:

1. $$p = \frac{2 + 4}{4 + 12} = .375$$

2. $$Z^* = \frac{.50 - .33}{[.375(1-.375)(.25 + .083)]^{.5}} = 0.60$$

For $P_m = 3/4 = .75$, $Z^* = 1.47$

For $P_m = 4/4 = 1.0$, $Z^* = 2.32$

At a significance level of 0.05, the critical Z_c statistic is 1.645 as determined from a normal distribution table. So for the three cases the results are as follows:

For $P_m = 0.5$, $Z^* << Z_c$ so there is no significant increase in the downgradient concentration

For $P_m = 0.75$ $Z^* << Z_c$ so there is no significant increase in the downgradient concentration

For $P_m = 1.0$ $Z^* >> Z_c$ so it is concluded that the higher proportion of ADL values downgradient is significant and there is a significant increase in the downgradient concentration.

B. The Tolerance Limits Default

For the parametric tolerance limits test, the distribution of the nitrate data was first tested for normality. A regression analysis was performed on this data (Appendix 1.0). This analysis showed the condition of normality could not be rejected at the 0.05 significance level, and no transformation was necessary. The regression analysis was also used to adjust the mean, variance and effective sample size to take into account the BDL values. The results of the regression analysis were as follows:

$$\bar{x}_b = 0.135 \text{ mg/l}$$
$$s_b = 0.268 \text{ mg/l}$$
$$N_{eff} = 4$$

Using the above data and the tolerance factor (K) of 5.14 for $\alpha = 0.05$ (from Table 3), the tolerance limit is calculated as:

$$TL = \bar{x}_b + Ks_b$$
$$= 0.0135 + (5.14)(.268)$$
$$= 1.39 \text{ mg/l}$$

Thus, based on the tolerance limit default, WDI would conclude that a significant increase in the downgradient concentration had occurred, if a nitrate concentration greater than 1.39 mg/l were measured downgradient, regardless of the results of the proportions test.

APPENDIX 6.0 THE SHEWHART-CUSUM CONTROL CHART

(Excerpted from USEPA Guidance Document: Statistical Analysis of Groundwater Monitoring Data)

7.3 COMBINED SHEWHART-CUSUM CONTROL CHARTS FOR EACH WELL AND CONSTITUENT

Control charts are widely used as a statistical tool in industry as well as research and development laboratories. The concept of control charts is relatively simple, which makes them attractive to use. From the population distribution of a given variable, such as concentrations of a given constituent, repeated random samples are taken at intervals over time. Statistics, for example the mean of replicate values at a point in time, are computed and plotted together with upper and/or lower predetermined limits on a chart where the x-axis represents time. If a result falls outside these boundaries, then the process is declared to be "out of control"; otherwise, the process is declared to be "in control." The widespread use of control charts is due to their ease of construction and the fact that they can provide a quick visual evaluation of a situation, and remedial action can be taken, if necessary.

In the context of ground water monitoring, control charts can be used to monitor the inherent statistical variation of the data collected within a single well, and to flag anomalous results. Further investigation of data points lying outside the established boundaries will be necessary before any direct action is taken.

A control chart that can be used on a real time basis must be constructed from a data set large enough to characterize the behavior of a specific well. It is recommended that data from a minimum of eight samples within a year be collected for each constituent at each well to permit an evaluation of the consistency of monitoring results with the current concept of the hydrogeology of the site. Starks (1988) recommends a minimum of four sampling periods at a unit with eight or more wells and a minimum of eight sampling periods at a unit with less than four wells. Once the control chart for the specific constituent at a given well is acceptable, then subsequent data

points can be plotted on it to provide a quick evaluation as to whether the process is in control.

The standard assumptions in the use of control charts are that the data generated by the process, when it is in control, are independently (see Section 2.4.2) and normally distributed with a fixed mean μ and constant variance σ^2. The most important assumption is that of independence; control charts are not robust with respect to departure from independence (e.g., serial correlation, see glossary). In general, the sampling scheme will be such that the possibility of obtaining serially correlated results is minimized, as noted in Section 2. The assumption of normality is of somewhat less concern, but should be investigated before plotting the charts. A transformation (e.g., log-transform, square root transform) can be applied to the raw data so as to obtain errors normally distributed about the mean. An additional situation which may decrease the effectiveness of control charts is seasonality in the data. The problem of seasonality can be handled by removing the seasonality effect from the data, provided that sufficient data to cover at least two seasons of the same type are available (e.g., 2 years when monthly or quarterly seasonal effect). A procedure to correct a time series for seasonality was shown above in Section 7.2.

PURPOSE

Combined Shewhart-cumulative sum (CUSUM) control charts are constructed for each constituent at each well to provide a visual tool of detecting both trends and abrupt changes in concentration levels.

PROCEDURE

Assume that data from at least eight independent samples of monitoring are available to provide reliable estimates of the mean, μ, and standard deviation, σ, of the constituent's concentration levels in a given well.

Step 1. To construct a combined Shewhart-CUSUM chart, three parameters need to be selected prior to plotting:

h - a decision internal value
k - a reference value
SCL - Shewhart control limit (denoted by U in Starks (1988))

The parameter k of the CUSUM scheme is directly obtained from the value, D, of the displacement that should be quickly detected; $k = D/2$. It is recommended to select $k = 1$, which will allow a displacement of two standard deviations to be detected quickly.

When k is selected to be 1, the parameter h is usually set at values of 4 or 5. The parameter h is the value against which the cumulative sum in the CUSUM scheme will be compared. In the context of groundwater monitoring, a value of $h = 5$ is recommended (Starks, 1988; Lucas, 1982).

The upper Shewhart limit is set at SCL = 4.5 in units of standard deviation. This combination of k = 1, h = 5, and SCL = 4.5 was found most appropriate for the application of combined Shewhart-CUSUM charts for groundwater monitoring (Starks, 1988).

Step 2. Assume that at time period T_i, n_i concentration measurements $X_1, \ldots, X_{ni}$, are available. Compute their average $\bar{X}_i$.

Step 3. Calculate the standardized mean

$$Z_i = (\bar{X}_i - \mu) \sqrt{n_i}/\sigma$$

where μ and σ are the mean and standard deviation obtained from prior monitoring at the same well (at least four sampling periods in a year).

Step 4. At each time period, T_i, compute the cumulative sum, S_i, as:

$$S_i = \max \{0, (Z_i - k) + S_{i-1}\}$$

where max {A, B} is the maximum of A and B, starting with $S_0 = 0$.

Step 5. Plot the values of S_i versus T_i on a time chart for this combined Shewhart-CUSUM scheme. Declare an "out-of-control" situation at sampling period T_i if for the first time, $S_i \geq h$ or $Z_i \geq SCL$. This will indicate probable contamination at the well and further investigations will be necessary.

REFERENCES

Lucas, J. M. 1982. "Combined Shewhart-CUSUM Quality Control Schemes." *Journal of Quality Technology*. Vol. 14, pp. 51-59.

Starks, T. H. 1988 (Draft). "Evaluation of Control Chart Methodologies for RCRA Waste Sites."

Hockman, K. K., and J. M. Lucas. 1987. "Variability Reduction Through Subvessel CUSUM Control." *Journal of Quality Technology*. Vol. 19, pp. 113-121.

EXAMPLE

The procedure is demonstrated on a set of carbon tetrachloride measurements taken monthly at a compliance well over a 1-year period. The monthly means of two measurements each (n_i = 2 for all i's) are presented in the third column of Table 7-2 below. Estimates of μ and σ, the mean and standard deviation of carbon tetrachloride measurements at that particular well were obtained from a preceding monitoring period at that well; μ = 5.5 µg/L and σ = 0.4 µg/L.

TABLE 7-2. EXAMPLE DATA FOR COMBINED SHEWHART-CUSUM CHART--CARBON TETRACHLORIDE CONCENTRATION (µg/L)

Date	Sampling period T_i	Mean concentration, X_i	Standardized $\bar{X}_i$, Z_i	$Z_i - k$	CUSUM, S_i
Jan 6	1	5.52	0.07	-0.93	0
Feb 3	2	5.60	0.35	-0.65	0
Mar 3	3	5.45	-0.18	-1.18	0
Apr 7	4	5.15	-1.24	-2.24	0
May 5	5	5.95	1.59	0.59	0.59
Jun 2	6	5.54	0.14	-0.86	0.00
Jul 7	7	5.49	-0.04	-1.04	0.00
Aug 4	8	6.08	2.05	1.05	1.05
Sep 1	9	6.91	4.99[a]	3.99	5.04[b]
Oct 6	10	6.78	4.53[a]	3.53	8.56[b]
Nov 3	11	6.71	4.28	3.28	11.84[b]
Dec 1	12	6.65	4.07	3.07	14.91[b]

Parameters: Mean = 5.50; std = 0.4; k = 1; h = 5; SCL = 4.5.

[a] Indicates "out-of-control" process via Shewhart control limit ($Z_i > 4.5$).

[b] CUSUM "out-of-control" signal ($S_i > 5$).

Step 1. The three parameters necessary to construct a combined Shewhart-CUSUM chart were selected as h = 5; k = 1; SCL = 4.5 in units of standard deviation.

Step 2. The monthly means are presented in the third column of Table 7-2.

Step 3. Standardize the means within each sampling period. These computations are shown in the fourth column of Table 7-2. For example, $Z_1 = (5.52 - 5.50)*\sqrt{2}/0.4 = 0.07$.

Step 4. Compute the quantities S_i, i = 1, ..., 12. For example,

$S_1 = \max\{0, -0.93 + 0\} = 0$
$S_2 = \max\{0, -0.65 + 0\} = 0$
.
.
.
$S_5 = \max\{0, 0.59 + S_4\} = \max\{0, 0.59 + 0\} = 0.59$
$S_6 = \max\{0, -0.86 + S_5\} = \max\{0, -0.86 + 0.59) = \max\{0, -0.27\} = 0$
.
etc.

These quantities are shown in the last column of Table 7-2.

Step 5. Construct the control chart. The y-axis is in units of standard deviations. The x-axis represent time, or the sampling periods. For each sampling period, T_i, record the value of X_i and S_i. Draw horizontal lines at values h = 5 and SCL = 4.5. These two lines represent the upper control limits for the CUSUM scheme and the Shewhart control limit, respectively. The chart for this example data set is shown in Figure 7-2.

The combined chart indicates statistically significant evidence of contamination starting at sampling period T_9. Both the CUSUM scheme and the Shewhart control limit were exceeded by S_9 and Z_9, respectively. Investigation of the situation should begin to confirm contamination and action should be required to bring the variability of the data back to its previous level.

INTERPRETATION

The combined Shewhart-CUSUM control scheme was applied to an example data set of carbon tetrachloride measurements taken on a monthly basis at a well. The statistic used in the construction of the chart was the mean of two measurements per sampling period. (It should be noted that this method can be used on an individual measurement as well, in which case $n_i = 1$). Estimates of the mean and standard deviation of the measurements were available from previous data collected at that well over at least four sampling periods.

The parameters of the combined chart were selected to be k = 1 unit, the reference value or allowable slack for the process; h = 5 units, the decision interval for the CUSUM scheme; and SCL = 4.5 units, the upper Shewhart control limit. All parameters are in units of σ, the standard deviation obtained from the previous monitoring results. Various combinations of parameter values can be selected. The particular values recommended here appear to be the best for the initial use of the procedure from a review of the simulations and recommendations in the references. A discussion on this subject is given by Lucas (1982), Hockman and Lucas (1987), and Starks (1988). The choice of the parameters h and k of a CUSUM chart is based on the desired performance of the chart. The criterion used to evaluate a control scheme is the average number of samples or time periods before an out-of-control signal is obtained. This criterion is denoted by ARL or average run length. The ARL should be large when the mean concentration of a hazardous constituent is near its target value and small when the mean has shifted too far from the target. Tables have been developed by simulation methods to estimate ARLs for given combinations of the parameters (Lucas, Hockman and Lucas, and Starks). The user is referred to these articles for further reading.

7.4 UPDATE OF A CONTROL CHART

The control chart is based on preselected performance parameters as well as on estimates of μ and σ, the parameters of the distribution of the measurements in question. As monitoring continues and the process is found to be in control, these parameters need periodic updating so as to incorporate this new information into the control charts. Starks (1988) has suggested that in

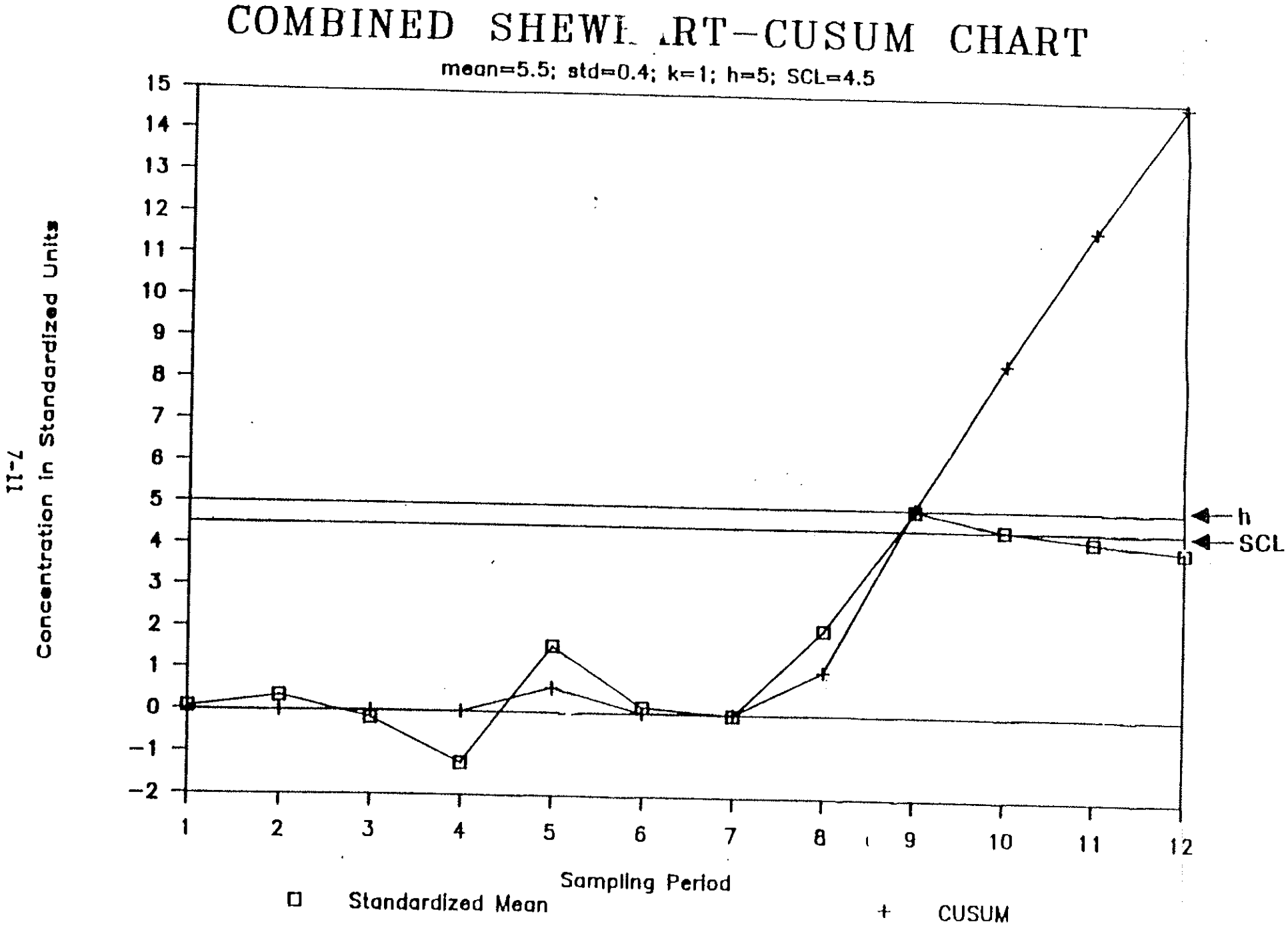


Figure 7-2. Combined Shewhart-CUSUM chart.

general, adjustments in sample means and standard deviations be made after sampling periods 4, 8, 12, 20, and 32, following the initial monitoring period recommended to be at least eight sampling periods. Also, the performance parameters h, k, and SCL would need to be updated. The author suggests that h = 5, k = 1, and SCL = 4.5 be kept at those values for the first 12 sampling periods following the initial monitoring plan, and that k be reduced to 0.75 and SCL to 4.0 for all subsequent sampling periods. These values and sampling period numbers are not mandatory. In the event of an out-of-control state or a trend, the control chart should not be updated.

Table 1. Critical Values of r.

N	alpha 0.10	0.05	0.01
4	.8951	.8734	.8318
5	.9033	.8804	.8320
10	.9347	.9180	.8804
15	.9506	.9383	.9110
20	.9600	.9503	.9290
25	.9662	.9582	.9408
30	.9707	.9639	.9490
40	.9767	.9715	.9597
50	.9807	.9764	.9664
60	.9835	.9799	.9710
75	.9865	.9835	.9757

From, "Minitab Manual"

Table 2. Critical Values of F.

Level of Significance = 0.05

ν_2 \ ν_1	1	2	3	4	5	6	8	12	15	20	30	60	∞
1	161.4	199.5	215.7	224.6	230.2	234.0	238.9	243.9	245.9	248.0	250.1	252.2	254.3
2	18.51	19.00	19.16	19.25	19.30	19.33	19.37	19.41	19.43	19.45	19.46	19.48	19.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.85	8.74	8.70	8.66	8.62	8.57	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.04	5.91	5.86	5.80	5.75	5.69	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.82	4.68	4.62	4.56	4.50	4.43	4.36
6	5.99	5.14	4.76	4.53	4.39	4.28	4.15	4.00	3.94	3.87	3.81	3.74	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.73	3.57	3.51	3.44	3.38	3.30	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.44	3.28	3.22	3.15	3.08	3.01	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.23	3.07	3.01	2.94	2.86	2.79	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.07	2.91	2.85	2.77	2.70	2.62	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	2.95	2.79	2.72	2.65	2.57	2.49	2.40
12	4.75	3.89	3.49	3.26	3.11	3.00	2.85	2.69	2.62	2.54	2.47	2.38	2.30
13	4.67	3.81	3.41	3.18	3.03	2.92	2.77	2.60	2.53	2.46	2.38	2.30	2.21
14	4.60	3.74	3.34	3.11	2.96	2.85	2.70	2.53	2.46	2.39	2.31	2.22	2.13
15	4.54	3.68	3.29	3.06	2.90	2.79	2.64	2.48	2.40	2.33	2.25	2.16	2.07
16	4.49	3.63	3.24	3.01	2.85	2.74	2.59	2.42	2.35	2.28	2.19	2.11	2.01
17	4.45	3.59	3.20	2.96	2.81	2.70	2.55	2.38	2.31	2.23	2.15	2.06	1.96
18	4.41	3.55	3.16	2.93	2.77	2.66	2.51	2.34	2.27	2.19	2.11	2.02	1.92
19	4.38	3.52	3.13	2.90	2.74	2.63	2.48	2.31	2.23	2.16	2.07	1.98	1.88
20	4.35	3.49	3.10	2.87	2.71	2.60	2.45	2.28	2.20	2.12	2.04	1.95	1.84
21	4.32	3.47	3.07	2.84	2.68	2.57	2.42	2.25	2.18	2.10	2.01	1.92	1.81
22	4.30	3.44	3.05	2.82	2.66	2.55	2.40	2.23	2.15	2.07	1.98	1.89	1.78
23	4.28	3.42	3.03	2.80	2.64	2.53	2.37	2.20	2.13	2.05	1.96	1.86	1.76
24	4.26	3.40	3.01	2.78	2.62	2.51	2.36	2.18	2.11	2.03	1.94	1.84	1.73
25	4.24	3.39	2.99	2.76	2.60	2.49	2.34	2.16	2.09	2.01	1.92	1.82	1.71
26	4.23	3.37	2.98	2.74	2.59	2.47	2.32	2.15	2.07	1.99	1.90	1.80	1.69
27	4.21	3.35	2.96	2.73	2.57	2.46	2.31	2.13	2.06	1.97	1.88	1.79	1.67
28	4.20	3.34	2.95	2.71	2.56	2.45	2.29	2.12	2.04	1.96	1.87	1.77	1.65
29	4.18	3.33	2.93	2.70	2.55	2.43	2.28	2.10	2.03	1.94	1.85	1.75	1.64
30	4.17	3.32	2.92	2.69	2.53	2.42	2.27	2.09	2.01	1.93	1.84	1.74	1.62
40	4.08	3.23	2.84	2.61	2.45	2.34	2.18	2.00	1.92	1.84	1.74	1.64	1.51
60	4.00	3.15	2.76	2.53	2.37	2.25	2.10	1.92	1.84	1.75	1.65	1.53	1.39
120	3.92	3.07	2.68	2.45	2.29	2.17	2.02	1.83	1.75	1.66	1.55	1.43	1.25
∞	3.84	3.00	2.60	2.37	2.21	2.10	1.94	1.75	1.67	1.57	1.46	1.32	1.00

From, "Handbook of Mathematical Functions", by Abromowitz and Stegun, (1972)

Table 3. Values of Tolerance Factor, K.

One-Sided Tolerance Limit Factors for a Normal Distribution

Values of k for $\gamma = 0.90$ and $n = f + 1$

n	0.900	0.950	0.975	0.990	0.999
2	10.253	13.090	15.584	18.500	24.582
3	4.258	5.311	6.244	7.340	9.651
4	3.188	3.957	4.637	5.438	7.129
5	2.744	3.401	3.983	4.668	6.113
6	2.494	3.093	3.621	4.243	5.556
7	2.333	2.893	3.389	3.972	5.201
8	2.219	2.754	3.227	3.783	4.955
9	2.133	2.650	3.106	3.641	4.771
10	2.066	2.568	3.011	3.532	4.628
11	2.012	2.503	2.936	3.444	4.515
12	1.966	2.448	2.872	3.371	4.420
13	1.928	2.403	2.820	3.310	4.341
14	1.895	2.363	2.774	3.257	4.274
15	1.866	2.329	2.735	3.212	4.215
16	1.842	2.299	2.700	3.172	4.164
17	1.819	2.272	2.670	3.137	4.118
18	1.800	2.249	2.643	3.106	4.078
19	1.781	2.228	2.618	3.078	4.041
20	1.765	2.208	2.597	3.052	4.009
21	1.750	2.190	2.575	3.028	3.979
22	1.736	2.174	2.557	3.007	3.952
23	1.724	2.159	2.540	2.987	3.927
24	1.712	2.145	2.525	2.969	3.904
25	1.702	2.132	2.510	2.952	3.882
30	1.657	2.080	2.450	2.884	3.794
35	1.623	2.041	2.406	2.833	3.730
40	1.598	2.010	2.371	2.793	3.679
45	1.577	1.986	2.344	2.762	3.638
50	1.560	1.965	2.320	2.735	3.604
60	1.532	1.933	2.284	2.694	3.552
70	1.511	1.909	2.257	2.663	3.513
80	1.495	1.890	2.235	2.638	3.482
90	1.481	1.874	2.217	2.618	3.456
100	1.470	1.861	2.203	2.601	3.435
120	1.452	1.841	2.179	2.574	3.402
145	1.436	1.821	2.158	2.550	3.371
300	1.386	1.765	2.094	2.477	3.280
500	1.362	1.736	2.062	2.442	3.235
∞	1.282	1.645	1.960	2.326	3.090

Values of k for $\gamma = 0.95$ and $n = f + 1$

n	0.900	0.950	0.975	0.990	0.999
2	20.581	26.260	31.257	37.094	49.276
3	6.155	7.656	8.986	10.553	13.857
4	4.162	5.144	6.015	7.042	9.214
5	3.413	4.210	4.916	5.749	7.509
6	3.008	3.711	4.332	5.065	6.614
7	2.756	3.401	3.971	4.643	6.064
8	2.582	3.188	3.724	4.355	5.689
9	2.454	3.032	3.543	4.144	5.414
10	2.355	2.911	3.403	3.981	5.204
11	2.275	2.815	3.291	3.852	5.036
12	2.210	2.736	3.201	3.747	4.900
13	2.155	2.670	3.125	3.659	4.787
14	2.108	2.614	3.060	3.585	4.690
15	2.068	2.566	3.005	3.520	4.607
16	2.032	2.523	2.956	3.463	4.534
17	2.002	2.486	2.913	3.414	4.471
18	1.974	2.453	2.875	3.370	4.415
19	1.949	2.423	2.840	3.331	4.364
20	1.926	2.396	2.809	3.295	4.319
21	1.905	2.371	2.781	3.262	4.276
22	1.887	2.350	2.756	3.233	4.238
23	1.869	2.329	2.732	3.206	4.204
24	1.853	2.309	2.711	3.181	4.171
25	1.838	2.292	2.691	3.158	4.143
30	1.778	2.220	2.608	3.064	4.022
35	1.732	2.166	2.548	2.994	3.934
40	1.697	2.126	2.501	2.941	3.866
45	1.669	2.092	2.463	2.897	3.811
50	1.646	2.065	2.432	2.863	3.766
60	1.609	2.022	2.384	2.807	3.695
70	1.581	1.990	2.348	2.764	3.643
80	1.560	1.965	2.319	2.733	3.601
90	1.542	1.944	2.295	2.706	3.567
100	1.527	1.927	2.276	2.684	3.539
120	1.503	1.899	2.245	2.649	3.495
145	1.481	1.874	2.217	2.617	3.455
300	1.417	1.800	2.133	2.522	3.333
500	1.385	1.763	2.092	2.475	3.277
∞	1.282	1.645	1.960	2.326	3.090

From, "Handbook of Statistical Tables", by D.B. Owen, (1962)

APPENDIX B

FIELD SAMPLING FORM

DATE:_____ PROJECT:

SAMPLE LOCATION:

PERSONNEL: _____

AMBIENT TEMPERATURE: ____ ºF ºC (Circle One)

SITE NAME: FORD - Monroe Plant

SITE ADDRESS: **3200 E. Elm Avenue, Monroe, MI, 48162**

OBSERVER(S): _____

WEATHER CONDITIONS: _____

SAMPLING EQUIPMENT:

- ☐ PVC bailer
- ☐ Dedicated PVC Bailer
- ☐ Stainless-Steel Bailer
- ☐ Dedicated Pump System
- ☐ Submersible Pump
- ■ Other: **Dedicated Disposable Polyethylene Bailer**

FIELD MEASUREMENTS:

TOP OF CASING (TOC) ELEVATION: _____ Date & Time Purged (EST)

DATUM: **USGS (mean sea level)**

A _____ Depth to Water (feet) from TOC

B _____ Total Depth of Well (feet) from TOC

C _____ Water Volume in Well (gallons-see below)

D _____ Actual Volume Removed (gallons)

E _____ Well Volumes Removed (D / C)

DISPOSAL METHOD FOR PURGED WATER:

- ☐ On-Site 55 Gallon Drum
- ■ Ground Surface
- ☐ Sanitary Sewer
- ☐ Subsurface Drain System

LAB SAMPLE PARAMETERS	DATE & TIME COLLECTED
Dissolved Metals	
Sulfate / Hexavalent Chromium	
Total Cyanide	
VOCs	
SVOCs	

FIELD PARAMETERS:

		Replicate I
pH (Standard Units):	_____	_____
Specific Conductivity (µs):	_____	_____
Temperature: º C º F (Circle One)	_____	_____

Calculate Volume of Water in Well:
(Depth of Well - Depth to Water) x 0.17 gallon/foot

(-) x 0.17 = _____ gallons
Well Volume

COMMENTS: _____

FIELD SAMPLING RECORD

2365 Haggerty Road South, Canton, MI 48188
(734) 397-3100

APPENDIX C

INSPECTION AND MAINTENANCE LOGS

FORD MOTOR COMPANY

INSPECTION LOG

Weekly Monthly Semi-Annual Annual

Inspection Performed On: Date: _____ Time: _____

Inspection Performed By: Name: _____

Company: _____

Directions:

Along the right side of the form is an indication of when each item is to be inspected (see type of inspection above). After inspecting the following items as described, check the appropriate box. For those items where a problem is noted, provide a detailed written description of the problem in the space provided at the end of the form. If more space is needed, attach additional sheets along with sketches, photographs, etc. Be sure to number each page, including any attached pages.

	ACCEPTABLE	NOT ACCEPTABLE	NOT APPLICABLE	TYPE OF INSPECTION
Part A - Security System (Existing Site Security)				
1. Guard on duty at plant entrance.	☐	☐	☐	**W**,M,S,A
2. Perimeter landfill fencing in place and gates locked, locks in good shape.	☐	☐	☐	**W**,M,S,A
Part B - Groundwater Monitoring System (see attached sketch)				
1. All wells/piezometers accessible.	☐	☐	☐	M,S,A
2. Protective covers secure and locked, locks in good shape (operable).	☐	☐	☐	M,S,A
3. Protective covers functioning.	☐	☐	☐	M,S,A
4. No evidence of standing water at surface of well/piezometer.	☐	☐	☐	M,S,A
5. Each well/piezometer labeled clearly and correctly.	☐	☐	☐	M,S,A
6. No evidence of standing water at surface of well/piezometer.	☐	☐	☐	M,S,A
7. Surface seal at each well/piezometer intact and functional.	☐	☐	☐	M,S,A
8. Cap secure on each well/piezometer.	☐	☐	☐	M,S,A
9. No unusual obstruction apparent in well/piezometer.	☐	☐	☐	M,S,A
10. No evidence of sediment build-up in well/piezometer, based on comparison of expected and measured total depths.	☐	☐	☐	M,S,A
11. No evidence of screen clogging, based on comparison of expected and actual recovery rates at individual wells/piezometers.	☐	☐	☐	M,S,A
12. No other problems which may cause the monitoring system to perform ineffectively.	☐	☐	☐	M,S,A

FORD MOTOR COMPANY

INSPECTION LOG

Inspection Performed On: Date: _____

	ACCEPTABLE	NOT ACCEPTABLE	NOT APPLICABLE	TYPE OF INSPECTION
Part C - Miscellaneous Inspection Items				
1. On-site monuments located and intact (see attached sketches).				M,S,A
2. Any repairs made to correct problems since the last site inspection appear to have been acceptable and problem(s) alleviated.				**W**,M,S,A
3. All problems noted on previous inspection report have been corrected.				**W**,M,S,A
4. No other evidence of hazardous waste discharge or leakage from the containment units or other possible sources were noted in the containment unit areas, other than those noted in this report.				**W**,M,S,A
Part D - Eastern Containment Unit Cover				
1. Vegetative cover maintained (mowed) and free of bare spots.				**W**,M,S,A
2. Cover free of undesirable plant species.				**W**,M,S,A
3. No evidence of burrowing animals.				**W**,M,S,A
4. No visible surface erosion, soft, wet or unstable areas noted on cover.				**W**,M,S,A
5. No evidence of standing surface water.				**W**,M,S,A
6. No areas of settlement/subsidence noted.				**W**,M,S,A
7. No cracks in cover soils.				**W**,M,S,A
8. Cover free of any other apparent problems which may lead to malfunction.				**W**,M,S,A
9. Gravel toe drain stable and free of clogging vegetation.				**W**,M,S,A
10. Stormwater inlets/outlets are free of sediment and debris and are functional.				**W**,M,S,A
11. Access road intact and functional.				**W**,M,S,A
12. Asphalt pavement above cover intact and functional.				**W**,M,S,A
Part E - Western Containment Unit Cover				
1. Vegetative cover maintained (mowed) and free of bare spots.				**W**,M,S,A
2. Cover free of undesirable plant species.				**W**,M,S,A
3. No evidence of burrowing animals.				**W**,M,S,A
4. No visible surface erosion, soft, wet or unstable areas noted on cover.				**W**,M,S,A
5. No evidence of standing surface water.				**W**,M,S,A
6. No areas of settlement/subsidence noted.				**W**,M,S,A
7. No cracks in cover soils.				**W**,M,S,A
8. Cover free of any other apparent problems which may lead to malfunction.				**W**,M,S,A
9. Gravel toe drain stable and free of clogging vegetation.				**W**,M,S,A
10. Stormwater inlets/outlets are free of sediment and debris and are functional.				**W**,M,S,A
11. Access road intact and functional.				**W**,M,S,A
12. Asphalt pavement above cover intact and functional.				**W**,M,S,A

FORD MOTOR COMPANY

INSPECTION LOG

Inspection Performed On: Date: _____

	ACCEPTABLE	NOT ACCEPTABLE	NOT APPLICABLE	TYPE OF INSPECTION
Part F - Eastern Containment Unit Leachate Collection System				
1. Manhole covers securely in place, locked, locks in good shape (see sketch).	☐	☐	☐	**W**,M,S,A
2. Leachate pumps are properly positioned and functional.	☐	☐	☐	**W**,M,S,A
3. Manhole sumps have less than three inches of sediment.	☐	☐	☐	M,S,A
4. Pump warning lights indicate system is functional.	☐	☐	☐	**W**,M,S,A
5. Secondary containment pipe free of liquids.	☐	☐	☐	M,S,A
6. Perimeter and interior pipe cleanouts are accessible, intact, and locked, locks in good shape.	☐	☐	☐	**W**,M,S,A
7. Collection piping cleaned within the last 12 months (as-built summary of pipe lengths attached).	☐	☐	☐	A
Part G - Western Containment Unit Leachate Collection System				
1. Manhole covers securely in place, locked, locks in good shape (see sketch).	☐	☐	☐	**W**,M,S,A
2. Leachate pumps are properly positioned and functional.	☐	☐	☐	**W**,M,S,A
3. Manhole sumps have less than three inches of sediment.	☐	☐	☐	M,S,A
4. Pump warning lights indicate system is functional.	☐	☐	☐	**W**,M,S,A
5. Secondary containment pipe free of liquids.	☐	☐	☐	M,S,A
6. Perimeter and interior pipe cleanouts are accessible, intact, and locked, locks in good shape.	☐	☐	☐	**W**,M,S,A
7. Collection piping cleaned within the last 12 months (as-built summary of pipe lengths attached).	☐	☐	☐	A
Part H - Sediment Containment Unit Leachate Collection System				
1. Riser pipe cover securely in place and locked, lock in good shape.	☐	☐	☐	**W**,M,S,A
2. Leachate level checked within the last month and is at an acceptable level (≤ 581.4).	☐	☐	☐	M,S,A

_____ _____

Inspector's Signature Client Representative's Signature

FORD MOTOR COMPANY

INSPECTION LOG

Inspection Performed On: Date: _____

Notes:

FORD MOTOR COMPANY

MAINTENANCE LOG

Maintenance Performed On: Date: _____ Time: _____

Maintenance Performed By: Name(s): _____

Company: _____

Describe the items(s) repaired or replaced: _____

Date(s) item(s) was/were last inspected: _____

Is this a recurring problem? When did it first occur? _____

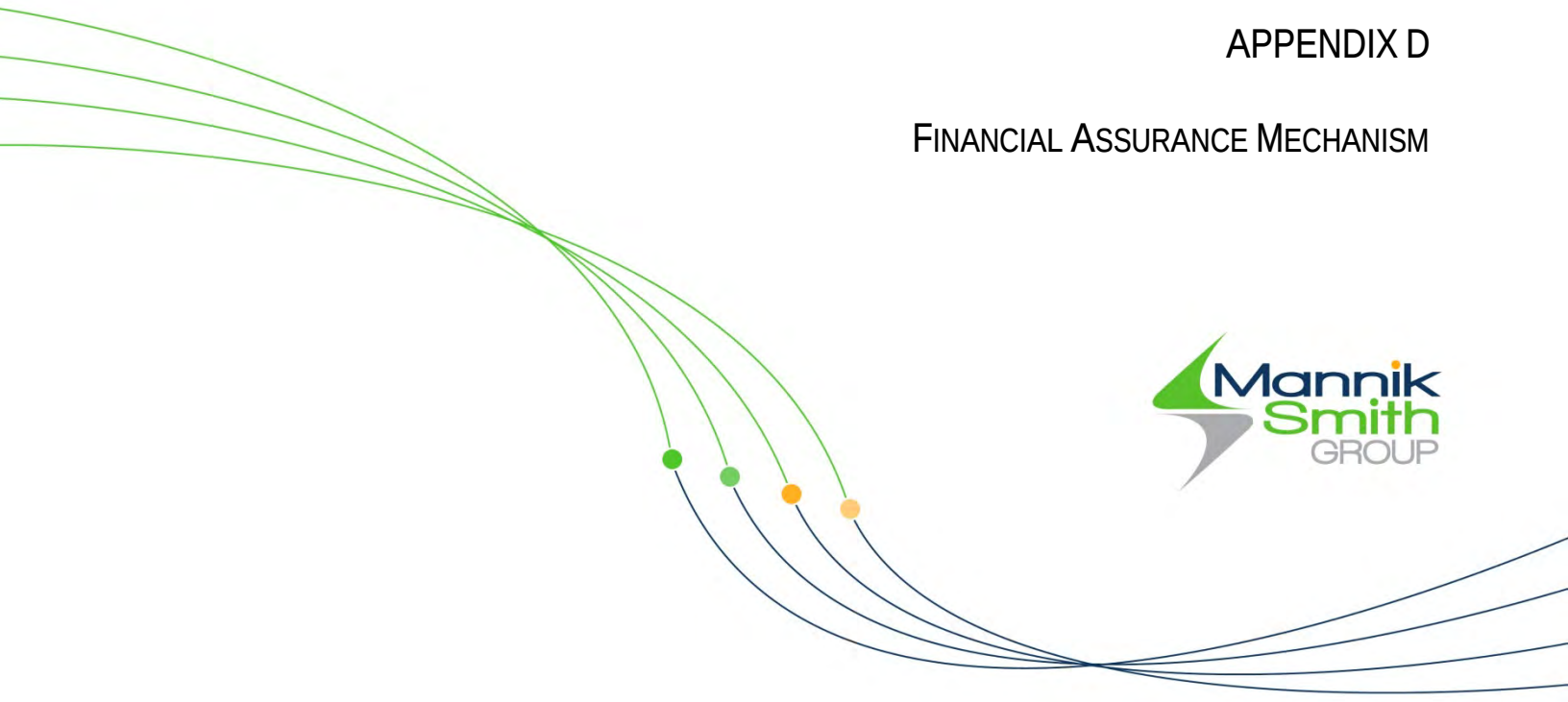
Describe in detail the repairs/corrections that have been made. Attach reports, plans sketches, photographs, or any other documentation as appropriate.

_____ _____

Inspector's Signature Client Representative's Signature

APPENDIX D

FINANCIAL ASSURANCE MECHANISM



pwc

Report of Independent Accountants

To the Management of Ford Motor Company:

We have audited, in accordance with generally accepted auditing standards, the financial statements of Ford Motor Company (the "Company") as of and for the year ended December 31, 2016 and have issued our report thereon dated February 9, 2017. We have not performed any auditing procedures since that date.

We have performed the procedures enumerated below, which were agreed to by Ford Motor Company and the Michigan Department of Environmental Quality (collectively the "specified parties"), solely to assist you with respect to the remittance of certain information requested by the specified parties. The Company is responsible for the preparation of information provided to the specified parties. This agreed-upon procedures engagement was conducted in accordance with attestation standards established by the American Institute of Certified Public Accountants. The sufficiency of these procedures is solely the responsibility of those parties specified in this report. Consequently, we make no representation regarding the sufficiency of the procedures described below either for the purpose for which this report has been requested or for any other purpose.

Mr. Bob Shanks, Ford Motor Company Executive Vice President and Chief Financial Officer, stated in a letter to the Michigan Department of Environmental Quality (the "Letter") that, at December 31, 2016 "Tangible net worth" was $28,922 million, "Total assets in the U.S." were $169,998 million, and the Company's assets "located in the U.S." were less than 90% of the total assets of the "firm."

We compared "Tangible net worth" of $28,922 million at December 31, 2016 in the Letter to a schedule prepared by the Company from its accounting records and found such amount to be in agreement. We compared the amounts on the schedule to corresponding amounts appearing in the Company's accounting records which are used as a basis for preparing the information contained in the Company's December 31, 2016 financial statements and found such amounts to be in agreement and recalculated the schedule. We make no comment, however, as to the appropriateness of how the Company defines "Tangible net worth."

We compared "Total assets in the U.S." of $169,998 million at December 31, 2016 in the Letter to corresponding amounts appearing in the Company's accounting records which are used as a basis for preparing the information contained in the Company's December 31, 2016 financial statements and found such amounts to be in agreement. We make no comment, however, as to the appropriateness of how the Company classifies its assets between the United States and other geographical locations.

We recalculated "Total assets in the U.S." as reported in the Letter as a percentage of total consolidated assets reported in the Company's audited financial statements included in the Company's Annual Report on Form 10-K for the year ended December 31, 2016, and found such amount to be less than 90% of the Company's total assets.

PricewaterhouseCoopers LLP, 500 Woodward Avenue, Detroit, MI 48226-1234
T: (313) 394 6000, F: (313) 394 6555, www.pwc.com/us

pwc

We were not engaged to and did not conduct an examination, the objective of which would be the expression of an opinion on the Letter. Accordingly, we do not express such an opinion. Had we performed additional procedures, other matters might have come to our attention that would have been reported to you.

This report is intended solely for the information and use of Ford Motor Company and the Michigan Department of Environmental Quality, and is not intended to be and should not be used by anyone other than these specified parties.

PricewaterhouseCoopers LLP

PricewaterhouseCoopers LLP
March 30, 2017

Ford Motor Company

The American Road
Dearborn, MI 48126

March 30, 2017

Ms. Heidi Grether, Director
Department of Environmental Quality
c/o Office of Waste Management and Radiological Protection
Hazardous Waste Section
P.O. Box 30241
Lansing, Michigan 48909

Dear Ms. Grether:

I am the Chief Financial Officer of Ford Motor Company, 1 American Road, Dearborn, Michigan (the "Company"). This letter is in support of the Company's use of the financial test to demonstrate financial capability as specified in Part 111, Hazardous Waste Management, of Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451), and its administrative rules, MAC R 299.9101 *et seq*.

1. The Company owns or operates the following facilities for which financial responsibility for liability coverage is being demonstrated through the financial test specified in R 299.9710(8): **None**

2. The Company guarantees, through the corporate guarantee specified in R 299.9710(9), liability coverage for the following facilities owned or operated by its subsidiaries: **None**

3. The Company owns or operates the following facilities for which financial assurance for closure or postclosure is demonstrated through the financial test specified in R 299.9709. The current closure and/or postclosure cost estimates covered by the test are itemized separately for each facility: **See Attached Exhibit A**

4. The Company guarantees, through the corporate guarantee specified in R 299.9709, closure and postclosure of the following facilities owned or operated by its subsidiaries. The current cost estimates for closure and postclosure so guaranteed are itemized separately for each facility: **None**

5. The Company owns or operates the following facilities for which financial assurance for corrective action is demonstrated through the financial test specified in R 299.9709. The current cost estimates for corrective action are itemized separately for each facility: **See Attached Exhibit B**

6. The Company guarantees, through a corporate guarantee conforming to the requirements specified in R 299.9709, corrective action for the following facilities owned or operated by its subsidiaries. The current cost estimates for the corrective action so guaranteed are itemized separately for each facility: **None**

7. In other states where the EPA is not administering the financial requirements of Subpart H of Title 40 of the Code of Federal Regulations (CFR), Part 264, the Company, as owner or operator or guarantor, demonstrates financial assurance for the closure or postclosure of the following facilities through the use of a test equivalent or substantially equivalent to the financial test specified in Subpart H of 40 CFR, Part 264. The current closure and/or postclosure estimates covered by such a test are itemized separately for each facility: **None**

8. In other states where the EPA is not administering the financial requirements of Subpart H of 40 CFR, Part 264, the Company, as owner or operator or guarantor, demonstrates financial responsibility for liability coverage for the following facilities through the use of a test equivalent or substantially equivalent to the financial test specified in Subpart H of 40 CFR, Part 264. The liability coverages covered by such a test are itemized separately for each facility: **None**

9. In other states where the EPA is administering the financial requirements of Subpart H of 40 CFR, Part 264, the Company, as owner or operator or guarantor, demonstrates financial assurance for the closure or postclosure of the following facilities through the use of the financial test specified in Subpart H of 40 CFR, Part 264. The closure and/or postclosure cost estimates covered by this test are itemized separately for each facility: **None**

10. In other states where the EPA is administering the financial requirements of Subpart H of 40 CFR, Part 264, the Company, as owner or operator or guarantor, is demonstrating financial responsibility for liability coverage for the following facilities through the use of the financial test specified in Subpart H of 40 CFR, Part 264. The liability coverages covered by this test are shown for each facility: **None**

11. In other states, the Company, as owner or operator or guarantor, is demonstrating financial assurance for corrective action for the following facilities through the use of a test equivalent or substantially equivalent to the financial test specified in Subpart H of 40 CFR, Part 264. The current corrective action cost estimates are itemized separately for each facility: **See Attached Exhibit C**

12. The Company owns or operates the following hazardous waste management facilities for which financial capability is not demonstrated either to the EPA or a state through the financial test or any other financial mechanism specified in Subpart H of 40 CFR, Part 264, or equivalent or substantially equivalent state mechanisms. Both the liability coverages and current closure and/or postclosure cost estimate amounts not covered by such financial assurance are itemized separately for each facility: **None**

13. The Company, as owner or operator or guarantor, is demonstrating financial assurance for plugging and abandonment as required under 40 CFR, Part 144, through the use of a financial test. The current plugging and abandonment cost estimates as required by

40 CFR, Section 144.62, are itemized separately for each Underground Injection Control (UIC) facility: **None**

14. The Company, as owner or operator or guarantor, is demonstrating financial assurance for closure, postclosure, and remedial action as required under Part 115, Solid Waste Management, of Act 451, or equivalent or substantially equivalent state or federal regulations, through the use of a financial test. The current closure, postclosure, and remedial action cost estimates are itemized separately for each solid waste management facility: **None**

15. The Company, as owner or operator or guarantor, is demonstrating financial responsibility for taking corrective action and for compensating third parties for bodily injury and property damage caused by accidental releases arising from the operation of petroleum underground storage tanks in accordance with 40 CFR, Part 280, or equivalent or substantially equivalent state regulations, through the use of a financial test. The amount of financial responsibility is itemized separately for each facility: **See Attached Exhibit D**

16. The Company, as owner or operator or guarantor, is demonstrating financial assurance for closure as required under 40 CFR, Part 761, or equivalent or substantially equivalent state regulations, through the use of a financial test. The closure costs are itemized separately for each commercial polychlorinated biphenyl (PCB) storage facility: **See Attached Exhibit F**

17. The Company, as owner or operator or guarantor, is demonstrating financial assurance for remediation costs under Part 201, Environmental Remediation, of Act 451, or equivalent or substantially equivalent state or federal regulations, by the use of a financial test. The remediation costs are itemized separately for each facility: **See Attached Exhibit E**

With this letter, I also am submitting the following items to demonstrate to DEQ that Ford meets the requirements for using the financial test as its financial assurance mechanism:

1. A copy of the independent certified public accountant's audited financial statement for the latest fiscal year for Ford;[1] and

2. A Report of the Independent Certified Public Accountant, which certifies its review of this letter and the Company's financial statements.

The Company is required to file a Form 10-K with the Securities and Exchange Commission (SEC) for the latest fiscal year. The Company's Annual Report on Form 10-K was filed with the SEC on February 9, 2017.

The fiscal year of the Company ends on December 31. The figures for the following items marked with an asterisk (*) are derived from this firm's independently audited, year-end financial statements for the latest fiscal year, ended on December 31, 2016.

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[1] "Total Assets in Michigan" includes real and tangible assets for the year 2015. This number resides on a schedule retained by the Ford Office of Tax Counsel and includes company cars, machinery and equipment, real estate, vehicle leases, and special tooling.

ALTERNATIVE II

1.	Sum of current closure and postclosure cost estimates for Michigan facilities (total of all cost estimates listed in paragraphs 3 and 4, above)	$8,224,900.00
2.	Sum of current closure and postclosure cost estimates for non-Michigan facilities (total of all cost estimates listed in paragraphs 7, 9, and 12, above)	$0
3.	Sum of other obligations covered by a financial test (total of all cost estimates listed in paragraphs 5, 6, 11, 13, 14, 15, 16, and 17, above) * Obligation in paragraph 16 is not added to the sum as it is also included in paragraph 17	$79,053,954.56
4.	Amount of annual aggregate liability coverage to be demonstrated (maximum aggregate for facilities listed in paragraphs 1, 2, 8, 10, and 12, above)	$0
5.	Sum of lines 1, 2, 3, and 4	$87,278,854.56
6.	Current rating of senior unsecured debt and name of rating service	Baa2 Moody's
7.	Date of issuance of bond	December 6, 2016
8.	Date of maturity of bond	December 8, 2026
*9.	Tangible net worth (if any portion of the closure or postclosure costs or other obligations covered by a financial test listed above is included in "total liabilities" on the firm's financial statements, then you may add that portion to this line)	$28,922 million
*10.	Total assets in the U.S.	$169,998 million
*11.	Total assets in Michigan excluding the value of land used for hazardous waste disposal	$26,525 million
*12.	Total assets in Michigan including the value of land used for hazardous waste disposal	$26,525 million

		YES	NO
13.	Is line 9 at least $10 million?	X	_
14.	Is line 9 at least 6 times line 5?	X	_
*15.	Are at least 90% of the firm's assets located in the U.S.? If not, complete line 16.	_	X
16.	Is line 10 at least 6 times line 5?	X	_

*17.	Is line 11 at least $50 million?	X	_
18.	Is line 12 at least 6 times line 1?	X	_

I hereby certify that the wording of this letter is identical to the wording in the letter specified by the Director of the Department of Environmental Quality for the financial test as such letter was specified on the date shown immediately below.

Bob Shanks
Executive Vice President &
Chief Financial Officer
Ford Motor Company

03/30/2017
Date

Note: Bob Shanks signs this letter on behalf of Ford. The matters stated in this letter are not within his personal knowledge; the facts stated in this letter have been assembled by authorized employees and counsel of Ford, and he is informed that these facts are true.

EXHIBIT A

Michigan Closure/Postclosure Matters Where Ford Utilizes the Financial Test

Site Name	Site Address	Oversight Agency	Governing Document	Docket No. / EPA ID No.	Financial Assurance Amount
Allen Park Clay Mine Landfill	17005 Oakwood Blvd. Allen Park, MI 48101	MDEQ	NREPA Part 111 Post-Closure; R299.9703	MID980568711	$421,900.00
Monroe Plant	3200 E. Elm Ave. Monroe, MI 48162	MDEQ	NREPA Part 111 Post-Closure; R299.9703	MID005057005	$5,169,000.00
Saline Plant	7700 E. Michigan Ave. Saline, MI 48176	MDEQ	Post Closure Plan	MID009305665	$2,634,000.00

EXHIBIT B

Michigan Corrective Action Matters Where Ford Utilizes the Financial Test for Itself

Site Name	Site Address	Oversight Agency	Governing Document	Docket No. / EPA ID No.	Financial Assurance Amount
Rouge Manufacturing Complex	2001 Miller Road Dearborn, MI 48121	MDEQ	Corrective Action Consent Order	MID087738431 WHMD Order No. 111-04-000	$12,850,000.00

EXHIBIT C

Non-Michigan Corrective Action Matters Where Ford Utilizes the Financial Test for Itself

Site Name	Site Address	Oversight Agency	Governing Document	Docket No. / EPA ID No.	Financial Assurance Amount
Former Ford Aero-Nutronic Facility, Newport Beach	1000 Ford Road Newport Beach, CA 92660	California Regional Water Quality Control Board, Santa Ana Region	40 CFR § 264/265	CAD041330077	$500,000.00

EXHIBIT D

UST Sites Where Ford Utilizes the Financial Test

Facility Name	Facility Address	City	State	ZIP	Number of USTs	Financial Assurance Amount
Ford Arizona Proving Grounds	20715 West Happy Valley	Whitmann	AZ	85361	1	$2,000,000.00
Chicago Assembly Plant	12600 South Torrence Avenue	Chicago	IL	60633	4	
Kentucky Assembly Plant	3001 Chamberlain Ln.	Louisville	KY	40241	2	
Louisville Assembly Plant	Fern Valley Road	Louisville	KY	40213	3	
Advanced Engineering Center	2400 Village Rd. Bldg. #774	Dearborn	MI	48121	1	
Allen Park Test Lab	1500 Enterprise Dr.	Allen Park	MI	48101	8	
Central Fuel Dispensing Sta.	1951 Village Road	Dearborn	MI	48121	2	
Climatic Wind Tunnel No. 3	20420 Oakwood Blvd.	Dearborn	MI	48121	4	
Dearborn Engine Plant	3001 Miller Rd.	Dearborn	MI	48121	7	
Driveability Test Facility	8000 Enterprise Drive	Allen Park	MI	48101	3	
Dynamometer Lab	1701 Village Road	Dearborn	MI	48121	18	
Flat Rock Assembly Plant	1 International Drive	Flat Rock	MI	48134	3	
Ford Land - Fairlane Plaza North	290 Town Center Drive	Dearborn	MI	48126	1	
Ford Land - Fairlane Plaza South	330 Town Center Drive	Dearborn	MI	48126	1	
Heat Octane & Roll Test Facility/ Environmental Wind Tunnels 4 & 5	20420 Oakwood Blvd.	Dearborn	MI	48212	2	
Michigan Assembly Plant	38303 Michigan Ave.	Wayne	MI	48184	2	
Michigan Proving Grounds	74240 Fisher Rd.	Romeo	MI	48065	14	
New Model Product & Dev.	17000 Oakwood Blvd.	Allen Park	MI	48101	6	
Powertrain Fuel & Subsystems Lab	21200 Donaldson Ave.	Dearborn	MI	48121	3	
Test Track Tank Farm	20400 Oakwood Blvd	Dearborn	MI	48121	8	
Rawsonville Plant	McKean & Textile Roads	Ypsilanti	MI	48197	2	
Romeo Engine Plant	701 E. 32 Mile Rd.	Romeo	MI	48065	2	
Scientific Research Labs	2101 Village Rd.	Dearborn	MI	48121	5	
Vreeland Road Quality Center	22400 Vreeland Road	Woodhaven	MI	48183	2	
Wayne Assembly Plant	37625 Michigan Ave.	Wayne	MI	48184	4	
Wixom Assembly Plant	28801 Wixom Ave.	Wixom	MI	48393	2	
Woodhaven Stamping Plant	20900 West Road	Woodhaven	MI	48183	1	
Twin Cities Assembly Plant	966 S. Mississippi River Blvd.	St. Paul	MN	55116	2	
Kansas City Assembly Plant	U.S. Highway 69	Claycomo	MO	64119	14	
Lima Engine Plant	1155 Bible Rd.	Lima	OH	45801	3	
Ohio Assembly Plant	650 Miller Road	Avon Lake	OH	44012	2	
Sharonville Transmission Plant	3000 Sharon Rd.	Sharonville	OH	45241	14	
Walton Hills Stamping Plant	7845 Northfield Rd.	Walton Hills	OH	44146	1	

EXHIBIT E

Other Matters Where Ford Utilizes the Financial Test

Site Name	Site Address	Oversight Agency	Governing Document	Docket No. / EPA ID No.	Financial Assurance Amount
Butler Mine Tunnel	Susquehanna River Pittston Township, PA 18640	EPA Region 3	CERCLA Consent Decree	M.D. Pennsylvania; Civil Action No. 3:CV00-1912; PAD980508451	381,640.00
Cam-Or Superfund Site	NW Corner SR 2 and US 421 Westville, IN 46391	EPA Region 5	CERCLA Consent Decree	N.D. Indiana; Civil Action No. 3:10-cv-00532; IND005480462	488,732.33
Fons/Old Wayne Landfill	1657 MacGregor Road Ypsilanti Twp., MI 48198	MDEQ	Agreement for a Limited Industrial Remedy	LANDUSE-ERD-97-018	4,245,987.34
Ford-Kingsford Products Facility	The City of Kingsford Kingsford, Dickinson County, MI	MDEQ	Consent Judgment/ RAP/Part 201	Case No. 07-1427-CE	1,000,000.00
Forest Waste Products Superfund Site	8359 E. Farrand Road Otisville, MI 48463	EPA Region 5	CERCLA Consent Decree	E.D. Michigan Docket No. 94-40462; MID980410740	567,105.13
G&H Landfill	3160 23 Mile Rd Utica, Michigan 48316	EPA Region 5	CERCLA Consent Decree	E.D. Michigan; Civil Action No. 92-CV-75460; MID980410823	40,000,000.00
Hertel Landfill Superfund Site	Route 44/55 Bedell Avenue and Tuckers Plattekill NY 12568	EPA Region 2	CERCLA Partial Consent Decree	N.D. New York Civ. Action No. 94-CV-1247; NYD980780779	1,019,591.00
Krejci Dump Site	814 W Hines Hill Rd Boston Heights, OH 44264	Department of Interior	CERCLA Partial Consent Decree	N.D. Ohio Civ. Action No. 5:97 CV-00894; OHD981785074	1,500,000.00
Lammers Barrel Superfund Site	East Patterson & Grange Hill Beavercreek, OH 45385	EPA Region 5	CERCLA Consent Decree	S.D. Ohio, Docket No. 3:14-cv-00032-WHR; OHD981537582	362,682.51
OU-2 of the Lake Calumet Cluster Site	2200 East 119th Street Chicago, IL 60617	EPA Region 5	Administrative Settlement Agreement and Consent Decree	CERCLA Docket No. V-W-13-C-013; ILD000716852	87,069.00
Metamora Landfill Site	1636 Dryden Road, Metamora MI 48455	EPA Region 5	CERCLA Consent Decree	E.D. Michigan Docket No. 91-CV-40320-FL; MID980506562	431,914.00
Organic Chemical Superfund Site	3921 Chicago Drive, S.W. Grandville, Michigan 49418	EPA Region 5	CERCLA Consent Decree	E.D. Michigan; Civil Action No.1:99-CV-428; MID990858003	600,000.00
Rasmussen Dump Site	9040 Spicer Road Brighton, MI 48116	EPA Region 5	CERCLA Consent Decree	E.D. Michigan Docket No. 92-40071; MID095402210	67,000.25
Ringwood Mines/Landfill	Peters Mine Road Ringwood Borough, New Jersey 07456	EPA Region 2	Administrative Settlement Agreement and Order on Consent	CERCLA Docket No. 02-2014-2025; NJD980529739	2,400,000.00
Raisin River 2	Monroe, Michigan	EPA Region 5	April 2016 EPA-Approved Long Term Monitoring and Maintenance Plan	EPA Regulations (40CFR 761) EPA ID: MID 005057005	1,470,831.00
Tibbets Road	23 Tibbetts Road Barrington, New Hampshire 03825	EPA Region 1	CERCLA Consent Decree	Civils Action Nos. c-91-120-S and c-91-194-S; EPA ID: NHD 989090469	3,680,402.00
Willow Run Creek Area	877 Willow Run Drive Van Buren Township, MI 48111	MDEQ	Consent Judgment/ RAP/Part 201	Case No. 95-79987-CE	5,401,000.00

EXHIBIT F

Polychlorinated Biphenyl (PCB) Closure Matters Where Ford Utilizes the Financial Test for Itself

Site Name	Site Address	Oversight Agency	Governing Document	Docket No. / EPA ID No.	Financial Assurance Amount
Willow Run Creek Area	877 Willow Run Drive Van Buren Township, MI 48111	MDEQ	Consent Judgment/ RAP/Part 201	Case No. 95-79987-CE	5,401,000.00

Note: The Site is also included in Exhibit E

Environmental Quality Office
Sustainability, Environment & Safety Engineering

Fairlane Plaza North, Suite 800
290 Town Center Drive
Dearborn, MI 48126 USA

March 30, 2017

VIA EMAIL AND FEDERAL EXPRESS

Mr. Daniel Dailey
Hazardous Waste Section
Office of Waste Management and Radiological Protection
Michigan Department of Environmental Quality
525 W. Allegan, 4th Floor South
Lansing, MI 48933

Re: Financial Assurance
Saline Plant
Monroe Plant
Allen Park Clay Mine Landfill
Rouge Manufacturing Complex

Dear Mr. Dailey:

Please find enclosed the original letter from Bob Shanks, Executive Vice President and Chief Financial Officer of the Ford Motor Company (Ford), constituting Ford's submission of financial assurance for the above mentioned sites. I have enclosed the Report of Independent Accountants, and Ford Motor Company's 2016 Annual Report on Form 10-K can be obtained at

https://www.sec.gov/Archives/edgar/data/37996/000003799617000013/f1231201610k.pdf

If you have any questions, or would like to discuss further, please don't hesitate to contact me at 313.322.5470, or via e-mail at mzakkar@ford.com.

Sincerely,

Mohamed Zakkar
Environmental Engineer

Cc Bradley Ermisch, MDEQ

Enclosures

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

C. HEIDI GRETHER
DIRECTOR

May 18, 2017

Mr. Mohamed Zakkar
Ford Motor Company
Environmental Quality Office
290 Town Center Drive, Suite 800
Dearborn, Michigan 48126

Dear Mr. Zakkar:

SUBJECT: In Compliance Determination; Financial Assurance for Postclosure Care and Corrective Action; Ford Motor Company;
Monroe Plant, Monroe, Michigan; MID 005 057 005;
Saline Plant, Saline, Michigan; MID 009 305 665;
Allen Park Clay Mine Landfill, Allen Park, Michigan; MID 980 568 711;
Rouge Manufacturing Complex, Dearborn, Michigan; MID 087 738 431

On May 15, 2017, the Michigan Department of Environmental Quality (MDEQ), Waste Management and Radiological Protection (WMRPD), conducted a financial record review (FRR) of the Ford Motor Company's (Ford) March 30, 2017, submittal in support of Ford's use of a financial test to demonstrate financial capability for postclosure care or corrective action at the subject facilities. Ford's establishment of financial assurance is required by Part 111, Hazardous Waste Management, of Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, and its administrative rules, Part 7, Financial Capability; the Monroe Plant November 28, 2007, Hazardous Waste Management Facility Postclosure Operating License; the Saline Plant Postclosure Plan approved May 18, 2007; the Allen Park Clay Mine Postclosure Plan approved September 30, 2007; and the Rouge Manufacturing Complex May 1, 2000, Corrective Action Consent Order WHMD No. 111-04-00, as amended.

Based on the FRR, the WMRPD hereby determines that Ford is in compliance with the Part 111 financial assurance requirements for the subject facilities.

If you have any questions, please contact me at 517-284-6574; tysonk@michigan.gov; or MDEQ, WMRPD, P.O. Box 30241, Lansing, Michigan 48909-7741.

Sincerely,

Kimberly M. Tyson

Kimberly M. Tyson, P.E.
Environmental Engineer Specialist
Hazardous Waste Section
Waste Management and Radiological
Protection Division

cc: Mr. Chuck Pinter, Ford
Ms. Colleen Lindell, Ford
Ms. Lynn Tucker, Ford
Mr. Brad Ermish, MDEQ
Mr. Pete Quackenbush, MDEQ
HWS/C&E Files

APPENDIX E

POST-CLOSURE COST ESTIMATE

Ford Motor Company
Monroe, Michigan Plant
Surface Impoundment Closure Project
Post-Closure Cost Estimate (Year 2017)
MID 005 057 005

YEARS 18 TO 30

Work Item		Annual Cost
1.0	**Post-Closure Cost Estimate** Yearly	$1,000
2.0	**Site Inspections** Weekly, Monthly, Semi-Annual and Annual	$52,000
3.0	**Inspection, Maintenance and Leachate Monitoring Report** Yearly	$6,500
4.0	**Independent Registered Professional Engineer Post-Closure Care Certification** Yearly	$500
5.0	**Cover Survey** Every 5 Years	$5,000
6.0	**Cover Erosion Repair and Reseeding** Estimate of 1.0 acre per year	$10,000
7.0	**Access Road Maintenance** 200 LF gravel and grade yearly	$5,000
8.0	**Effluent Monitoring** Lump Sum per Quarter plus ECU/WCU/SCU every 5 years	$6,000
9.0	**SCU Sampling and Management** Annually, or as needed, leachate treated through on-site WWTP	$1,000
10.0	**LCRS Pipe Cleaning and Integrity Verification** Yearly	$12,000
11.0	**Groundwater Monitoring** Semi-Annual Sampling; Quarterly Hydraulic Monitoring	$64,000
12.0	**Monitoring Well Maintenance** Yearly	$2,675
13.0	**Vegetative Cover Grass Cutting** Yearly	$4,800
14.0	**Waste Water Treatment Plant Operation** Yearly	$88,000
	Total Estimated Annual Post-Closure Cost (years 18 to 30)	$258,475
	Total Estimated Post-Closure Costs (years 18 to 30)	$3,360,175
	$258,475 earning interest @ 5% annual interest	$12,924
	Financial Assurance = $258,475 x 20 years	$5,169,500

Note: Excludes Groundwater or Soils Investigation associated with the on-site Solid Waste Management Units

ATTACHMENT A12

COST ESTIMATES
THE MANNIK & SMITH GROUP, INC.

Ford Motor Company
Monroe, Michigan Plant
Surface Impoundment Closure Project
Post-Closure Cost Estimate (Year 2017)
MID 005 057 005

YEARS 18 TO 30

Work Item		Annual Cost
1.0	**Post-Closure Cost Estimate** Yearly	$1,000
2.0	**Site Inspections** Weekly, Monthly, Semi-Annual and Annual	$52,000
3.0	**Inspection, Maintenance and Leachate Monitoring Report** Yearly	$6,500
4.0	**Independent Registered Professional Engineer Post-Closure Care Certification** Yearly	$500
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	Total Estimated Annual Post-Closure Cost (years 18 to 30)	$258,475
	Total Estimated Post-Closure Costs (years 18 to 30)	$3,360,175
	$258,475 earning interest @ 5% annual interest	$12,924
	Financial Assurance = $258,475 x 20 years	$5,169,500

Note: Excludes Groundwater or Soils Investigation associated with the on-site Solid Waste Management Units

ATTACHMENT A13

TOPOGRAPHIC MAP
THE MANNIK & SMITH GROUP, INC.

TOPOGRAPHIC MAP

See Attachment II

ATTACHMENT A14

LIABILITY MECHANISM
THE MANNIK & SMITH GROUP, INC.

LIABILITY MECHANISM

Not applicable.